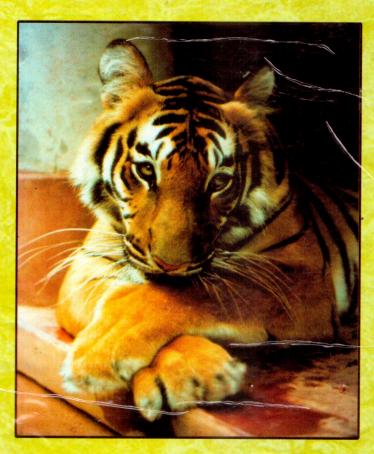


GOVERNMENT OF ODISHA FOREST DEPARTMENT

# TIGER CONSERVATION PLAN

OF SIMILIPAL TIGER RESERVE, ODISHA

(2013-14 TO 2022-23)



Prepared by:

Dr. Anup Kumar Nayak, IFS

Field Director, Similipal Tiger Reserve cum Regional Chief Conservator of Forests, Baripada



### GOVERNMENT OF ODISHA FOREST DEPARTMENT

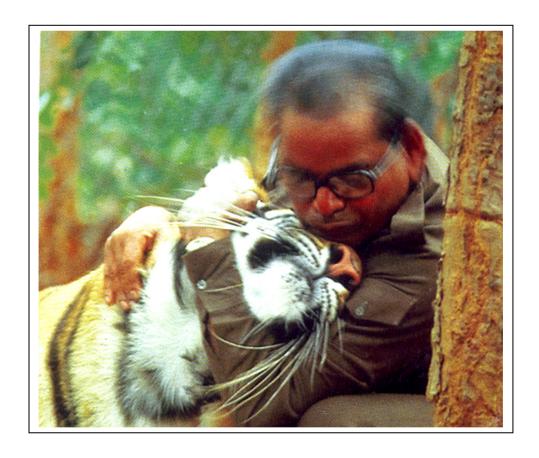
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This Plan is dedicated to Late Padmashree S. R. Choudhury, the founder Field Director of Similipal Tiger Reserve and premier wildlife biologist of India.

Author.



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## F. No. 1-14/2011-NTCA (Part I) Government of India Ainistry of Environment Forest and Clima

Ministry of Environment, Forest and Climate Change National Tiger Conservation Authority

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Dated: 31st December 2014

То

The Chief Wildlife Warden, Government of Odisha, Bhubaneshwar

Sub: Approval of Tiger Conservation Plan (TCP) for the Similipal Tiger Reserve - reg.

Reference : 1. Comments of this Authority communicated vide letter no. 1-8/2012-NTCA dated 5.7.13 P-3622. Comments of this Authority on delineation of corridors vide letter no. 1-8/2012-NTCA dated P-44016.5.14

Sir,

The draft Tiger Conservation Plan (TCP) prepared by the State of Odisha for Similipal Tiger Reserve, under sub-section (3) of section 38V of Wildlife (Protection) Act, 1972, was submitted to this Authority requesting for approval under section 38O (1) (a) of the said Act.

After examination of the said TCP by the Expert Committee of the NTCA constituted for the purpose, observations of NTCA/ Experts were communicated to the Chief Wildlife Warden (Odisha) & the Field Director, Similipal Tiger Reserve, for their incorporation in the TCP.

In this context, I am directed to say that further to the compliance furnished by the State Government and based on the recommendation of the technical committee, approval of the NTCA is hereby granted for the TCP of Similipal Tiger Reserve for the period from 2013-14 to 2022-23, under section 38O (1) (a) of the Wildlife (Protection) Act, 1972, subject to following conditions:

- a. No deviation shall be made from the prescriptions of the TCP, read with conditions stipulated here-in, without prior approval of the NTCA u/s 38O (1) (a) of Wildlife (Protection) Act, 1972.
- b. The approved TCP shall have a provision for mid-term review corresponding to the proposed period of the plan, for appropriate mid course alteration, if any, as required.
- c. The State Government shall comply with the guidelines and advisories issued by the NTCA/ Project Tiger from time to time and the commitments made in the tripartite Memorandum of Understanding (MoU).
- d. Since the core/ critical tiger habitat has the status of a National Park/ Wildlife Sanctuary, all provisions under Chapter IV of Wildlife (Protection) Act, 1972 would be applicable to such areas, in addition to sections 51 (1C), (1D) and 55 (ab), (ac).
- e. At no stage of implementation of various prescriptions of the TCP relating to the tiger reserve, shall overrule the provisions of:
  - i. The Wildlife (Protection) Act, 1972
  - ii. The Indian Forest Act, 1927
  - iii. The Biological Diversity Act, 2002
  - iv. The Environment (Protection) Act, 1986
  - v. The Forest (Conservation) Act, 1980
  - vi. The National Forest Policy, 1988

469.

- vii. The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006
- viii. Directives issued from time to time by Honourable Supreme Court of India
- f. The NTCA reserves right to review, modify and withdraw this approval at any time, if any of the conditions of approval are violated.
- g. The following need to be ensured while executing forestry operations in the buffer area of the tiger reserve:
  - i. To ensure minimum 'patch disturbance' and minimum human-wildlife conflicts, forestry operations should be restricted only in those coupes which are due for the current year.
  - ii. Compliance of section 38V (2) of the Wildlife (Protection) Act, 1972 should be strictly ensured.
  - iii. No working or camping should be permitted in the area after sunset.
  - iv. Daily monitoring of the tiger movement, water points and cattle kill should be done and recorded.
- g. The Tourism activities should be strictly managed/ regulated as per the comprehensive guidelines issued by the NTCA under section 38O (c) of the Wildlife (Protection) Act, 1972 vide letter dated 15/10/2012.

Yours aithfully,

(Dr. H.S.Negi) Inspector General of Forests (NTCA)

### Copy to:

1. The Principal Secretary of Forests, Government of Odisha, Bhubaneshwar

2. Addl. Principal Chief Conservator of Forests (Central)A/3, Chandersekharpur, Bhubaneswar-751023

3. The Inspector General of Forests (NTCA), Regional Office, Guwahati

4. The Field Director, Similipal Tiger Reserve, Odisha for necessary action and information please.

### **PREFACE**

Similipal Tiger Reserve, covering an area of 2750 sq km of forest lying on the South Eastern corner of Deccan Peninsula in the Mayurbhanj District of Odisha, is one of the largest tracts of contiguous forest with immeasurable ecosystem service values. It forms the largest watershed of northern Odisha. The rich diversity of habitats and mosaic of landscapes also supports a fascinating floral and faunal composition. The Government have dedicated such a vast forest, to fulfil the commitment of protection and conservation of biodiversity and wildlife. Once an exclusive hunting preserve of the Maharajas of Mayurbhanj, Similipal today is the beacon of conservation. Similipal is among the first 9 tiger reserves of India declared in 1973 under Project Tiger. After amendment of Wildlife Protection Act in 2006, it is a statutory requirement to have a Tiger Conservation Plan for the area as per guidelines issued by the National Tiger Conservation Authority.

The last Tiger Conservation Plan for Similipal Tiger Reserve was written by Sri R. N. Reddy for the period from 2008-09 to 2012-13. The present plan have been prepared for a period of 10 years from 2013-14 to 2022-23.

The format and write up of this plan have been based on the Guide to Planning Wildlife Management in Protected areas and managed Landscapes by V.B. Sawarkar as well as Guidelines for preparation of Tiger Conservation Plan issued by National Tiger Conservation Authority, MoEF, Government of India. The plan has incorporated following important interventions as per the NTCA guidelines.

- Appropriateness and adequacy of critical tiger habitat
- Protection strategies
- Monitoring Tiger, its co-predators, prey and their habitat

### **ACKNOWLEDGEMENT**

The author is sincerely thankful to National Tiger Conservation Authority for their technical guidance and financial support for writing the Plan, particularly to Dr. Rajesh Gopal IFS, ADGF & Member Secretary, NTCA and Dr. H. S. Negi IFS, IGF, NTCA for their valuable suggestions given during their visit to Similipal Tiger Reserve.

I am thankful to Shri J. D. Sharma IFS, Principal Chief Conservator of Forests, Odisha and ex-CWLW, Odisha and Shri S. S. Srivastava IFS, Principal Chief Conservator of Forests (Wildlife) and Chief Wildlife Warden, Odisha for their constant guidance and very useful inputs provided by them at every stage for writing this Plan. I am also thankful to Sri P. N. Padhi, IFS, Ex-Principal Chief Conservator of Forests, Odisha for his encouragement to write the Plan.

My thanks are also due to Sh Bikash Ranjan Dash, OFS-I (SB) ,Deputy Director, Similipal Tiger Reserve and S. Md. T. Rahman OFS-I (SB) ,Deputy Director (Tourism & Research), without their support and suggestions the plan would never have been completed. Sh Dash particularly has played a pivotal role in giving a shape to the whole plan apart from contributing a lot in writing the plan for the core area. Sh Rahman has contributed a lot in collecting tons of data for writing the plan for the buffer area.

The field problems of Similipal Tiger Reserve would not have been projected properly without information and suggestion provided by Sri Bijay Kumar Panda, OFS-I (SB), Ex-Divisional Forest Officer, Baripada Division, Sri Sanjay Kumar Swain IFS, Divisional Forest Officer, Baripada Division, Sri Ashish Kumar Behera OFS-I (SB), Divisional Forest Officer, Karanjia Division and Sri Arun Kumar Swain OFS-I (SB), Divisional Forest Officer, Rairangpur Division, Sri H. B. Udgata, OFS-I (SB), Divisional Forest Officer, Balasore WL Division and Sri Sangram Keshari Behera. IFS, Divisional Forest Officer, Keonjhar WL Division. I am thankful to all of them.

Ms Anshupragyan Das, OFS-I (JB), Asst. Conservator of Forests, Similipal Tiger Reserve and Sh Narendra Kumar Naik, OFS-I (JB), Asst Conservator of Forests, Similipal Tiger Reserve have provided necessary assistance in design, layout and printing of the Plan as per the template.

My special thanks are also due to Dr P. S. Easa, Scientist, KFRI, Peechi for his contributions and valuable suggestions during his trips to Odisha on various occasion.

I am thankful to stakeholders like EDC members, revenue and police officials, other line department officials, PRI members, and NGOs for providing valuable suggestions during various meetings held with them from time to time. I am extremely thankful to the field staff of Similipal Tiger Reserve who provided all the field data for the plan.

My thanks are also due to Dr Pratyush Kumar Mahapatra, Sh Sandeep Mishra ,Sh Satya Ranjan Behera and Truptirekha Kar, Research Assts for analyzing the data collected during ongoing projects in Similipal.

I am very much thankful to the staff of my office for providing available data and information required for writing this plan. Thanks are also due to late Dillip Kumar Jena, Range Officer of this office for arranging all the logistics during the entire period of plan preparation till the plan getting the final shape.

I cannot forget the contribution of Sri Prabir Kumar Palei, Retd. Range Officer in providing valuable inputs for the plan from his long experience of working in Similipal Tiger Reserve.

I am also thankful to Sri Dharani Dhara Mohakud , Sujit Kumar Das and Sri Manish Kumar Bakshi, GIS Analyst who have taken pains in tirelessly typing, correcting and completing the Plan in time.

Last, but not the least, I am sincerely thankful to all ,whose names have not been specifically mentioned but are of any kind of help and are associated, directly or indirectly, in completing the Tiger Conservation Plan.

(ANUP KUMAR NAYAK)
Field Director, Similipal Tiger Reserve cum
Regional Chief Conservator of Forests, Baripada

### **EXECUTIVE SUMMARY**

Historically, wildlife managers took a restricted view of wildlife and focused primarily on game species of interest to hunters because revenue from hunting products and services provided the main funding source for program development and land acquisition. In the past several decades, ecosystem management has come to the forefront as the paradigm for modern land management. Wildlife management in an ecosystem management context is the management of rare and common habitats and animal populations for multiple uses at multiple scales to achieve ecosystem integrity and sustainable use of available resources. Management in this approach must embrace human use and employ methods to preserve, conserve, enhance, restore, and manage species and habitats. As such, the historic and current definitions of wildlife management are integrated with ecosystem management to meet the needs of society. Drastic landscape level alterations have substantially changed the potential carrying capacity for many species from historic times. Current problems including habitat loss and degradation, fragmentation of habitats, the spread of exotic floral and faunal species, pollution, and human disturbance among others, are all contributing to loss of species diversity and abundance. Wildlife management plans are essential for properly managing wildlife habitats, population, and associated recreational activities. A management plan is a description of the short-term objectives and long-term goals that will be met by manipulation of habitat, wildlife populations, and people and how these objectives and goals will be reached. Historically, management plans have focused primarily on increasing abundance of game species and maximizing recreational opportunities associated with these species. Currently, management plans address threatened and endangered species and habitats, species that are not classified as rare, overall biodiversity, and quality and abundance of game species populations. Management objectives are targeted towards restoring native habitats; removing invasive, exotic species; protecting habitats for rare species; conserving and providing habitat for birds, small mammals, and herpetofauna; increasing the abundance of other species; providing public recreational opportunities. These plans should be biologically feasible and should result in the maintenance and enhancement of wildlife populations and habitats.

The plan shall have to address a range of issues in a holistic manner including protection of the tiger reserve; provision of site-specific habitat inputs for a viable population of the tigers, co-predators and prey animals without distorting the natural prey-predator ecological cycle in the habitat; delineation of dispersal pathways and corridors and ensuring that adjoining forest divisions have forestry operations compatible to tiger conservation. In addition, the plan shall also ensure the agricultural, livelihood, developmental and other interests of the people living in tiger bearing forests or tiger reserve.

As per provisions under Wildlife (Protection) Act, 1972 amended 2006, each Tiger Reserve should have a Tiger Conservation Plan. National Tiger Conservation Authority have also issued guidelines for preparation of Tiger Conservation Plan. Thus, an attempt is made in this conservation plan to summarise the existing situation, analyse the potentials and challenges and suggest steps that should be adopted for long-term survival of the forest ecosystem in the Similipal landscape.

Similipal Tiger Reserve, covering an area of 2750 sq km of forest lying on the South Eastern corner of Deccan Peninsula in the Mayurbhanj District of Odisha, is one of the largest tracts of contiguous forest with immeasurable ecosystem service values. It forms the largest watershed of northern Odisha. The rich diversity of habitats and mosaic of landscapes also supports a fascinating floral and faunal composition.

The vast terrain of Similipal with wide altitudinal, climatic and topographic variations, criss-crossed by large number of perennial streams, harbours a unique blend of Western Ghats, Eastern Ghats and Sub-Himalayan plant species. The floristic composition indicates a connecting link between South Indian and North Eastern Sub-Himalayan Species. The landscape supports more than 1352 plant species with 94 species of orchids of which three species are endemic. It is also the home of some endemic cultivars and aquatic grass species. It houses 7 % of the flowering plants and 8% orchids of India. Similipal comes under Deccan Peninsular Bio-geographic Zone, Chhotanagpur Province and Mahanadian Region. Forest is predominantly moist mixed deciduous forest with tropical semi-evergreen forest in areas with suitable microclimatic conditions and sporadic patches of dry deciduous forests and grasslands. Some patches of old plantations of tropical pines and Eucalyptus are also present. The rich diversity of habitats and mosaic of landscapes with wide altitudinal and climatic variation of Similipal supports a fascinating faunal composition. There are 55 species of mammals, 361 species of birds, 62 species of reptiles, 21 species of amphibians and many species of insects and micro fauna. Similipal Tiger Reserve is having the largest number of source population of tiger and one-fourth of total elephant population of Odisha. It is also the only home of unique melanistic tiger. Similipal Tiger Reserve is also having a rich history of conservation. It is also famous for Padmashree Late Saroj Raj Chowdhury, its founder Director and the tigress "Khairi", his foster daughter. Similipal has come under the Global Network of Biospheres from 2009.

Protection of this vast and unique habitat is the major challenge in front of the Park Managers. The major threat to Similipal is the vastness of the area and high anthropogenic pressure coming from 68 villages situated within the park and about 1200 villages in the surroundings. The area is dominated by tribal who are born hunters. They have a unique tradition of mass hunting called *Akhand Shikar* which poses a serious threat to the animal population of the park. The situation is aggravated with intrusion of poachers from adjoining Jharkhand area who instigate local tribal for elephant poaching.

While the core area is managed by Field Director assisted by a Deputy Director, three territorial DFOs are having jurisdiction over the buffer area of the park. Coordination between core and buffer staff is an important aspect of strengthening protection mechanism of the park.

In March & April, 2009 the park witnessed unprecedented devastation due to a series of naxalite attack followed by rampant poaching, tree felling and damage of infrastructures by opportunistic neighbouring villagers. All the protection camps remained vacant after the attack for about a year and the park was open to all types of ravages. This resulted in drastic reduction in prey base of large carnivores and also depletion in vegetation with selective felling of *Bija*, sal and *Sissoo* trees.. The morale of the staff was at its lowest. The efforts on the part of the park authorities in overcoming the above threats resulted in gradual restoring normalcy and strengthening protection of the park with visible impact.

The last Management Plan for Similipal Tiger Reserve was written by Sri R. N. Reddy for the period 2008-09 to 2012-13. The present plan has been prepared for the period from 2013-14 to 2022-23, for a period of 10 years.

### **Objective of the tiger Conservation Plan**

The objective of this plan is protection of the Similipal Tiger Reserve by providing site specific habitat inputs based on sound principles of natural resource management and developing framework for compatible land use in the adjoining area.

### **The Planning Process**

The process of preparation of this plan is:

- 1. Assessment of the existing situation of the area including its importance for tiger conservation, effectiveness of the current protection and management strategies, the risks or threat perception, the number of competing interests, the level of stakeholders' involvement and the issues arising from outside the Tiger Reserve.
- 2. Setting up of realistic management goals and objectives for the Tiger Reserve based on these baseline information and problem analysis for achieving the objectives.
- 3. Evolving strategies for achieving the objectives basing on sound planning principles.
- 4. Prescribing monitoring and evaluation mechanism for measuring performance and taking corrective actions necessary to achieve planned results.

While preparing the plan the essentials of the suggested inputs have been developed basing on:

➤ Past management plans written for the area, history of management based on those plans and their implications.

- ➤ Various research documents of the experts and scientists of the studies conducted in the park on various subjects of conservation and general literatures available on the related subjects.
- ➤ Best practices of wildlife management followed in other Protected Areas of the country and outside.
- ➤ Views emerged during consultation with various stake holders regarding protection and other issues relating to Similipal.

### **Components of the Tiger Conservation Plan**

The Tiger Conservation Plan has three major components to address three different areas: core, buffer and indicative plan for corridors and connectivity. The different components and sub-components are described briefly below.

The entire Critical Tiger Habitat over 1194.75 km² have been brought under the Core Area Plan. While the old core area (Proposed National Park) over 845.70 km² is under direct control of the Field Director, three territorial Divisions namely, Baripada, Karanjia and Rairangpur are having jurisdiction over the balance 349 km² of the Critical Tiger Habitat and the entire buffer area of 1555.3 km² Proposal have been submitted to bring the entire CTH under the direct control of the field Director.

There were 4 revenue settlements in side the core area out of which one village and the two settlements have been completely relocated. Process is going on for relocation of other three villages.

The objective of the management of core area is to keep the area completely inviolate with very minimal intervention. Accordingly the area has been divided to three zones, i.e, 1. Fully inviolate Zone, 2. Restoration Zone (revenue villages after relocation to be developed as meadows) and 3. Eco-tourism Zone.

Similarly the buffer area has been divided into 4 zones namely, 1.Traditional Use Zone, 2. Eco- tourism Zone, 3. Eco-development Zone, 4. Biodiversity Conservation Zone.

A Security Plan as a theme plan of protection has been elaborately prepared for the entire Tiger Reserve. The highlights are:

- 1. Extensive patrolling on foot has been given importance in the plan
- 2. Revisiting of the location of anti poaching camps and proposal for relocating the camps to the periphery for keeping the core undisturbed.
- 3. Special strategies for monsoon patrolling and prevention of Akhand Shikar
- 4. Intra Divisional coordination and coordination with police for joint patrolling strategy.

- 5. Intelligence gathering with involvement of EDCs
- 6. Establishment of a Court liaison unit
- 7. Creation of Special Tiger Protection Force consisting of 108 armed Forest Guards, 3
  Range Officers and 1 ACF with all infrastructures.
- 8. Raising of a dog squad for detection of poisoning spots and search operation of wild animal articles.
- 9. Strengthening of infrastructure and capacity building programme for staff

Strategy for forest fire control and prevention has been prepared elaborating the duties and responsibilities at all level.

Maintenance of boundary is an important component of management. The core boundary is demarcated with paintings on trees. Where the core boundary coincides with village boundary masonry pillars have been proposed to prevent encroachment. Entire boundary will be digitized. The buffer boundary pillars will be restored and pillar position will be digitized.

The habitat management aiming at a good prey base, supporting viable population of tiger and co-predators is the main objective of the theme plan. The main component is the grassland management. There are very few open spaces like meadows and grasslands available for herbivores. They cover hardly 2% of the area. The present tiger density is less than the predicted tiger density or carrying capacity of Tigers in STR .Unless maintained regularly there will be invasion of woody species. Proposal has been made for mapping of the meadows and regular maintenance.

Staff housing facilities for the frontline staff is very poor in the reserve. As the inaccessible and remote location of their headquarters are not suitable for keeping families and providing education to their children proposal for group housing outside the reserve for family accommodation of the field staff have been proposed.

The extensive research inputs on Ecological, Biological and Socio-Economic parameters are urgently required for sound PA management and bio-diversity conservation has been proposed. The wildlife training is a most crucial agenda of the management. The challenging wildlife conservation scenario today requires committed wildlife managers who possess scientific competence and social awareness aided by communication skills. They also need sharp detection and enforcement capabilities against organised criminal elements nursed by big-money illegal trade. Accomplished wildlife biologists and social scientists are also necessary. Frontline staff equally must have similar skills at the grassroots level. The current capacity building and personnel planning and management measures need to be greatly strengthened to meet these challenges. Therefore the training programmes aimed at

upgrading the skill levels to the staff to match these challenges have to be part of routine rather than exception.

The tiger population management and monitoring is the most challenging task of the frontline staff and field officers. However, these management and conservation efforts are constrained by the absence of information based and reliable monitoring system in place. The basic information such as distribution and densities of tiger and prey population in the reserve is still not fine tuned, hence the importance is given in this plan. The on going Phase IV tiger monitoring as per NTCA protocol have been discussed.

Ecotourism in Similipal is restricted mostly to buffer area only and very few areas in core is used for tourism. No further expansion of tourism is proposed in core area. Ecotourism activities are proposed to be developed in buffer and adjoining areas with development of new destinations and substantial involvement of local community. Nature education programme for all stake holders have been proposed. An innovative programme called "Friends of Similipal Tigers" is going on where volunteers from among school students are being created who would disseminate the message of wildlife conservation among their friends and relatives.

In the buffer area to rejuvenate the degraded and denuded forest ecosystem, by adopting a scientifically proven soil and water conservation methods and strategies to regenerate the natural and native vegetation, preferably bamboo forests, swamps, dry deciduous forests and mountain grass lands have been proposed.

Massive Eco Development programme in the buffer villages to involve people participation and buildup support of stake holders against any negative impact on the biodiversity, its maintenance and conservation have been suggested.

Wildlife health care and population management of each mega species has been elaborately discussed. The vaccination programme to create the immunity belt around the reserve has been the focal point in the plan. The management of captive elephants, their upkeep, health management and engage them for the physical work has been planned meticulously. The diet chart for the elephant has been worked out scientifically and fixed accordingly. The engagement of elephants for the ride and other works has been fixed depending on size, sex and age which need to be followed rigidly.

The emphasis is given for the staff deployment and staff development issues in the plan. The basic facilities for the staff and infrastructural up-gradation in the reserve gained importance in the plan. The proposal for restructuring with bringing the entire Critical Tiger Habitat under the direct control of Field Director has been discussed. The tiger steering committee and its duties and responsibilities, the tiger foundation concept and its implementation also been thought off meaningfully and incorporated in the plan.

The plan objectives for the buffer area and scope of implementation and buffer area problems like man-animal conflict etc., have been discussed more elaborately in the buffer area plan.

Potential corridors connecting Similipal with other protected areas and forest areas have been identified and strategy for protection and management of the corridors ensuring safe passage of wild animals has been proposed in the Corridor Area Plan.

The annual budget for the plan period has been worked out by taking the ground realities into considerations. The budget source and the fund mobilization strategy also been identified. The man-animal conflict and the solution and also strategy to handle the problem have been discussed in the plan. The overall aim and objective of the plan is for the biodiversity conservation keeping the tiger at the apex as it is the flagship species of conservation. The plan implementation has to be through the involvement of people as it is a people participatory programme.

As a standard practice with planning documents, all supportive detailed information in shape of maps and annexures have been appended to the plan.

### **Plan Period**

The plan has been prepared for a period of 10 years starting from the year 2013-14 to 2022-23. If any provision of the prescription is found incompatible to wildlife conservation during implementation the same can be revised/modified to suit the purpose during the plan period.

### **TABLE OF CONTENTS**

PARA	CONTENTS	PAGE
	Preface	I
	Acknowledgement	ii
	Executive Summary	iv
	Table of Contents	ΧI
	Tiger Conservation Plan: Core Area	
	Part A: The Existing Situation	
	Description of The Tiger Conservation Unit/ Landscape And Significance of The Area For Tiger Conservation	1
	Significance of the area for tiger Conservation	2
	Legal Provisions Contained In The Wildlife (Protection) Act Regarding Tiger Conservation Plan And Their Brief Description Of Their Relevance In The Tiger Conservation Unit/Landscape	2
	Delineation of Area Into Core, Buffer And Adjoining Landscape	4
	Chapter 1; Introduction of the Area	
1.1	Name, Location, Constitution & Extent	5
1.2	Approach & Access	6
1.3	Statement of significance	7
	Chapter 2: Background Information and Attributes	
2.1	Geology, rock & Soil	11
2.2	Hydrology & Water Sources	12
2.3	Vegetation Cover Types	13
2.3.1	Cover	17
2.3.2	Food	18
2.3.3	Species and Communities of Conservation Importance	18
2.3.4	Key Areas	18
2.4	Wild Fauna, Habitat and Trophic Niches	20

2.5	Major Conspicuous Changes In The Habitat Since Inception	22
	Chapter 3: Status of Tigers and Co-Predators	
3.1	Distribution	24
3.1.1	Tiger	24
3.1.2	Leopard	24
3.1.3	Dhole	24
3.1.4	Hyena	26
3.1.5	Sloth bear	26
3.1.6	Wolf	26
3.2	Abundance Status	26
3.2.1	Tiger	26
3.2.2	Leopard	27
3.2.3	Dhole	29
3.2.4	Hyena	29
3.2.5	Bear	29
3.2.6	Wolf	29
3.3	Prey-Predator Relationship	29
3.3.1	Density of prey species	29
3.4	Assessment of threats	32
	Chapter 4: History of Past Management and Present Practices	
4.1	Conservation History	34
4.2	Habitat Management	35
4.2.1	Meadows	35
4.2.2	Saltlicks	36
4.3	Protection and Intelligence Gathering	36
4.4	Tourism and Interpretation	36

4.5	Research and Monitoring	36
4.5.1	Research	37
4.6	Relocation of Villages	44
4.7	Administration and Organization	45
4.7.1	Staff	46
4.7.2	Housing	46
4.7.3	Office Accommodation	47
4.7.4	Check Posts	47
4.7.5	Watch Towers	48
4.7.6	Communication	48
	Chapter 5: Land Use Patterns & Conservation-Management Issues	
5.1	Land use Classification	51
5.2	Socio-Economic Profile of Villagers	51
5.3	Resources dependency of Villagers	53
5.4	Human Wildlife Conflict	53
5.5	Assessment Of Inputs Of Line Agencies / Other Departments	53
	Part B: The Proposed Management	•
	Chapter 6: Visions, Goals, Objectives and Problems	
6.1	Vision	54
6.2	Management Goals	54
6.3	Management Objectives	54
6.4	Problems in Achieving Objectives	54
6.5	SWOT Analyses	56
	Chapter 7: Management Strategies	
7.1	Delineation of Critical Wildlife Habitats and Inviolate Areas	58
7.1.1	Appropriateness and adequacy or Inadequacy of Current Core	59
7.2	Zone and theme approaches to management strategies	59

7.2.1		60
7.2.2	Zone Plans	60
	Zone Plan for Fully Inviolate Zone	
7.2.3	Zone Plan for Restoration Zone	62
7.2.4	Zone Plan for Ecotourism Zone	63
7.2.5	Theme Plans	67
7.2.5.1	Theme Plan for Protection (Security Plan)	67
7.2.5.2	Theme Plan for Fire Protection	101
7.2.5.3	Theme Plan for Maintenance of Boundary	109
7.2.5.4	Theme Plan for Tiger Population Estimation and Monitoring	110
	Chapter 8: Research, Monitoring and Training	
8.1	Research Priorities	112
8.1.1	Future Strategy	114
8.2	Research Project	116
8.3	Monitoring Framework	118
8.3.1	Physical	118
8.3.2	Biological	118
8.3.4	Socio-Economic and Management	123
8.3.5	Methodology	123
8.4	Training Needs Assessment & HRD Plan	124
8.4.10	HRD Plan	131
	Chapter 9: Tiger Population and Habitat Assessment	
9.1	Daily Monitoring and Forecasting	134
9.2	Tiger Population Estimation And Monitoring Framework (Phase I, Ii, Iii And Iv)	134
9.3	Habitat Assessment And Monitoring Framework	144
9.4	Spatial Database Development	144
9.5	Analyses and Reporting Framework	146
9.6	Capacity Building	146

	Chapter 10: Protection and Intelligence Gathering	
10.1	The Tiger Cell	147
10.2	The Strike Force	148
10.3	Special Tiger Protection Force	148
10.4	Strategy For Protection And Communication	152
10.5	Fire Protection	152
10.6	Intelligence Gathering and Coordination	152
	Chapter 11: Miscellaneous Issues	
11.1	Housekeeping of departmental Elephants	153
11.2	Wildlife Health Monitoring	165
11.3	Mortality Survey	170
11.4	Relocation of Core Area Village	184
11.5	Habitat Improvement	185
	Chapter 12: Organization, Administration and Budget	
12.1	Tiger Steering Committee (State Level)	191
12.2	Tiger Conservation Foundation (Park Level)	191
12.3	Coordination With Line Agencies/ Departments	192
12.4	Staff Deployment	193
12.5	Fund Raising Strategies	196
12.6	Schedule of Operations (For both core and buffer)	197
12.7	Miscellaneous Regulations	200
	Chapter 13: Monitoring and Evaluation	
13.1	Criteria	205
13.2	Process	205
13.3	Maintenance of Geo-referral Data	206
13.4	Bio-Diversity monitoring	207
13.5	Habitat Shift of Species	207

13.6	Disaster Management and Monitoring	207
13.7	Annual Report	207
13.8	Management Effectiveness Evaluation: By management Itself or through external Agency	208
13.9	TCP to be placed in Public Domain	211
	Tiger Conservation Plan for the Buffer Area	
	Part A: The Existing Situation	
	Chapter 1: Introduction of the Area	
1.1	Name, Location, Constitution & Extent	212
1.2	Approach and Access	213
1.3	Statement of Significance	213
1.4	Geology, Rock, Soil	214
1.5	Hydrology and Water Resources	215
1.6	Vegetation Types	216
1.7	Wild Fauna and Habitats	220
1.8	Major Conspicuous Changes in the Habitat since Inception	221
	Chapter II: Status of Tiger and Co-predators	
2.1	Distribution	223
2.2	Abundance Status	227
2.3	Prey-predator Relationships	232
2.4	Assessment of Threats	233
	Chapter III: History of Past Management and Present Practices	
3.1	Conservation and Forest Management History	237
3.2	Protection of Tiger, its Prey and Habitat	243
3.3	Other Land Use – Villages, Agriculture, Developmental Programs, Tourism etc.	245
3.4	Research, Monitoring and Wildlife Health	249
3.5	Nature Education and Interpretation	249

3.6	Administration and Organization	250
	Chapter IV: Production Sector in the Landscape	
4.1	Forestry (Affects directly)(D*)	253
4.2	Agriculture (D)	253
4.3	Integrated Development (eco-development, development through Dist. Administration) (D)	257
4.4	Tourism (D)	258
4.5	Fisheries (D)	258
4.6	Tea / Coffee Estates (affects incidentally) (I**)	260
4.7	Road / Rail transport (D)	260
4.8	Industry (D)	260
4.9	Mining (D)	260
4.10	Thermal Power Plants (I)	260
4.11	Irrigation Projects (D)	260
4.12	Temple Tourism (D)	260
4.13	Communication Projects (D)	260
4.14	Study on NTFP in Buffer Area of Similipal	261
	Chapter V: Land use Patterns and Conservation Management Issues	
5.1	Land use Classification	263
5.2	Socio-Economic Profile of the Villagers	267
5.3	Resource Dependence of Villagers	274
5.4	Human-Wildlife Conflict	274
5.5	Assessment of Inputs of Line Agencies/ Other Departments	277
	Part B: The Proposed Management	
	Chapter VI: Visions, Goals, Objectives and Problems	
6.1	The Vision	286
6.2	Management Goals	286

6.3	Management Objectives	286
6.4	Problems in Achieving Objectives	287
6.5	SWOT Analyses	289
	Chapter VII: Management Strategies	
7.1	Delineation of Buffer Areas and Other Zones within the Buffer Area (e.g. Eco-development Zone, Forestry Zone, Production Sector zone, etc.)	292
7.2	Zone and Theme Approaches to Management Strategies	292
	Chapter 8: Research, Monitoring, Training and Wildlife Health	
8.1	Research Priorities, Main Projects and Implementation	367
8.2	Monitoring Framework	368
8.3	Training	369
8.4	HRD Plan	370
8.5	Wildlife Health Monitoring	372
8.6	Mortality Survey	373
	Chapter 9: Tiger Population and Habitat Assessment	
9.1	Daily Monitoring Protocol	378
9.2	Tiger Population Estimation Framework	378
9.3	Habitat Assessment Framework	386
9.4	Spatial Database Development	387
9.5	Analysis and reporting Framework	387
	Chapter 10: Protection and Intelligence Gathering	
10.1	Deployment of Native Work Force	388
10.2	Patrolling Strategy including Joint Patrolling	388
10.3	Maintenance of Village Level Crime Dossier	389
10.4	Fire Protection	390
10.5	Intelligence Gathering and Coordination	390

	Chapter 11: Organization, Administration and Budget	
11.1	Buffer areas coordination committee and its linkage with Tiger	391
	Steering Committee and Tiger Conservation Foundation	
11.2	Coordination with eco-development committees, confederation	391
	and other line agencies / departments / production sectors.	
11.3	Staff Deployment	392
11.4	Fund Raising Strategies	392
11.5	Schedule of Operations	393
	Corridor Plan	
	Part A: The Existing Situation	
	Chapter 1: Introduction of the Area	
1.1	Brief Description of the Area and Significance for Tiger Conservation	395
1.2	Map showing landscape beyond Core and Buffer Area	407
1.3	Major Land use Classification in the Area	408
1.4	Statement of Significance	410
1.5	Geological attributes and Hydrology	410
1.6	Vegetation Types	410
1.7	Wild Fauna and Habitats	412
1.8	Major Changes in the landscapes (Settlements/ Other infrastructures)	412
1.9	Administration and Organization	413
	Chapter 2: Status of Tiger and Co-predators	
2.1	Distribution and Abundance Status with type of use by the tiger and co-predators	414
2.3	Prey-predator Relationships	414
2.4	Phase IV Tiger Monitoring in Corridor Area	414
2.5	Assessment of Threats	416
	Chapter 3: Land Use Patterns and Conservation-Management	
3.1	Issues   Socio-economic Profile of Villagers and Resource Dependency	417
	and Human-Wildlife Mutual Impacts	
3.2	Assessments of Inputs of Line Agencies/ Other Departments	417

	Chapter 4: Visions, Goals, Objectives and Problems	
4.1	Vision	419
4.2	Management Goals	419
4.3	Management Objectives	419
4.4	Problems in Achieving Objectives	420
4.5	SWOT Analyses	421
	Chapter 5: Management strategies	
5.1	Delineation of Corridors and other habitat used by tigers and copredators	423
5.2	Prioritization Linkages	430
5.3	Development of integrated Landuse Approach for the Area commensurate with tiger conservation and co-existence agenda (Formulation and Coordination)	430
5.4	Wildlife management in territorial forest areas (Identification and inclusion of prescriptions in the Working Plans of respective divisions as per Working Plan Code)	431
5.5	Zone Plan Management Strategies (Protection, Habitat Management and Habitat Restoration, Supplementing Declining Local Populations and Facilitating their Re-colonisation)	431
5.6	Theme Plans	433
	Chapter 6: Eco-development and Livelihoods	
6.1	Constitution of Adjoining Corridor Area Management Committee (with representation of different Forest Divisions, Line agencies and other Stakeholders) and Linkages with Tiger Conservation Authority	442
6.2	Formation of Eco-development Committees (EDCs) and supporting institutional framework (Confederation of EDCs, Self Help Groups and Nature Clubs)	443
6.3	Livelihood Support Initiatives through Village Micro-plans supported by Tiger Conservation Foundation and Other Line Agencies	443
6.4	Monitoring and Evaluation	444
<u>6.5</u>	Monitoring of Tiger Movement in the Corridors	444

	Chapter 7: Tiger Population and Habitat Assessment	
7.1	Day to Day Monitoring Protocol	445
7.2	Tiger Population Estimation Frame Work: Buffer Zone	447
7.3	Estimation of Tiger Population using Capture Recapture Framework	452
7.4	Habitat Assessment Framework	455
7.5	Analysis and Reporting Framework	456
	Chapter 8: Organization, Administration and Budget	
8.1	Coordination Committee for effective implementation and management and Linkages with Tiger Steering Committee and Tiger Conservation Foundation	457
8.2	EDC Coordination	457
8.3	Staff deployment, Protection Strategy and Linkages with Tiger Cell and Buffer Zone Striking Force	457
8.4	Schedule of Operations	457
	References	458
	Annexure	
I	Notification of Similipal reserve Forest	463
II	Notification of Similipal reserve Forest in Mayurbhanj Forest Manual	464
III	Preliminary Notification of Similipal National Park	465
IV	Gazette Notification of Similipal National Park	471
V	Notification of Similipal Tiger Reserve	472
VI	Notification of Similipal Wildlife Sanctuary	484
VII	Notification of Similipal Biosphere Reserve	566
VIII	Notification of Mayurbhanj Elephant Reserve	575
IX	Revised Guidelines of ongoing Centrally Sponsored Scheme of Project Tiger	580
Х	Guidelines issued by NTCA for tiger reserves	591
XI	Committees	679
XII	Bye Laws of Similipal Tiger Conservation Foundation	683
XIII	Draft Restructuring Proposal of Core and Buffer Divisions of Similipal TR	691

XIV	List of Mammals	695
XV	List of Birds	697
XVI	List of Amphibians	707
XVII	List of Reptiles	708
XVIII	List of Fishes	710
XIX	List of Invertebrates	712
XX	List of Plants	713
XXI	List of Orchids	742
XXII	List of Ethnobotanical Species	754
XXIII	List of Threatened, Endangered, Endemic and Rare Species	757
XXIV	List of Research conducted in 2010-11 - 2013-14	763
XXV	List of Rivers & Streams	765
XXVI	List of Water Bodies & Water Harvesting Structures	766
XXVII	List of Grasslands & Meadows	772
XXVIII	List of Swamps in core Area	776
XXIX	List of Salt Licks in Core Area	777
XXX	List of Anti-Poaching Camps	778
XXXI	List of Buildings	781
XXXII	List of Check Posts	784
XXXIII	Watch Towers in Core Area	784
XXXIV	List of Roads	785
XXXV	List of Vehicles	788
XXXVI	List of VHF Stations	791
XXXVII	List of FRH/ Tourist Lodges	794
XXXVIII	Tiger & Leopard Census in 2004 & Before	795
XXXIX	2001 Population census of Sanctuary Villages	803
XL	2003 Livestock Census of Sanctuary Villages	806

XLI	Land Use of Sanctuary Villages	808		
XLII	List of Range/Section/Beat/Compartments of STR Core			
XLIII	Allotment of Areas of Sanctuary to Anti Poaching Camps			
XLIV	Cadre Strength and Vacancy Position of Establishment of Field Director			
XLV	Sensitive Sites of Poaching & Timber Smuggling in Core Area			
XLVI	Illegal Entry Points to Similipal Tiger Reserve			
XLVII	Sensitive Villages Around Similipal			
XLVIII	Sensitive Routes & Villages in buffer Area			
XLIX	Fire Prone fringe Villages	832		
L	List of Fire Lines in Core Area	834		
LI	Cases Booked in Last Five Years	838		
LII	Poaching Cases in Last three Years	840		
LIII	Tourist Inflow Figure	841		
LIV	Revenue From tourism	842		
LV	Coupe Working in Buffer Area in Last Three Years	843		
LVI	Man Elephant Conflict in Buffer area	844		
LVII	Area Distribution of Traditional Use Zone	845		
LVIII	Damages Caused by Naxalite Attack in Similipal in 2009	847		
LIX	Past Expenditure of Project Tiger Fund	850		
LX	List of Survey of India Topo sheet of Similipal TR	850		
LXI	List of Satellite Imageries available with Specifications	850		
LXII	Odisha Forest Sector-Eco tourism Policy in Odisha	851		
LXIII	Notification of Hadgarh Wildlife Sanctuary.	860		
	Maps			
	Similipal Tiger Reserve Landscape Unit	3		
	Location Map of Tiger Reserve	5		

Carnivore Signs during 2	012 Tiger Monitoring	25
Map Showing Distribut Monitoring	ion of Tiger & Leopard in 2012 Tiger	28
Ungulate Density		31
Administrative Map of S	TR	49
Forest Class Map		52
Eco-tourism Zone in Cor	e Area	65
Anti-poaching Camp Loc	ation	73
Sensitive area for poach	ing and timber cutting	75
Forest fire prone area		107
Transects for tiger moni	toring	139
Grid map for tiger monit	oring	145
Grassland and water bo	dies	186
State Water Plan		216
Landuse Map (2003)		264
Landuse Map (2006)		265
Cluster map of zones in	Buffer Area	296
Traditional Use & Forest	ry Zone	298
Ecotourism Zone		309
Eco-development Zone		333
Biodiversity conservatio	n Zone	363
Similipal – Santospur Co	rridor	397
Similipal – Kuldiha Corri	dor	398
Similipal – Badampahar	Corridor	399
Landscape beyond Core	and Buffer Area	407

NAME OF THE TIGER RESERVE: SIMILIPAL TIGER RESERVE, MAYURBHANJ. ODISHA, INDIA

### INTRODUCTION

### DESCRIPTION OF THE TIGER CONSERVATION UNIT/ LANDSCAPE AND SIGNIFICANCE OF THE AREA FOR TIGER CONSERVATION.

Tiger inhabited forests in India are classified into 6 major tiger landscapes which are also called as Tiger Conservation Units. Currently tigers occur largely in the forest areas of 17 States in India. Nagaland, Meghalaya, Tripura, and Haryana have reports of occasional tiger occurrence. The distribution of tigers and their density in these forests vary on account of several ecological and anthropogenic factors like forest cover, terrain, natural prey availability, presence of undisturbed habitat and the quality of managerial efforts taken towards protection. Each of the TCU is considered to have tiger population sharing same genetic pool since the areas comprising these units are contiguous and historically have had good connectivity over long time. Tiger population in a TCU is also a source population for the adjoining protected areas and hence their conservation is essential for the maintenance of tiger population on a long term basis.

Similipal Tiger Reserve is the part of larger Central Indian landscape complex and specifically it is part of the Similipal – Hadagarh – Satkosia landscape unit. Similipal has the single largest population of tigers in Odisha.

Biogeographically, the area of the tiger reserve falls in

Biogeographic Zone Deccan Peninsula

Biogeographic province Chhotanagpur

Biogeographic Region Mahanadian

Similipal Tiger Reserve covers an area of 2750 km² covering Similipal RF and the surrounding contiguous Reserved Forests, Proposed Reserved Forests. The total breakup of land in the landscape and the boundary description is given in Annexure V.

#### SIGNIFICANCE OF THE AREA FOR TIGER CONSERVATION

Similipal stands ahead of any other Tiger Reserve in the country for long term conservation of tiger and its habitat because of the following reasons:

- 1. The vastness of its area: The area of the Reserve extends over 2750 km<sup>2</sup> adorning it as the fourth largest in the Tiger Reserve network of India.
- 2. A forest connectivity that is likely to be a viable tiger corridor exists between Simlipal Tiger Reserve and Satkosia Tiger Reserve. Tiger signs were recorded along this corridor in the tehsils of Anandapur in Keonjhar District and Angul (Status of tigers, co-predators and prey in India, 2010, NTCA).
- 3. The presence of innumerable hills, dales and perennial streams makes Similipal an ideal haunt for tigers, co-predators and prey animals.
- 4. Similipal forests account for more than one-fourth of the total geographical area and two-third of total forest area of the district of Mayurbhanj. The surrounding forests have been well preserved by the people.
- 5. There is no developmental project near to this Reserve. The district has a forest based economy for which people come forward for the forest protection for their own survival.
- 6. Participatory forest management is quite popular in the district.
- 7. The villages inside Similipal are still engaged in the primitive form of agriculture without utilizing the modern agricultural implements.
- 8. Similipal receives more than 2000 mm rainfall in a year. Because of its position in the eastern region of India, it never suffers from drought.
- 9. Except the much maligned incidences of *Akhand Shikar* (mass hunting rituals) by tribal there is no instance of organized poaching of tiger in Similipal. With the increased awareness programmes and mobilization of native villages in the protection of Similipal, mass hunting of animals will be a thing of past.

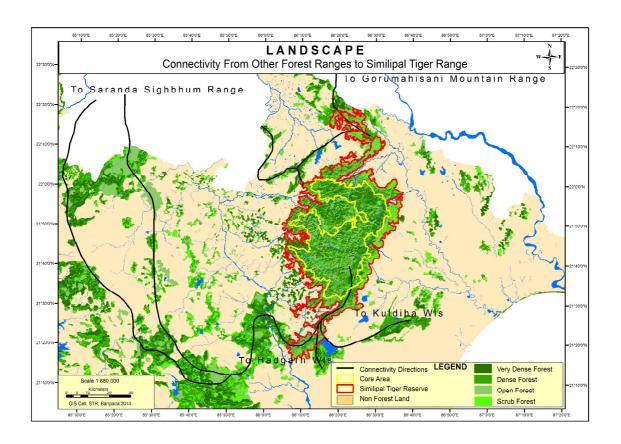
Similipal is the epitome of tropical forest in our country. The structural diversity and interspersion both in standing state and standing crop make it a unique ecosystem. It has therefore been declared as a Biosphere Reserve by Govt. of India.

# LEGAL PROVISIONS CONTAINED IN THE WILDLIFE (PROTECTION) ACT REGARDING TIGER CONSERVATION PLAN AND THEIR BRIEF DESCRIPTION OF THEIR RELEVANCE IN THE TIGER CONSERVATION UNIT/LANDSCAPE

Section 38V, subsection (3), chapter IV B, of the wildlife protection act, 1972 amended in 2006, requires every state government to prepare a tiger conservation plan for each area declared as a tiger reserve under subsection (1) of

section 38 V. It also makes it mandatory to include staff development and deployment plan as an integral part of such

### Map of the Tiger conservation Unit/Landscape



tiger conservation plan. In the context of landscape approach to conservation, section (3) also requires the plan to ensure

- a. Protection of tiger reserve while providing for site specific habitat inputs for a viable population
- b. Ecologically compatible land uses in the tiger reserve and areas linking one reserve with another while addressing livelihood concerns
- c. Compatibility of forestry operations in adjoining forest areas with the need of tiger conservation

Above legal provisions require the tiger reserve area to be managed as a part of larger landscape unit and all management decisions to be taken in a way that helps in improving the connectivity between different reserves that are part of the same landscape and larger landscape complex.

Section (4) requires a tiger conservation plan to ensure the agricultural, livelihood, developmental and other interests of people living inside tiger reserve and other tiger inhabited forests. This section has special relevance in the context of landscape approach as it defines tiger reserve to include core or critical tiger area habitat which are required to be kept inviolate and buffer or peripheral area where coexistence between wildlife and human activity is promoted with due recognition of rights of local people. The limits of such peripheral area are required to be determined on the basis of scientific and objective criteria in consultation with the concerned Gram Sabha and an expert committee. This legal provision firmly states that peripheral areas be given equal importance in management decisions as they are critical in providing connecting and dispersal habitat for wildlife. Besides, bringing peripheral areas under management influence of reserves will provide much needed protection to wildlife when it strays out of legal boundary of the reserve.

Section (5) provides for creation of inviolate areas for tiger conservation on the basis of voluntary relocation of people living inside the tiger inhabited areas on mutually agreed terms and conditions when other reasonable options of co-existence are not available.

### **DELINEATION OF AREA INTO CORE, BUFFER AND ADJOINING LANDSCAPE**

The Reserve has been delineated into core and buffer area as detailed below.

Core Area: Part of Similipal Wildlife Sanctuary (146 Compartments): 1194.75 km<sup>2</sup>

Buffer Area: Balance of Similipal Sanctuary, 32 RF blocks, one PRF &

 8 villages:
 1555.25 km²

 Total:
 2750.00 km²

The boundary description and other details have been given in Annexure V.

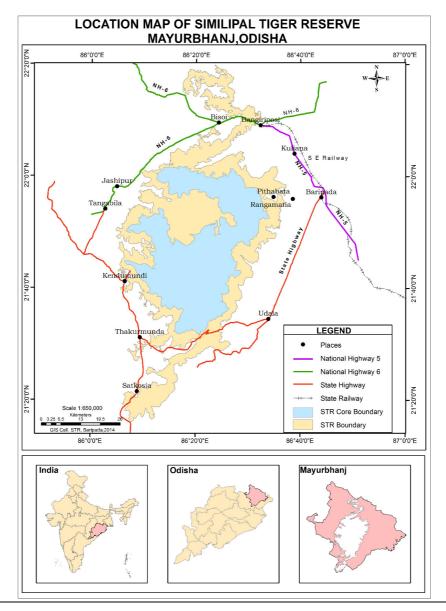
### INTRODUCTION OF THE AREA

### 1.1.1 NAME, LOCATION, CONSTITUTION & EXTENT

### **1.1.2** Name Similipal Tiger Reserve

### 1.1.3 Location

Similipal Tiger Reserve is located between  $21^0\ 31'$  and  $22^0\ 02'$  north latitude and  $86^0\ 06'$  and  $86^0\ 36'$  east longitude. It is situated within Mayurbhanj District in the Northern-most part of Odisha state.



### 1.1.4 Constitution

Similipal Tiger Reserve was constituted on 4<sup>th</sup> December, 1973 covering an area of 2750 km<sup>2</sup> as one of the first nine tiger reserves of India.

### 1.1.5 Extent (Area statement and Legal Status) :-

Initially the core area of the Similipal Tiger Reserve extended over 845.70 km² which was the area of proposed National Park. After amendment of Wildlife Protection Act in 2006 it was mandatory requirement for each Tiger Reserve to identify Core or Critical Tiger Habitat basing on scientific observation. For this purpose the Govt of Odisha vide No. 16428 Dated 16.10.2007 had constituted an Expert Committee to suggest the extent of Critical Tiger Habitat. The committee had meeting with the National Tiger Conservation Authority where the extent of the Critical Tiger Habitat for Similipal Tiger Reserve was decided to be to an extent of 1194.75 km² which was communicated vide letter no 1501/11/2007-PT(Part) Dated 03.12.2007. Accordingly the State Govt notified the core or Critical Tiger Habitat of Similipal Tiger Reserve having an extent of 1194.75 km² which is a part of Similipal Wildlife Sanctuary. The Core or Critical Tiger Habitat has been declared under section 38 (V) of Wildlife (Protection) Act (Amended 2006).

### 1.1.6 Notification

Similipal Tiger Reserve was constituted vide Govt. of Odisha Notification No.8F(T)-9/2007/20801/F&E dtd. 31<sup>st</sup> December 2007 (Annexure V).

### 1.2 APPROACH & ACCESS

There are two main entrances to Similipal Tiger Reserve, one through Jashipur and other through Pithabata. However, nodal approach point remains at Baripada, headquarters of Field Director, Similipal Tiger Reserve.

NH-5 (Howrah-Chennai) runs close in North-East directions and NH-6 (Howrah-Mumbai) runs very close to the landscape in North-West direction. During dry season the area is accessible through Baniabasa on Baripada-Udala PWD road. The road distances of both the entrances are as follows:

То	From			
Entrance at	Bhubaneswar	Balasore	Calcutta	
Pithabata	270km.	76 km.	240 km.	
Jashipur	252 km.	156 km.	290 km.	
Baripada	250 km.	56 km.	220 km.	

### Rail

- (a) There is a railhead at Baripada connecting Rupsa on Howrah-Chennai main line of South-Eastern railway.
- (b) Balasore at a distance of 52 km from Baripada is situated on Howrah-Chennai main line.

### **Air Terminals**

Kolkata and Bhubaneswar are the nearest airports.

Petrol and diesel are available at Baripada, Kuliana, Bangriposi, Bisoi, and Jashipur.

Medical facilities are available at above places.

The nearest telephone and postal services are available at Baripada and Jashipur.

Forest Department Rest houses are available at Baripada and Jashipur. Accommodation for tourists are available at Ramtirtha (Jashipur), Gurguria and Jamuani which are outside the core area of the reserve.

### 1.3 STATEMENT OF SIGNIFICANCE

The Similipal Tiger Reserve is the epitome of tropical forest in our country. It encompasses a rich biodiversity of both flora and fauna. The structural diversity and interspersion both in standing state and standing crop make it a unique ecosystem. The forest is a unique composition of different types of forest such as northern tropical mixed deciduous forest, northern tropical semi-evergreen forest, mixed deciduous hill forest, high level sal forest, dry deciduous sal forest, plain sal forest, grassland and savannahs. The biodiversity rich Similipal constitutes vast treasure of diverse wild genes with wide adaptability to diverse climatic and ecological conditions prevailing here.

The landscape harbours 7% flowering plants, 8% orchids, 7% reptiles, 20% birds and 11% mammals of India. Similipal stands as a link between the flora and fauna of Southern India and Sub Himalayan North-east India. It is the abode of more than 1253 species of flowering plants, 99 species of non-flowering plants, 21 species of amphibians, 62 species of reptiles, 361 species of birds, 55 species of mammals and many species of flora and fauna still to be identified.

It bears 94 species of orchids, many of them endemic and endangered, and 72 species are Himalayan species, many species of insects, ferns and medicinal plants. There are many species of rare, endangered, threatened and vulnerable plants and animals. Mahaseer, Hornbill, Chowsingha, Mouse deer, Giant squirrel, Flying squirrel, Ruddy mongoose, mugger crocodile and Rufus tailed hare are examples of this unique biodiversity.

Above all, Similipal is famous for its tigers and elephants. It alone is the home of 50% tiger and 25% elephants of Odisha.

Similipal is the only home of the unique melanistic tiger.

Similipal forest, spreading over 2271.78 km² area is a compact mass of unique natural forest that influences the climatic regime of whole of Odisha, West Bengal, Jharkhand and other areas in the eastern and northern parts of India. It is the richest watershed in the State of Odisha giving rise to many perennial rivers like Budhabalanga, Khadkei, Khairi, Bhandan, West Deo, Sanjo and Palpala. Perennial water flow is a part of typical ecosystem of Similipal hill forest.

Largest patch of sal forest in the sal-teak transition zone and similarities with elements of Westernghats and North-east India in floral and faunal composition makes Similipal's ecology unique.

Diversity in temperature regime between northern and southern region, wetland diversity, including perennial water sources, altitude ranging from 40m to 1100m with Khairiburu, the highest peak at 1168m, frost valleys in central and south Similipal and high rainfall area with 1800-2900 mm precipitation in 135-158 days annually make Similipal one of the distinct and diverse of ecosystems.

The park has a long history of management. It was once upon a time the hunting place of the maharaja of Mayurbhanj.

The park has a great potential for research as it has diverse types of flora and supports a very high density and biomass of prey community. The area forms a good research base for conducting long term study.

Similipal is the original home of Birhors, Hill Khadias and Ujias which are some of the primitive tribes of Odisha.

Similipal is a grand repository of indigenous knowledge pertinent to conservation of biodiversity, ethnobotanical study and traditional ecological knowledge.

Similipal is famous for its founder Director Padmashree Late S. R. Choudhury (05.12.1973 to 04.05.1982) known for his worldwide acclaimed pugmark method of tiger census and the tigress "Khairi", his foster daughter.

The values of importance of the Park in different categories are listed overleaf.

Sl. No.	Category	Values
1	Global	The landscape harbours 7% flowering plants, 8% orchids, 7% reptiles, 20% birds and 11% mammalian species of India. 3 species of orchids are endemic to Similipal. Similipal is the only home of melanistic tiger. Due to vastness of the area and connectivity the tiger reserve has the potential for long term conservation of tiger. The tiger reserve is known for its founder Director Padmashree Late S. R. Choudhury whose pugmark
		method of tiger monitoring is acclaimed worldwide. The tiger reserve is a part of Similipal Biosphere Reserve which has been
2	National	Similipal stands as a link between the flora and fauna of southern India and sub Himalayan North-east India. It is the abode of more than 1253 species of flowering plants, 21 species of amphibians, 62 species of reptiles, 361 species of birds, 55 species of mammals and many species of flora and fauna still to be identified. The forest is a unique composition of different types of forests such as northern tropical mixed deciduous forest, northern tropical semi-evergreen forest, mixed deciduous hill forest, high level sal forest, dry deciduous sal forest, plain sal forest, grassland and savannahs. Similipal is the home of melanistic tiger and black panther. It bears 94 species of orchids, many of them endemic and endangered, many species of insects, ferns and medicinal plants. There are many species of rare, endangered, threatened and vulnerable plants and animals. Mahaseer, Hornbill, Mouse deer, Giant squirrel, Flying squirrel, Ruddy mongoose and Rufus tailed hare are examples of this unique biodiversity. Above all, Similipal is famous for its tigers and elephants. It alone is the home of 50% tiger and 25% elephants of Odisha. The biodiversity rich Similipal constitutes vast treasure of diverse wild genes with
		wide adaptability to diverse climatic and ecological conditions prevailing here.
3	Regional	Similipal, spread over 2172.37 km <sup>2</sup> area is a compact mass of unique natural forest that influences the climatic regime of whole of Odisha, West Bengal, Jharkhand and other areas in the eastern and northern parts of India. It is the richest watershed in the State of Odisha giving rise to many perennial rivers like Budhabalanga, Khadkei, Khairi, Bhandan, West Deo, Sanjo and Palpala. Perennial water flow is a part of typical ecosystem of Similipal hill forest. Largest patch of sal forest in

		•
		the sal-teak transition zone and similarities with elements of Westernghats and North-east India in floral and faunal composition makes Similipal's ecology unique. There are many waterfalls inside Similipal. Joranda (181m), Barehipani (217m), Shirsa (243m), Uski, Sitakund, Olkudar and Deokund are few notable waterfalls among them. Diversity in temperature regime between northern and southern region, wetland diversity, including perennial water sources, altitude ranging from 40m to 1100m with Khairiburu, the highest peak at 1168m, frost valleys in central and south Similipal and high rainfall area with 1800-2900 mm precipitation in 135-158 days annually make Similipal one of the distinct and diverse of ecosystems.
4	Local	It sustains livelihood of the local inhabitants. It acts as one and only recreational centre for the local Urban Dwellers. It serves as a Centre of Conservation, Education and Nature Interpretation for the children, students, businessmen, govt. servants, politicians and on the whole the local people. The Tiger Reserve conserves soil and there by reduces the chances of siltation, stone accumulation on the adjoining agricultural lands. It acts as a watershed for the major rivers i.e. Budhabalanga, Khairi,Bhandan, West Deo, Khadkei, Sanjo and Palpala which facilitates Irrigation, Drinking Water Supply to the human habitations in and around the Similipal Tiger Reserve. It tremendously influences the micro climate of the area. The tiger reserve has historical importance. It was once the hunting ground of the Maharajas of Mayurbhanj. Similipal is linked with the religion and culture of the people of Mayurbhanj.

# **BACKGROUND INFORMATION AND ATTRIBUTES**

# 2.1 GEOLOGY, ROCK AND SOIL

Similipal was a part of Gondwanaland in the Palaeozoic era. The main layout of the formation layers is of three concentric cups of metamorphic rocks interbedded with sub-metamorphic layers i.e. volcanic with outer interspace and igneous with inner interspaces. The metamorphic rocks are granitoid gneiss, true gneiss and mica schist with pegmatite. The gneissic rocks are much intersected by dykes of basic and intermediate rocks. The sub metamorphic rocks are shale, haematitic rock laterites, limestone, calcareous deposits, quartzite, phyllites and micaceousschist. Haematitic rocks, laterite and shale occur in extensive formations in central and south Similipal. Outcrops of sub-metamorphic and quartzite haematite occur all over Similipal hills. The soils of Similipal are acidic in nature having a pH range of 4.8 to 6.8 in most areas. The main soil types are as follows:

- From haematitic rocks, rich red loam soil is derived having intense biotic activity and dense tall wood lots.
- Laterites produce deep soils, reddish in colour having the capability to support good tree growth. Where the depth of the soil is less, it supports poor tree growth but good grass growth for animals.
- Shale on weathering produces substantial deposits of clay and clayey loam soils good for biotic growth.
- Outcrops of sub-metamorphic sand stone and quartzite haematites on disintegration produce sandy soil. In deep layers, it supports good growth of plants and animals. Where the depth of soil is thin it favours the growth of grasses.

Presently, soil erosion does not pose any serious threat except for Budhabalanga valley. Integrated complex of rock, soil and vegetation held in a stable formation provide little scope for degradation. However, sporadic denudation in small pockets remains but it is not recognizable.

### 2.1.1 Terrain

The tract dealt with is mostly undulating and hilly interspersed with open grasslands and wooded areas. The inclined plateau has risen abruptly from the low coastal plains of the District. The steep side faces the Bay of Bengal and run

northwards to finally merge with Chhotanagpur (average elevation of 500 mts). In the basin of the hills lie numerous valleys supporting meadows. The elevation of the highest point is 1168.00 m above MSL locally known as Khairiburu. It stands along with Meghasani at 1165.00 m above MSL as twin towers of natural grandeur. The elevation of the central region of the plateau near Dhudurchampa is 1009.95 m. the elevations of a few other points in the locality are mentioned below.

Place	Altitude above MSL in meter
Jenabil	865.00
Upper Barakamuda	824.00
Bhanjabasa	706.00
Chahala	770.00
Nawana	730.00
Dhudurchampa	914.00
Bakua	926.00

#### 2.2 HYDROLOGY AND WATER SOURCES

The water level in the core area is very high and is woven with perennial water sources converging to three Rivers i.e. Budhabalanga, Salandi and Baitarani out of which the former two emerge from the Protected Area and the later one have its tributaries flowing from the PA. The Rivers flow through the Districts of Mayurbhanj, Balasore and Bhadrak and serve as life-line for the districts and finally converge to Bay of Bengal. The other tributaries are Palpala, East Deo, West Deo, Khairi, Tel, Sanjo, Bherol etc. along with many rivulets and nullahs most of which are perennial. An analysis of water availability in the area has shown that more than 50% of the streams carry water during driest period of the year and the rest get totally dry. As the water requirement of herbivores is quite important, further augmentation has been achieved by creation of water bodies in the core area as detailed in Annexure XXVI.

### 2.2.1 Climate

The area has a subtropical climate with three distinct seasons i.e, summer, monsoon and winter. Hot summer, well-distributed rainfall and a normal winter characterize the climate. November to February comes under the winter whereas March to May form the summer months. The monsoon is quite conspicuous during June to September. October constitutes the post-monsoon period.

### 2.2.2 Rainfall

The Similipal complex acts as a water tower of Odisha, West Bengal, Chhatisgarh and Jharkhand. The South-Eastern part gets more precipitation. The atmosphere in the South-Eastern portion normally remains humid due to the flow of sea wind. The structural behaviour of Meghasani in Similipal obstructs the wind flow. Vegetation present in this area helps in formation of micro-climate which helps in giving more of precipitation in this side of Similipal. Thus, this complex of hill ranges

get comparatively more precipitation due to the coastal effect, monsoonic flow of wind and micro-climate formation over Similipal Range of hills.

The rainy season is sultry, humid and occurs between June-October. The South-West monsoon brings nearly 90% of the total annual precipitation. Most of the rainfall concentrates during June-September which also constitutes maximum number of mean rainy days. Average annual rainfall is 2000 mm.

# 2.2.3 Temperature

Climatically this tract is comparatively hot. The North Similipal is comparatively drier than the South Similipal. In winter frost occurs in the Upper Barakamuda valley and other adjoining valley in South Similipal. Nawana valley in central Similipal also receives sporadic frost resulting in a significant dip in temperature in these areas. The temperature ranges from 4° C to 34° C.

## 2.2.4 Humidity

The air is quite humid with relative humidity always extending 70%

#### 2.2.5 Wind

During winter a cold wind blows inside the reserve locally called as "Kaliani Paban". Spring breeze is quite common all through the area. There is hardly any cyclonic wind inside.

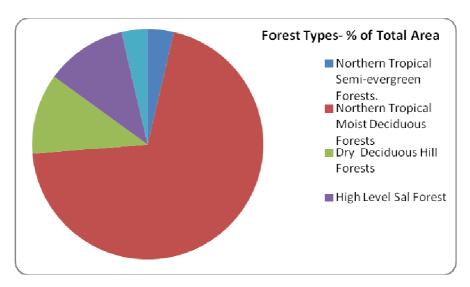
# 2.2.6 Drought

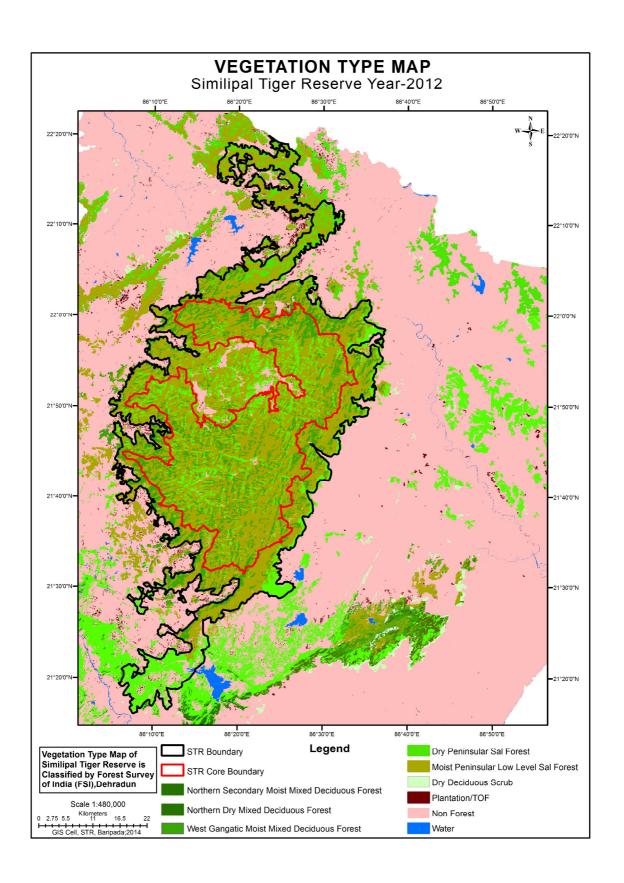
Since there are perennial water sources, the drought due to irregular monsoon and scarcity of rainfall is not felt.

# 2.3 VEGETATION COVER TYPES

The various forest types found in Similipal Tiger Reserve is given below as per the coverage in the area of the Landscape (Champion & Seth's classification). The vegetation cover type of Similipal Tiger Reserve has been shown in a map section.

# Percentage of vegetation types/ ecosystem in core zone of STR





# Northern Tropical Semi-evergreen Forests. (Type: 2b/c3)

This type spreads over an area of about 80 km<sup>2</sup>. The species found under this forest type depending upon the soil and micro climatic conditions are as follows:-

# On Stream Beds

Salix terasperma, Trewia nudiflora, Macaranga peltata, Aphanamixis polystachya, Symplocos cochinchinensis, Glochidion spp., Bischofia javanica, Syzygium cumini, Pongamia pinnata, Diospyros malabarica, Saraca asoca and at places Terminalia arjuna.

# ➤ A little Higher up in Damp Areas.

Bombax ceiba, Alstonia scholaris, Ficus spp., Polyalthia cerasioides, Anthocephalus cadamba, Dillenia pentagyna, Litsea spp., and Citrus spp. are met with.

# > Still Higher up

Michelia champaca, Artocarpus lakoocha, Toona ciliata, Mangifera indica, Ailanthus excelsa, Mesua ferrea, Stereospermum chelonoides, Xylia xylocarpa and Bridelia retusa are met with.

# • Northern Tropical Moist Deciduous Forests (Type: 3C/C2e)

It covers an area of about 1540 km<sup>2</sup>. It is found all over Similipal except the moist valleys and on the southern and the eastern aspects of the hills. Sal forms 50% to 90% of the standing crop. Quality of sal being 'IV' on the steep drier aspects and 'II' on gentler slopes with deep soil and cooler aspects. Quality-I Sal occurs in small pockets under good soil and climatic conditions. The common species found in this type of forests are Terminalia sp., Pterocarpus marsupium, Anogeissus latifolia, Schleichera oleosa, Haldinia cordifolia, Toona ciliata (rare), Michelia champaca, Mangifera indica, Bombax ceiba, Careya arborea, Dillenia pentagyna, Gmelina arborea, Garuga pinnata, Lannea coromandelica, Syzygium cumini, Ougeinia dalbergioides, Xylia xylocarpa, Kydia calycina, Lagerstroemia parviflora, Bridelia retusa, Mitragyna parvifolia, Trema orientalis, Emblica officinalis, Zizyphus spp., Cassia fistula, Buchanania lanzan, Sterculia villosa, Miliusa velutina, Helicteres isora, Indigofera pulchella, Croton oblongifolius, Colebrookia oppositifolia, Flemingia chappar, Strobilanthes Wendlandia spp., Imperata cylindrica, Themeda caudate, Cymbopogon martini, Eulaliopsis binata, Thysanolaena maxima, Curcuma aromatica, Bauhinia vahlii, Millettia extensa, Smilax macrophylla, Combretum decandrum, Disocorea spp., Asparagus racemosus. Ferns and orchids are

found in moist places. Ferns- Adiantum spp., Dryopteris spp., Cyathea gigantean, Spinulosa spp., Cyclosorus spp. and Holtt Tree Fern.

# Dry Deciduous Hill Forests (Type: 5B/C1c and 3C/C3)

It is spread over an area of 250 km<sup>2</sup> (approx) mostly in the eastern and the southern Similipal with steep and exposed slopes, this type of forest has Sal as major species covering upto 30% of the crop. Other associates are Anogeissus latifolia, Sterculia urens, Boswellia serrata, Dalbergia latifolia, Cleistanthus collinus, Gardenia gummifera, G. latifolia, G. turgide, Erythrina suberosa, Cochlospermum gossypium, Helicteres isora, Nyctanthes arbortristis with an abundance of herbs, shrubs and grasses as ground cover.

# High Level Sal Forest. (Type: 3C/C 2e(i))

This type of forest occurs on the plateaus above an elevation of 850m and extends over about 250 km<sup>2</sup>. Pure stands of poor quality sal are found with *Dillenia pentagyna, Syzygium cerasoides, Pterocarpus marsupium and grasses* like *Imperata cylindrical* and *Themeda caudate*. Large patches of *Phoenix acualis* occur.

# Grassland and Savannah. (Type: 3C/DS-I)

The area of grasslands in Similipal is less than 2 km² spread all over in small and large patches. Altitudinally ubiquitous in nature, grasslands are found on hill tops over 900 metres high as well as in the frosty valleys and nallah banks. In the former it is perhaps a climax type where as in the later, it seems to be of seral origin, a stable "Pre-climax" under the combined influence of edaphic and climatic factors, mode of origin and intensity of biotic effects. In the frosty open valleys, Sal and other frost tender woody plants are annually bitten back to whippy growth. The species include *Syzygium cerasoides, Symplocos racemosa*, and *Dillenia pentagyna*. The common member of Poaceae is *Imperata cylindrica*, *Themeda gigantia* and *Saccharum spontaneum*.

#### ➤ In Hills-

Pollinidium angustifolium, Pogonatherum paneceum, Sehima nervosa.

# Moist Areas-

Apluda mutica, Arundo donax, Eragrostis atrovirens, Phragmitis karka, Sporobolus indicus, Sacciolepsis indica.

### Other Grasslands-

Bothriochloa bladhii, Cymbopogon fresuosus, Cynodon dactylon, Heteropogon contortus, Imperata cylindrical and Themeda spp. The list of grasslands and meadows available inside the core area of the Reserve is given in Annexure XXVII.

#### 2.3.1. Cover

It is considered as a variation seen in a habitat which affords protection to animals from weather, predators or enemies by offering a better vantage point. Cover may be 'vegetal" or "non-vegetal". Vegetal covers are non-static; they change with time due to ecological successions. Thus each successional stage has its own species composition and the cover value also changes accordingly. Topography of Similipal Tiger reserve is such that it itself provides adequate cover for certain animals like Tiger, Leopard which can make use of even the thick bouldery deposits on ground as ambushing cover.

A broad classification of cover and its status is given below:

- 1) **Refuge Cover:** This means vegetation from which the wild animals can not be driven out during hunting. The status is reasonably very good in the Similipal Tiger Reserve. Ideal refuge cover areas are meadows in Upper Barhakamuda and Devasthali.
- 2) **Ambush cover:** This means any cover used by a predatory animal for ambushing its prey. It can be vegetal or non-vegetal. Thus status of non-vegetal cover is fairly good in Similipal Tiger Reserve. Grasslands and meadows in Jenabil are the unique habitat to serve as ambush cover.
- 3) **Loafing Cover**: Some animals (Herbivores like Sambar, Indian Bison) at certain points of time may prefer to spend their time aimlessly at some secluded place in a habitat. Any place offering shade in summer and providing adequate protection from wind in winter can be treated as loafing cover.Pure Sal forest patches in the Khairi Forest Block, West DeoForest Block,Palpala Forest Block, Budhabalanga East and Budhabalanga west Forest Blocks of Similipal Sanctuary.
- 4) **Breeding Cover**: This is much important in mammals since they exhibit parental care. Certain birds also have well built nests during the breeding season where the young ones are nurtured. Tall grass can serve as breeding cover to certain animals. The status of this cover at present is adequate. Jenabil Grassland, Chahala grasslands serve as breeding cover for many birds, lizards and snakes.
- 5) **Roosting Cover for Birds:** Birds require a safe place for resting which is known as 'Roosting Cover'. All waterfall sites serve as good roosting cover. Barehipani water fall, Joranda waterfall, Chingudia Waterfall, Gunduria, Shisha, Dhundubasa Waterfalls are the roosting cover sites.

#### 2.3.2. Food

Food is an essential pre-requisite for any organism. Its availability in a habitat changes with season. Herbivores depend on the plant material for their sustenance where as carnivores survive on the availability of prey animals. The herbivore food material is lower in energy when compared to those of carnivores.

Animals, especially herbivores are 'selective feeders' and their food preference is related to palatability. The most relished food material is the first choice or preferred food. Food second in choice but nutritionally good is called as 'staple food' where as those ingested to fulfill short term requirements or to relieve hunger are known as emergency materials or 'stuffers' respectively. The animals here are occasionally forced to feed on low preferential food due to habitat disturbances. Carnivores resort to cattle lifting in search of an 'Economic Prey.'

# 2.3.3. Species and Communities of Conservation Importance; Key Areas

**Bija:** This is the most frequented species occurring in majority of the forest blocks in fair proportion attaining to good sizes. West Deo, Khairi, Bhandan, Palpala Forest blocks have good numbers of Bija trees and have good regeneration.

**Terminalia:** This is the characteristic species of clay loam soil and occurs in most of the blocks attaining very good sizes in. DHAURA, HALDU and MUNDI are normally found in most of the Forests in fairly high proportion. East Deo, Palpala, West Deo 27-32 Forest Block, Salandi Forest blocks, and at Budhabalanga FB of Similipal Sanctuary.

## 2.3.4. Key Areas:

Edges: Animals with limited mobility but having varied requirements from the habitat benefit more when the edges are present in abundance. An edge is the place of contact between plant communities or successional stages or vegetative conditions. The area which is influenced by the transition between plant communities or stages is called as an Ecotone. *Inherent edges* are relatively stable and permanent features of a particular area. It is obtained when plant communities meet in a habitat, which occur due to certain natural factors i.e. Difference in topography, geomorphic differences and changes in microclimate. *Induced edge* on the other hand is short lived and occurs when two succession stages or vegetative conditions within a plant community meet. Various environment factors like grazing, planting activities, fire, logging operations, and erosion create induced edges. Both induced and inherent edges are in sizeable proportion though of low contrast. All the forest blocks of the Similipal Tiger Reserve having meadows are having adequate EDGES or ECOTONE areas.

**Snags:** Snag means a standing dead tree which is devoid of leaves and branches. Snags can be classified as HARD or SOFT. Hard snags are free from decay

where as soft snags show stages of deterioration. Many species of fungi, mosses, lichens use decayed wood as a substratum for growth. Invertebrates use the space in between bark and timber as a habitat. Birds excavate cavities or use the existing one for nesting, roosting or even perching. Mammals use them as dens or as escape cover, some times they are also used by bats for roosting. When a tree dies, it undergoes a series of changes known as SNAG SUCCESSION. Each stage of snag succession is of importance to a particular wild animal in a habitat. All the forest blocks comprising the Similipal core area is adequately represented with SNAGS. But snags are relatively less in buffer area of the tiger reserve.

Dead and Down Woody Materials: The dead and down woody materials on the floor of a forest has many valuable functions in a wildlife habitat. The trunks of dead and down trees constitute a source of food for certain birds like wood peckers, branches as perches and cavities for nesting purposes; the root portion is also used by many partridges. For nesting, small vertebrates and invertebrates use the space between the bark and the wood materials as a habitat. Fire which is most frequent in this area affects the dead and downy materials. Most of the slash which constitute fire hazard is completely destroyed by fire. Many wild animals even use the fallen logs as hiding cover and as sites for feeding and reproduction. After the judgment of Apex Court of the country, these dead and downy woody materials percentage has increased considerably.

**Riparian Vegetation:** Vegetation growing along the stream banks are called riparian vegetation. These vegetationharbours many animals and also serve as corridors for animal movement. Such sites are available in plenty through out the core area. Such sites are found at Bhadragoda valley, Tarinibilla, Patbil and numerous small swamps at Devasthalli, Bachhurichara, Sapaghar, Matughar, Tiktali and Chahala.

All open areas, forested blanks, highly disturbed areas such as deserted villages, road sides, habitations, fire affected areas inside the Sanctuary have been invaded by weeds which are fast growing in nature and cover the entire area preventing any type of growth beneathto come up. As they are not palatable they reduce the forage availability to wild ungulates and destroy the habitat. The infestation of weeds is not alarming due to dense vegetation. The weeds available inside Similipal Sanctuary are *Eupatorium odoratum*, *Ageratum conyzoides*.

The aquatic vegetation otherwise termed as riparian ones consist mainly of Arjuna, Jamun and Karanj species. The same is found in various forms i.e. standing, emergent, and floating as well as under submerged condition along streams, rivers.

Edge manipulation is a very common practice in habitat management. Many species of wild life are animals of edges and their abundance is increased in a

habitat if the quantum of edge is enhanced per unit area. By resorting to planting the edge effect can be maximized provided, it is shaped in proper way.

# **Swamps and Marshes**

Swamps and marshes in Similipal are locally called as "Daldali". The list of Daldalies inside Similipal core area is given in Annexure XXVIII.

# 2.4 WILD FAUNA, HABITATS AND TROPHIC NICHES

Many wild animals including some endangered ones like tiger, panther, elephant, gaur and four horned antelope etc. are found in different levels of abundance. Ratel, pangolin, giant squirrel, flying squirrel, sambar and chital are among the other few worth mentioning. The status of avi-fauna, herpeto-fauna is not precisely known. However, estimation of population density of different animals gives an indication about their status. Census figures for some of the major species are given overleaf.

SI No.	Name of the species	Number	Year of census
1.	Tiger	101	2004
2.	Leopard	127	2004
3.	Elephant	334	2012
4.	Bison	1243	2004
5.	Sambar	10185	2004
6.	Spotted deer	3548	2004
7.	Barking deer	12248	2004
8.	Wild boar	14538	2004
9.	Mouse deer	4013	2004
10.	Squirrel	10660	2004
11.	Hanuman Langur	47265	2004
12	Rhesus macaque	3079	2004
13	Wild dog	24	2004
14	Mugger	89	2007
15	Mugger	68	2008
16	Mugger	No census	2009
17	Mugger	78	2010
18	Mugger	85	2011
19	Mugger	82	2012
20	Mugger	80	2013

## **Elephant Census in STR (Core Area):**

Census Year	Adult Bulls (>240 cm)	Adult Cows (>210 cm)	Adult US	Sub- Adult Bulls (151- 240 cm)	Sub- Adult Cows (151- 210 cm)	Sub- Adult US (151- 210 cm)	Juvenile (121- 150 cm)	Calf (< 120 cm)	Grand Total
2002	77(01 Makhana)	237	3	-	-	-	27	68	412
2005	30	151	7	4	19	4	17	60	292
2007	29	137	_	37	31	-	11	53	298
2010	22	107	_	17	94	05	14	72	331
2012	15	155	-	25	49	-	37	53	334

## Important invertebrates, their status:

The invertebrates are much more diverse in Similipal and equally significant in their ecological role compared to vertebrates. But they have been left unstudied to a large extent. All the major phyla including annelids, arthropods and molluscs occur in Similipal but taxonomic studies are yet to be taken up. Honeybees, Termites, Butterflies and Moths are found in abundance. Presence of certain insectivorous birds like Indian Roller, Flycatchers, Bee-eaters and Drongos in large numbers indicates the richness of insect population. Earthworms, ground leeches are the prominent annelids. Invertebrates are available all through Similipal with varying congregations.

Rao and Satpathy (2003) report about modal ecorace of silkworm (Antheraea mylitta), which is unique to Similipal and adjoining area. Sethy (2004) communicates 169 species of invertebrate fauna (Mollusca-9, all Gastropoda; Arthropoda-19, 1 millipedes, 2 centipedes, 1 crab, 2 scorpions, 13 spiders; Insecta-141, 42 grasshoppers/crickets, 10 dragon flies, 42 butterflies, 6 true flies, 24 beetles, 6 termites/ants, 4 bugs, 4 bees, 3 aphids/leaf hoppers) as a brief report on the inventory of invertebrate-faunal diversity in Similipal based upon his 04 field visits covering three seasons during 2003. Jena (2004) reports two species of leeches (Gnathobdellide)in Chahala Range of Similipal Tiger Reserve.

#### Distribution of animals and habitats

The census of tiger and panther reveals a distribution pattern of big cats and accordingly territories are mapped. Similar mappings cannot be attempted for elephants, as there is always internal migration throughout the year. Only preliminary work has been done on the distribution of herbivores under normal condition. A distribution factor has been assigned for some major mammal and distribution maps have been prepared for four-horned antelope, bison and giant squirrel. Based upon sightings and other evidences, it is quite clear that South Similipal possesses more herbivores than other area created by juxtaposition of grasslands, riparian zones and woodlands. However, the extent of such favoured habitats is highly restricted inside Similipal. The meadows inside the valley are prone to invasion of woody species. The details of tiger occupancy and prey animals have been discussed along with maps in Chapter- 3.

## 2.5 MAJOR CONSPICUOUS CHANGES IN THE HABITAT SINCE INCEPTION

Due to managerial intervention and interpolation of various forest conservation practices the habitat has undergone changes like availability of water holes and salt licks. The meadows have been developed. Due to fire protection measures and protection of the forests against illicit felling the ground flora have become conspicuous and the canopy is being recouped. The positive and negative changes can be summarized as follows:

## Positive:

- 1. The total lack of large lentic waterbodies have been addressed by construction of water bodies like Dhuduram and Karkachia.
- 2. Due to protection effort and active management of salt-licks, animal visitation and sightings have improved substantially.
- 3. A series of meadows have been maintained in the core area, especially the southern side, which has increased the habitat for ungulates.
- 4. Continued and effective fire protection in the core has resulted in luxuriant and moisture-loving ground flora, especially in semi-evergreen patches.

## **Negative:**

1. Due to the continued presence of three villages and two settlements in the core area, signs of biotic interference like overgrazing, weed infestation etc. are seen in areas surrounding those villages.

- 2. Due to almost complete prevention of illegal felling and fire in the core area, meadows are getting encroached by woody vegetation which though is a natural process of succession, makes the effective habitat available for herbivores less.
- 3. During March & April, 2009 there was a series of attack by Left Wing Extremists in Similipal Tiger Reserve by which all the staff staying in side the Reserve vacated their camps out of fear and came out. This situation continued for more than one year. During that period rampant poaching of animals and illicit felling of timber took place. This resulted in drastic reduction of prey base of tiger. The details of the damages caused in the attack have been given in Annexure LVII.

# STATUS OF TIGERS AND CO-PREDATORS

### 3.1 DISTRIBUTION

#### 3.1.1. Tiger

Historical records indicate that Tiger was almost uniformly distributed throughout the reserve. But an analysis of the trends in spatial distribution based on the 2004 census reveals that they are now concentrated on the southern side. The distribution of tigers and leopards according to the 2004 census is given in Annexure XXXVIII.

Subsequent monitoring including the on going phase-IV monitoring indicates presence of tigers mostly in UBK, Jenabil and National Park Range.

# 3.1.2. Leopard

Leopards are more widely dispersed, and their distribution as per the 2004 census as shown in Annexure XXXVIII.

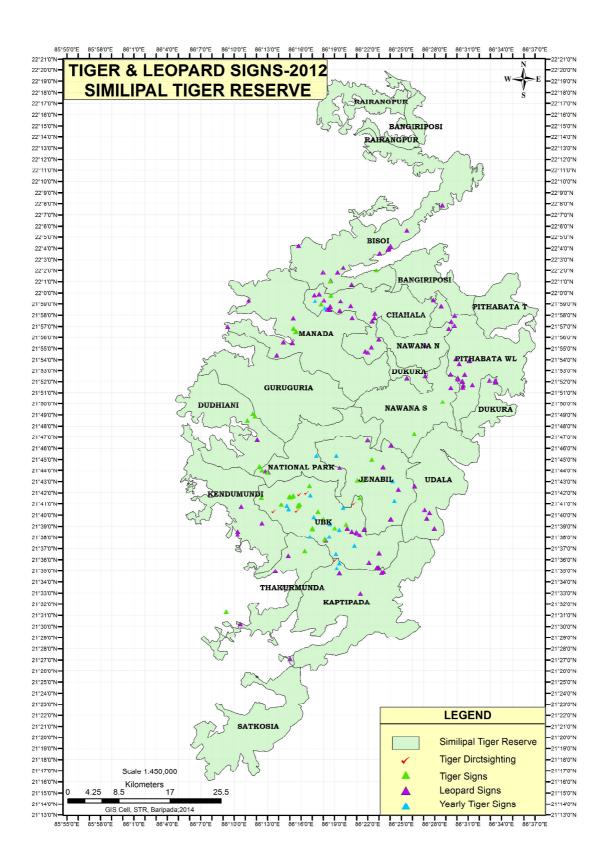
In 2006, estimation of tiger and co-predators had been done in collaboration with Wildlife Institute of India and the report was published in "Status of Tigers, Co-predators and prey in India" by NTCA in 2008. As per the report Similipal Landscape comprising of 3824 km² patch of forest has recorded tiger presence in 2 units having a total tiger occupancy of 2297 km² with an estimated tiger population of 20 (17-34) tigers.

As per the "Status of tigers, co-predators and prey in India, 2010" published by NTCA, tiger occupied area in Similipal was 2297 km² in 2006 where as it was reduced to 1088 km² in 2010. This may be due to disturbance caused by naxal attack in Similipal in 2009.

The distribution of tiger has been assessed after the carnivore sign survey conducted in 2012 as part of Phase-IV tiger monitoring which can be seen from the map overleaf.

#### 3.1.3. Dhole

Population of Dhole seems to have fallen steeply over the years, so much so that there have been no recent sight records for the past several years. This is not surprising as sudden fluctuations in wild dog populations with a cyclical rise and fall is a phenomenon, which has been known from other parts of our country,



especially South India. Srivastava& Singh (2003) mentions that in Similipal Tiger Reserve, the wild dog (dhole, *Cuon alpinus*) was found "in small groups" during 1970s, and the status was "low" in 1980s. An estimate in 1990 put the number at 400-428 dogs in 104 packs. In the late 1990s the dhole was rarely sighted. Competition faced from village dogs is considered as one of the "introduced" factors responsible for the changing status of the dhole in Similipal. The gradual reduction in sighting of dhole in Similipal between 1970s and 1990s could be a positive sign for the growth of population of tiger but the possible reason for their gradual reduction is a matter of concern for biodiversity conservation. It is suggested that as long as households existed in PAs, it will be necessary to enumerate and monitor the populations of domestic and transient dogs along with populations of the humans and cattle.

## 3.1.4. Hyena

Hyena, primarily a scavenger, occurs only in the fringe areas, mostly along the scrub and ravine country near villages and thus comes into no direct contact with either Tiger or the Leopard.

#### 3.1.5. Sloth Bear

Sloth Bear has a patchy distribution inside the reserve, occurring in rocky slopes and dry deciduous slopes, mainly in the outer peripheral areas with very low concentration in the core area. The main areas of occurrence in the core area are Badghati-Brundaban in Chahala, Bhajam in Pithabata and Kulipal at Jenabil.

### 3.1.6. Wolf

Wolf is virtually unknown from within the reserve, but for isolated reports from the fringe foothill areas and the adjoining scrubland including the vicinity of Manbhanga village at Kaptipada and scrub forests of Thakurmunda.

The status of distributional range of tiger and co-predators in the Critical Tiger Habitat of Similipal have been derived from the sign survey done in 2012 in the on going Phase IV monitoring which is given overleaf.

# 3.2 ABUNDANCE STATUS

## 3.2.1. Tiger

A total of 101 was estimated during the pug-mark census undertaken in 2004. The NTCA report released in 2008, says that 'Simlipal Landscape comprising of 3824 km<sup>2</sup> patch of forest has recorded tiger presence in 2 units having a total tiger occupancy of 2297 km<sup>2</sup> with an estimated tiger population of 20 (17-34) tigers'. As per

the Status Report of Tigers, Co-predators and Prey in India, 2010 published by NTCA, in 2010 the abundance was 23 (12-34).

# 3.2.2. Leopard

A total of 101 was estimated during the pug-mark census undertaken in 2004.

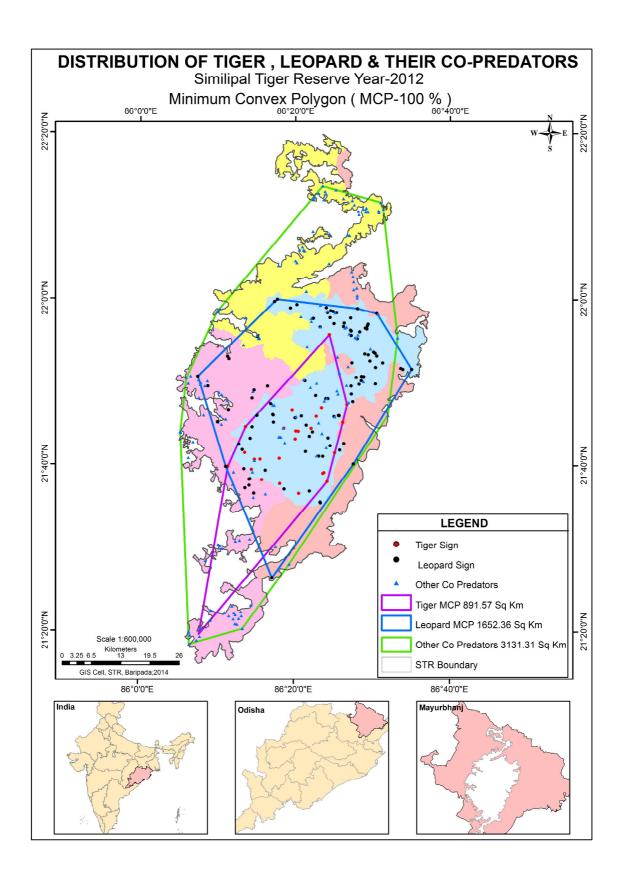
Status of distributional range of tigers and leopards in Similipal Tiger Reserve, 2012. (pre monsoon & post monsoon)

Species	Site occupancy (psi)	Detection Probability (p)	AIC value
Tiger	0.52±0.07	0.61±0.05	193.6
Leopard	0.62±0.07	0.51±0.06	208.2

Status of distributional range of tigers and leopards in Similipal Tiger Reserve, 2013 (pre-monsoon)

Species	Site occupancy (psi)	Detection Probability (p)	AIC value
Tiger	0.60±0.15	0.25±0.07	190.1
Leopard	0.74±0.06	0.51±0.05	284.5

Estimated site occupancy or Naive estimate (psi) of tigers in Similipal Tiger Reserve were  $0.52\pm0.07$  (SE) and detection probability (p) was  $0.61\pm0.05$  (SE) whereas the Site occupancy of leopard was  $0.62\pm0.07$  (SE) and detection probability  $0.51\pm0.06$  (SE) in 2012. However, in 2013 the estimated site occupancy of tiger in the Similipal tiger reserve was  $0.60\pm0.15$  (SE) and detection probability was  $0.25\pm0.07$  (SE). Similarly the estimated site occupancy of leopard was  $0.74\pm0.06$  (SE) and detection probability  $0.51\pm0.05$  (SE). The estimated occupancy of tiger in the overall STR core division was 11%, where as the estimated occupancy of leopard was 49%.



Status of distributional range of other co-predators in STR core (1194.75 km²), in Similipal TR, 2012.

Species	Site occupancy (psi)	Detection Probability (p)	AIC value
Bear	0.07	0.21	139.9
Hyena	0.23	0.03	42
Jackal	0.01	0.01	46.5
Jungle Cat	0.13	0.28	73.1
Wolf	0.19	0.03	32.6

#### 3.2.3. Dhole

A total of 24 were estimated during the animal census undertaken in

# 3.2.4. Hyena

2004.

No estimate has been done.

### 3.2.5. Bear

No estimate has been done.

## 3.2.6. Wolf

No estimate has been done.

#### 3.3 PREY-PREDATOR RELATIONSHIPS

Though systematic investigations into the dynamics of prey-predator relationships have not been carried out, analysis of direct sightings, indirect evidences and scats reveal the prey preferences of Tiger and its main co-predator the Leopard. Large-sized prey like Gaur can be killed only by the Tiger, though Sambar and Wild Boar remains its preferred prey. Leopards seem to prefer Muntjac, Chital, Langur and smaller mammals like Porcupine. Hence, a sort of resource partitioning based on prey size exists. The virtual absence of Wild Dog makes the picture less complex as there is no direct competition for the Tiger as regards large prey.

# 3.3.1. Density of Prey species

The density estimation of prey species have been done in "Distance" software on the basis of data obtained from line transect survey done in 2012 as part of Phase-IV tiger monitoring. The density of different prey species in the core area is

given overleaf. Common langur was found to be the most abundant prey species in STR core with a density of  $10.2/\text{km}^2$  in winter and  $16/\text{km}^2$  in summer followed by rhesus macaque (6 /km² in winter and  $7/\text{km}^2$  in summer), chital (5 /km² in winter and  $3.8/\text{km}^2$  in summer), wild pig (3.2±0.7 SE/km² in winter and  $4.8\pm1$  SE/km² in summer), sambar (2.8±1.8 SE/km² in winter and  $4\pm1.8$  SE/km² in summer), barking deer (1.6±3.2 SE/km² in winter and  $1.6\pm0.4$  SE/km² in summer) and mouse deer (0.6±0.2 SE/km² in winter and  $1\pm0.2$  SE/km² in summer) in that order.

Table . Detailed analysis of herbivore density (per 100 sq km) in Similipal Tiger Reserve Core by distance sampling method during 2012

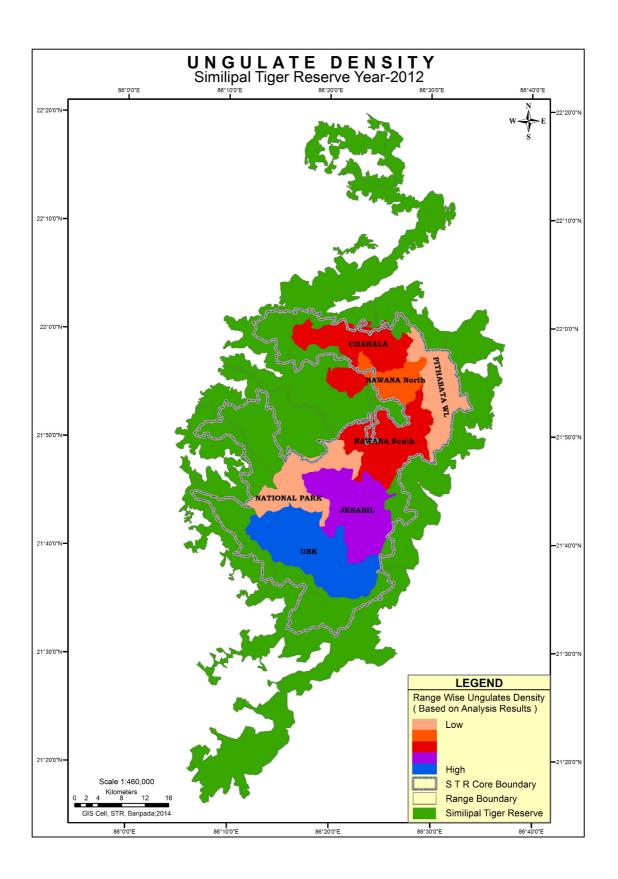
**ESW**-Effective Strip Width, **GS**-Group Size, **SE**-Standard Error, **Dg**-Group Density, **CV**-Coefficient of Variation, **D**-Individual Density, **LCL**-Lower Confidence Limit, **UC**L-Upper

Species	Observ ation	ESW (m)	GS ± SE	Dg ± SE	%CV	D ± SE	%CV	LCL (95%)	UCL (95%)
Barking Deer	230	27.6	1.4 ± 0.4	109 ± 24	22.7	161.7 ± 37.2	23	101.7	257
Chital	40	18	5.4 ± 0.7	91.6 ± 35.3	38.6	501.2 ± 204.2	40.7	201.3	1248
Sambar	91	25.1	2.3 ± 0.1	113.2 ± 53.2	46.9	262.8 ± 124.8	47.4	92.2	748.7
Mouse Deer	21	15.8	1 ± 0.3	66.3 ± 17.3	26.1	66.3 ± 17.4	26.3	37.2	118
Wild Pig	145	29.9	4.6 ± 0.3	71.2 ± 13.9	19.5	332.2 ± 68.6	20.6	217.8	506.9
Rhesus Macaque	60	16.7	8.5± 0.8	68.8 ± 12.4	18.1	592 ± 122.6	20.7	390.7	897
Common Langur	248	24.2	7.6 ± 0.3	134.4 ± 25.6	19.1	1024 ± 201	19.6	691	1517.6
Bison	4	50	3 ± 1	20 ± 0	0	60 ± 21.6	36	19.7	182.2

**Confidence Limit** 

Table. Seasonal variation of prey densities in Similipal Tiger Reserve Core, (2011-2012)

Prey	Number of observations (W)	Number of observations (S)	D ± SE (W)	D ± SE (S)	DS±SE (W)	DS±SE (S)
Barking Deer	230	211	1.6±3.2	1.6±0.4	1.4±0.4	1.4±0.5
Chital	40	36	5 ± 2.2	3.8±1.2	5.4±0.7	3.2±0.4
Sambar	91	89	2.8±1.8	4± 1.8	2.3±0.1	2.6±0.2
Mouse Deer	21	23	0.6±0.2	1± 0.2	1 ± 0.3	1 ± 0.3
Wild Pig	145	131	3.2±0.7	4.8± 1	4.6±0.3	4.2±0.2
Rhesus Macaque	60	59	6 ± 1.6	7± 1.4	8.5±0.8	8.2±0.8
Common Langur	248	227	10.2 ±2	16± 2.7	7.6±0.3	8 ± 0.3
Overall Prey	835	774	4.9±0.6	6.9±0.8	4.7±0.1	4.4±0.1



#### 3.4 ASSESSMENT OF THREATS

## 3.4.1. Infringement on Inviolate area

Tiger is a shy and solitary animal requiring large undisturbed area for its survival. Presence of three villages within the core area is a serious threat. The breeding success of a tigress depends on the extent of inviolate area. The core area seems to be perforated by the presence of these villages, tribal settlements within the core area. Two settlements of primitive tribe are in Upper Barakamuda and Bahaghar. They have no agricultural land and NTFP collection is their only means of sustenance. Least disturbed area is best suited as tiger habitat. Also presence of multiple settlements in adjoining buffer area is a serious threat for dispersing and transient tigers. The presence of a number of villages adjoining the core boundary put a lot of pressure on the core in the form of grazing, fire, NTFP collection and other forms of biotic interferences.

# 3.4.2. Poaching and illicit felling

Poaching is another major threat to tiger population. Poaching of major prey species in Similipal is of a major concern. Poaching pressure is more from the villages on the western part of the Reserve. Poaching in Similipal is done through fire arms, bow & arrow, snaring and other local methods. Depletion of prey base in turn affects all other carnivores. Periodic poaching incidences may cause serious detrimental effect to the carnivores. Illicit felling of timber though limited to selected pockets in core area like Baunskhal, Chakidi, Kabatghai, Kairakacha, Dhudram, it posses threat to the habitat. Selective felling of Bija and Champa trees in buffer area has resulted in almost depletion of those trees in the buffer and now the timber smugglers are eyeing on the trees of those species available in core area.

## 3.4.3. Akhand Shikar

The tribal communities surrounding Similipal have a tradition of ritualistic mass hunting called "Akhand Shikar" where the villagers in hundreds enter the park particularly during "Maha Vishubha Sankranti" in April with bows and arrows for hunting of wild animals. Now a days with dilution of the tribal culture the bow and arrows have been replaced with more destructive guns and the practice is going on throughout the year.

# 3.4.4. Elephant poaching

Elephant killing is another threat to the park. Targeted elephant poaching for ivory by outsiders with the help of local people is an acknowledged

threat. In most of the cases the elephants are killed by poisoning in salt licks and water sources. Sometimes poisons kept to kill herbivores for bush meat are eaten by elephants resulting in killing of a number of elephants, male, female and calf at a time. The death of elephants in last 3 years in Similipal has been given in Annexure LII.

# 3.4.5. Intrusion of tribal from Jharkhand

A number of tribal settlements in the buffer and in close proximity to core area have people migrated from Jharkhand. Their population is slowly expanding with clandestine settlement of their kith and kins from Jharkhand in those villages. Some times poachers from Jharkhand take shelter in those villages and with the help of the villagers kill animals and return to their state by which it becomes difficult to apprehend them.

#### 3.4.6. Undercurrent of extremism

During 2009 from 28<sup>th</sup> March to 15<sup>th</sup> April the park was subjected to a series of naxal attack in which a lot of damage to the infrastructures at many places in the core area took place. All the staff vacated their camps out of fear and the park was open to the vagaries of the timber smugglers and poachers. This situation continued for a period of about one year after which normalcy returned gradually. The detail of the damages caused by naxal attack is given in Annexure LVIII.

Though naxal activities are not reported now but there is undercurrent of naxal activities in the fringe areas of the park.

# HISTORY OF PAST MANAGEMENT AND PRESENT PRACTICES

### 4.1 CONSERVATION HISTORY

Forest management in Mayurbhanj dates back to later part of nineteenth century. A forest policy was declared before 1885 by the then Maharaja of Mayurbhanj. In the year 1888 one Forest Ranger and a Peon were appointed for management of forests. The Reserve Forests of Mayurbhanj were under the management and control of the forest department whereas other protected forests were under the charge of revenue department. The Reserve Forests were more or less stable and permanent in nature but protected forests were maintained to meet the requirement of the royats and residents and also subject to clearance for cultivation. The forest area was being given under 'Amal-Nama' lease by the revenue authorities and leases for reclamation of reserve forests were given under the special sanction of the Ruling Chief. Thus the extent of reserve forests and protected forests decreased.

In 1907 a State Forest Department was created with Mr. J. A. Martin, State Engineer as head of the Department. As the forest management intensified, the protective staff came under the jurisdiction of Mayurbhanj. In 1906 a survey party demarcated the boundary line from Talabandha to Similipalgarh to form a working circle for giving lease to M/S B. Borooah& Co.

In 1904 the Mayurbhanj narrow gauge railway line was built up to Baripada. This line was of immense use in transportation of timber. Huge quantity of timber used to be extracted from plain forest mainly Reserve Forests. The 30years lease of Bholanath Borooah & Co expired during 1946. There was no systematic working of the forests for which Similipal Reserve Forests during 36years lease, was worked twice and north Similipal three times. East Similipal, which was withdrawn from the lease in the year 1922, was worked like the rest of the Similipal Reserve Forests through several contractors.

The first working plan was prepared by Mr. C. C. Hart in 1896-97. This was revised by Mr. B. M. Dasgupta in 1946. B. M. Dasgupta prepared the first working plan for whole of Similipal reserve forests for working under selection cumimprovement system. But after about 6 years Dasgupta's plan was replaced by the

working plan of reserve forests of Mayurbhanj state by Mr.SripalJee during 1953-54 after integration of Mayurbhanj state to the Union of India on 6th November 1948, which became part of Odisha as a district on 1st January 1949 only. This plan was revised separately for Karanjia and Baripada Divisions by Sri R. Mishra and Sri S. Bose respectively during 1973-74.

Despite practicing commercial forestry, supplying railway sleepers and other utility timber outside Mayurbhanj, the Ruler was very rigid in his forest protection measures and employed large number of forest staff, much higher in number in comparison to other princely states and even the directly British administered areas with good network of forest roads and communication facilities.

Protection suffered a lot after independence in 1947 when forests were drastically reduced. Mayurbhani state merged with Odisha state in 1949. Mr.Saroj Raj Chaudhury, an eminent wildlifer of the country took charge as first Field Director of Similipal Tiger Reserve on dated 05.12.1973. The Govt of Odisha vide notification no.18703/FFAH dated 6th august, 1980 notified the intention of the Govt. to declare 303 km<sup>2</sup> of the northern portion of Similipal as National Park. This constituted the core of Tiger Reserve. As this area was not considered sufficient as core, 542.70 km<sup>2</sup> was added to this by notification no.19525/FFAH dated 11th June, 1986 bringing the total area of core to 845.70 km<sup>2</sup> which came fully under the control of the Project Tiger. Rest of the sanctuary area was under the control of Baripada, Karanjia and Rairangpur Divisions. Similipal Forest Development Corporation was formed in the year 1979 to work the timber and N.W.F.P. operations in Similipal besides taking up other developmental works within the forest. After complete moratorium in the tree felling was imposed in 1988, Similipal Forest Development Corporation (S.F.D.C.) stopped working in Similipal. The present core or Critical Tiger Habitat of 1194.75 km° was declared in 2007.

## 4.2 HABITAT MANAGEMENT

#### 4.2.1. Meadows

Improvement to living condition of the wild animals is ensured through management of water sources, meadows and salt licks. The improvement works to the existing water sources has already been described in Chapter-2. The meadows are being maintained in every year through eradication of woody species and coarse grasses and introduction along with promotion of new grasses through sowing of grass seeds and early controlled burning of the meadows.

#### 4.2.2. Saltlicks

Like wise the saltlicks both natural and artificial are being maintained through freshening and supplementation of salts. The list of saltlicks available in the core area is given in Annexure XXIX.

## 4.3 PROTECTION AND INTELLIGENCE GATHERING

The forest protection and collection of intelligence has gained prime importance. Since the inception of the Reserve it has undergone a series of changes with an eye to the ground realties. It has resulted in ensuring protection of the landscapes from the clutches of axe, saw, bow and arrow and gunshots. For the purpose of proper protection 63 anti-poaching camps have been established in the core area manned by one Forester/ Forest Guard and assisted by 6 Protection Assistants engaged on daily wages. The camps have been equipped with VHF and solar lighting system. The staff of each camp goes on foot patrolling as a daily schedule covering all the sensitive routes and points. They maintain a daily patrolling register at each camp. Special strategies are adopted for monsoon patrolling and to prevent Akhand Shikar. The list of anti-poaching camps in the core area is given in Annexure XXX.

#### 4.4 TOURISM AND INTERPRETATION

The tourism activity has been extended over 130 km road length, which is confined mostly to the buffer zone of the Tiger Reserve. Only a small area at Chahala (0.05 sq km)is coming under core area where day-tourists are allowed to visit. Besides, the tourist route passes through stretches of forests in core area between Bhajam-Nigirdha over 18 km, Haldia Chhak to Chahala via Brundavan over 15 K.m and a small transit route near Kalikaprasad gate over 5 K.m. Out of the total road length of 600 km in the core area, thus 38 km of road have been used for tourism from the very beginning. Tourists were allowed to stay at Chahala complexes prior to naxal attack (2009), when the accommodation facilities in these locations were destroyed. However, no tourists are now allowed to stay at Chahala since then.

### 4.5 RESEARCH AND MONITORING

Research and Monitoring are two major activities in professional conservation practices. These activities can be in scientific, socio-economic and management oriented sectors. Similipal is an interesting and unique place for ecological and wildlife studies because of its bio-geographical situation, geological features, the international recognition as one of the first nine prime areas for tiger conservation and for being one of the first eight Biosphere Reserves of India.

#### 4.5.1. Research

In the management of an area, research plays a significant role. The various new pieces of information and facts that come into light ultimately find a place in the management prescriptions. Research is solely responsible for bringing back many endangered species from the threshold of extinction.

# 4.5.1.1. Present status of research in Similipal

#### Research on flora

# Floristic survey

- A team from Regional Research Laboratory, Bhubaneswar led by Saxena and Brahmam (1989) recorded 1076 spp. of plants for the Similipal hills. There are only two species of Gymnosperm and 60 species of ferns. The dicotyledonous: monocotyledonous species %ratio is (71.5:28.5) for Similipal as against (68.9):(31.1) for Odisha and (81.3):(18.7) in the world flora. The higher percentage of monocotyledonous spp. for Similipal is due to higher number of grasses. There are 150 species of grasses in families Poaceae: 107 species and Cyperaceae: 43species.
- An updated checklist of flora of Similipal Biosphere Reserve has been published by STR (Kar & Nayak, 2014), which indicates presence of more than 1352 spp of flora.
- Mishra (1997) made an inventory of the endemic/endangered/vulnerable/ rare plants of 52 species of Similipal forest basing on his field observations, data from herbarium collections and published literature on the flora of Odisha.
- ➤ Dhal et. al., during 2011-13 conducted the work on diversity assessment and documentation of Pteridophytes of Similipal Biosphere Reserve. They report 71 species of Pteridophytes from Similipal Biosphere Reserve.

#### **Orchids**

➤ The work of Saxena and Brahmam (1989) mention 45 spp. of orchids. Mishra(1997) reports further 48 spp. of. Similipal is now having of 94 species of orchids which includes three endemic species, one representative of the Indian flora and a good number of rare/ phytogeographically interesting species.

## Coix aquatica

During winter, 1993-94 two Professors from the Botany Department of Marathwada University located the grass *Coix aquatica* near Ransa in Similipal. Earlier, the species was recorded outside the Tiger Reserve.

## **Bio-diversity Index**

- Swain and Nanda (1997) made the vegetation study in the newly created preservation plot inside core area of Similipal (National Park Range) which reveals the Importance Value (IV) of Shorea robusta being the highest in the overwood whereas that of the Mallotus philippinensis and Cyperus rotundus are highest in the middle storey and ground flora respectively. The population structure of some species was exhibited by having more numbers of intermediate or high girth classes with the absence of seedlings. Certain species indicate gap phase type regeneration (interrupted). This interrupted regeneration of a species indicates that one or more climatic or bio-edaphic factors inhibited the regeneration completely for certain periods of time and with the return of favourable condition the species was able to regenerate again.
- Mohanty (2001) report that the species diversity index of different layers of the vegetation varies from 1.798 to 3.107 for trees; 2.193 to 2.951 for shrubs and saplings and 2.057 to 3.496 for herbs and seedlings. In case of tree and shrubsapling layer the species diversity index is more in core zone and less in buffer zone. However, the reverse trend is noticed in case of herbs and seedlings.

### **Medicinal plants**

➤ Pandey and Rout (2005) report 267 species of medicinal plant in Similipal. Dicots and monocots are represented by 63 and 5 families respectively. Six families represent Pteridophytes. Sixty-three species have been introduced in the Medicinal Plant Nursery at Ramatirtha near Jashipur.

### Research on fauna

## Tiger and leopard

- ➤ Based on observation made on a free-living pet tigress, Khairi, Choudhury (1999) reports several aspects of reproductive biology, senses and inter-specific interactions of tiger. Singh (1997) informs that during the same period Mr. R. L. Brahmachary studied the marking fluids of Khairi for chemical description of the pheromones. The study was later pursued on tigers at Nandankanan.
- During 1989-1993 repeated surveys on Tiger population have led to inferences on the biology and population dynamics of tiger and leopard in the wild in Similipal. Polygamy is more pronounced in tiger when compared with leopard. The sex ratio may be 1:1 at birth but it favours females in the prime breeding territories. About 12% of female tigers litter every year and 72.2% of cubs

belong to tigresses with hind pugmark lengths 12-13.9 cm. Young tigers with pug lengths 9.0-10.9 cm remain away from main territories while trying to set their own territories. (Singh, 1997).

- ➤ Singh (1997) further reports from analysis of the records of tigers with aberrant colours- the stripeless, white, melanistic and black etc. that the body colour of tiger can vary over a wide range of aberrant colours with 'no stripes' to 'completely black' tigers. The intermediary stages include various shades of white tigers, the pallid or golden tiger, various shades of normal yellow tiger, the brown tigers, the melanistic tiger and the blue tigers. All these possible colour occur according to a normal distribution curve in the wild gene pool of *Panthera tigris*. The dome is occupied by different shades of 'normal colour' tigers, while the aberrants occupy various regions of the dome of the curve. The aberrants reappear in a population in normal course of time as throwbacks and not because of identical repetitions of mutations. The details have appeared in a series of publication from Similipal including a final compilation as Singh, L. A. K. (1999): Born Black The Melanistic Tiger in India. WWF-India, New Delhi, 66p.
- ▶ Population estimate of tiger and leopard was earlier made by an indirect method of estimating the minimum size of the total population (whole count). It was carried out in the month of January once in two years by pugmark census technique. It was evolved during 1972 by Late S. R. Choudhury (Choudhury, 1972) and refined during 1990s [Singh, L. A. K. (2000): Tracking Tigers: Guidelines for estimating wild tiger populations using the Pugmark Technique. (Revised Edition).WWF Tiger Conservation Programme, India.]2004 pugmark census records tiger − 101 (male-28, female-41 & cub-32) and leopard − 127 (male-44, female-64 & cub-19). A new method of monitoring tigers, copredators, prey and their habitats has been introduced since 2006 and monitoring is still in progress.
- ➤ Habitat utilization by tiger has been studied round-the year which highlight the dynamics of habitat-sharing by tigers and leopards of either sex.
- Sighting of tiger and its signs are recorded with GPS readings and mapped in a GIS domain.

#### **Elephant**

Most of the available information on elephants have been compiled in a publication titled, Srivastava, S. S. and Singh, L. A. K. (2001): Elephants in Similipal (History, status, issues, techniques and biological notes on elephants) Volume-I. Similipal Tiger Reserve, Baripada, Mayurbhani, Orissa. 200pages

- ➤ Important studies are on the identification of elephant habitats including corridors, the distribution pattern, population status and management issues relating to elephants of Orissa. Another study involved the analysis of the sighting trends of elephants in Similipal during nine years. The 'sighting trend' highlighted aspects relating to population biology of the elephant in Similipal. There has been a significant analysis of male-male aggressions among elephants leading to natural deaths (Singh, 1997).
- Swain (2004) reports elephants in culture and heritage, evolution, taxonomy and distribution, social organization and population structure, food plants and the carrying capacity of forests, migration of elephants and elephant corridors, man and wild elephant conflict, captive elephants, economics of elephant conservation in general and that of Similipal in particular.
- ➤ Direct count of elephants has been used to estimate elephant population in Similipal. During 2012 census there were 456 elephants in Similipal and adjoining area (adult bulls 60, adult cows 273, adult unsex 01and Young/juvenile 122). In the Similipal Elephant Reserve number of elephants in Similipal and adjoining area, which include Kuldiha and Hadgarh, was found to be 788.

## **Prey animals**

- Prey animals include bison, wild boar, sambar, chital, barking deer, mouse deer, hanuman langur and rhesus monkeys. Pre-laid transects such as jeepable roads, animal tracks, foot paths, fire lines, core lines and other demarcating long clearances are covered by the staff around the year with recording of relevant observations on population estimates.
- ➤ During 2004, transect census of prey animals was conducted following the method of Brower et al (1990), according to which, there are bison −1243, wild boar − 14538, sambar − 10185, chital − 3548, barking deer − 12278, mouse deer − 4013, hanuman langur − 47265 and rhesus monkey − 3079 in Similipal.

### Giant squirrel

Singh (1997) reports preliminary study on *Ratufa indica* which highlighted the distribution pattern of the species indicating the quality of forest canopy.

➤ Rout and Swain (2005) reports the census result of 10,660 giant squirrels in Similipal and 24 food plants of this species.

## Herpetofauna

➤ Dutta et al (2005) reports about 77 species (one spp. of crocodilian, 17 spp. of frogs, 14 spp. of lizards, 40 spp. of snakes and 5 spp. of turtles) in Similipal Biosphere Reserve. In addition, about 5 un-described (probably new to science) and 5 un-recorded species have also been found to occur in the Reserve. The herpetofauna of Similipal is the amalgamation of species with wide distribution range, endemics (specifically new and un-described species of frogs), Western Ghat species (colubrid snake Ahaetulla pulverulentus: first record from the State and agamid lizard Calotes rouxii), Northeast Indian species (one rhacophoris frog, one snake: Psammodynastes pulverulentus), Himalayan species (one skink) and central Indian species (fresh-water turtles, lizards).

#### Crocodiles

- One of the important surveys included the survey of the status of mugger crocodiles (*Crocodylus palustris*) in Similipal and monitoring of rehabilitated population. There has been a positive trend of growth of populations of mugger in Similipal. However, because of continued humanpressure on wetlands muggers have not done as well as it should be expected. These studies are significant when voices are raised about commercial utilization of the crocodilian resources under an assumed plea that the group is safe in the wild.
- Studies on Crocodylus palustris have generated or supplemented data on biology, growth variations, and territorial resource partitioning with implication in sanctuary management. Although muggers may peacefully coexist with man and cattle, there are recommendations to consider the territorial habits of the species in order to mitigate man-crocodile conflicts.

## Avi-fauna

Important Avian Surveys have been carried out in the past by U.N. Dev under an Eastern Ghat Project titled "Project Bihang", and by teams from the Bombay Natural History Society. In association with ornithologists from the BNHS and the U.S. Fish and Wildlife Service a checklist of raptors of Similipal has also been of fairly good order. As per his report, over 450 spp. of birds have been identified for Odisha. Of these 265 were recorded in Similipal. A study on the

wetland birds in periphery of Similipal has also been taken up. Two reservoirs, namely Badajora and Haladia on the periphery of Similipal Biosphere Reserve attract winter birds. In this respect the habitat of Badajora is of particular interest. Both these habitats, however, promise for development as good birdwatching sites close to the district headquarters of Baripada in the outskirts of Similipal. As per the recent Checklist of Birds of Similipal Tiger Reserve, 2013 (Nayak & Naik, 2013,), there are 361 Species of birds in Similipal (Annexure XV).

#### **Black-headed Munia**

After reporting about the range extension for *Lonchura malacca malacca* to east of its formerly cited limit in Raipur, a study on the nesting biology of the species was undertaken at Ramatirtha near Jashipur. The birds nest every year in the vegetation in the crocodile pens at Ramatirtha. Apart from nesting ecology of *L. m. malacca*, the study highlights multiple use of an exhibit and methods for environmental enrichment management of crocodiles (Singh & Rout, 1992).

## **Invertebrates**

- Rao and Satpathy (2003) report about the two most famous wild tropical tassarecoraces namely Modal and Nalia (*Antheraea mylitta*). Modal spins the highest silk bearing tassar cocoons in the world and it shows superior values in respect of commercial characters i.e., shell weight (3.64g), SR % (25.68) and filament length (1383m) and have least signs of deformity and diseases.
- ➤ The Zoological Survey of India, Kolkata and its Estuarine Biological Station at Berhampur record 217 taxa from major invertebrate groups and 400 spp. of vertebrate, and a first ever baseline data on alpha or regional faunal diversity from the region.
- Sethy (2004) communicates 169 species of invertebrate fauna (Mollusca-9,all Gastropoda; Arthropoda-19,1 millipedes, 2 centipedes, 1 crab, 2 scorpions, 13 spiders; Insecta -141, 42 grasshoppers/crickets, 10 dragon flies, 42 butterflies, 6 true flies, 24 beetles, 6 termites/ants, 4 bugs, 4 bees, 3 aphids/leaf hoppers) as a brief report on the inventory of invertebrates faunal diversity in Similipal, based upon his 04 field visits covering 03 seasons during 2003.
- > The checklist of fresh water fishes in Similipal has been updated in 2013-14.
- ➤ Jena (2004) reports two species of leeches (Gnathobdellida) in Chahala Range of Similipal Sanctuary.

## **Villages**

- ➤ IIFM, Bhopal has taken up a study in 2006 for a critical socio-economic analysis of the changing demographic profile and livelihood patterns vis-à-vis the concern for conservation of the biodiversity resources of the Similipal Biosphere Reserve (Funded under Central Plan, Similipal Biosphere Reserve).
- Anthropological Survey of India has taken up a study on cultural dimension of tourism eco-oriented as man in the Biosphere during 2006.

#### Research on abiotic factors

## **Geology and Geomorphology**

➤ Similipal is a lenticular elongated plateau with steep slopes of 500 to 600 m on the outer area to 1000 to 1100 m along the centre, which is underlain by an assemblage of volcano-sedimentary rocks consisting of alternate sequence of quartzitic and spilitic lavas. 'Amjhori Sill' was introduced as the last layer and occupied the central part of the plateau. Three drainage systems, Budhabalang from the North, Baitarani from the West and Salami from the South, originate more or less from the plateau traversing deep dissection of the plateau as water falls. The height difference between the plateau and surrounding plains along with weathered rock producing thick soil are suitable for development of dense forest which is less disturbed by biotic interferences. (Iyengar and Banerjee, 1964; Saha, 1994; Mahalik, 1997).

## Meteorology

- Pujari (1997) states that Similipal stands as a water tower and obstructs the flow of monsoonic winds to North in Bihar, West Bengal and Madhya Pradesh. The behaviour of precipitation is comparatively different than other districts. Analysis of rainfall data of 93 years reveals that in this area a 32-33 years cycle is in operation. Distinct phases have been observed with special processes of rainfall behaviour. Further studies reveal that this area is losing substantial amount of precipitation in each phase. It may be pointed out that this hill complex has touched as low as 100 cm during 1974. Proper management practices may be the answer for managing the situation in future.
- ➤ In Similipal five different locations have been selected to record the data from April, 1988. These locations are Ramatirtha in the periphery of Similipal Tiger

Reserve, Chahala and Nawana in North-Similipal, and Upper Barakamuda and Meghasini in South-Similipal. The parameters recorded at these stations are maximum-minimum ambient temperatures, relative humidity at 0600 hr, 1200 hr, and 1800 hr and the rainfall. The instruments used for the studies are standard maximum-minimum thermometers, dial-type hygrometers and manual rain gauge. New units are being purchased and set up in the place of old defunct ones.

#### 4.6 RELOCATION OF VILLAGES

There are 4 revenue villages and 2 settlements inside the Critical Tiger Habitat (Core) of Similipal Tiger Reserve. Revenue villages are Jamunagarh, Jenabil, Bakua&Kabatghai. The two tribal settlements are Upper Barakamuda and Bahaghar . These are existing in the core area since creation of the tiger reserve in 1973. The villagers of Jenabil were completely relocated and rehabilitated at Amdiha in 2010 followed by the relocation and resettlement of 32 families of Barakamuda and Bahaghar in 2013 as per the details given below:

Village	Family	Year-wise break up of Families relocated			Balance		
		Year	Kapand	Ambadiha	Asankudar	Total	
Jamunagarh	37	1994	11	-	-	11	26 (2008- Survey)
Jenabil	84	1998	-	23	-		0
		2010		61	-	84	
TZ 1 1 .	72	1994	30	-	-	20	25 (2000 G
Kabatghai	73	2003	-	8	-	38	35 (2008-Survey)
Bakua	61	-	0	0	-	0	61 (1998-Survey)
Barakamuda	22	2013	0	0	22	22	0
Bahaghara	10	2013	0	0	10	10	0
Total	287		41	92	32	165	122

## 4.6.1. Need for relocation

The core area of the Tiger Reserve forms the crucial natal area and a critical tiger habitat. It is imperative that this area is made absolutely sacrosanct and free from any kind of human interference.

## 4.6.2. Progress of relocation of remaining villages

#### 4.6.2.2. Jamunagarh

During the year 1994, 11 families have been shifted to Non-forest land at Kopand and compensation has already been paid. Land acquisition proceeding under Orissa Land Acquisition Act 1894 has been finalized. As per survey conducted during 2009, 26 families are staying in the village. Gram Sabha are being conducted to convince them for relocation. Villagers were unwilling to be relocated. But recently villagers have shown a positive tendency for relocation except for a few hardliners and the process for conducting Gram Sabha is being facilitated by District Administration to obtain the consent of villagers. Land at Nabra RF (98.13 ha) under Baripada Division has already been de-reserved for the purpose. Process of FRA has been completed.

## 4.6.2.3. Kabatghai

During the year 1994, 30 families have been shifted to non-forest land at Kopand under Matiagarh GP of Jashipur Block in KaranjiaTahasil and during the year 2003, 8 families were shifted to Ambadiha colony and compensation has already been paid. Land acquisition proceeding under Orissa Land Acquisition Act 1894 has been finalized. As per 2009 survey, 35 families have been enlisted. Gram sabha was conducted on 11.11.2010 and the villagers agreed for relocation. Out of the 35 families 33 families opted for Option - II and 2 families for Option-I under NTCA guideline. RevenueForest Land at Arjunvilla village over 20.51 ha & at Raikadkacha village over 5.92 Ha under Bisoi Range of Rairangpur Forest Division has been identified and diversion proposal submitted to Govt of India. Process of FRA has been completed.

#### 4.6.2.4. Bakua

The villagers have expressed their un-willingness to vacate their land for which Land Acquisition process could not be taken up. Process of FRA has been completed.

## 4.7 ADMINISTRATION AND ORGANISATION

After creation of the tiger reserve the Field Director was having control over the core area of the tiger reserve. Vide Notification No. 1669 Dated 25.01.1994 of Govt of Odisha in F & E Deptt, the post of Field Director was changed as Conservator of Forest and Field Director who was given administrative control of the territorial Divisions of Baripada and Karanjia, i.e, the Divisions having part jurisdiction over the buffer area of Similipal TR. After revision of IFS cadre with effect from 27.11.2008, this post was split into two separate posts, 1. Regional C.C.F., Baripada (CCF rank) and 2.Field Director, STR (CF rank). Again vide Notification No 11884 Dated 02.07.2011 of

Govt of Odisha in Forest & Environment Department the post of Field Director was upgraded to the rank of C.C.F. and both the posts were unified as Field Director, Similipal Tiger Reserve and Regional C.C.F., Baripada who is having administrative control over Similipal tiger Reserve as well as territorial Divisions under Baripada Circle.During re-organization of Forest Department in 2003 vide Notification No 1F(A)-100/2003/13228/F&E dt.08.08.2003 of Govt. of Odisha in Forest and Environment Department the post of Deputy Director, in the rank of Deputy Conservator of Forests, was created in Similipal Tiger Reserve to look after the core area of Similipal Tiger Reserve. In 2011 another post of Deputy Director was created with headquarters at Jashipur to look after tourism and research activities of Similipal Tiger Reserve.

List of Range, Section, Beat and Compartments have been given in Annexure XLII. The cadre strength, staff position of the establishment of Field Director, Similipal Tiger Reserve is given in Annexure XLIV.

The co-operation of sister department such as Health, Veterinary, Irrigation, Police and Revenue Departments are inevitable in smooth management of the Sanctuary. The officers of such department extend their hands ungrudgingly as and when necessary.

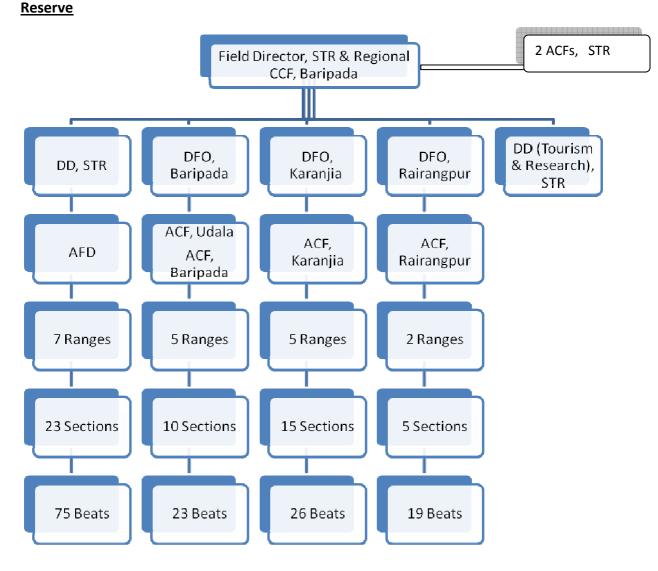
#### 4.7.1. Staff

There are 7 Ranges, 23 Sections and 75 Beats to look after the area in core Division as per the statement in Annexure XLII.

## **4.7.2.** Housing

The PA does not have the amenities to cater to the need of the staff barely necessary for stay. The housing facility is quite inadequate and there are no facilities like communication, electricity, telephone and other electronic devices. The climate is very harsh and extremely malaria-prone. The question of providing education to the scions of the staff working inside is a daydream. This type of environment compels the staff to remain absent from duty at the detriment of forest protection. The situation will improve upon only when the staff are provided accommodation at places nearer to the PA with facilities for education of their children, health care, electronic communication. Two family hostels have been constructed at Jashipur and Baripada for accommodation of 7 families of core area staff. The list of buildings available inside the PA is given in Annexure XXXI.

Administrative structure of management of Similipal Tiger



#### 4.7.3. Office Accommodation

Office accommodation for all the officers is available at their respective headquarters. The accommodation for the office of the Regional Chief Conservator of Forests and Filed Director is inadequate. Office accommodation for 9 Forest Sections and 40 Beat Officers are wanting.

## 4.7.4. Check posts

There are 10 nos. of check posts as detailed in Annexure XXXII inside the core area of the Tiger Reserve.

#### 4.7.5. Watch Towers

At Present there are 10 watchtowers and hide-outs inside the Tiger reserve, The list is furnished in Annexure XXXIII.

#### 4.7.6. Communication

#### 4.7.6.1. Roads

There is an arterial type of distribution of road inside the landscape. The detailed length of the forest roads is given in Annexure XXXIV.

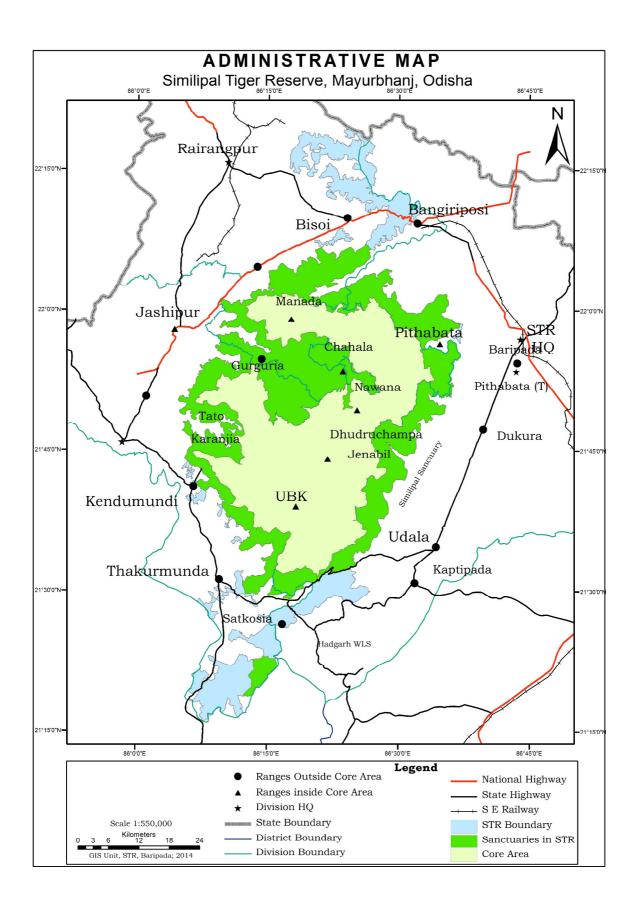
#### 4.7.6.2. Vehicles

The vehicles as detailed in Annexure XXXV are being used for management of the landscape.

## 4.7.6.3. VHF Communication Facilities

In the Tiger Reserve at present there are 59 fixed VHF stations as given in Annexure XXXVI.

One VHF maintenance unit is existing at Baripada with one Wireless Technician. It caters to the need of repair and maintenance of VHF sets not only in STR but also of other Divisions, whenever it is required



## 4.7.6.3.1. Call pattern through VHF at STR Hqrs

Time	Type of call
6 AM	Group call with core stations
7 AM	Group call with buffer stations, Meteorological data
8AM	Group call with core stations, Staff position
9 AM	Group call with buffer stations
10 AM	Group call with core stations
11 AM	Group call with buffer stations
12 Noon	Group call with core stations, Tourist figure
1 PM	Group call with buffer stations
2 PM	Group call with core stations, Tourist figure
3 PM	Group call with buffer stations
4 PM	Group call with core stations, Protection Assistants position by Ranges
5 PM	Group call with buffer stations, Collection of PAs position by Meghasani
	station
6 PM	Group call with core stations, Tourist exit position, Collection of PAs position
7 PM	Group call with buffer stations
8 PM	Group call with core stations, Range Officers position
9 PM	Group call with buffer stations

## LAND USE PATTERNS & CONSERVATION-MANAGEMENT ISSUES

#### 5.1 LAND USE CLASSIFICATION

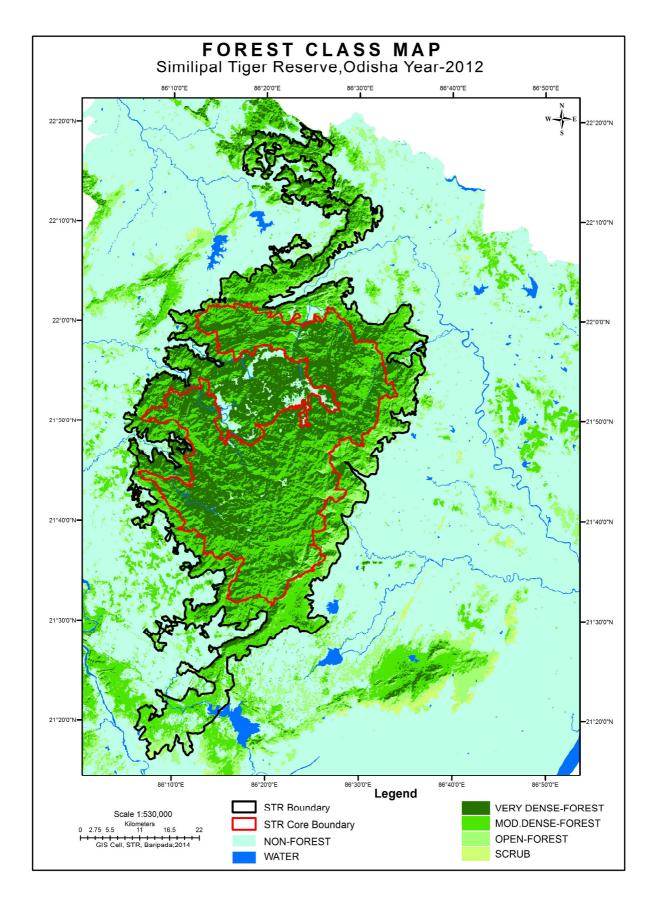
Different types of land use and their extent in Similipal Tiger Reserve is shown below.

Class	Area (sq km)	% of area	
Semi-evergreen	162.14	5.90	
Moist Deciduous	2368.13	86.11	
Dry Deciduous	78.06	2.84	
Savannah-Woodland	36.67	1.33	
Sub total	2644.99	96.18	
Scrub	61.25	2.23	
Grassland	1.82	0.07	
Agriculture	37.86	1.38	
Barren land	3.42	0.12	
Waterbody	0.65	0.02	
Sub total	105	3.82	
Grand total	2,750	100	

The entire land of the core area is forest land except three revenue villages. The land occupied by 3 villages in the core area is under cultivation and human habitation.

## 5.2. SOCIO-ECONOMIC PROFILE OF VILLAGERS

There are three human inhabited revenue villages in the core area, viz. Kabataghai, Jamunagarh and Bakua. Their population profile has been shown in Table No. Para 4.6. They are of Khadia, Kolhas and Santhal tribes. The people residing inside the core area mainly live on agriculture supplemented by collection of the tubers, roots, fruits and other NTFPs. They have also kept cattle. Economically the people are very poor. Besides these threevillages there are two settlements at Upper Barakamuda



(Source: FSI, 2012)

and Bahaghar. Some of them have been engaged on daily wages as protection assistants in anti-poaching camps.

#### 5.3 RESOURCE DEPENDENCY OF VILLAGERS

The people entirely depend on forest for agriculture as they get the water required for the purpose from the perennial streams. In order to meet their requirements other than food they depend on the forest as they collect NTFPs and sell them in the local market. The tribals of two settlements at Upper Barakamuda and Bahaghar have no agricultural land. They maintain their livelihood by NTFP collection and selling those in local markets.

#### 5.4 HUMAN WILDLIFE CONFLICTS

No such incidence has been noticed so far except one incident of killing of a daily wage protection assistant by elephant at Upper Barakamuda on dated 14.11.2012.

## 5.5 ASSESSMENT OF INPUTS OF LINE AGENCIES / OTHER DEPARTMENTS

The three villages are under the process of relocation. No developmental activities by any line department are taken up in those villages except regular medical check up by mobile medical units. In the core area no activity is undertaken by other departments except Similipal Tiger Reserve.

## **VISIONS, GOALS, OBJECTIVES AND PROBLEMS**

#### 6.1 VISION

The vision of this plan is to see Similipal Tiger Reserve as a globally important site with integration of all ecological functions with a healthy and viable breeding population of tiger in a large inviolate area.

#### 6.2 MANAGEMENT GOALS

To make the core area a safe haven for a healthy breeding population of the tiger and co-predators by eliminating all kinds of biotic interferences.

#### 6.3 MANAGEMENT OBJECTIVES

- 1. To protect and conserve native biodiversity to ensure a viable breeding population of tiger, co-predators and its prey base.
- 2. To ensure viable population of elephant and their dispersal in adjoining area.
- 3. To create habitat inviolate from any form of incompatible land use practices within the core area.
- 4. To gradually reduce the pressure of tourism from core area by promoting and regulating community based eco-tourism in buffer and adjoining area.
- 5. To enhance professional competency of staff through training, capacity building and welfare measures.
- 6. To promote, facilitate and strengthen long term and need based scientific research and monitoring of animals and their habitat.

#### 6.4 PROBLEMS IN ACHIEVING OBJECTIVES

Above objectives are examined against anticipated issues/problems, which may hinder partially or fully achieving objectives, these issues and problems anticipated are given as under.

## 6.4.1. Problems in achieving objective no. 1:

#### 6.4.1.1. Biotic pressure

There are three villages in core and 65 villages in the buffer zone of the Reserve which have sizable human population. They depend upon natural resources for their day to day need like fuel wood, agriculture equipment, food security, minor

forest produce etc on the buffer andcore zone. The increasing population is putting more and more pressure on resources, causing degradation of forest and habitat.

#### **6.4.1.2.** Poaching

The villages inside the Sanctuary and surrounding it are tribal dominated and the villagers resort to hunting for subsistence often. The tribal have a traditional practice of mass hunting called *Akhand Shikar* where they enter the sanctuary with weapons in large numbers in festive occasions for hunting of wild animals.

## 6.4.1.3. Limited grasslands

Though plenty of grass is available in the open forest and grass land but the grasslands are about 2% of PA and they are being invaded by woody growth which reduces overall palatability of grass species.

#### 6.4.1.4. NTFP Collection

Although there is ban on removal of forest produce from PAs, but still illegal collection of NTFP like Honey, Sal resin, Amla, Tubers, Barks, Fuel wood, & Medicinal plants is carried out by the local tribal inhbitants. The major threat is due to over and destructive collection which is degrading the habitat and causing disturbance to wildlife. Removal of fuel wood often involves lopping/cutting down of trees.

## 6.4.2. Problems in achieving Objective No. 2:

## 6.4.2.1. Elephant poaching

Elephant killing is a threat to the park. Targeted elephant poaching for ivory by outsiders with the help of local people is an acknowledged threat. In most of the cases the elephants are killed by poisoning in salt licks and water sources. Sometimes poisons kept to kill herbivores for bush meat are eaten by elephants resulting in killing of a number of elephants, male, female and calf at a time.

## 6.4.3. Problems in achieving Objective No. 3:

#### **6.4.3.1.** Grazing

Cattle population of the villages in the buffer zone surrounding the core is very high, which pose a serious problem of grazing, resulting in disturbance to wildlife, invasion of weeds and destruction of habitat on the fringes of the core.

## 6.4.4. Problems in achieving Objective No. 4:

#### 6.4.4.1. Tourist inflow

The tourist pressure is increasing every year. This inflow some days of the year has crossed carrying capacity. Though very limited area of core zone is open for tourism, the tourist routes pass through a stretch of forest in core area.

## 6.4.5. Problems in achieving Objective No. 5:

#### 6.4.5.1. Insufficient infrastructure

Though a lot of infrastructure development works have been carried out in the past but to overcome the new threats and challenges, better infrastructure support like maintenance of roads, Construction and maintenance of Patrolling camps, Vehicles, field Gears, Wireless system, Watch towers, Office Buildings, Staff Quarters, Research and Monitoring Equipment, Infrastructure for Environmental Education, Eco – Tourism & Interpretation, Infrastructure for Wild life Health Monitoring, Research & Rescue operations are required.

## 6.4.5.2. Arduous working condition

The service conditions inside the Tiger Reserve are very hard, the staff and protection assistants have to stay in camps, away from their family and maintain double establishment for their family. The area is malaria prone which becomes acute during summer.

## 6.4.6. Problems in achieving Objective No. 6:

#### 6.4.6.1. Insufficient database

Though a number of studies have been made on the flora, fauna and other aspects, sufficient data have not been generated, particularly on status and distribution and changes in vegetation, dynamics of grass lands and invertebrates etc.

# 6.5 STRENGTHS-WEAKNESSES-OPPORTUNITIES-LIMITATIONS(SWOT) ANALYSES.

#### 6.5.1 Strength

- Substantial area of intact contiguous forest area which has excellent long-term conservation potential.
- The park has connectivity with adjoining wildlife areas like Kuldiha and Hadgarh
- Adequate tiger population which can serve as the nucleus of a healthy source for the buffer and adjoining landscape

- Excellent road network, VHF and general protection infrastructure.
- Support of Govt in management.
- The area has five forest types as classified by Champion and Seth and varied habitat components thereby making it rich in diversity.
- The area has a long and rich conservation history.

#### 6.5.2 Weakness

- Multiple settlements in buffer and core.
- Long boundary with large interface with adjoining villages.
- Largely illiterate tribal population with very backward socio-economic conditions.
- Vacancy in frontline staff.
- Non-functional EDCs in adjoining buffer area.
- Poor coordination mechanism with NGOs and Institutions.
- Absence of updated baseline data.

## 6.5.3 Opportunities

- Excellent opportunity to work out an integrated protection-cum-habitat management in the core to increase the carrying capacity and maintain a healthy tiger population with long-term conservation potential.
- Excellent potential for long-term research into tiger habitat selection, ranging, social dynamics and prey-predator interrelationships.
- Opportunity to work with large communities surrounding the park.
- Opportunity for Inter-Governmental coordination.

## 6.5.4 Limitations

- Inadequate strength of trained frontline staff.
- Three villages inside the park still to be relocated.
- The population of the fringe communities has shown a manifold increase. This has impacted the resources of the Park in a significant way.
- Inhospitable terrain, climate and endemic malaria-proneness.
- Under current of naxalism in the periphery.

## **MANAGEMENT STRATEGIES**

#### 7.1 DELINEATION OF CRITICAL TIGER HABITATS AND INVIOLATE AREAS

Bio-geographic approach for conservation of wildlife and biodiversity (that significant representation of all ecosystem and bio-geographic regions, biomes etc in the protected area network) is essential. The main cause of decline of the tiger and other endangered fauna in human dominated landscape is competition and conflict with the growing human population and the demand of modern market driven lifestyles as well as the dominance of livestock in the traditional agrarian society of India. The land use pattern is incompatible between man and wildlife, as high density of both adversely affects either way.

The conservation of the flagship species i.e. the top predator of our ecosystem ultimately conserves our entire eco-system and biodiversity.

Tiger is a territorial animal, which advertises its presence in an area and maintains a territory. There may be a partial overlap of the territories of two male tigers. However, increase in the degree of overlap may result in infighting. Several female territories do occur in an overlapping manner within the territory of a male tiger.

The tiger land tenure dynamics ensures presence of prime adults in a habitat, which act as source populations, being periodically replaced during old age by young adults from nearby forest areas.

The on-going study (Tiger its co predator, prey base and their habitat by NTCA and WII) and analysis of available research data on tiger ecology indicate that the minimum population of tigresses in breeding age, which are needed to maintain a viable population of 80-100 tigers (in and around core areas) require an inviolate space of 800 -1200 sq km. Tiger being an "umbrella species", this will also ensure viable populations of other wild animals (co-predators, prey) and forest, thereby ensuring the ecological viability of the entire area / habitat.

Based on the demographic parameters and life history traits of tigers population simulation models suggest that if a core area having territories of 20 breeding tigresses were made inviolate, the resultant tiger population with an

adequate buffer (multiple use area with eco-sensitive land use) has a very low probability of extinction. Tigress's territories are determined by prey availability which in turn is dependent on the productivity of the area. The size of this inviolate area depends on the average territory size of tigresses. These range between 40 to 60 km2 within most of the tiger areas in the sub-continent. Thus, for a population of 20 breeding tigresses we need an inviolate area of 800-1200 km2. An ecological sensitised zone of 1000-3000 km2 (buffer, Co-existence area, multiple use area) around this inviolate space is needed for sustenance of dispersal age tigers, surplus breeding age tigers and old displaced tigers. This buffer and the tiger population within it is essential to make the core of 20 breeding females viable for long term, since it sustains the dynamics of source and sink. Such a tiger reserve will sustain a population of 75-100 tigers.

## 7.1.1. Appropriateness and adequacy or Inadequacy of Current Core:

1194.75 sq. km. area, the core area of Similipal Tiger Reserve has been declared as Critical Tiger Habitat. The Critical Tiger Habitat have been determined as per recommendation of the expert committee constituted for the purpose by the State Government as per the guidelines issued by NTCA as well as provisions under Section 38V of Wildlife Protection Act, 1972. Similipal Tiger Reserve is situated within a vast tract of forests connecting with PAs of Kuldiha and Hadgarh. This provides more inviolate habitat to tiger. It is obvious that the present legal boundary of the Tiger Reserve does not serve as ecological boundary for many species of fauna. To and fro movement from the adjoining forest areas although not frequent, but reported often. Connectivity is one of the critical factors for Similipal as regards future conservation of tiger and other mega mammals are concerned.

#### 7.2 ZONE AND THEME APPROACHES TO MANAGEMENT STRATEGIES

The "zone" and "theme" approaches have been adopted in the proposed management strategies of Similipal Tiger Reserve. A Zone, is an area of specific management category distinguishable on account of its objectives. The number and kind of zones required, depends on objectives and how different the objectives are with respect to each other, so as to necessitate separation of strategies by areas. Zones, cannot be planned in isolation, but must relate realistically to the surrounding areas of other zones and where relevant, to areas outside the PA. Using the GIS environment, all the zones have been worked out considering vegetation, physiography and Park administrative infrastructure boundaries. Various managerial situations and needs can be taken care of by an effective combination of the "zone" and "theme" plans. Under this approach, several specific objectives and problems relevant to an identified part of the PA can be recognised as a "management zone". This management zone would have its own measures and strategies. Furthermore, several objectives and different problems, created by a combination of factors, can be

tackled by a "theme strategy" under which measures can be prescribed for the entire area.

#### 7.2.1 Zone Plans

The area is divided into the following fourzones.

- 1. Fully Inviolate Zone (1189.588 km<sup>2</sup>)
- 2. Restoration Zone (5.01 km<sup>2</sup>)
- 3. Ecotourism Zone (0.152 km²)

## 7.2.1.1. Fully Inviolate Zone (Core Zone)

The 'Core Zone' as a management entity was for the first time introduced for the management of wildlife in India in the year 1973. In fact, the term used was 'Sanctum Sanctorum' which changed to 'Core' with usage. Such areas, require to serve as centres of ecological reference and ecological processes so as to maintain at least a good percentage of the key habitats, elements of conservation importance such as species, communities and population under reduced threats. Main objective of constituting this Zone is to preserve it in as near natural condition as possible by providing all protection. Protection shall be against all forms of biotic interference and only scientific studies permitted.

## 7.2.1.2. Restoration Zone

The Restoration Zone would include the area of the 7 revenue villages in the core area out of which three villages are human inhabited and their relocation is under process.

#### 7.2.1.3. Ecotourism Zone

Ecotourism is mostly restricted to buffer area in Similipal Tiger Reserve. Only some stretches of tourist routes pass through core area (0.102 km²) and about 0.05 km² area near Chahala is earmarked for the visitors for animal sighting.

#### 7.2.2. Zone Plan for Fully Inviolate Zone

#### 7.2.2.1. Constitution

The area under Fully Inviolate Zone of the Tiger Reserve is the entire Critical Tiger Habitat over  $1189.588~\rm km^2$  excluding the revenue village areas present within it. At present there are 7 villages inside the core area, out of which 3 are uninhabited and one

village is completely relocated. After complete relocation and its restoration, these areas will be added to the area of the core zone.

## 7.2.2.2 Objectives

This Zone, is constituted with the main objective of preserving the area in as natural a state as possible by providing it all protection from various biotic factors. Natural course of ecological succession is to be promoted.

## 7.2.2.3 Strategies

The core zone has typical PA values and is a habitat of rare, threatened and endangered fauna. The following strategies are laid down for management of the core zone.

- Protection will be given top most priority.
- Illegal cutting and removal of any tree will be checked.
- Collection of NTFP from the area will be strictly prohibited.
- Movement of vehicles except for the purpose of inspection, protection and scientific studies shall not be allowed inside.
- Grazing inside the area will not be allowed.
- Water and soil conservation measures to be taken up but in a low scale
- Improvement of habitat through eradication of woody encroachments in existing meadows, early burning of grasslands and enrichment of a couple of existing saltlicks will be done.
- Construction of buildings and other forms of civil construction will be restricted.
- Blocks and compartments will be demarcated in the ground and monitored with respect to the changes in the flora and fauna.
- Limited scientific research will be allowed in this zone.
- A portion of the core zone, about 350 km² area consisting of part of Upper Barakamuda, Jenabil and National Park Range will be treated as "Core within the Core" to keep the breeding habitat of tigers absolutely inviolate. The area shall be declared as 'No Go' area where restrictions shall be imposed on movement of all vehicles including departmental vehicles except for exigencies of protection. Research activities and movement of outside people will be restricted in this area.
- The strategies discussed in the theme plans will be enforced in this zone.

#### 7.2.3 Zone Plan for Restoration Zone

#### 7.2.3.1 Constitution

There are seven revenue villages inside the core area of Tiger Reserve with an area of 5.01 km², out of which Jenabil village is completely relocated and three villages namely Kabataghai, Jamunagarh and Bakua are under the process of relocation. Balance three villagea namely, Daldali, Chahala and Dhuduruchampa are uninhabited villages and forest colonies have been established at Chahala and Dhudurchampa for the purpose of management. Area statement of the villages is given below.

SI No	Name of village	Area in Km²	Remark
1	Kabatghai	0.92	Inhabited
2	Jamunagarh	1.4	Inhabited
3	Bakua	0.59	Inhabited
4	Jenabil	1.4	Relocated
5	Daldali	0.06	Uninhabited
6	Chahala	0.04	Uninhabited
7	Dhudurchampa	0.6	Uninhabited
	Total	5.01	

#### 7.2.3.2 Objective

The objective is to restore the left out blank areas after relocation and develop these areas as meadows with minimal intervention.

#### 7.2.3.3 Strategies

- The area will be left blank and developed as a meadow.
- A time series monitoring in the GIS shall be initiated for the changes in the habitat after relocation, complemented by regular data collection of change in plant species composition and animal use pattern.
- Water conservation measures like small check dams, earthen or loose boulder structure to be constructed on the nullah with natural look to enhance the water regime of the soil.
- Soil Conservation Measure to be taken up by planting cuttings of fodder species which are not exotic to the area.
- Invasive weeds will be uprooted.

- One watchtower at each village area to be created to have a close watch on forest fire, poacher movement and monitoring of large mammals and pachyderms.
- After achieving restoration objectives, the restoration zone will be allotted to fully inviolate zone.

#### 7.2.4 Zone Plan for Ecotourism Zone

Eco-tourism in context of Tiger Reserve is ecologically sustainable nature-tourism, which is emerging as an important component of tourism industry. It is distinct from mass tourism, having sustainable, equitable, community based effort for improving the living standards of local host community living on the fringes of the Tiger Reserve. Eco-tourism is proposed to be fostered in accordance with site-specific Eco-Tourism plan and carrying capacity of Tiger Reserve in the buffer areas. The Core / Critical Tiger habitat would be minimally used for any form of tourism The development of tourism related facilities within the buffer zones of Tiger Reserve would continue with inputs under Project Tiger.

The STR management envisages a strategy where tourism will be encouraged in the buffer and adjoining area. Tourists shall be permitted into those areas where minimal infrastructure is available at present. No further tourist infrastructure shall be developed anywhere inside the core area. Hence, the plan of action shall largely pertain to the buffer and adjoining area.

#### 7.2.4.1 Organisation Setup And Management

#### 7.2.4.2 Administrative set-up

No separate Range for management of tourism is there. Very few staff are engaged in tourism management. The booking counter at Pithabata is managed by Range Officer, Pithabata WL Range and entry permit is issued by the Forester/ Forest Guard at Pithabata. The booking counter at Jashipur is managed by Range Officer, National Park assisted by the Guide of the STR. In 2011 one post of Deputy Director, Tourism & Research has been created with headquarters at Jashipur.

## 7.2.4.3 Staff Requirement

One post of Range Officer, tourism with two Foresters need be created to assist DD, Tourism & research for tourism management.

#### 7.2.4.4 Infrastructure requirement

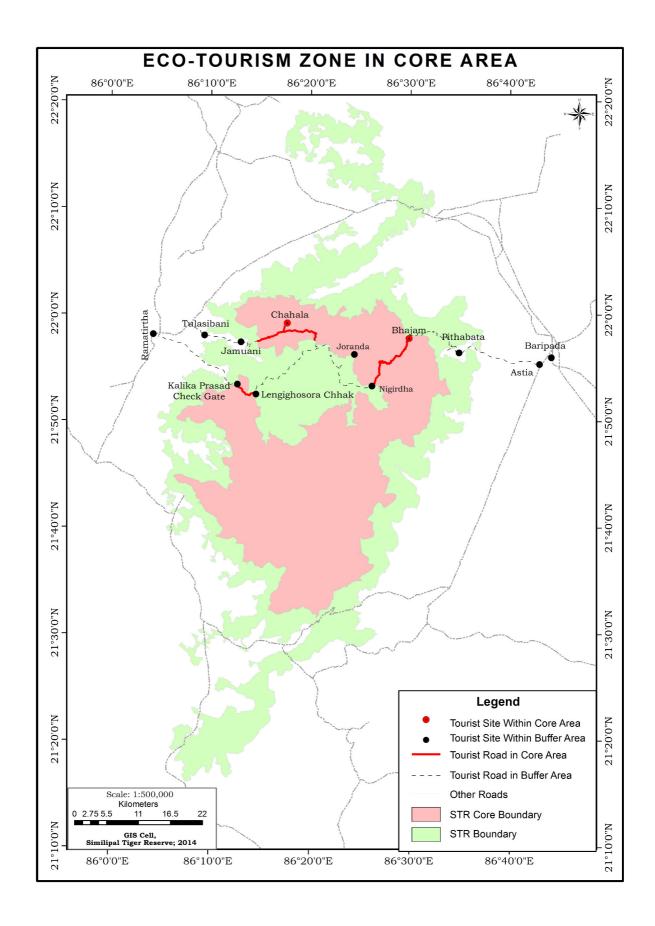
The details have been elaborated in the Chapter14 for eco-tourism in buffer area plan.

## 7.2.4.5 An analysis of tourism activities at present

The ecotourism in core area of Similipal Tiger Reserve is restricted to only one place i.e. at Chahala. Only a transit route from Bhajam to Nigirdha about 18 K.ms and Haldia Chhak to Jamuani via Chahala which has length of length 15 K.ms and a small transit route near Kalikaprasad gate of length 5 K.m pass through the core area. Out of the total road length of 600 km in the core area, thus 38 km of road are used for tourism activity, which is about 6 % of the road length of core area. The total area of the tourist routes passing through core area would be 0.102 km<sup>2</sup>. On the transit route none of the core area is exposed to the ecotourism except for a small area at Chahala and a limited number of vehicles are allowed to pass at an interval of 1/2 hour for a group of 10 vehicles. An area of 0.05 Sq Kms. at Chahala are earmarked for the ecotourists to observe wild herbivores silently. Thus the total area assigned for ecotourism in core area is 0.152 sqkm. The park is open to tourists from November till middle of June next year. Only 60 vehicles are allowed entry through two entry gates i.e. Pithabata Check gate from eastern side of the STR and Jashipur entry permit booking counter at the western side. The provision of eco-guide with every tourist vehicle has been made mandatory from both the gates since 2012. Tourists were allowed to stay at Chahala earlier for which facilities are available. But after the naxal attack in 2009-10, the tourists are not allowed to stay.

#### 7.2.4.6 Tourist Inflow

Every year Similipal is visited by numerous tourists from India and abroad. Proximity to big cities like Kolkata, Jamshedpur and Bhubaneswar makes it an ideal destination for holidaying, recreation and nature study. The tourist inflow figure has been given in Annexure LIII.



#### 7.2.4.7 Accommodation Facilities

At present, no accommodation is provided to tourists visiting core areas, although facilities are available at Chahala. The details of accommodations available for stay of the tourists is given in Annexure XXXVII.

## 7.2.4.8 Transport Facilities and Entry fees

Four wheel driven vehicles are preferable considering the hilly terrain and kachcha road. Vehicles are also available on hire from Jashipur and Baripada. Drivers of the private owned vehicles of Jashipur and Baripada are sensitized about rules and regulations of Similipal Tiger Reserve regularly before the onset of tourism season. Details of entry fees charged from the tourists have been given in Chapter 14 of Buffer Area Plan.

#### 7.2.4.9 Revenue from Tourism

Although modest, yet revenue from wildlife tourism can be recycled for the development of Similipal. The year-wise revenue collected is furnished in Annexure LIV.

## 7.2.4.10 Similipal Eco-tourism Society (SES)

The SES was formed in 2006 with a view to promote sustainable nature-based tourism in Similipal and its vicinity. With the formation and functioning of Similipal Tiger Conservation Foundation, proposal has been submitted for dissolution of Similipal Ecotourism Society and merger of its funds with the Foundation. Revenue collected from entry fees and for accommodation of tourists is partly deposited with SES for development of tourism activity in and around STR.

## 7.2.4.11 Outreach & Extension

A clearly spelt out outreach and extension policy which is at present lacking, will be developed. The nodal centre for such activities will be a world-class Interpretation Centre, designed and put up by CEE, which will come up in Ramtirtha at Jashipur. Outreach material including park souvenirs, brochures and publicity material will be made available there.

#### 7.2.4.12 Determination of Carrying Capacity:

The carrying capacity for tourists inside Similipal have been calculated as per NTCA guidelines in Zone Plan for Ecotourism in Buffer Area which comes to 60 vehicles per day.

## 7.2.5.13 Implementation Of Ecotourism Guidelines

On 15.10.2012 NTCA have formulated a comprehensive guideline for management of eco-tourism in tiger reserves called as the National Tiger Conservation Authority (Normative Standards for Tourism activities and Project Tiger) guidelines, 2012. Govt of Odisha vide Notification No 14990 Dated 08.08.2012 have issued the Odisha Forest Sector- Eco-tourism Policy (Appendix LXIV). The prescriptions of the above guidelines will be followed while managing eco-tourism activities in and around Similipal Tiger Reserve.

## **7.2.4.14** Park Interpretation Programme

Interpretation center has been developed at Ramtirtha through CEE, Ahmedabad to educate the visitors on the PA, the objectives of the PA and the policies that govern its management. It would also educate the visitor to appreciate the importance of the PA to the region and the nation and thereby create a constituency in support of the PA. This group can become an important ally in lobbying for support for conservation.

#### 7.2.5 THEME PLANS

The goal of the plan is to restore, maintain and enhance the biodiversity, habitat and conservation value of the Reserve so as to ensure perpetuation of the tiger as flagship species. This can be ensured through a multifaceted approach to the complexity of the problems noticed at the time of management. Theme plans include the activities those are common to more than one zone. They are:

- 1. Protection (Security Plan)
- 2. Fire Protection
- 3. Maintenance of boundary
- 4. Tiger population estimation and monitoring

#### 7.2.5.1 Theme Plan for Protection (Security Plan)

The theme plan for protection (Security Plan) will be for the entire Similipal Tiger Reserve over 2750 sq km (both core and buffer area).

The protection is one of the most important activities in the biodiversity conservation of the Reserve. It lays stress on defence against interference, damage or destruction of any kind by the human beings and the cattle including illicit felling,

grazing, NTFP collection, poaching, encroachment and fire etc. However, the following factors militate against efforts of Park management in ensuring protection:

- 1. The Park is surrounded by large number of human habitations.
- 2. The poverty in the fringe areas coupled with the demand for the forest and wild animal products exerts a considerable pressure on the Park.
- 3. Inadequacy of skilled manpower resources.
- 4. Inadequate intelligence network for providing timely information about impending activities.
- 5. Difficulty in detection and prosecution of cases.
- 6. General lack of awareness, understanding and support from the fringe communities.
- 7. Ritualised mass hunting by tribal
- 8. Under current of extremism in fringe areas of the park.

## **Objectives**

- 1) To maintain and conserve bio diversity by providing efficient protection
- 2) To maintain and conserve viable population of tiger and its prey species
- 3) To check illegal and unscientific harvesting of NTFP and fuel wood
- 4) To check biotic pressure
- 5) To enhance capacity building of staff
- 6) To provide infrastructure for protection

## Problems in achieving the objectives

- 1. Inadequate staff and infrastructure.
- 2. Patrolling is difficult in monsoon
- 3. Illicit felling and collection of NTFP
- 4. Inadequate coordination and cooperation with other law enforcement agencies and administration
- 5. Time consuming political process in management issues.
- 6. Improper boundary demarcation

#### Strategy

The overall patrolling strategy of the Tiger Reserve includes the following features:

- Staff / camps listed with duty allocation and route chart
- The teams are equipped with mobile wireless sets and firearms
- The patrolling teams systematically cover the area allotted to them
- Special instructions/ provisions for squads

- Surveillance: hotels, tourist points, vehicles, bus stand, trains and other means
  of transportation on the fringe of the park and nearby towns.
- Surveillance of traditional hunters
- Coordination with local police
- Sanctioning labourers for patrolling
- Networking
- Preparation of daily schedule
- Regular checking of market
- Surprise checking of barriers
- Preparation of "crime maps" with periodic updating
- Monitoring cattle kill, human kill, injury incidences and crop raiding
- Monitoring issues relating to compensation
- Monitoring water points near habitation
- Preparation of crime gang dossiers at range level
- Preparation of individual crime dossiers
- Monitoring of habitual offenders
- Preparation of monthly Crime Map on 1:50,000 scale indicating location of each crime with date.
- Conveying progress to Field Director/ Dy. Director on a daily basis through wireless
- Deviating from routine schedule during emergencies
- Taking note of offences registered in local police station
- Using tape recorder/ camera etc. to record evidences
- Special monitoring of water holes near human habitation during the pinch period
- Surveillance of half eaten carcasses of livestock on account of carnivore depredation to be carried out to eliminate the possibilities of poisoning for retaliatory killing by local people.
- Continuous monitoring of the area where more than three incidents of livestock depredation are reported within a fortnight.
- Village level crime register to be maintained at the EDCs level to keep track of villagers involved in wildlife offences.
- Maintaining list of vehicles passing through manned barrier and surprise check by senior officer at such point every month.

#### **Administrative Units**

The Similipal Tiger Reserve is under the overall control of the Field Director, Similipal Tiger Reserve and Regional Chief Conservator of Forests, Baripada. Four Divisions are having territorial jurisdiction over the tiger reserve. The Deputy Director, Similipal Tiger Reserve who sits in the office of the Field Director, looks after

protection and management of old core area (National Park area) while three territorial DFOs are having jurisdiction over the balance core area and buffer area of the reserve. The area statement thus comes as below:

Division	Sanctuary area		Other RFs	Total
	Core	Buffer		
Dy. Director, STR	808.66	87.63	-	896.29
DFO, Baripada	113.68	321.15	80.40	515.23
DFO, Karanjia	199.50	336.61	173.12	709.23
DFO, Rairangpur	72.91	271.52	199.70	544.13
Villages inside sanctuary				85.12
Total	1194.75	1016.91	453.22	2750.00

One Deputy Director with headquarters at Jashipur is looking after tourism and research activities. For proper management and protection, the entire core area over 1194.75 sq. km. is required to come under the control of the Deputy Director, STR and the three territorial Divisions need to have jurisdiction only over the buffer area of 1555.25 sq. km. The detailed proposal for restructuring has been given in Annexure XIII.

The Ranges covering the entire Similipal Tiger Reserve are shown below.

SI.	Division	Range	Headquarters	Jurisdiction
No.				
1	STR Core	Pithabata WL	Pithabata	Core
2		Nawana North	Nawana	-Do-
3		Nawana south	Dhudurchampa	-Do-
4		Jenabil	Jenabil	-Do-
5		Upper Barakamuda	Barakamuda	-Do-
6		Chahala	Chahala	-Do-
7		National Park	Jashipur	-Do-
8	Baripada	Pithabata	Baripada	Part core,
				part buffer &
				outside
				Reserve area
9		Dukura	Dukura	-Do-

10		Bangriposi	Bangriposi	-Do-
11		Udala	Udala	-Do-
12		Kaptipada	Kaptipada	-Do-
13	Karanjia	Thakurmunda	Thakurmunda	-Do-
14		Satkosia	Satkosia	-Do-
15		Kendumundi	Kendumundi	-Do-
16		Dudhiani	Tato	-Do-
17		Gurguria	Jashipur	-Do-
18	Rairangpur	Manada	Manada	-Do-
19		Bisoi	Bisoi	-Do-

The other administrative units having jurisdiction over Similipal Tiger Reserve have been detailed below.

Division	Range	Section	Beat
STR	7	23	75
Baripada	5	10	23
Karanjia	5	15	26
Rairangpur	2	5	19
Total	19	53	143

## **Anti-poaching camps**

There are 94 Anti-poaching Camps strategically located to effectively control illegal entry, poaching, timber smuggling etc. the details are given in Annexure XXX.

The existing anti-poaching camps will be maintained. All the camps will be deployed with full strength of staff and 6 nos daily wagers equipped with fire arms and walkie-talkies. All the protection camps will be made full-proof equipped with basic communication facilities and amenities like wireless sets, hand held sets, solar lights and charging equipment, drinking water, toilets and fencing around the camp.

Apart from the above, temporary camps will be established in shape of *machans* or other low cost camps at vantage locations as per field requirement in specific occasions like fire season or *Akhand Shikar* control. The annual maintenance of

camp sheds including furnishing; uniform etc will be assessed by the Dy Director and concerned DFOs which will be incorporated in the Annual Plans.

## **Relocation of existing Protection Camps**

The location of existing anti-poaching camps will be reviewed. At present the camps are distributed through out the reserve. Presence of protection staff and their day to day activities is no doubt disturbing the wild animals and their habitat in an inviolate area. In order to provide a proper inviolate area to the wildlife it is essential that the anti-poaching camps will be gradually relocated to the periphery to prevent the entry of the poachers to the core area. Only a few camps at most vulnerable points will be present. The new sites will be selected considering the entry routes of poachers, availability of water source for the staff and existing road communication etc. The process of relocation of camps will be completed in two to three years and provisions will be kept in the APO each year for the purpose.

## **Review of Illicit Activities for last 5 years**

The details of offences of last 5 years are furnished in Annexure LI.

## **Protection from Poaching and timber smuggling**

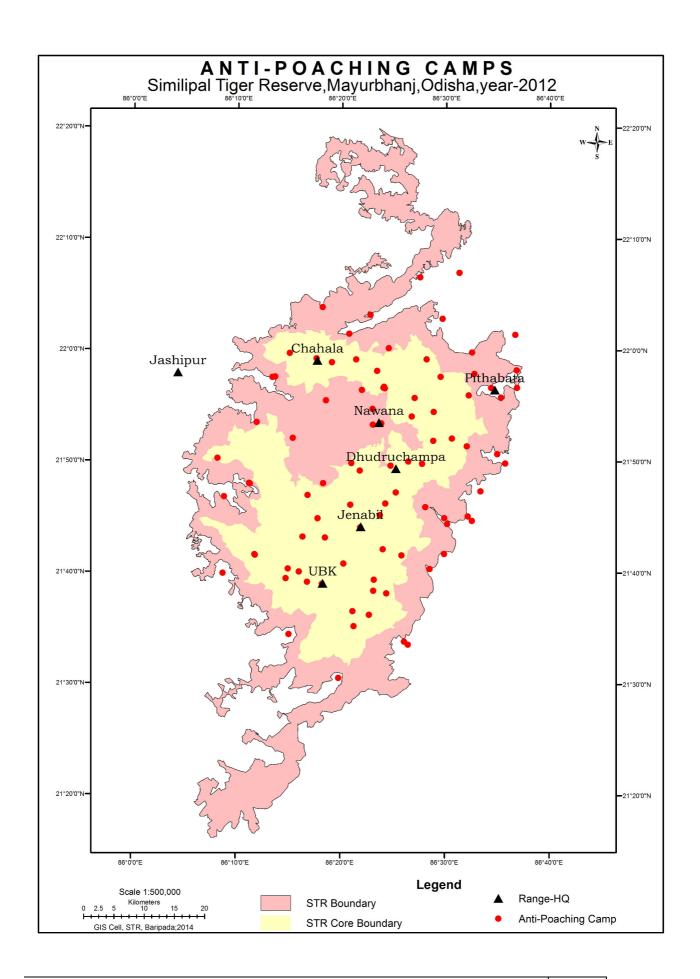
The list of sensitive sites from protection point of view have been given in Annexure XLV.

## **Illicit Felling locations**

Joranda, Khejuri, Chhatadanda, Lembuguda, Baunskhal, Kachudahan, Bulundah, Bhajam, Kabatghai, Bakua, Dhuduram, Kusumbani and Bhatunia, Lulung, Baniabasa, kairakacha, Haldia, Barehipani

## **Illegal Entry points**

The list of illegal entry points to Similipal is given in Annexure XLVI.



## **Sensitive Villages**

The list of sensitive villages from poaching and illicit felling point of view have been given in Annexure XLVII.

#### **Patrolling**

Extensive patrolling on foot, on elephant back and on vehicle is of paramount importance. The Patrolling should be focused on following sensitive spots -

- a. Water Sources and their approaches and signs of poisoning if any.
- b. Saltlicks and their approaches and signs of poisoning if any.
- c. Nala beds specially junctions with other nalas and roads and signs of poisoning if any.
- d. Fire sensitive areas
- e. Checking the water holes outside the TR during summer season Laying out impression pad near water point in villages to ascertain the presence of carnivores in the area.
- f. Signs of human presence
- g. Cattle kill by tiger
- h. Snares, traps etc

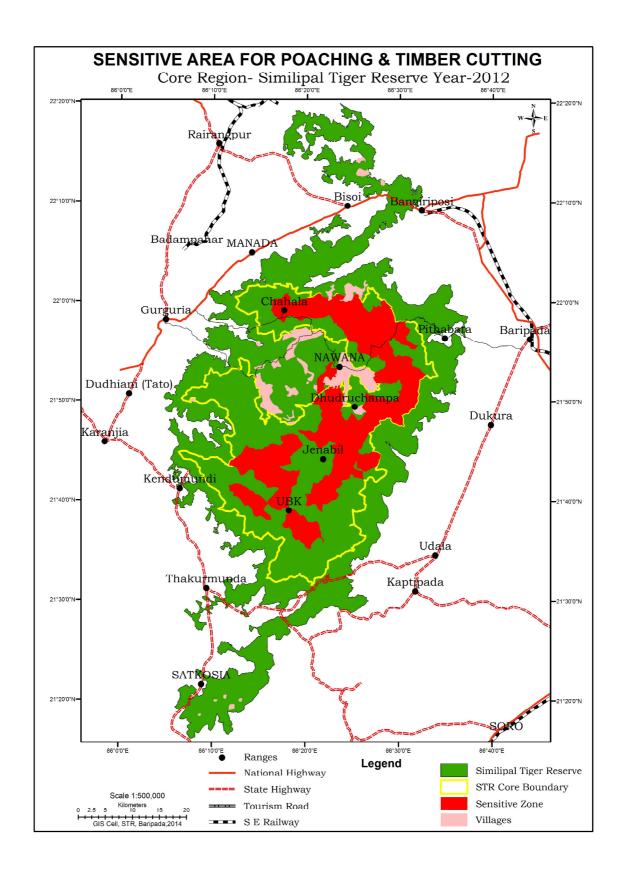
The following schedule of patrolling is prescribed.

- Antipoaching camps patrol team to cover the full area once a week.
- Range officer to join any of the patrol team once in every week.
- Deputy Director/ DFOs to join randomly patrol team once in every fortnight.
- Field Director to join the patrol team once in every two months.

There are 94 anti-poaching camps with housed staff. Almost all of these camps are provided with solar lights, drinking water, trench fencing to protect structures from elephants and wireless network connection. For drinking water, high quality water filters have been provided to most of the anti-poaching camps.

Each camp will maintain

- 1. one patrolling register,
- 2. one duty register and
- 3. one message register



Details of the daily patrolling including the time, routes and area covered and all important observations will be recorded in the patrolling register. Message register will be maintained for recording of all wireless messages received and sent. All the registers will be periodically checked by all the superior officers starting from the Foresters to the DD/ DFO. Similarly the Range Officer will chalk out foot patrolling programmes with all the anti-poaching squads of his Range apart from his regular patrolling schedules. The ACFs and the DD/DFOs will also make monthly schedules for patrolling with the squads.

#### MONSOON PATROLLING

Similipal Tiger Reserve becomes more vulnerable to illicit felling and poaching during monsoon as large part of the park becomes inaccessible and mobility of staff is considerably impaired. To meet these challenges a special protection strategy for monsoon is required. Keeping the ground reality in mind, and to make optimum use of available resources to achieve best result towards protection of Similipal Tiger Reserve following strategy is made out for the coming monsoon.

## Strategy

A four-pronged strategy will be adopted which will be largely preventive in nature but can also be reactive if situations so demand.

- A. Deployment of Protection labourers in all the anti-poaching camps.
- B. Strike force manned by Forest personnel.
- C. Prevention of poaching through intensive awareness drives with special emphasis on identified village Haats (weekly markets)
- D. Collection of intelligence secretly with the available experience, from the dossiers list and counter acting effectively and timely through available resources.

#### A. <u>Deployment of Protection Labourers in The Anti-Poaching Camps</u>

## 1. Organisation of Anti-poaching camps

There are anti-poaching camps covering the entire area of the sanctuary and beyond that covering the Tiger Reserve. Each camp will be fortified with 4 to 6 protection labourers drawn from surrounding villages, preferably from the buffer area villages.

If the Divisional Forest Officers/ Deputy Director, Similipal Tiger Reserve feels that the staff strength need to be changed due to field conditions or other logistic problems it can be done with approval of the Field Director, Similipal Tiger Reserve. All the camps will be supplied with first-aid kits with medicine and accessories. In case of emergency, the patients will be transported to the nearest hospital by the departmental vehicles.

## 2 Patrolling pattern (on foot)

All the regular staff will be in proper uniform. Every day each camp will march towards the adjoining camp, and some times during night, if needed, along foot paths/animal tracks and put their dated signature in the Camp Register of the camp they have visited and return to their original camp. The next day they will proceed to another adjoining camp. This will continue till all the adjoining camps around the command area of a particular camp are covered. The cycle will then be repeated. On completion of the day's work, they will mention their observations in their camp Register.

## 3 Preparation of route chart

The Range Officer in consultation with Divisional Forest Officer / Deputy Director, STR will prepare a map indicating all the foot paths, roads and animal tracks diverging from or converging to a camp with connectivity to other camps. With reference to the map, he will prepare a camp-wise chart for all the camps in his Range, indicating the movement pattern of the staff, which will act as a guideline for movement of staff as outlined in item No.2 above. While preparing the route chart the Range officer should give importance to the water holes, salt licks and critical habitats of wild life in the compartment. The patrolling party would look around for any destructive activity in the area and immediately report it to the concerned Range Officer. The list of vulnerable salt licks and routes of entry of poachers and wood cutters during monsoon is given below for guidance of protection staff.

#### A. Natural Salt Licks

#### **UBK Range:**

1.Pokharibadi Buffer area in Kendumundi Range near core of Kandadhanu area,2.Bachhurichara meadow towards Sarudala, 3.Nawana grassland, 4.Ginahaja, 5.Baladaghara entire meadow towards Mahabirsal, 6.Ankurbasa, 7.Baladaghara on Kandadhanu roadside towards West Deo, 8.Golkund meadow(three places), 9.Pokhridanda towards Dhudram, 10.Baragadia meadow, 11.Khadichua, 12.Tarinibilla towards Baunsdiha, Janagada (meadow),

13.Matughar, 14.Bengapani, 15.Champagada (Bahaghar), 16.Chakasil, 17.Dhudram, 18.Tarinibilla meadow, 19.Dhobighat, transect at 20.Nekedanacha foot path side, 21.Mandachaturi, 22.Bhalukanthi, 23.Balidar 24. Ujiapinda, 25.Kadalibadi, near camp meadow, 26.Mahulhudi, 27. Maruadibandha,

## Jenabil Range:

1.Sunpokhari, 2.Dalkikacha, 3.Adhamukha, 4.Gorukantha, 5.Baunsdiha, 6.Sarua to Tiktali footpath at different places of meadow, 7.Ashoknala head, 8. around Tiktali camp (6 places), 9.Tiktali to Kiabasa footpath side, 10.Janagada meadow on dividing ridge of Jenabil& UBK, 11.Gurandia towards Dhalamati on road side, 12.Gayalgada meadow,

## **National Park Range**

1. Nuagaon towards Mahantahana footpath side, 2. Patuagada, 3. Ganapati near proposed camp, 4. Nemia towards Kandadhanu, 5. Kalkam meadow near Khadibasa after crossing nalla, 6. Old fire watch tower at Ganapati,

## **Nawana South Range**

1.Bhadragada, 2.Rajabhadi near old FRH Dhudurchampa meadow, 3.Jodapal, 4.Balikhal, 5.ChampaBarehi,

## **Nawana North Range**

1.Joranda ring road side, 2.Pandabandha, 3.Pansia, 4.KhadkeiBaunskhal road side, 5.Bhandadhar

## **Chahala Range**

1.Bhatunia, 2.Brundaban towards Kundagarh footpath, 3.Daladali ring road side, 4.Rangapahad, 5.Kairakacha Brundabhol,

#### Pithabata Range

1.Badamakabadi meadow, 2.Sabarbasa, 3.Andharitota, 4.Bhajam, 5.Kalipahad, 6.Dalkikacha (Lalpani), 7.Jambhirakhal, 8.Satnalia, 9.Chhitajharan

## B. Entry routes of poachers/ wood cutters

#### **Outside Similipal**

- 1. Dangadiha towards Sanghagara
- 2. Mandaljhadi/ Baliposi/ Khediaposi- Judamnala, Bathudiabasa, Dhudram towards Bamandiha, Bengapani
- 3. Edelbeda, Ranibhola, Khaparakhai- Panskudar, Silda, Pokharibadi, Ginahaja, Baladghar, Ankurbasa
- 4. Manbhanga, Dobala, Nachipur- Chingudia, Salting Ghati, Bengapani, Dala
- 5. Bisipur/ Dudhiani- Nemiadanda, Baladghar
- 6. Dudhiani/Budhigan/ Ramjodi- Nemia, Mahabirsal, Baladghar
- 7. Pahadpur, Kaliani- adjacent to Similipal
- 8. Manada- Chahala, Haldia
- 9. Bankidihi- towards HaldiaChahala ring road

- 10. Ghatkuanri/ Talabandha towards Chahala, Haldia, Kairakacha, Bhatunia
- 11. Chakidi- Kusumbani
- 12. Jaldiha, badagaon, Chapadihi via Baunskhal
- 13. Haldibani, Bhuasuni- Bulunda, Bhajam
- 14. Baldiha, Sitakund, Digdiga-Lulung, Namti, Munibasa, Satnalia
- 15. Digdiga& adjoining villagers- Kalipahad, Jambhirkhal
- 16. Chandanchaturi- Jambhirakhal, Murari, Kachudahan
- 17. Bangra, Bahalda- Badamakabadi, Andharitota, Belpanidanda
- 18. Baniabasaetc- Jadapal, Dhundbasa
- 19. Deokund, Phulbadia, Dalkikacha, Ambaghati, Maruadibandha, Manikpur, Taldiha
- 20. Podadiha, Chakradharpur, Hudisahi- Bhanjabasa, Gunduria, Tangiria, Mahulhudi

## **Inside Similipal**

- Kabataghai/ Kandibil/ Kasira/igaon etc- Kabatghai, Ransa, Gayalgada, Basudevpahar
- 2. Khejuri, Bharadachua& adjoining villages- Basudevpur, Bakua towards Gurandia&Athardeuli
- 3. Lembugada, bandiriabasa, Astakunar, bagdega, Phulbadia- In & around the village area
- 4. Gurguria, Kolha, Uski, Barehipani, Barsia- Kolha, bandiriabasa, Rangapahad, Uski
- 5. Kalikaprasad& adjoining area- Uski, Kolha
- Kukurbhuka, Nawana, Nigirdha, makabadi- Taranda, Jhandapahad, Kusumbani,
   Champabarehi
- 7. Garasimilipal, Bagdega, Budhabalanga, Bakua- towards Gurandia, Bisaldanda, Bhadragada, Chhatadanda

## 4 En-route Interception

The Divisional Forest Officers will ensure that all the routes used by the timber smugglers outside the core area of Tiger Reserve are patrolled with the Divisional mobile squads and all the Forest check-gates function in right earnest. The DFOs will keep vigil on known poacher-villages and collect information from local haats about poaching plans, as such plans are generally hatched there. Any information on movement would be passed on to the adjacent Ranges/ camps both in buffer and core area and special vigil would be kept on movement of poachers. Having prior knowledge of movement of locals for poaching and illicit felling is most important part of our protection strategy and will be given topmost priority with all sincerity and devotion.

#### 5 VHF communication

There will not be any negligence in transmission of message from the field VHF stations directly to the monitoring cell at Headquarters i.e. "LION" station or through "MAINA" station. VHF set of territorial frequency has also been installed at "MAINA" to facilitate communication between Core and Buffer camps. It will be ensured that all the camps are equipped with VHF. All the staff i.e. Range Officers and Foresters, while in the field, should have the walkie-talkie with them. Requirement of VHF sets to be brought to the notice of Field Director.

## 6 Collection of intelligence

Secret payment /awards to informer can bring advance information on poachers, etc. and can be a very effective tool in protection. The field staff would cultivate such contacts. Payment can be met from secret funds and other sources. Special care will be taken to track the movement of unidentified persons moving in the fringe area, as during monsoon, poachers from outside states like Jharkhand and North East India have come for poaching of tuskers in the past. A list of villages having persons involved in poaching and poisoning of animals, particularly elephants are given below.

## List of villages suspected to be involved in poaching / poisoning

## Inside Similipal

1.Bagdega, 2.Gadsimilipal, 3.Saruda, 4.Budhabalanga, 5.Benipur, 6.Gopinathpur

## **Outside Similipal**

1.Balinal, Hudisahi, 2.Chakradharpur, Badakhaman, 3.Manikpur, 4.Manabhanga, dobala, 5.Sarat, 6.Dangadiha, 7.Mandaljhari, Baliposi, Kirkichipal, 8.Edelbeda, Ranibhol (Kendumundi), 9.Khalpada (Dudhiani), 10.Kundagada, 11.Tambalbandha/ Charabandha, 12.Kandibil, Kashira, 13.Phulbadia, Bandiriabasa

# 7 Monitoring

The movement of the staff in the camp will be monitored by the concerned Forest Guard/Forester of the Beat/Section on a daily basis and would be checked regularly by the concerned Range Officer. Each camp will have 3 registers (i) VHF message register, (ii) Attendance register (both for regular staff and casual labourers) and (iii) Patrolling register (Detailed day to day observations are to be noted). All the registers will be updated daily and produced on demand by any visiting supervising officer, who will sign it after entering his observations.

## B <u>Strike Force</u>

A group of 8 to 10 staff would be ready round the clock at each Range Hq. to act as striking force and move whenever required by the RO. If sufficient staff are not available, the Range officer shall requisition staff from other camps or even other nearby Ranges.

## 1. Modus operandi of strike force

The staff stationed in each camp will thoroughly cover the area assigned to them by foot, day or night, as required. In case of any incidence of poaching/presence of poachers, they will contact the nearest camp who will contact the Range headquarters immediately. The Range Officer will mobilize the staff from within his Range (and neighboring Ranges if the situation so warrants) and immediately proceed to the spot to combat the poachers. Unidentified person will not be allowed inside the sanctuary and, if noticed, they will be detained and the Range Officer will conduct enquiry and immediately report to the concerned DD, STR/ DFOs of the outcome of such enquiry.

# 2. Deployment of vehicles

In order to ensure movement of the striking force, one vehicle for each Range has been provided for all the Ranges. They would be authorized to use hired vehicles. The DFOs may hire vehicles to deal with emergency situations with permission from the Field Director, STR and RCCF, Baripada in case sufficient Govt vehicles are not available with them.

# 3. Patrolling with captive elephants

There are five captive elephants under Similipal Tiger Reserve presently stationed at Gurguria. They can be utilized for protection purpose.

# C Monitoring of Patrolling

## 1. Daily monitoring

Every Range Officer of STR shall report to the concerned Asst. Conservator of Forests at 8:00 pm over VHF regarding the daily monitoring report of his range.

Asst. Conservator of Forests shall report to the concerned Divisional Forest Officers/ Deputy Director on receipt of the information.

Deputy Director/ Divisional Forest Officer shall report to the Field Director at 9:00pm every night over VHF/Phone regarding the daily monitoring report of the ranges within his jurisdiction.

# 2. Monthly monitoring

Mandatory monitoring duties to be performed every month at the level of executive field functionaries are outlined below:

#### **Forest Guard**

Apart from regular monitoring of the anti-poaching camps in his beat jurisdiction / areas allotted under his charge, each Forest Guard shall lead the patrolling team at least twice a week (8 times a month) with 25% night patrolling.

The Forest Guard shall personally check and exhaustively review EVERY camp under his jurisdiction, at least thrice a month and submit a report to the Forester.

#### **Forester**

Apart from regular monitoring of the anti-poaching camps in his section / areas allotted under his charge, each Forester shall lead the patrolling team at least once a week (4 times a month), of which 25% of the time shall be spent in night patrolling.

The Forester shall personally check and exhaustively review every camp under his jurisdiction at least twice a month and submit a report to the RO.

## **Range Officer**

Apart from regular monitoring of the anti-poaching camps in his range jurisdiction / areas allotted under his charge, each Range Officer shall lead the patrolling team at least twice a month , of which 25% of the time shall be spent on night patrolling.

The Range Officer shall personally check and exhaustively review every camp under his jurisdiction at least once a month and submit a report to the ACF, who in turn shall incorporate his observations and submit it to the Divisional Forest Officer.

Night patrolling dates are to be fixed at random by the Range Officers in consultation with the ACFs.

Divisional Forest Officers/ ACFs can ask for surprise patrolling during any given day of the month.

#### **Asst. Conservator of Forests**

The ACF shall visit 50% of all camps in the division in a month and shall submit a report to the Divisional Forest Officer by 20<sup>th</sup> of every month. He will lead the patrolling duty twice a month, once during day and another during the night.

#### **Divisional Forest Officer**

The Divisional Forest Officer shall personally review 20% of the camps under his jurisdiction every month and submit a report to the Field Director.

# **Co-ordination Meetings**

- There shall be a Tiger Reserve Level Conference of all buffer and core area Divisional Forest Officers/Dy. Director, STR along with their ACFs and Range Officers chaired by the Field Director, STR on the 10<sup>th</sup> of every alternate month or any such convenient date.
- 2. The performance of the camps will be evaluated in all the meetings.

#### STRATEGY TO PREVENT AKHAND SHIKAR

The pernicious practice of tribal mass hunting, *Akhand-Shikar*, and associated habitat destruction is scourge of Similipal Tiger Reserve. Even after years of efforts this practice is not only continuing, rather its practitioners have become more brazen after the Maoist attack in Similipal during 2009, which had a very debilitating impact on the morale of the staff,. Though the staffs are not yet free from the fear psychosis (of Maoists' presence in Similipal), every attempt is being made, with due precaution, to save Similipal from poachers and timber smugglers.

A six-pronged comprehensive strategy will be adopted which will be largely preventive in nature but can also be reactive if situation so demands.

- A. Deployment of temporary Protection staff in all the Anti-poaching Camps.
- B. Prevention of poaching through intensive awareness drives with special emphasis on identified village *Haats* (weekly markets).
- C. Collection of intelligence secretly and counter acting effectively and timely through our Range Striking Force.
- D. Effective Multilayered Monitoring.
- E. Developing cordial relation with District Administration.
- F. Providing better alternative source of livelihood through ecodevelopment activities.

## A. <u>Deployment Of Temporary Protection Staff In Anti-Poaching Camps</u>

#### Allotment of Area

At present, following strategic camps have been set up covering all the 226 compt. of Similipal RF (2271.78 sq km) and are managed by FG/Forester assisted by temporary Protection staff. The whole area of Similipal RF has been distributed compartment wise among each camp so that no compartment is left beyond the command area of a camp. The area can be reallocated by Deputy Director, STR/Divisional Forest Officer under intimation to the Field Director, STR, if circumstances so warrant. (Annexure XLIII)

Till the restructuring, the Division wise compartments and area covered would be as shown overleaf.

S. N.	Name of the	No. of compartments	Area in km²
	administrative unit		
1	Deputy Director, STR	87 full and 10 part	896.29
2	DFO, Baripada	38 full and 8 part	434.83
3	DFO, Karanjia	49 full and 1 part	511.11
4	DFO, Rairangpur	37 full and 1 part	344.43

There shall be at least six temporary Protection Staff (daily wagers) per camp in core area and ten in buffer area. It is observed that at any given point of time, there are at least one / two persons absent either due to malaria, which becomes acute during summer, or out to fetch ration.

Out of the deployed persons one person should remain in the camp to attend VHF calls and preparation of food. If the Deputy Director, STR/ Divisional Forest Officers feel that the strength be reduced due to logistic problem it can be reduced with approval of Field Director, Similipal Tiger Reserve. In no case the strength of the camps will be fragmented. The authorities can temporarily shift the camp, en masse, to another place if they feel necessary.

## • Patrolling pattern

The staff in each camp will march towards the adjoining camp each day and some times during night, if needed, along foot paths/animal tracks. They would put their dated signature in the Camp Register in the camp which they have visited and return to their original camp. The next day they will proceed to another adjoining camp. This will continue till all the adjoining camps around the command area of a particular camp are covered; the cycle will then be repeated. On completion of the day's work, they will mention their observations in their camp Register giving details of observation.

## • Preparation of route chart

The Range Officer, in consultation with the concerned Dy. Director/Divisional Forest Officer, shall prepare a map indicating all the footpaths, roads and animal tracks diverging from or converging to a camp with connectivity to other camps. With reference to this map he shall prepare a camp-wise chart for all the camps in his Range, indicating the movement pattern to be followed by the staff of each camp. As this chart will work as a guide/ reference, the Range officer would give due importance to water holes, salt licks, old Shikari camp and critical habitats of wild life in the compartment, while preparing the route chart.

The Patrolling Party, while patrolling, would look around closely for any sign of poaching /destructive activity and report to the concerned forester/ Range Officer at the earliest whenever it finds any.

# Monitoring

The movement of the staff in the camp shall be monitored by the concerned Forest Guard/Forester of the Beat/Section on daily basis, and this shall be checked regularly by the concerned Range Officer. All the patrolling registers shall be updated daily and produced on demand by any supervising officer, who shall sign it after recording his observations. The detailed date lines and procedure is discussed separately.

# B. <u>Targeted Awareness Drives</u>

Lack of awareness is a major reason for poaching and ritual hunting. The core area staffs do not come in contact with buffer villagers often. The staff of buffer area shall have to play a proactive role in creation of awareness and generation of information network. The following steps need be taken.

## 1. Educating the people.

Since the poachers are from the villages located in the buffer or near the boundary of STR, it is imperative on the part of the staff of buffer area to create awareness among the people. Displaying of signage, distribution of handouts and beating of drums at the local *haats* would add to their effort.

#### 2. Awareness of Local leaders

Local tribal priests "Dehuries" and local elected representatives will be approached to spread the message that the traditional practice of "akhand shikar" is not in consonance with present time. It is not only illegal, punishable with imprisonment up to 7 years; it destroys the highly endangered fauna of Similipal and our country.

The Honorary Wildlife Wardens can also play an important role in these initiatives. Also, the concerned EDCs may be sensitized by holding awareness campaigns before the "akhand-shikar" season.

## C. <u>Collection Of Intelligence & Counteracting Effectively</u>

Killing of animals is often not taken with due seriousness by the local people hence they hardly come forward with any information on poachers. So the staff working in field will have to create a network of informers. This can be ensured by engaging spies at vulnerable villages and rewarding the informers in lieu of their services. The fund required for this purpose can be met from secret fund etc.

## 1. Plugging legal loop-holes

It is observed that although forest and wildlife laws are very stringent, the forest officers responsible for enforcing them often fail to enforce them with due effectiveness for want of sound knowledge of Rules and Regulations and proper legal procedure. This defeats the purpose of such legislations. The staffs need to be properly guided, trained and helped in preparing case records. This would plug legal loopholes and make it difficult for the culprits to evade punishment.

## 2. Dossiers of offenders

In each Range dossiers of Forest and Wildlife offenders shall be kept updated and this will be made available to each section in-charge also to help him in investigation and prevention. The ROs will be instructed to prepare such dossier and they are expected to keep it updated.

## 3. Close Watch on Dehuries

As they lead the shikar expedition of tribal, a close watch will be kept on their movement. Reaching the congregation ground before the different groups meet at the onset of expedition, is comparatively easy way to tackle them. Also reaching the spot where puja, before shikar expedition, is being done, would force them to abandon the plan of shikar as any disturbance by outsiders especially by enforcement agencies, is considered inauspicious before going to akhand shikar.

## D. Counteraction

## 1. Modus operandi in Emergency situation.

The staff stationed in each camp shall thoroughly cover the area as assigned to them by foot. In case of any incidence of poaching/presence of poachers, they shall contact the nearest camp who shall contact the Range headquarter immediately. The Range Officer shall mobilize the staff from within his Range (and neighboring Ranges if the situation so warrants) and immediately proceed to the spot to combat the poachers. The vehicles kept at the disposal of the Range Officers for prevention of illicit felling, poaching and fire protection shall be made use off for this purpose.

The concerned RO of the buffer range at the foothills, (from where the shikaris have originated and to which they will return) would be alerted to plug possible exit routes and catch them unawares.

Often, the services of a magistrate / police also become essential while tackling large number of shikaris. Hence the concerned DFO will contact the Dist. Administration, if the situation so warrants. The DFOs/DD would keep the police and district administration informed so that they are not caught unaware.

No unidentified person will be allowed inside the tiger reserve. If noticed, the person to be detained and the range officer to conduct enquiry and immediately report the fact to concerned DD/DFO.

# 2. Accountability

As the entire area has been brought under the command of one or the other anti- poaching camp, the sphere of responsibilities has been clearly defined. This would ensure greater accountability too. For any lacunae in prevention of poaching and apprehending the poachers, concerned Forest Officer, having jurisdiction over the area of occurrence, shall be held responsible.

# E. <u>Multilayered Monitoring And Evaluation</u>

The monitoring programme suggested above in Para on Monsoon Patrolling strategies will also be followed during programme for prevention of Akhand Shikar.

#### INTER DIVISION CO-ORDINATION

In Order to effectively control the illegal entry points, control of fire during fire seasons, sharing of good practices, sharing the photo ID and addresses of regular offender the following schedule of Inter Division and Interstate Co-ordination is prescribed.

The Forest Station staffs during the course of patrolling shall meet the Section Staff of Inter Division and Interstate once a week and maintain record of meeting.

The Range officer will meet the Inter Range officer once a month and discusses the Inter Range and Interstate Range issues and report to Deputy Director.

The Deputy Director will meet the Divisional Forest Officer and discuss the issues and report to the Field Director.

The issues where Intervention at higher level is necessitated will be brought to the notice of Chief Wildlife Warden who in turn will place the matter before the State Level Steering Committee, Governing Body of Foundation, and state level Monitoring Committee for appropriate decisions.

The following information will be shared during the above stated meetings

- Sharing Land Line & cell phone numbers at section, Range, Division and Circle level.
- Sharing photos, addresses of Regular offenders at Range and Division level.
- Sharing information on illegal entry points at section, Range, Division and Circle level.
- Sharing names of candid informers for rewards at Range, Division and Circle level.
- Sharing information on investigation in Wildlife related crimes having interstate ramification.
- Sharing information with crime control bureau at DFO and Circle level.
- Sharing information on licensed gun holders in the vicinity at DFO Level.
- Joint annual inspection of boundaries.
- Sharing information on Good practices and staff welfare.
- Synchronized cattle vaccination, fire line clearance, wildlife census etc.
- Sharing information related to inter state migration of major species with main focus on tiger.

## **Joint Camps**

The following camps will be jointly managed by sharing staff/ antipoaching watcher of core and buffer Divisions.

Name of the camp Range of STR Core to		Range of Buffer Divisions to deploy	
	deploy staff	staff	
Nigirdha	Pithabata WL	Dukura (Baripada Division)	
Silda	Upper Barakamuda	Kendumundi (Karanjia Division)	
Chandanchaturi	Pithabata WL	Dukura (Baripada Division)	
Digdiga	Pithabata WL	Dukura (Baripada Division)	
Baniabasa	Jenabil	Udala (Baripada Division)	
Kulipal	Jenabil	Udala (Baripada Division)	
Sarua	jenabil	Udala (Baripada Division)	
Gunduria	Upper Barakamuda	Kaptipada(Baripada Division)	
Chakhidi	Nawana North	Bangriposi(Baripada Division)	
Dangadiha	-	Thakurmunda (Karanjia Division) &	
		Kaptipada (Baripada Division)	

#### **JOINT PATROLLING WITH POLICE**

The vastness of area and degree of pressure on Similipal require coordination with police officials and a strategy to be in place for joint patrolling with police staff. The following programme is proposed for joint patrolling by police and forest staff to prevent *Akhand Shikar* and timber smuggling within Similipal Tiger Reserve which will be followed on regular basis every year.

- 1. There will be monthly Sub-Divisional level coordination meeting between Range Officers and IICs to be chaired by concerned SDPO. DFOs will plan out and coordinate such meetings
- 2. DFOs will take initiatives and will make planning for joint patrolling of timber smuggling routes.
- 3. Meetings of forest and police officials will be held before commencement of *Akhand Shikar* for planning out strategies to check this mass hunting activity. Such strategies will also be adopted during other vulnerable periods during festive occasions as the mass hunting is more or less linked to the rituals of the tribal. A list of such vulnerable periods during the year is listed below.

Before Makara Sankrantii.e, before 14<sup>th</sup> January

Before Maha Shivaratri

Before Holi

Before *Maha Vishubha Sankranti*i,e, period before 14<sup>th</sup> April

Before Raja Sankrantii.e, before 14<sup>th</sup> June

Before *Durga Puja* 

# Before *Kali Puja*Before Christmas

- 4. Activities of renowned poachers and timber smugglers will be kept a close watch.
- 5. Random house raids of known poachers, timber smugglers will be made jointly by forest and police officials which will be done more frequently before *Akhand Shikar*.
- 6. Flag march in the suspected villages will be done jointly by forest and police staff frequently. The list of suspected villages involved in poaching and illicit felling is given below.

## **Inside Similipal**

Bagdega, 2.Gadsimilipal, 3.Saruda, 4.Budhabalanga, 5.Benipur,
 6.Gopinathpur

## **Outside Similipal**

- Balinal, Hudisahi, 2.Chakradharpur, Badakhaman, 3.Manikpur,
   4.Manabhanga, dobala, 5.Sarat, 6.Dangadiha, 7.Mandaljhari, Baliposi,
   Kirkichipal, 8.Edelbeda, Ranibhol (Kendimundi), 9.Khalpada (Dudhiani),
   10.Kundagada, 11.Tambalbandha/ Charabandha, 12.Kandibil, Kashira,
   13.Phulbadia, Bandiriabasa
- 7. Police force as per availability will be provided to forest officials when requisitioned for any operation.

#### **CHECK GATES**

To check illegal entries, pilferage of natural resources and regulate the entry to Similipal Sanctuary the existing check gates will be maintained. The list of check gates on the entry routes to Similipal have been given in Annexure XXXII.

The check gates play a vital role in checking illegal intrusion of outsiders into Similipal. People from Jharkhand often enter Similipal on the plea of meeting their relatives in Similipal, remain their as refuge, conduct crimes like poaching and go away. Some people also stay back by encroaching forest land with the help of local inhabitants. The Check gates at Pithabata, Kaliani, Kalikaprasad and Tulsibani are the entry points for people to Similipal. These gates will be strengthened to effect proper checking of all vehicles and people entering through these gates, may be tourist, bonafide inhabitants, business vehicles etc. Close circuit camera have been installed at

Kaliani check gate for surveillance of people and vehicles passing through the gate. CC cameras will be installed at other entry gates also.

#### **ROADS**

The list of existing road network has been shown in Annexure XXXIV. All the roads are kachha/ murrum roads. Annual maintenance of the roads will be done along with minor repair of wooden bridges and other cross drainage structures for the patrolling and protection of the Tiger Reserve.

#### **VEHICLES**

The protection related existing vehicles have been detailed in Annexure XXXV. At present all the Range Officers have been provided with four wheeler vehicles. New vehicles are required for the following stations by replacing the existing old vehicles which are giving trouble running in difficult terrain. Most of the vehicles have become old which will be gradually replaced within the plan period

- 1. Range Officer, Pithabata WL Range
- 2. Range Officer, UdalaRange
- 3. STR headquarters- 2 four wheelers and 1 van

The existing vehicles need annual maintenance according to necessity.

#### COMMUNICATION

The communication needs to be strengthened to apprehend the offender, red alert, seeking additional assistance, informing the various officers depending on the gravity of the case including inter division and inter state. The list of wireless stations, in Similipal Tiger Reserve has been given in Annexure XXXVI. At present the wireless communication of Similipal Tiger Reserve core area is being managed with low band sets where as the wireless communication of buffer Divisions is being done with high band sets as a result communication between core and buffer staff through wireless during patrolling or for sharing of information is not becoming possible. Hence to bring the entire Similipal Tiger Reserve to a uniform system of communication it is proposed that low band sets of all the stations will gradually be replaced with high band sets within one year.

#### ARMS AND AMMUNITIONS

The list of arms and ammunitions available with the Divisions is furnished herewith.

## **List of Equipment & Fire Arms**

SI. No.	Name of equipment	Number	Ammunitions
1.	DBBL Gun	82	2207
2.	.315 Sporting Gun	24	1687
3.	.32 Revolver	30	2147

During 2009 as per directives of Home Department, Govt of Odisha the arms and ammunitions were deposited in the District armoury in view of safety from naxalite attacks. The arms and ammunitions have been returned back to field staff for their use in protection duty. State Govt will be moved to provide immunity to the forest staff against criminal action in case of use of fire arm in the light of immunity given to police officials under the provisions of Section 197 of Indian Penal Code. Regular training of field staff on use and maintenance of fire arms will be organised.

## **INTELLIGENCE GATHERING**

Intelligence networking is a very important pre-requisite for prevention of crime as well as for follow-up after the crime has taken place. Intelligence deals with all things, which should be known in advance for taking actions in the direction of crime prevention. In this process after gathering the information, it is evaluated, analysed and used in the decision making. Advance information is key to success for prevention of crime and this emanates from intelligence. It is almost axiomatic that no poaching can occur without the passive knowledge or active help of villagers living in and around the Tiger Reserve. While the villagers do come to know about poaching activities around their area, they are not willing to inform the Tiger Reserve Management for three reasons.

- 1. The General lack of rapport between officials and the villagers
- 2. Fear of reprisals by the culprits involved in poaching
- The most important reason being a wide spread hostility in the villages against the Tiger Reserve which have put severe restriction on the use of the forest for their basic needs- grazing, firewood, small timber and collection of NTFP for livelihood.

The poachers and criminals need protection, hideouts and information about movement of animals and Tiger Reserve staff. Therefore most pertinent point at Tiger Reserve level is building bridges for trust between the Tiger Reserve and the local people. The prescription for building bridges and trust are prescribed in Plan for buffer Zone in Eco Development & Ecotourism Chapter.

#### **Collection of Information**

The Range Officer, Strike Force and Territorial Range Officer will maintain a directory of phones from locals in fringes, residential areas of offenders, teachers, students, people's representatives, NGOs and generate informers which may lead to candid informers in due course. The Range Officer, Strike Force and Territorial Range Officers will list the candid informers and maintain and also supply the same to Deputy Director/DFOs/Field Director. The Range Officer Strike Force/Range Officer Territorial Deputy Director/DFOs/Field Director will provide a code to candid informers and keep it confidential. In no circumstances the candid informers shall be exposed to Public or any law enforcement agency.

## **Rewards for providing information**

The motivation of persons providing intelligence information could be varied and needs to be treated accordingly. A credible reward system is the sheet anchor for generation of information. There need to establish and operate a cash reward system for providing information. The reward should be just, appropriate and made on the spot. As is being done in Customs Department, payment of rewards should vary according to the value of the items recovered by the information. Payment should be delinked from the disposal of cases in the Court; Rewards should be paid to all giving information, including Forest and Wildlife officials. Cash rewards should be payable for:

- a. Information leading to the seizure of wildlife products and arrest of the offenders.
- b. Information leading to successful prosecution of cases in courts; and
- c. Information pertaining to the organization, modus operandi and other details of gangs indulging in wildlife trade.

The Deputy Director/ DFOs will take action to implement the provision of Sec60A of Wildlife (Protection) Act 1972 "Reward to persons". As per Subsection 1 of Section 60A fifty per cent of the fine imposed by the court can be rewarded to person who renders assistance in the detection of the offence or the apprehension of the offenders. As per sub sec 2 of section 60A fifty percent of amount of compounding can be rewarded to person who renders assistance in the detection of the offence or the apprehension of the offenders.

#### **OPENING UP OF NEW CHANNEL OF INFORMATION**

#### Public should know whom to contact:

To enable the public to contact promptly, in towns and cities, a specific telephone number shall be allotted. This telephone shall be managed round the clock by wildlife officials and prompt action would be taken by enforcement personnel.

#### PROCEDURE FOR REGULAR OFFENDERS

## (I) Establishing a Criminal Profile Directory:

STR headquarters will maintain records of persons with a history of poaching and/or wildlife trade in the locality. This will include details about physical appearance, identification marks/signs, employment, family, key associates, criminal history, convictions if any, pending cases etc. Sudden and long absences of such persons from their normal place of stay must be investigated. Sudden acquisition of movable and immovable assets must also be investigated for possible transaction of wildlife materials and sources of such transactions. Photographic dossiers can be very useful in investigation. Maintenance of crime dossiers at Tiger Reserve level is very important. These dossiers can be collated with other states on a need base. Such dossiers shall have information about poachers from both sides of the borders who are known to be active in the area. In every case, the link of old crime to new offenders and old offenders to new crime shall be regularly analysed.

## (II) Maintaining Dossier at EDC Level

As per guidelines issued by Project Tiger, a dossier of local offenders shall be maintained at each EDC level. The EDCs shall be activated in this line and taken into confidence. Help of *Gramrakhies* deployed at each village would also be taken.

## (II). Forfeiture of Property derived from illegal Hunting and Trade

Every person and his associate who has been convicted of an offence punishable under Wildlife (Protection) Act 1972 with imprisonment for a term of three years or more is liable to proceed against him for forfeiture of property by following the procedure detailed in Sec 58A to 58Y of Wildlife (Protection) Act 1972. The Deputy Director/ DFOs will closely monitor such cases and submit proposals for forfeiture of property of such persons.

#### Communication & Infotech in Wildlife Protection & Crime Risk Management:

Wildlife protection and crime risk management in the present scenario requires a widely distributed information network using the state-of-the art technology. GIS is a user-friendly tool for data integration to facilitate prompt action.

With Internet and Intranet technologies, complemented by VSAT, GPS and wireless communication in networking, the PA/ Tiger Reserve HQ can be connected to the state HQ, Police HQ and Project Tiger Directorate to disseminate information for field action in apprehending the offenders.

## **Imperatives for Success:**

The following imperatives ensure the success of wildlife protection and crime risk management:

- Good surveillance
- Timely reporting & networking
- Prompt situation analysis
- Immediate action

There are several elements in wildlife protection and control viz.

- Relative spatial abundance of wild animals
- Identification of risk factors
- Proximity to risk factors, sensitivity categorization, crime
   Mapping & updating
- Site-specific protection strategy
- Immediate action for apprehending the offenders based on effective networking & communication

Geographic Information System has the ability to manage both spatial & non-spatial data and therefore provides an ideal framework for wildlife protection and risk management. Space technology has shown the interconnectivity of natural and anthropogenic phenomena occurring anywhere on earth. Thus, an integrated approach based on space remote sensing in the GIS domain with relevant biotechnological inputs can play a vital role in wildlife crime risk management.

# Methodology/ Functionalities:

The following methodologies / functionalities are proposed to be applied for the protection and crime risk management:

- Creation/ Maintenance of a crime database in the **GIS domain** of the PA included in the zone, using forest cover/ terrain images from NRSA, overlaid with GPS point data from the field and the **Management Information System** (MIS)
- Regular round the clock updating of the crime database from the field (Range HQ of the Tiger Reserve & other PAs) by establishing communication links, at present with wireless network.

- Regular updating of Range level crime data through wireless from Patrolling Camps
- Establishing external communication links between STR and other government authorities, viz. Chief Wildlife Warden, Police HQ, MOEF (NTCA), WWF (Traffic-India), WCCB and the CBI. This would facilitate tracing the offence to the last stage
- Updating the MIS/ GIS platform with tiger presence using **GPS** (**Global Positioning System**) and constantly overlaying this information with other data
- Updating the database with surveillance information like: crime-history, criminal dossiers from local police, district and inter-district criminals, criminals operating on railways, wandering gangs, resident gangs.
- Updating the database with **risk factors** leading to proximity, analysis for **'sensitivity charting'** viz. closeness to habitations, roads, railway, bus route, accessibility during monsoon, types of traffic, cattle kill, human kill/ injury by carnivores
- Updating the database with criminal intelligence (from informers & recorded sources)
- The MIS will have an **Intranet portal** to be used by authorised persons for uploading relevant data using the **Internet backbone** from anywhere in the world
- Monitoring the movement of 'anti-poaching squads' (village patrol, road patrol, forest patrol) through GPS. This would facilitate viewing the location and path taken by the anti-poaching squads apart from planning fresh routes to make a strike
- Use of the database to trace new crime to old offenders and old crime to new offenders to facilitate prosecution and planning fresh site-specific anti-poaching operation
- Using the database to monitor dependency in Courts for expediting conviction of wildlife related cases

#### Law Enforcement:

Considering the ever-increasing biotic pressures on wildlife protected areas, it is very important that the law enforcing officers/ staff of wildlife protected area are well-acquainted with and updated on the various forest and wildlife Acts and maintain a very close working relationship with the police and judiciary to put across the government's point of view more effectively.

The government have empowered the various ranks of field staff of forest department to take cognizance of offences relating to forest and wildlife. The frontline staff is always required to be kept well - prepared with necessary documents/ proforma prescribed under the Acts for taking appropriate action and registering a forest/ wildlife offence. The Park Management shall also ensure that the staff remains trained and updated on the latest amendments to the concerning Acts, and for this purpose easy Odia translation of the concerning Acts shall be circulated down to the

lowest level for a better understanding of the subject. Besides, periodic Legal Workshops and discussions shall also be organized, involving resource persons from the judiciary and the police department to guide the staff in the proper investigation of forest offences, procedural norms, and to simplify the intricacies of the laws. The staff would be benefited by such arrangements, as these close interactions point out the various shortcomings/ mistakes in the entire procedure which render the cases weak, increasing the possibility of criminals going scot-free.

The management of a Tiger Reserve is a great learning process, and the lesson learnt is that procedural flaws would help the offenders escape prosecution, and even the staff may find themselves facing legal proceedings for improper arrest or seizure.

The staff of the Tiger Reserve requires internal periodic refresher courses, discussions, and high levels of discipline and motivation. Such discussions and workshops would build the confidence of the staff in the following:

- Arrest or apprehension of persons/ offenders engaged in illegal acts inside the Tiger Reserve
- Proper documentation of illegal activities for court proceedings, including evidence in the form of confiscated wildlife articles, relevant photographs, signed statements, and reports
- Proper seizure of items prohibited under the Laws, or required as evidence to testify to an illegal act
- Simple legal procedures in delivering the arrested offenders to the police/court, and filing charges

## **Setting up of The Court Liaison Unit -**

In present practice, the dealing of the court cases is not much effective and the offenders are mostly acquitted for want of effective follow-up. Due to lack of proper attention, most of the court cases become weak resulting in the acquittal of the accused persons.

To avoid the repetition of such situations in future, a **Court Liaison Unit** shall be constituted for the Similipal Tiger Reserve.

To ensure the regular attendance on fixed dates in cause-listed cases, a special team of staff along with appointment of panel lawyer shall be identified and earmarked for this purpose. The team shall be entrusted with the job of attending the court regularly and report to the Field Director from time to time. The team would also inform the concerned staff to take necessary actions in such case, required from time

to time. The team would also coordinate with APP/PP and maintain the necessary records for every individual case. The **Court Liaison Unit** shall consist of

- (i) One Deputy Ranger/ Forester as In-charge
- (ii) Forest guards, one each for the courts having jurisdiction
- (iii) One Lower Division Clerk at Tiger Reserve headquarters to maintain the necessary records.

The Deputy Rangers/ Foresters of the concerned Division in whose jurisdiction the court exists, can be assigned with the job.

#### The Strike Force

The leader of the strike force will be the Range Officer, Enforcement, the other members of strike force will be two Foresters and four Forest Guards. The Force will be fully equipped with vehicle, arms/ammunition, communication equipment, funds for intelligence gathering, etc. The Strike Force will be given training on intelligence gathering, identification of wildlife articles, investigation, etc.

## **Duties and Responsibilities:**

- Rapid action and response on receipt of any information related to illegal activities.
- Liaison with the territorial Range Officers and assist in protection.
- Liaison with EDCs to gather information on intelligence.
- Inspire confidence in people who want to provide secret information.
- Liaison with staff of anti-poaching camps.
- Sharing information with the territorial Range Officers on illicit activities.
- Maintain a secret record with the details of informers, information received, etc.
- Inform the Deputy Director, Similipal Tiger Reserve, territorial Range Officers of any illegal activity and red alert to the antipoaching camps.
- The Range Officer, Strike Force will be assigned any other duties related to protection.

## **The Special Tiger Protection Force**

This is a centrally Sponsored Scheme of NTCA for deployment of a force with specialised training to be deployed as Tiger Protection Force. For Similipal Tiger Reserve NTCA have approved for a 112 member STPF consisting of 108 Forest Guards, 3 Forest Rangers and one ACF to come on deputation from existing cadre. The STPF have become functional at present by bringing 63 Forest Guards on deputation from the core and three buffer Divisions of Similipal TR. The details have been given in the Chapter 10 on "Protection and Intelligence Gathering".

# **Creation of Dog Squad**

One Dog Squad for Similipal consisting of one sniffer dog and one tracker dog has become functional. Two Forest Guards as dog handlers along with two dogs have undergone training at National Training Centre For, Dogs of BSF at Tekanpur, MP. The dogs will help in detection of poisoning spots as well as in search operation of wild animal articles.

#### THE TIGER CELL

A Tiger cell as detailed below is proposed for Similipal Tiger Reserve

# **Composition:**

1.	Field Director, Similipal	Tiger Reserve cum	Regional C.C.F., Baripada
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Chairman

2. [	D.F.O	Baripada Forest Division –	Member

3. DFO, Karanjia Forest Division – Member

4. DFO, Rairangpur Forest Division - Member

5. Superintendent of Police, Mayurbhanj- Member

6. Deputy Director Similipal Tiger Reserve – Member Secretary

# **Duties and Responsibilities:**

- Monitoring the investigation of cases relating to tiger and leopards.
- Conduct Surveys on poached animals, identify and document trade routesand Market forces.
- Monitoring the compliance of patrolling in core and buffer.
- Monitoring the implementation of protocol for monitoring Tiger, co-predator, and prey populations in landscape.

- Liaison with crime control bureau and other agencies in respect oftiger/leopard poaching and intelligence sharing.
- Rewards for candid informers, excellent performance, etc
- Identify existing conflicting land use policies affecting Tiger and prey habitat and resolve through Multi-sectorial dialogue.
- Monitoring the cattle lifting cases by Tiger

The Tiger Cell will meet at least once in six months. Tiger Cell can invite experts if needed in any of its meeting. The proceedings of the meeting will be submitted to the Chief Wildlife Warden.

#### **STAFF WELFARE**

The following staff welfare measures are being undertaken for the staff working in Similipal Tiger Reserve.

- 1. Project allowance for all categories of staff.
- 2. Residential accommodation for the children of frontline staff of core area in nearby towns like Jashipur and Baripada.
- 3. Supply of medicine kits, mosquito nets, water filters and radio sets to all protection camps.
- 4. Steps will be taken for providing food allowance or dry ration to all the protection assistants working in side Similipal.

# CAPACITY BUILDING FOR PROTECTION OF TIGER, CO-PREDATOR ANDPREY SPECIES

The Deputy Director /Field Director will take the following actions for the upgrading the knowledge of Executive and Protective Staff.

- All the Range Officers and Antipoaching Camps will be supplied with a copy of "Important Aspects of investigation in wildlife offences" released by TRAFFIC in 2010.
- All the Range Officers and Antipoaching Camps will be supplied with a copy of "Wildlife Crime an Enforcement guide" release by Wildlife Protection Society of India.
- All the Range Officers and Anti-poaching camps will be supplied a copy of "Wildlife Offences Advisory on Fire Arms in Criminal Investigation and Trials" released by Wildlife Crime Control Bureau Ministry of Environment & Forests, Govt. of India.
- All the Range Officer and Anti-poaching camps will be supplied a copy of "Hand book on Wildlife Law enforcement in India" by Samir Sinha, Traffic India.
- All the Range Officers and Antipoaching camps will be supplied with Toposheet showing the problems areas.

- Every Year after general transfer, the Executive & Protective staff would be placed in the Field after due orientation explaining their responsibility, strategies to be adopted etc.
- The Deputy Director / Field Director will arrange training related to Protection.
- Deputy Director will maintain record of incidents related to poaching, illegal trade, confiscation etc on tiger and other wildlife species, map location and discuss in annual meetings with Executive, Protective staff and Tiger Protection Force to take suitable measures for future.
- Refresher courses for staff on forest & wildlife laws and other laws relating to forest & wildlife offences will be organised in a regular manner.

#### **SECURITY AUDITING**

The Deputy Director/ Field Director will conduct quarterly security audit and generate report. The audit will include review of offence case detection, fate of prosecution cases up to 5 years back, availability and adequacy of protection infrastructure, equipments etc. The annual report of security audit shall be placed before Steering Committee/ Governing Body of Foundation.

#### 7.2.5.2 THEME PLAN FOR FIRE PROTECTION

One of the important factor which commands profound effects on forest and wildlife, is fire. Forest fire has beneficial effect under control but has hazardous effect when it is wild. Fires usually do not kill a large number of animals but they do harm micro fauna and flora of the habitat. Fire destroys the organic matter, which contributes to the humus content of the substratum. Fire changes the abundance and composition of wildlife communities drastically, and a general ecological effect of fire is to reverse the natural plants succession. The fire also destroys the eggs of a number of ground-nesting birds and reptiles. The fire compels animal and bird population to abandon the habitat and migrate randomly in various directions, which may disturb the spatio-temporal utilization of a habitat. Many seeds and several plant species are completely destroyed by fire and their regeneration is affected adversely.

Specific fire protection scheme would certainly check spreading of fire, with a system of immediate detection of fire, speedy communication, quick arrival to the fire site, immediate action to extinguish the fire on war footing scale. One of the most important fire protection measures, is to get reciprocal commitments regarding control of forest fire through regular meetings with local people of the surrounding villages.

#### **FUNDAMENTALS OF FOREST FIRE**

It is necessary to understand and evaluate the causes of fire, which are many. The factors contributing to fire are heat, fuel and air. In a fire-control operation, one or more of these factors would need to be eliminated. The spread of fire depends upon fuel and weather. Heavy fuel like logs, stumps, and branch wood burn readily but slowly and throw off a large volume of heat, when dry. Light fuel such as dry grass, dead leaves etc. burn quickly, accelerate spread of fire and kindle heavier fuels. So far as weather is concerned, wind, moisture and temperature are important. Strong wind fans rapid spread of fire by augmenting supply of air. Wind is the least generally in the early morning. The moisture content of fuel is also an important consideration for firecontrol. Under normal circumstances fire burns slowly in the night, because the damp air and moisture is absorbed by fuel. Air is drier during the day and causes rapid burning. It is thus easier to control fire in the night than during the day. It, however, does not imply that no serious effort should be made during the day to extinguish the fire. In fact, most fires are controlled during the day, due to various other considerations. Air temperature is another important consideration, asit not only affects fuel and air movement, but also the fire-fighters themselves.

#### **CAUSES OF FOREST FIRE**

Forest fire may be accidental or deliberate. Among accidental, fires may start as a result of carelessness on the part of smokers, picnickers, travellers, forest laborers, and collectors of NTFP. Forest fire are at times intentionally set by graziers, for lush growth of grass, by poachers to drive out wild animals for hunting, by honey collectors to drive away honeybees, by antisocial elements on account of vandalism or to obliterate evidences of the forest offence committed by them. Fires are many a time set unaware by pilgrims along roads. Still others set fire to the forests through a die-hard superstition of propitiating a deity.

#### **SOCIO-ECONOMIC IMPACT**

Forest fires are recognized not only as a major constraint to production forestry but also as a principal factor causing degradation of the human environment. Some of the impacts of forest fires are tangible but are difficult to evaluate inmonetary terms. Studies of dynamics of vegetation reveal, that the original species which propagate readily from seed, or coppice from the stump, would tend to reappear on a site after a forest fire. Thus highly flammable species would immediately revegetate and perpetuate a hazardous fuel-type. The other deleterious impact of forest fires is aggravation of surface and gully erosion. The area burnt upstream would tend to reduce the storage capacity of the reservoir downstream. It has been observed that site degradation on account of repeated forest fires causes, soil erosion and floods, which have an adverse effecton streams, lakes and man-made reservoirs.

#### **FIRE PRONE AREAS**

Based on the vulnerability to forest fire, the areas falling under Similipal Tiger Reserve can be classified into three zones viz., highly fire prone areas, moderately fire prone areas and less prone areas.

Zone	Vegetation Type		
Highly Fire Prone	Dry deciduous and moist deciduous		
	forest, grasslands, scrubs, semi-evergreen		
	patches, and areas falling within the		
	settlements		
Moderately Fire Prone	Moist deciduous forests		
Less Fire Prone	Evergreen forests, semi evergreen forests		
	and old plantations		

#### FIRE CONTROL MEASURES:

The fire season in Similipal Tiger Reserve usually starts from February and continues till May or till receipt of first shower of pre-monsoon. Past experience shows that almost all cases of fire are man-made out of which maximum cases are to facilitate growing of succulent grass/ leaves for the domestic cattle of the villages, a number of cases are for collection of NTFP and few cases for poaching of wild animals. The key factors in controlling the fire will be:

- 1. Timely and meticulous planning.
- 2. Effective utilisation of fund.
- 3. Proper gearing up of available machineries.

Following measures are laid down to guide in combating the situation to make Similipal Tiger Reserve free from fire.

# 1. Preparation of Fire Map:

The Range wise fire map in a convenient scale will be prepared with division of entire Range into High, Medium and Low fire prone zones with different colour coding (eg. Vermillion/pink/yellow) to different zones. The parameters for determination of proneness to fire will be nearness to habitation, forest type(microclimatic), passages through the forest and distance from water bodies etc. The Dy Director will submit a copy of the map to the Field Director latest by 31<sup>st</sup>January. After fire season is over the Range Officer has to submit a report of success/failure with a map showing the incidents of fire.

#### 2. **Prevention of fire:**

The aim shall always be to prevent the forest fire from breaking. Following steps are to be taken to achieve this objective.

<u>Creation of awareness</u>: The message of the evils of forest fire and the duties of the villagers residing on the fringes and enjoying the usufructs shall be disseminated among the people.

<u>Provision of incentives:</u> The motto will be to prevent forest fire by motivating and winning the heart of the people through incentives. EDCs/VSSs will be activated and incentives shall be given to the committees/villages showing active involvement in fire protection in their area. List of fringe villages of the core area of Similipal Tiger Reserve is given in Annexure L.

<u>Clearance of fire lines</u>: All the forest roads, boundaries and footpaths passing through or touching the forest shall be taken as fire lines which shall be cleared of leaves and other inflammable materials. In case of forest road at least 3mt on either side shall be maintained clean and in case of live footpath a 6mt strip shall be cleaned which shall be maintained regularly. New fire line if required will be cleared in 3 mt width. List of firelines to be maintained in the core area is given in Annexure XLIX.

<u>Deployment of fire watchers:</u> Sufficient numbers of fire watchers will be deployed on the fire lines those will patrol over the area to give information on incidences of fire to the nearest camps.

<u>Deployment of informers:</u> In the villages accustomed to *Akhand Shikar* spies are to be engaged to keep track of the poachers and pass on the information to the concerned forest officials in the field.

## 3. Fire fighting:

In order to combat the fire, fire fighting squad at the rate of one or more per Range will be formed depending on availability of fund. The squad will consist of 10 persons on daily wages under control of one regular staff, i.e, Forester or Forest Guard. The squad will be equipped with vehicle, fire fighting tools and VHF. The squad will work round the clock and prevent fire in collaboration with the villagers to whom incentives have been given. They will also extinguish fire on receipt of information on outbreak of fire. In Similipal due to topography, any small outbreak of fire in the lower hill side spreads upward covering extensive areas. Hence the fire fighting staff at the lower hill side has greater responsibility in preventing upward spreading of fire. All the staff and daily wage protection staff shall also be pressed into action.

## **Detection of Forest Fires**

Effective controlling of fire calls for prompt detection and reporting. Detection implies location of the fire and passing on the intelligence to the persons responsible for control. If detection is inefficient, the fire would engulf large areas by

the time suppression forces reach the fire scene. No suppression is possible till the fire is detected. The interval of time between origin of fire to arrival of the suppression force would cover operations such as: detection, reporting, preparation and mobilization. It is imperative that fires are detected no sooner than they originate so that they can be controlled with ease, and the damage restricted to the utmost minimum. It is not feasible to keep the entire forest area under observation at all times or even during the fire season. Parameters such as: the value of the forest to be protected, the frequency of fire occurrence in the area, the nature of the fire and its concomitant adverse effect, facilities for transport and communication, financial resource, the strength of the suppression force and its availability, fire –fighting equipment available, help determine the "priority areas" for observation and the detection-time standards.

The possible means of fire –detection include

- (i) voluntary detection and reporting by the general public;
- (ii) ground patrolling;
- (iii) watchtower observation and
- (iv) remote sensing (MODIS satellite information)

An efficient detection system should make use of all these methods, according to special needs of the area of risk.

# **Voluntary Reporting**

Where forest area affected by fire has habitation, in and around, it is possible that the local population including right-holders, way fares etc. may report the fires. Such voluntary reporting is dependable through EDC. This is possible only where the EDCs are properly motivated, the EDC needs to be enlightened, motivated about the danger and control of forest fires. Legally the right-holders are duty bound to report about forest fires.

# **Ground Patrolling**

In theory, it is a simple arrangement but can be vastly improved if executed methodically. Since the view of the patrolman is often restricted, only limited area can be covered by this method; hence it shall be taken recourse to in regard to the most valuable forest where fire danger may be high, patrol may travel on foot, vehicle etc and shall make use of vantage points. They should be familiar with their designated area including the topography of the area as well as the habits of the local people. They may be required to perform the functions of prevention, law enforcement, fire-suppression etc. The function of a patrolman also includes detection, prevention and suppression. Apart from mobile patrol parties organized by Deputy Director /Field Director mainly for checking theft of forest produce, fire watchmen are engaged during the fire-season for a period of 3 to 5 months. These fire-watchmen assist the forest staff, in detecting and preventing forest fires, as well as in protection of Tiger Reserve. They do not have any training in fire-prevention or fire-

detection and are employed seasonally. As a result they are often not able to develop the required expertise in their work. It may be more economical in the long run, to employ specially trained gangs regularly and to use them for other work after the fire season is over. In any case, apart from the fire watchman, forest fires, can also be detected and reported by other officials of the Tiger reserve or other government agencies, in the Tiger Reserve during their normal work in and around forest areas.

# 4. Post-fire operations

In spite of all the precautions, if fire break out, immediate steps to be taken to extinguish it and the gutted area to be measured and mapped out, the loss to be assessed and the reasons for fire along with responsibility need to be fixed.

## Safety

Fire-fighting is a hazardous task. Every precaution shall be taken to prevent injury to the fire-fighting crew. The fire-fighting crew shall be properly equipped with a first-aid kit. Fire-fighting crew shall be supplied with fire-resistant clothing. Fire resistant cloth is now being made within the country at reasonable price.

## 5. Accountability:

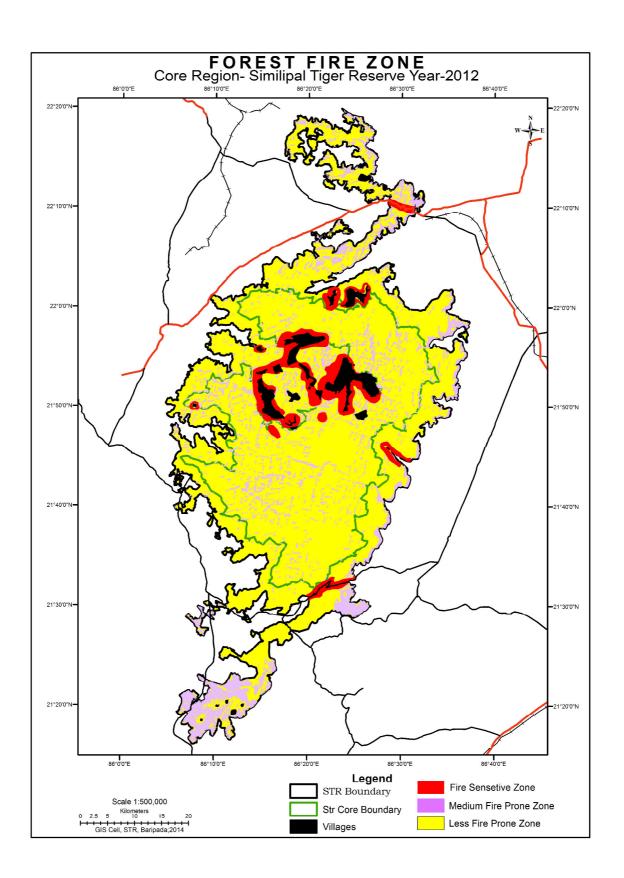
The staff will be accountable for the fire in their area and necessary disciplinary action will be taken against them.

# 6. Monitoring and evaluation:

In order to monitor the programme, control rooms in the Division and Range Offices will function round the clock. In the STR headquarters a daily monitoring register has been kept where all the cases of fire incidence along with the action taken will be reported. After the fire season is over, the entire area is to be inspected by the concerned Divisional Forest Officer/Dy Director and evaluate the works of the staff. Outstanding performance of any officer/ staff/ labourer/ village committees will get suitable recognition.

The Deputy Director will generate fire control Map indicating the fire burnt area every year and submit to the Field Director. The information generated will be utilized while planning fire protection for the ensuing year. Range officers will submit fire occurrence report to deputy director in the proforma prescribed below.

SI no	Range	Locality	Extent	Nature	Loss if	Whether	Remarks
&			affected	of	any	fire has	
date			by fire in	damage		been put	
			ha			off	



#### PROBLEMS AND TIPS

# 2. Fires in a log

If a log is burning first, cool off the parts where it is the hottest. This could be done with damp dirt thrown with a shovel, A fire line should be dug around the burning log, to prevent spread of fire on the ground. The fire-line should be located at a sufficient distance from the log, to provide a safe working areas If the fire is on a steep slope, a trench (like ploughed furrow) should be dug on the lower side, to catch rolling, burning chunk, Wherever possible, the log should be turned around, to lie up and downhill, to prevent it from rolling and scattering fire. If is it not possible, the log should be securely blocked with rocks or rolled into a prepared trench. If the log is too heavy to handle, it is better to have a deep trench below it. After the fire has been cooled down, if water is readily available, it should be sprayed on burning coal or parts. If water is not available, all burning portions should be rubbed well with clean dirt. If there are several burning logs, it would be advisable to clear the area of debris and duff. As a mop-up, all the burnt area and portions of the log should be examined carefully, by looking for smoke and feeling with the hands, to make sure that every spark of the fire has been extinguished. This must be ascertained before leaving the area.

#### 2. Fire in dead trees

Dead trees that are in various stages of decay are potential fire- hazards. Once such a tree is on fire, it becomes a dangerous fire-spreader, as sparks from a dead burning tree may be carried to far off distances, it usually becomes necessary to fell the dead tree within the fire area. If it is not possible, a safe place should be located for the fall of such a tree, by clearing bushes and other inflammable material from the area. Falling material shall be watched carefully. Once the dead tree has been felled, same action shall be taken to extinguish all fire according to the instructions given above, for taking care of burning logs. Each piece of burning material must be extinguished. A thorough search for fires, that might have been caused by sparks from the dead tree should be made.

As mentioned above, a dead burning tree should normally be cut down. However, if the fire is near the ground and water is available, it may be possible to extinguish it, without felling the dead tree.

## 3. Fire in a stump

If a large stump is burning and the fire has spread to the ground, a fireline should be made immediately, to prevent its further spread. Hotspots should be cooled down, by throwing clear dirt with a shovel. The work of extinguishing fire in the stump should then proceed. The roots should also be checked up and burning roots put out. All the fires should be extinguished to ensure that every spark is out.

## 4. Fire in grass/weed/ mixture of fuels, etc.

Grass is very susceptible to changes in weather, it absorbs or dries out moisture rapidly and this character reflects the way grass will burn. Dry and dead grass ignites quickly and is one of the fastest burning fuels particularly where it grows dense. A fire in the grass will cover a large area in no time unless it is controlled immediately. Wind and slope add to the spread of fire. Grass fires, however, do not burn very hot and they soon cool down. A grass fire may be controlled by use of clean dirt, applied with a shovel. A fire-line may also be used by working directly to the fire's edge. Any unburnt material, between the fire-line and the fire -edge should be burnt out. Weeds cover large areas in old burns, cut-overs etc. A fire in weed resembles a grass fire but usually there is a greater amount of flame and smoke. Fire in the weed could be extinguished by working directly on the edge of fire. Clean dirt or water can be used. When there is a fire in the bush burning uphill, start work at the flanks, from the rear and then travel through the burnt area, to the head, as soon as fire reaches the ridge top. Here, action is taken on the rear and flanks to cut the heat and stop lateral spread. Frontal attack becomes possible, when head of the fire reaches the ridge top, but the fire must be controlled before it crosses down the other side. Weeds are flash fuels, which do not burn very long; so fire can be mopped up very quickly but there are usually rotten wood, stumps, logs or other heavy fuels present, which require considerable work. In such cases, it is specially important to quickly size up the fire, to spot the danger points and plan the attack. Each danger points should be taken care of, to stop spread or the threat of spread.

#### 7.2.5.3. THEME PLAN FOR MAINTENANCE OF BOUNDARY

The core area of Similipal Tiger Reserve, extends over an area of 1194.75 sq km divided into 7 Ranges, 23 Sections and 75 Beats. The boundary of the core area extends over 386.87 km. In Similipal Tiger Reserve, part of Similipal Sanctuary constitutes the entire core area and the other part is under buffer of the Tiger Reserve. Hence due to contiguity of the forest, erection of any kind of pillar is not suggested. The boundary will be demarcated with colour painting on the trees falling on the boundary line at a visible distance. The colour will be two bands of white paint with a band of green paint in between. However at some portions, particularly in Nawana North and Nawana South Range the core boundary coincides with the village boundary and outside area is revenue land. In that portion boundary pillars will be posted after DGPS survey to prevent encroachment. Once the above are done, then the boundaries of the Park would have to be redefined and digitized and shown on GIS map.

# **Objectives**

- Proper record of land.
- Boundaries should be marked on land and map.

#### **Problems**

- Land records of area are not computerised.
- The boundaries are not marked in the field.
- Internal boundaries are also not marked.
- Staffs do not know exact external and internal boundaries.
- Geo-cordinates of the core boundary not notified.

## Strategy:

- Entire land records of area will be computerized.
- The boundaries of area would be carefully checked and marked clearly on map as well as in the field.
- Beat maps of the area would be prepared showing clearly the boundaries and other important features. These beat maps shall be provided to the Forest Guard, so that he can take care of the boundaries in his control. The beat shall be the basic unit of management and Beat Guard shall be responsible for its maintenance.
- Updating of land records shall be regular process.

# Monitoring

• Norms will be fixed for DD/ACF/RO for checking of boundary pillars in the field.

# 7.2.5.4 Theme Plan on Tiger Population Estimation and Monitoring

NTCA have issued protocol for monitoring of tigers, co-predators and prey. It comprises of a four stage process involving primary data collection at forest guards beat level, its collation and analysis. All these information are then used to develop relationships for understanding tiger population dynamics in tiger occupied landscape. This process is required to be carried out every year The four phases are

Phase I: spatial mapping and monitoring of tigers, prey and habitat

Phase II: spatial and attribute data

Phase III: Estimating the population of tigers and its prey

Phase IV: Intensive monitoring of source populations

The following methodology for this monitoring under Phase IV as per the latest protocol of NTCA will be adopted.

- A. Maintaining daily patrolling log (Form No. 6) in patrolling camp. The staff of all antipoaching camps after returning from daily foot patrolling will record their observation in the patrolling log
- B. Carrying out the 8 day protocol of Phase I twice a year for carnivore sign survey and ungulate survey on fixed transects which will be analysed at STR headquarters using "Distance" software to monitor the spatial occupancy of carnivores and herbivore density with seasonal variations.
- C. Recording data from "pressure impression pad"
- D. Obtaining the minimum number of tigers in the tiger reserve by analysing the sign survey and camera trap data.
- E. Obtaining the tiger number for the reserve using camera trap in a mark recapture frame work. A camera trap database for the tiger reserve will be created following the standard nomenclature of NTCA and will be supplied to NTCA for the national repository of camera trap photograph of tigers.

The details of tiger population monitoring and habitat assessment have been discussed in Chapter-9.

# RESEARCH, MONITORING AND TRAINING

Research is one of the major issues in the Plan Outline of the Project Tiger document, 1972. The document envisaged that the scientific staff of the reserves would undertake basic research programmes aimed at evaluating systematic factors and influences, for devising pragmatic management practices to cover specific population and the entire ecosystem. Research constitutes a very important aspect of effective management of wildlife protected areas. Research based wildlife management is crucial for the success of any Tiger Reserve. This is a legitimate activity, and must be compatible with the objectives of wildlife management in the protected area. The Tiger Reserve should have a clear wildlife research policy based on the following priorities.

## 8.1 RESEARCH PRIORITIES

Wildlife management is a mix of field craft and science based on field research. Research in the Tiger Reserve shall focus on the critical information needs, which are by and large common to most of our Protected Areas. Professional researchers working in isolation on topics or species relating to their field of interest can contribute very little for fostering wildlife management. The research shall be "problem solving studies", based on a consultative process involving PA management. Some "pressure points" for PA management are common to most of our PAs, and in addition to the on-going small term projects, wildlife research in Similipal Tiger Reserve should preferably focus on these as given overleaf.

PA Managerial Priorities	Research Areas	
A) Values Relating to PA:	- Regional changes in species richness	
	&diversity	
	- Changes in species occurrence	
Ecological/ Regional landscape	- Effect on water table	
	- Habitat fragmentation	
	- Endangered species: prey base, age/	
	sex ratio, biomass computation, life	
	table computation	
2. Habitat degradation	- Types of exotic infestation	
	- Control methods	

Reasons for livestock depredation  Percentage of livestock in the food-
Percentage of livestock in the food-
_
spectrum of carnivores
Reasons for crop damage
Biodiversity conservation vis-a-vis
management practices in-vogue
Magnitude
Modus operandi (variations)
Wildlife crime intelligence and
networking
Wildlife crime prevention
Nature and efficacy of existing
preventive and control measures
Changes in the habitat due to fire
Changes in animal use pattern due to
fire
Impact (magnitude)
Ecological changes
Periodicity
Founder population size
Translocation
Involvement of host-communities
Mechanism
Impact assessment
Morphological studies
Biochemical studies
DNA fingerprinting
Landscape epidemiology studies
Health and monitoring both of animals
and village livestock
Customisation of software suited to
Similipal setting
Estimation procedures, indices for
various species
Home range studies
Effect of existing land use
Mechanism/ strategy to mitigate ill
_

	- Methods for mitigation
	- Decadal population growth in impact
	zones outside PAs (human/ cattle)
Interface problems	- Resource use pattern of indigenous
	people
	- Impact of PAs on indigenous people
	- Community role in conservation
	- Levels of sustainable use
	- Grazing impact
	- Regeneration status in right burdened
	forests
	- Impact of rights and concessions on
	habitat quality
	- Socio-economics of indigenous
	community
	- Resource requirements of indigenous
	people & dependencies
	- Traditional knowledge & occupation of
	indigenous communities
	- Impact assessment of Eco-

Apart from the above biological/ ecological researches, the park management shall also encourage the collection of relevant information on the effects of the Tiger Reserve on local economy and communities of the surrounding villages. Such social researches shall also be developed into reports, status papers, micro-plans, and other documents resulting in the formation of effective policies for ecodevelopment of local communities. Although these social projects may sound purely academic or official, and may not have any immediate obvious management significance, they would prove to be of a great value later, as the present scenario of the park - people interface in our country is bound to go a very long way.

#### 8.1.1 FUTURE STRATEGY

# 8.1.1.1. Development of Infrastructure

## A. Research Labs/Facilities -

The park has no basic facilities for research. One main Research lab will be established at Baripada. Basic equipment like- computers with GIS facility, refrigerator, deep-freezer, microscopes, oven, weighing machine, veterinary instruments etc. for research shall be provided. The additional instruments like- vehicle

development woks

etc. required for different field research would be procured. There is an urgent need for carrying out systematic and basic research related to habitat, herbivore and carnivore status, population density, habitat use pattern etc. and impact of various works being carried out in and around the Protected Area. To conduct these research activities there shall be a full time research officer, researcher and assistants. Chemical Immobilization equipment and drugs would also be required to capture the diseased or other wild animals in stress requiring help and treatment.

## B. Meteorological Stations

Presently rain gauge is working only at Nawana. Meteorological Stations shall be established at different locations, preferably at Range headquarters so staff can take proper information and collate the data systematically.

#### C. Constitution of Animal Rescue team

As per the guidelines of NTCA an Animal Rescue Team will be constituted by Field Director, which will carry out the rescue and rehabilitation of wild animals. Team shall consist of the followings

In-charge Officer - Veterinary Doctor or ACF Range Officer - At least one Range officer

Forester - At least 3-4 Dy-Rangers or Foresters

Forest guard - At least 3-4 Forest Guards

Experienced Member - Locally engaged labour or MR labour who have

Previous experience.

The team members will be trained in, tranquilizing, trapping the distressed animal and providing it first aid; and in application of various useful instruments.

# 8.1.1.2. Constitution of Research Advisory Committee

A Research Advisory Committee shall be constituted with the following members-

(i)	The Chief Wildlife Warden, Odisha	Chairman
(ii)	Senior Research Officer, O/o PCCF (WL)	Member
(iii)	A representative from WII	Member
(iv)	State Wildlife Health Coordinator	
	from VeterinaryCollege, OUAT	Member
(v)	Field Director, Similipal Tiger Reserve	Member Secretary
(vi)	Any other Scientist / Forest officials,	
	nominated by the CWLW of Odisha	Member/Special
		invitee

A Park Level Research Committee for Similipal Tiger Reserve shall be constituted with the following members—

(i)	The Field Director, Similipal TR	Chairman
(ii)	Faculty, North Odisha University (2 nos)	Member
(iii)	Veterinary Surgeon of Similipal TR	Member
(iv)	Deputy director, STR	Member

(v) Deputy Director (Tourism & Research), STR Member Secretary

The Committee shall have the following main activities: -

- (a) To finalize the selection/identification of relevant research based studies.
- (b) To review the progress of research activities carried out for the Similipal Tiger Reserve
- (c) Provide suggestion/recommendations for improvement and smooth functioning of the research activities.

The meeting shall be arranged as per the requirement, but at least once in six months. The members would be eligible to get TA/DA and other facilities, decided by the Government from time to time.

#### 8.2. RESEARCH PROJECTS

The list of research projects carried out in Similipal Tiger Reserve in 2010-11 to 2013-14 has been given in Annexure XXIV.

The Research activities in the Tiger Reserve were confined to traditional research on forest and wildlife. In the changing scenario it is necessary that the scope of such research should extend to the micro flora and fauna as they are also part and parcel of the biosphere. It also is desired to engulf the socio-economic condition of the people and forest crimes within its sphere. Most of the research works to be spelt out in this chapter will be confined to the flora and fauna of the Reserve. As such the attention is drawn to the following field for research.

- Determination of bio-diversity richness along with the micro flora and micro fauna.
- The carrying capacity of different wild animals, their food, food potentiality.
- The health of wild animals with special reference to the elephants
- The nutrition content of different edible plant species taken by the wildlife.
- The effect of fire both conducive and adverse to the forests.
- Eradication of weeds like *Eupatorium* from the forests.
- Ground water table
- Ethno-botany i.e. various plants used by the local people, their distribution and status.

- Socio-economic condition of the people inside the PA and its impact on management.
- Forest crime, their trend, causes and remedies.

# **Strategies**

The following strategies will be adopted for the purpose of research.

- Establishment a Research Center with GIS laboratory and monitoring cell at Baripada under a Research Officer with one GIS Analyst and Computer Operator with required infrastructure like building, Soil Testing kits, Computer, Cameras, Binoculars, Microscopes and other instruments.
- The help of Sociologist, wildlife expert and Criminologist will be taken.
- A Forest Crime and Prosecution Cell at Baripada in the Office of the Field Director will be established with one Forest Ranger, one Forester and one Junior Clerk. A computer will be purchased for the purpose of keeping the records of Forest Crime. The Cell will monitor the crime up-to-date position of prosecution process and outlining the procedure for preparation of case record for prosecution.
- Maintenance of existing sample plots and preservation plots to study the impact of biotic interference, growth statics of plants and succession.
- Plus trees of different species will be selected, listed and protected for collection of seeds to be distributed among the Divisions for raising plantations.
- All the transects laid to monitor herbivores, their signs; the habitat features will be permanently maintained and observations on signs of wildlife be recorded in a register at frequent intervals.
- Computer data on animal sighting, herd size of each species, movement pattern, plant phenology and fire incidence will be recorded and analysed to give inputs for future management.

## **Linkage with Academic agencies**

The research work will be taken up in collaboration with Regional Plant Resource Centre, Bhubaneswar, Wildlife Institute of India, Dheradun, Anthropological Survey of India, Zoological Survey of India, Botanical Survey of India, Bombay Natural History Society to name a few. The experts in Botany and Zoology Department of Utkal University and North Odisha University will also be entrusted with the research work whenever necessary.

#### 8.3 MONITORING FRAMEWORK

As stated in previous chapters, the Reserve has a good network of forest camps covering all vegetation cover types and habitats of wildlife. A photographic album of ground flora covering many species of grasses, herbs and forbs shall be prepared and distributed to all field staff involved in the day to day monitoring to facilitate easy identification of species from the management point of view. The data generated from such continuous monitoring shall later be inferred/ analysed into very interesting trends, and bases for species-specific and habitat specific planning in the Tiger Reserve. Each Forest Guard in-charge of the respective camp must fill in the requisite information derived from the daylong patrolling of his beat. This would lead to the generation of a lot of data on the basic parameters required for managing a wildlife protected area.

- **8.3.1. Physical** physical monitoring is as important as biological monitoring. By physical monitoring we can monitor following issues:
- a. Patrolling camps
- b. Park boundary
- c. encroachment
- d. unauthorized entry of people
- e. monitoring of patrolling parties who are engaged for protection and physical monitoring
- f. animal health by direct sighting
- g. waterhole/salt-licks/grasslands/animal trail etc. monitoring
- h. Siltation in water bodies
- Rate of erosion in the banks of streams
- j. Change in rainfall pattern and change in diurnal/ seasonal variation of temperature
- **8.3.2. Biological** The Park Management will ensure that the monitoring of biological resources form a basic routine activity in protected area management, and it is the principal way in which the management can identify trends or changes, and so gauge the effectiveness of its managerial inputs. The management shall strive to include a number of useful monitoring activities in the routine duties of the staff, as well as regular annual estimation of wildlife, counts and other activities.
- **8.3.2.1 Tiger, Co-Predators, Prey and its habitat** Monitoring status of tigers, copredator prey base and important components of the conservation plan. All forest camps within the Tiger Reserve shall be provided with camp registers containing proforma of information/ data collection relating to the broad phenology of the vegetation type, species-wise animal sighting with their age-class and sex-class

structures, females with fawns, lactating females, and others etc. The proforma for recording indirect evidence of tiger and panther has also been included. As far as the management is concerned, a useful inventory could be as simple as information on the distribution of important species, whose numbers reflects important ecological processes. Even crude indications of the numbers of these animal species would add to the value of inventory. A coloured photographic guide for identification of animals should be prepared and distributed among all the field staff.

Daily Monitoring and Forecasting- Similipal Tiger Reserve is home to source population which is extremely important for long term conservation of tigers at landscape level. Prescribed format for daily monitoring is enclosed. The park manager will get this data daily by wireless and should monitor daily basis. So he may know the daily activities and tiger movement etc. The analysed information thus generated should be sent to NTCA every month. The format of daily monitoring using in camp level in TRs is given in table next.

# Format of Patrolling CampRegister for Routine Ecological Monitoring

Particul	Particulars of Patrolling			Phenology					
Date	Place & Time		Flowering	Fruiting	Leaf Fall	New			
	Compartment		trees/	Trees/		Leaves			
	No.		Plants	Plants					
1	2	3	4	5	6	7			

## **Formats for Biological monitoring**

Herd Structure	Herd Structure of Ungulates													
Total No. of	All N	∕lale H	erd		Female-Fawn Herd N			Mi	ked I	lerd				
Herds														
(Chital/												٠,		
Sambar/										ılt	ب	Adult		
Gaur/barking		بد				ب			ᆂ	Adult	Adult	Sub A		
deer/four		Sub-Adult				Sub-Adult			Adult	qns	e A			
horned	Adult	P-A	Fawn	Total	Adult	p-A	Fawn	Total	Male	le S	Female	Female	Fawn	Total
antelope etc.)	Ad	Su	Fa	2	Ad	Su	Fa	입	Š	Male	Fe	Fer	Fa	To
8	9	10	1	12	13	14	15	16	1	1	19	20	2	22
			1						7	8			1	

Vari	Various Stages of Antler Development			Birth Frequences Ungulates Intervals)		Stages of G	Gestation		
Males with	Fallen	Males with Developing	Males with Branched	Males with Developed	Total	Date	Total New Borns	No. of Pregnant Female	No. of Lactating Females
23		24	25	26	27	28	29	30	31

Data/ E	vidence	Relating	to the T	iger						
Male/ Female Pugmark (No./ Unit Distance Walked)	Urination (No./ Unit Distance Walked)	Scraping (No./ Unit Distance Walked)	Call (No./ Unit Distance Walked)	Scratches (No./ Unit Distance Walked)	Scat (No./ Unit Distance Walked)	Cattle Kill	Other Kill	Stride Measurement	Straddle Measurement	Signature Inspecting Officer
32	33	34	35	36	37	38	39	40	41	42

Habitat Assessment and Monitoring Framework- The Tiger Reserve will develop a system of ecological monitoring of flora and fauna. For habitat assessment sampling for Vegetation, Human Disturbance and Ungulate Pellets will be done. To quantify the habitat parameters and determine relative abundance of ungulates sampling will be done along the same line transect on which ungulate encounter rates were estimated. Sampling for vegetation, ungulate dung/pellet and human disturbance will be done only once on a transect.

**Spatial Database Development-** Spatial database shall be developed and data taken in different datasheets to be collected for analysis.

Analyses and Reporting Framework- The data taken from field to be compiled TR/Landscape-wise and send to WII for further analysis and results.

**8.3.2.2. Other Species**- Other species which are not direct prey of co-predator of tiger, separate monitoring protocol shall be developed. Not only big mammals or vertebrates but if it is important or indigenous to that site or if it is in red data list or

endangered and threatened species, special monitoring protocol shall be developed. In Similipal Tiger Reserve tracking of elephant herds and recording herd size, sex ratio, health, movement pattern, feeding habits etc. shall be recorded daily by patrolling parties and shall be recorded in a proper format. So collected data can be analysed and monitoring by higher level can be done.

## 8.3.2.3. Vegetational Changes

This may include the status of regeneration of key species, status of grasslands/meadows, successional stages in a community, invasion of woody species into grasslands, productivity of a site and weed infestation. Some example of indicators of vegetation is given below:

1	Lichens	Highly susceptible to environmental
		degradation
2	Mosses	Indicators of moist/dry environment
3	Orchids	Presence of many endemic species
4	Pterocarpus marsupium and	Illegally felled for house building and
	Dalbergia latifolia	furniture; deficiency shows biotic pressure
5	Invasive species	Eupatorium sp. whether invading to core
		area
6	Vegetation cover vegetation	
	changes will also be	
	monitored by using satellite	
	imageries through FSI and	
	GIS Cells at STR, Wildlife	
	Hqrs	

# 8.3.2.4. Changes due to fire

Effect on soil, flora and fauna Effect on regeneration

Cause of fire: Mapping of fire incidence and damage.

Successional changes induced by fire

## 8.3.2.5. Changes in animals

Change in number population structure age group and sex-ratio.

Distribution of animals Health Conditions Prey Preferences Behavioural Aberration etc.

Distribution of melanistic/black tigers

# The following table indicates the indicators in animal species.

SI.	Animals	Reason of selection
No		
1	Tiger	Charismatic species and apex of the ecological
		pyramid
2	Elephant	Charismatic species and largest herbivore
3	Prey animals including gaur	Prey base of large cats
4	Giant squirrel	Indicates closeness in canopy
5	Mugger	Master predator and charismatic aquatic herpetofauna
6	Turtle and tortoise	Indicator of ground flora, fauna, soil and water quality
7	Mahaseer fish	Indicator of water quality and intensity of fishing
8	Peafowl	Charismatic avifauna, National bird
9	Predator birds	Presence of plenty of prey base
10	Hornbills	Highly endangered, presence indicates good environment
11	Hill myna	Endangered as captured for pet trade
12	Moths and butterflies	Indicate virginity of environment and free from biotic pressure.

It is very crucial to have access to and use of pertinent literature on forest and wildlife management and periodicals thereon in the library of the PA at Baripada, so that to cater to the need of Researchers and field functionaries to update their level of knowledge in tune with changing scenario in management of PAs, so it is suggested a full fledged library be established in the PA headquarters.

# 8.3.3. Effects of management inputs

Utility of Water Impounding Structures . Relocation of enclave villages and its trend of utilization of vacated lands by wild animals, Inputs under eco-development and its role in reducing the dependency on forest.

## 8.3.4. Socio-economic and management

In Similipal Tiger Reserve there are many tribal settlements. Village boundary, villager's crop-fields and their activities, out-side people who are coming to whom shall be monitored to develop a protocol by park management. Old offenders who are living inside or outside shall be listed and for monitoring of their day-to-day activities, offender-wise duty shall be allotted to staff, who will collect information and send report to higher officers.

## 8.3.5. Methodology

For monitoring physical changes, different gadgets need to be installed at certain representative sites to quantify the parameters. Data collected will be analyzed in computer installed at Baripada. For monitoring vegetational changes and changes induced by fire, sample-plots are to be laid randomly. For tree species, the plot size should be 10m x 10m or a circular plot of 5metre radius will give best results (Tested in Rajaji National Park having similar forest types). A few larger permanent plots of 1ha area are also recommended. Aerial photographs and satellite imageries of the tract will be indented from National Remote Sensing Authority. An in house GIS centre is required to be developed. For monitoring the impacts of management inputs, radiating transect are suitable for water impounding structures and effectiveness of eco-development measures. For relocated sites, line transect for indirect animal evidences assisted with data on opportunistic encounter will form the base for interpretation. Methods of monitoring animals generally include roadside counts, external body conditions, fat estimation, bone marrow estimation and study of fecal matter. For certain types of more detailed study the use of radio telemetry is suitable. But, its feasibility in Similipal Tiger Reserve needs an assessment along with determination of site- and species-specific design of equipment. However, radio tracking equipment can be used for monitoring the movement of elephants, which sometimes visit Similipal and change places while moving through the states of Orissa, West Bengal and Jharkhand. Impacts of tourism are best monitored through indicators namely; (i) ecological. (ii) alternate and (iii) diverse. Certain major Ecological Impact Indicators are visible soil erosion, abundance of selected wildlife species (scavengers), frequency of wildlife sightings, exposed plant roots, water ambient quality and amount of trash and litter left behind by visitors. Alternate Indicators include (i) Noise impact of traffic, (ii) Disruptive settlement pattern in tourism villages and (iii) Disruptive construction in recreational areas. Local agriculture serves as the main indicator of diverse impacts and can be quantified as, expansion of agriculture to meet the tourist demand for supply of specific agricultural products and shrinkage of agricultural land to develop infrastructures for wildlife tourism. The monitoring will be done internally at Division level by the Divisional Forest Officer and at Circle level by The Field Director, STR. The evaluation will be done by an outer agency preferably the Indian Institute of

Management, Indian Institute of Forest Management and Anthropological Survey of India at an interval of three years

#### 8.4 TRAINING NEEDS ASSESSMENT & HRD PLAN

Though the management of the Similipal ecosystem itself is a learning process for the majority of the frontline staff, the Park Management shall ensure that the newly inducted staff undergoes wildlife training conducted by various Institutes in the State and outside. Officers shall be encouraged to undergo Diploma as well as Certificate and Capsule courses conducted by the Wildlife Institute of India, Dehradun for officers down to the Forest Ranger. The information about the training and institute providing training is as following —

**Table: Training Courses** 

S.	Course Name	Course	Course	Participant	Resource	Frequency
No		Туре	Duration	Level	person/	
					org.	
1	Improved	Diploma	Nine	A.C.F./DCF	WII,	Once
	Wildlife	Course	Months		Dehradun	
	Management					
2	Eco- development	Module	Three Months	A.C.F./DCF	WII	Once
3	Improved Wildlife Management	Certificate Course	Three Months	F.R.	WII	Once

Besides, Forest Guards and foresters posted in Similipal shall be given specialised training in wildlife apart from basic forestry training. Apart from above basic training, some very important trainings are required to staff/officers for their day to day functioning.

## 8.4.1. Wildlife Protection

## 8.4.1.1. Detection and process of wildlife offences

Training will be imparted to improve:

- Understanding of principles and procedures of intelligence gathering.
- Understanding of relevant sections and rules made there under of laws in Odisha Forest Act, Wildlife Protection Act, Criminal Act, Criminal law.
- Knowledge of effecting seizure, booking and investigating offences.
- Methods of hunting/ poaching and modus operandi of poachers.

Knowledge of animal traps, snares & poisons.

- Executive instructions for safe keeping of seized materials.
- Training the field staff, Range officers and staff working in Strike Force onIntelligence Network.
- Training on identification of Wildlife parts and products for Forest Department,
   Police, Tourism, Agriculture and Food regulatory Authority and other relevant law Enforcement officers.

#### 8.4.1.2. Maintenance and use of fire arms

Training will be imparted to improve:

- Knowledge of various types of arms, ammunition and their use by forestofficials.
- Powers, under State Govt. orders to use fire arms.
- Laws including Arms Act pertaining to use of fire arms.
- Training to the field staff in using and maintenance of fire arms.

#### 8.4.1.3. Use of Wireless sets

Training will be imparted to improve:

- Knowledge of various types of wireless sets being used in the state and theiruse.
- Knowledge of operative language and wireless use code book.
- Knowledge battery and solar panel's working and maintenance.

# 8.4.1.4. Carrying out fire protection measures

Training will be imparted to improve:

- Knowledge of fire, firelines, fire behaviour and its effect on habitat.
- Knowledge of season, place and the time of the day for line cutting and burning.
- Knowledge of different types of watch towers, fire towers and their maintenance.
- Knowledge of fire protection plan.
- Method of organising and mobilizing fire fighting teams, managing labourforce in fire suppression.

#### 8.4.1.5. Maintenance of checking barriers

Training will be imparted to improve:

- Knowledge of checking barriers and their location.
- Knowledge of transit rules.
- Knowledge of existing govt. rules regarding entry in Protected Areas.
- Knowledge of searching and seizure of vehicles.

# 8.4.1.6. Personal Safety and First-aid.

Training will be imparted to improve:

- Knowledge of animal behaviour and offender behaviour.
- Knowledge of first-aid, maintenance of first-aid box, improvised stretches, etc.

- Knowledge of tackling offenders in custody.
- Safety of offenders in custody.

#### 8.4.1.7. Establishment and maintenance of boundaries

Training will be imparted to improve:

• Knowledge of forest survey and mapping; alignment of boundary of Foreststations, and its checking with maps. Existing rules and regulations governing boundary cairns. Survey of boundary, Act and Rules.

## 8.4.1.8. Conducting Patrol in Patrolling Units/Section

Training will be imparted to improve:

- Knowledge of activities permitted regulated and prohibited in Protected Area,
   Forest Beat, Section and Range.
- Knowledge of patrolling Registers.
- Knowledge of procedures of Section inspections, Govt. Rules/Circulars regarding Inspection Report. Stump and tree measurement techniques.
- Knowledge of Wildlife Activity Calendar.

## 8.4.2. Dealing with wild animal damage problem and animal in distress.

## 8.4.2.1. Dealing with Crop damage case

Training will be imparted to improve:

- Knowledge of signs and evidence of wild animals, knowledge about prevailing govt. rules.
- Knowledge of types of physical barriers and their efficacy in relation to various species of wildlife.

## 8.4.2.2. Dealing with Cattle lifting case

Training will be imparted to improve:

- Knowledge of predator specific signs of killings.
- Reporting and Monitoring Cattle lifting cases.
- Disposal of carcass.

## 8.4.2.3. Dealing with Human injury and death cases

Training will be imparted to improve

- Knowledge of procedure to deal with human injuries and death caused by wild animals.
- Govt. rules regarding payment of compensation and insurance policy provisions.

## 8.4.2.4. Dealing with Problem animal

Training will be imparted to improve

- Knowledge of general animal behaviour and crowd behaviour.
- Knowledge of reporting procedures.
- Training to field staff and handling and rescue of Wild animal.

## 8.4.2.5. Dealing with animal in distress

Training will be imparted to improve

- Knowledge of behaviour of an animal in distress.
- Knowledge of methods and means of transportation.
- Significance of expert veterinary medical help.
- Knowledge of restraint and handling of wild animals.

#### 8.4.3. Field Craft

## 8.4.3.1 Identifying wildlife evidences, taking measurement, making record

Training will be imparted to improve

- Knowledge of what items constitute wildlife evidence.
- Broad species habitat equations.
- Species specific characteristic appearance of dropping by their shape, size, pattern of deposition and if relevant, to consider reference to distinctive habitat types.
- Precautions in interpreting wildlife evidences and the possible level of information that can be generated.
- Where to look for tiger pugmark, understanding of morphology of pugmarks that lead to tiger identified by sex and age class status. What is a true representative print, The measurement and records to be made.
- What to record in a dead wild animal encountered. How to make standard body measurement.
- For Skeletal remains of animals, anatomical differences between carnivores, herbivores& within these groups, species identity by specific characters.
- Method of killing of prey by tiger, leopard and wild dog.
- A method for writing observations.
- Method of preparing PIPs (Pug Impression Pads) as per standards, establishing a system, its maintenance and use.
- Methods of identifying Tiger and prey Via Sign Survey, use of Camera Traps for Wildlife Surveys and methods for making observations and recording data.

## 8.4.3.2. Identification of animals and birds by sight and calls

Training will be imparted to identify

- Calls of wild animals and birds and their interpretation.
- How to differentiate the sexes in animals and birds. In case of commonly encountered herbivores and carnivores how to determine an age class by external features.

## 8.4.3.3. Approaching a wild animal

Training will be imparted to improve knowledge on

- Principles of animals behaviour very broad. How behaviour governs somatic changes and what are such changes, atleast in case of large vertebratespecies – alarm, and aggression are important.
- What constitutes personal safety?

- What actions are least disturbing to wild animals?
- How a dangerous animal should be approached dos and do not.

# 8.4.3.4. Identification of common plants

Training will be imparted to improve knowledge on

- Plant morphology and taxonomy.
- Common local/ English (at least few important) names.
- Nature of feeding signs on plants.
- Knowledge of how herbarium specimen is collected preserved mounted andtheir significance.

# 8.4.3.5. Record basic data (animals, animals activities, plants, habits attributes, events).

Training will be imparted to improve

- The method of writing simple scientific observations with the essential details.
- How to interpret a sign, an evidence, an event or an activity.
- Use of diameter, girth tapes, callipers, Abney's level, hand held compass, ranging rod, rope and pegs for establishing plots, ready made quadrants.
- Understanding formats and writing observations as per the format structure.

## 8.4.4 Wildlife Habitat Management

# 8.4.4.1. Define concepts in habitat management

Training will be imparted to improve

- Rationale for conserving biological diversity in forested landscapes. Linkagewith quality of human life and survival.
- In situ and ex situ conservation.
- What are PAs and why they are established?
- Basic wildlife biology: Broad introduction to Animal & Plant Kingdom. Wild Animals of Odisha: Mammals; Birds; Reptiles; Amphibians. Their description, social organization, general behavior and habits; habitat, distribution and status. Wild plants of Odisha: Significant species and communities. Identification of common plant species and those which are endangered. To include trees, shrubs, herbs, grasses, epiphytes in general, with use made by local communities of people as relevant.
- A broad history of wildlife conservation: India (general), Odisha (in particular).
- Concept of endangered, vulnerable, threatened rare and endemic species. Examples of animal & plant species in these categories from Odisha.
- Ecosystem functions.

# 8.4.4.2. Creation and maintenance of Waterholes.

Training will be imparted to improve

- Significance of water to wild animals and cattle.
- Water as a critical habitat component.
- Construction of various kinds of water storage structure and maintenance.

#### 8.4.4.3. Weed identification and control.

Training will be imparted to improve

- Knowledge on definition of weeds, propagation, appropriate time to control and species specific control method.
- Use of tools.

## 8.4.4.4. Management of grasslands.

Training will be imparted to improve

- Value of grassland as a habitat for dependent species of animals and plantsof conservation importance.
- Activities having impact on grasslands.
- Impacts of grazing and fire.
- Fire behavior.

## 8.4.4.5. Carrying out soil and water conservation measures.

Training will be imparted to improve

- Knowledge on Significance of soil conservation treatments.
- Working knowledge of preparing mechanical and vegetative structures.

# 8.4.4.6. Raising nursery and carrying out plantation.

Training will be imparted to improve

- Nursery and Plantation technique that uses pits, contour trenches, contour bunds.
- Grading and maintaining planting stocks and its transport, planting operation.

## 8.4.4.7. Monitoring habitat components.

Training will be imparted to improve

- Significance of monitoring including protocols and periodicity.
- Knowledge of habitat requirement of common species occurring in the area.
- Definitions of seedling, sapling, pole and tree.

## 8.4.4.8. Estimating and monitoring wild animal populations.

Training will be imparted to improve

- Identification key to major wild animals of Odisha.
- Knowledge of tiger, leopard, tiger cub pug mark attributes.
- Understanding population estimation methodologies.
- Habitat orientation and behaviour of common wild animals.

# 8.4.5. Health Management of Wild Animals.

Training will be imparted to improve

- Knowledge of symptoms of death due to anthrax and its disposal.
- The standard procedure followed in the department. Awareness of frontline staff's role in accomplishing the operation.
- Knowledge of prevention of infectious diseases.
- Knowledge of collection, preservation and transport of samples.

Knowledge of zoonotic diseases.

## 8.4.6. Forest Engineering

# 8.4.6.1. Developing and maintenance of infrastructure.

Training will be imparted to improve

- Knowledge to understand methods of testing good quality bricks, sand, stone,cement etc. with storage system.
- Method of preparing cement mortar, C.C. with appropriate proportions.
- White washing, colour washing, painting, varnishing, methods.
- Consideration for proper site selection.
- Construction involving brick, stone, wood, tiles thatch.
- Ecological consideration in aligning roads.
- Overall supervisor's role and what to supervise.
- Maintenance of store.
- Making measurements, cross checks and maintaining measurements book.
- Blending the construction with Natural environment.

## 8.4.6.2. Construction of machans, use of watch towers and hides.

Training will be imparted to improve

- Knowledge on Principles of location and use of machans, watch tower andhides, principles of camouflage.
- Observers do's and dont's on machan watch tower, inside a hide.
- Kinds and use of knots, noose, use of pulley and tackle.

## 8.4.7. Account and service matter.

## 8.4.7.1. Preparation of voucher and accounts.

Training will be imparted to improve:

- Knowledge of :
- 1. Conduct rules
- 2. TA rules, financial rules.
  - Knowledge of simple volume area calculations.
  - Important standing orders.

#### 8.4.7.2. Service Matter.

Training will be imparted to improve

- Synopsis of conducts rules.
- Duties.
- Dress code etc.
- Important standing orders and circulars.

# 8.4.8. Special Training

Training will be imparted for Managers of Tiger Reserve in Management Techniques including leadership skills, decision making, Planning, Protection, Use of Information Technology and Personal Management.

# 8.4.9. Learning Best Practices.

The frontline and Executive staff will be sent to other important Tiger Reserves/PAs such as Kanha, Bandipur, Nagarhole, Mudumalaietc to learn and share best practices.

# 8.4.10. Human Resource Development (HRD) Plan

Wildlife management is a specialized branch, which need special orientation, skill and knowledge. Training makes a technocrat and field staffs perfect in his profession. Exposure of good efforts done in the *Par excellence* site develops a feeling of motivation to achieve the goal to the same degree or sometimes higher also. Not only this, tremendous degree of confidence is also developed if the initiative done is appreciated by others. Hence it is nice to initiate effort to impart special training to all level of staff in various relevant fields.

To handle sensitive bio-diversity conservation vis-à-vis eco-development issue, field officer many times in stress due to burden of field work as well as office work. Hence imparting regular refresher courses covering different topics including relaxation programme like Yoga is recommended for the various levels of staff of Similipal Tiger Reserve as following

S. No	Course Name	Course Type	Course Duration	Participant Level	Resource person/ org	Frequency
1	General wildlife management course	Orientation Course	One week	D.C.F./C.F.	WII, Dehradun	Once
1 a	do	Orientation Course	10 days	A.C.F./ D.C.F.	WII, Dehradun	Once
1 b	do	Orientation CourseModu le on different modules	One month to Three month	Dy. Ranger Foresters, &ForestGuard	Wildlife training school	Once
2	Soil and moisture Conservation	Orientation Course	One week	Dy. Ranger Foresters, &Forest Guard	WALMI, Bhubaneswar	Once in a year
3	Rural development	Orientation Course Module II	One week	Dy. Ranger Foresters, &Forest Guard	State Institute for Rural Development, Bhubaneswar	Once in a year
4	Enforcement of Law and Enactment's	Refresher Course	Three days	Range officers, Dy. Ranger, Foresters &	STR headquarters	Once in six months

				Forest Guards		
5	Fire protection	Local	One week	Dy. Ranger	Should be	Once in a
	training	training and		Foresters,	organized	year
		Orientation		&Forest	locally at	
		course		Guard	Divisional level	
6	EDC account	Refresher	Three	EDC chairmen	Divisional	Once in
	keeping capsule	course	days	and	Headquarters	Two year
	course			associated		
				staff		
7	Research and	Capsule	One week	DCF, ACF,	WII, Dehradun	Once in
	Monitoring	course		Range	for DCF and	Two year
	course			officers,	ACF;	
				Foresters and	Training	
				Forest guard.	schoolsFor	
					lower staff	
8	Education	Refresher	One week	ACF, Range	WII, Dehradun	Once in
	Awareness	course		officers,	for DCF and	two year
	course			Foresters and	ACF; Training	
				Forest guard	schoolsFor	
					Foresters and	
					Forest guards.	

The senior as well as lower field staff shall be exposed to latest trends and developments achieved in different subjects related to wildlife management. Such exposure would help the field staff to carry out various management practices for effective management. A regular short- course requires to be organized from time to time for the ground level field staff to impart technical expertise to carry out various routine works, like; population estimation, water hole management, wildlife habitat management and the like.

To impart training in the above topics and other useful subjects other human resource development activities for the facilities staff who are engaged in field duty. For education of their children forest colony shall be built at Baripada and Jashipur. Regular medical camps shall be arranged for field staff as well as ecodevelopment committee members.

## Conducting Study tours at par-excellence sites: -

- (i) Eco-development study tour for EDC members and associated staff
- (ii) Wildlife management study tour for Officers & field staff.
- (iii) International study tours
- (iv) Working visit for Field Director

## Workshops and Field Study: -

Every year workshop and field study shall be organized at Tiger Reserve level to share the experience gained during the field works and dissemination of the new knowledge and practices being used in other PAs. Some of the topic for workshop and field study shall be -

- 1. Wildlife and its habitat monitoring and understanding the objective of data collection during regular patrolling.
- 2. Wildlife census and field techniques
- 3. Anti poaching, Legal proceeding and forensics
- 4. Micro planning for eco-development in surrounding villages
- 5. Fire protection training
- 6. EDC Account keeping
- 7. Environmental Education and Awareness
- 8. PA planning workshop
- 9. Regional planning workshop
- 10. PA management plan finalization workshop

  During these types of workshop and field training regular interactions/
  discussions between officers and field staff would also add to the understanding of
  new perspectives relating to wildlife management.

## TIGER POPULATION AND HABITAT ASSESSMENT

Reliable estimates of status and trends of carnivore population along with their prey base as well as evaluation of habitat quality are highly crucial for effective conservation and management. One of the vital agenda of the Tiger Reserve is monitoring status of tigers, co-predators, prey base and evaluating habitat quality at regular interval. As the core of Similipal Tiger Reserve is a home to the source population of tigers in the landscape, continuous monitoring is extremely important for long term conservation of tigers at landscape level. It is also necessary to intensively monitor prey base and related habitat attributes on regular basis. This chapter proposes strategies for regular monitoring of tigers, co-predators, prey and their habitat in line with the methodologies prescribed by the NTCA to strengthen not only the supervision at field level but also to generate formation on regular basis for evaluating tiger occupancy.

The strategies include:

- Daily monitoring by the patrolling parties
- Collecting information from PIPs on regular basis
- Implementing tiger monitoring protocol as part of national level exercise
- Carnivore sign survey, prey base estimation and camera trapping seasonally by PA management.

Based on the data collected through above exercises, a database on the distribution of tigers, association with co-predators and prey base, potential habitats, threats to the population and habitats for conservation planning will be created. Reports on the monitoring programme will be submitted by the Field Director and Chief Wildlife Warden for onward submission to the NTCA. The results will be used by the management for reframing protection strategies if needed.

#### 9.1 DAILY MONITORING AND FORECASTING

Day to day monitoring of wild life is one of the most important task of the patrolling staff of all camps. All the information is recorded in Camp register daily by patrolling party. The Final Protocol for Phase-IV Tiger Monitoring issued by NTCA provides the format of daily Monitoring register (Form No 6) which will be maintained in every camp. For the impression of Pugmarks of Tiger, Panther and other carnivores, impression pads (PIPs) shall be laid out on the roads at distance of 500 meters. At the junction of the road impression pad shall be laid on all roads just few feet away from

the junction. Impression pad shall be made on both side of the road crossing a river or nala. The width of PIPs shall be almost the width of the road and length shall cover two strides i.e. almost 6 meters. All the PIPs shall be serially numbered. The PIPs shall be monitored on the basis of day-to-day patrolling, at least twice in a week for Tiger evidences. The plaster cast, photograph and tracing of pugmark shall be taken along with GPS location. Scats will be analysed for seasonal diet analysis. The data shall be compiled, mapped and maintained monthly to know the trend. With experience and exposure to resident tiger and their pugmarks, the staff can be able to identify individual tigers from their track set characteristics. Sign survey and individual tiger monitoring shall remain a regular task for every guard.

# 9.2 TIGER POPULATION ESTIMATION AND MONITORING FRAMEWORK (PHASE I, II, III AND IV)

For designing, implementing and evaluating the success of any conservation program for an endangered species, it is imperative to monitor the status, distribution and trends in the population of the target species. The monitoring program should be transparent in approach and holistic, addressing an array of parameters related to the survival of the species by using the blend of the best available science and technology. The guidelines issued by NTCA will be meticulously followed with minor refinement if required according to field situation. Datasheet formats have been prescribed to be used during monitoring which have not been elaborated in this chapter.

#### Phase I: Spatial mapping and monitoring of tigers, prey and habitat

For estimating the distribution, extent and relative abundance of tigers, other carnivores, and ungulates, data will be collected in simple formats on carnivore signs and ungulate sightings and on indices of human disturbance and habitat parameters. For this data collection beat will be taken as a unit. All the concern staff shall be trained in the data collection protocol.

The detailed methodological approach for sampling carnivore signs, ungulate encounter rates, pellet/dung counts, habitat and anthropogenic pressures is as follows.

## 1. Sampling for Tiger, Leopard, and Other Carnivore Sign Encounter Rate

To obtain data on the presence, absence and intensity of use of a Beat by tigers and other carnivores, we shall quantify the relative abundance of tiger, leopard, and carnivore signs in an area. The following procedure will be followed for data collection:

- A beat will be considered as a sampling unit.
- Areas within the beat that have the maximum potential for tiger occupancy will be intensively searched.
- Since tigers & leopards have a tendency of using dirt roads, trails, foot paths, river beds and nalas, these landscape features within the beat need to be searched intensively.
- One to three persons who know the terrain and habitat features of the beat shall conduct the search for tiger sign.
- There shall be 3-5 separate searches (in different compartments within the beat and/or at different times 1-5 days apart) each search covering about 5 km distance in areas having the best potential for tiger presence. It is important to record the distance covered and the time spent during each search separately (in the data sheet-1) and accurately. If time is spent resting or in other activities while conducting the search, this duration should be reported separately. The GPS coordinate of the beginning point of each search path shall be recorded.
- The total minimum distance covered while searching for tiger and other carnivore sign shall be 15 km per beat.
- Tiger & leopard signs shall be classified into the following categories 1) Pugmark trails, 2) Scats (Old: dry with hair and bones visible; Fresh: dry but intact with shiny surface; Very Fresh: soft, moist, and smelly, 3) Scrapes, 4) Scent marks (spray, rolling), 5) Rake marks on trunks, 6) Actual sighting, 7) Roaring (vocalization),8) Kills (Predation on wild prey).
- A brief description of the topography and forest type is to be recorded for each sign.
- In case of pugmark trails, each trail set is considered as one sign (not each pugmark as one sign). In case a tiger (or other carnivore) continues to walk along a dirt road for a long distance (say 1 km), then this shall be considered as one sign, and a comment recorded in the remarks section of the data regarding distance covered by a pugmark trail of a single tiger.
- Tiger and leopard signs if encountered outside of the sampling route shall also be recorded with GPS coordinates and with appropriate comments.
- Special emphasis shall be given to sign of tigress & leopards with cubs, and any authentic evidence of tiger cubs (sightings of cubs, lactating tigress, tracks, etc.) obtained within the past twelve months shall be mentioned in the data sheet.
- While sampling for tiger and leopard signs, record shall also be kept for signs of any other carnivore that are encountered.
- The number of livestock that are killed by predators within the past three months need to be recorded in the questionnaire following the data sheet.
- It is important to report data sincerely. It is likely that there may be reliable information that tiger/leopard is present in the beat being sampled, but no

tiger/leopard signs are recorded during the intensive search survey. In such cases, mention should be made in the remarks column of the data sheets. However, failure in obtaining tiger sign from a beat is equally important as recording tiger/leopard signs and for appropriate analysis of this data the actual data should be reported.

# 2 - Sampling for Ungulate Encounter Rates

This protocol outlines a simple method for quantifying ungulate abundance in an area based on visual encounters while walking along fixed line transects. The following procedure needs to be followed for data collection. The observer need to carry one GPS set and compass along with other required material.

- After considering the shape, size, vegetation, and terrain type of the beat, a transect line of a minimum of 2 km and not exceeding 4 km will be marked for sampling.
- The transect line should traverse similar habitat (broad vegetation types) as far as possible. If the beat is composed of 2 or 3 distinct vegetation types eg. Mixed Teak Forest comprising 40% of the beat and the remaining 60% comprised of Miscellaneous forest with bamboo, then 2 separate line transects shall be marked for sampling.
- Care shall be taken that a line transect is not located near a busy road nor should it run parallel to a river or other features of the landscape which may bias sighting of ungulates.
- For each transect the point of beginning and end point coordinates (Latitude and Longitude) shall be recorded by a GPS.
- The broad forest type and terrain type that the transect traverses need to be recorded.
- Each transect shall be walked by 1 -2 persons during the early morning hours (6 AM to 8 AM). Preferably one of the persons walking should be a good field person who is able to spot wildlife.
- A record shall be kept of all mammals and peafowl seen during the walk in the prescribed format. For each animal sighting the following needs to be recorded: 1) serial no of the sighting, 2) time of the sighting, 3) species (eg. sambar, chital, wild pig, peafowl, langur, etc.), 4) group size number of animals of the same species in the group sighted, it is important to try to count the number of animals in the group as accurately as possible. Animals are considered to belong to two different groups if the closest animals from the two groups are

- separated by a distance of over 30 m, 5) Angle of sighting and 6) Angular distance from the animal to the observer.
- If possible the number of young (fawns/calves less than 1 year of age) seen in the group shall also be recorded.
- A broad habitat category (vegetation and terrain type) needs to be recorded for each sighting eg. S.No. 5, 12 chital (10 adults and 2 young) were seen at 6:40 am, in mixed teak forest, gently undulating terrain.
- Each line transect needs to be walked atleast on three different mornings for estimating ungulate encounter rates.

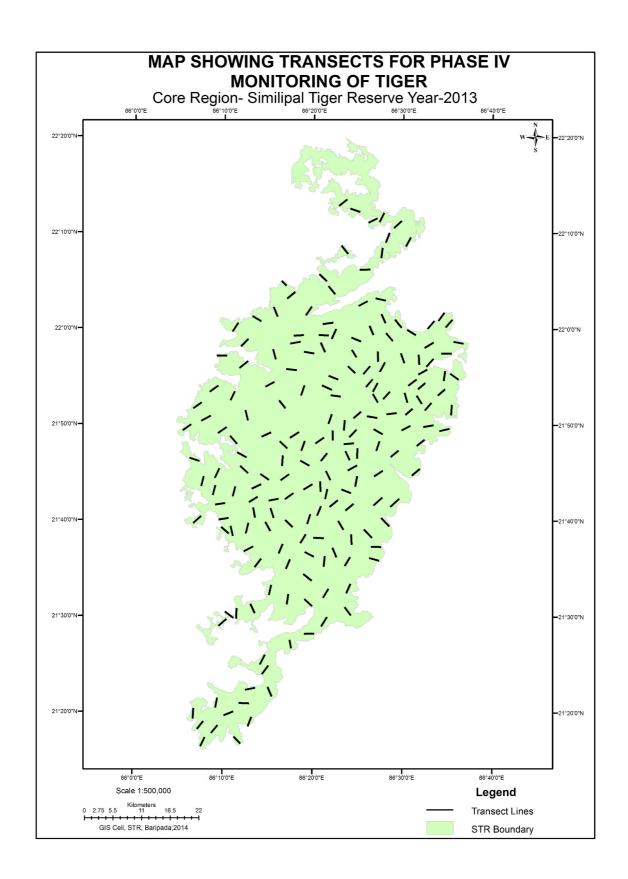
In Similipal Tiger Reserve 178 permanent transect lines of 2 km length each have been made as detailed below which will be maintained regularly.

Name of Division	No. of transect lines
STR Core	73
Baripada	29
Karanjia	48
Rairangpur	28
Total	178

## Sampling for Vegetation, Human Disturbance and Ungulate Pellets

To quantify the habitat parameters and determine relative abundance of ungulates sampling will be done along the same line transect on which ungulate encounter rates were estimated. For economy of time and effort it would be possible to first sample the line transect during early morning hours for ungulate encounter rate and then while returning along the same line, sample for vegetation and ungulate pellets. Sampling for vegetation, ungulate dung and human disturbance will be done only once on a transect.

- Again a beat will be the sampling unit, and sampling will be done along the established line transect.
- The beginning and end point coordinates of the line transect need to be recorded using a GPS unit.
- The same principle of laying line transects as explained in the section on ungulate encounter rates is applicable here .
- Vegetation would need to be sampled every 400 m along the transect.



• The vegetation would need to be quantified visually at the following categories for each plot:

# a) 15 m. radius circular plot

- 1. Broad vegetation type and associated terrain type eg. mixed teak forest on hilly terrain, sal forest on flat land, etc.
- 2. Within a distance of approximately 15 m of the observer the five most dominant trees (over-story, all vegetation >6 fit height, including bamboo) need to be listed in the order of dominance (abundance).
- 3. The observer needs to list the 5 most dominant shrub species (middle story, vegetation >20 cm and <6fit) in order of dominance (abundance) within 15m of the location. He needs to categorize shrub density (under-story vegetation) as absent, very low, low, medium, and dense. Shrubs will be assessed on five point scale (0 to 4 i.e. absent to most abundant) for density estimation.
- 4. If weeds are present, their abundance need to be scored on 0 to 4 scale (0 being absent and 4 high abundance) and the three most common weeds seen in 15 m need to be listed in order of abundance.
- 5. Within the same 15 m distance the observer needs to record number of signs of looping, wood cutting and presence/absence of human foot trail. Mention need to be made if people and or livestock are seen from the plot.
- 6. The observer needs to visually quantify the canopy cover at the location. The observer should subjectively classify the proportion of the sky above him that is covered by canopy foliage and categorize it into <0.1,0.1-0.2,0.2-0.4,0.4-0.6,0.6-0.8, >0.8 canopy cover (see Figure 5).
- 7. A mention needs to be made in the data sheet regarding the number of permanent human settlements, human population, and livestock population present in the beat (to the best of his knowledge).
- 8. A mention needs to be made based on the observers knowledge if any non timber forest product is collected from the beat. If yes, which NTFP and to score the magnitude of collection on a 5 point scale (0- no collection 4-high rate of collection).
- 9. If the beat was burnt (natural or management practice), the proportion burnt in the past 3 years need to be mention in the data sheet.

## b) 1 m radius circular plot

This plot shall be laid 5m away from the centre of the 15m circular plat. The observer needs to use a 2m long stick to define an imaginary circle around him with the stick as the diameter. Within this circular plot (2m diameter) the observer needs to a) quantify the per cent of ground cover, i.e. the proportion of the ground

covered by herbs, grasses, litter, and bare ground, b) List the 3 most dominant grass species, and herb species in order of dominance.

## 4 - Sampling for Ungulate Pellets

Ungulate abundance will also be indexed by enumerating their faecal pellets. This exercise will be done on the same line transect that has been sampled for ungulate encounter rate. To save time, this exercise can be done after the line transect has been sampled in the early morning for ungulate encounters.

- At every 400 m along the transect (line of walk) the observer needs to sample an area of 2m by 20m, perpendicular to the transect for quantifying ungulate pellets. This is done by using the 2 m long stick held at the centre horizontally in his hand and by walking slowly, 20m right and left of the transect alternately at every 400 m.
- All ungulate pellets encountered need to be recognized to ungulate species and recorded in appropriate columns of the attached data sheet.
- The number of faecal pellets needs to be counted. In cases where the pellets occur in large heaps, then they shall be categorized into the following categories: A(50-100), B (100-200) and C (>200).
- In areas where small livestock like sheep and goat are known to be grazed, it is
  possible that faecal pellets of these can be confused with wild ungulates
  especially those of chital. In such areas, a mention needs to be made that goat
  or sheep graze the area.
- In the last row of the data sheet the observer needs to report if ungulate/ animal listed in the data sheet occurs in the sampled beat to the best of his knowledge irrespective of whether its pellets/dung were recorded in the plots.

This spatial data generated will be used to model tiger occupancy, detection probability of tiger signs, and relative sign density at high spatial resolution. The data will be analysed in GIS domain and several spatial and attribute data like human density, livestock density, road network, topographical features, forest type and cover, meteorological data, poaching pressures and landscape characteristics will be used as covariates to model tiger occupancy and relative abundance in landscape and individual forest patches. Several corroborating variables like prey encounter rates, pellet group counts and habitat condition will help in ensuring quality data. This system will also monitor the status of other biodiversity resources.

## Phase II: Spatial and attribute data

The spatial and attribute data that are likely to influence tiger occupancy of a landscape will be used for modelling in a GIS domain. The vegetation map, terrain model, night light satellite data, drainage, transportation network, forest cover,

climate data, Normalised Difference Vegetation Index, livestock abundance, human density, socio-economic parameters, etc will be used for modelling habitat condition and tiger occupancy. Beat-wise vegetation sampling will be done to generate broad vegetation map. Part of this component will be done in collaboration with Forest Survey of India and Survey of India. This modelling helps in determining current spatial distribution of tigers, potential habitats, threats to crucial linkages between occupied landscapes and conservation planning.

## Phase III: Estimating the population of tigers and its prey

Phase 3 of the methodology will have the answers the question of how many tigers and ungulates are there.

We use the double sampling approach of Pollock et al (2002) by sampling the entire landscape for occupancy and relative abundance related indices along with other covariates (human disturbance and habitat quality - Phase I & II data) and a sub sample for estimating absolute density. Indices are then calibrated against known absolute densities for extrapolation in that landscape (Conn et al. 2004, Pollock et al 2002, Skalski and Robson, 1992, Williams et al 2002).

# 1. Tiger numbers

Individual tigers can be identified based on stripe patterns which will be photo-captured by camera traps. Population estimates based on mark-recapture framework will be done using CAPTURE, CARE and Density software(Carbone et al 2001, Chao & Yang 2003, Efford 2007, Karanth 1995 and 1998, Karanth and Nichols 1998, 2000 and 2002, Karanth et al 2004, Pollock et al 1990, Per Wegge et al 2004 and Rextad& Burnham 1991). These densities will then be extrapolated for the areas under various density classes within the landscape to arrive at a tiger population estimate. We do realise that these population estimates have high variances, but since these estimates are not to be used for monitoring trends (which is proposed to be done through the site occupancy and relative abundance data), they should suffice the need for converting a relevant ecological index to a more comprehensible concept of numbers.

## 2. Tiger prey

Phase I of the protocol would be reporting encounter rates on line transects (Buckland et al 1993); these would suffice for monitoring trends in ungulate population and site-specific occupancies as the same transects would be sampled during subsequent surveys. To convert encounter rates to density, an estimate of the effective strip width of these transects would be essential. For this the data on angular distance and angle of sighting will be recorded. The effective strip width of a transect primarily depends on the visibility (vegetation and terrain type), ability to detect

ungulates by different observers and animal behaviour response (Buckland et al 1993). Effective strip widths determined from the model and actual sighting of ungulates for different vegetation types. However ungulate response is likely to play an important role in disturbed area in determining effective strip width. The habitat and terrine specific effective stripe width will be determined by actual sampling and by modelling. These estimates of effective stripe width will be used for converting encounter rates of ungulates to density estimate by modelling detection probabilities. Pellet group counts on transects would serve as an index to the presence and relative abundance of ungulates.

## Phase IV: Intensive monitoring of source populations

The following methodology for this monitoring as per the latest protocol of NTCA will be adopted.

- F. Maintaining daily patrolling log in patrolling camp
- G. Carrying out the 8 day protocol of Phase I twice a year
- H. Recording data from "pressure impression pad"
- I. Obtaining the minimum number of tigers in the tiger reserve
- J. Obtaining the tiger number for the reserve using camera trap in a mark recapture frame work
- K. Using scats for DNA analysis to obtain the minimum tiger number in reserve where camera trapping is not possible

#### 1. Photo registration of tigers:

The Tiger Reserve will be divided into grids of size of 4 sq.km. of each grid . Based on the availability of camera traps and existing strength of the Tiger Monitoring Team, the camera traps will be systematically deployed in the field based on carnivore sign survey. The Tiger Monitoring unit will be strengthened with additional manpower and the infrastructure such as additional camera traps with accessories, field gears and transportation facilities. The Tiger Reserve management will ensure that sufficient trap cameras are available for covering the entire Reserve (25 sets of camera traps/sampling covering approximately 100sq.km). Timely procurement of accessories required for the exercise such as memory cards, batteries and other stationeries will be ensured for each sampling. Sufficient copies of all the above proforma in local language will be provided to the field staff for collecting the data.

## 2. Tiger pugmark and other signs:

Regular monitoring of tiger signs (pugmark tracings, plaster casts, etc) shall be undertaken in every beat at a weekly interval with monthly compilation of data. With experience and exposure to the resident tigers and their pugmarks, the forest staff may be able to identify individual tigers from their track set characteristics (Panwar 1979, Smith et al 1999 and Sharma 2001). Sign surveys and individual tiger monitoring should become a regular task for every guard. The monthly data should be mapped and maintained to analyse trends.

# 3. Monitoring by telemetry in select areas:

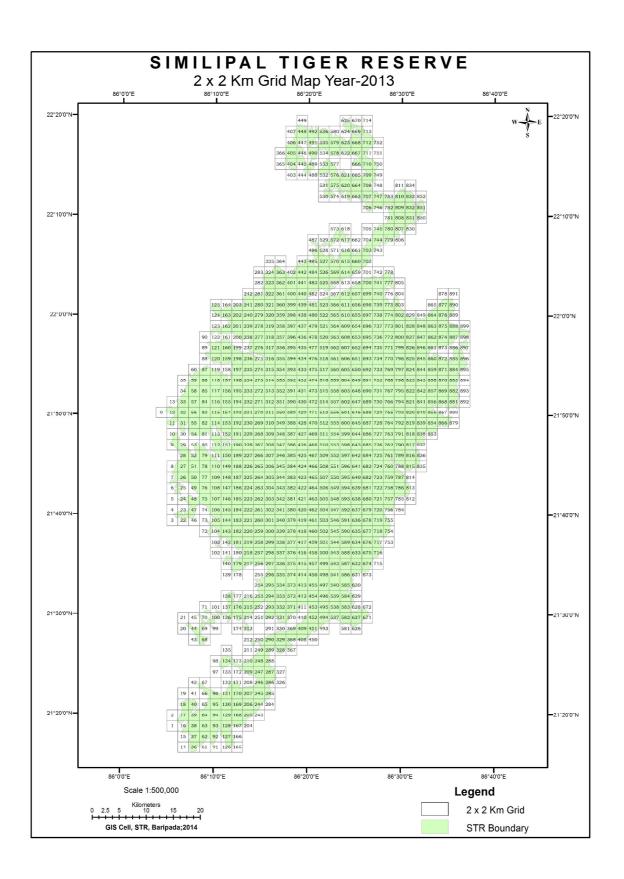
Modern technology of VHF, GPS and satellite telemetry will be used to study and monitor aspects of demography, metapopulation dynamics (dispersal, ranging patterns), mortality, predation, ecology and behaviour. In all source populations, tiger abundance and density shall be estimated using camera traps, digital images of pugmarks and/or DNA profile from non-invasive methods biannually.

#### 9.3 HABITAT ASSESSMENT AND MONITORING FRAMEWORK

The data collected during phase I for sampling for Vegetation, Human disturbance will be collated and put in GIS Domain. This can be correlated with tiger and prey base presence. Any change in the habitat can be monitored by serial data present in GIS Domain.

#### 9.4 SPATIAL DATABASE DEVELOPMENT

The primary data collected from the field on tiger and prey base along with influencing parameters can be used to determine current spatial distribution of tigers, association with co-predators and prey base, potential habitats, threats to the population and habitats for conservation planning. Thus information will be generated on vegetation cover, terrain model, drainage, transportation network, climate data, livestock abundance, human density, socio-economic parameters, etc which will be used for modeling habitat condition, tiger occupancy and potential areas of tiger for conservation planning. The above data generated at Park level will be analysed every year with the help of experienced field biologists. Infrastructure needed for generating such information including formation of a GIS unit and procurement of digital data will be developed in Similipal Tiger Conservation Foundation with funding support from NTCA. The database on territory of individual tigers and their identity will be kept strictly confidential.



#### 9.5 ANALYSES AND REPORTING FRAMEWORK

## 9.5.1. Analysis

The information generated from carnivore sign survey, camera trap method, PIPs, transects and daily monitoring during perambulation will suitably be used for analysis of occupancy of tigers, co-predators and prey in different vegetation and terrain and preparing the tiger occupancy maps. Statistical analysis of information collected from field will be done using software such as 'CAPTURE' and 'DISTANCE' with the expertise of Field Biologist of Similipal Tiger Reserve. Spatial distribution, relative abundance and densities of tigers and its biotope along with the habitat quality will be generated. This information can also be used to develop relationships for understanding tiger population dynamics in the Tiger Reserve and its adjacent areas.

# 9.5.2. Reporting

The reporting systems for daily monitoring and implementation of tiger monitoring protocol are already explained in the sections concerned. Reporting will be done as per the guidelines of NTCA.

#### 9.5.3. Annual census

Annual inventories and annual censuses, species specific as well as general, will be conducted by the park management and reports submitted to the Chief Wildlife Warden.

#### 9.5.4. Dissemination of results

The output of the entire monitoring programme mentioned above will be made available to the management so as to revisit management prescriptions. The information will also be published in widely referred journals and presented in seminars/symposia.

## 9.6. CAPACITY BUILDING

The following documents will be supplied at Ranges and Antipoaching Camps.

- Field guide for monitoring Tigers, co-predators, prey and their habitats issued by National Tiger Conservation Authority and Wildlife Institute of India.
- A field guide to animal signs
- A pocket book for forest guards 'Tracking Tigers' by Dr. L.A.K.Singh, WWF Tiger Conservation Programme
- "M-STRIPES" Monitoring system for Tigers-Intensive Protection & Ecological status: a software developed by National Tiger Conservation Authority, Wildlife Institute of India and Zoological Society of London would be introduced.

Officers and staff of Similipal having interest in computer software will be exposed to the use of different analysis software like Distance, Capture, Vortex, Stripe etc so that the entire monitoring can be done in house.

## PROTECTION AND INTELLIGENCE GATHERING

#### 10.1 THE TIGER CELL

A Tiger cell as detailed below is proposed for Similipal Tiger Reserve

## **Composition:**

- 1. Field Director, Similipal Tiger Reserve cum Regional C.C.F., Baripada Chairman
- 2. D.F.O., Baripada Forest Division Member
- 3. DFO, Karanjia Forest Division Member
- 4. DFO, Rairangpur Forest Division Member
- 5. Superintendent of Police, Mayurbhanj Member
- 5. Deputy Director Similipal Tiger Reserve Member Secretary

## **Duties and Responsibilities:**

- Monitoring the investigation of cases relating to tiger and leopards.
- Conduct Surveys on poached animals, identify and document trade routes and Market forces.
- Monitoring the compliance of patrolling in core and buffer.
- Monitoring the implementation of protocol for monitoring Tiger, copredator, and prey populations in landscape.
- Liaison with Wildlife Crime Control Bureau and other agencies in respect of tiger/leopard poaching and intelligence sharing.
- Rewards for candid informers, excellent performance, etc
- Identify existing conflicting land use policies affecting Tiger and prey habitat and resolve through Multi- sectoral dialogue.
- Monitoring the cattle lifting cases by Tiger

The Tiger Cell will meet at least once in six months. Tiger Cell can invite experts if needed in any of its meeting. The proceedings of the meeting will be submitted to the Chief Wildlife Warden.

#### 10.2 THE STRIKE FORCE

The leader of the strike force will be the Range Officer, Enforcement, the other members of strike force will be two Foresters and four Forest Guards. The Force willbe fully equipped with vehicle, arms/ammunition, communication equipment, funds for intelligence gathering, etc. The Strike Force will be given rigorous training in intelligence gathering, identification of wildlife articles, investigation, etc.

## **Duties and Responsibilities:**

- Rapid action and response on receipt of any information related to illegalactivities.
- Liaison with the territorial Range Officers and assist in protection.
- Liaison with EDCs to gather information on intelligence.
- Inspire confidence in people who want to provide secret information.
- Liaison with staff of anti-poaching camps.
- Sharing information with the territorial Range Officers on illicit activities.
- Maintain a secret record with the details of informers, information received,
   etc
- Inform the Deputy Director, Similipal Tiger Reserve, territorial Range Officers of any illegal activity and red alert to the antipoaching camps.
- The Range Officer, Strike Force will be assigned any other duties related to protection.

## 10.3 SPECIAL TIGER PROTECTION FORCE

The policy initiative announced by Govt. of India vis-a-vis National Tiger Conservation Authority under Ministry of Environment and Forest for Protection of Flagship Species TIGER- the mascot of India's wilderness, its habitat, Co-predators and of course prey species is the basis for raising, arming and deploying the SPECIAL TIGER PROTECTION FORCE in Similipal Tiger Reserve in the District of Mayurbhanj, Odisha. This is a 100% Centrally Sponsored scheme.

## 3. **Description of the STPF.**

(A) Name of the Force:
Similipal Special Tiger Protection Force (SSTPF).

#### (B) Composition of the Force:

i. The SSTPF will not be an "Armed Force of the Union/ State", but a modest dedicated Force comprising of forest personnel as suited to Similipal Tiger Reserve.

- ii. The SSTPF would be comprised of one company of Tiger Force with a total strength of 112 personnel and would be a specialized force with its own structure and composition for deploying in Similipal Tiger Reserve.
- iii. The Company of the SSTPF would be headed by a Tiger Force Assistant Conservator of Forests and three Tiger Force Range Officers.
- iv. The SSTPF personnel would serve in the Force till the age of 40 years and would be later absorbed by State Forest Department on posts outside the Tiger Reserve, while ensuring new, suitable substitutes. The SSTPF personnel would be posted in Similipal Tiger Reserve for a minimum tenure of three years.
- v. There would be 81 Special Tiger Guards in STPF who would be equivalent to the rank of a regular Forest Guard of the state Forest Department and entitled to the same salary and other emoluments as regular Forest Guards.
- vi. There would be 27 Tiger Force Watchers to be outsourced from local villages through Service Providers. They will be entitled to the same salary and other emoluments as regular Group D employees.

## (C) Structure of the STPF:

 The SSTPF would comprise of 3 platoons with each platoon under a Tiger Force Range Officer, assisted by 27 Special Tiger Guards and 9 Tiger Force Watchers.

# (D) Overall Command and Control:

i. The Tiger Force Asst. Conservator of Forests in-charge of the SSTPF and other personnel would work under the overall control and supervision of the Field Director of Similipal Tiger Reserve. The administrative as well as operational command of the said force would remain with the Field Director/ Deputy Director of Similipal Tiger Reserve who will be appointing / disciplinary authority also. The NTCA would pay the deployment charges to the state Govt. or reimburse such cost relating to SSTPF on the lines of the Indian Reserve Battalion. The reimbursement and payment would be 100% central assistance from the NTCA.

ii. In case of emergency Ministry of Environment & Forests, Govt. of India will have the authority to transfer the SSTPF company from one place to another using the first right of call. The Govt. of India will also have the authority to ask the State Govt. to make the SSTPF available for deployment elsewhere in other tiger reserves within the state or in sensitive interstate borders for tiger protection. It will decide the number of companies to be posted in Similipal Tiger Reserve.

## (E) Recruitment:

- The recruiting authority for the SSTPF would be the Field Director / Deputy Director, Similipal Tiger Reserve.
- ii. Recruitment to the post of Special Tiger Force Guards of the SSTPF Company would be done from the State while the Tiger Force Asst. Conservator of Forests and Tiger Force Range Officer will be appointed to the Force on deputation from the State Forest Department in consultation with the Field director.
- iii. On attainment of the age of 40 years, SSTPF personnel would be transferred out of the Tiger Reserve to other units of the Forest Department by the Principal Chief Conservator of Forest of the State,

## (F) Legal Immunity to SSTPF for discharging the official mandate:

- i. The SSTPF personnel being Forest Officers will have policing power as conferred to them by law.
- ii. The State Govt. would confer power to the SSTPF personnel under Sub-Section (3) of Section 197 of the Code of Criminal Procedure, 1973 (2 of 1974), and all powers enabling it in that behalf, the power to use firearms to combat tiger poaching and related offence within the tiger habitat, through a notification. In this context, Sub-section(2) of section 197 of the Cr.P.C, 1973 (2 of 1974) shall be made applicable to all personnel of SSTPF.
- iii. Whenever, firing is resorted to by the SSTPF personnel, each such incidence shall be enquired into by the Executive Magistrate; any proceeding, including instituting a criminal case or arrest can be initiated only if it is held, as a result of the Magisterial Enquiry, that the use of firearms has been unnecessary, unwarranted and excessive, only after such

report has been accepted by the Govt. after due examination.

## (G) Other features:

- i. The SSTPF, not being an "Armed Force of the Union/ State", would be used only for Tiger Protection, and under no circumstances would be requisitioned in aid of Civil Authority, for any other district work. A MOU is to be formalized between NTCA and the State Govt. on this account.
- ii. The funding support for raising, arming, deploying and subsequent expenses of the SSTPF will be met with by the National Tiger Conservation Authority.
- iii. The Field Director, Similipal Tiger Reserve would provide monthly reports on the deployment / initiatives done by SSTPF to the NTCA.

## (H) Financial Implications:

The cost details relating to salary, procurement of vehicles, arms & ammunitions, infrastructure are provided in Annexure- .

- i. The total recurring cost (per annum) for the SSTPF works out to Rs 1,62,38,368/- (Rs.1.62 crore)
- ii. The total non-recurring cost for SSTPF works out to Rs 1,89,82,002 /- (Rs 1.90 crore)

#### (I) Training:

- i. The STPF Foresters and Forest Guards shall receive special training from the State Police Department as well as the Central Paramilitary Forces, based on special syllabus for skill development, combating poaching and enabling intelligence based enforcement in a forest terrain.
- ii. The training of the SSTPF would be on the pattern of a syllabus of basic training which would be prescribed by the Ministry of Environment & Forests, on the basis of the ongoing syllabus prescribed the Ministry of Home Affairs for the India Reserve Battalion.
- iii. Arrangement shall be made for regular physical training of the STPF in collaboration with the available resources.
- iv. Specialised trainings would be provided in enforcement procedures by noted agencies including international visits if the need arises.

#### 10.4 STRATEGY FOR PROTECTION AND COMMUNICATION

The strategy for protection and communication is discussed, described and prescriptions related to protection is proposed in theme plan for protection in Chapter 7.

#### 10.5 FIRE PROTECTION

The strategy for fire protection is discussed, described and prescriptions related to fire protection are proposed in theme plan for fire protection in Chapter 7.

#### 10.6 INTELLIGENCE GATHERING AND COORDINATION

The strategy for Intelligence Gathering and Coordination is discussed, described and prescriptions related to Intelligence Gathering are proposed in theme plan for protection in Chapter 7.

# **MISCELLANEOUS ISSUES**

#### 11.1 HOUSEKEEPING OF DEPARTMENTAL ELEPHANTS

Three elephants named Mahendra, Sobha and Bhawani were procured from Karnataka Forest Department in November, 2001 for protection and tourism work in Similipal. Sobha gave birth to Laxmi on 25.04.2002. Laxmi died on 21.09.2006 due to snake bite. Bhawani gave birth to Rajkumar on 20.10.2002. On 11.09.2010 Rajkumar was sent to Chandaka wildlife Division to serve as a kunki elephant in driving operation of wild elephants causing depredation. On the same date Mahendra and Sobha were sent to Berhampur Division to serve as kunki elephants in driving operation of wild elephants causing depredation. Bhawani gave birth to Shibani on 14.12.2008. Now all the five captive elephants are staying at Gurguria camp.

#### **Objectives**

The objectives of the elephant camp of Similipal Tiger Reserve are:

- 1. Eco-tourism
- 2. Patrolling for anti-poaching operations
- 3. To control Man-Elephant conflict outside the Reserve or other areas (Kunki operations)
- 4. Other miscellaneous works connected with forestry

Camping facility is available at two places: Hatighar under Jenabil Range in core area and Gurguria under Gurguria Range in buffer area. During tourism season from November to June the camp elephants are stationed at Gurguria where facility is available for elephant ride for the visitors. During other part of the year the elephants are stationed at Hatighar where better availability of fodder is there. Besides this, continuous stationing of the elephants in one camp may result in gradual depletion of fodder species in that area ,the change of camp allows the vegetation to regenerate in the previous camp site and to minimize re-infection by parasite.

## List of captive elephants in Similipal Tiger Reserve

SI.	Name	of	the	Sex	Age	(Years	Source of procurement
No	Elephant				as on	March	
					2013)		
1	Mahendra	3		Male	52		Procured from Forest Deptt,
							Karnataka on 31.11.2001
2	Bhavani			Female	57		-Do-
3	Shobha			Female	65		-Do-
4	Rajkumar			Male	11		Captive born on 20.10.2002
							from Bhavani
5	Shivani			Female	05		Captive born on 14.12.2008
							from Bhavani

# Management

Both the elephant camps have water source near to the camping site (Khairi river near Gurguria and Jamunanala near Hatighar) which are used both for bathing and drinking of the elephants. Both theses are perennial sources so no problem is faced during summer.

All the elephants are allowed to rest and sleep in forest or natural condition with access to shade except for a period of 4 hours when they are used for tourist ride. Only the three adult elephants are used for tourist ride.

All the elephants are provided with stall feeding two times daily and allowed to free range in forest for food. The feeding time is 8-9 AM and 3-4 PM and the stall ration include horse gram, paddy, ragi, jaggery, coconut and salt.

The female elephants are not showing occurrence of oestrus cycles now. The adult male elephant Mahendra is exhibiting signs of "musth".

The camp elephants are got examined periodically by veterinary surgeon from Jashipur.

#### Duties and responsibilities of the staff

#### **Duties of Forest Ranger**

Forest Ranger in charge of the concerned Range of the camp is administrative in charge of the camp and is responsible for all the administrative matters, personnel matters, pay and establishment of the camp staff. He is also responsible for the reporting for the camp, estimation and financial budgeting, expenditure and maintenance of the account.

#### **Duties of Forester**

Forester in charge of the elephant camp is directly responsible for the care and management of the elephants under his control.

- He shall be made to be wholly in charge of the livestock, their accourtements, food grains and other miscellaneous stores entrusted in the same and accountable for the same.
- Responsible for day-to-day management of the camp and seasonal work schedule, that is in vogue.
- Responsible for maintenance of discipline among the elephant men.
- Responsible for issue of daily grain rations, supervising the proper looking and feeding of elephants according to the diet schedule.
- Responsible for the proper training of the newly captured elephants and weaned calves.
- He will take adequate health care of elephants as and when elephants fall sick, he must arrange to get proper veterinary care promptly, He must also be conversant with giving first aid both for elephants and elephant man.
- Maintenance of proper hygiene condition in and around campsite.
- Check periodically the fodder resources available around the camp and their abundance.
- Provision of adequate supply of cut fodder to the animals, which need to be tied up for various reasons.
- He will maintain all the records and registers intended to be maintained in an elephant camp and record relevant information.
- He will maintain separate register for logging, day-to-day happenings, and interesting events, such as mating, calving, birth/height and weight of calves, monthly growth rate, incidence of musth, behaviour, sickness and other relevant matters.
- He shall carry out the instructions given by his superiors and veterinary personnel (VAS) and get all instructions recorded in the register.

#### **Duties of the Elephant Man**

Each working elephant shall have a Mahout and IInd mahout. Both Mahout and IInd Mahout are responsible for the proper upkeep of the animal and they shall be under the control of the official in charge of the camp.

# **Duties of Mahout**

- Responsible for training of the animal for all purposes.
- Take proper care of the accoutrements provided for the elephants.

- Responsible for taking the animal for work, giving bath and assist the official in charge of the camp in all the activities connected with elephant camp.
- Responsible for the health of animal and report promptly as and when his elephant fall sick or gets injured for proper veterinary care.

#### **Duties of IInd Mahout**

- The mahout shall be assisted by 2<sup>nd</sup> Mahout in training, giving bath to the animal, feed the animal in proper care of the accourrements provided and also in other activities in managing his word.
- He will assist in cooking rations in the camp.
- He will assist in maintaining the camp hygiene by proper disposal of dung and litter collected around the camp, providing water for cooking, collection of fuel for cooking, etc.

## **Duties of Veterinary Assistant Surgeon**

There is no Veterinary Asst surgeon for the tiger reserve. The Govt recently have sanctioned one post of VAS on deputation from Animal Husbandry Department. The post is yet to be filled up. The duties of VAS vis a vis Elephant camp is as follows.

- Responsible for veterinary care of all the departmental elephants.
- He shall prescribe rations for the departmental elephants as well as work load.
- He shall annually fix and revise the book value of the departmental elephants.
- Responsible for disease prevention work in and around the tiger reserve.
- Organize timely preventive vaccination of departmental elephants against Anthrax and other communicable diseases.
- He shall periodically record the body measurements of all the departmental elephants, such as height, girth and body weight.
- A book shall be maintained at each elephant camp and the FVAS should note instruction or his remarks for guidance of the subordinate in charge of the elephants.
- He will check food materials for their quality as well as adequacy.
- He will see that no elephant is over worked and at the first signs of fatigue or loss of conditions should be given rest or light duty.
- He will check the fodder resources available around the campsite.

## Day to day function of the camp

Time schedule	Camp routines				
6.30 AM-8.00 AM	Bathing and scrubbing				
8.00 AM – 8.30 AM	Training session				
8.30 AM – 9.00 AM	Application of neem oil on the foot. Morning feeding with				
	grain rations (Cooked)				
9.00 AM – 12.00 Noon	Elephant ride (during tourism season)				
12.00 Noon – 4.00 PM	Leave out for grazing				
4.00 PM – 5.00 PM	Evening bathing and scrubbing				
5.00 PM – 5.30 PM	Training session				
5.30 PM – 6.00 PM	Evening feeding with grain ration (Cooked)				
6.00 PM - 6.30 AM	Leave out for grazing/ stall feeding with fodder leaves in the				
(next day)	camp itself				

#### **WORK SCHEDULE**

Elephants which are used to carry the visitors for wildlife sighting being used in the morning hours 8:00 to 11:00 hrs. The elephants are currently not being used for any heavy energetic work like timber work and other regular forest operation.

# **WORK OF FOREST CAMPELEPHANTS**

The following works can be allotted to the elephants in consonance with the objectives of sanctuary management.

#### • Forest protection:

- Used for patrolling in the interior of forest areas.
- Elephant movement itself in the forest for collection of fodder to different areas will increase protection from poaching.

## • Eco-tourism

- Elephants are being used for carrying the visitors for wildlife sightseeing.
- Elephant camp open for visitors to see their bathing, feeding and other husbandry activities.

## • Education and publicity:

 The Elephant camp at Gurguria is open to the general public. The department shall develop an educational package for tourists. Video shows explaining the plight of elephant in the wild, efforts being taken for their conservation can be conducted. Camp serves as platform for research to know more about elephants.

## • Kunki operations:

- The foremost importance of the camp is our elephants being used to drive wild elephants when ever the conflict happened even in other places of the state as anti-depredation measure.
- Capture and translocation/captivating of problematic wild elephants,
- To assist in rescue operation for rescuing the animal which is in distress like swallowed in the mud, fell down in the well, etc.
- To assist in treating sick wild elephants.
- Breeding programme
- Germ-plasm conservation: As being the both reproductive male and female left free in the wild, a chance of mating between wild and captive elephants, which helps in flow of gene between captive and wild.
- Camp act as a rescue center to rear and adopt the wild abandoned calf.

#### **WORK LOADS**

Work loads given to the elephant vary according to age, size and sex. Other regulating parameter would be health and growth of the animal. Training for patrolling and ecotourism safari may be started at the age of 6-7 years depending upon the health and body condition of the animal. The following is the work scale fixed for the camp elephants.

10 -19 yrs Light work 20-30 yrs Moderate work 30-50 yrs Heavy work

Over 50 years the working capacity of the animal gradually reduced every year up to the age of retirement at 58 yrs old. Therefore it is always advisable to use the elephants beyond 50 years only for patrolling and ecotourism works. The animals that maintain good health and their teeth have not worn out may be used for a few more years. The elephant is not a good pack animal, is not suited for carrying heavy loads. The elephant is unbeatable to drag and lift the weight, but they cannot carry a load more than 400kgs.

Height of the Elephant	Weight (Kg)			
(Mtr)	(Allowed to carry on its back)			
< 1.50	Not used for carrying load			
1.51 ~ 1.80	Not exceeding 150 kg (carry only fodder and trainer)			
1.81 ~ 2.25	Not exceeding 200			
2.26 ~ 2.55	Not exceeding 300			
> 2.50	Not exceeding 400			

Load should be reduced to 50% in hilly or difficult terrain.

#### **DIET OF ELEPHANTS:**

The diet of the elephants consists of following in the camp.

Concentrate feeding: Elephants are bulk feeders, since they are simple stomached, they have to spend at least 18-20 hrs in a day to feed, since elephants in captivity are maintained for various forestry works, the animals have to spend energy performing various types of hard work. In addition about 7-8 hours in a day are spent for work, bath, commuting, etc., The digestive system of elephant is suited to adapt to their continuous feeding habit. The main reasons for the continuous feeding may be the lower efficiency and the shorter time spent in Gastro intestinal tract about 21 to 24 hrs. The dry matter digestibility in elephants is 45-50%. Whereas, crude protein and crude fiber digestibility about 89% and 18.5% respectively. Hence to compensate the loss of time for grazing and replenish the energy spent, the animals are to be fed with readily available energy in the form of grain ration. Components of grain ration are

Horse gram- For protein supplement

Ragi - For carbohydrate

Coconut – For protein & fat source

Salt - For better assimilation and absorption of ingested nutrients in the

intestinal tract; also to reduce intestinal worn burden and palatability.

Molasses - For palatability

#### **Diet Schedules**

The following considerations are used for planning the diet.

- Selection of ingredients: It is based on the nutritive value, palatability, easy availability throughout the year and economic consideration of food grains.
   Compared to other food grains, ragi and horse gram are in high nutritive value, cheaper in cost. It is easy to cook them and elephant like these grains.
- Diet formula: It is formulated according to the age, sex, weight and its workload. The quantity of the each grain for different classes/size of animals has been decided after much care and thorough examinations.

#### Diet chart of camp elephant

Items	Mahendra	Sobha	Rajkumar	Bhavani&Shivani
Paddy in Kg/Day	12	10	06	14
Ragi in Kg/Day	08	06	03	07
Horse gram in Kg/Day	08	06	02	07
Paddy straw in	30	20	10	25
bundles/Day				
Molasses in Gms/ Day	250	250	50	350
Coconut in nos/Day	0	0	01	01
Salt in gms/Day	150	150	50	200

Castor	Oil	(External	100	100	50	150
applicati	on) in (	Gms/ Day				
Neem	Oil	(External	20	20	13	20
applicati	on) in (	Gms/ Day				

As and when necessity arises, such as for those animals which are in rundown condition, pregnant and lactating cow elephants, growing calves, orphaned calves, etc., prescription of special diets should follow such as coconut, rice, gingly oils, vitamins, and other nutritive tonics, etc.,

Rice is included in the diet of young calves and lactating mothers, sugarcane is prescribed for calves and animals under training. Inclusion of jaggery in the diet is to facilitate administration of oral medicine to the elephants, as they are conditioned to the taste of jaggery. The quality and its adequacy of the rations shall be inspected by Veterinary personnel regularly. The diet prescribed for whole day and the elephants are fed with the rations both in morning and evening *i.e.*, half the prescribed quantity in morning and remaining half in evening.

Elephants in the forest camps are sent out for grazing. This is a desirable practice as they have seasonal preference and choose their own required fodder. This also encourages socializing, resulting in mating and other activities. But under special circumstances, when the elephants are used for providing rides to the tourists, elephants in musth and newly weaned calves and sick or incapacitated animals are tied near the vicinity of the camp and cut fodder is even during night hours. The quantity of cut fodder to be provided should be at least 3% of the body weight, taking into consideration of the wastage. When the elephants are left out for grazing, adequate precautions must be taken to hobble them, and use a trailing chain. Even a hobbled animal can move over a distance of about 1~2 km. The elephant man should take care to leave the animals, where adequate fodder is available. They must also check for the presence of wild tuskers, which tend to be aggressive towards captive elephants.

#### **Health Care Management**

Captive elephants tend to lose their inherent disease resistance owing to substantial change in their feeding habits. Similarly, they are also exposed to several diseases of domestic animals due to increased interaction with them.

Many diseases like Anthrax, Blue Tongue, Rinderpest, TB, Pasteurellosis, Trypanosomiasis etc. have been reported in captive elephants in many areas though the information regarding susceptibility and prevalence of diseases is meagre in Similipal. Captive elephants are also prone to parasitic infections of alimentary tract. Therefore, the apprehension calls for a strict and regular schedule of vaccination.

For maintenance of health and well being of captive elephants an annual health monitoring programme is essential before each vaccination schedule. The annual health-monitoring schedule must include the following parameters:

- Pulse and respiration rate
- Body weight
- Blood examination for blood parasites, blood chemistry and haematology
- Urine and faecal examination for parasites
- Care of feet
- management of nutrition

As early recognition of disease is very important for its prevention and control, regular monitoring of faecal and urine samples for colour, quantity, endoparasitic infestations, and food habits apart from observations relating to movements of body parts are essential.

The following health care protocols shall be followed for the elephant camp.

- a). Skin care: Two times bath for elephant both morning and evening each last at least 11/2 –2hrs. This helps in following ways.
- i. To reduce their body temperature.
- ii. To relax the animals; elephant love to spend time in the water
- iii. Scrub bath improve their blood circulation and skin condition.
- iv. To wash the wounds.
- v. Improves bond between animal and mahout.
- vi. Better chance to find abscess, cyst, wound and other skin infection in early stage.
- vii. To reduce and prevent external parasitic infection like ticks, mites and louse.
- **b). Foot care:** Application Dekamil oil (Neem oil) on the foot over the nails, commissure of tusk and on external genital opening in female elephants, this helps in following ways.(Dekamil oil consist of neem oil 15 kg; Camphor -0.5g; Garlic -0.5g; Dekamil -0.5g)
- i. Strengthening of cuticle.
- ii. Prevent over growths of cuticle.
- iii. Prevent splitting of nails.
- iv. It acts as an antiseptic and prevents foot rot and foot abscess.
- v. It acts as a fly repellent and prevents egg lying on the foot, commissure of tusk and female external genitalia, thus prevents gastric and valvalmyiasis.
- **c). Preliminary health checks up:** It shall be carried out every day while elephants assemble at the feeding centre by Veterinary personnel. If animal found sick in the preliminary health check up then the animal shall be subjected to special clinical examination.
- **d). Screening for parasite:** The dung samples from all animals are subjected to screening for parasite once in every three months.

e). De-worming: De-worming was carried out once in every three months.

### f). Vaccination:

The vaccination programme shall be as per the prevalence and previous reports on outbreaks of infectious diseases in the area. It is essential that vaccination should be completed before monsoon. Sometimes, though rarely, vaccine may cause reaction in the form of anaphylaxis. Therefore, it is desirable that the vaccination should be done in the supervision of qualified wildlife vet.

# **Vaccination Schedule**

S.No.	Vaccine/ Medicine	Month of Vaccination	Periodicity
1.	FMD polyvalent vaccine	May/ June-Nov./ Dec.	Every 6 months
2.	HS Vaccine	April/ May	Annually
3.	BQ Vaccine	April/ May	Annually
4.	Anthrax Vaccine	April/ May	Annually
5.	Deworming schedule	March-Sept.	Every 6 months

- **g). Tetanus toxoid:** The freshly wounded animals are subjected to tetanus toxoid or once in every 6 months it can be given
- **h).** Screening for Tuberculosis: All the animals shall be screened for tuberculosis at least once in a year.
- i). Haemogram: Complete haemogram should be done at least once in a year to diagnose disease condition already existing.
- **j). Screening for blood parasite:** Screening for blood parasites especially for trypanasomiasis shall be done at least once in a year.
- **k). Body weight Measurements:** As the elephant being large sized animals it is difficult to find out chronic wasting condition. Hence the body weight and other measurement shall be done at least once in three months to diagnose the chronic wasting diseases and malnutrition. It also helps to now about growth rate, seasonal variation, post musth effect and treatment responded formal nutrition.
- **I). Health camp to elephant men:** Anthropozoonotic disease like Tuberculosis may spread from human to animals or vice versa, hence the healthy animals need healthy mahout. Conduction of regular health camp to mahouts every year is must
- **m).** Planned, Balanced & Special diet: The quantity of diet for different classes/size of animals has been decided after much care and thorough examination. Special diet has been prescribed as and when necessity arises, such as for those animals, which are in rundown condition, pregnant and lactating cow elephant, growing calves, orphaned calves, etc.,

- **n). prescribed work load/ Working hours:** Workload for different classes/height/size of animals has been prescribed after much care and thorough examination to maintain animals in good condition.
- **o). Trimming of tusks:** The tusk tips of captive bulls become sharp by constant use. The tips have to be trimmed by Veterinary personnel, periodically to avoid breakage while working, to prevent injury to other animals and also unnecessary tusk fracture while animal playing and fighting with other tuskers. The trimming is only to manage mental practice not for show purpose. Hence the Veterinary personnel should take proper precautions in trimming the tusk tips, particularly in young stock to avoid injury in the core.
- **p). Trimming of nails:** Over grown nail may be trimmed regularly to avoid unnecessary injury to the animals, splitting of nails and other foot problems.
- **q). Rodent Control:** The rodent is a carrier for Encepahlomylocarditis virus. Hence the elephants provision stocks store and elephant house should be rodent proof.
- r). Care of Musth elephants: Bulls maintained in captivity, particularly in forest department come to musth periodically. Musth is signs of health, as only bulls in normal health will come to musth. As soon as a bull comes to musth it shall be tied upclose to the camp, special musth fetters must be used to fetter the animals. If the animal responds to the mahout, the animal can be taken for watering, withholding horse gram from the diet and giving a reduced quantity of cooked rations will be done. Taking suitable precautions, the temporal glands of the animal must be examined and cleaned and dressed with fly repellent oil. Sometimes, the gland may get infected and hence should be attended regularly. The temporal gland discharge and the urine have break down products of testosterone. Hence it gives a pungent odour. It can attract a wild bull in musth. This has to be prevented. An elephant in musth will show inclination to mate with a cow elephant in oestrous, hence if the bull does not exhibit aggression can be permitted to mate with a receptive cow elephant. Consorting with a cow elephant may reduce the aggression of the elephant in musth and also if mated it would reduce the duration of musth. Never allow the animal for grazing nor allow any other bulls to come in close proximity of the animal in musth. The bull shall never be disturbed by presence of other people, vehicles or other animals.
- s). Care of pregnant /Lactating cow elephants: The cow elephants in the forest camps breed regularly, as they have access to bulls both captive and wild. If the animal has conceived, the signs of pregnancy will be observed from 10 to 12 months of pregnancy, the gait of animal shows down, the breasts start filling with the outward tilting the teats. There may be viscous discharge from the mammae. From 12-13 months of pregnancy, the foetal movement can be observed. Once the foetal movements are observed, the animal should be taken off from work and given complete rest until the calf is born and 6 months of age. The quantity of ration or concentration is raised. A special diet consisting of vitamins, mineral, soaked green grams and coconuts are provided, 6-10coconuts/day provided before and 10 coconuts

after delivery. Coconut milk contains several nutritious materials and enhances the quality of mother's milk. At the time of delivery one of the non-lactating cow elephant will keep company with animal and after delivery acts as mother. As soon as the calving takes place, the animal must be brought to the camp and observe whether the mother allows the calf to suckle and the calf is active. Fly repellent oil must be applied around the umbilical cord. Veterinary care of the mother should be available. VAS must check whether placenta has been expelled by the mother elephant, whether the mild is adequate for the calf and must also observe feeding frequency.

#### HANDLING OF ELEPHANTS BY MAHOUTS

The camp elephants are being handled only with ordinary plain stick by the mahout. The use of ankush (Iron hook) has been banned about for past 30 years. The use of Ankush or any other sharp metal found by officials being handled by mahout, he will be given departmental punishment. The elephant being trained and handled by giving positive reinforcement in response followed by rewards like sugar cake, banana, jaggery, etc., the animal being love and affectionate with his mahouts. The mahout must be able to establish his dominance over the elephants to feel that the mahout is smarter at the same time a loving and affectionate partner. Rather mahout is a senior partner, who is firm but not cruel. This type of relationship will lead to a positive response from the elephant like obedience to command, love and affection. The love and affection can simply control the animal and the obedience that comes by the sticks. "Elephant never forgets ",this saying is true and people who are familiar with elephant know it. Elephants have a remarkable memory for events and people and also believe to be emotional, so elephants naturally remember well as well as had things while in musth, captive male elephants deliberately try to attack their mahouts. The bigger problems of aggressive behaviour by an elephant towards a mahout are the elephant magnitude of the aggressions, resulting in serious injury, permanent disability or even death of mahout. The most of the tuskers are even handlable and controllable to his mahout even in musth. The reason being may be rather than the method of handling and training of elephants moreover the systematic management. The morning bath is followed by training by giving positive enforcement and feeding, this will increase the bond and relationship between elephant and mahout. The planned and prescribed work followed by relax time for grazing and bathing in evening makes the more the elephant imprint with his mahout. The reason for manslaughter and aggression of elephants to his mahout is as follows:

i. Crude method of handling, training and punishing the elephants by using Ankush, putting thorny chain. Mahout who is not very familiar with the elephant mood and psychology looses the patience and tend to punish the elephants. The elephant remains adamant, which makes the situation from bad to worse.

- ii. Inexperienced fellow become mahout due to lack of employment and frequent change of mahout: A bad mahout can easily spoil a good elephant also. It is considered that a short-tempered mahout and patient elephant a vice versa may get along well.
- iii. Long exhaust walk in the hot climate.
- iv. Long exhaust work.
- v. Deprivation of food and water
- vi. Inexperience to identify the onset of musth, using the elephants for work before completion of musth in post musth stage.

#### TRAINING PROGRAMMES.

The training programmes need to be conducted every six months for mahouts and assistants, whereby the services of experienced mahouts can also be pressed. All aspects of elephant husbandry, health care, methods of training elephants, kumki training, dealing of problematic rogue elephants and 10 commandments of good mahouts will be covered as part of training programme. Apart from this a special emphasis is also required on motivational aspects of the staff, so that their commitment to the elephants remains high.

It would be informative, worthwhile and interesting if a 'Service Register' of each elephant, is maintained right from its birth/caught in the wild etc, duly mentioning, salient features in the life of the elephant. The register shall mention:

- Date of birth if known, If caught in the wild, found abandoned or procured from elsewhere, the details there of.
- Parentage
- Age & Height at the beginning of each year
- Working capacity and how utilized
- > Details of movement & when shifted to different locations
- Diet
- Illness & treatment given from time to time.

The 'Service Register', like that of officials, should move with the elephant when shifted out of the Park. It, would provide necessary information of the past history to the next official or Veterinarian for any treatment to be given.

The Service Register, can be of the size of a measurement book, (10 cm  $\times$  20 cm) which is handy to carry around.

#### 11.2. WILDLIFE HEALTH MONITORING

The health of wild animals inside Similipal is noticed to be good except elephants. They are seen to be suffering from formation of abscess, gastroenteritis and some congenital diseases. The principal prey animals like sambar and wild boar

available in good numbers are seen to be very healthy. Monkeys, cheetal, gaur and other animals largely appear healthy free from any diseases. However, regular vaccination of the cattle in the enclave villages needs to be made. The work will be done following plan and schedule. The carcass of the cattle shall be disposed of by burning. Similarly death of any wild animal due to poisoning and suffering from any infectious disease shall also be burnt.

To improve the health of elephants, study shall be made how to provide medicine for de-worming and other diseases though the soil-salt mixture in the saltlicks. At present the local Veterinary Assistant Surgeons look after the health of the captive elephants, rescued animal and carry out the post-mortem inside the PA. State Govt have sanctioned one post of VAS on deputation from Animal Husbandry Department. Rescue centres will be established at Gurguria/ Nawana with infrastructure like rescue vehicle, medicine etc.

## Wildlife Health Management

Protected areas are established with an aim to conserve components of biodiversity to maintain their status in the natural ecosystem to protect the species from premature extinction. Outbreak of fatal diseases among the population of wild animals has lost considerable wild fauna in the past. Large-scale mortality of Bison in South India during (1968 and 1975) and Kajiranga National Park (1981) by Reinderpest and by Foot and Mouth Disease (FMD) in 1952 had been reported in the past. Dissemination of a number of diseases, like Reinderpest, FMD, Anthrax, TB and Rabies are common in wild animals. In order to maintain the good health status of the wild animals, efforts for disease surveillance is extremely important in the Protected Areas.

There is a great competition of survival among wild ungulates and cattle for both forage and water. The domestic animals come in contact with wild animals, particularly ungulates at common grazing fields and at waterholes. Due to this, chances of the transmission of various fatal infectious diseases from livestock, to wild animals, namely Rinderpest (RP), Anthrax, Foot and Mouth Disease (FMD), Hemorrhagic Septicemia (HS) etc., are extremely high. It is also known that there are few diseases which are communicable to carnivores form diseased ungulates; e.g. Rabies, Anthrax, Hydatidosis and Trypanosomiasis (Arora, 1994).

#### 11.2.1. Handling of injured / sick Schedule I Wild animals like Tiger

All cases of sick / injured Scheduled I wild animals, as reported by the field staff, shall be subjected to examination by an independent team, to ascertain whether human intervention/treatment is required. Since wild animals in nature are subjected to ongoing, natural intra/inter specific interactions, human interventions for treating such animals may not always be necessary. However, till the arrival of the

independent team, the field staff shall continue with the monitoring of sick/ injured wild animal.

The composition of the team is suggested as follows

- a) An authorized representative of the National Tiger Conservation Authority.
- b) A Non governmental outside expert nominated by the Chief Wildlife Warden of the State.
- c) One Veterinary Asst Surgeon

#### 11.2.2. Wildlife Health Monitoring Protocol for staff:

In the present scenario where a Wildlife Manager has to deal with Human-Wildlife Conflict, diseased, sick and injured animals, Stray Wild animals, Postmortem, domestic livestock and stray dogs etc. the services of Veterinary Officer are highly essential. Presently the service of Veterinary Asst Surgeon, Jashipur is mostly utilized for all the above said purposes. It is noticed that there is considerable delay in tackling the issues for want of expert services. Recently govt have sanctioned one post of Veterinary surgeon for Similipal TR on deputation from Animal Husbandry Department. The veterinary surgeon will arrange training to all the field staff covering the following aspects including reporting system. The veterinary expert will also monitor the implementation of the protocol and submit report to the Field Director Similipal Tiger Reserve.

- Signs and symptoms of various diseases of Wild Animals.
- Identification of Wild-Animal from bones, skeleton, Hairs etc.
- Immunization Programme for livestock and stray dogs.
- De-worming medicines, vitamins and mineral supplements to wild animals based on necessity.
- Testing the water quality in water holes.
- Collection of samples, preservation, transportation etc.
- Rescue operation for stray Wild Animals and after care and facilities for rescue animals.
- Keeping track of cattle depredation by carnivores through wireless on a daily basis, and ensuring timely compensation to affected people.
- Monitoring movement of wild carnivores near human habitations through "impression pads" created near water points and other sensitive areas, and maintaining a record of such village level monitoring in the Gram Sabha/ Panchayat/EDC.
- Alerting / sensitizing local people appropriately, including safe Disposal of livestock carcass and other garbage, to prevent habituation of wild carnivores like panther from frequenting and subsequently becoming resident in the area.
- Deployment of tracking squads comprising of frontline staff and experienced local people, and plotting day-to-day movement of the aberrant wild carnivore (preferably using GPS in the GIS domain).

- Deployment of a "watch team" for patrolling the affected village area, techniques like crackers, light, etc.
- Using camera traps/impression pads for collecting field evidences relating to the wild carnivore for arriving at an inference.
- Constituting an advisory committee comprising of field staff, experienced trackers and NGOs for obtaining advice relating to identify/sex of the aberrant wild carnivore causing depredation, especially for ascertaining its sex, age, physical deformity and other related parameters.
- In case of recurring human depredation in quick succession, use of dummies with a bent posture inside trap cages for trapping the aberrant animal (such traps, with inbuilt mechanism for automatic closure after animal entry, should be placed at several sensitive areas) in consultation with Chief Wildlife Warden.
- Radio collaring and monitoring the problematic animals in consultation with Chief Wildlife Warden.

The procurement and supply of Drugs/Medicines, Cages, metal detector, vehicle etc to the veterinary expert will be ensured. Sufficient budgetary provision for the establishment of Laboratory and related facilities in a phased manner will be made.

Free-ranging wild animals are as susceptible to diseases as any other living beings. Diseases have been a major cause of local extirpation of a number of wild animal species in India. With the increasing interaction between wild and domestic animals, the chances of disease transmission amongst them are high. Therefore, similar to the attempts made for recording the occurrence of disease outbreaks in wild animals of protected regions, efforts shall also be made to know the occurrence of specific infectious and contagious diseases in domestic animals at the periphery of the protected wildlife areas. Until and unless different epizootiological cycles of various parasitic and infectious diseases are delineated, it will not be possible to plan out measures to eradicate these diseases from free ranging wild animals.

For maintenance of health of wild animals, it is essential to monitor and survey the parasitic and infectious diseases periodically so that necessary actions could be taken to prevent disease outbreaks and control large-scale mortality. Surveillance programmes will be a major aid in the implementation of long-term health management plan on the appropriate measure to maintain healthy population of wild animals and guarding them against the risk of sudden and heavy mortality or morbidity in Protected Areas. This can be best achieved by preventing transmission of diseases between wild and domestic and in-between wild animals by manipulating the factors involved in the transmission. Establishing the database for forecasting the diseases by performing epizootiological studies in and around the Protected Areas round the year is of utmost importance and needs attention.

Preventive medicine in free ranging wild animals is more closely related to wildlife management. In wild life medicine health of population is its highest priority. Individual animal therapy in wild life medicine is difficult, if not impossible in most instances. Preventive medicine will be practiced to ensure the health of wild animals of the reserve.

A large number of cattle pass through the near by area to Similipal Tiger Reserve. There is a problem of illegal cattle grazing. The common use of water hole by cattle and wild animal is the main cause of introduction of infectious diseases in to wilds. Following are the diseases that may attack wild animals of the reserve.

FMD
Anthrax
Brucellosis
Leptospirosis
Protozoic
Ecto-Endo parasite

# (A) Prophylactic Immunization:

Some disease which is common to this area and is epidemic in nature and spread by both wild and domestic animals, preventive treatment against these diseases by the means of prophylactic immunization to the domestic animals is given. Domestic cattle, which may transmit the disease among wild fauna, can be vaccinated to prevent the occurrence.

Such immunization is carried out in villages located within a radius of 5 Km from the Park. It is believed that an animal can cover maximum distance of 5 Km. to graze and browse.

Prophylactic immunization shall be regularly carried out with the help of Veterinary Department every year, to reduce the chances of spread of disease from cattle to the wildlife.

# (B) Disease Surveillance:

A quick disease reporting, detection and treatment system only can achieve proper disease surveillance. In the case of wild animals, detection of disease is only based on observation on animal behaviour and their day to day activities. Concept of landscape epidemiology that associates the occurrence of a certain disease with the existing landscape shall also be kept in the mind. The knowledge of animal species typical to the given area and particular disease maintained and spread by them will be extremely useful in disease detection and treatment. If such a disease is detected, its prophylactic treatment by immunization, water hole treatment or aerosol

immunization can be done. To protect and maintain wildlife in PA with good health, it is necessary to achieve disease surveillance of –

- (i) Native wild population
- (ii) Domestic cattle of adjoining villages

# Parameters for the monitoring of wild animals health -

- General examination
  - i. Physical examination
  - ii. Clinical observation
- 2. Laboratory investigations
  - i. Faecal examination
  - ii. Haematological examination
  - iii. Serological examination
- 3. Study of kill / Mortality
- 4. Detailed post-mortem examination
- 5. Collection of material for laboratory examination

#### 11.3 MORTALITY SURVEY

A survey to be conducted regularly and intensively at section level to find out the mortality of any animals. All such instances are to be recorded and reported on regular basis to the higher office. As per the NTCA guidelines all half eaten kills should be guarded to avoid poisoning of the kill by locals in retaliation. Mortality means susceptible to death. Mortality in wildlife may be due to environmental stress, disease outbreak, poisoning, accident etc. information about mortality rate for wild animal is very important for population dynamics. Heavy mortality rate for any species can change the survival possibility. So, it is very important to keep the record of mortality of wild animals for the core of Similipal TR. Mortality survey is regular process which can be done in following steps-

- Mortality register shall be maintained at range level on daily basis for each and every type of mortality. Monthly compiled record at range level shall be sent to DD/FD. Separate record shall be maintained for mortality other than that attributable to an offence and mortality attributed to poaching or an act of vandalism. Survey record can be maintained in prescribed Format. All records shall be analyzed at FD office annually and report shall be submitted to CWLW.
- Mortality data shall be collected by the field staff at block.
- Each mortality information shall be immediately reported to range office and if needed, specimen shall be collected and sent for pathological investigation.
- It shall be informed to all the staff through a circular in Odia language that Tiger or any other Carnivore on kill shall not be disturbed for knowing dead animals.

#### ANIMAL MORTALITY OTHER THAN THAT ATTRIBUTABLE TO AN OFFENCE

SL	SPECIES	LOCATION	YEAR	SEX	Number	Discovered	Cause of	remarks
NO				&		in what	mortality	
				Age		condition		
1	2	3	4	5	6	7	8	9

**Note**: Location: By compartment, landmark etc.

Sex &age: As per parameters for age class. Sex, if possible to

identify.

Discovered in what condition :Carcass, complete or partial. Skull or any other recognisable remains collected where only some remains of an animal are found.

Cause of mortality: If known e.g. territorial fight, accident, possible disease

(following postmortem results), old age, cause difficult to

determine, predation etc.

Remarks: Any other useful information.

#### ANIMALS MORTALITY ATTRIBUTED TO POACHING OR AN ACT OF VANDALISM

SI	Species	Location	Cause of n	Cause of mortality					
No									
			Number	Sex	Age	Class			
1	2	3	4	5	6	7	8		

Location: By compartments or landmarks.

Cause of mortality: Whether the animal was intact or remains found, article

or trophy to be recorded. Cause if known e.g.

animal snared, shot or poisoned etc.

Remarks: Any other useful information, especially matters of illegal

trade.

# 11.3.1 Post Mortem Protocol For Ensuring Transparency Incases Relating To Tiger Mortality.

In this context, the following actions are advised.

- All the tiger carcasses shall be preserved in a deep freeze till an independent team analysed the cause of tiger death.
- Every incident of tiger mortality shall be thoroughly examined by an independent team whose composition is as below:
  - An authorized representative of the NTCA.
  - A Veterinary Officer of the tiger reserve/district.

- A non-governmental outside expert nominated by the Chief Wildlife Warden of the State.
- Every incident of tiger mortality shall be brought to the notice of the NTCA by telephone/fax, followed by a detailed post-mortem report alongwith the report of the independent team. The death of schedule animals shall also be informed to the Chief Wildlife Warden.
- The Standard Operating Procedure to deal with tiger death issued by NTCA on 17.12.2012 will be strictly followed.

#### 11.3.2 Record of Post Mortem Examination

The Veterinary Experts and others involved will prepare and submit the postmortem examination report in the format prescribed here under

RECORDS OF NECROPSY EXAMINATION
NAME OF TIGER RESERVE:
NAME OF SPECIES with scientific name:
AGE (approximate)SEXAMBIENT TEMPERATURE in *C (at the time of
acquisition)
DATE OF NECROPSYDATE & TIME OF DEATH (estimated)
TIME OF ACQUISITION OF CARCASSTIME OF DISPOSAL OF
CARCASS
GPS LOCATION AT PLACE OF DEATH & PLACE OF NECROPSY (if
different)
AREA DESCRIPTION (topography water source, etc)
I. HISTORY OF DEATH
1. Brief History
1. Bitel History
2. Observation of the course adiags
2. Observation of the surroundings

3. Other relevant information									
II. EXTERNAL EXAMINATION									
PHYSICAL CONDITION :Normal Fat Thin Emaciated									
RIGOR MORTIS									
SUPERFICIAL LYMPH GLANDS : MUCOUS-MEMBRANE:									
NATURAL ORIFICES : BODY WEIGHT in kg(approximate)									
BODY LENGTH in cm : TAIL LENGTH in cm:									
(nose to tip of tail) (base of tail to tip of tail)									
HEIGHT AT WITHERS in cm : CHEST GIRTH in cm									
STATE OF CARCASS: Fresh /Refrigerated /Deep frozen /									
Incomplete									
STATE OF DECOMPOSITION : Fresh /Bloated /Active decay /									
Advanced decay									
DESCRIPTION OF WOUNDS/INJURIES, if									
any									
OTHER REMARKABLE OBSERVATIONS, if									
any									
,									
Vital Measurements (whichever applicable):-									
Rt. FORE FOOT-PAD GIRTH & LENGTH X BREADTH in cm									
(carnivores):									
LENGTH OF CANINE TEETH in cm (carnivores): Upper RightUpper									
LeftLower LeftLower Right									
Rt. FORE FOOT-PAD CIRCUMFERENCE in cm (elephant)									
:									
LENGTH & CIRCUMFERENCE (at base) OF BOTH TUSK/TUSH IN CM									
(elephant):									
(elephant)									
OTHERS (Longth of Antion/Horn, Longth etc.)									
OTHERS (Length of Antler/Horn, Length etc.)									
<u>:</u>									

# III. INTERNAL EXAMINATION

A Chin Cubautanaana tissus O Mansalas	
A. Skin, Subcutaneous tissues & Muscles	
B. Body cavities	
1. Position of visceral organs	
2. Peritoneal cavity	
3. Pleural cavity and pleura	
C. Respiratory system	
1. Larynx	
2. Trachea	
3. Bronch and Bronchioles	
4. Lungs (Appearance, color & consistency)	
5. Lymph Glands	
6. Diaphragm	
D. Hepatic system	
1. Liver (Appearance, size, color)	
2. Liver tissue	
3. Gall bladder & Ducts	
4. Lymph glands	
E. Circulatory system	
1. Pericardial sac	
2. Heart muscle	
3. Heart chambers	
4. Large blood vessels	
5. Small blood vessels	
6. Spleen (Appearance, size, colour)	
7. Splenic tissue	
F. Digestive tract	
1. Pharynx	
2. Esophagus	
3. Stomach (Simple): i) Cardiac zone	
3. Stomach (Simple). I) Calulac 2011e	
ii) Fundus	
iii) Pylorus	
Stomach (Compound): i) Rumen	
ii) Reticulum	
ii, neticulum	

	iii) Omasum					
	iv) Abomasum					
4. Small Intestine	i) Duodenum					
	ii) Jejunum					
	iii) Ileum					
5. Large Intestine	i) Caecum					
	ii) Colon					
	iii) Rectum					
6. Lymph glands (M	esenteric)					
G. Urogenital Organ	S					
1. Kidneys (Colour 8	k appearance)					
2. Urinary bladder						
3. Reproductive org	ans i) Testes/Penis/Glands					
. H. Adrenals						
I. Head						
1. Buccal & Nasal ca	vities					
2. Tongue						
3. Brain & spinal cor	rd					
J. Skeleton						
IV. SUMMARY OF MAJOR FINDINGS						

SI. No.	Sample	Preservative used	Examination required	Laboratory addressed

V. PROVISIONAL DIAGNOSIS
Place : 1. Signature:
Date : Veterinarian's name:
Designation:
2. Signature :
Veterinarian's name:
Designation:

Note: Attach a rough sketch of the area duly signed by the competent authority.

# 11.3.3 Instruction For Performing Necropsy And Collection of Samples For Laboratory Test

Many diseases affecting valuable wildlife resources have gone undetected because appropriate samples were not collected for diagnostic testing from animals that died due to the disease. When appropriate samples and accurate written and photographic records are taken, the cause of disease can be determined in most cases. It would be worthwhile to collect complete tissue samples including blood as it would aid in the recognition of disease condition. If only selected samples are taken because a particular disease is suspected and the animal does not have that disease, these samples may be inadequate to test for other disease that might be causing the disease. Furthermore, selective sampling limits the information that could be procured from a wild animal necropsy that aid in future population or eco system management. Before performing a necropsy on an animal two important points need to be considered:

- 1. ZOONOTIC DISEASES: Examine whether species have a disease that is transmissible to humans. Disease such as rabies or Echinococcosis (Hydatiddisease) in carnivores, anthrax or rabies in ungulates or psittacosis in birds can cause serious and fatal diseases in humans. Many primate diseases also can cause human illness. Hence it is necessary to take appropriate protective measures before conducting the necropsy. Wearing a mask is particularly important when performing a necropsy on a primate, bird, or a carnivore suspected of rabies. Also, all samples should be handled with care and unfixed samples should be placed in leak proof containers so that dangerous infectious materials do not leak during transport.
- 2. REPORTABLE AND INFECTIOUS DISEASES: Examine whether animal have a disease that is infectious to livestock or other wild animals. Diseases such as anthrax, foot and mouth disease, or tuberculosis can spread to other animals through contamination of

the environment during the necropsy procedure. Anyone conducting necropsy of wild animals should be aware of the typical lesions of these diseases and take extra precautions when decontaminating a necropsy site.

#### **EQUIPMENT**

A basic necropsy kit can be assembled in preparation for transport to a field necropsy site on short notice. The kit shall contain the following items:

### **Necropsy equipment**

1. Bone cutter (small), 2. Bone cutter (Large), 3.Butcher knife, 4.Hammer, 5. Knife (Large), 6. Knife (Small), 7. Knife Sharpener, 8.Surgical Blades, 9. BP blade handle, 10. Rat tooth forceps (small and large), 11.Tissue forceps (small and large), 12.Probe, 13. Scissor (both ends sharp) (small and large), 14. Scissor (blunt-sharp) (small and large), 15.Tray, 16.Sharp container, 17.Spirit lamp, 18. Match box, 19. Measuring tape (30 meter length), 20. Nylon thread

### **Necropsy documentation**

- 21. Marker pen and pencil, 22. Labels, 23. Necropsy forms, Laboratory specimen forms,
- 24. Notebook, papers

#### **Protective Clothing**

- 25. Apron (disposable or non-disposable), 26. Shoe covers (disposable), 27. Sterilised Gloves (disposable), 28. Non-sterilised Gloves(disposable), 29. Veterinary Gloves(disposable)
- 30. Face Mask (disposable), 31. Cap (disposable), 32. Full Face Shield (disposable)

# **Specimen containers and sampling instruments**

33. EDTA vacutainer, 34. Serum separator vacutainer, 35. Syringe with needles (20g) 2ml, 5ml, 10ml, 36. Microscope glass slides & slides box, 37. Aluminium foil, 38. Containers 250ml, 500ml, 39. Zip lock bags – medium and large, 40. Sterile swabs, 41. Sterile containers (50ml)

### **Transport materials**

42. Cotton roll (500g), 43. Insulated container, 44.Packaging tapes (1 inch and 2 inch), 45.Ice packs, 46. Ice box – small

#### **Disinfecting materials**

47. Chlorhexidine Solution (Savlon®), 48. Isopropyl Alcohol, 49.Liquid soap, 50. Lime

#### **Fixatives and Preservatives**

51. Methanol, 52. Silica gel, 53. Buffered formalin 10%, 54. Sterile Buffered glycerin 50%, 55. 70% Ethyl alcohol

#### Others

56. Global Positioning System, 57. Camera, 58. Weighing scale (upto 400kg), 59. Plastic sheets, 60. Flashlight

## 11.3.4 Safety Considerations

### **Personal safety**

Some diseases of wildlife can cause serious illness or death in humans, all carcasses should be handled as if they were harbouring potentially dangerous disease and precautions for personal safety should be exercised. Minimal protective clothing is always advised that includes apron, gloves and a mask that covers the nose and mouth, shoe covers.

# **Handling of carcass**

Diseased wild animal should be handled carefully to minimize exposure of other wild and domestic animals. If Anthrax is suspected, a blood smear shall be made by nicking an ear vein or other available vein and checking for *Bacillus anthracis* by microscopy before the carcass is opened. Carcasses with anthrax or other infectious diseases should be buried (preferably covered with a disinfectant and buried at least 2 m deep to prevent scavenging).

# **Despatching samples**

Fresh collected and frozen samples shall be packed and dispatched immediately after necropsy so that no further deterioration occurs. Laboratory must also be telephonically informed about the details of the samples.

# Labelling of specimen

All containers, tubes, slides and bags shall be labelled using a waterproof marker. Placing a second label in a plastic bag that is then attached to the container adds further security. For formalin fixed tissues, a paper label with the animal identification written in pencil can be submerged in formalin with the tissues.

The following information should be included on the labels:

Date:

Location:

Species:

Tissue type & preservative used:

# 11.3.5 General Observations about the Carcass and its Surroundings Assessment of the Condition

Examine:

- Any recent weather conditions that could have caused animal deaths
- Ambient temperature that might lead to further deterioration of carcass
- Signs of struggle.
- Condition of the animal.
- Any bite wounds, other signs of predation. If wounds are present, look for bruising and bleeding in the tissues near the wounds would indicate that they occurred before the animal died. Look for signs of humans or injuries caused by humans. Otherwise these wound most likely were caused from the carcass being scavenged.

- Broken bones, missing hair, broken or missing teeth or other signs of trauma.
- Deformities (if any).
- External parasites (preserve if any).
- Consideration about Nutritional Status
- Evaluate weight, body length and chest girth (details mentioned in the necropsy form).

Examine:

- Fat stores under the skin and in body cavities.
- Amount of fat around the heart and kidneys
- Muscle mass.
- Amount of food in the digestive tract.
- Condition of the teeth like deposition of tartar, chipping, fracture, pulpal exposure, etc.

# 11.3.6 Specimen Collection and Preservation

Most carcass will have some Autolysis, but diagnostic tests can still be performed if tissues are properly handled. Therefore gentle handling of autolysed tissues is recommended. Quickly place in preservative. Freeze or refrigerate samples as soon as possible for infectious disease ortoxicology testing. Autolysis can cause many artefacts in tissues that can be confused with a disease process. However, it is always best to take a sample from an area that looks abnormal rather than assume that the change was caused by autolysis. Histopathology will be able to distinguish between true lesions and post-mortem changes.

#### Histopathology

- Samples shall be taken from all major organs and any abnormal areas as well.
- Samples from GIT can be placed in one container and should not be placed with other organs.
- Samples shall be placed in container of 10% buffered formalin.
- Quickly submerge tissues in 10 times the volume of formalin as the volume of tissue.
- Samples shall not be thicker than 1 cm so that they can fix, but long and wide enough to represent the different areas of a tissue as well as any abnormalities.
- Samples that include abnormal areas and surrounding normal areas are best.
- Samples should be handled carefully by grasping at the edges.
- Crushing, stretching, scraping, or otherwise damaging specimens should be avoided. Gentling handling is required.
- If a tissue needs special labelling, it will be placed it in a different container or a piece of paper attached to the tissue with string or a pin and label the paper or container with pencil or waterproof marking pen.

## Microbiology (Bacteriology and Virology)

To take sample without contaminating them, the samples need to be taken before tissues are touched and the instrument need to be sterilized. These samples also should be placed in sterile containers. To sterilize instruments, the tips need to be dipped in alcohol and then flame them or to flame the tips until they are red and then to let them to be cool. Samples also can be taken with a sterile swab, sterile syringe, or by placing a large (3cm X 3cm) section of tissue directly in a sterile container (the centre of the tissue will be uncontaminated). Samples that contain abnormal areas shall be taken. Appropriate samples include: whole blood, pus, areas with abscesses or nodules, or intestinal contents (with a loop of intestines). When taking samples from infected tissues, an area near the edge of the affected tissue where live organism are most likely to be found is to be selected. If no abnormal areas are present, standard tissue samples of lung, liver, kidney, spleen, tonsil, and intestines will be taken. Samples need to be kept moist with sterile transport media, sealed in a sterile container and cold. If refrigeration is not available, samples can be placed in 25% buffered glycerine in sterile containers. Transport swab need to be taken from areas where the presence of pathogens is suspected. Sampling of the pleural surface of the lungs, bronchi, stomach mucosa, and perineal fluid, fluid in the pericardial sac, brain surface, abscesses, or infected areas is recommended for relatively fresh carcasses.

Smears of pus and infected tissues are also useful and can be air-dried and fixed with heat.

#### Toxicology

After taking samples half of each sample need to be placed in aluminium foil and half in plastic bags or containers (aluminium or plastic interfere with the testing of some toxins). Samples need to be stored frozen (if possible) until shipped to a laboratory.

# **Parasitology**

- Faeces, gastro-intestinal contents and mucosal scraping can be preserved by refrigeration or 10% buffered formalin. If GIT protozoa are suspected, the faecal matter can be stored in normal saline and then refrigerated.
- External parasites are best preserved in 70% ethanol.
- Trematodes (flukes) and cestodes (tape-worms) can be preserved by 10% buffered formalin.
- Nematodes can be preserved in 70% ethanol. A small quantity of glycerine if added prevents shrinkage.
- Thin and thick blood smears on clean glass slides need to be made and air dried and fixed with methanol.
- Preparation of Slides for Cytology
- A clean cut with a scalpel blade be made across the surface of the abnormal area of the tissue which is required to be examined.

- The sample is to be firmly grasped with forceps, placing the cut surface down.
- The cut surface of the sample is to be blotted across a paper towel or other absorbent surface until no blood or fluids are evident.
- Then the blotted surface is to be gently touched in several locations on clean slides.
- Fixing with methanol.

#### Urine

Urine can be collected from the urinary bladder of relatively fresh carcasses with a sterile syringe. If the bladder is not distended it may be desirable to slit it to remove the urine with a syringe. Urine can be refrigerated but it should be submitted for culturing or clinical pathology as soon as possible after collecting. Samples can otherwise be frozen for later determination of osmolality and other urine values.

# 11.3.7 General Concerns for Performing the Necropsy

- All the procedures involved during necropsy must be carried out before sunset and proper light is essential.
- Proper history and thorough ante-mortem examination of the carcass to be ensured.
- All carnivores and ungulates are placed on the left side so that the right side of the carcass is opened. All birds, reptiles, and primates are placed on their back.
- After the body cavities are opened, the general nutritional condition of the animal and location of all organs shall be assessed (to determine if any organs are displaced) before organs are removed. At this time, a sterile blood sample for culture can be taken to obtain serum for serological tests. Also sterile samples of other organs shall be taken for culture before organs are handled.
- After the general condition of the animal has been recorded, individual organs can be removed, examined, and sampled in a systematic manner. Any abnormal findings (lesions) need to be described.
- Photographs of abnormal findings provide the best documentation for records.

## **Description of Abnormalities found at Necropsy**

Criteria preferred for describing any abnormality is location, number & distribution, colour, size, shape, consistency, and texture. For example: "The liver contains multiple tan, firm nodules ranging from 1 to 3 cm in diameter that are distributed through out all liver lobes. The nodules are gritty on cut surface".

# 11.3.8 Post-necropsy

## **Disposal of carcass**

Open air incineration is best preferred for all predators, small to medium-sized ungulates, primates, birds and reptiles as it allows complete disposal of all body parts (highly priced in wildlife illegal trade). If facility permits, large-sized ungulates can be cut to pieces before incineration. On-site burning is best preferred

for elephants after removal of tusks. The Veterinary expert may decide whether the Carcasses to be left to nature for foraging by carnivores, Wildboars, vultures etc. The Standard Operating Procedure issued by NTCA for disposal of carcass will be followed for each case.

# Disinfecting the necropsy site

The carcass and all tissues from the carcass including blood soaked dirt shall be buried or incinerated. All contaminated paper or plastic materials shall be either thoroughly disinfected or incinerated. All blood and residual tissues shall be removed from the instruments and tools with soap and water. Then the instruments shall be disinfected. Necropsy boots and apron shall be cleaned and any contaminated clothing thoroughly washed. The external surface of any containers with samples shall also be washed. Lime shall be sprinkled to disinfect the necropsy site.

#### 11.3.9 Storage or submission of samples

All the samples must be packed separately with proper packaging tapes to avoid leakage and cushioned with absorbent materials to avoid spoilage. If necessary, ice packs would be interspersed with specimen to provide uniform refrigeration or freezing effect. Formalin-fixed samples can be kept at a cool room temperature until shipped. Any samples for culture need to be kept refrigerated (for parasitology or bacterial culture) or frozen (for toxicology or virus cultures). It is best to ship frozen and fixed samples separately. If they must be shipped together, then insulate the fixed tissues from freezing by wrapping in newspapers. There should be no spillage of formalin, because fixation of frozen samples will make culturing for bacteria or viruses impossible and will alter cells on blood smearsor cytology slides. Furthermore, formalin will cause undesirable effect on the samples for toxicological investigation.

#### **Fixative and Preserves**

### **Sterile Buffered Glycerine (50%)**

For transporting tissue for culture when refrigeration is not available.

To make sterile buffered glycerine with an equal amount of buffer composed of:

- A. 21 g citric acid mixed in 1000 distilled water
- B. 28.4 g anhydrous sodium phosphate in 1000 distilled water

Mix 9.15 ml of A and 90.85 ml of B

Mix 100 ml of buffer with 100 ml of glycerine.

Then sterilize in small tubes to take into the field

#### 10% Buffered Formalin

For fixation of tissues for histology.

To make one litre mix.

100 ml formalin (38-40% formaldehyde)

900 ml distilled water

4 g sodium chloride (table salt)

# 70% Ethyl Alcohol

To make one litre mix. Add 700 ml of 100% ethanol and 100 ml of distilled water

Tissue	Microbiology	Toxicology
Brain	✓	✓
Fat	✓	✓
Stomach contents		✓
Hair		✓
Liver	✓	✓
White Blood	✓	✓
Lymph	✓	✓
Tonsils	✓	✓
Spleen	✓	✓
Abscesses, granulomas	✓	✓

LABOR	RATORY SPECIM	EN FORM				
NAME	OF TIGERRESER	RVE:				
NAME	OF Species with	n scientific name				
AGE	(approximate):	SEX:AI	MBIENT TEMPE	RATURE in C(at	the time of	
acquis	ition):					
DATE	OF NECROPSY EX	XAMINATION AT	TACHED: YES/No	0		
BRIEF	HISTORY:					
SI.	Sample	Preservative	Examination	Laboratory		
No.		used	required	addressed		
	_1	<u>- L</u>	<u> </u>	.1		
Date 8	& Time of Collect	tion		•••••		
Mode	of dispatch: Po	ost/Rail/Air/Bus/I	Messenger (mes	ssenger's		
	•		•	J		
Date & time of dispatch						
	•					
Hande	ed over to					
Dated						
		ne & signature				
-,						
				•••		

#### 11.4 RELOCATION OF CORE AREA VILLAGE

#### **Need for relocation**

The core area of the Tiger Reserve forms the crucial natal area and a critical tiger habitat. It is imperative that this area is made absolutely sacrosanct and free from any kind of human interference.

### **Progress of relocation**

Out of 149 families 72 families have been shifted up to 2003 and as per survey during July-2004, the total numbers of families are found to be 120. The increase in number of families after resurvey is due to addition of families, which are the offspring of the balance families who remained in the core villages. These families in the three villages need be relocated. Besides there were 22 nomadic Khadia families at Barhakamuda and 10 at Bahaghar who have been relocated outside in 2013.

The details of families relocated from the villages inside core area of Similipal Tiger Reserve during the period from 1994-2013 are given below.

Village	Family		Year-wise break up of Families relocated			Balance	
		Year	Kapand	Ambadiha	Asankudar	Total	
Jamunagarh	37	1994	11	-	-	11	26 (2008- Survey)
Jenabil	84	1998	-	23	-		0
		2010		61	-	84	
TZ 1 . 1 .	hai 73	1994	30	-	-	38	35 (2008-Survey)
Kabatghai		2003	-	8	-		
Bakua	61	-	0	0	-	0	61 (1998-Survey)
Barakamuda	22	2013	0	0	22	22	0
Bahaghara	10	2013	0	0	10	10	0
Total	287		41	92	32	165	122

The relocation of balance families of Jamunagarh and Kabataghai village has not progressed much as the land required for their settlement is not ready and dialogues with the villagers is going on for voluntary relocation.

#### **STRATEGY**

- 1. Process of diversion of forest land proposed to be allocated for rehabilitation of Kabataghai villagers shall be expedited.
- 2. Continuous dialogues with the villagers of Jamunagarh and Bakua to be held with the help of local NGOs to convince them for voluntary relocation.

3. Till the rights of affected persons are finally settled, alternative arrangement shall be made for making available fuel, fodder and other forest produce to affected persons in terms of their rights as per record.

#### 11.5 HABITAT IMPROVEMENT

Similipal exhibits multiplicity of habitats for a range of species. Recognizing its status as a Tiger Reserve as well as a part of Elephant Reserve, the forest constitutes major elements of habitat. Within each category of forest, special habitats would be found. Tiger and elephant are manifestation of that sum, which is embedded in the inter-relationship of living and non-living. Good habitats for tiger must contain enough for the tiger to survive on. Long, reasonably undisturbed forests will be required for elephant to continue its signature to appear over generations. As far as possible, the strategy should be to keep the habitats protected; and to manipulate, only after fully understanding the implications of the actions and that too cautiously, and to monitor systematically and scientifically.

With the backdrop of the vastness of the area of the landscape, the diversities of the habitat types and the diffused nature of the wild animal populations, it is necessary to adopt following strategies to improve the habitat congenial for the growth of wild animal population.

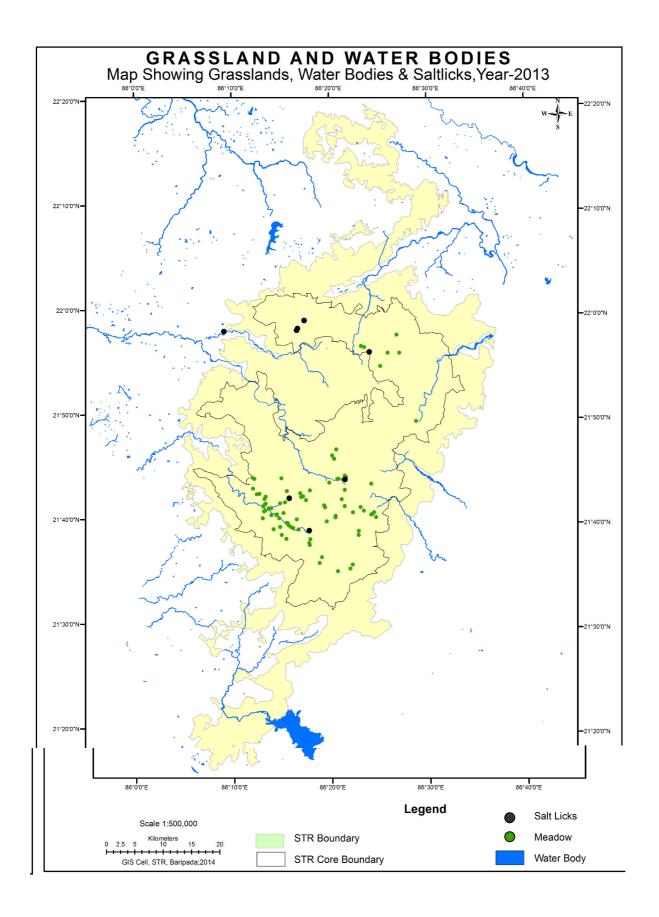
## **Objectives**

To do an overall improvement of habitat in terms of availability of food, cover and water to wild animals by some management interventions or habitat manipulation works.

### **Strategies:**

#### Improvement of meadows

Carrying Capacity of Tigers in Similipal Tiger Reserve was calculated to be 9.4/100 sqkm following the method prescribed by Hayward. The present density of Tigers in Similipal is less than the predicted Tiger density. According to studies, an area of five to eight percent of the habitat should be retained in the form of grassland in a total area of 1000 km²( Gopal, 2012). But in similipal grassland occupy less than one percent area in the critical tiger habitat. However, no creation of new open area for developing grass land is suggested, but the existing grasslands are proposed to be maintained with arresting succession process and development of grass land in relocated village sites. The location of grasslands in Similipal has been depicted in a map.



The grassland and meadows of the PA extending over 176.57 ha at different places (Annexure XXVII) are now invaded by sal saplings. These need to be uprooted and obnoxious and unpalatable grass and shrub species eradicated by ploughing the meadows. More palatable and indigenous grass species like *Cynodon dactylon* is to be sown in patches by fencing the area.

Restoration of the existing meadows and maintaining their character will be focused in the following areas:

- (a) Rajabhadi near Bhanjabasa, Balidara, Bhanjabasa-UBK road, Tarinivilla, Hatisala, Tiktali, Nuagaon-Solamundi, Devasthali-Patabil-Bachhurichara-Sapaghara-UBK road;
- (b) Nigirda-Panasia, Pandabandha-Kusumtota; Khadkhai-Baunsakhala;
- (c) Gurandia;
- (d) Sunpokhari, Sarabasa-Jadapal; Dhudruchampa-Kaniabasa; Badamakabadi.

Efforts will also be made to develop meadows on the relocated village sites in the core area.

#### **Eradication of weeds**

All weeds like *Lantana* and *Eupatorium* hich are noticed mainly near settlements and relocated sites need to be uprooted and destroyed during rainy season. Weed invasion is not noticed in large scale in the core area except the village areas.

#### **Development of waterholes**

There are 16 water bodies inside the PA constructed in the past as detailed in Annexure XXVI. These get silted and hence required to be renovated once in two years. No new structure within core area is proposed during the plan period.

# Management of swamps

The swampsare natural depressions in the valleys, where due to clay pan formation in the sub-surface, water retention ability of soil increases and marshy conditions occur. They constitute significant habitats for wild animals and hence their accounting is very important. All swamps must be mapped and recorded. Their vegetation profile shall be inventoried and weeds closing in from the periphery shall be removed on an annual basis. However, attempts to dig waterhole in *swamps* shall be discouraged as such interference may break the clay pan in the subterranean stratum and we may lose the water retention ability of these marvellous creation of nature. The list of swamps locally known as "Daldali" is given in Annexure XXVIII.

These shall be preserved and maintained as they are an edaphic climax. Due to succession some tree species are found encroaching the grasslands, particularly after a series of years with deficit rainfall. These shall be removed and the succession halted by burning the swamps to suppress woody growth to maintain the grassy vegetation.

The swamp habitat holds the key to maintenance of high ungulate densities (particularly of Chital, gaur, and elephant). These moist grass savannahs appear to be maintained naturally in years of normal rainfall, but after a series of years with a deficit rainfall, they may be invaded by native woody plants and weed. If there is a series of dry years, this could lead to a problem which may need to be addressed by artificial clearing & burning of the swamps to suppress woody plants and to maintain the normal grassy vegetation.

Mapping of all the swamps will be done in a GIS domain to monitor them regularly.

#### **Development of saltlicks**

The list of existing saltlicks has been given in Annexure XXIX.

No new artificial salt lick will be created and the existing salt licks near the camps will be maintained. Regular surveillance will be kept on the natural salt licks.

- Staff will visit the saltlicks on patrolling duty every day morning and evening.
- For elephants, twice a week application of salt on Mondays and Thursdays at the rate of 1:4 rock salt: common salt shall be done.
- Application salt and cleaning of artificial saltlicks will be done in morning time when the saltlick is totally free of any animal.

#### Miscellaneous

- For dust baths during dry months and wallowing during the rains and winter as many spots as possible will be developed. These spots will be maintained by treating the same with tick repellants.
- Sand banks at suitable spots along West Deo and Budhabalanga in the downstream of Barehipani fall, will be created for the mugger crocodiles to bask and lay eggs.
- Molecules of refuges and shelters will be provided for the tiger and its prey animals in dispersed pockets all over the Reserve wherever possible.

 A survey of dens of tigers be made, marked, GPS reading recorded and strictly protected.

#### 11.6 INFRASTRUCTURAL DEVELOPMENT

The available infrastructure is quite inadequate for accommodation of the staff. The inhospitable climatic condition and absence of social infrastructure inside the PA does not permit the field staff to keep their families with them. It creates bottle necking in management of the Reserve. Hence it is suggested that accommodation for 2 Asst. Conservator of Forests and 7 Range Officers of the core area will be provided outside the PA at Baripada and Jashipur. Similarly the inadequate accommodation for the Forests Guards and Foresters will be fulfilled. The office of the Regional Chief Conservator of Forests and Field Director, Baripada will be constructed with annexes, such as laboratory for the GIS, interpretation centre and data base. Following new constructions are proposed during the plan period.

- 1. Reconstruction of office of the Field Director at Baripada
- 2. 3 nos quarters for ACF and AFD, STR at Baripada
- 3. 2 nos Forester quarters at Hatisal and Bhajam
- 4. 4 nos of FG quarters at Matughar, Gunduria, Silda and Bengapani
- 5. Special repair & extension of ACF quarters at Jashipur for accommodation of Dy Director, Tourism & Research.
- 6. Quarters for ACF, STPF, 3 Forest Rangers, STPF and 18 Foresters, STPF at Jashipur
- 7. Office of ACF, STPF at Gurguria.

In the core area creation of civil infrastructure shall be minimum and only badly essential infrastructure like patrolling camps and communication structures/cross-drainage structures will be made.

Name of the office	Location	Remarks
Field Director &RCCF	Baripada	Outside but adjacent to TR
Dy. Director, Baripada	-do-	-do-
RO, National Park	-do-	-do-
RO, UBK	Upperbarakamura	Inside the PA
RO, Jenabil	Jenabil	-do-
RO, Nawana(N)	Nawana	-do-
RO, Nawana(S)	Dhudruchampa	-do-
RO, Chahala	Chahala	-do-
RO, Pithabata(WL)	Pithabata	Outside the PA

The administrative offices are located both inside and outside the TR. The details are furnished below.

Likewise 23 Sections and 75 Beats have separate buildings inside the park the list of which have been given in Annexure XXXI. Annual maintenance of these buildings is required.

#### ORGANIZATION, ADMINISTRATION AND BUDGET

#### 12.1 TIGER STEERING COMMITTEE (STATE LEVEL)

Section 38 U of the Wildlife Protection Act, 1972 (Amended 2006) requires each state govt to constitute a State Level Steering Committee for ensuring co-ordination, monitoring, protection and conservation of tiger, co-predators and prey animals. The State Level Committee have been constituted vide Notification No. 565 Dated 08.01.2010 of Forest & Environment Department, Govt of Odisha which have been given in Annexure XI.

#### 12.2 TIGER CONSERVATION FOUNDATION (PARK LEVEL)

The Wild Life (Protection) Amendment Act, 2006 (Section 38X) provides for establishment of a Tiger Conservation Foundation in each tiger reserve, to facilitate and support management, apart from taking initiatives for involving people in conservation. The Foundation is a new institutional framework which can complement the tiger reserve management and liaison with various Eco development committees and their confederations apart from production sectors in the landscape. The Foundation will be a registered society under the relevant rules of the State, and as prescribed in the guidelines, will have a State level Governing Body, apart from a field level executive committee under the Chairmanship of the Field Director with representatives of the Eco development committees as nominated by the Governing Body. The Foundation would act as a "non profit center" and as a "development agency" by increasing local participation. It can secure the tiger reserve from financial constraints by providing funding support through various sources: recycling of gate receipts, service charges, donations and the like. The Foundation, may undertake various activities related to mainstreaming of conservation: Eco development, staff welfare, visitor regulation, field research, facilitating Eco development committees for market access, conducting capacity building programs, ecotourism and Joint Forest Management.

The Similipal Tiger Conservation Foundation has been constituted as a registered society under Societies Registration Act and has become operational with its 1<sup>st</sup> Governing Body meeting held on 28<sup>th</sup> June, 2012. The constitution, bye-laws and operation manual of the Foundation have been given in Annexure XII.

#### 12.3 COORDINATION WITH LINE AGENCIES/ DEPARTMENTS

Co-ordination with line agencies / departments are needed for :-

- Better protection: Police, revenue, railway authorities, Judiciary etc.
- Eco-development: Revenue, Rural development, Agriculture, health, Veterinary, Horticulture, Zilla Panchayat, Women and Child Development, PHD, Education, Tribal Welfare etc.
- Gaps in habitat development: ZJila Panchayat, Rural development, Agriculture etc.
- Conflict resolution: Revenue, Police, Tribal welfare, Judiciary etc.

It is evident from above that co-ordination can be obtained in many ways and in many fields. Better co-ordination will not only ease pressure on limited resources of reserve management but will earn general goodwill among various sectors.

For co-ordination following measures would be adopted:-

- Regular meetings with line department.
- Co-coordinating with District Collector and CEO, Zilla Parishad for organizing special meetings
  - with line departments.
- Knowing various schemes of line departments and identifying schemes suitable for the reserve area.
- Reserve tour of officials of line departments.
- Accreditation and highlighting achievements of other departments in reserve area.

These are few suggestive things, but in practice convergence could be achieved only through good interpersonal relationship with officials of line departments of various levels from district to village. Officer of reserve should interact with their respective counterparts in other departments.

Co-ordination with the district administration, police and other departments like Health and Veterinary is maintained periodically through meetings and organized programmes like awareness camps, health and cattle camps, immunization drives etc. Involvement of experts, faculty and students from The North Orissa University, Regional Plant Resource Centre, ORSAC etc. is also a regular feature.

#### 12.4 STAFF DEPLOYMENT

The organizational set up and the staff position have been given in Chapter 4. The Similipal Tiger Reserve is under the overall control of the Field Director, Similipal Tiger Reserve cum Regional Chief Conservator of Forests, Baripada. Four Divisions are having territorial jurisdiction over the tiger reserve. The Deputy Director, Similipal Tiger Reserve who sits in the office of the Field Director, looks after protection and management of old core area of 845 km² (National Park area) while three territorial DFOs are having jurisdiction over the balance core area and buffer area of the reserve. It is proposed to bring the entire core area of 1194.75 km² (Critical Tiger Habitat) under the management of Field Director, Similipal Tiger Reserve. The draft restructuring proposal is given in Annexure XIII.

Division	Sanctuary area		Other RFs	Total
	Core	Buffer		
Dy. Director, STR	808.66	87.63	-	896.29
DFO, Baripada	113.68	321.15	80.40	515.23
DFO, Karanjia	199.50	336.61	173.12	709.23
DFO, Rairangpur	72.91	271.52	199.70	544.13
Villages inside sanctuary				85.12
Total	1194.75	1016.91	453.22	2750.00

## Proposed new area of the STR Core Division, and Buffer Divisions -Baripada, Karanjia, and Rairangpur in Similipal Tiger Reserve after Restructuring.

Name of the Division	Total Core Area before Re- structure in Sq.Kms	Total Buffer area of the Division before Restructure	Other rev. forests / village forests in Sq.kms	Total Area of the Division in STR in Sq.kms. before Restructure	Area tra  Area excluded in Sq. Kms	Area included in SqKms	Total Core Area  after Restucture in Sq.Kms	Total Buffer Area of the Division after Restruct uring in sq.Kms.
STR Core Division	808.66	87.63	NIL	896.29	87.63	386.09	1194.75	NIL
Baripada	113.68	321.15	80.40	515.23	113.68	53.69	NIL	455.24
Karanjia	199.5	311.61	198.12	709.23	199.5	1.95	NIL	511.68
Rairangpur	72.91	271.52	199.70	544.13	72.91	31.99	NIL	503.21
Village/Reve nue areas				85.12			-	85.12
Total				2750.0 (Tiger reserve)			1194.75 (Core)	1555.25 (Buffer)

#### Responsibility

The duties and responsibilities of each category of Officers have amply been enshrined in the Odisha Forest Department Code, 1979. Hence there is no necessity of repeating the same here. In the light of Wildlife (Protection) Act, 1972, the responsibility as mentioned below will be reposed on the Officers concerned to facilitate smooth administrations. All the Officers from the level of Range Officer and above need to be posted who have been specially trained on Wildlife management.

In view of various conservation areas overlapping the PA as discussed in chapter-1 (1.3), unlike other PAs, the Regional Chief Conservator of Forests need to be declared as Head of the Department, so that he can directly be made accessible and accountable to the Govt. besides, the power of transfer and posting the Range

Officers, Foresters and Forest Guards between the wildlife and Territorial wings within his jurisdiction.

The Deputy Director (Tourism & Research) need to be declared as Drawing & Disbursing Officer for implementing all eco-tourism related activities in Similipal.

The Assistant Conservator of Forests under the Deputy Director and the proposed three are to be declared as Wildlife Warden to carry on the provisions of Wildlife (Protection) Act, 1972. Immediate steps are to be taken to delegate the power of Investigation u/s 50 (8) of the Act.

The Range Officer working within the Sanctuary area should be given the responsibility of enquiry into the cases booked u/s 50 of Wildlife (Protection) Act. 1972. The number of such cases in a Range in a year does not exceed to 10, which they can do without any detriment to their normal duties.

The Forester in charge of a Section inside the Sanctuary will be responsible for detection and preliminary enquiry of all cases.

The Forest Guard will protect the Forest, detect the cases and draw FIR only. He will be responsible for all illicit felling, poaching and encroachment of forest land if not noticed and FIRs drawn.

#### **Staff Amenities**

#### 1. Field Equipment :-

Necessary camp and field equipment for the protection of staff shall be provided. The other necessary equipment helpful in carrying out field work e.g. water bottles, measuring tapes, compass, pedometers, field forms and diaries, small axe, fire arms, tiger tracers, plaster of paris etc shall be provided as and when needed.

#### 2. Uniforms and protective gears :-

Timely supply of good quality uniforms as per provisions shall be ensured every year along with other items such as caps, belts, boots, hunter shoes, winter wears, raincoats etc. Protective gears like wooden canes etc shall also be provided.

#### 3. Incentives and awards:-

At present Project Tiger allowance is paid to various categories of staff & allowance paid for personnel deputed in naxal prone areas.

Apart from monetary incentives, incentives or awards for meritorious work shall be given for motivation. Nominations for excellent work to various awards like State Forestry Award, Rajiv Gandhi wildlife award, Amrita Devi Vishnoi award etc shall be made for deserving persons.

#### 4. Health checkups / Insurance :-

Regular health camps shall be organised for health checkups of staff. Some hospitals could be contracted for complete checkup and treatment of staff and their immediate family. This will ensure better health and will in turn result into better output from staff & will have great value.

Possibilities of Health insurance for staff & protection assistants living in interior areas shall be explored with insurance company.

#### 12.5 FUND RAISING STRATEGIES

At present, the funds are entirely from the Central and State Governments, mainly the following sources.

Name of the scheme	Funding Agency
CSP- Project Tiger	Govt of India, 50% recurring fund by
	State Govt
Finance Commission Grant	State Govt
State Plan (Wildlife Protection	-Do-
&Conservation)	
State Plan (Elephant Management	-Do-
Project)	
Central Plan (Elephant Management	Govt of India
Project)	
CAMPA	State CAMPA

With the formation of Similipal Tiger Conservation Foundation more options will be explored to raise funds from national and international donor agencies like Ford Foundation, UNEP, NGOs like WWF and corporate groups.

As per the Section 38X (2) of Wildlife (Protection) Act, 1972 one of the objective of formation of Tiger Conservation Foundation is to augment and mobilize financial Resources including recycling of entry fee and such other fees received in a Tiger Reserve to Foster Stake- holder development and eco-tourism. At present the revenue realised from tourism is partly deposited with the Similipal Ecotourism Society. A proposal have been moved to the Govt for dissolution of the Society and merger of it along with its fund with the Similipal Tiger Conservation Foundation.

It shall be ensured that activities approved in the Tiger Conservation Plan are only executed. The deviations if any may be done only with the prior approval of Chief Wildlife Warden.

#### 12.6 SCHEDULE OF OPERATIONS (FOR BOTH CORE AND BUFFER)

All the operations in the PA will be completed as per the direction and schedule prevailing in the department. The scheduling for some Operations is given below.

Operations	Months											
	Jan	Feb	Mar	April	Мау	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Protection												
Monsoon patrolling												
Intelligence gathering												
Line cutting & burning												
Fire Protection												
Road Repairs												
Water conservation work												
Lantana uprooting												
Weed uprooting												
Nature awareness programmes												
Tourism activities												
Vaccination work												
Eco-development work												

The activity budget is detailed in Annexure LXIII. The schedule of operations shall be derived from Activity Budget and while preparing Annual Plan of Operation the activity budget shall be grouped under following heads.

#### Antipoaching activities (Non-recurring) – The antipoaching activities may include

- Deployment of antipoaching squads
- Establishing and maintenance of existing patrolling camps and deployment of camp watchers for patrolling.
- Organising vehicular patrolling by constituting squads. comprising of field staff,
   Special Tiger Protection Force, with wireless handset and paraphernalia for apprehending offenders, apart from prescribing a patrolling calendar for the squad.
- Ensuring special site-specific protection measures, during monsoon as 'Operation Monsoon' – considering the terrain and accessibility of Protected Areas.
- Deployment of Special Tiger Protection Force for patrolling, surveillance of water holes, manning barriers.
- Procurement of arms and ammunition.
- Rewards to informers.
- Legal support for defending court cases.
- Procurement of vehicles, boats.
- Procurement of field gear, night vision device.

#### Strengthening of Infrastructure in Tiger Reserve (Non Recurring).

### The strengthening infrastructure may include.

- Civil works (Staff Quarters, family Hostels, Office Improvement, Patrolling Camp, House keeping Buildings, Museum, Culverts) etc.
- Maintenance/Creation/Up gradation of road network
- Maintenance/Creation of wireless tower
- Maintenance/Creation of Fire Watch tower
- Maintenance/Creation of Bridges, dams/Check dams
- Maintenance/Creation of Fire lines/fire breaks
- Maintenance/Creation of Earthen ponds
- Procurement/ Maintenance of vehicle (Jeep, Truck, Tractor)
- Habitat Improvement works
- Procurement of Hardware, Software/GIS
- Procurement of Compass, Range finder, GPS, Camera traps etc.
- Procurement of Satellite Imagery for management planning
- Map Digitization facility for management planning.

#### **Habitat Improvement and water Development**

The habitat improvement may include weed eradication, removal of gregarious plant growth from grassland, grass improvement, water retention

structure, swamp maintenance, Maintenance of waterholes, check dams, soil & moisture conservation etc.

#### Addressing Man-Animal Conflict (Non recurring)

The activities under addressing Man-animal Conflict may include.

- Payment of compensation for cattle lifting, death of human beings and crop depredation\* due to wild animals.
- Creation of crop protection structures.
- Procurement / deployment of traps, cages to catch problematic animals.
- Procurement of tranquilizing equipment, rescue vehicles and drugs.

#### Co-existence agenda in Buffer/Fringe area

The activities for co-existence agenda includes.

- Providing ecologically viable livelihood options to local stakeholders for reducing their dependency on forests.
- Conserving the forest area through restorative inputs involving local people for providing habitat supplement to wild animals moving out of core areas.

Rehabilitation package: on voluntary basis from the enclaves in the core for creating inviolate spaces for Wildlife (Non recurring).

Research and Field equipment (Non recurring)

Staff development and capacity buildings – (Non recurring)

- Capacity building / training.
- Providing project allowance and special incentives.
- Specialized training in the use of GIS, antipoaching operations.
- Specialized training in jurisprudence and wildlife forensics.
- Study tours for appraisal of good practices in other reserves.
- Dissemination workshops.
- Specialized training in park interpretation.
- Specialized training in management planning

Mainstreaming Wildlife concerns in Tiger bearing forests and Fostering corridor conservation through restorative strategy involving locals to arrest fragmentation of Habitats.(Non-recurring)

This would involve

- Redressing man-animal conflict
- Capturing problematic/ aberrant wild animals.
- Monitoring of wild animals.
- Antipoaching operations.
- Habitat improvement measures.
- Safe guards/Retrofitting measures in the interest of Wildlife Conservation

- (Non-recurring)
- Project allowance to staff (all categories of Project Tiger (Non-recurring) The
  project allowance will be limited to the amount approved by NTCA for each
  category. The present rates of Project allowances are as follows.

(a) Field Director Rs. 2000 /- per month

(b) Deputy Director Rs. 1500/-

(c) Assistant Director

Research Officer/Veterinary Rs.1300/-

Officer (Equivalent rank)

(d) Forest Ranger and equivalent Rs. 1000/-

rank

(e) Forester and equivalent rank Rs.900/-(f) Forest Guard and equivalent Rs. 700/-

rank

Ministerial Staff

Class II - Rs. 1000 (per employee per month)
Class III - Rs.700 (per employee per month)
Class IV - Rs.400 (per employee per month)

Staff Welfare activities (Non recurring)

Fostering Eco-Tourism in Tiger Reserve (Non-recurring)

#### **Activity Budget**

Details of activity budget have been given in Annexure LXIV.

#### 12.7 Miscellaneous regulations -

#### 1. Record of Deviations & Implemented targets

A book at the reserve level shall be maintained to record deviation & implemented targets. This book shall also include annually deferred targets. It shall be attempted to accomplish tasks in year in which its provisions are made & if some tasks could not be taken up in the prescribed year, they should be taken up in plan period.

There may be some strategies / prescriptions which are not in Tiger Conservation Plan, but at particular time need is felt to include new strategies to be included. These strategies shall be proposed with justifications to competent authority to obtain due approvals. There may be need in future to change certain strategies /

prescription, similar procedure shall be adopted for them too. These deviations shall be duly recorded in this book.

Implemented targets both in terms physical & financial achievement shall be recorded with highlights & problems in achieving them.

A similar record shall be maintained at each range level too. These records shall be updated timely and duly inspected from time to time. The book shall always be placed with Tiger Conservation Plan. This book needs to be referred at the time of revision of Tiger Conservation Plan especially on matter which relate to strategies in the field.

#### 2. Maintenance of Compartment Histories

Compartment histories are important document for deciding strategies of management. Compartment histories were not maintained in previous plan period. Revised formats of Compartment Histories will be provided to all range officers for preparation. All compartment histories in due format shall be prepared within 6 months.

The formats will be simple and all entries shall be made and the required maps shall be prepared and attached with compartment histories. Compartment histories shall be prepared in three copies, one for the range level and two for office of the tiger reserve. One copy at office of tiger reserve level shall be maintained as master copy, along with which old compartment histories shall also be attached.

Range officer shall update compartment histories on annual basis. The updated CHs shall be submitted to office of tiger reserve every year for updating CHs maintained there. After up-dated range copy of CHs shall be duly returned to ranges.

Annual documentation shall include all important operations, events and attributes taken place or observed in the compartment some of them are given below:-

- Operations related to habitat management
  - Grassland
  - Meadow
  - Weed eradication
- Soil moisture conservation

- Creation or repair of water sources
- Wetland
- Micro habitat management etc
- Events
  - Animal mortality
  - Fire incidences
  - Flood
  - Change in river courses
- Siltation of water sources
- Insect/pest infection
- Tree mortality
- Protection
- Illegal grazing
- Illegal lopping / felling / girdling of trees
- Legal illegal collection of NTFPs
- Poaching incidences / attempts
- Other illegal activities
- Observations
  - Animal signs / movements
  - New water sources / saltlicks
  - New micro habitat locations
  - Important change in vegetation
  - Any other useful information regarding management

Compartment histories shall be duly checked by senior officers on annual basis. Following minimum checking by various level of officers is prescribed as below:-

ACFs - 30%
Deputy Director - 10%
Field Director - 05%

#### 3. Pocket Field Guide for Plan implementation

To accomplish effective and informed application of plan prescriptions, a pocket field guide of the size no larger than 10 cm broad by 16 cm long is prescribed. This shall have a 'held' margin at the top along the shorter side so that it can be opened vertically like a forester's conventional field notebook. To subsequently permit insertion of pages of extra material, revised strategies, maps etc in the field guide it may be designed in the fashion of a binder.

The field guide is meant to present the essence of the plan strategy application, complete in all technical details and the regulations concerned with respect to each strategy as might be relevant. It is a field action document meant to be carried by all field or line personnel and therefore must be written with economy to the point.

The field guide must have (i) a permeability to state its purpose and utility (ii) the objectives listed by their priority (iii) the constitution of zones by area (iv) a map of administrative units such as division, range, round, beat superimposed by the zones (v) the all important section on strategy details and application.

The field guide may contain more than one map. Only those maps which are considered essential for smooth functioning shall be included. A map shall not be larger than 20 cm broad by 16 cm long, so that when folded in half it conforms to the size of the guide. The top margin of the left half of the map shall be held within the guide 'binding' allowing the right half of the map to be folded in or out for reference.

The section on strategy shall first deal individually with all zonal strategies, separating each zone for obvious reasons. This shall be followed by the individual zonal strategies. Each strategy must be complete in all its technical details of execution, the standards it must attain and the regulations that need to be observed. Where monitoring is involved, the aspects relating to its execution must be specified. Where necessary, diagrams shall be included.

While dealing with separate zones it might happen that a few action elements might repeat. At such point rather than repeating the action details a reference to the previous set shall be recorded.

To facilitate access to any particular action title, each page of the guide at the bottom, in a central position, shall carry the relevant printed action title in a

rectangular box of 2 cm  $\times$  1/2 cm. As the pages are held together and riffled, any title can easily be accessed.

The guide shall have an index or a table of contents in its customary place. At any given time if any section is modified or is required to be deleted or added to, it can be done quite easily by disengaging such material or adding pages to the binder. The table of contents must be altered according to the changes taking place in the field guide. Senior managers shall monitor the response of users with the objective of ensuring smooth implementation of plan strategies.

#### MONITORING AND EVALUATION

The main focus of monitoring and evaluation in this Plan is to check annually the status of problems, gap in information and the capacity of the frontline staff to tackle management issues identified in the plan and SWOT analysis. The following procedures will be followed for monitoring and evaluation.

#### 13.1 CRITERIA

The criteria for monitoring the plan programmes implemented in the plan will be as follows

- 1. Monitoring the reduction of threat to wildlife by creating awareness and enforcing the law through network of field functionaries.
- 2. Monitoring the habitat through reduction of illicit felling of trees and monthly review of the performance of each camp and administrative units.
- 3. The monitoring work will be taken up by the Deputy Director and Assistant Conservator of Forests while the works are in operation.

The criteria for evaluation of the success of the projects undertaken will be taken up regularly by the Field Director, STR

#### 13.2 PROCESS

Adequate arrangements with elaborate procedure have been laid down about for protection of the forests. For the purpose of intensive supervision the area of each forest beat has been reduced. Besides huge amount of money is being spent for which the accountability for the successive implementation of the scheme rests with the Forest Officials. Proper monitoring at the time of implementation and evaluation at frequent intervals will foretell the success. Hence the modality for monitoring and evaluation is laid down as detailed below;

1. The target for each beat Forest Guard along with the concerned Forester in detection of forest cases is fixed at five for each beat in case of the core area and ten in case of the buffer area per months i.e. for 30 days. These cases should spread uniformly over the month. If the required number of cases is detected within a week then it will be presumed that for the next three weeks the staffs have not performed their duties. In case no case is detected the concerned Forest Guard / Forester will give a certificate that no illicit felling of

trees and no killing of wild animals has been done in his Beat / Section in the following manner.

- a. In case of Forest Guard "certified that with all efforts I could identify ....... cases. Except these there is no case in my Beat area".
- b. In case of Forester "certified that with all efforts I could identify ...... cases. Except these cases in my Section with Beat Forest Guards no other cases occurred.
- 2. Each Forest Guard will move around each Beat area and cover the entire area once in a week. Similarly the Forester and the Range Officer will inspect Beat area of one Beat within a week and within a fortnight respectively on rotation basis, so that all the Beats are covered. The inspection report of the Forest Guard / Forester and Range Officer will be submitted to the concerned Deputy Director / Divisional Forest Officer concerned, who will either check it or get it checked by the Asst. Conservator of Forests attached to Division during tour. Such report will be submitted to this office at the time of Divisional Forest Officers conference. The Deputy Director and Divisional Forest Officer will devise a format of questionnaire for the purpose of inspection and circulate among the staff to be filled in and submitted to him.
- 3. The Deputy Director, Similipal Tiger Reserve along with the Divisional Forest Officers of buffer area will meet once in a month prior to 15<sup>th</sup> of each month along with the concerned Range Officer and discuss about the problems relating to illicit felling and poaching of animals inside the Sanctuary. The Deputy Director will hold the meeting with neighboring Divisional Forest Officer on rotation basis. The proceedings of the meeting will be submitted to the Field Director. There will be a bi-monthly Core-Buffer meeting chaired by the Field Director in which all aspects related to protection shall be exhaustively reviewed.

#### 13.3 MAINTENANCE OF GEO REFERAL DATA

Deputy Director will open a division journal and will record the following details in the division journal.

Latitude/Longitude of waterholes

Latitude/Longitude of checkdams

Latitude/Longitude of daldalies

Latitude/Longitude of Division headquarter.

Latitude/Longitude of Range headquarters.

Latitude/Longitude of Forest Section headquarters.

Latitude/Longitude of headquarter of beats.

Latitude/Longitude of locations of Antipoaching camp.

Latitude/Longitude of Check posts

Start and end point of each Road.
Start and end point of each Trek paths.
Start and end point of each Fire lines.
Latitude/Longitude of Bridges, Culverts.
Latitude/Longitude of Illegal entry points.

#### 13.4 BIODIVERSITY MONITORING

1Ha plot in each vegetation type will be maintained and entered in the division journal the following details.

- Inventory of all species of trees (including seedlings and sapling), shrubs, herbs and weeds The measurement of all the tree species will also be recorded in the journal. Deputy Director should also calculate the biomass of Tree, shrubs, herbs and grass in each vegetation type and arrive at carbon sequestration of each vegetation type in consultation with experts.
- Presents/ absent, abundance, density of Wildlife evidences This exercise of recording Wildlife evidences and inventory will be repeated every year and the record for the same will be entered in the division journal.

#### 13.5 HABITAT SHIFT OF SPECIES

The annual surveys/census as proposed in chapter 9 will be analysed for habitat shift of species to study the impacts of climate change/global warming.

#### 13.6 DISASTER MANAGEMENT & MONITORING

In the circumstances there is disaster such as fire, epidemic etc. The Deputy Director may take the following actions.

#### Fire

Adequate preventive measures like clearance of fire lines, awareness of villagers, deployment of fire squad and watchers with vehicles will be taken up in every fire season. In case of uncontrollable fire, help of fire fighting squad will be sought from District Administration.

#### **Epidemic**

Expert team may be constituted by involving a panel of veterinary experts. A detailed plan may be drawn by expert team and implemented in order to contain the epidemic.

#### 13.7 ANNUAL REPORT

The annual report will be generated based on the prescriptions in the foregoing chapters and placed before the steering committee and governing body of the foundation.

## 13.8 MANAGEMENT EFFECTIVENESS EVALUATION (MEE): BY MANAGEMENT ITSELF OR THROUGH EXTERNAL AGENCY

Since the second half of last century, protected areas across the world have increased dramatically in area and size as most countries have developed protected area systems as a core strategy to protect biodiversity and environment. The many values of protected areas for biodiversity conservation, protection of cultural heritage, maintenance of vital 'ecosystem services' and provision of a range of socioeconomic benefits have been well recognised, and the roles of protected areas in mitigating and adapting to climate change are increasingly important (Dudley et al. 2010). However, using protected areas as a key strategy for biodiversity conservation is reliant on the assumption that they can protect their values for the foreseeable future. Society is making investments of money, land, and human effort into protected area acquisition and management and into specific intervention projects. The community, people investing in protected areas, and protected area managers need to know if these investments are sound. Questions include:

- Are protected areas effectively conserving the values for which they exist?
- Is management of these areas effective and how can it be improved?
- Are specific projects, interventions and management activities achieving their objectives, and how can they be improved?

The need to evaluate protected area management effectiveness has become increasingly well recognised internationally over the past ten years, as we have seen in both developed and developing countries that declaration of protected areas does not always result in adequate protection . As the total number of protected areas continues to increase, so too do calls for proper accountability, good business practices and transparency in reporting (Hockings et al. 2006). In addition, as other strategies for 'off-park' conservation and multi-use reserves have developed, and as concern for rural poor and Indigenous rights has increased, there has been more questioning about the role and effectiveness of protected areas.

Evaluation is also critical for adaptive management. We live in a world where we experience and can expect dramatic changes – in the biophysical world, the community, the economy and the way we govern ourselves. As global change accelerates, we need to be able to show to what extent protected areas are functioning as an effective strategy for conservation. Managers need to understand what works and what does not, so they can build on the best ideas and practices. Evaluation of management effectiveness is a vital component of this responsive, proactive style of protected area management. Through evaluation, both positive and

negative experiences can be used as opportunities for learning, and continual improvement can be combined with anticipation of future threats and opportunities.

As per guidelines issued by World Congress of Protected areas (WPCA), 2006, Management Effectiveness Evaluation (MEE) is the assessment of how well a protected area is being managed – primarily the extent to which it is protecting values and achieving goals and objectives. It includes consideration of design issues, the adequacy and appropriateness of management systems and processes and the delivery of protected area objectives including conservation of values.

#### **Purpose of Evaluation**

Broadly speaking, MEE can:

- Enable and support an adaptive approach to management
- Assist in effective resource allocation and Promote accountability and transparency and
- Help involve the community, build constituency and promote protected area values

In addition to substantive benefits, the process of MEE can also deliver a number of procedural benefits such as improved communication between managers and other stakeholders. Evaluation should be seen primarily as a tool to assist managers in their work, not as a system of watching and punishing managers for inadequate performance. Evaluation must be used positively to support managers and be seen as a normal part of the process of management. Recent experiences around the world have demonstrated that involving external stakeholders in the assessment process and transparent sharing of the results of assessment can help to build cooperation and support for protected areas. Management effectiveness evaluation has been conducted in many countries using range of methodologies/ approaches emanating from the global MEE framework. These approaches vary considerably in their scale, depth, duration and data collection methods.

NTCA is conducting MEE of Tiger Reserves in India through constitution of committees of experts in the relevant fields every year.

The terms and reference of the above Committees are;

- (i) To apply the Management Effectiveness Evaluation (MEE) framework and assessment criteria for independent evaluation of the Tiger Reserves in the country.
- (ii) To evaluate whether the chosen approaches in Tiger Reserve management are sound, adequate and appropriate.

- (iii) To evaluate whether the funds allocated are being used effectively for meeting the objectives of management of Tiger Reserves as laid down in the respective Tiger Conservation Plans/ Management Plans.
- (iv) To evaluate the process and outcome of long-term monitoring of the biological and socio-cultural resources.

The Wildlife Institute of India provides a pre-assessment orientation to the experts for using the new matrix, apart from collation/publication of the results with financial support from the National Tiger Conservation Authority.

#### The MEE Framework for India

Element Name	Headline Indicators				
	1.1	Identification of values			
Context	1.2	Assessment of threats			
Context	1.3	Biotic interference in core area			
	1.4	Compliance of statutory requirements			
	2.1	Tiger conservation plan			
	2.2	Safeguarding of biodiversity values			
	2.3	Stakeholder participation			
Planning	2.4	Habitat management			
	2.5	Effective protection strategy			
	2.6	Mitigation of human-wildlife conflicts			
	2.7	Landscape conservation approach			
	3.1	Adequacy of manpower deployment			
	3.2	Adequacy of physical infrastructure			
Inputs	3.3	Adequacy of central government funding			
	3.4	Adequacy of state government funding			
	3.5	NGO resource contribution			
	4.1	Adequacy of trained manpower resources			
	4.2	Frontline staff performance evaluation			
Process	4.3	Effectiveness of public participation			
Frocess	4.4	Process of complaint handling			
	4.5	Livelihood support to local communities			
	4.6	Village relocation planning			
	5.1	Dissemination of information to public			
	5.2	Management of visitor facilities			
Outputs	5.3	Evaluation of research/monitoring trends			
	5.4	Adequacy of infrastructure maintenance &			
		funds			
	6.1	Population trends of tiger & other species			
Outcomes	6.2	Threat assessment			
Outcomes	6.3	Visitor satisfaction			
	6.4	Local community support			

#### Recommendations of MEE report 2010-11 and status of compliance

In 2010-11, 39 Tiger Reserves were evaluated by independent expert teams under the guidance of Wildlife Institute of India and NTCA and MEE ratings obtained. According to the evaluation report, Similipal falls within "red corridor" and was included under cluster –III, which was evaluated by Sh R.K.Dogra, Ms Prerna Bindra under the chairmanship of Dr R.L.Singh.

Action points recommended by MEE

• The core and buffer of Similipal TR must be brought under the unified command of the Field Director.

Compliance-The post of Field Director, Similipal TR has been upgraded to that of Regional C.C.F. Vide govt notification no. 11884 dated 02.07.2011 and the unified post has been named as FD, STR cum RCCF, Baripada, which has started functioning with effect from 08/08/2011. With this, core and buffer areas have come under a single administration.

 The staff shortage must be filled, and also augmented from its current strength.

Compliance- 9 posts of Forester and 29 posts of Forest Guard have been filled up in the recruitment of 2011-12. This has substantially sorted out the problem of staff shortage for the time being at the field level. However, this process needs to continue regularly as many staff are retiring and are likely to retire every now and then.

• There is a need for the provision of a para-military force, to work with the forest department for protection, given the kind of mass ritual hunting in the reserve, and the influx of armed poachers, and timber smugglers

Compliance-Govt of Odisha has already notified the creation of Similipal Special Tiger Protection Force during 2012. Action is on to recruit the members of the force

Rehabilitation of villages from the core critical habitat

Compliance-One village has been completely relocated out of 4 villages in core area of the TR during 2010. There are 3 villages still present in core area. Efforts are on to motivate the inhabitants of these villages to come out of the TR.

#### 13.9 TCP TO BE PLACED IN PUBLIC DOMAIN

The Tiger Conservation Plan after its approval will be placed in the public domain by displaying the plan on official website of Similipal Tiger Reserve <a href="https://www.similipal.org">www.similipal.org</a>.

### INTRODUCTION OF THE AREA

#### 1.1 NAME, LOCATION, CONSTITUTION & EXTENT:

#### 1.1.1 Name

Similipal Tiger Reserve, Buffer Area-The Buffer area of the tiger reserve comes under the jurisdictions of Baripada (T) Division, Karanjia (T) Division and Rairangpur (T) Division.

#### 1.1.2 Location

Similipal Tiger Reserve is located between 21<sup>0</sup> 28' and 22<sup>0</sup> 8' north latitude and 86<sup>0</sup> 04' and 86<sup>0</sup> 37' east longitude. It is situated in the middle of Mayurbhanj district of Odisha state. The buffer area of the STR is the peripheral regions of the Similipal sanctuary apart from two elongated patches of forests along Northern and Southern part of Sanctuary. Bufffer area also contains a part of Hadgad sanctuary at its Southern end apart from a part of Similipal Sanctuary. The area from Pithabata and Digdiga to Podadiha in the eastern side of the STR comes under Baripada Division. The western side of Buffer begins from Bhandan 1 compartment of Similipal R.F. near Tulsibani of Rairangpur Division extends up to Salandi 14 compartment near Thakurmunda of Karanjia Division. In the North, a strip of area extends up to Sarali R.F., Tungru R.F. and Mankadbeda R.F. of Rairangpur Division bordering Jharkhand. Similarly a strip of forest area covering Satkosia R.F and Nada R.F. of Karanjia Division runs up to extreme south of the Tiger Reserve adjoining Hadagarh Sanctuary in neighbouring Keonjhar District.

#### 1.1.3. Constitution

The Buffer zone of Similipal Tiger Reserve was initially constituted on 4<sup>th</sup> December 1973 under Project Tiger covering an area of 1904.30 km<sup>2</sup> as one of the first nine tiger reserve of India. Thereafter the area was decreased to 1555.25 km<sup>2</sup>as recommended by an expert committee and subsequently notified by Govt of Odisha vide their notification during December-2007 in accordance with provisions of amended WLPA, 2006.

#### **1.1.4** Extent

The Buffer area of Similipal Tiger Reserve extends over 1555.25 km² which includes part of Similipal RF and the surrounding contiguous area of Reserved Forests, proposed Reserved Forests, 57 villages inside Similipal RF, 5 villages inside Satkosia RF and 3 villages inside Tungru RF. The details of Reserved Forests and other forests are furnished in the Annexure V.

#### 1.1.4.1 Division wise buffer area and area under Sanctuary.

	STR Buffer area in sqkm					
Division		Sanctuary are	Non-Sanctuary	Total		
	Similipal	Hadagarh	Total	area	Total	
STR	87.63	-	87.63	-	87.63	
Baripada	321.15	-	321.15	80.40	401.55	
Karanjia	311.61	25	336.61	173.12	509.73	
Rairangpur	271.52	-	271.52	199.70	471.22	
Villages inside Sanctuary					85.12	
Total	991.91	25	1016.91	453.22	1555.25	

#### 1.2 APPROACH AND ACCESS:

There are two main entrances to Similipal Tiger Reserve, one through Jashipur and the other through Pithabata.

NH-5 (Howrah-Chennai) runs close to STR in North-East directions and NH-6 (Howrah-Mumbai) runs very close to the landscape in North-West direction. During dry season the area is accessible through Baniabasa on Baripada-Udala PWD road.

The road distances of both the entrances are as follows:

То		From			
Entrance at	Bhubaneswar	Balasore	Calcutta		
Pithabata	270km.	76 km.	240 km.		
Jashipur	252 km.	156 km.	290 km.		
Baripada	250 km.	56 km.	220 km.		

#### 1.3 STATEMENT OF SIGNIFICANCE

Similipal forests are quit significant from flora and fauna point of view.

According to bio-geographic classification by Roger and Panwar (1980), Similipal has been classified as follows:

Bio-geographic Zone : Decan Peninsula

Bio-geographic province : Chhotnagpur

Bio-geographic Region : Mahanadian

However, Similipal represents features of all the four Biotic Provinces for which Odisha is the junctions. These provinces are Eastern plateau Chhotnagpur, Lower Gangetic plain and Coastline. In fact geological studies, fossil and recent studies indicate that Similipal is a biological link between the Western Ghats in South and the Eastern Himalayas in North.

Environmentalists and intellectuals also look Similipal in very high esteem. They treat it as 'Himalaya' of Odisha, They believe the way 'Himalayans'

regulate the monsoon for Indian sub-continent, similarly 'Similipal 'influences the rain pattern of the Odisha, Bihar and West Bengal. Similipal is also the origin of a large number of perennial rivers which are life line for the people of Mayurbhanj, Keonjhar, Balasore and Bhadrak. A large number of people living within and outside Similipal derive their livelihood from Similipal forests through collection of firewood, timber and large number of minor forest products. It is a source of large number of medicinal plants. 'Khadia Tribes', who are landless, mostly depend on Similipal forests for their survival. In addition to common man, it imparts teaching and knowledge to a large number of researchers, academician and intellectuals. It is dotted with numerous peaks, valleys waterfalls and beautiful flora and fauna, so it attracts a large number of tourists from within and outside the country.

However, Similipal is also not free from problems. The growing populations of 65 villages located within the buffer area are posing challenges to its existence. Flora and fauna near the habitations are shrinking. People residing in and around the Sanctuary are very much dependent on its resources and thus affecting the capacity of forest by removing firewood, timber and minor forest products. Biotic interferences like forest fires, grazing are also affecting the biodiversity. Akhand Shikar is causing destruction to both flora and fauna. The Buffer area of Similipal Tiger Reserve extends over 1555.25 sq kms which includes part of Similipal RF and the surrounding contiguous area of Reserved Forests, proposed Reserved Forests, 57 villages inside Similipal RF, 5 villages inside Satkosia RF and 3 villages inside Tungru RF. As such, the buffer zone has an important role to play *vis-à-vis* the tiger land tenure dynamics. It surrounds the critical tiger habitat of 1194.75 km² which forms the core of STR, the natal habitat for tigers in the reserve.

#### 1.4 GEOLOGY, ROCK, SOIL

Similipal was a part of Gondwanaland in the Palaeozoic era. The main layout of the formation layers is of three concentric cups of metamorphic rocks interbedded with sub-metamorphic layers i.e. volcanic with outer inter-space and igneous with inner inter-space. The metamorphic rocks are granitoid gneiss, true gneiss and mica schists with pegmatite. The gneissic rocks are much interspaced by dykes of basic and intermediate rocks. The sub metamorphic rocks are shale, haematitic rock laterites, limestone, calcareous deposits, quartzites, phyllites and micaceous schists. Haematitic rocks, laterite and shale occur in extensive formations in central and south Similipal. Outcrops of sub-metamorphic and quartzite haematite occur all over Similipal hills.

The soils of Similipal are acidic in nature having a pH range of 4.8 to 6.8 in most areas. The main soil types are as follows:

- From haematitic rocks, rich red loam soil is derived having intense biotic activity and dense tall wood lots.
- Laterites produce deep soils, reddish in colour having the capability to support good tree growth. Where the depth of the soil is less, it supports poor tree growth but good grass growth for animals.
- Shale on weathering produces substantial deposits of clay and clayey loam soils good for biotic growth.
- Outcrops of sub-metamorphic sand stone and quartzite haematite on disintegration produce sandy soil. In deep layers, it supports good growth of plants and animals. Where the depth of soil is thin it favours the growth of grasses. Presently, soil erosion does not pose any serious threat except for Budhabalanga valley. Integrated complex of rock, soil and vegetation held in a stable formation provide little scope for degradation. However, sporadic denudation in small pockets remains but it is not recognizable.

#### 1.5 HYDROLOGY AND WATER RESOURCES

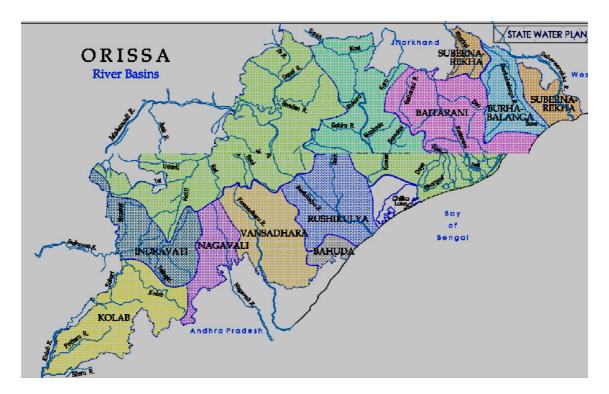
Nine major perennial rivers such as the Budhabalanga, Deo, Sunei, Gangahaar, Jambhira, Khadkhai, Khairibhandan, Bankabal and Katra and their tributaries that originate mostly from Similipal Hills provide good potential for water resources to be harnessed for several areas of development. These rivers provide enough opportunities for expansion of irrigation. Six Medium Irrigation Projects, 202 Minor Irrigation Projects and thousands of ponds and tanks available in the district offer tremendous scope for reservoir fishery and development of pisciculture. The major water bodies are at the foot hills and outer skirts of the Tiger reserve. These fulfill the water requirement of the wildlife round the year. The riverine system are divided into two. These are:

#### **East Flowing River system:**

The East flowing water Drainage system called Budhabalanga water drainage system is enriched with water resources in the northern and eastern part of the buffer area of the tiger reserve .The Budhabalanga river emerges from Core area of the tiger reserve and Northern part of Similipal Reserved Forest and catchment areas of the river fall in compartment numbers Balanga East 1 to 24. This river flow through districts of Mayurbhanj and Balasore and serves as life-lines for the districts and finally winds its way to the Bay of Bengal. The perrenial tributaries of the river Budhabalanga are Palpala, Kafra, Sanjo, East Deo, Kalo , Sono and along with many rivulets and nullahs. An analysis of water availability in the area has shown that more than 50% of the streams carry water during the driest period of the year although the rest get totally dry. This forces the wild animals to congregate around the water available areas during summer. There is a small irrigation dam raised on river Kalo near Udala outside the Tiger Reserve.

#### **West Flowing River system:**

The second river system of the buffer zone is drained by Baitarani drainage system with a number of perennial streams joining the main river Baitarini which emerge from Konasika of Keonjhar District. The major tributaries are Salandi, Bhandan, Khairi, West Deo , Tel, Sim and Kantamauli. There is an irrigation project namely Deo irrigation project going to be established outside the Tiger Reserve near Tato of Karanjia Division. The above tributaries are perennial and most of them emerge from core and buffer area of the Tiger Reserve in the western and southern parts.



#### 1.6 VEGETATION TYPES:

The vegetation types are same as that of the core area. However, occurrence of dry deciduous forest type is more marked in the north-western edges of the reserve; the percentage of moist deciduous and semi-evergreen forests is correspondingly lower in the buffer area. The canopy is also more open here with the forests subject to increased biotic pressure mainly illicit felling and grazing. The common plant species found in Similipal and adjoining areas have been listed in Annexure XX.

#### Northern Tropical Semi-evergreen Forests. (Type: 2b/c3)

This type spreads over an area of about 30 km<sup>2</sup>. The species found under this forest type depending upon the soil and micro climatic conditions are as follows:-

Salix terasperma, Trewia nudiflora, Macaranga peltata, Aphanamixis polystachya, Symplocos laurina, Glochidion spp., Bischofia javanica, Syzygium cumini, Pongamia pinnata, Diospyros peregrina, Saraca indica and at places Terminalia arjuna. Bombax ceiba, Alstonia scholaris, Ficus spp., Polyalthia cerasioides, Anthocephalus cadamba, Dillenia pentagyna, Litsea spp., and Citrus spp. and Michelia champaca, Artocarpus lakoocha, Toona ciliata, Mangifera indica, Ailanthus excelsa, Mesua ferrea, Stereospermum suaveolens, Xylia xylocarpa and Bridelia retusa are at higher altitudes.

#### Northern Tropical Moist Deciduous Forests (Type: 3C/C2e)

It covers an area of about 1400 km<sup>2</sup>. It is found all over Similipal buffer area except the moist valleys and on the southern and the eastern aspects of the hills. Sal forms 50% to 90% of the standing crop. Quality of sal being 'IV' on the steep drier aspects and 'II' on gentler slopes with deep soil and cooler aspects The common species of trees found in this type of forests Terminalia sp., Pterocarpus marsupium, Anogeissus latifolia, Schleichera oleosa, Adina cordifolia, Toona ciliata (rare), Michelia champaca, Mangifera indica, Bombax ceiba, Careya arborea, Dillenia pentagyna, Gmelina aroborea, Garuga pinnata, Lannea coromandelica, Syzygium cumini, Ougeinia dalbergioides, Xylia xylocarpa, Kydia calycina, Lagerstroemia parviflora, Bridelia retusa, Mitragyna parvifolia, Trema orientalis, Emblica officinalis, Zizyphus spp., Cassia fistula, Buchanania lanzan, Sterculia villosa, Miliusa velutina, Helicteres isora, Indigofera pulchella, Croton oblongifolius, Colebrookia oppositifolia, Flemingia chappar, Strobilanthes spp., Wendlandia exserta, Imperata cylindrical, Themeda caudate, Cymbopogon martini, Eulaliopsi binata, Thysanolaena maxima, Curcuma aromatica, Bauhinia vahlii, Millettia auriculata, Smilax macrophylla, Combretum decandrum, Disocorea spp., Asparagus racemosus. Ferns and orchids are found in moist places. Ferns- Adiantum spp., Doryopteris spp., Cyathea gigantean, Spinulosa spp., Cyclosorus spp. and Holtt Tree Fern.

#### • Dry Deciduous Hill Forests (Type: 5B/C1c and 3C/C3)

It is spread over an area of 50 km<sup>2</sup> (approx) mostly in the eastern and the southern Similipal with steep and exposed slopes, this type of forest has sal as major species covering upto 30% of the crop. Other associates are Anogeissus latifolia, Sterculia urens, Boswellia serrata, Dalbergia latifolia, Cleisanthus collinus, Gardenia gummifera, G. latifolia, G. turgide, Erythrina suberosa, Cochlospermum gossypium, Helicteres isora, Nyctanthes arbortristis with an abundance of herbs, shrubs and grasses as ground cover.

#### • High Level Sal Forest. (Type: 3C/C 2e(i) )

This type of forest occurs on the plateaus above an elevation of 850m and extends over about 50 km<sup>2</sup>. Pure stands of poor quality sal are found with *Dillenia pentagyna, Syzygium cerasoides, Pterocarpus marsupium and grasses like Imperata cylindrica* and *Themeda caudate*. Large patches of *Phoenix acualis* occur.

#### • Grassland and Savannah. (Type: 3C/DS-I)

The area of grasslands in Similipal buffer is less than 1 km² spread all over in small and large patches. Like the grasslands of core area, grasslands are found on hill tops over 900 metres high as well as in the frosty valleys and nallah banks. In the former it is perhaps a climax type where as in the later, it seems to be of seral origin, a stable "Pre-climax" under the combined influence of edaphic and climatic factors, mode of origin and intensity of biotic effects. In the frosty open valleys, sal and other frost tender woody plants are annually bitten back to whippy growth. The species include *Syzygium cerasoides, Symplocos racemosa,* and *Dillenia pentagyna*. The common member of Poaceae is, *Imperata cylindrica, Themeda gigiantia* and *Saccharum spontaneum*.

#### Small Grasslands-

Bothriochloa bladhii, Cymbopogon fresuosus, Cynodon dactylon, Heteropogon contortus, Imperata cylindrica, and Themeda spp. The list of grasslands available inside the buffer area of the Reserve is given below:

#### **Baripada Division**

Range	Section	Beat	Area
Pithabata	Balidiha	Balidiha	Sanachandri

#### **Karanjia Division**

Range	Section	Beat	Area/Compartment
Thakurmunda	Keshdiha	Mandaljhari	Compt.No.SL-4
Karanjia	Kadadiha	Sunaposi	Paudia
Kendumundi	Baghalata	Bisipur	Bisipur RF-II
Satkosia	Noda	Salchua	Satkosia RF Comptt.No.2
			'

#### **Rairangpur Division:**

Range	Section	Beat	Area/Compartment
Manada	Manada	Alapani	Pandabandha
	Manada	Tamalbandh	Haldia Camp
	Manada	Tamalbandh	Sal Beela
	Jamuani	Jamuani	Rajpal Camp

#### Cover:

The term cover means vegetation, cliffs, overhangs, caves and dens or other shelters which provide shelter for wildlife. Cover is also required for breeding, resting, roosting, refuge, loafing and ambushing and escaping. Types of cover and cover value of vegetation or other features differ from species to species. It also permits the formation of "travel lance" within a habitat. Snags provide excellent dens for birds and small mammals. Forests provide both refuse and ambush cover. Meadows provide escape cover and borrows provide breeding cover to tiger as well as other subterranean dwellers. Giant Fig trees provide food and roosting cover to many birds. Cover is not a limiting factor in Similipal but prominent features serving as cover need to be listed

The special habitats of buffer area of the tiger reserve are listed below:

Name of Range Pithabata	Name of habitat Sanachandri Badachandri	Special features  Mouse door habitat		
<del>-</del>	Sanachandri	<del>  -</del>		
Pitnabata		Mouse deer habitat		
	Badachandri			
		Mouse deer habitat		
Dukura	Beldunguri	Red jungle fowl habitat		
Udala	Devkund	Cliff ,habitat for residential birds		
	Sarabasa, Garudabasa	Habitat for hill Myna and raptors		
Kaptipada	Haridachua of Notto RF	Peacock habitat		
	Notto RF forest near Bhegidiha	common langur		
	Machakandana	Cliff, habitat for residential birds		
Bangriposi	Jala Hasti	Water Fall in Budhabalanga river		
	Joldiha	Budiakacha Nala (Natural salt		
		lick)		
	Badgaon	Chapadihi (Natural salt lick)		
Karanjia Division				
Name of Range	Name of habitat	Special features		
Karanjia	Paudia	Grass land, Barking deer habitat		
Kendumundi	Bisipur RF-II	Grass land, Barking deer habitat		
Satkosia	Satkosia RF Comptt.no.2	Mouse deer, wild pig habitat		
Rairangpur Division				
Name of Range	Name of habitat	Special features		
Bisoi	Duarsuni	Ghat area, Rhesus monkey habitat		
Manada	Pandabandha	Barking Deer habitat		
Manada	Haldia camp	Barking deer habitat		
Manada	Salbeda	Mouse deer habitat		
Manada	Rajpal camp	Mouse deer habitat		

#### 1.7 **WILD FAUNA AND HABITATS**

The wild fauna and the habitats in the buffer area is largely same as that of the core area except the concentration which is lower than the core area. There exists a scanty population of tigers in the buffer area with movement of what are probably transient individuals noticed. Leopards are regularly recorded from the buffer area. As the habitat is prone to biotic interference, due to existence of villages inside and on the fringe, open forest species like Wolf, Hyena, Indian Fox etc are found confined to these areas. The buffer area is well habited with leopards and they are the prime food competitor of tigers. Thus management of such wildlife habitats is needed.

Similipal being the home of highest number of elephants in Central India, is another species of conservation importance. Mugger Crocodiles and Orchids are also found native in Similipal. Riparian zones having Arjuna , Mango and Jamun communities and grasslands are important conservation areas which provide resting, roosting, breeding cover and food material to many animals. Ficus, Madhua and Arjuna trees having a lot of bee hives serve as favourite for sloth bears, honey badgers and other species. Caves, dens and snags are key area for tigers, sloth bear , wild dog, owl, many other bird and reptiles. Examples -Mahubhandar and Champajhar area (SL14), of Gurguria and Thakurmunda Range of Karanjia respectively.

Many wild animals including some endangered ones like tiger, panther, elephant, gaur etc. are found in different levels of abundance. Ratel, pangoline, giant squirrel, flying squirrel, sambar and chital are among the other few worth mentioning. The status of avi-fauna is very rich. Nayak and Naik (2013) have enlisted 361 species of birds within Similipal Biosphere Reserve. Similarly there is a report published by RPRC in 2009 indicating presence of 81 species of amphibians and reptiles in Similipal. However, estimation of population density of different animals gives an indication about their status. The major census figures are given in appendices. The details of flora and fauna have been dealt in detail in core plan (Chapter No 2.4). Special attention is needed to enhance the productivity in such a way that the livelihoods of locals are enhanced by keeping by growth of wildlife in ascending trend.

#### **DISTRIBUTION OF ANIMALS AND HABITATS**

The census of tiger and panther reveals distribution patterns of big cats, accordingly territories are mapped. Similipal mapping cannot be attempted for elephants as there is always internal migration throughout under normal condition.

A distribution factor has been assigned for some major mammal and distribution maps are being prepared for four-horned antelope, bison and giant squirrel. Based upon sighting and other evidence, it is quite clear that south Similipal possess more herbivores over areas created by juxtaposition of grassland, riparian zones and woodlots. However the extent of such favoured habitats is highly restricted inside Similipal . The valley meadows are prone to invasion by woody species.

# 1.8 MAJOR CONSPICUOUS CHANGES IN THE HABITAT SINCE INCEPTION Invasion of Plant Weeds

In recent years the deciduous forest of Similipal Tiger Reserve and in adjoining buffer zone have been invaded by several exotic plant species such as

Lantana camara, Eupatorium odoratum, Parthenium hysterophorus, Ageratum conyzoides. This is a big problem in Gurguria, Kendumundi, Thakurmunda, Satkosia Range of Karanjia Division and in Bisoi, Manada Ranges of Rairangpur Division and in Bangiriposhi, Pithabata, Kaptipada and Udala range of Baripada division. These weeds which have invaded almost all habitats pose a threat to the growth of grass diversity, richness and fodder plants, hindering free movement of animals.

#### **Loss of Perennial Water Bodies**

Many of the local perennial water sources have disappeared and pose a concern for the managers. These perennial water sources need to be recharged through a variety of conservation measure for the safeguarding of key flagship species. Construction of checkdams on nallahs cause silting along the dams and block natural waterflow. This need to be regulated in future. Massive planting of species such as *Pongamia spp.* along the degraded banks of nallahs should be carried out to protect the nallahs from the harsh sun, keeping them cool and protecting the natural spring and water flow as it is.

#### Invasion of Sal and its associates trees in Grasslands

Saplings of tree cover especially Sal and its associates species invade in to the grasslands of Similipal Tiger Reserve reducing the herbivore habitats. This is a huge problem, which needs to be tackled by eradication of saplings by uprooting and controlled burning of the grasslands.

#### 2.1 DISTRIBUTION

Tiger is the symbol of power, beauty and ferocity .Believed to have evolved in China over a million years ago, the Tiger spread to Siberia to reach to Caspian Sea and eastern Turkey. A few moved into south east Asia and crossed to Sumatra, Java and Bali and a few others to Myanmar and the Indian sub-continent .Despite heavyhunting, tiger survived with eight sub species, three of which got extinct (Caspian, Java and Bali tigers) after 1940s. The Indian or Bengal tigers *Panthera tigris* (Linnaeus 1758) are currently distributed over Bangladesh, Bhutan, China, India, Western Myanmar and Nepal. India has the highest number of tigers in the wild.

Loss, fragmentation and degradation of forests have been the major factor in decline of the tiger population in the wild. The illegal killing for the stripped pelt and for the bones and other parts for medicinal purposes added to the problem. At the turn of the 20th century one estimate of the tiger population in India placed the figure at 40,000. The first ever all-India tiger census was conducted in 1972 which revealed the existence of only 1827 tigers. The project Tiger was launched in 1973 and various tiger reserves were created in the country.

Initially, 9(nine) tiger reserves were established in different States during the period 1973-74, by pooling the resources available with the Central and State Governments. These nine reserves covered an area of about 13,017 km², viz Manas (Assam), Palamau (Bihar), Similipal (Odisha), Corbett (U.P.), Kanha (M.P.), Melghat (Maharashtra), Bandipur (Karnataka), Ranthambhore (Rajasthan) and Sunderbans (West Bengal). At present, there are more than 42 tiger reserves in India. Tigers, being at the apex of the food chain, can be considered as the indicator of the stability of the ecosystem. Thus, 'Project Tiger' is basically the conservation of the entire ecosystem and apart from tigers, all other wild animals' population have also increased in the project areas.

Tiger is not only a flag bearer of conservation but also an umbrella species for important eco regions of the state. Its role as a top predator is vital in regulating and perpetuating ecological processes and systems (Terborgh J. 1991, Sunquist *et al* 1999). Tiger needs large undisturbed landscapes with ample prey to raise young and to maintain long term genetic and demographic viability (Seidensticker and McDougal 1993, Karanth and Sunquist 1995, Carbone *et al* 1999). In the past 50 years, humans have changed ecosystems largely to meet growing demands for food, fresh water, timber, fibre, and fuel (Millennium Ecosystem

Assessment, 2005) more rapidly and extensively than in any comparable period of time in human history.

According to the report published by the NTCA (National Tiger Conservation Authority) and Wildlife Institute of India 2008, Similipal Landscape comprising of 3824 km² patch of forest has recorded tiger presence in 2 units having a total tiger occupancy of 2297 km² with an estimated tiger population of 20 (17-34) tigers. This report also mentioned that the state has a total forest cover of 27,427 km² with mapable tiger occupancy reported in 9,144 km². Odisha reported mapable leopard presence in 25,516 km², dhole presence in 8,215 km² and Sloth Bear presence in 43,236 km² of forested habitat. Amongst prey species wild pig were reported from 21,525 km², nilgai 711 km², chital from 6,040 km², gaur from 2,772 km² and sambar from 6,112 km² of forested habitat. Tigers were distributed in four larger occupied units, three smaller units and sporadic occurrences largely in Southern and Central part of the State. The larger occupied units comprise of a population of 20 (17-34) tigers in Similipal Tiger Reserve area.

Sunabeda-Udanti-Indravati Landscape is part of a contiguous forest patch of 34,000 sqkm having a tiger occupancy in Orissa of 570 km<sup>2</sup> of about 9 (7-11) tigers in proposed Sunabeda Tiger Reserve.

Tiger population in the tehsil of Malakangiri in the district of Koraput comprising the sanctuary of Balimela and Kondakamberu comprises a part of the forested patch of 6254 km² that extends from East Godavari, Khammam and Vishakapatnam of Andhra Pradesh.Tiger occupancy in this forest patch in Orissa was reported in 879 km². Sporadic tiger presence is recorded in several places within Koraput district.

Satkosia Landscape is part of a forest patch of 13,459 km<sup>2</sup> and has tiger occupancy in 787 km<sup>2</sup> with several smaller pockets reporting tiger presence. The low density population was estimated to about 6 tigers. The area covers the districts of Phulbani, Ganjam, and Kalahandi. The total tiger population in Odisha was estimated to be 45 (37 to 53) tigers.

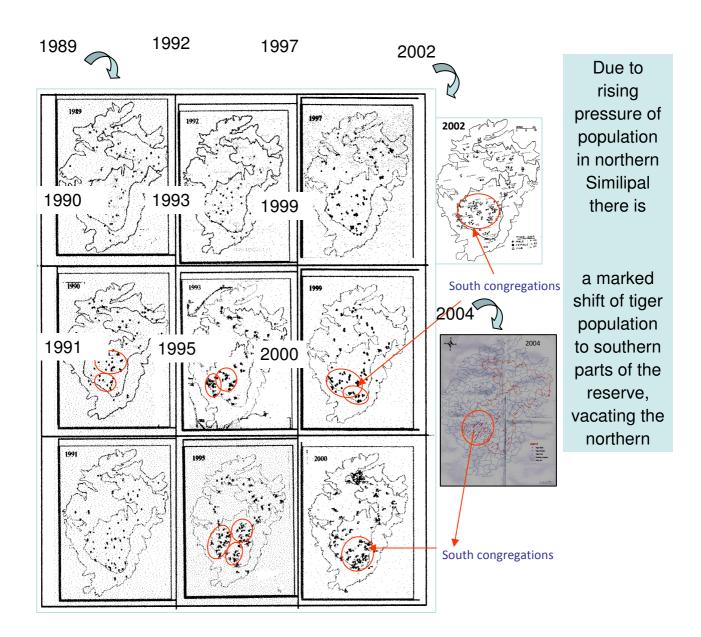
## Connecting population of Tigers in Buffer zone of Similipal:

The Buffer area of the territorial divisions – Karanjia, Baripada and Rairangpur act as thick forest coverage to the STR core, hence has great conservation significance. This area has potentiality of having moderate density tiger habitats if problems such as poaching and grazing in these areas are effectively addressed. The forest ranges namely Dudhiani, Gurguria, Kendumundi, Satkosia of Karanjia Division, similarly Bangiriposhi, Kaptipada, Udala and Pithabata of Baripada Division and Manada, Bisoi range of Rairangpur Division have such potential habitats of both prey species and the tigers. These forest ranges were selected for initial survey for tigers and their prey and also to identify the problems they have. The previous year tiger estimate reports that the there was increasing population of tigers after inception of project Tiger from 1972 up to 1990. In this period protection to the wild animal from

Akhand Shikar were given priority. Thus the population of prey animals were stable. This resulted in gradual increase in the tiger population up to 1990. From 1990 onwards the growth in tiger population is almost stagnant. When individual tiger territories were mapped on Beats on topo-sheets, the tiger population and their territories were visible and constantly monitored. On observations to the maps, it was found that there has been a southward shift of the tiger population in Similipal, as the northern population of tigers gradually disappeared although the total number has remained almost constant after 1986. Thus it is apprehended that the tiger population is forced towards the south due to rising human and biotic pressure in the northern and the surrounding buffer area.

YEAR	ı	MALE	E	EMALE	- 1	CUB	TOTAL	
1972	-				·   -·		   17*	 
1312	İ		i		i		±/*   	
1975	i		i		i		30*	
	1		1		- 1			
1976	ı		I		ı		46	
1977	1	23	ı	29	1	4	56	
1979	ĺ	22	Ì	39	Ī	4	65	
1984	ı	31	I	43	1	7	81	
1986	ı	32	I	51	1	6	89	
1989	- 1	21	I	51	- 1	21	93	
1990	1	22	I	52	-	20	94	
1991	1	24	1	50	-	22	96	
1992	J	24	1	49	-	22	95	
1993	-	24	1	49	-1	22	95	
1995	-	25	1	47	-1	25	97	
1997	- 1	26	I	48	- 1	24	98	
1999	- 1	28	I	44	- 1	26	98	
2000	1	29	1	39	- 1	29	99**	
2002	1	29	1	43	- 1	27	99	
2004	1	28	1	41	- 1	32	101	
	+-		+		-+-		+	+
* Entire area was not covered.								

Trend of tiger area occupancy shows gradual shifting of tiger habitats from Northern Similipal towards Southern side due to biotic pressure and lesser prey availability.



( Source- Report of Dr. L.A.K.Singh on Pug Impression Pad method of tiger estimation in Similipal TR)

## The Reasons of shifting of Tigers from Northern Part of Similipal to Southern Part:

A. Number villages in the Northern part of the Tiger Reserve Core area are more than the Southern cores of the Tiger Reserve.38 villages are in a condensed area holding about 10000 people.

- B. Human Population of Northern Similipal Villages in the buffer part increasing to almost double from 1971 to 2001 (Annexure XXXIX)
- C. Tourism activities, vehicle movements and traffic of human movement is more in the Northern part than the Southern part.
- D. Biotic interference such as cattle grazing, NTFP collection, Fuel wood collection etc are more in the Northern Part.

The Division wise tiger and leopard census report have been given in Annexure XXXVIII.

The leopards are found towards the buffer area and near periphery to the human habitations and many were found competitors of the tigers. If we analyze the figures, it was evident that where as 26 and 27 leopards were present in 2002 and 2004respectively, the corresponding figures for tigers were 4 and 7 only in these years in the buffer regions.

#### 2.2 Abundance Status:

Report from the 2006 sign survey, conducted in Similipal Tiger Reserve, the Tiger/Leopards reported in the buffer area are mentioned below:

Divisions	No of	Tracks	Range where	Name of Beats	Signs-Srape/ Scats/
	transe		tiger/Leopard	where	Pugmark
	cts		signs found	tiger/leopard signs	Vocals/Rakes/
				noticed	Sight
Karanjia	48	24	Kendumundi	Baghalata	pug
				Bisipur	Pug
				Edelbeda	Scat
				Khaparkhai	Scrape, Scat and
					Pug
			Dudhiani	Ranipat	Scrape
				Dudhiani	Scat and scrape
			Gurguria	Gurguria	Pug, Scat and
					scrape
				Utras	Pug
				Barigaon	Scrape and Scat
Baripada	48	24	Bangiriposhi	Rangamatia	Scrape and scat
			Kaptipada	Podadiha	Scrape
				Dangadiha-I	Scat
				Dangadiha-II	Pug and scat
			Udala	Dengam	Pug
Rairangpur	38	19	Bisoi	Bankidihi	Pug and scat
				Talabandha	Scat
			Manada	Jamuani	Pug, scrape
				Phulbadia	Pug, scrape and
					scat
				Nawana	Pug, scrape and
					scat

Hence at least in 19 beats in three divisions, Tiger/Leopard signs were available in the buffer area of Similipal Tiger reserve. Tiger signs were present in all three division areas but their abundance varied. Details of tracks and scats seen on the transects in the six beats out of the above 19 beats areas.

Tiger signs seen in the survey area

Divisions	No of transects	Tracks	Signs seen in Tracks	% of tiger occupancy
Karanjia	48	24	9	37.5
Baripada	48	24	5	20.8
Rairangpur	38	19	5	26.3

Nine beats in Gurguria and Kendumundi ranges, which indicated presence of tigers almost close to core area and there is a possibility of overlapping of tiger territories in to these beat areas. Similarly the Kaptipada Range of Baripada division is very close to southern portion of the Core area of the TR with abundant herbivore population due to less biotic interference and more food availability.

2.2.1. Abundance Status in 2012

Report from the 2012 sign survey, conducted in Similipal Tiger Reserve, the Tigers reported in the buffer area are mentioned below:

Divisions	No of trans ects	Tracks (km)	Range where tiger signs found	Name of Beats where tiger signs noticed	Signs-Srape/ Scats/ Pugmark Vocals/Rakes/
					Sight
Karanjia	44	220	Dudhiani	B-Kamuda	Scat
			Gurguria	Barigaon	Scat
Baripada	27	135	Nil	Nil	Nil
Rairangpur	25	125	Bisoi	Kanachinda	Pug mark
			Manada	Allhapani	Scat
				Sanasialinai	scat
				Mohanpur	Pug mark, scat
				Jamuani	Pug mark, scat

The tiger presence was found in seven beats in two divisions in buffer area of Similipal tiger reserve. No tiger evidence was found in Baripada division.

Table-Status of distributional range of tiger and their co-predators in Karanjia division in Similipal TR, 2012.

Species	Site occupancy (psi)	Detection Probability (p)	AIC value
Tiger	0.06	0.05	27.4
Leopard	0.31	0.26	62.7
Bear	0.37	0.08	156.5
Hyena	0.61	0.06	86.5
Jackal	0.02	0.01	77.2

The estimated occupancy of tiger in the overall Karanjia division was 0.06. Detection probability was 0.05. The average estimated occupancy and detection probability of other co-predators of tiger was 0.32 and 0.10. The leopard, bear, hyena and jackal were found to be other co-predators in this landscape.

Table-Status of distributional range of tiger and their co-predators in Baripada division in Similipal TR, 2012

Species	Site occupancy (psi)	Detection Probability (p)	AIC value
Tiger	Nil	Nil	Nil
Leopard	0.23	0.06	22.7
Bear	0.4	0.03	75.3
Hyena	0.20	0.04	14.7
Jackal	0.23	0.01	64.5
Wolf	0.26	0.02	46.7

The estimated occupancy and detection probability of tiger in the overall Baripada division was nil. The average estimated occupancy and detection probability of other co-predators was 0.26 and 0.06. The leopard, bear, hyena, jackal and wolfs were found to be other co-predators in this landscape.

Table-Status of distributional range of tiger and their co-predators in Rairangpur division in Similipal TR, 2012

Species	Site occupancy (psi)	Detection Probability (p)	AIC value
Tiger	0.2	0.01	45.1
Leopard	0.1	0.01	33
Bear	1	0.22	101
Hyena	0.24	0.9	52.8
Jackal	0.2	0.02	48.3
Wolf	0.03	0.01	16.1
Fox	0.01	0.0	14.6

The estimated occupancy of tiger in the overall Rairangpur division was 0.2. Detection probability was 0.01. The average estimated overall occupancy and detection probability of other co-predators of tiger was 0.26 and 0.19. The leopard, bear, hyena, jackal, wolf and fox were found to be other co-predators in this landscape.

Tiger signs were present in two division areas but their abundance varied. Details of tracks and scats seen along the transects in the seven beats.

Tiger signs seen in the survey area

Divisions	No of	Tracks (km)	Signs seen in
	transects		Tracks
Karanjia	44	220	2
Baripada	27	135	Nil
Rairangpur	25	125	7

## **Prey species**

Although tigers feed on a range of species, the bulk (96%) of their diet in Similipal TR comes from Sambar, Chital and Wild pigs. However they are likely to take other prey species both, small and large, when the main prey species (Chital, Sambar and Wild pig) are not available. Kendumundi, Satkosia and Gurguria Range of Karanjia Division have the best assemblage of prey species than the other ranges of this division. Chital is the most abundant prey species while other species make up

much smaller numbers. Podadiha, Dangadiha areas of Kaptipada Range of Baripada Divisionand is rich in Chital but poor in other prey species. Wild pigs are the only prey species that appear to be equally abundant in all the three areas.

As in the case of tigers, the data on prey species gives a coarse indication of the status of the habitat for tigers. It is clear that the Manada portion of Rairangpur Division is the poorest and needs significant management inputs to revive.

## **Prey Abundance in 2012**

Species	Observation	Model	ESW (m)	D ± SE	%CV	AIC
Barking Deer	25	НН	53	1 ± 2.8	45	75.1
Wild Pig	46	UP	45.1	1.8 ± 2.1	26.8	105
Hare	16	НН	18	0.9 ± 1.4	30.2	25.2
Common Langur	98	НС	33.5	2.5 ± 3.2	22.4	263.4
Pea Fowl	22	НН	32.6	0.8 ± 1.5	24.4	64.5
Overall Prey	207	UC	37.8	1.3 ± 2.3	15.1	527.1

The available prey density is quite minimal in buffer area of tiger reserve, except Common langur and Wild pig. Both of these prey items encountered abundantly along the transect line.

## **Biotic pressures**

The major pressure on the habitat comes in the form of cattle grazing, fuel wood removal, minor timber removal, NTFP collection, competition for water sources (with domestic livestock and people), public road running across the habitat to villages and poaching (minor and major species). The Rairangpur portion of the buffer part is more disturbed area than the other two.

Poaching and hunting by local villagers have been reported in this area for species ranging from smaller ones to large herbivores. Most of the killing is for bush meat purpose. However elephant poaching have been observed in and around these areas in the recent past and are therefore not free from this threat. Tiger poaching has not been reported for a long time. Still there is a need for a more detailed assessment.

#### Activities now undertaken in Buffer Portion of the TR:

a) EDC being revived in all the forest settlement villages in Karanjia, Baripada and Rairangpur Division for an effective co-ordination with local communities to safe guard the landscape through alternative livelihood improvement programme to the people who depend on the forest.

- b) Conservation and Awareness programmes are organized for various stakeholders with regard to tiger conservation policies and management on a long term basis
- c) A strong protection measures is augmented to prevent poaching incidences of tigers and its prey base. Additional networking of anti poaching camps need to be established in Anandpur Wildlife Division, Balasore wildlife Division and Keonjhar Division to stop complete stoppage of illegal forest produce smuggling.
- d) Massive ecotourism programmes being launched on revenue lands, private lands in the outer/ periphery of the TR by PPP mode where income generation activities for the forest dependent villagers could be ensured.

High encounter rates of carnivores along with the availability of prey species in the area clearly indicate good health of the habitat for sustaining a considerable population of carnivores. If proper management and protection can be given to this area, it will certainly increase the chances of distribution of tigers and co predators over a larger landscape.

## 2.3 PREY PREDATOR RELATIONSHIPS

To support a good population of predators and reduce the competition amongst different carnivore species, a healthy prey population is a prior necessity. The prey species diversity and population of the adjoining areas in Baripada and Karanjia forest divisions indicate a very potent foundation for conservation of large and small carnivores in the area. Presence of a moderate population of spotted deer, sambar and gaur in the area suggest a good habitat for tigers and co predators in terms of prey availability and will certainly ensure a better chance of survival.

The prime habitats which undoubtedly are the area with better canopy cover, less disturbance and low human presence are better occupied by herbivores like sambar, chital, wild pig and gaur. Body size of predators normally determines the preffered size and species of prey. Large bodied predators go for large sized prey species. Tiger prefers sambar, while Leopard prefers chital precisely for that reason. Leopards and wild dogs are sometime found to predate upon sambar and chital because of high prey availability and co-existence. Their diet also constitutes variety of other lesser prey. Leopards being extremely adaptive animals can virtually sustain on any available prey and are found frequently feeding on animals like the hanuman langur thanks to its charismatic ability to climb trees. Hyena and leopards with characteristics of smaller body sizes are often found feeding on smaller prey while tiger mostly prefer prey with considerable body size.

Protection and controlled disturbance therefore will allow the adjoining areas of the tiger reserve to nurture more predators. Scientific management of the

habitats will help in supporting more prey and provide better survival chances for the predators.

Poachers and illegal timber wood smugglers are mostly residing in this plateau. Awareness and Eco-development activities for those tribes who are all involved in poaching activities directly or indirectly will considerably reduce poaching in the whole landscape.

Properly developed scientific management plan will be implemented along with species specific approach. The management input for the Baripada Division. Karanjia and Rairangpur Divisions need to focus on identification of poachers, timber smugglers, conservation education, eco-development programmes, medical camps, nature clubs, informers, shows of strength through use of Special Tiger Force.

#### 2.4 ASSESSMENT OF THREATS

## Threats from ritual hunting of wild animals (Akhand Shikar):

Akhand shikar is the year old tribal practices of massive wild animal hunting perpetrated by local tribes. During the months of January to June thousands of tribal males from buffer and adjoining villages gather together in the buffer areas carrying traditional arms and country made guns. They offer prayers before the local deity and offer rice, flowers and domestic birds before going for hunting. They move from place to place and on the way kill herbivore species like Sambar, Chital, fowls, Wild boars, Gaurs, Mouse deer etc whatever they encounter on their way. They share the meat of these wild animals and bring it to their village and consume these as a sacred food in their families. The hunting of wild herbivores put huge pressure on the prey base for the big cats during summer. Thus it is the major threat to the wildlife in Similipal.

## Threats from poaching by wildlife smugglers:

There is little evidence of organised smuggling of wildlife derivatives in Similipal. But poaching for tusks/ivory of elephants by local tribal has been reported. Sometimes poisons in the form of insecticides kept by villagers to kill herbivores for bush meat are eaten by elephants resulting in their death. The settlements within the buffer area are often used by poachers from outside particularly Jharkhand as a conduit for carrying out illegal activities with the support of local tribes. Similarly, small animals like Civet, Chamelions, Pangoline and its body parts, snakes and many other small vertibrates/ invertibrates are also under threat from local poachers.

## Threats to Swampy Grasslands (Daldali):

Swampy grasslands are important habitats for herbivores like sambar and chital. They provide moisture as well as minerals to the herbivores and are significant part of their habitat. Presently, these swampy grasslands are under threat from encroachment for agriculture and are also getting infested with thick lantana covers which in turn suppress the growth of grass. Management of Lantana and Eupatoriums in these areas is important. The swampy marsh lands need to be enumerated and marked as major habitat for herbivores apart from protecting them from encroachment is a priority for their restoration. Cool season burning of the Daldali will keep them productive. Cutting and fire will keep away the wood land encroachment from the Daldali. Clearing of wood growth in the grasslands will help in reestablishment of grass and other swampy eco-system. Vigilant watch on the swamps and undertaking proper protection measures may also reduce animal poaching as these swamps are prone to become preferred shooting grounds of wild animals.

#### **Threats to Water holes**

Scarcity of water during the dry seasons of the year poses a major threat to wildlife populations mostly in fringe areas. Competition for water compel animals to congregate or move towards disturbed areas as a result of which they become vulnerable towards poaching as well as communicable diseases from domestic livestock or other anthropogenic sources. Constructions of check dams and maintaining water holes in the dry season are therefore, important aspects to be taken care of.

## Poisoning of Carnivore kills by local people:

There are stray cases of cattle kill by tigers. Sometime leopards kill the domestic cattle and that builds animosity amongst the villager. As a revenge, they put poison in the kill and leopards die consuming the poisoned animal. One such case has been noticed in Bisoi range in Rairangpur Division, in which a leopard was killed during November, 2011. Quick payment on compassionate ground and strong protection measures will help in taking care of this problem.

## Illicit Felling of valuable trees and degradation of the wildlife habitat:

In the past, timbers were extracted from the Similipal Forests by the British Government and subsequently by the Mayurbhanj Governance by keeping timber extractors inside Similipal. Timber was the source of revenue for them.But after the ban on green felling in 1988, the timber suppliers of the tiger reserve could not get alternative livelihood option. They continued to extract the timber illicitly and supplied to the outside mafia clandestinely. This resulted in loss of valuable trees such as Sal. Bija, Adina, etc However, anti-smuggling programmes such as foot patrolling

,monsoon patrolling, Joint combing operation have yielded good results and the timber cutting activities have been curbed in recent years. But rehabilitation of the timber extracting tribes and locals is the need of the hour by provision of alternative livelihood generation and through motivation.

## **National Highway/State Highway**

N.H.6 passes through the northern part of Tiger reserve at Bangriposi over a length of 7 km in Bisoi Range in Rairangpur Division. Similarly, State high way passes through Notto Reserve Forests in buffer areas of STR in the south in Kaptipada Range in Baripada Forest Division. These often restrict free movement of wildlife and is a source of numerous other nuisances for the park. Road kills, mainly of amphibians and reptiles are noticed. Sometimes large mammals like Sloth Bears and Rhesus Monkeys have been reportedly killed. A detailed survey needs to be made on the number of vehicles plying through these stretches and their frequency to arrive at the exact nature of disturbances to the wildlife and their habitat. Till such time, laying of speed breakers at proper intervals and signage would reduce such incidents. Effective roadside patrolling and heavy penalty will help reduce nuisances like feeding of wild animals.

#### **Biotic Pressure**

The primary threat to this area comes from the huge biotic pressure (cattle grazing, fuel wood collection, NTFP collection, poaching for bush meat etc.) exerted by the ever expanding human population. 100% of the population is dependent entirely on forest for firewood; taking out an estimated 22000 tons of firewood from the Buffer regions annually. Today with a population of nearly 12000 residing inside buffer areas, assuming an average consumption of 5kg per day for 100% maintenance of the families and an average of 4 people per family, it would work out to over 22000 tons of firewood annually.

## **Overgrazing and Habitat Degradation**

Out of 65 buffer villages in 57 villages in the buffer area, livestock of a remarkable population reside and depend upon the Similipal Tiger Reserve for fodder . The cattle population was 8811 during 2003 survey by the Animal Husbandry department of Govt. of Odisha These live stocks frequently enter in to the tiger reserve and graze and browse the vegetation. Livestock population in buffer area have been given in Annexure XL.

In addition, the study shows that 30% of the families own cattle where dung is the main produce resulting in 4000-5000 tons of dry cattle dung being transported out of this area to the cropfields. Overgrazing that compacts the soil, eliminates grass layer and coupled with fires (for grazing) severely reduces the fertility of the soil.

This impact along with removal of trees and shrubs for fuel wood and small timber reduce the areas' ability to function as a watershed. This increases erosion (silting downstream checkdams and canals), flooding and reduces water retention in the forest area. The BudhabalangaRiver and Baitarini river are thus adversely affected.

Habitat degradation, disturbances from human as well as cattle presence in the forests, competition for scarce resources (water, grass, tree, shelter, etc.) is threatening the habitat for wildlife and key corridors. Such hindrance to free movement of elephants and other wildlife would increase human-wildlife conflict.

#### **Tourism**

The last few years has seen an exponential rise in the number of tourists coming into the area for picnic especially to Sitakund, Lullung, and Deokund on the periphery of the TR. This is a good sign as tourists are distributed over a large area in different locations outside the main tourist route within the STR. However, these destinations need attractive infrastructures to meet the growing number of tourists. The sight of these places stewn with garbage after the visit of tourists is very disturbing. Efforts are on to involve the local Eco-Development Committees for management of these sites.

#### Fire Threats:

Fire occurrence during early summer causes degradation of the habitat. Since the buffer forests are of a dry deciduous and moist deciduous types, the leaf shedding during early March to April make thick leaf coverage on the forest floor. The villagers are in habit of setting fire to make forest floor clean to collect Mahua flowers, Sal seeds, other NTFP falling on the forest floor as well as for poaching. Thus recurrence of fire incidents noticed during early summer from every part of the buffer forest that occasionally spreads to core area. This is a major cause of habitat degradation. A comprehensive fire management plan has been developed for each of the three divisions in buffer area.

#### 3.1 CONSERVATION & FOREST MANAGEMENT HISTORY

Nothing found relevant to management of Similipal Forest prior to 1885. A forest policy was declared before 1885 by the then Maharaja of Mayurbhanj. In the year 1888 one Forest Ranger and a Peon were appointed for management of forests. The Reserve Forests of Mayurbhanj were under the management and control of the forest department whereas other protected forests were under the charge of revenue department. The Reserve Forests were more or less stable and permanent in nature but protected forests were maintained to meet the requirement of the royats and residents and also subject to clearance for cultivation. The forest area was being given under 'Amal-Nama' lease by the revenue authorities and leases for reclamation of reserve forests were given under the special sanction of the Ruling Chief. Thus the extent of reserve forests and protected forests decreased. Up to 1904 Departmental exploitation had been practiced in a small scale.

In 1907 a State Forest Department was created with Mr. J. A. Martin, State Engineer as head of the Department. As the forest management intensified, the protective staff came under the jurisdiction of Mayurbhanj. In 1906 a survey party demarcated the boundary line from Talabandha to Similipalgarh to form a working circle. This was meant for giving lease to M/S B. Borooah & Co. in the year 1916. The Barooah and Company took the lease for 30 years to work the western Similipal.

In 1904 the Mayurbhanj narrow gauge railway line was built up to Baripada. This line was of immense use in transportation of timber. Huge quantity of timber used to be extracted from plain forest mainly Reserve Forests. The 30 years lease of Bholanath Borooah & Co expired during 1946. There was no systematic working of the forests for which Similipal Reserve Forests during the lease was worked twice and north Similipal three times. East Similipal, which was withdrawn from the lease in the year 1922, was worked like the rest of the Similipal Reserve Forests through several contractors.

The first working plan was prepared by Mr. C. C. Hart in 1896-97. This was revised by Mr. B. M. Dasgupta in 1946. B. M. Dasgupta prepared the first working plan for whole of Similipal reserve forests for working under selection cumimprovement system. But after about 6 years Dasgupta's plan was replaced by the working plan of reserve forests of Mayurbhanj state by Mr. Sripal Jee during 1953-54 after integration of Mayurbhanj state to the Union of India on 6th November 1948, which became part of Orissa as a district on 1st January 1949 only. This plan was revised separately for Karanjia and Baripada Divisions by Sri R. Mishra and Sri S. Bose respectively during 1973-74.

Despite practicing commercial forestry, supplying railway sleepers and other utility timber outside Mayurbhanj, the Ruler was very rigid in his forest protection measures and employed large number of forest staff, much higher in number in comparison to other princely states and even the directly British administered areas with good network of forest roads and communication facilities.

Protection suffered a lot after independence in 1947 when forests were drastically reduced. Mayurbhanj state merged with Orissa state in 1949. Mr. Saroj Raj Chaudhury, an eminent wildlifer of the country took charge as first Field Director of Similipal Tiger Reserve. The first Notification to declare 2200 km<sup>2</sup> as Sanctuary under Wildlife (Protection) Act, 1972 was issued on 3rd December, 1979 in notification No. 30467/FFAH of Govt. of Orissa. This was followed in quick succession by notification no.18703/FFAH dated 6th august, 1980 which notified the intention of the Govt. to declare 303 km<sup>2</sup> of the northern portion of Similipal as National Park. This constituted the core of Tiger Reserve. As this area was not considered sufficient as core, 542.70 km<sup>2</sup> was added to this by notification no.19525/FFAH dated 11th June, 1986 bringing the total area of core to 845.70 km<sup>2</sup> which came fully under the control of the Project Tiger. Rest of the sanctuary area is under the control of Baripada and Karanjia divisions. Similipal Forest Development Corporation was formed in the year 1979 to work the timber and N.W.F.P. operations in Similipal besides taking up other developmental works within the forest. After complete moratorium in the tree felling was imposed in 1988, Similipal Forest Development Corporation (S.F.D.C.) was not working in Similipal.

## **Timber Operations:**

As described in the previous paragraph, regular timber operational activities were well documented from 1885-86. The forests were dominated by Sal with scattered sporadic patches of mixed miscellaneous species. The bamboo is conspicuous by its absence.

## **Silvicultural Systems and Tending Operations**

The system first followed was Selection cum improvement as prescribed in Hart's working plan which prescribed to remove trees of 6 feet girth and above to avoid development of hollowness during 1904-1905. Subsequently, during the period of 10 years lease (1906-1916), the lessee was entitled to all trees of 6 feet and above girth except the following.

- 1. All kusum (*Schleichera oleosa*), Kasafala (*Terminalia chebula*), Kochila (*Strychons nuxvomica*), Bahara (*Terminalia bellerica*), Simili (*Bombax ceiba*), Bara (*Ficus bengalensis*) and Asan (*Terminalia tomentosa*),
- 2. All edible fruit bearing species, viz. Mohua (*Madhuca indica*), Charo (*Bucharania lanzan*), Kendu (*Diospyrus melanoxylon*) etc,

- 3. All bamboo clumbs.
- 4. All tree on or along the bank of streams and nullahs.
- 5. All other trees which are 6' in girth with bark expect those which are marked by the State Forest Department for felling. During the thirty year lease period, the above mentioned "Selection System" was in practice only for one species of tree viz. Sal with 5' and above girth. Annual target of converted Sal was kept between 3,00,000 cft to 5,00,000 cft. The maximum permissible conversion was raised from 5,00,000cft to 8,00,000cft. By 1939, exploitation was as per schedule in north and west Similipal where as in south Similipal inaccessibility compelled the lessee to exploit less than the stipulated amount. To compensate the lessee, the exploitable girth of Sal was brought down to 4'-6" from earlier 5'. There was no marking rule based on silvicultural considerations expect the observance of girth limit and excluding the trees on the bank of nullahs.

After the expiry of 30 years lease, in 1946 Dasgupt's Plan was strictly adhered to. The forests were put under a selection cum improvement system of working. Exploitable girth for sal was fixed at 5'-6" at breast height, for Champa (Michelia champaka) 7'; Koim (Adina cordifolia) and Asan (Terminalia tomentosa) 6'-6"; Piasal (Pterocarpus marsupium), Simul (Bombax ceiba), Gudi Koim (Mitragyna parviflora), Bankhira (Xylia xylocarpa) 6': jamu (Syzygium cumini), Dhan (Anogeissus latifolia) and Charla (Holoptelia integrifolia) 5'-6" and other 5'. The area was divided into four felling series with a felling cycle of 20 years. The main fellings were followed up with cleanings.

Prescription of Dasgupta's plan was abandoned midway during 1953-54 and Jee's plan was followed. The high forest of Similipal was worked under Selection system with a felling series. The felling cycle was fixed at 20 years with a provision to retain one third of Selection trees (sal).

The exploitable girth for different species was as follows.

1.	Sal	5 '- 0 <b>"</b>
2.	Champa	7' – 0"
3.	Piasal, Gamhari, Godikoim, Bankhira,	
	Chhachina, Charla, Bhurkunda	6' - 0"
4.	Asan	5' - 6"
5.	Sissoo	4' - 0"
6.	Panjan ( Bhandhan)	3"-0"

The marking rules adhered to is narrated below:-

## (A):

No regular Marking was to be done in grassy savannahs, open forests bordering savannahs, and areas subjected to frost damage expect that only dead and dying trees were marked.

#### (B):

All trees, whether normal or defective, which have attained their respective exploitable girth were marked for felling expect the following.

## (B.1):

Sal, in which case normally for every two sound Sal trees marked, one sound and healthy sal tree, upto one foot bigger in girth than the exploitable girth, were reserved.

#### (B.2):

Unmarketable species of exploitable girths, if not interfering with any growth of the principal species or with growth of very promising stems of the useful species.

## (B.3):

Trees standing in blanks inside the forests with no established regeneration of any kind of species to take their place.

## (C) and(C.1):

All dead, dying, defective and diseased trees of under exploitable girths down to 3 feet gbh were also to be marked for felling expect for sal , in which case only the dead, dying and such the defective and diseased trees, which will doubtlessly deteriorate in value, if retained further , will be marked for felling. Secondly they can also be marked for felling if their removal is beneficial to the established regeneration or older growth of the principal species that are already there, and but for their removal would not get the chance to grow up well. In no circumstance however, normal or healthy sal trees or nearly such trees of under exploitable girth were marked for felling.

## (C.2):

All trees of the inferior species of 3' gbh and over which are interfering with the growth of established regeneration or older growth of the principal or useful species were marked for felling.

## (C.3):

If after marking under the rules, stems of 3 feet and above girth are left too congested, a further marking with a view to thin the crop were made so that the most promising stems of the principal and useful species are left favoured.

## (D):

All marketable dead trees of all species and of all sizes were also marked for felling. Inspite of this well laid out marking rules, revenue oriented marking were carried out. Cultural operation was not carried out due to paucity of funds. Lack of market for cleaning produce constituted a fire hazard. Silvicultural considerations and principle had no priority, largely because the staff was overburdened and their technical calibre not very high.

Even the prescription for retention of one third of exploitable sal trees was not followed rigidly.

From 1972- 73, separate working plans were written for Baripada and Karanjia division in which the areas covered by Similipal Tiger Reserve (now, north Similipal) were excluded i.e. 25 compartments of Baripada Division and 07 compartments of Karanjia Division.

The details of the stated compartments below.

Sl.No.	Name of	Name of the excluded	Total area of the
	the	compartments	Compartments
	Division		
1	KARANJIA	BALANG WEST II TO 15, KHADKEI II	
		& BHANDAN-11	3.91 km²
2	BARIPADA	PALPALA – 1,2,6,7,8,9,	
		10,11,12,13	230.06 km²
		BALANG-	
		14,6,7,8,9,13,14,15,16,17,18,19.	
		SANJO - 1,2,3.	

Hence the remaining portion of the core area i.e. 542 sq.km, proposed to be declared as a National park vide Government's Notification No. 8f (T) 8/85-19525/FFAH dated 11-06-1986 was worked as per the prescription of Mishra's working plan for Baripada Division . However, all commercial forestry operation was

discontinued after May, 1982 as a result of government's notification dated 03-12-1979 declaring the tract as a sanctuary. The marking rules followed was somewhat similar to earlier one with a few cosmetic changes here and there mainly in the exploitable girth fixed for different species.

## Even –aged systems and Uneven-aged systems:

The practice of selection system followed by natural regeneration resulted in an uneven aged crop. Certain patches of forest in South Similipal (in frost prone valleys) look like an even aged crop due to repeated dying back effect. Similarly, forest areas on both the sides of Jenabil-Nuagaon Forest road looked like an even aged crop probably because of over exploitation (a near total clear felling type ) in the past.

## **Bamboo Working:**

Bamboo do not occur naturally in the Similipal Hills. Sporadic clumps are seen in certain patches which are of artificial planting origin. As such, there is no bamboo operation in the tiger project area.

## **Firewood harvest and Collection:**

No firewood coupes were laid in the Similipal Hills now constituted as tiger reserve. Hence, the concept of firewood harvest and collection in a specific manner is non-existent. However, from the regular selection coupes, the lops and tops of the felled trees were converted to billets of firewood and sold outside by the contractors executing the exploitation. The neighbouring district Balasore has a comparative higher demand of firewood than the Mayurbhanj district.

## **Non-wood Forest Produce:**

After declaration of sanctuary and subsequent intention to declare the core of the sanctuary a national park, officially collection of timber and NTFP has been stopped. However Similipal Hills is a giant reservoir of such products and this is also evident from the collection figure of Baripada Forest Division and Karanjia Forest Division mentioned in Appendix. Clandestine collection from the sanctuary by the ecosystem people cannot be ruled out. Besides the canning centre at Jashipur managed by the Orissa Forest Development Corporation collected, processed and marked the following quantities of Non-wood Forest produce in Quintals.

YEAR	HONEY	ARROV	V-ROOT:	S SAL-RE	SIN		WAXPICKLES	
1981-82	78.98	02.47	02.41	01.00		-		
1982-83	107.91	09.75	11.00	02.39	14.84			

1983-84	100.96 12.47	44.04	02.39	3	19.86		
1984-85	148.43 02.02	18.22	03.23	2	24.55		
1985-86	111.6602.79	182.92	03.36	-	16.20		
1986-87	97.86	12.58		64.14	0.13		11.20
1987-88	126.27	03.83		220.62	-		15.12
1988-89							
1989-90	44.33 11.16	i	121.12	2 -		04.36	
1990-91	06.97 -		-	-		02.39	
1991-92	05.55 -		-	-		05.76	
1992-93	123.03 9.94		25.75	5 -		09.37	
1993-94	202.26	7.18		0.84	-		06.19
1994-95	09.06	1.37		-	12.96		
1995-96	13.05	0.39					11.16
1996-97	5.00 -	-					

There is no doubt regarding damage to the habitat due to collection of such non-wood forest produce. Forest areas are deliberately burnt; big trees are felled, certain species of plants are debarked for the purpose. Collection of edible fruits and other plant parts deprive wild animals of a secured source of a food. Inside the sanctuary having 65 villages it is a Herculean task to stop illegal collection of such non-wood forest produce. Hence the leases granted in other area in the district of Mayurbhanj require stricter regulation, supervision and control.

#### Leases

No part within the Similipal Tiger Reserve is under lease. There is no proposal to divert any land for that purpose.

## 3.2 PROTECTION OF TIGER, ITS PREY AND HABITAT:

There are specific strategies to combat the traditional Akhand Shikar, poaching and illicit felling during Monsoon and fire in the TR. In the recent past STR suffered a series of naxal attack from 28.03.2009 to 15.04.2009 when large scale damage to infrastructures, tourism facilities, ransacking of tourists and robbing of valuables including seized materials etc took place. All core staff of the TR vacated their headquarters apprehending danger to their lives. They didn't return to their

headquarters for a substantial period. This resulted in large scale destruction of forest and killing of wild animals in the Reserve.

During 2010-11 the protection camps were gradually re-established and but started functioning in the true spirit only during 2011-12.At present, 96 protection camps are functioning with deployment of 490 protection assistants on daily wage basis along with regular staff. Following additional measures are in place inside the TR to strengthen protection aspects.

- ❖ 14 four wheeler vehicles have been engaged for patrolling duty and provision of hiring of vehicles have been made whenever required.
- ❖ 10 nos ex-military personnel have been deployed at Podadiha for anti-poaching work.
- ❖ 164 Eco-Development Committees are at work in and around Similipal and they are one of the main awareness sources against forest offence.
- ❖ The proposal for creation of Special Tiger Protection Force for Similipal has been approved by govt. which will have 112 nos. armed forces for exclusive protection of Similipal.
- ❖ Recruitment process for filling up of vacancies in base level posts is complete and most of the vacancies have now been filled up.
- Two units of SOG have been placed at Gurgudia and Nawana for anti-naxal operation only.
- During 2011-12, 50 offenders were arrested involved in poaching as well as smuggling of timber cases.

Besides above, each buffer divisions have taken specific protection strategies since 2011-12 by identifying sensitive villages and routes used for poaching /smuggling of forest produce. The details of area and protection measures are described below:

## **Baripada Forest Division:**

In general, wildlife is moderately represented in Baripada Forest division. Moreover, the forests of the division are contiguous and part of the Similipal Sanctuary and therefore the movements or animals are very common in the buffer area of the Baripada Division. Repeated annual forest fire scare away wildlife to the adjoining forests of the core area. Common langur, Rhesus monkeys, Sambar ,Chital, Wild pigs are seen at times in the well-wooded natural forests. In deciduous forests and along the watercourses, wild elephants from Similipal roam in small herds especially in Deokund,Chandanchaturi, and Podadiha areas. Bamboos, Sal barks, Siali leaves (*Bauhinia vahlii*) are their favourite food, but often they visit crop field and cause considerable damage. Carnivores are moderately represented. Sloth Bears, Jungle cat, wild dogs and jackal are often seen. Numerous snakes, both poisonous and non-poisonous, are common. Birds of different kinds are seen of Which Jungle fowl, Pea fowl, Pigeon, Patridge, Bulbul, Koels, Barbets, Parakeets, Woodpeckers, etc. are very common. Sensitive villages are identified and strict patrolling measures adopted

since 2011-12 to protect the tiger and its'prey base and the wildlife habitats. The details are given in Annexure XLVIII.

## **Karanjia Forest Division:**

The forest of Karanjia division are rich in wildlife .Elephants are common in all ranges. They are from either Similipal or Jharkhand . Sambar, spotted deer, civets, jackal, gaur, wildpig, sloth bear and common langur, etc are the common ones. Tiger, panther, mouse deer are rare. Common birds are Jungle fowl, Pea fowl, Pigeon, Partridge, Bulbul, Koels, Barbets, Parakeets, and Woodpeckers. In West Deo and Khairi rivers, Mugger crocodiles are abundant. Tiger signs are found in few adjoining beats to the core. Baghalata, Edelbeda, Khaparkhai beats are the territory of 1-2 tigers. Similarly Utaras, Gurguria and Barigaon beats are under the habitat of 2-3 tigers. Ranipat and Dudhiani beats of DudhianiRange are the habitat of 1-2 tigers. Since the area are used by the villager in lesser frequency the prey base are well established. Sensitive villages are identified and strict patrolling measures adopted since 2011-12 to protect the tiger and its' prey base and the wildlife habitats. The details are in Annexure XLVIII.

## **Rairangpur Forest Division:**

As in the case of tigers, the data on prey species gives a coarse indication of the status of the habitat for tigers. It is clear that the Manada portion of Rairangpur Division is the poorest and needs significant management inputs to revive. The forest of Bisoi are well enriched with sambar, common langur, wild pig, chital, omnivores like sloth bear and carnivores like leopards and jackals. Sensitive villages are identified in this division and strict patrolling measures adopted since 2011-12 for protection of the tiger and its'prey base and the wildlife habitats. The details are in Annexure XLVIII.

# 3.3 OTHER LAND USE – VILLAGES, AGRICULTURE, DEVELOPMENTAL PROGRAMS, TOURISM ETC.

There are 65 villages within the buffer area, which include 57 villages in Similipal Sanctuary, 5 villages inside Satkosia RF of Karanjia Division&3 inside Tungru RF of Rairangpur Division.

As per 2001 census the population of 65 villages is given in Annexure XXXIX.

## **Agriculture:**

Agriculture is the leading occupation of Santals, Kolhas, Bathudis and Mundas. The Mahalis are mainly bamboo artisans. The Khadias and Mankdias fully depend on forest for food, shelter and day to day maintenance to their lives. They collect honey, sal resin and arrowroot from the forest and sell in the weekly markets. Collection of forest produces is the next important occupation. The other occupational fields are (i) mat making, (ii) sawing, (iii) basket making, (iv) working as

black-smith, (v) tailoring, (vi) distillery (vii) livestock farming. Sometimes men and women earn wages as agricultural labour or in forest and roadwork. 'Weekly markets' or 'Hata' play a very major role in the economy. Because of the distance of the market places, they use to sell their collected forest produces in the weekly organised markets or 'hata'. Sal leaves, honey, arrowroot, gums, wax and medicinal herbs are regularly collected and sold in the 'hata'.

The cropping pattern in a few villages is practiced 3 times in a year. i.e. Summer crop, Khariff crop and Winter crop. Most of the villages are deprived from irrigation system. Some of the villages are having small irrigation dams which are found dry during summer months and Kharif crops could not be cultivated. The details of the crop raised during the over all area of the buffer is shown below:

## Agricultural practices in buffer area of the Tiger Reserve.

		SL.NO	MONTH	CROPS
		52	JANUARY Sowing of Maize /Groundnu	
		1	37 11 (37 11 11	Transplantation of Paddy
		2	FEBRUARY	Transplantation of Vegetable Seedlings
		_	12511671111	Sowing of Vegetables
				Planting of Sugarcane
Summer	<del> </del>	3	MARCH	Harvesting of Wheat
				Sowing of Pulses
		4	APRIL	Harvesting of Pulses
		5	MAY	Harvesting of Summer Paddy
				, and the same of the same of
		6	JUNE	Cultivation of Paddy/Maize/Arhar/ Mesta
Kharif -				, , , , , , , , , , , , , , , , , , , ,
		7	JULY	-Do-
		8	AUGUST	-Do-
		9	SEPTEMBER	Harvesting of early Paddy started
		10	OCTOBER	Harvesting of early Paddy
Winter		11	NOVEMBER	Harvesting of winter paddy started
VVIIICEI	-			Sowing of Wheat /Mustard/ Spices
		12	DECEMBER	
Winter	-	10	OCTOBER NOVEMBER	, ,

(Source:- Office of the Deputy Director of Agriculture, Mayurbhanj Range, Baripada)

The most vulnerable crop was paddy. Banana, vegetables, jack-fruit, wheat, bamboo, mango, maize, mandia(ragi), biri(black gram), kultha (horse gram) were also affected.

## **Ecotourism**

The landscape is studded with places of tourist interest carved by the nature. The promotion and development of eco-tourism is being attended to by Similipal Eco-tourism Society and now to be managed by the Similipal Tiger Conservation Foundation.. The places are well connected with motorable roads with provisions of trekking on forest trails and enjoying the nature on the back of captive elephants. Earlier, tourists were allowed to stay at Bareipani, Joranda, Nawana, Gurguria and Chahala within the Tiger Reserve. Most of the infrastructures at these places were destroyed in naxal attack during 2009. Since then, there is no provision for night halts anywhere in STR except at only one place i.e. Gurguria. The other places of accommodation are located outside the TR on the periphery like Jamuani, Sitakund and Lulung. Tourists are allowed to visit STR only during day time. The reservations for accommodation in tourist cottages are made through website <a href="https://www.similipal.org">www.similipal.org</a>.

#### **Tourist numbers:**

During the last seasons the tourist inflow in to the Similipal Tiger Reserve has been shown in the Annexure LIV which may be referred here. The figures showed gradual increase of tourists to STR along the tourist route from year 2000-01 up to the year 2008-9 and suddenly fell to zero due to Maoist activity and attack on the tourists in the year 2009-10. Subsequently with the assistance of police, the tourist sites have been re-established by the STR authority, which are gaining popularity among the tourists. The number of foreign tourists visiting STR has been very low in the previous years as is evident from the tourist figure. There is a scope for attracting more number of foreign tourists to STR with the improvement of infrastructure in future.

Apart from the above tourist flow, the data-base maintained in the office of STR since 2011 shows quite a large number of picnickers and eco-tourists visit the Deokund water fall which lies just on the border of the Tiger Reserve in the eastern side.

#### **Visitors to Deokund:**

Year	No. Of Vehicles			No.of Indian Tourists.	No Of Foreign tourists.	Revenue Generated in Rupees.	
	Light	Heavy	Total				
2010-11	2149	232	2381	30595	0	1,24,850	
2011-12	4886	472	5358	69042	0	3,67,050	

There are many picnickers who visit Sitakund, Ramtirth, Bhimkund, Kalo Dam, Haldia Dam, Jambhira dam, Suleipat Dam, Olkudar, Kanchhinda etc and there is no record available on such visitors except at Ramtirth.It is estimated that more than 2 lakh tourists visit these places and much more revenue can be generated if the tourist management done through local EDC/VSS with the guidance of Forest Department.

#### Firewood:-

For the average villager firewood requirements are met from the forests of buffer area. With the rapid extension of cultivation, the sources of fuel supply from private lands have fallen very low. There is demand for firewood from the adjoining Balasore districts also. The increase on the price of petroleum Gas, curtail on the quantity of Kerosine oil to the rural folk force the villagers to use more and more firewood as fuel for running their family life. Thus pressure on the forest for firewood has been increasing day by day

## Grazing:-

The number of cattle grazed in the buffer area is very large. The purpose of villagers maintaining such large herds is for their dairy products and manure. Grazing facility is an important requirement of the local people and this is provided at very nominal rates. Grazing is banned in many places and now it is being regulated by issuing nominal permits subject to the usual condition noted in the government permit.

## Fodder and Sabai grass-

The villagers living close to forests collect fodder grass, leaves of Char, Ficus spps from forest for their livestock for stall feeding. But the stall feeding practices are less common since the villagers drive their cattle away in to forest for grazing. The high milk yielding cattle need to be introduced in the buffer villages to lessen the stray cattle stock and minimize the pressure and risk to forest and wild herbivores from diseases.

The Sabai grass (*Eulaliopsis binata*) is the rope grass grown by the tribals in the wastelands in buffer area especially in Kaptipada and Khunta blocks. The make ropes with the technical assistance from the LAMPS (*Large* Sized Agricultural Multi-purpose Cooperative Societies). The grass is grazed by domestic buffalo/cattle and used as alternative forage by the wild elephants. Thus the grass has supportive value towards the wildlife.

## 3.4 RESEARCH, MONITORING AND WILDLIFE HEALTH

#### Research in buffer areas

The research works in Similipal Tiger reserve area has been discussed in Chapter 4.5 of core plan. The research especially in buffer area has not yet carried out. Research works undertaken in Similipal Biosphere Reserve during the Year 2010-11 to 2013-14 has been given in Annexure XXIV.

Findings of a study conducted by Field Director, STR during 2011-12 on "Impact of domestic dog on wild herbivore population in multiple use area of Similipal Tiger Reserve, Odisha, India."

A study was conducted to estimate the herbivore abundance in multiple use area of Similipal Tiger Reserve and to know the Impact of domestic dog on herbivore population. Two villages of core area and two villages of buffer area were randomly selected for the study. The major outcome is that it reveals the negative impact of dogs on wild herbivores. Each household is keeping dog. Though the villagers during the survey stated to have kept dogs for safeguarding their life, livestock, property and crop against wild animal, the fact they did not reveal is use of dogs for hunting of wild herbivores. Mainly the small sized herbivores are mostly affected by domestic dog presence. Apart from domestic dogs, there are also stray dogs in every village whose number would be more than that of the domestic dogs. The presence and movement of dogs in the vicinity of the forest reduces the space of wild herbivores. The present study does indicate the adverse effects of use of dog by villagers of fringe villages on ungulate populations due to which there is a restriction in their distribution within the tiger reserve. From management point of view it is necessary to monitor the use of domestic dogs and to vaccinate them to reduce the risk of disease spread.

## 3.5 NATURE EDUCATION AND INTERPRETATION

A multi-media enabled Community Forestry Information Centre was established at Kaliani check-gate en route Gurguria during 2008, which needs major enhancement

An interpretation Centre has been established at Ramatirtha through CEE, Ahmedabad to create awareness about the Similipal Tiger Reserve, forests, wildlife and the ecosystem among the locals and the visitors.

Efforts are on to set up a mini Interpretation centre at entry gate at Pithabata. Already souvenir shops have started functioning at Jashipur and Pithabata since 2012-13 tourist seasons. Souvenir items made by local artisans consisting of sabai grass products and bamboo products are sold in these shops, which is gradually gaining popularity.

Efforts have been taken to create awareness among the locals about the approach of vulnerable periods, such as fire and crop raiding seasons. They are also educated to take precautions to safeguard their lives and property.

An innovative programme have been launched in Similipal Tiger reserve namely 'Friends of Similipal Tigers' since July, 2012. In this program, the school and college students having interest in tigers in villages and townships around the Similipal were invited to join as volunteers through an application forwarded by their respective principals. Initially, applications from 300 students from institutions around Baripada were received. Then the students along with their teachers were called for an introductory meeting on 2<sup>nd</sup> September,2012 in which a thorough interactive discussions were held on food, biology, home range, and threats to Similipal Tigers. Subsequently, a selected 43 students were taken for a field trip inside the TR for an on the spot realization of problems of encroachment, habitat and prey base of tigers. The basic objective of having a cadre of volunteers of young students is to support the conservation efforts of TR authority in future. They in turn are to act as nuclei for educating the villagers, parents and colleagues in their own villages and homes about the need to protect the charismatic animals which abound in plenty in Similipal but are facing threats. This programme has evoked very positive response from students and teachers as well. Efforts are on to involve as many students and teachers as possible from the educational institutions in and around a radius of 5 km from the boundary of STR within next one year.

Debates, quiz, poetry, essay writing and painting activities based on wildlife and forest of Similipal are being organized on the occasion of wildlife week and the winners rewarded.

## 3.6 ADMINISTRATION AND ORGANIZATION

Prior to creation of Similipal Tiger Reserve during 1973, entire area was partly under administrative control of Baripada Territorial Division and Karanjia Territorial Division with following Reserved Forest areas.

a) Baripada Division: 979.41 km²
 b) Karanjia Division: 1174.34 km²

Similipal Sanctuary came into existence on 3<sup>rd</sup> December 1979. The core remained under administrative control of the Field Director and the area beyond core was being looked after by Divisional Forest Officer, Baripada and Karanjia Divisions under the administrative control of Conservator of Forests, Angul Circle till 1993. During 1994, both the divisions were also brought under the administrative control of Field Director who was working as Conservator of Forests for the said divisions vide Notification No.8F (T) 2/94-1669 dt.25.01.1994 of Forest and Environment Department, Government of Orissa. Thereafter a new Division named as Rairangpur Forest Division was carved out from existing Karanjia Division during reorganization of Forest Department in 2003 vide Notification No 1F(A)-100/2003/13228/F&E dt.08.08.2003 of Forest and Environment Department, Government of Orissa. Field Director, STR cum Regional Chief Conservator of Forests now heads the administration of both core and buffer part of the Tiger Reserve since August, 2011, who is under the control of PCCF & CWLW Orissa.

The Administrative Units of Similipal Tiger Reserve Core & Buffer is given below:

Division	Range	Section	Beat
STR	7	23	75
Baripada Div	5	10	23
Karanjia Div	5	15	26
Rairangpur Div	2	5	19
Total	19	53	143

The co-operation of sister departments such as Health, Veterinary, Irrigation, Police and Revenue Departments are inevitable in smooth management of the buffer areas. The officers of such department extend their hands ungrudgingly as and when necessary.

## Staff

The staff of buffer area are having part jurisdiction over Similipal Tiger Reserve. They have area outside the reserve under their jurisdiction for which they have to perform the activities of territorial Division along with protection of Similipal.

## Housing

The TR does not have the amenities to cater to the need of all staff barely necessary for stay. The housing facility is quite inadequate and there are no facilities like communication, electricity, telephone and other electronic devices. The climate is very inhospitable and very much prone to malaria. The question of providing education to the scions of the staff working inside is a daydream. This type of environment compels the staff to remain absent from duty to the detriment of forest protection.

## **Check posts**

There are 19 nos. of check posts as detailed below inside the sanctuary and at outlets as detailed in Annexure XXXII.

#### COMMUNICATION

#### **Roads**

There is an arterial type of distribution of road inside the Sanctuary. The detailed length of the forest roads are given in Annexure XXXIV.

#### **VHF Communication Facilities**

In the buffer area of STR, at present there are 37 fixed VHF stations as given in Annexure XXXVI.

## Vehicles available with Buffer D.F.O.s for STR

The details have been given in Annexure XXXV.

## PRODUCTION SECTORS IN THE LANDSCAPE

## 4.1 FORESTRY (AFFECTS DIRECTLY) (D\*)

No forestry operation like harvest of timber and collection of NTFP, plantation activities are taken up inside Similipal and part of Hadgarh sanctuary which is embedded within the Tiger Reserve .Most of the buffer areas come within the sanctuary area. Only timber coupes are worked out by OFDC Ltd in Satkosia RF and Notto RF of the buffer area as per the valid working plan. The last three years figure is furnished in Annexure LV.

## 4.2 AGRICULTURE (D)

The people residing inside the buffer area are agrarian. The Soil is generally acidic in reaction. The soil types noticed are sandy loam and lateritic, light textured with low water retentive capacity.

In this area paddy is the major cultivated crop, followed by pulses and oil seeds. While there has been decrease in the coverage of Khariff paddy in high lands, the area under pulses, oil seeds and other cereals has been showing an increasing trend due to diversifications of cropping pattern in such land as important dry land farming strategy against the erratic rainfall. They harvest two crops in a year in the cropfields where irrigation facility is available. The main crop is paddy, ragi, maize etc. They also raise vegetables for own consumptions.

## **Agricultural Marketing**

With Agriculture as the mainstay of the economy of buffer area of the Similipal Tiger Reserve, most of the farmers take up agriculture as subsistence enterprise. Due to poor socio-economic condition of the tribal farmers, marketed surplus often exceeds marketable surplus. Exploitation of moneylenders and middlemen and exchange of commodities in the barter system are discernible in the district. Basically agricultural produce, Minor Forest Produce, Livestock and Fish etc. are sold in the primary market. Unregulated weight and measures lack of grading and standardization, poor storage facilities and lack of farm organization are key feature of existing market system of the district.

Rice, pulses, oil seeds, vegetable, maize, fruits, milk, fish, groundnut and MFPs like Tamarind, Harida, Bahada, Amla, Mohua, Kusum, Neem, Karanj Seed, Char Seed, Mohua seed are marketable surplus commodities/produces available in the district. But due to want of agro-processing and value addition, the farmers are

selling these commodities in the primary market at whatever price is offered to them. For development of agriculture and allied sector in the Vulnerable, Remote & Bordering GPs, basic agricultural inputs such as seed, fertilizer, pesticide and machineries may contribute for the development of agriculture and allied sector. The pattern of use of such basic in-puts could be taken as indicators for agricultural development. Cattle feed, medicines, fingerlings, fish feed are essential inputs for livestock and fishery development. Efforts will be made for supply of such basic inputs and service facilities to the farmers. MFP based processing units for processing of Tamarind, Neem seed, Karanj seed, Kusum seed can be thought of. The less remunerative enterprises need diversification and existing farming system require further intensification to increase production level.

Various groups such as SHGs, User groups, Common interest group or Farmers interest group will be formed in villages for protection of common interest. Empowerment and management of natural resources for ensuring equity in distribution of benefit in rain fed area, management of water resources, community organization is considered vital. Farm women contribute significantly to agricultural production and household food security in the district. The skills can be improved to reduce their physical strain, labour, time and to improve the quality of work. They can be involved in special production activities including post-production activities to avoid wastage and value. Formation of women group in the concept of SHG or FIG is also considered essential for farm women. The scheme would involve identification of existing market infrastructure facilities, critical gaps thereon and scope for strengthening present facilities plus creation of new infrastructure in the cluster of GPs having necessary growth potential within the project time frame. Farm based key activities will be selected for agricultural development in general and improvement of vegetable cultivation and horticulture in particular. Depending upon the climate and land compatibility, floriculture can also be taken up as an economic activity.

A RRA was conducted for understanding the existing market infrastructure facilities, status of villages and villagers and scope for further improvement in their livelihood status. Keeping the shortcomings in mind of 25 remote GPs of the district the funding pattern has been conceived to engage maximum rural youths for productive purposes.

## 1. Marketing facilities for agricultural produces.

Mini market yard @ Rs.5.00 lakhs in each GP in a strategically located place that includes

- Covered market shed
- Internal roads
- Open pucca platform
- Boundary wall

- Site development
- Tube well
- Plantation
- Provision of generator (Diesel Operated)
- Mini Godown

The mini-market yard is managed by local GPs or wherever enterprising and functional SHGs or federation of SHGs are available they can take over the management of the market. Some of the market complex will be exclusively used for catering the need of service sector.

## Horticulture

District plan on Horticulture development has been formulated basing on *MACRO MANAGEMENT MODE* of Horticulture activities. This envisages integrated development of horticulture through area expansion, transfer technology (training, exposure visit and demonstrations), input supply and management, in-house production of new improved and hybrid varieties of fruit plants, root & tuber crops, spices and vegetable, optimum utilization of water resources farm mechanization, seed and planting materials production in government and private sector. Dissemination of latest technology is the recent advancement in the field of Horticulture through organizing training, workshop and exhibitions. Post harvest management of the Horticultural produce has also taken place in this plan.

## **Objectives**

The general objective is providing sustainable livelihood to poor scheduled tribe rural families through proper utilization of land and water resources. Specific objectives are as follows.

- General self-employment through tree based farming system.
- Ensure food security.
- Enhance income of normal families.
- Proper utilization of land & water resources.
- CapacityBuilding of rural poor through training and exposure.

#### Strategy

- Basing on the Agro climatic and soil condition different Horticulture crops has been suggested for different areas.
- Fruit plants will be planted both in irrigated and non-irrigated condition.
- Horticulture Nurseries in private sector will be encouraged including strengthening of govt. nurseries and farms.
- Root & tuber crops, vegetable & spices will come up either as pure crop or inter corp. in orchards.

- Dissemination of latest technology through demonstration, training, workshop and exhibition.
- Emphasis will be given on integrated pest management & Organic farming.
- For post harvest management, preservation activities of fruits & vegetables will be taken care of.
- Promotion of private entrepreneur for sale of Horticultural inputs, garden tools and implements etc.
- Use of 256 ragani compost & bio-fertilizer with aim for organic farming will be encouraged.

## **Programme Activities:**

The various activities chosen under Horticulture are

- 1. Area expansion of fruit crops like Mango, Lime, and Custard Apple.
- 2. Development of private nursery and construction of Market yard.
- 3. Demonstration of root & tuber crops.
- 4. Organization of training.
- 5. Rubber Plantation in tribal area (Rubber Board).

## **Sericulture**

Tassar culture is practiced in Mayurbhanj district since the erstwhile dynasty of Mayurbhanj. In this district tribals do tassar culture traditionally. It has been an important subsidiary occupation of large number of tribals and people of other backward community by rearing tassar Silkworms on its food plants like Asan, Arjun, and Sal etc., which are available in plenty. In Mayurbhanj, tassar culture has been declining due to uncertain climatic condition, indiscriminate cuttings of tassar food plants in the forest, inadequate seed supply, lack of post cocoon facilities and inadequate market support due to insufficient funds. At present nearly 4000 families are engaged in tassar culture in this district. Out of them about 80% families reside in the buffer area of the Tiger Reserve

The most important pre-requisite of Silk Industry is production & supply of quality seeds. It is estimated that the annual demand of tassar seeds in this district is around 6 lakhs D.F.Ls. The existing Govt. agencies and Primary tassar rearers Cooperative Societies and other seed rearers are not equipped to meet the same in time. Therefore, stress is to be given to maintain better plantation of tassar food plants for quality seeds & smooth rearing activities with proper marketing facilities. Considering the above aspects the following schemes are implemented during 3 years period i.e. from 2003 - 04 to 2005 - 06.

#### PRE-COCOON ACTIVITY

- 1. Assistance to Tassar seed rearers for maintenance of tassar food plants.
- 2. Assistance to Tassar rearers for development of chawkie garden
- 3. Rearing equipment support to Tassar rearers
- 4. Support for setting up of tassar grainage by pvt. Graineurs.
- 5. Support to tassar rearers for quality dis-infectance.

#### **POST COCOON ACTIVITY**

1. Support to tassar silk spinners

The sericulture has improved the economic condition of the rural mass in the buffer area.

## 4.3 INTEGRATED DEVELOPMENT (ECO-DEVELOPMENT, DEVELOPMENT THROUGH DIST. ADMINISTRATION) (D)

Integrated approach through eco-development along with amelioration of the livelihood option of the people is resorted to through the forest deptt. Other developmental works like communication, health and live-stocks are being taken up through the District Administration. The livelihood generation activities are taken up in the buffer villages of the Tiger Reserve by the Integrated Tibal Development Agency (ITDA) which are enlisted below

## Tribal Handicrafts Design Development Programme of ITDA, Baripada

Many SHGs have taken initiatives to market under the tribal handicraft Centre which has promoted and developed design of different tribal handicrafts such as Tribal Jewellery and household articles in Dhokra casting trade, improvement in utility articles, Statues, Murals in stone carving trade, artistic as well as live models in terracotta and bronze casting, Artistic bamboo crafts items etc. These models are prepared during the course of design development training for tribal artisans and marketed in the Pallishri Fairs.

## Income Generating Scheme for Khadia & Mankidia Primitive Tribal Groups for Self-Employment:

Khadias and Mankidias are primitive tribals living in Mayurbhanj district. They are very poor with miserable living condition. The Mankidias do not have any cultivable land. Many of them also do not have even homestead land. They depend on collection of forest produce to earn their livelihood. Similarly most of the Khadias also do not have any cultivable land. They mostly depend on labour.

The following income generating schemes are functioning for economic up-liftment of these tribal.

## 1. Siali leaf Khalli and Rope making

Siali leaf are plentily available in the forest in buffer area outside the sanctuary and Mankidias are well acquainted with the Siali leaf Khalli and rope making. A financial assistance of Rs. 5,000/- provided to each of 222 Mankidia families with an out lay of Rs. 11.10 lakhs for this project as the product has a good market in the area. 50% of the assistance e met from RSVY fund and balance 50% met by the ITDAs.

#### 2. Sabai rope making

The Khadias make ropes with the locally available Sabai grass for an additional income. The technique for sabai rope making is very simple. Sabai rope has also good market in the area. A financial assistance of Rs. 5,000/- have been provided to each of 344 Khadia families with an outlay of Rs. 17.20 lakhs for Sabai rope making.

## 4.4 TOURISM (D)

Eco-tourism has been promoted over a limited area confined to 130 kms road length in Similipal sanctuary only. The local people are engaged as guides to the tourists and on services rendered to the tourists at eco-tourism spots located at Gurguria, Jamuani, Chahala, Barehipani, Muktapur, Nawana and Joranda only.

Looking in to the huge tourist flow in to the tourist places inside the buffer regions, action is being taken to uplift the economic growth of the locals of buffer area of Similipal Tiger reserve area on promotion of the eco-resorts, home—stay facilities, food plazas, trekking, boating, vehicle ride, machhan ride, wild sighting walk, souvenir shop promotion etc. These services are to be provided to the tourists by the EDC members constituted within buffer villages at the active guidance of the Forest department, tourism and other line departments.

## 4.5 FISHERIES (D)

The buffer area has rich potential for Aquaculture Development through adoption of intensive pisciculture practices and exploitation of enriched Reservoir Fisheries. The Fisheries resources comprise of tanks owned by Gram Panchayats, Revenue Department and ponds in private holdings. The total water area covered under pisciculture is 5338.85 hectares excluding 5525 hectares under Reservoir and Minor Irrigation Projects most of which are in buffer or peripheral area. The present level of fish production of the Mayurbhanj District is about 9600 M.T. and the per capita consumption of fish in the District is about 5.28 Kg per annum as against 11.0 Kg per annum of World Health Organization (WHO) standard.

Among various avocations proposed for sustainable income generation for the rural population of this District, Fisheries Development Programme through scientific aquaculture and exploitation of captive fisheries resources has been initiated by the Fishery department as narrated below:

## Objectives

- To provide income generating assets in the form of pisciculture tanks on own land of selected BPL beneficiaries.
- To induct skill training to the BPL fish farmers in scientific pisciculture and fish seed rearing.
- To provide input assistance in the form of fish seed, fertilizers, feed and medicines etc. towards operational expenditure.
- To organize pisciculture Women Self Help Groups (SHGs) and arrange lease of G.P. tanks / MIPs on long-term basis for adoption of scientific pisciculture.
- To provide captive nurseries for backyard Fish seed rearing as a source of profitable income.
- To provide input assistance for fish seed rearing at minimum cost.
- Overall increase of fish production and per capita consumption of fish to reach the level of WHO standard of 11.0 Kg per annum for combating malnutrition.
- Sustainable increase of income of the members of the SHGs to cross the poverty line.

Keeping the aforesaid objectives in view the following three schemes under fisheries sector are proposed for overall economic growth of the rural population of the district.

## I. Establishment of fish seed rearing units by the women self help groups through development of defunct/ derelict gram panchayat tanks (SGSY pattern)

The present demand for fish seed in the district has been estimated to be around 400 lakh of which the Govt. fish seed production units existing in the District have potential of producing 120 lakhs of fish seed. Besides 100 lakhs seeds can be arranged for stocking in the District from the hatcheries of the Orissa Pisciculture Development Corporation Ltd. Thus, there is a sizeable gap of 180 lakhs, which is to be met through private producers and traders. Keeping this in view, it is contemplated to mobilize fish seed production by the Women Self Help Groups under this proposed scheme by which the members of the Groups can earn sustainable income besides ensuring supply of quality fish seed to the needy fish farmers. They can also raise fish fingerling for stocking in the pisciculture tanks adopted by them. It is proposed to implement the scheme in Baripada, Betnoti, Jashipur, Kuliana, Kaptipada and Rairangpur blocks of the District. Skill training for the members of the Women SHGs in the technology of fish seed rearing will be taken up under ongoing schemes like SGSY, ITDA etc. Defunct / derelict G.P. tanks available in the G.Ps will be developed through renovation and made available as seed rearing units which will be leased out in favour of the women self help groups on long term basis. The SHGs will avail bank loan and subsidy as per SGSY norm @ Rs. 1.25 lakh provided as Rashtriya Sam Vikash Yojana subsidy to each group and the rest 1.25 lakh availed as bank loan.

## 4.6 TEA / COFFEE ESTATES (AFFECTS INCIDENTALLY) (I\*\*)

Tea/Coffee cultivation is not practiced in this area.

## 4.7 ROAD / RAIL TRANSPORT (D)

The transport by road is resorted to on permission from the Tiger Reserve Authority.But the bonafide residents of the buffer villages after producing Identity Card are allowed to enter freely on the roads passing through the Similipal Tiger reserve.

There is no rail transport system.

## 4.8 INDUSTRY (D)

There is no industry in the area.

## 4.9 MINING (D)

There is no mining anywhere in the reserve.

## 4.10 THERMAL POWER PLANTS (I)

There are no thermal power plants in the area.

## 4.11 IRRIGATION PROJECTS (D)

There is no big/medium irrigation project within the area except few water harvesting structures and diversion weir on perennial nallah made in Khejuri, Barigaon, Dudhiani villages to facilitate irrigation to the cultivation land under micro-irrigation project.

## 4.12 TEMPLE TOURISM (D)

Deokund and Atharadeuli are places of pilgrimages for the local people.

Deokund situated inside the TR is a place of pilgrimage for the Hindus and is famous for the deity of Goddess Ambica. Sacred Deokund was established by the royal dynasty of Mayurbhanj. Athardeuli is situated on the transitional zone of core and buffer area and is a place of worship by tribes belonging to Bathudi community. They visit the place once in a year during April and thousands of devotees offer obeisance to the tribal deity.

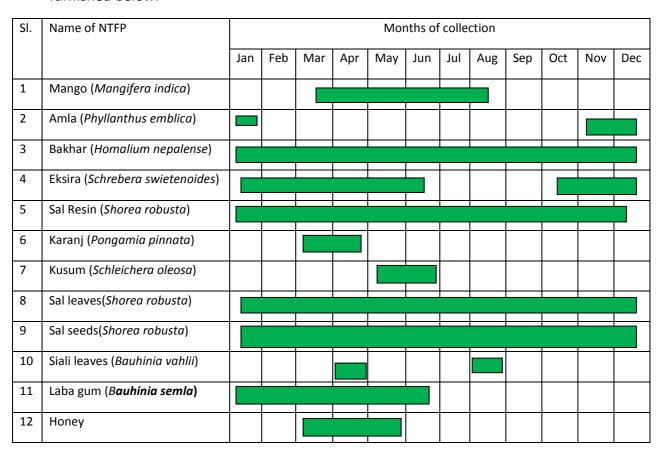
## 4.13 COMMUNICATION PROJECTS (D)

All communication projects shall be scrutinized as per the existing guidelines of NTCA from time to time.At present only V.H.F. communication system has been functioning by the buffer divisions. No mobile communication tower has been established in the buffer area.No telephone system is functioning in the buffer area.

#### 4.14 STUDIES ON NTFP IN BUFFER AREA OF SIMILIPAL

The study on NTFP dependency by local people was conducted by STR for about five months from 25 August 2012 to 15 December 2012 in peripheral villages of Similipal Biosphere Reserve in two Forest Divisions such as Baripada Division and Karanjia Division. During the study period, information on NTFPs traded in 41 weekly markets are collected covering eleven Forest Ranges in these Forest Divisions. The study showed that in all 31 types of NTFP commodities were traded during the above period. Out of these, mahula (flowers of Madhuca indica) was observed to be the most common NTFP which was brought for selling in highest quantity and was available in most of the markets. Total 6589 kg of mahula were marketed in 15 markets by 231 sellers covering 12 Forest Ranges. Next most traded item was found to be ranu dust followed by kusum, sal resin, myrobalans, karanja, lac ,mahua seeds, and cotton in that order. Total 114kg 600gm of sal resin was marketed by 309 sellers in 24 markets covering 12 Forest Ranges. Similiparly, a total 430kg 500gm of kusum was marketed by 27 sellers in 5 markets covering 5 Forest Ranges. Besides these common NTFPs, 27kg of kachada, 2825kg of ranu dust, and 23kg 700gm of red ants were marketed only in Baripada Division where as 27kg 500gm of cotton, 60kg of karanja, 29kg of lakha, and 110kg of Harida, Bahada, Anla were marketed only in Karanjia Division. Other minor NTFPs included mushrooms, tubers, roots, siali ropes, Sal leaves and Sal tooth sticks which were also marketed by sellers.

A calendar showing months of collection of some major NTFPs is furnished below.



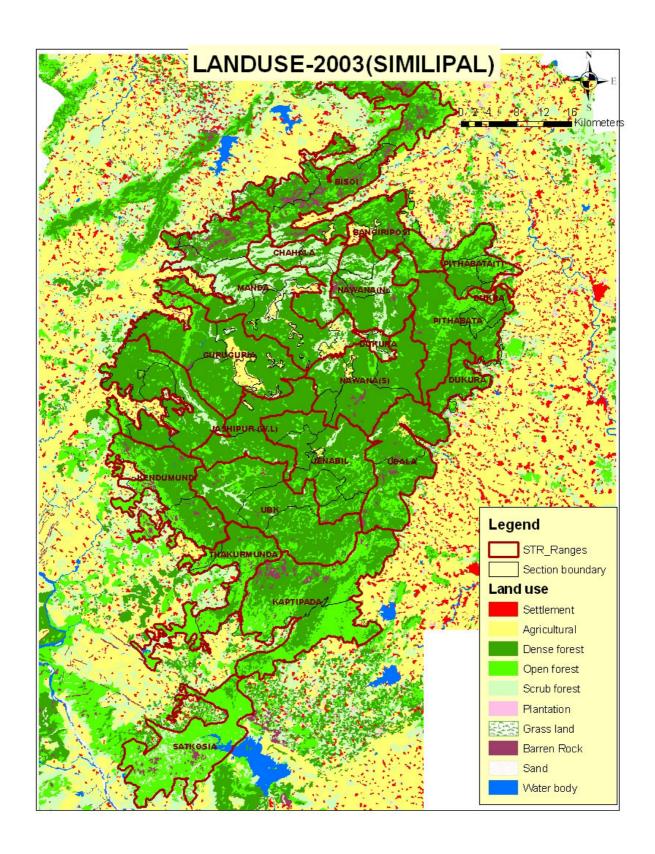
12	Mahua saad (Madhuaa indiaa)								
13	Mahua seed (Madhuca indica)		ı						
14	Mahua flower(Madhuca indica)								
	Widirad Nowel (Widahaca malea)		ı						
15	Methi leaves (Rungia pectinata)								
	The state of the s		ı	I		l			
16	Mulika root (Cesampelos							1	
	pariera)								
17	Mushroom (ornamental)								
18	Mushroom (edible)								
	(Termitomyces sp.)								
	(,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,								
19	Pala broom ( <i>Phoenix acaulis</i> )								
	Pala broom ( <i>Phoenix acaulis</i> )								
19									
20	Pala broom ( <i>Phoenix acaulis</i> )  Arrowroot ( <i>Curcuma aromatica</i>								
	Pala broom ( <i>Phoenix acaulis</i> )								
20	Pala broom ( <i>Phoenix acaulis</i> )  Arrowroot ( <i>Curcuma aromatica</i> Pita alu								
20	Pala broom ( <i>Phoenix acaulis</i> )  Arrowroot ( <i>Curcuma aromatica</i>								

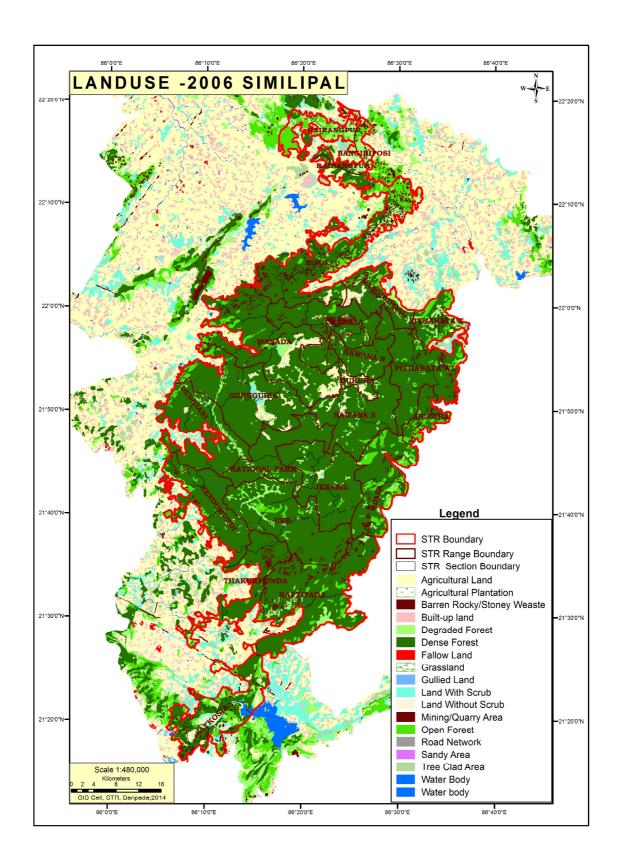
## LAND USE PATTERNS AND CONSERVATION MANAGEMENT ISSUES

#### 5.1 LAND USE CLASSIFICATION

The Buffer villages of Similipal Tiger Reserve have 65 villages and hamlets. Among them 57 villages are inside the sanctuary and almost at center of the Tiger Reserve. These 65 villages have an area of 111.18sq.Kms. Beside these, most of the Rayati Lands of more than 250 villages are situated close to the boundary of the Tiger reserve. The cropping pattern and the type of crops raised influence the wild fauna to a greater extent. However, the lands of the buffer villages are classified as per landuse pattern which symbolizes the human dependency on the agriculture and other land in the Similipal (Annexure XLI)

So, out of the total 111.18 Sq. Kms ,irrigated lands are 0.22 Sq.Kms and unirrigated single crop giving area is 35.14 Sq.Kms which is about 34% of the total land available with the villagers. Another 2.15 Sq.K.m area have been settled under Forest Right Act 2006 till date totaling to 37.29 Sq.Kms which will raise the agriculture land to 37% of the total. The crops are raised in the rainy season and chiefly paddy. During winter, little moisture available during October/November allow the farmers to cultivate mustard, gram, maize, vegetables like tomato, raddish, pumpkin etc.





## **Forest Rights Settlement:**

The Forest Rights claims as per the Scheduled Tribes and Other Traditional Forest Dwellers

( Recognition of Forest Rights ) Act 2006 in Similipal Tiger Reserve- Buffer area.

**Community Rights:** : The following community right claims have been settled in Similipal Tiger Reserve buffer area as on 2012.

SL. No.	Name of the Forest Division	Villages in STR	No of FRC constituted	No.of community Rights approved by DLC	Area in Acres	Purpose
1	Baripada	15	1	0	0	
2	Karanjia	21	4	2	4344.29	MFP collection
3	Rairangpur	29	26	0	0	
	Total	65	31	2	4344.29 Acre or 1751.73 Ha	

**Individual Rights**: The following individual right claims have been settled in Similipal TigerReserve buffer area as on 2012.

A total of 5.93 ha and 215.42 ha of forest land have been settled as individual rights for homestead and agricultural purposes respectively under Forest Right Act 2006 as per the table given below

SL.	Name of	Villages	No of FRC	Individual Rights- Titles Area in Acres		Acres	
No.	the Forest	in STR	constituted	issued after a	issued after approval from		
	Division			DLC			
				Homestead	Agriculture	Homestead	Agricultur
							е
1	Baripada	15	1	9	26	7.58	110.85
2	Karanjia	21	4	0	126	0	161.93
3	Rairangpur	29	26	14	116	7.14	261.46
	Total	65	31	23	268	14.72 Acre	534.24
						or 5.93 Ha	Acre or 215.42 Ha

This area has been a source of numerous products including timber, fuel wood, pulp wood and a variety of NTFP such as bee wax, Amla, Honey, marking nuts, Tamarind, Mango, soap nut, Char seeds, Mahua flower, Mahua Seeds, Chebula, Lemon grass ,Sabai Grass

## 5.2 SOCIO – ECONOMIC PROFILE OF THE VILLAGERS

Outside the Tiger Reserve area, townships namely Baripada, Udala, Sharat, Thakurmunda, Karanjia, Jashipur, Bangiriposhi are located in the plains. Besides these, 65 villages are found within the buffer area. The Tiger Reserve is surrounded by about

SI No.	Block	Forest Area in Ha	Permanent pasture and gazing lands in Ha	Culturable waste Land in Ha	Land put to non- agricultural uses in Ha	Barren & cultivable land in Ha
1	Bangriposi	4061	1047	1092	2596	588
2	Bisoi	6180	739	2833	1919	1854
3	Jashipur	5086	1399	2054	3440	718
4	Kaptipada	8420	1325	2620	4459	2340
5	Karanjia	3065	1443	2002	2402	149
6	Khunta	535	463	2046	2403	276
7	Suliapada	2756	263	1643	1627	60
8	Thakurmunda	9421	3055	3031	2388	609
9	Udala	368	436	67	2225	41
	Total	39892	10170	17382	23459	6635
	Grand Total of	the Area	ı	97538		1

1200 villages all around within 10 K.m. from the periphery of the Tiger Reserve.As per 2001 census around 5 lakh people reside in these villages. They more or less influence the tiger reserve. The population of various communities residing in these areas as follows:

i. Tribals : 73.44%ii. Scheduled Caste : 5.25%

#### iii. Other Caste : 21.35%

tribes Bhumija, Bathudi, Kolha, Common are Gond, Santhal, Khadia, Mankidias. Bathudis was the earliest settlers of Similipal and in course of time they were allowed to be the chiefs of four main forts of the adjoining areas. Khadias were originally living in Panchpir and were making out their livelihood by collecting forest produce from Similipal. Later on they migrated into deep dense forests of Similipal. Gonds were old settlers in certain parts of Similipal. Depredation of tigers and elephants, constant attack of fever and forced labour compelled some of the original settlers in Similipal to migrate to the plains. Depopulation due to the reasons stated above, happened as many as seven times in Similipal and fresh migration took place. In the course of migration Santhals, Kolha, Munda, Mahalis and Khadias came and settled there. Among all the tribes the Santals and Mahalis are 'Sarna' by religion who also worships Hindu Gods. They speak in Santhali language and use Alchiki dialect. The Kolhas are Hindus. They speak in their own language and their dialect is Orangichiki. The Bathudis are Hindus and use Oriya language. The Mundas are Hindus and many of them inside the TR have been converted to Christianity. The Khadia and Mankidias are nomads. As regards the social custom of the people the Santals & Mahalis worship their deities under a Sal tree at the place of worship called Jahira and during April they perform Phubhanguni Puja. The priest is called Naeke and for other tribes the priest is locally known as Dehuri. The Bathudis, Khadias and Mankdias worship their Gods in forest. The village priest acts as the guide of the people influencing their day to day activities. The people are very poor and live in hutments made of brushwood and soil. They cook their food with the help of firewood collected from the forest. They depend upon the forest for repair of their houses and preparation of agricultural implements. The agriculture being practiced is not a main factor for soil erosion. Occasionally they girdle the trees and clear the bushes for use of the land for the purpose of cultivation. The natural water channels are blocked and diverted during the summer season for the purpose of cultivation, which reduces the flow of water in the water channels emerging from the sanctuary. They are not habituated with the other utilities of cattle other than cultivation. Hence during lean season they leave the cattle inside the forest for grazing. The people in general take handia (a type of country liquor). As a tribal community they enjoy the folk dances on festive occasion. The plan prescriptions as narrated in chapter-2 have been aimed to reduce the dependency of the people on the forest resources and amelioration of their economic condition. Agriculture is the leading occupation of Santals, Kolhas, Bathudis and Mundas. The Mahalis are mainly bamboo artisans. The Khadias and Mankdias fully depend on forest for food, shelter and day to day maintenance to their lives. They collect honey, sal resin and arrowroot from the forest and sell in the weekly markets. Collection of forest produces is the next important occupation. The other occupational fields are (i) mat making, (ii) sawing, (iii) basket making, (iv) working as black-smith (v) tailoring, (vi) distillery (vii) livestock raising. Sometimes men and women earn wages as agricultural labour or in

forest and roadwork. 'Weekly markets' or 'Hata' play a very major role in the economy. Because of the distance of the market places, they use to sell their collected forest produces in the weekly organized markets or 'hata'. Sal leaves, honey, arrowroot, gums, wax and medicinal herbs are regularly collected and sold in the 'hata'.

The relationship with forest of these people are established since ages. They derive all types of NTFP, firewood, timber for their own consumption as well as for sale in the market nearby. The tribals, particularly from the villages in the periphery indulge in traditional hunting ritual called *Akhand Shikar*. Hundreds of people in group enter into the Similipal during 'Pana Shankranti' in mid April every year with country made guns, Bow-arrows, Axe, Knife of varied sizes and kill herbivores like deer, wild pigs, hares, wild buffalos and many others. They have a belief that the traditional hunting brings prosperity to them. But now a days the traditional hunting have spread from December to May in a year. It is made mostly to get meat for own consumption and to sell in local market to gain some financial benefits.

The poorest people are the ones who influence the forest most .They have very low level of income and the agriculture lands owned by them are less and underdeveloped.Employment opportunities are very less.The primitive group of tribes are the Khadia and Mankidia who are one of the weakest class of people having no agriculture land. They depend upon honey collection, hunting and selling of bush meats , firewood and timber for their livelihood

The residents of the buffer area of the tiger reserve resort to traditional agriculture practice. Their crops are usually rain fed. Thus their yield is less than the normal and insufficient to maintain their family through out the year. To support their family, they collect NTFP, firewood, and timber. The employment opportunity are very less. Some of them do not hesitate to collect various wildlife products from the floor of the forest in TR for some quick money.

## **Soil types and landuse practices:**

Soils of Similipal Tiger Reserve are mainly developed by the relief, parent material and climate. The biotic features, mainly the natural vegetation follows the climatic pattern. Soils of STR have been divided into 8 broad soil groups which are given in detail in previous chapter 1. However the landuse pattern basing on the soil types is discussed here.

## 1. Red soils

There are three types of red soils found in Similipal. These are Red Gravelly soil, Red Sandy soil, and red loamy soil. The main features are coarse texture, single grained to weakly granular structured surface soil, highly porous with low

available water holding capacity. These put severe limitations for rainfed farming. These soils are non saline and do not contain any lime kankar or free carbonate. The red colour is due to presence of iron oxides. These soils are moderately acidic and are generally deficient in nitrogen, organic matter and molybdenum. Boron deficiency symptoms have been observed in vegatable crops. The added phosphorus is generally fixed in these soils due to presence of free iron and aluminium oxides. The distribution of the Red Gravelly soil found in the chicken neck part of the STR buffer in Northern region and come within jurisdiction of Rairangpur division. Red Sandy loam covers entire buffer area encapsulating the Core region. Only a part of Budhabalanga valley in the Bangiriposhi Range of Baripada Division has red gravelly soil.

## 2. Hematitic rock, Laterite and lateritic soils

The Central and South similipal Major area of the Core of STR soil contains lateritic mass within control section of the profile. The lateritic mass is characterized by compact to vesicular sometimes honey-combed structure, composed essentially of a mixture of hydrated oxides of iron and aluminium with small amount of manganese and titanium oxides and quartz as a necessary diluents. These soils are highly permeable and are poor in nitrogen, phosphorus, potassiumand calcium. They are generally acidic in nature and found in the eastern part of the buffer region of the Tiger Reserve especially in Baripada Division..

## 3. Red and yellow soils

They occur as a catenary association in undulating and rolling terrains and found at the extreme boundary of the buffer area and the transition zones of the STR encircling the Red loam areas. Major part of Jashipur, Kendumundi, and Dudhiani of Karanjia Division and Pithabata, Udala, Kaptipada Range covers the Red-Yellow soil profile which differ in depth, texture, colour and cropping systems. Soils of uplands are comparatively coarser in texture having red and yellowish red colour, shallow in depth and are well drained. Ferruginous nodules are invariably met within these soils. Soils are comparatively more acidic than those of lower reaches. The soils of low lying areas, especially of bottom land situation are formed on colluvial, and alluvial deposits. These are of fine texture, deep and show pale yellow greyish and olive shade of colour. They occasionally show effect of mottling due to submergence in monsoon and drying thereafter.

The cropping systems followed in yellow soils is rice followed by pulses/oilseeds with residual soil moisture or supplementary irrigation and that followed in upland red soils is monocrop of pulses/oilseed/millets.

#### 4. Brown forest soils

These are mainly brown coloured, formed in association with forest growth. The organic matter is moderate to high in these soils. These are fertile, slightly acidic and are suited for horticultural crops in higher elevations. The brown forest soil is found in the crop fields settled in Forest Right Act 2006 and the crop fields found in the villages found close proximity to the forests and found in the almost all buffer villages.

## **Problem Soils and their Management**

More area can be brought into cultivation if the problematic soils are properly reclaimed and managed.

#### A. Problem soils

The problem soils of STR can be grouped into three, classes, viz., 1. Up land, low fertile, low water retentive acidic soils, 2. Low land soils posing iron toxicity problems.

#### 1. Low fertile acidic soils

The red and laterite and lateritic group of soils generally belong to this category which constitute about two-third of the total areas in the STR. These soils have been developed due to intensively weathered parent material of varying composition of sandstone, quartzite, granite gneiss, khondalities either in situ or over transported material. Soils developed due to ferrugenous sandstone are acidic in nature and medium in organic carbon content. The texture of these soils varies from sandy loam to sandy clay loam with depth. The available water holding capacity of these soils is low.

Soils are highly permeable and susceptible to droughts during frequent dry spell in the rainy season emergence of seedling is obstructed due to a shallow crusting developed after beating action of a rain because of cementation of colloidal iron oxides.

Soils have low nutrient retention capacity and are strongly acidic. Soils contain low available nitrogen, phosphorus and potassium. Legumes suffer from calcium deficiency. A mixed cropping of groundnut, redgram or finger millet-red gram is more remunerative than single rice crop. Productivity is low under the farming system, followed by local farmers.

## 2. Low land soils posing iron-toxicity problems

In the landscape of rolling topography, soils located on valley slope, toe-slope lands receive washing of lateritic constituents rich in iron due to seepage. Rice crops grown on such soils show bronzing due to iron toxicity which gets accentuated under

waterlogged situations developed due to underlying clay substratum that restricts vertical drainage.

## **B.** Management

General measures that are followed in the reclamation of these soils are mentioned here.

- 1. Acidic soils can be managed by the application of organic manures and liming material.
- 2. Improving drainage facilities by constructing deep drains around the field, checking lateral seepage water by constructing check embankments across the slope reduces the iron toxicity.
- 3. The sodium content of saline soils can be removed by flooding and by growing resistant varieties.

## **Soil Fertility Status**

The major and micro nutrient content of the soils generally indicate the fertility status.

## 1. Nitrogen, phosphorous & potassium status

Soils of STR are generally low to medium in these nutrients.

#### 2. Secondary and micro nutrients

About 2/3 rd of the cultivated area in the state is highly to mildly acidic in reaction and deficiency of calcium and magnesium has not been reported so far. In highly leached sandy lateritic soils, zinc deficiency is occurred, which is corrected by application of 40-50 kg zinc sulphate per hectare.

Red and laterite soils are deficient in molybdenum. Boron deficiency is found in highly porous upland lateritic soils particularly in the surface due to heavy leaching. Application of 10 kg borax/ha or spray application of 0.1 to 0.2 per cent solution helped in correcting the deficiency. Bronzing in rice which is associated with higher iron concentration in the soil is observed mainly in the kharif season. It occurs in poorly drained acid soils especially those situated adjacent to ferrugenous lateritic highlands. Bronzing is manifested due to presence of high amount of easily decomposable organic matter, application of sulphur containing fertilizers, insufficient supply of phosphorus and potassium excess iron and low manganese in the soils.

#### **Fertilizer Recommendation**

Fertilizer recommendations of different crops in the state are given in Table below:

## Fertilizer Recommendations of Different Crops in Similipal Tiger Reserve Buffer Area

SI.No	Crops	Nitrogen	Phosphorus	Potassium
		(kg/ha)	(kg/ha)	(kg/ha)
1	Rice	60	30	30
2	Wheat (irrigated)	80	50	25
3	Wheat (rainfed)	30-40	50	25
4	Finger millet (Ragi)			
	a. kharif	30	15	15
	b. rabi & summer	50	25	25
5	Maize	100	50	50
6	Sugarcane	200	100	60
7	Potato	80-120	75	100
8	Jute	50-60	20-30	30-40
9	Groundnut	20	40	40
10	Pulses	20	30	20

## **Techniques for Efficient Fertilizer Use**

The acceptability of a fertilizer source depends on agronomic efficiency and cost per unit of nutrient. The farmers are adopting the split application of nitrogen in order to improve its efficiency. In kharif season, it is applied in 2 or 3 splits to avoid the risk of rain uncertainty. This not only improves the yield but also provides certain flexibility to the farmers in matching nitrogen application with weather conditions. Urea super granules or briquettes has been found to be very useful in improving the nitrogen efficiency however commercial production and marketing of super granules have not yet been there, and so farmers have not started using it. Incubation of dry soil with urea (4:1) for about 48 hours has been found to be highly beneficial. A rabi crop grown under stored moisture is unable to fully utilize the native soil nutrient and, therefore, it does well when fertilizer is placed deep. In rabi season NPI NPK are preferable for better efficiency. Granulated sources perform better than the powdered forms.

Under submergence condition the solubility of native phosphorus is higher. Completely water soluble sources are less efficient for upland red and lateritic soils due to high phosphorus fixation.

By the experiment results, legume particularly in neutral and alkaline soils show that nitrogen and phosphorus fertilizers (water soluble sources) mixed together give better result than applied separately, as phosphorus is required for efficient functioning of rhizobia. Therefore, under such condition di ammonium phosphate (DAP) should be preferred. The phosphorus application should be done in the furrows for better efficiency as by this a higher concentration of phosphorus in solution is developed in the rhizosphere of the plant root.

The native soil potassium is not sufficient to take care of the crop unless soil has medium to high level of available potassium. Non exchangeable soil potassium also contributes to availability. Rice straw and panicles have high concentration of potassium. If straw is incorporated into the field, only 5 percent of the total amount of potassium is removed. In coarse sandy soils, split application of potassic fertilizer has yielded good results.

Among the micronutrients, uses of boron and molybdenum have been beneficial in many situations for upland cereals, pulses, and vegetables like tomato, cabbage and cauliflower.

## 5.3 RESOURCE DEPENDENCE OF VILLAGERS

Agriculture is the main occupation of the people residing inside the Reserve Forests and on the fringe. The population is increasing rapidly as discussed in the previous paragraphs. Forest is the main victim of the population pressure. People depend on forest for shelter, firewood, and food. Raw materials for erecting houses for shelter are obtained from forest. Their cattle graze in forest. Roots, leaves, tubers, herbs, and insects of the forest constitute their main item of food at the time of scarcity. Diseases are cured by application of forest herbs. Hunting and fishing in forests and rivers are their common pastime. With the increasing population, the above all activities are also increasing. Sometimes people from inside and outside Similipal over exploit the forest resource for their commercial gain. In fact, the traditional methods of collection of forest produce never harm the forest to a big extent. The timber traders, poachers and smugglers are more harmful for the existence of forest. These people always exploit the simplicity of tribal people and use them for their benefits. Traditional and simple tribals are not so harmful for the forest because their resource consumption is very less and they are very nature-friendly.

#### 5.4 HUMAN – WILDLIFE CONFLICT

Since the time immemorial, Human wildlife conflict has been going on in and around the Similipal Tiger Reserve.But no incident of tiger attack or uplift of human beings by Leopard has been ever reported. Cases of cattle lifting by big cats are occasional in buffer area. Other wildlife cases such as Bear attack as well as Hyena attacks are known to occur but these are very accidental and causalities have been reported on this count in buffer area. But the most conflicting situations arise during the migration of the Pachyderms every year. The tables in Annexure- LVI show the man-elephant conflicts and the compassionate grants paid during the last few years.

## Man- Elephant interface in Buffer area of the Tiger Reserve

The detail of crop raiding and human kill by elephants has been given in Annexure LVI. Crop raiding and other depredation by Similipal elephants is confined to limited pockets of Pithabata, Dukura, Bangriposi and Bisoi Range.

#### Protection measures - STR Buffer Area:

There are 33 No. of Antipoaching camps in buffer divisions equipped with V.H.F. sets and staff both regular and casual to stop the anti-smuggling/anti poaching activities. The list of these has been reflected in the tabular form in Annexure XXX.

Wildlife poaching cases detected in the buffer area in the last 3 years has been given in Annexure LII.

## Loss of Human Life & Property by Elephants

Loss of life and injury caused by elephants in the last 6 years in Similipal area has been analysed below. A total of 18 people were killed and 13 injured during the period due to elephant attack in the buffer area of STR. This is relatively high (>1 attack/year) and as such it increases the fear and worry about elephants. It affects the farmers for crop protection and people dependent on the forest for minor forest produce (MFP) and fuel wood. This constant worry and fear make them susceptible to stress and this leads to frustration and anger against elephants. People become hostile towards the Forest Department whenever there is a death or injury caused by elephants.

## **Crop Protection**

Due to the intensity of crop raiding in the periphery of Similipal tiger Reserve the practice of watching the crop in the night in the machans near the crop field is adopted.

## **Compassionate grant:**

The payment made on compassionate ground in last 6 years have increased many fold as frequency of elephant damage is increasing. The compassionate amount paid to the victims are shown in the table above.

The present rate for such payment (2013) is given below-

- Human Deaths- Rs 200000/- per victim.
- Permanent Injury-Rs 75000/- per victim.
- Minor injury- Rs 5000/- per victim.

- Death of Cattle- Rs 5000/- per victim.
- Death of calf- Rs 2500/- per victim.
- Crop Damage- Rs 10000/ Acre
- Vegetable/Cash Crop Damage Rs 12000/ Acre
- Permanent Damage to House- Rs 10,000/- per house.
- Minor damage to house Rs- Rs 2000/-

## **Elephant Deaths due to Conflict**

The increase in pressure in the buffer part of the STR coupled with development in the corridor area has resulted in retaliatory action by some of the villagers against elephants. Often elephants are attacked with bows and arrows during the crop raid by the villagers in the periphery. The injuries thus inflicted does not cause instant death but results in secondary infections and general weakening of the animal leading to death in rare cases. Now a days a trend of poisoning has been noticed in Karanjia and STR core area by the poachers. They use an insecticide namely Themate locally named Danadar used to poison water source or putting it in salt-balls and used in saltlicks by wrapping the poison with common salt in leaves to make balls. Hence intense patrolling and regular checks to saltlicks have been carried out regularly by the staff.

At present Human Elephant Conflict (HEC) cannot be considered as being serious but the sentiment among some people that it is more serious now than what it was in the past. Such a feeling could originate from the fact that people have greater aspirations for a better life and cannot accept losses they took as normal in the past. Cropping patterns have changed and a lot more cash or commercial crops are being grown and this possibly makes people less tolerant to conflict with elephant. The presence of some crops year-round also increases the potential for raiding and this increases the efforts needed to stop HEC.

While Human Elephant Conflict mitigation has improved, this is largely because of increased private investment in crop protection. Government based efforts, mainly electric fences have largely failed because of poor planning and implementation and also because communities have not taken responsibility for maintaining fences. The failure of such fences results in a blame game and further disgruntles people although they are equally to blame. There is a clear need to improve capacity (of government agencies and communities) for HEC mitigation, to bring about better coordination between government agencies and communities and also within communities. We also need to develop the ability to apply conflict mitigation measures on a sustained basis and lastly seek long-term solutions that resolve HEC on a more lasting basis.

The last would take into account land use, agricultural practices, provide/develop mechanisms to improve livelihoods, develop crop protection mechanisms that cover elephants and other animals also (especially wild pigs), develop the ability to deal with habitual raiders, and manage elephant populations in a sustainable way.

However such killings and attacks can be reduced by increasing the knowledge and capacity of local people in dealing/interacting with elephants when they encounter them or move in areas where they are likely to encounter them.

There is a need to review HEC mitigation inputs by government agencies and NGOs so that problems can be identified and better methods implemented. Capacity and motivation need to be developed within the department so that the Forest Department can develop better partnerships with local communities and implement HEC mitigation strategies in an effective and sustained manner. Capacity, cohesiveness and commitment need to be developed within local communities.

There is a need to bring about an integrated approach in the various government departments that deal with various aspects of development of local communities in the area. At present some departments work at cross-purposes and that does little to improve the livelihoods of the locals. These developmental efforts also need to stay in tune with the conservation goals of the PA and the landscape through coordination with the Forest Department.

## 5.5 ASSESSMENT OF INPUTS OF LINE AGENCIES/ OTHER DEPARTMENTS:

Developmental programmes are taken up by the Forest department as well as other government departments in the zone of influence. These developmental activities are taken up Gram panchayat and Sub-division wise. Four Subdivisions are found in this buffer zone namely Karanjia, Rairangpur, Baripada and Udala. There are several Gram panchayats coming under the subdivisions for all the developmental activities. Some of them are beneficial to the villagers, some are detrimental to the ITDA, Agriculture, Horticulture, Soil conservation Department, Animal husbandry department, fisheries, Khadia-Mankidia Development Agency and various government and non government agencies working in the area. Huge numbers of developmental works are taken up in the buffer zone through DRDA for the upliftment of local tribal as well as non tribal people. There are certain works like construction of group houses under Indira Awas Yojana, foot paths, and construction of water tanks, check dams, community hall, and TV rooms taken up by village panchayat union which never threaten the integrity of reserve.

The inputs of the Development Agencies are categorised under the following heads in STR buffer Areas:

• LIVELIHOOD SECTOR – Horticulture, Fisheries, Sericulture,

Industry, Tourism, Agricultural marketing, Agriculture, Forest and Soil Conservation, GIS

Cell & Help Desk.

• **SOCIAL SECTOR** - Health, Special Interventions for the

Differently Abled, Education, Sports, and

Women & Child Welfare.

• INFRASTRUCTURE SECTOR – Communication with emphasis on Rural Connectivity and connectivity in Vulnerable, Remote and Bordering Areas done by Rural Development department, Similipal Tiger Reserve authorities (FD, and DFOs).

In the *LIVELIHOOD SECTOR*, an effort has been made to integrate agriculture and allied activities with industry and tourism with an aim to enhance the quality of life of the tribal people and people staying in remote areas of the district. The objective is to provide sustainable livelihood to poor scheduled tribe rural families through proper utilization of land and water and also to ensure food security, promote self-employment enhance income and capacity building through training and exposure. 23.87% of the total budget has been allocated to this sector.

- Horticulture Based on agro climatic and soil conditions, different horticulture crops have been suggested for different areas. Development of private nurseries, dissemination of latest technology and information through demonstration, training, workshops and exhibition will be encouraged. With rubber already having been proved as eco-friendly and an excellent crop for rehabilitation / settlement of socially and economically backward classes of people, an emphasis on rubber plantation has been made.
- Fisheries With the district's rich potential for pisciculture development, emphasis has been put on providing income generating assets in the form of fish seed rearing units by women SHGs, providing technical training to 600 fish farmers on scientific pisciculture management to make their activity economically viable and sustainable and information discrimination through IEC activities.
- Sericulture Tassar culture has been practiced in this district since the time of the
  erstwhile royal dynasties. The most important pre-requisite of the silk industry is
  production and supply of quality seeds. Therefore, stress is to be given to maintain
  better plantation of tassar food plants for quality seeds subject to Forest
  Conservation Act and smooth rearing activities with proper marketing facilities.
  The schemes will be encouraged with the above objective in sight.
- Industry Blessed with naturally grown forest bamboo, the project logically aims
  at providing a special package to the traditional bamboo workers for
  augmentation of their earning. With a substantial tribal population in the district, a

- center for development of tribal handicraft design has been proposed apart from providing for income generating schemes (like sabai rope making and siali leaf khalli & rope making) for the Khadia and Mankadia Primitive Tribal Groups, self employment through honey collection (project –MADHU) and providing vocational training (preferably technical) to youths in the remote GPs of the district.
- Tourism Venturing into and enjoying nature in a way as to assure that the negative impacts on the cultural and natural environment are minimized and negated, forms the basic of eco-tourism. Development of Eco-tourism at Similipal Hills along with improvement of orchidarium, residing infrastructure and trekking routes in Similipal, have been proposed. Mayurbhanj has many locations which though are irresistible destinations are not attracting enough tourists and for this, development of tourism sites at Khiching, Devkund, Bhimkund etc. have been proposed. Heritage tourism can be promoted at the historic Jubilee Museum and Archives. Research for development of Chhau dance (which is a part of the tribal way of life of Mayurbhanj) is aimed to be promoted at the proposed Chhau Research Centre & Museum. Similarly, the proposed improvement of acoustics and development of Tribal Cultural Centre in Saheed Smruti Bhawan is also extremely essential in the light of the Bhawan being the only cultural centre at the district headquarters.
- Agricultural Marketing- With agriculture as the mainstay of the people, efforts are being done to establish rural markets in 25 remote and bordering GPs. This will not only help to promote forward and backward linkages to the farmers of the area, but also help in ensuring a better quality of life for the tribal poor which is extremely important especially in the light of these areas being remote, vulnerable and bordering areas.
- Agriculture Presently, the percentage of irrigated land in the district is only 21% in Kharif season and 9% in Rabi season. To increase the cropping intensity and productivity, more area is to be brought under irrigation. For this purpose, it is proposed to install 100 borewells during the plan period of 3 years. It is proposed to provide 50% subsidy of Rs.50,000/- per borewell either to individual beneficiaries or groups.
- **Forest** The improvement of irrigation system in the forest areas is very important especially with a large population of tribal of the district residing in the forest areas whose mainstay is agriculture and allied activities.
- Soil Conservation It has been proposed to construct W.H.S., farm ponds, percolation tanks, cross bundhs, diversion weir, etc, in the non-irrigated rain-fed patches under the RSVY scheme which will provide life saving irrigation, check the soil erosion, recharge the ground water and generate employment opportunity. These projects would be implemented in identified watershed area.

## **Conservation Management Issues in the Buffer Zone:**

Felling for fire woods, grazing, man-made fire, NTFP collection is a threat if not collected on a sustainable method. This kind of issues caused degradation of the forest by over exploitation of critical micro habitats used by various wild animals.

- a. Encroachment of forest lands and poaching for meat is the common problem in Karanjia, Rairangpur and Baripada parts of buffer zones.
- b. Stone quarries, Murrum quarries, Crusher units operating in the adjoining areas hinder free movements of wild elephants in the nearby forest areas.

## **Proposed Activities:**

Developmental activities by various line departments for the benefit of the villagers need to be taken up after a transparent dialogue with the forest department which would not be detrimental to the tiger reserve. The following activities have been taken up by the other line Department around the Tiger reserve to uplift the economic conditions of the tribals and locals.

#### LIVELIHOOD SECTOR – SERICULTURE

## PRE COCOON ACTIVITY

## 1. <u>Assistance to Seed Rearers for maintenance of Tassar food plants</u>

Aim & objective of the scheme is to improve the quality & productivity of Tassar food plants by adoption of developed technology. The unit cost of the Scheme is Rs. 3900/- per hectare/ per year for maintenance of economic plantation of tassar host plants. The 50% of the unit cost is to be provided as subsidy from RSVY source to tassar seed rearers for maintaining tassar host plantation subject to maximum of Rs 1950/- per hectare towards cost of fertilizer & chemicals etc. Rest 50% of unit cost is beneficiary contribution, which includes cost of FYM & cultural operation. The total requirements of fund for 3 years will be Rs. 16,84,800/- from RSVY source.

## **MARKETING OF COCOONS**

There are 20 Tasar Rearers Co-Operative Societies organized in Mayurbhanj district. Sericultural schemes under R.S.V.Y. will be implemented through these Co-Operative societies. The tasar cocoons and tasar silk yarn to be produced from beneficiaries will be purchased & marketed through these Tasar Rearers Co-Operative Societies. The beneficiaries under this scheme are members of these Societies. The tasar cocoon and yarn are sold to SERIFED, Orissa and different tasar weavers of this state through these tasar co-operatives.

## **Apiculture**

Beekeeping (Apiculture) can be taken as part time business enterprise. It is an agro - forest based complementary rural industry and can be done as full time or part time occupation, which can provide sustainable income to the beekeepers/farmers. It is an important resource base for farming, plantation and forest systems that provides economic, nutritional and helps in creation and conservation of bio-diversity and in particular, ecological security to the rural community. The bee colonies can be maintained by people of all ages including youth, women, tribal, without prejudice with minimum inputs and time. Other products like Beeswax, Propolis and Bee Venom can be obtained through bee keeping, which have high utility in pharmaceutical and cosmetic industry. Honeybees are of much value for the pollination of agro-horticulture crops. Income derived through bee pollination is 10 to 20 times more than value of honey obtained. The scheme has been conceived with an idea to provide additional income to the enterprising farmers of Mayurbhanj district who would be assisted under RSVY Scheme.

In Mayurbhanj district the honeybees suitable for domestication are *Apis cerana Indica* and *Apis melleifera*.

Season	Type of Flowers	Collection/Box
-	Flowers of oil seeds, Neem, Sal, Asana, Piyasal, Karanj, Mahua, Eucalyptus etc.	

## **FOREST HONEY**

The Similipal buffer forest also accommodates a lot of tribes such as *Khadia* and *Kolha* (*Ho*) who primarily depend on the forest resources for their livelihood. One of their major sources of income is honey collection in the forest. Major honeybees species found in and near SimilipaL hills is *Apis dorsata*, which is commonly known as rock bee (locally, '*Baghua*'). They are bigger in size and aggressive in nature. They reside in the darker areas and migrate over longer distances in the radius of 3-4 kilometers. These bees make hives (locally known as "*Mohubhandar*") on Sal, Simul trees and in stone caves. In Mayurbhanj district, the major share of honey comes from this type of bee.

Seasons	Months	Type of Flowers	Collection/ Hive	Yearly collection
				per honey
				collector.
Winter	Oct	Flowers of oil	Maximum 14-15 Kg.	
	Dec.	seeds and other	Minimum 800gm.	
		different flowers	Average 4-5 Kg.	
Summer	April-	Neem, Sal, Asana,		150 Kg
	June	Piyasal, Mahua		

## S W O T Analysis

## Strengths

- Minimum 40 MT of forest honey is harvested every year in Mayurbhanj.
- Assured market identified.
- Khadias and Kolha (Ho) are traditional honey collectors.
- The block functionaries have formed 06 SHGs exclusively of Khadias.
- Abundance of flora of different variety.
- Vast areas under forest coverage.
- Presence of successful progressive farmers under apiculture in the district.

#### Weaknesses

- ⊗ Presence of middlemen.
- $\otimes$  Exploitation by middlemen and the local traders in the form of cheating in the weight and low price given to the honey collectors as compared to govt. support price.
- ⊗ Lack of awareness amongst honey collectors about market.
- ⊗ Deforestation.
- ⊗ No proper grading and standardization units.
- ⊗ Lack of proper and effective technology.
- $\otimes$  Traditional practice of collecting honey leads not only to poor quality, but also endangers the species and potential of the forest.

## **Opportunities**

- ✓ No dearth of market.
- ✓ Niger, oilseeds are grown extensively and its area is also increasing.
- $\checkmark$  The scheme can be taken as a bankable scheme other than RSVY to enhance the production base.

- ✓ Ensuring quality to get better price.
- ✓ Organise these honey collectors into SHGs and federations.
- ✓ Provide them with the transportation facilities and marketing avenues.
- ✓ Train them technically and theoretically to make them skilled
- ✓ Aggressive advertising and marketing to create impulsive demand for honey. The present demand is purposive.

#### **Threats**

- Change in govt. policies subsidy withdrawal, any change related to MFP policies.
- Local traders/middlemen.

Eco-friendly method for collection of forest honey

Lacking in skill

Practical skill related to apiculture.

- Adulteration.
- Tribals requirements are "quick money" rather than "more money"-delay in bank loan and cumbersome procedure to obtain loan.

## Justification of the Project

The prevailing deforestation and the traditional method practiced by the above mentioned tribes for harvesting honey have adversely affected the bee population. Moreover, the Rock bee honey is usually found at inaccessible places such as top of the tree, dense forest, rock caves, etc. Hence these tribal, in order to get the honey, use any means of reaching them. In the process, they destroy the colony and extract the entire comb, which adversely affects the bee population and also indirectly affect the tribal livelihood. Besides, it also has negative ecological implications as the traditional practice is against the eco-friendly principles of the nature. Again, due to the inaccessibility of market to these tribes and the increasing demand of the forest products in the local and external market, these tribes have been off late/are being exploited by the middleman. These middlemen lure them to sell their hard earned collections at a much lower rate than the prevailing market prices and they get the benefit.

Therefore in an attempt to give these tribes, justice and opportunity, DSMS plan & aims at uplifting the socio-economic condition of these tribes by providing them advanced skills, techniques and adequate marketing opportunities with prompt and assured better price.

## **Operational aspects:**

The scheme will be implemented outside sanctuary through DSMS, the district level apex marketing society, which will also organize training programme for the beneficiaries and identify bulk buyers of raw and processed (with a brand) honey. There will be 5 clusters (3 Forest, 2 Apiary) which will be nurtured and maintained by SHPIs (Self Help Promoting Institutions). In each cluster SHPIs will be collecting honey from the beneficiaries against cash payment at government declared support price. To facilitate honey procurement process, revolving fund will be placed with SHPIs after making appropriate agreement with DSMS. For honey processing the honey processing unit of HRDC (NGO) at Betnoti will be utilized. The plant is installed with support from UNDP and KVIC and has capacity of processing 100 Kg of honey per day. Suitable brand and package will be developed after scientific market study.

## **Selection of beneficiaries**

## **Apiculture**

The scheme lays stress on cluster approach and availability of flora. Enterprising beekeepers would be assisted under the loan-cum-subsidy scheme and will be from economically backward families in consultation with respective cluster SHPIs and bankers.

## **Forest Honey**

Khadias and Kolha (Ho) who are already engaged in forest honey collection will be assisted in the programme with the SHPIs support.

## **Training**

Training is the most essential component of the scheme. To acquire basic theoretical knowledge and practical skill on apiculture and ecological honey harvesting the beneficiaries will be given skill development training.

## **Marketing and Product Promotion**

This market driven project has been conceived to strengthen the existing activity and the production base. DSMS, Mayurbhanj is receiving concrete orders from bulk buyers, but in absence of any organised production base, they are unable to supply the required quantity of honey. In order to streamline the production and to organize the farmers as well as forest honey collectors, this project has been planned in an integrated manner. In Mayurbhanj district, every year minimum 40 MT of forest honey is collected and no organized marketing channel exists in this activity at present. The project will enable us to organize the honey collectors and fetch a better price for them.

For marketing of honey both in raw form and processed state and to make speedy correspondence with the bulk buyers like *Dabur, Emami, Baidyanath, Himalaya,* there

is a provision of computer with Internet facility at the district authority and with STR Headoffice at Baripada .This would facilitate the marketing. DSMS is already an enlisted vendor of Dabur, Kolkata, Aryan International, Delhi for supplying raw forest honey by the .

## **Transportation Logistics**

For transporting the raw honey from different clusters to Head quarter and processing centre at Betnoti a 207 Model, Tata Make Vehicle will be hired. The fund required for the purpose will be met out of RSVY.

## **Revolving Fund**

For procurement of raw forest and apiary honey from the beneficiaries of different clusters through SHPIs an amount of Rs.11, 00,000.00 is required as working capital. The fund available with SHGs will be utilized for the purpose.

Till the beneficiaries are strengthened into self managed people's organization ie. SHGs and their federation within the project period, DSMS will manage the amount to ensure effective forward linkages to the programme and will refund the amount to the SHGs and their federation.

FINANCIAL ASPECTS
UNIT COST FOR APICULTURE(PER BENEFICIARY WITH 10 BOXES)

Sl. No.	Particulars	No.	Price(in Rs.)	Cost(in Rs.)
1	Bee Box	10	850	8,500
2	Bee Colonies	10	450	4,500
3	Queen Gate	10	5	50
4	Nuclear Box	2	300	600
5	Bee Veil	2	50	100
6	Smoker	2	200	400
7	Honey extractor	2	350	700
8	Gloves	3 pairs	30	90
9	Miscellaneous Equipments	-	200	200
10	Drum for storage	-	350	350
11	Working capital	-	1,500	1,500
	Total			16,990Say <b>17,000</b>

Unit Cost: Rs.17,000.00 , RSVY subsidy Rs. 8,500.00, Bank credit Rs. 8,500.00

## **VISIONS, GOALS, OBJECTIVES AND PROBLEMS**

## 6.1 THE VISION:

The importance of STR has been spelt out in the previous chapter on statement of significance and its role on shaping the economy of North Orissa which is mostly agrarian has also been mentioned. Besides, the people living inside and on the fringes are mostly Adivasis and inextricably associated with the forest. The present enactment of Govt. of India to confer on the tribal the rights of forests plays a vital role in visualizing the future shape of the TR. The management aims at preservation of the natural heritage through a process of ameliorating the socio-economic condition of the people gradually, simultaneously interpolating the management principles congenial to the forests and its denizens as well as acceptable to the people. In short, the vision is to have an ecologically viable buffer area which will suitably safeguard and supplement the core area, the critical core natal habitat for the Tiger, its copredators and prey base and which shall be managed intensively both for the betterment of wildlife and local communities based on sound principles of sustainability.

#### 6.2 MANAGEMENT GOALS

- a. Ecological security for the forests with sustainable livelihoods for the local people.
- b. To complement the core area by maintaining the buffer area as a viable wildlife habitat.

## 6.3 MANAGEMENT OBJECTIVES

In pursuance of the above goals, the following specific objectives have been set for the Management of Similipal Buffer Zone Areas

- 1. To protect and conserve the flora and fauna by maintaining and protecting biodiversity-rich patches.
- 2. To mainstream tiger conservation concerns in the activities of the production sectors.
- 3. To restore the habitat with appropriate soil and moisture conservation measures.
- 4. To ensure the maintenance of viable wildlife populations for Ecological, Scientific, Aesthetic and Cultural values.
- 5. To ensure peaceful co-existence of wildlife and man.
- 6. To foster and monitor the populations of Tiger and co-predators by creating appropriate habitat conditions supporting good prey base.

- 7. To create management capabilities amongst the staff and to develop capacity building.
- 8. To encourage scientific research studies on topics, that will be management oriented and for improvement of the wildlife interest.
- 9. To protect the habitat from traditional poaching ( Akhand Shikar) and timber smuggling activities.
- 10. To achieve reduction in resource dependency on forests of the Buffer Zone by providing alternative livelihoods and conservation through ecodevelopment activities.
- 11. To maximize recreational experience of the people through various activities while minimizing the adverse impact of tourism on wildlife and its crucial habitat.

## 6.4 PROBLEMS IN ACHIEVING OBJECTIVES

1. Objective-To protect and conserve the flora and fauna by maintaining and protecting biodiversity-rich patches.

## **Problems-**

- i) Number of human settlements is more and these are near the biodiversity-rich areas. The forest dependency by these people causes high degree of destruction of flora and fauna.
- ii) The settlers are the kins of nearby Jharkhand and West Bengal tribes and many migrate from the outside the Tiger Reserve and settle here by marriage and by adoptions. This increases human population in the buffer area and more threats to wildlife and their habitats.
- iii) Man generated fire incidences are more in buffer areas that result in destruction of ground vegetation and ground fauna.
- iv) Tradition of mass hunting by local tribes
- 2. Objectives-To mainstreaming tiger conservation concerns in the activities of the production sectors.

#### **Problems:**

- i) Lack of awareness among the production sector managers.
- ii) Lack of co-ordination among the line departments.
- iii) Inadequate data on impacts of developmental activities undertaken in STR

3. Objective-To restore the habitat with appropriate soil and moisture conservation measures.

#### **Problems:**

- i) Inadequate database on the area of land degradation, cause of degradation, effect of degradation.
- ii) Inadequate fund for carrying out appropriate soil and moisture conservation measures in the degraded sites.
- 4. Objectives-To ensure the maintenance of viable wildlife populations for Ecological, Scientific, Aesthetic and Cultural values.

#### **Problems:**

- i) Inadequate data on the population structure and their ecology
- ii) Tradition of mass hunting by local tribes
- iii) Heavy biotic pressure on the resources
- 5. Objectives-To ensure peaceful co-existence of wildlife and man.

## Problem:

- i) Multiple human settlements in buffer area.
- ii) Frequent crop raid by elephants and small herbivores in the buffer villages
- iii) Akhand shikar tradition, indiscriminate poaching for bush meat
- 6. Objective-To foster and monitor the populations of Tiger and copredators by creating appropriate habitat conditions supporting good prey base.

## **Problems-**

- i) Less scientific data available on the tiger habitat and on its prey base.
- ii) Heavy biotic interference in the buffer area.
- 7. Objective-To create management capabilities amongst the staff and to develop capacity building.

#### Problem:

- i) Inadequate trained staff on wildlife management in buffer divisions.
- ii) Lack of motivation amongst the staff in buffer
- iii) Ground level illiterate daily wage staff.
- 8. Objective-To encourage scientific research studies on topics, that will be management oriented and for improvement of the wildlife interest.

## Problem:

- i) Inadequate scientific data on the flora and fauna of Buffer area.
- ii) Inadequate funding for research activities.

9. Objective-To protect the habitat from traditional poaching( Akhand Shikar) and timber smuggling activities.

#### **Problem:**

- i) Age old traditional customary hunting practices by local people.
- ii) Lack of awareness for wildlife conservation among the local people in buffer area.
- iii) Ill-equipped, demoralized staff is unable to counter thousands of armed tribal mass.
- v) Poor socio-economic conditions of the local tribes.
- vi) Undercurrent of Naxal activities in the area.
- 10. Objective-To achieve reduction in resource dependency on forests of the Buffer Zone by providing alternative livelihoods and conservation through ecodevelopment activities.

#### **Problems:**

- i) Poor socio –economic condition of the buffer villagers.
- ii) Lack of awareness among the villagers on ongoing developmental activities.
- iii) Lack of co-ordination between the line departments.
- 11. Objective-To maximize recreational experience of the people through various activities while minimizing the adverse impact of tourism on wildlife and its crucial habitat.

## Problem:

- i) Lack of awareness among the tourists.
- ii) Lack of infrastructures for tourism.

## 6.5 STRENGTHS-WEAKNESSES-OPPORTUNITIES-LIMITATIONS (SWOT).

## Strength.

Similipal buffer part has very large tract of intact forests rich in biodiversity and forestry resources. The buffer zone supports assemblage of prey species in different size classes which in turn support the large carnivores. An organized patrolling system is in place for the past decade. An equal importance is also being given by the present administration of the buffer zone i.e. the concerned territorial forest divisions. Further, no mining or large industry exists which would have been detrimental to ecological security. Buffer areas are under management control of Field Director from August 2011.

#### Weakness.

- a) There are as many as 65 villages and hamlets with about 15000 human population living within the buffer zone of Similipal Tiger Reserve with ever increasing demand for modern facilities
- b) Poor socio-economic condition of the inhabitants
- c) High population of unproductive cattle and livestock in buffer area.
- b) Inadequate professionally trained staff

## Opportunity

- To maintain a viable breeding population of Tigers and its co-predators along with the elephants in this large landscape with connectivity to other biodiversity rich areas.
- o To tap immense potential for sustainable eco-tourism
- To develop a sustainable model of NTFP harvesting and marketing
- To develop a multi-pronged strategy for rural development based on agro-horticulture.

## **Limitations (Threat):**

- 1. Gradual fragmentation of Tiger reserve in the form of footpaths and roads used by increased population of villagers
- 2. Increasing demand on dwindling forest resources by ever increasing human Population around the Reserve.
- 3. Very low levels of literacy and complacent tribal population with limited aspirations.
- 4. Under current of naxal activities.
- 5. Inhospitable terrain, climate and endemic malaria-prone area.
- 6. Increasing population of domesticated hunter dogs in the area.
- 7. Human and cattle presence in every part is disturbing inviolate areas

## **MANAGEMENT STRATEGIES**

#### INTRODUCTION

The need for ensuring ecologically compatible land uses in tiger reserves (buffer / peripheral areas) and corridors have been provided in sections 380 (g) and 38V (3)(b) of the Wildlife (Protection) Act, 1972. Further, under section 38V (3)(c) of the said Act, a provision has also been made to ensure that 'the forestry operations of regular forest divisions and those adjoining tiger reserves are not incompatible with the needs of tiger conservation'. In general, the managerial approach of buffer is applicable to tiger corridor areas as well. Intensive form of land uses like commercial mining, setting up of industries causing pollution and establishment of major hydro electric projects, and discharge of effluence / solid wastes in natural water bodies etc. needs to be avoided in such areas.

#### **GENERAL PRINCIPLES OF MANAGEMENT**

- 1. Co-occurrence agenda (Wildlife and People).
- 2. A 'no-go area' for industrial development (but retrofitting safeguards required if such infrastructure already exists).
- 3. The wildlife status of buffer should not be elevated to that of the core and managerial interventions should be restricted to allow tiger / wildlife gene permeability and low density occupancy while facilitating the meta-population dynamics of tiger in productive patches.
- 4. Factoring in the landscape context and reducing resource dependency of local people on forests through sectoral integration resulting in ecologically sustainable livelihood option.
- 5. Using the impact of natural / managerial interventions in the core area as a guide for dealing with forestry practices and wildlife management in the buffer.
- 6. Identifying zones of influence vis-à-vis the various land uses operating in the area.
- 7. Overarching focus on habitat restoration/productivity, reduction of forest resource dependency, providing ecologically sustainable livelihood options to local people, permitting ecologically sustainable land uses, avoiding intensive forms of land uses like mining or heavily used infrastructure and actively addressing human-wildlife interface. In case such land uses are present or permitted appropriate mitigation measures need to be enforced so as not to compromise on the conservation objectives of the buffer.

8. Convergence of ongoing district level schemes is important to provide ecologically sustainable livelihood options for local people. This would reduce their dependency on forest resources while eliciting the much needed public support. A sizeable portion of tourism gate receipts should be recycled and earmarked to ecodevelopment committees for village specific interventions as per the participatory micro plan, with reciprocal commitments to protect wildlife and their habitat on quid-pro-quo basis.

# 7.1 DELINEATION OF BUFFER AREAS AND OTHER ZONES WITHIN THE BUFFER AREA (E.G. ECO-DEVELOPMENT ZONE, FORESTRY ZONE, PRODUCTION SECTOR ZONE, ETC.)

The entire buffer area of the four divisions is divided into the following

#### zones:

- 1. Traditional Use & Forestry Zone (TUZ) (1434.58 km²)
- 2. Eco-tourism Zone (0.37 km²)
- 3. Eco development Zone (102.3 km²)
- 4. Biodiversity Conservation Zone (18 km²)

#### 7.2 ZONE AND THEME APPROACHES TO MANAGEMENT STRATEGIES.

## 7.2.1 Zone plan

Zonation is the most important activity of the management of landscapes for wildlife conservation. A zone is a specific management area distinguishable on account of its objectives. Separate zones need to be created because some of the management objectives may not necessarily be compatible. Zones cannot be managed in isolation and must relate to the functions of other zones and where relevant, to areas outside in a realistic web. Zoning is a frame work to a gradient of land use in a wildlife area. Management zones must be large enough to achieve the objectives proposed in that zone. The management zones need not be fixed in space or in time.

## Regulations

The following general regulations are prescribed for the Buffer Zone.

- 1. The area will be protected against encroachments, since it has interface with habitations. This will be done by periodic boundary patrol as well as maintaining very conspicuous cairns.
- 2. The habitat of the area will be opened for restricted grazing and by different strategies and by providing alternative arrangements, through ecodevelopment committees and developing fodder bank etc.,

- 3. The incidences of head loading will be minimized by focusing on the forest dependents through eco-development and providing free gas connection where feasible.
- 4. The resources of this zone will be protected from smuggling and poaching activities.
- 5. Habitat improvement works and maintenance of the existing facilities will be carried out.
- 6. Habitat restoration activities, like soil and moisture conservation works, the planting, removal of lantana and other weeds etc will be permitted.
- 7. Forest Fire prevention structure will be developed to control fire.
- 8. Habitat manipulation for improvement will be permitted in this zone.
- 9. NTFP collection will be allowed in the Buffer zone subject to WLPA and FRA
- 10. There will be no selection felling/ or thinning of timber species.
- 11. Shared use of Buffer Zone will be limited only to the non-consumptive use of the resources.
- 12. The biotic interference in the area will be minimized by the scheme of ecodevelopment.
- 13. The scientific research will be encouraged in this zone. A separate guideline has already been given.
- 14. Regulation of traffic in the highways is very important, by speed regulation, parking regulation and also controlling the movement of vehicles during night time.
- 15. Awareness and nature camps will be encouraged to understand the importance of eco system.

## **SCOPE OF MANAGERIAL INTERVENTIONS**

- (i) Providing ecologically sustainable livelihood options to local people in collaboration with various sectors/organizations.
- (ii) Incentivizing local people for protecting forests and wildlife (PES, Ecotourism).
- (iii) Ensuring retrofitting measures in sectors of development with reciprocal commitments.

- (iv) Ensuring active management in areas where tiger / Co predators / wild ungulates co-occur with people to minimize human-wildlife interface conflicts.
- (v) Ensuring monitoring of tiger / wildlife on a periodic basis in standardized manner, amenable to scientific inference.
- (vi) Ensuring surveillance and protection of tiger and wildlife.
- (vii) Building up the capacity of field staff and local people as a part of an adaptive management to ensure effective implementation.
- (viii) In case the buffer comprises of protected area then managerial interventions should be in conformity with the provisions of the Wildlife (Protection) Act, 1972.

## **Zone of Influence**

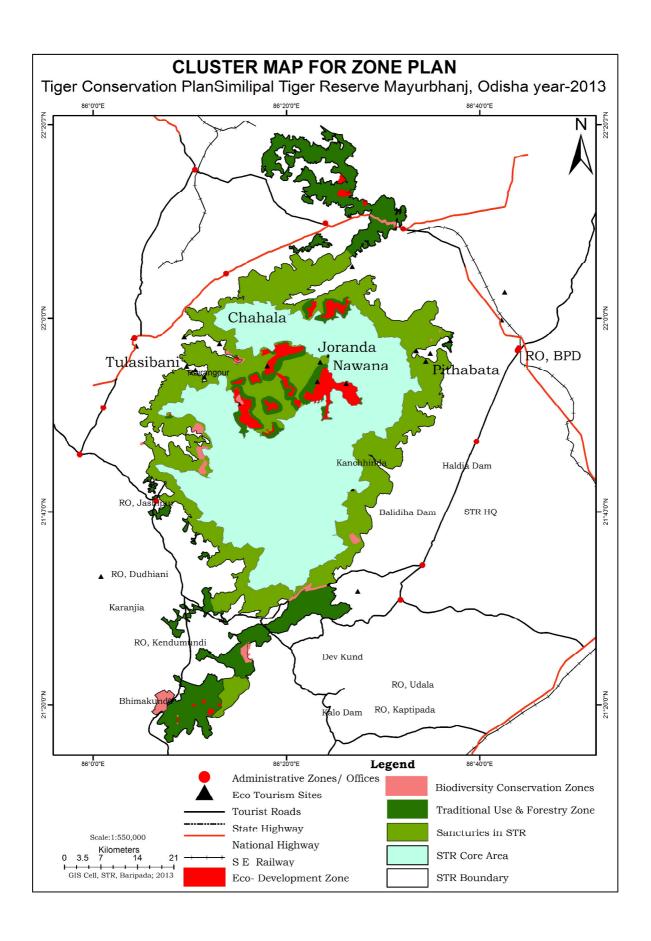
The concept of Zone of influence has not been applied in the earlier management plans. The zone of influence (ZI) is a concept that helps in rationally identifying the extent and constitution of the buffer zone. For this purpose two aspects need to be considered. First, it is important to identify and list the villages and communities situated outside the boundaries of theTR which are traditionally dependent on the forest based resources within TR. The residents of such villages may have their subsistence related activities extended to forests outside the TR boundaries as well. Once this pattern is established it will be possible to delineate an area outside the TR boundary to include such villages and forest areas over which the people's activities extend. Secondly, it will be necessary to estimate areas outside the TR boundary and the villages over which the influence of TR is experienced. This may be owing to loss of job opportunities following stoppage of forestry operations within, curtailment of resource use by people, wildlife related damage problems at the TR interface such as crop-raiding, damage to property, cattle killing, injury to people or man-eating by large carnivores. After establishing the patterns and the extent of area influenced, and comparing it with the First, the boundary describing the combined extent should constitute the buffer zone eventually. Apart from the socio-economic argument, it is the local support that is key here to guard against pressures on the conservation.

## The Regulation

The following regulations are prescribed for the zone of influence.

- I.The Zone of influence being outside the legal Reserve area will be managed more on the principles of shared use of the resources.
- II.All the traditional Forestry practices, including traditional resource use, as enshrined in the approved work plan will be permissible.
- III. The maintenance of snags, snag recruits, the dead-woods and special habitats in the managed forests will be maintained with a thumb rule of a minimum of Five big snags, Five snag recruits and Five large dead-woods per hectare.

- IV.In all the areas, institutional platform for Joint Forest and wildlife management in the Zone of Influence will be created with reciprocal commitment from either side. Extension buffering for wildlife and social buffering for people will be the main objective for such arrangement. This will be achieved through ecodevelopment discussed separately.
- V.The institutional arrangement will also be provided for various stakeholders and specialized groups, providing a platform for dialogue on the issues of common interest, like school students and teachers, hospitality associations, drivers associations, youth wildlife clubs, conservation societies etc.
- VI. The acquisition of corridors by the department to maintain the integrity of the landscape for elephant and tiger conservation.
- VII.Sensitive and key habitats within a TUZ, especially the water bodies, the riparian blocks and the special habitats, should receive adequate protection and management inputs.
- VIII.Regulatory eco-tourism with commandments will be prescribed outside for the eco-tourism operators and resorts.
  - IX.Habitat restoration activities, like soil and moisture conservation works, the afforestation, weed management, removal of lantana, water management etc will be encouraged.
  - X.Livelihood options will be created for the forest dependents that reduce pressures on the existing habitat.

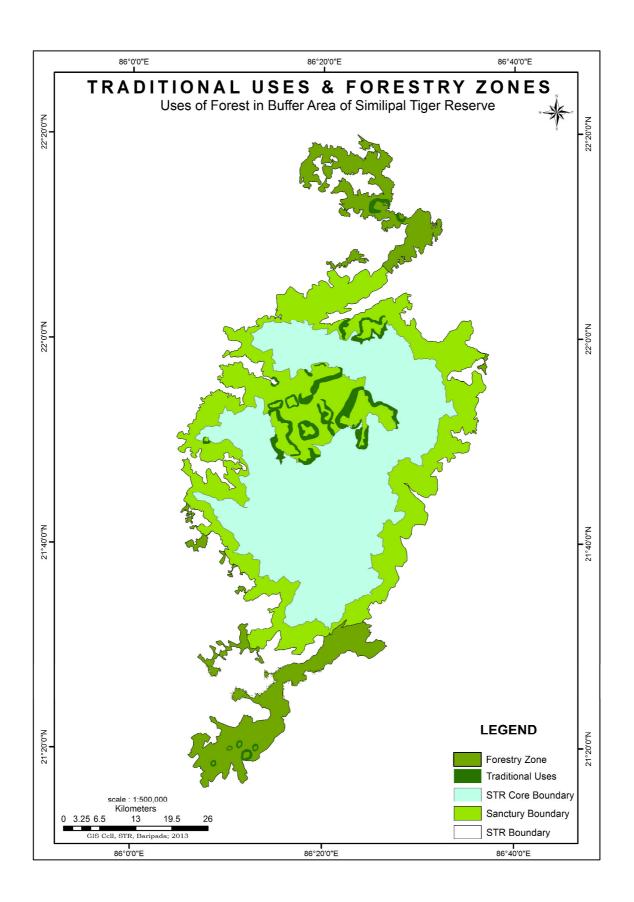


# 1. TRADITIONAL USE & FORESTRY ZONE (TUZ) (1434.58 km<sup>2</sup>)

There are 65 villages inside this zone. An area of 103.11 km² of the forest from the total area of the TUZ has been earmarked to the adjoining villages for bonafide use of the people. The details of such area are given in Annexure LVII. Further, an area of 1331.06 km² covered under the Revised Working Plan of Karanjia and Baripada Division by Sri A.O.F. Bakhla (1996-97 to 2015-16) is also included in this zone. The wildlife management (overlapping) working circle has been created in the above plan to include the above proposed buffer area of Similipal Tiger Reserve with the objective to improve, maintain the environment in and around Similipal for the conservation of wild animals, to conserve the diversity and integrity of biotic conservation of plants and animals within natural eco-system and safeguard the genetic diversity of species on which their continuing evolution depends.

## Strategies.

- This zone is meant for traditional use of the enclaved villagers within which, regulated livestock grazing is allowed, and collection of NTFPs and firewood is permitted for the bonafide use of enclaved villagers as well as normal forestry practice with compliance of the rights and concessions of the villagers in those areas.
- Activities like construction of check dams, meadow formation for fodder demand of the cattle, plantation of the fruit bearing trees to meet the NTFP demand of the villagers and to supplement the food needs of herbivores, elephants and birds in degraded sites, soil and moisture conservation



measures, silvicultural measure for improvement of the existing forest for the benefit of both animal and people need to be taken up.

- Resource use regulations *prima facie* need to be tied to wildlife habitat needs.
- NTFP harvesting shall be regulated with proper assessment of regeneration status of such species.
- Entry into the TUZ is to be regulated by providing **identity cards** to the villagers of the enclaved villages.
- As in core zone steps to be taken to develop refuges and shelters for wild animals and all the available nesting dens of different animals to be surveyed, identified and protected.
- Fire needs to be prevented by involving the people of the enclaved villages.
- Compartment or part of the compartment needs to be earmarked for villagers for the grazing of their cattle.
- Grazing area to be earmarked.
- Enrichment planting of favourable species of wildlife in blank patches. Planting of grasses at suitable places.
- Encouragement of undergrowth, middle storey and ground flora in the Forest.
- No fruit bearing trees like Harida (*Terminalia chebula*), Bahada (*Terminalia belerica*), Anla (*Emblica officinalis*), *Ziziphus* species, *Ficus* species and Mahula (*Madhuca indica*) shall be felled.
- Soil and water conservation measures will be taken up.

## 1. Forestry

- Ecosystem management required
- Ecological availability of a tree should be ascertained before removal
- A tree should be considered ecologically available if
  - (a) Its removal does not create a gap beyond 43 to 45%.
  - (b) The regeneration of species at various formation levels within a radial distance of twice the crown radius of the tree being selected for felling should have an 'established' status.

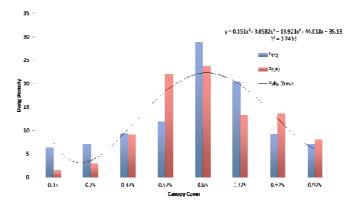
# Tree fellings / Thinnings

- No clear felling and other silvicultural systems promoting concentrated regeneration
- No conversion to uniform forests
- A high forest system with diffused regeneration should be preferred
- Status of regeneration should be an overarching consideration to permit felling
- Areas having considerable disturbance should not be felled

# Tree fellings / Thinnings

# Canopy class and wild dung presence

Mid-Value	Wild dung	SE	Freq.
0.15	10.52	0.79	6
0.25	11.68	0.71	7
0.375	15.46	1.08	9
0.525	19.56	2.75	12
0.65	47.86	19.30	29
0.725	33.92	14.03	20
0.825	15.22	7.21	9
0.925	11.72		7



- After due consideration to regeneration/status, the relationship between canopy class and wild ungulate dung presence should be used as a guide to prescribe the stem removal
- Buffer areas should be managed for wild ungulates at a level which is 30% lower than the optimal levels in core areas
- In general, the relationship between mean ungulate density and canopy class intervals in a sal / tree dominated forests, with polynomial curve fitting shows that the 80% lower bound corresponds to a canopy cover of 43% (computed for sal forests of Central India; similar relationships need to be developed for other forest types to facilitate inference)
- Thus, for sal forests of Central India, the timber harvest in the buffer / corridor area may be permitted in a selective manner so that the canopy cover does not fall below 43% during winter months. This strategy will minimize tigerhuman conflict while permitting selective extraction of timber species
- More openings will permit more light while fostering more regeneration thereby attracting wild ungulates and tigers
- The idea behind buffer / corridor management is to sustain it for gene flow, while not elevating its status to that of core area in terms of wildlife abundance

# **Collection of NTFP**

- NTFP collection should not be permitted in areas with maximum disturbance and unestablished regeneration status, as this would adversely affect the demography of such species.
- The regeneration status of NTFP species in the buffer / corridor area should be compared with its status in the core / critical habitat.
- Collection should not be permitted in areas having endangered arboreal fauna.
- No lopping / felling should be permitted during NTFP collection.
- Collection should not disturb 'canopy bridges' in an area.
- The timings for NTFP collection should be regulated while avoiding early morning or late evening.
- The patterns of NTFP collection should be studied for prescribing ecologically permissible collection.
- The quantum of NTFP collected in an area should be regulated, considering its consumption by wild animals.

- An estimation of the availability of NTFP (fruit / tuber / leaf) should be done (example: for total fruit crop estimation, considering several categories of branches and the number of fruits per branch etc.).
- Fire should not be used to promote new flush of leaves (usually done for Tendu), as this would lead to forest fire.
- Fruit removal affects frugivory, hence fruit tree should be fostered.
- The density of NTFP species in the buffer / corridor area should be compared with their densities in the core / critical tiger habitat. In low density areas such NTFP species should not be permitted for extraction.
- A chart depicting NTFPs collected in various areas within the division over months during a year should be prepared for close monitoring.
- Different parts of a tree / plant / shrub / herb are harvested as NTFP and many
  of them are valuable as medicinal plants. To avoid overexploitation, it is
  important to prescribe site specific indicators for their ecologically sustainable
  management, vis-à-vis the regeneration status.
- The nursery techniques of NTFP species (especially those having medicinal value) should be fostered through the community linked to incentives for growing subspecies.
- Regulation through PES (Payment for Ecosystem Services)

## **Collection of NTFP**

Indicators to avoid over exploitation of NTFP

NTPF part harvested	Indicators
Fuelwood	<ul> <li>Regeneration status</li> <li>Intensity of girdling/cutting of young trees (number of stumps per unit area)</li> <li>Change in the rate of extraction</li> <li>Quantum of dead/fallen twig branches on forest floor</li> </ul>
Leaves	<ul> <li>Reduction in canopy cover</li> <li>Reduction in leaf litter</li> <li>Regeneration status</li> <li>Weed invasion</li> <li>Change in species composition</li> </ul>
Fruit/flower/seed	<ul> <li>Regeneration status</li> <li>Annual productivity per sample tree vis-à-vis the productivity in core/critical tiger habitat</li> <li>Method of harvesting</li> </ul>

	Season of harvesting vis-à-vis requirements of wild animals (fruit/flower/seeds act as 'qualifiers' in a habitat, and their total harvesting would reduce such welfare factors)
Bark	<ul> <li>Girdling</li> <li>Tree mortality</li> <li>Regeneration status</li> <li>Number of dead stems per unit area</li> </ul>
Rhizome	Regeneration status

# Fuel / fodder collection

- (a) Grazing should be regulated in a rotational manner, and prophylactic immunization should be done for village livestock.
- (b) Since the unrecorded removal from forest exceeds the recorded removal in many States, fuel / fodder collection should not be permitted in disturbed areas or compartments with poor regeneration status. Such areas should be prescribed a 'recovery' period before reopening them for fuel / fodder collection.
- (c) A 'safe lopping index', based on site specific studies should be prescribed for fodder removal on a rotational basis.

# 2 ECO-TOURISM ZONE- (0.37 km<sup>2</sup>)

The eco-tourism in Similipal Tiger Reserve is restricted mostly to the buffer area only. The ecotourism zone extends over 130 km road length, out of which 92 km road length is in buffer covering an area of 0.37 km² which is used for tourism. The park is open to tourists from November till middle of June next year. Only 60 vehicles are allowed entry through two entry gates i.e. Pithabata Check gate from eastern side of the STR and Jashipur entry permit booking counter at the western side. The provision of eco-guide with every tourist vehicle has been made mandatory from both the gates since 2012. Night halts in two places i.e. Gurguria and Jamuani have been provided at present although facilities are available at Barehipani, Joranda and Chahala, which have been put to use for accommodation of tourists earlier prior to naxal attack during 2009. Plans are afoot to provide limited accommodation facilities in eco-villages at Guguria, Nawana and Bareipani G.P.s through involvement of local EDCs

Many spots in the periphery need to be promoted as ecotourism sites. These are Devkund, Ramtirtha, Olkudar, Sitakund, ecotourism site at Salabani near Baripada, Sami briksha etc.

Many new components of tourism have been launched like bird watching trips and trekking from Gudgudia and Jamuani. Facility of elephant ride at Gurguria has been provided to visitors.

The meadow of Chahala, magnificent waterfall at Barehipani, Nawana Valley, bank of the river Budhabalanga near Jambu, waterfall and majestic hills at Joranda, Lulung and the shrine at Deokund attract people far and near. Being one of the finest and the largest TR of the State, it not only attracts the visitors from places like Cuttack, Bhubaneswar, Sambalpur and Rourkela inside Odisha but also tourists from other states of India. A significant number of foreign tourists also visit the Reserve. The TR remains open to visitors tentatively from 1<sup>st</sup> November to 15<sup>th</sup> June of the following year. Ideal season for visit is from November to February. Arrival of tourists attains peak during December and January. Picnicking and camping facilities have been developed in the periphery along the bank of the river Khairi-Bhandan at Ramatirtha, Gurguria, Lulung and Jamuani.

## **Objectives**

In the light of the above mentioned concerns, the aim of the project in Similipal Tiger Reserve would be to integrate an Eco-tourism Management Plan with the major objectives of:

- Understanding any adverse impact caused by the tourism activity in the protected area, with respect to its carrying capacity.
- Identifying the solutions for the adverse impacts on protected area due to tourism activity.
- Devising strategies for implementation and monitoring of these solutions along with the authority of implementation and the time frame for sustainable ecotourism management.
- Studying the impact of tourism on local flora and fauna.
- Preparing a framework for effective community participation in the tourism activities.
- Preparing a framework for effective management of visitors inside the sanctuary.
- Economic valuation of the park which could be used for determining the visitors' entrance fee and feasibility of various tourism development activities to be undertaken.
- Promotion of tourism in buffer and adjoining areas with new avenues to reduce the tourism pressure on the core area.

# **Strategies:**

## **Development of Infrastructure**

There are two entry point counters existing at Jashipur and Pithabata. The visitors can obtain entry permits with usual fees either of these booking counters. Movement of tourist vehicles inside Similipal TR is allowed from sunrise to sunset. Guide facilities are available both at Jashipur and Pithabata on usual payment. There are adequate guides at present to guide and facilitate the tourists inside the TR properly. The following infrastructures are available and have been developed within the TR as per National Wildlife Action Plan (2007-2016). Accommodation facilities such as rest houses, dormitories, villas and tribal cottages are available inside the Tiger Reserve at Chahala, Bareipani, Joranda, Nawana and Gurguria and outside the TR at Lulung, Jamuani and Ramatirtha. After the naxal attack during 2009, the accommodation facility at Chahala, Joranda, Lulung & Bareipani has not been put to use. The other rest houses at Nawana and Gurguria are occupied by police authority to monitor and control naxal activities hence not being used. Only recently since 2011-12, the accommodation facilities at Jamuani and Gurguria have been reopened to tourists. Accommodation beyond three consecutive nights inside the TR is not permitted to any group or person. Accommodation facilities at Jamuani are presently managed by the Forest Department where as the tourist complex at Gurguria and Ramtirtha has been outsourced to a private company for management. The facilities for night staying tourists are inadequate and there is a scope to add extra facilities at Gurguria and Jamuani with minimum inputs. Existing accommodation facility available but now defunct at other places like Joranda, Bareipani, Nawana, Lulung and Chahala will be revived in due course depending on the prevailing situation.

An eco-tourism society titled as Similipal Eco-tourism Society has been formed in Similipal sanctuary with effect from 21.12.06 and has been registered under Registration of Societies Act -1860, which is an autonomous body to look after the management and promotion of eco-tourism in the district. The bye-law of the society has been approved by Govt. of Orissa. The society will abide by the following rules and regulations in carrying out its business.

# **Problems**

## **Issues inside the Similipal Tiger Reserve**

## 1. Fluctuating tourist population from season to season

The number of tourists varies greatly from season to season. This presents managerial problems for both forest department and tourism facility providers. The number of tourists during the peak seasons is much higher than the

manageable limits and during the off-season the facilities are vacant. Strategies need to be developed to spread out the pressures at the peak times by limiting the time that an individual can remain inside the PA.

# 2. Environmental impacts of tourism

The environmental impact of diesel vehicles is more than the petrol vehicles. The large number of vehicles and the speed at which they travel inside the PAs create problems due to the amount of dust generated. Constant disturbance for the wild animals and reduced visitor experience due to congestion inside the park are other serious problems as unsatisfied tourists who do not get the feeling of being in a wilderness has a long term negative impact on the tourism potential of the site. The constant usage of roads can also lead to erosion of roads, especially in the monsoon season. As very few tourists are allowed to trek on foot inside the park, the ecological impact on the park is directly proportional to the number of vehicles than the number of tourists.

# 3. Concentration of vehicles near a specific point

The bunching of vehicles at specific sites is becoming a serious problem both from the forest department and tourism point of view. From the tourism point of view, serious nature enthusiasts find this over-crowding a bitter experience with noise and too many humans, which destroy the wilderness experience.

## 4. Lack of interpretation facilities on the protected areas' biodiversity values

Interpretation is the art of explaining the character of the places to visitors so that they become aware of the significance and objectives of the PA and develop a desire to support conservation. Interpretation facilities play a very important role in education and awareness building of the tourists arriving at the tourism destination. At present there are no facilities for education and awareness building for the tourists arriving at Pithabata entry gate; although a state of art interpretation centre has recently been developed at Ramatirtha in association with CEE, Ahmedabad.

# 5. Inadequate training of guides

There is a concern about the availability and standard of guides. Tourism in Similipal is seasonal, i.e., for 7 months in a year. During this period also tourist inflow is peak in December and January only, for which most of the guides have to remain jobless after this peak period. The standard of the available guides also need improvement.

#### Issues outside the TR

## 1. No community based ecotourism activities being initiated around the TR

The villages in and around the reserve have not been encouraged to take up tourism activities at community level and thus earn an alternative means of livelihood. As the agricultural and cattle rearing activities around the protected areas are not economically viable, people are in search of activities that can earn them sustainable means of livelihood.

Community participation is a vital component of ecotourism web, but this aspect seems to have been obliterated behind other components. It can play a vital role in not just the environmental conservation, but may hold the answer for livelihood issues in resource rich, yet economically poor rural set up near by the protected areas.

## 2. Lack of coordination between different stakeholders of tourism activity

The forest department controls the management of the tourism zone, while the tourism activity is under the management regime of the tourism department with private operators playing an important role. This leads to confusion as regards to the respective roles of each department in protected area based tourism. The confusion also exists on the prioritisation of functions of a protected area: i.e. biodiversity conservation or tourism generation. This debate arises due to the lack of coordination between the two government departments. The same lack of co-ordination exists between the other stakeholders of tourism activity like the hoteliers, local administrative bodies and local people.

# 3. Marketing of the Tiger Reserve for animal sighting

It also affects the visitor's overall viewing experience; people are known to get dejected or even angry when they do not sight an animal. Guides have to face constant criticism for not being able to show the tourist an animal. As the diversification of tourism is restricted due to the lack of multi-dimensional activities of recreation, the variety of tourists arriving at the destination sites is also constrained. Well-informed wildlife and ecotourists are less averse to such situations even if disappointed. This problem needs proper attitude building at the tourist level.

The STR management envisages a strategy where tourism will be encouraged in the buffer and adjoining areas. Only tourists shall be permitted into those areas along the existing tourism route, where minimal infrastructure is already available at present. No further tourist infrastructure shall be developed anywhere inside the core area.

# Tiger Conservation Foundation and Management of Community Based Ecotourism Programmes

Similipal Ecotourism Society (SES) had been created in 2006 as a registered Society for development of tourism activities in and around Similipal Tiger Reserve. With formation and functioning of Similipal Tiger Conservation Foundation with effect from 28.06.2012, proposal has been submitted for dissolution of the SES and transfer of its funds to Foundation for management of Ecotourism.

# Tourism activities at present

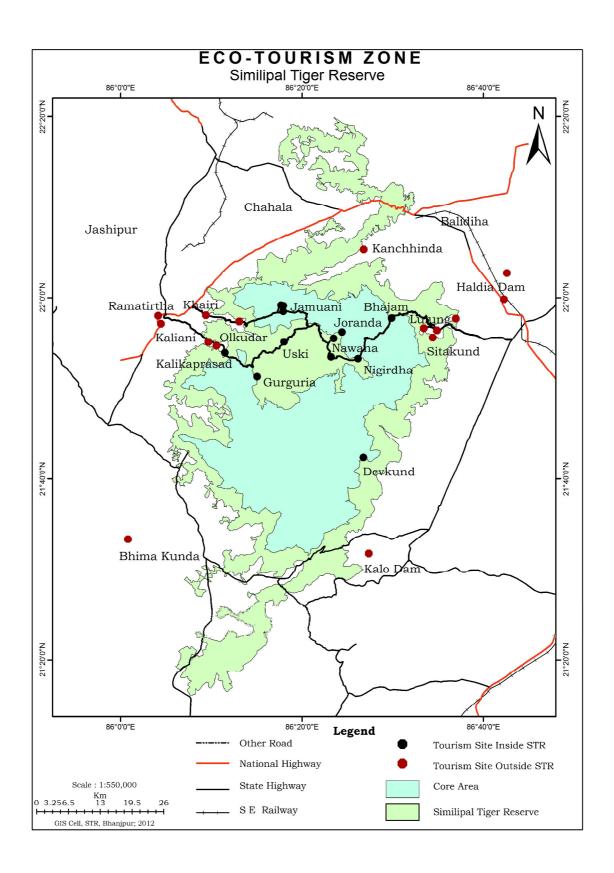
#### 1. Places of Tourist Interest

#### Chahala

A royal forest resort from Maharaja times with a sprawling meadow and a saltlick for observing animals from a hide

## Ramatirtha-

Situated on the confluence of Khairi and Bhandan rivers emerging from Similipal, Ramtirtha is a place of worship attached to the sentiment of Hindus due to its mythological importance. It is a place of picnic with an Astral garden and Mugger Research Centre. Accommodations for the tourists in cottages with catering facilities are available throughout the year.



## **Gurguria**

On the bank of River Khairi with planned landscaping and surrounded by wooded hillocks, Gurguria gives the feeling of a hill station. The Orchidarium with 63 indigenous orchids in pots is very attractive during summer when it flowers. The main attraction is elephant ride and hill trekking. Accommodation with catering facility and conference hall are available.

#### **Barehipani**

Resemble the shape of a rope locally known as Barehi. The rolling waterfall with a height of 217 mtrs presents a majestic view with reverberating sound in the gorge from where the River Budhabalanga runs to the plain land. Tented accommodation in a natural environment is enjoyable during winter and summer.

## Joranda

The waterfall from a height of 181 mtrs touches the ground on the gorge perpendicularly. Tourist cottage with cooking provision was available prior to 2010. Elephants, Chital and Sambars frequently visit saltlick near the campus as the sun sets in the nature unfolds the beauty through vast stage of green lush vegetation. A watch tower with glass house available for observing wild beauty of forests.

## **Sitakund**

A place of religious importance for Hindus, is a site of attraction for picnickers due to the picturesque beauty of a small waterfall and a gorge filled with water.

#### Lulung

Lulung is situated at the entrance of the park on the bank of a tributary to River Palpala with perennial water flow. The crystal clear water with pebble of different sizes on the river bed and dense forest on both sides of the River wins the heart of the people to assemble for picnic. A tourist lodge run by Orissa Tourism development Corporation caters the needs of the tourists.

# **Deokund**

Deokund is a located on the bank of River Deo, while meandering on the hills, place of worship by the Hindus. The temple of Goddess Ambica was built up by the royal dynasty of Mayurbhanj in ancient period. The cascade touching the base of the temple falls on a gorge where the River rests awhile and further follows its course. It is the most lovable picnic spot.

## <u>Olkudar</u>

Olkudar is situated 5 Kms far from Kaliani Gate in the right side direction. There is a waterfall falling from a height of 20 meters on rocks and looks very scenic. The Olkudar waterfall needs a wide publicity and approach roads and site development.

#### **Samibrukshya**

Samibrukshya is place of worship of Lord Shiva near Podadiha of Baripada Division. A Shiva ling is naturally sprouted from the ground and thousands of devotee visit here in rainy season.

#### **Kalo Dam**

It is near to Samibrukshya on Kalo river . Thousands of picnickers visit Kalo dam from Baripada and outer skirts during November to February . Tons of garbage and plastic bottles are dumped in the lower bank of the river by local toursts

## **Haladia Dam and Jambhira Dam:**

Similarly as above thousands of picnickers visit Haladia dam near Kuchei and Jambhira Dam near Deuli of Baripada Division from Baripada /Balasore town during November to February. Tons of garbage and plastic bottles are dumped in the lower bank of the river by local toursts

#### Suleipat Dam:

There is beautiful Dam found at Badampahad R.F. of Rairangpur Division and a major picnic site. Tourists from Baripada, Rairangpur, Karanjia and from Jamshedpur visit the place during November to February. Tons of garbage and plastic bottles are dumped in the lower bank of the river by local tourists.

## **Balidiha Dam:**

There is a small reservoir of about 1 acre submerged area found near Balidiha of Baripada Division used by tourists as a picnic site. Tourists from Baripada ,Rairangpur visit the place during November to February. Tons of garbage and plastic bottles are dumped at the site by local tourists.

#### Sankarmara Dam:

There is small reservoir submerging about 1.5 acre found on the way in Baldiha-Bhuasuni road used by tourists as a picnic site. Tourists from Baripada, Rairangpur visit the place during November to February.

## **Nedam Dam:**

This is also a small reservoir covering 6 acres of area near Nedam village of Sorishaphal G.P. made for irrigation purpose but it attracts hundreds of tourists during winter and the scenic view of hills, reservoir water and forests are the key attraction of the site.

## Kanchhinda

It is a scenic place well surrounded by hills and near to Bangiriposhi .The place is picnickers' paradise and thousands of them visit every year for recreation purpose.

## Talabandha:

A valley present at the foot hill of North Similipal is a place of scenic beauty near Talabandha, which attracts hundreds of visitors in winter.

#### **Baribeda:**

Near Baribeda village, a big water pool is full of freshwater fishes of 10-15 K.G. weights are the key attraction of tourists. The tank is known as Brahmankunda. And thousands of local tourists visit the site every year.

#### **Eco-Park**, Manchabandha

It a recent project on natural sal forest nature park, six kilometer away from Baripada on the way to Balasore. People visit this site for picnic and recreation. The sal forest, nature trails, small reservoir gives pleasant feeling of natural habitat of wildlife.

## **Tribal Dance of Mayurbhanj**

Most of the tribes of Mayurbhanj are culturally affluent with folk dance, tribal ethnic dance, tribal songs and rituals. The eco-tourists have keen interest to see the life styles of these forest living people. The famous tribal dances of similipal are Chhow, Dantha, and Bahabanga Dance of Santhal tribe . Pinkali, Bahabana, Kathi dance of Kolha tribes. Changu dance of Bathudis, Khadia folk dance and Mankidia Folk dance. Bhuiyan dance of Bhuinya tribes are famous and worth viewing.

# 2. Tourist Entry points

There are two entry points for tourists, Pithabata and Jashipur. Entry permits are issued at the booking counter there. Entry to Devkund and Sitakund sites are managed by local committees.

#### 3. Vehicles

Private vehicles (4 wheeler, SUV) are allowed to enter the park. Cars are not allowed due to road condition. Maximum 60 vehicles are allowed per day, i.e. 20 vehicles from Pithabata and 40 vehicles from Jashipur. Over a period of 5 years, it is contemplated to allow only specifically designed petrol vehicles to be provided by the local inhabitants to ply within the zone for tourism purposes.

#### 4. Guides

Tourist guide service is available at Pithabata and Jashipur. Guide services have been made compulsory for all tourist groups.

#### 5. Accommodation

Night stay facility is available at Gurguria and Jamuani in side the park. Another facility for accommodation is available at Ramtirtha near Jashipur. The detail of availability of accommodation in those places is given in Annexure XXXVII. Apart from these, private hotels are available outside the park at Jashipur and Baripada.

# 6. Elephant ride

Elephant ride for tourists have been started in 2012 at Gurguria between 9 AM to 11 AM every day.

# 7. Trekking

Trekking has been started in a small scale at Jamuani.

# 8. Souvenir shop

Souvenir shops have been opened at Pithabata and Jashipur/ Ramtirtha for promotion of local handicrafts and small souvenir items with Similipal logo. Local women Self Help Groups have been entrusted with the management of the shop at Jashipur.

# 9. Timing

Booking counters remain open from 6 AM to 9 AM. The day tourists have to leave the last gate of the park by 5 PM.

#### 10. Tourist season

The park remains open for tourists from 1<sup>st</sup> November to 15<sup>th</sup> June.

# 11. Entry Fee

# Entry fee

Person/Day	Fee(in Rs.)
1) Indian Citizens	40
i) A group of 10 or more@	per person 30
2) Foreign nationals	1000
i) A group of 10 or more@	per person 200
3) Students	20
i) A group of 10 or more@	per student 10
For conducting scientific researed i) Indian	ch : 30
ii) Foreign national	450
5) Children below three years	Free
6) Physical handicapped	Free
7) Jeep/Car/LMV per day	Rs.100.00 per vehicle per day
8) HMV/2-wheelers	Not allowed

Separate fees are also levied for trekking, photography and video shooting. All the tariffs mentioned here are revised from time to time by the Government. Other fees are as follows:

# (A) Trekking/nature trail

Indian Rs.20/- per head/day over and above the entry

fee

Foreign National Rs.100/- per camera for first 3 days & Rs.40/-/day

thereafter.

# (B) Still Camera

# (a) Amateur photographer

Indian Rs.20/- per camera for first 3 days & Rs.10/-/day

thereafter.

Foreign National Rs.100/- per camera for first 3 days & Rs.40/-/day

thereafter.

# (b) Professionals

Indian Rs.50/- per camera/day

Foreign National Rs.400/- per camera/day

# (C) Cine camera smaller than 35 mm.

## (a) Amateur

Indian Rs.200/- per camera/day

Foreign National Rs.1000/- per camera/day

(b) Professional

Indian Rs.1000/- per camera/day

Foreign National Rs.10,000/- per camera/day

# **Community Based Ecotourism Programme**

Community based eco-tourism is important in the present context. The host community will be actively involved in conservation and eco-tourism planning. Professional and technical training would be imparted to the local people which would ensure them a sustained income from eco-tourism initiatives, apart from according a priority status. At present, in Similipal, the involvement of local people in eco-tourism is as below:

- as route guides
- as vehicle owners/ small tour operators
- as small cafeteria owners
- as petty shop keepers
- as small scale lodge owners

There is more scope for involving the local community in several activities, viz. owners of modest tourist accommodation, catering (ethnic dishes), souvenir making, cultural events and the like. There are several examples of local community involvement in eco-tourism,

An eco-tourism package has been proposed for the Buffer Zone, which would shift the tourism pressure from Core Zone. The proposals form a part the site-specific eco-development programme evolved in a participatory manner with the indigenous people from villages peripheral to the park. Eco-tourism is visualised here as an important source of income for the host communities living close to the

Protected Area, compensating for the curtailment of their access to the PA, and as an incentive for wildlife conservation. The Govt. of Odisha have laid down the guiding principles for constituting Eco-development Committees (EDC), apart from microplanning through these committees, to ensure the active participation of the local people for forest protection and rehabilitation. The package addresses both to the indigenous host communities and the visitors (urban/rural).

# **Proposed Ecotourism Plan**

# **Objectives of Eco-Tourism In Buffer and Adjoining Area**

The Similipal Tiger Reserve being an ecologically significant area has envisaged following objectives for ecotourism to be carried out in buffer zone to-

- Minimize the impact of tourism on wildlife and its crucial habitat.
- Maximize recreational experience of the people through various activities.
- Increase visitors concern for nature conservation.
- Create a sense of belongingness and public support for the conservation.
- Create opportunities for the local people to compensate for their sacrifices for conservation.
- Enhance the livelihood of the local people including the unemployed tribal youth by involving them in the tourism activities.

## Management of impacts from wildlife tourism

As is mentioned earlier, the main objective is the conservation of habitat and wildlife and tourism is a secondary off-shoot, that need to be carefully planned in order to minimize its negative impact on the conservation. The nature and magnitude of impact of eco-tourism on wildlife is likely to be influenced by many variables, including the type of activity, the sensitivity of the ecology of the area. However it is a difficult task to know and evaluate all the impacts. Little quantitative information exists about the type, scale and significance of the environmental impacts arising from wildlife tourism. There is, however, some acceptance that negative impacts will result from tourism-induced change. Therefore, the reserve management must be sensitive to the need to control the impacts arising from tourist activities.

# **Involvement of local communities**

Tourism in a wilderness area can be a two-edged sword. With proper planning and slow growth, eco-tourism can both benefit the local economy and preserve the resource base. If local inhabitants can be assured some economic

benefits from eco-tourism, as well as continued necessities such as food, fuel, and land tenure, eco-tourism can integrate conservation and development.

The present level of involvement of local communities in the activities of Similipal Tiger Reserve is barely conspicuous. There is a need to do the stakeholders analysis correctly. The local communities make lot of sacrifices of their developmental needs for the sake of conservation and their sacrifice need to be adequately compensated by involving them; creating livelihood opportunities for them and also by channelizing the resource generation in a way that it helps them in meaningful livelihoods.

An institutional mechanism need to be developed for this sort of partnership which gives scope for local level small innovations. As far as eco-tourism is concerned the local participation can be achieved by the activities like

- 1) eco-guides by skill up-gradation and proper training of local youth.
- 2) Self help group for catering and canteen services.
- 3) Sanitation and support services.
- 4) Maintenance of eco-tourism facilities.
- 5) Eco-development activities by identifying specific target groups.

## **Spectrum of Activities Envisaged**

The following ECO-TOURISM activities are envisaged

- Package tour cum trekking in pre defined routes for wilderness visits in selected locations of the buffer zone with specially designed vehicles.
- Package tour for children.
- Open jeep rides for exclusive, high-end wildlife enthusiast.
- Short nature walks with appropriate interpretation.
- Orchidarium.
- Butterfly park.
- **Eco-interpretation.**
- Education talks and power point presentations by experts.
- Wildlife documentaries.
- Nature camps and eco-awareness camps.
- Elephant ride on a limited scale.
- Machan and watch tower views.
- Birding and bird watching excursions.
- Camping in tents at specified camp sites.
- Nature photography and guided tours.
- Cultural tourism and peep into local tribal's lifestyle.
- Visitor book and two-way feed back system.
- Competitions for school students.
- One day with Mahout.

- Trekking.
- Package tour for wild venture for eco-tourists.

#### Possible outcome of the eco tourism

- 1. Improved protection status
- 2. Continuity of anti-poaching operation
- 3. A motivated team of officials matching the task
- 4. Increased visitor satisfaction level
- 5. Increased public support for conservation.
- 6. Maximizing visitors enjoyment.
- 7. Creation of stakes of local communities in park management.
- 8. Direct benefit accruing out of educational programmes for various user groups.
- 9. Increased revenue forecasts.

## **Stakeholders Participation**

Ecotourism requires cooperation between various stakeholders. Consultation with the stakeholders is an essential process of development of an ecotourism plan.

<u>Local Communities</u> understand impacts of tourism and take considerate decisions, offer services for employment and supplementary income. They own and operate ecotourism enterprises.

TourismDepartmentpromote destinations, develop appropriate infrastructure, enforce and monitor policies and strategies, establish standards and implement certification programmes, ensure local involvement, compile and disseminate tourism figures.

<u>Forest Department & Protected Areas</u> define objectives and acceptable levels of impact, develop management plans and practices, regulate access and enforce environmental laws, monitor impacts and promote interpretation programmes.

<u>Private Sector</u> develop and market tourism products (activities, facilities and destinations), implement good practices, proactively support conservation and community development, ensure product consistency and client satisfaction.

NGOs & Academic Institutions offer information, training and technical advice, collect information to monitor and evaluate ecotourism, foster linkages between various stakeholders, undertake action research and develop materials for interpretation programmes.

<u>Government</u> develop policies, strategies, land use plans and regulations, define jurisdictional mandate and responsibilities of different agencies,

provide mechanism for participatory planning and finance for project implementation, ensure environmental protection and visitor safety, determine fees commensurate with visitors willingness to pay.

#### **Tourism Zone**

The details of Tourism Zone in buffer area have been described in Chapter 7 of Buffer Area Plan.

## **Development of Trekking Path**

The following trekking paths will be developed. Suitable local youth will be trained as nature guides to accompany the eco tourists in the trekking.

1.Kaliani-Olkudar	( 5 Kms)-	Karanjia Division
2.Jamuani-Rajupal	(6.5Kms),	Rairangpur Division
3.Pithabata-Sitakund-Lulung	(9Kms)	Baripada Division
4.Jamuani-Brundaban-Chahala	(13kms)	Rairangpur Division/STR
5.Ramjudi-Kiajhari	(5Kms)	Karanjia Division
6. Duar suni-Khadambeda	(10Kms)	Rairangpur Division
7. Mahuldihi – Baniabasa	(6Kms)	Baripada Division
8. Keshdiha-Mandaljhari	(8Kms)	Karanjia Division
9.Gurguria-Barigaon	(5Kms)	Karanjia Division
10.Nedam to Brahmankunda	(5Kms)	Baripada Division

#### **Development of Tented Accommodation**

Tented accommodation facilities will be developed for exclusive nature lovers at Jamuani, Gurguria and Pithabata. Four nos of tented accommodation have already been constructed at Jamuani. The activities for tourists would include trekking, elephant riding, bird watching apart from visiting of scenic spots.

# Eco village stay

Three nos of Eco-villages are proposed to be created at Nawana, Gurguria and Barehipani. The design of the Eco-villages will be as model tribal village with all basic amenities. The facilities will be managed by local EDCs in collaboration with the Tiger Reserve Management. They will provide ethnic foods, run gift shop of local artefacts and act as nature guides for the tourists. They will also organise tribal cultural shows for the tourists.

# **Development of Ecotourism sites outside Similipal Tiger Reserve**

The following sites outside Similipal Tiger Reserve will be developed as ecotourism destinations. Infrastructures as per siterequirement will be developed.

- 1. Ramtirtha
- 2. Jamuani
- 3. Olkudar
- 4. Bhimakunda
- 5. Samibruksha
- 6. Kalo Dam
- 7. Haladia Dam
- 8. Jambhira Dam
- 9. Suleipat Dam
- 10. Kanachhinda
- 11. Balidiha Dam
- 12. Sankarmara Dam
- 13. Nedam Dam
- 14. Talabandha
- 15. Baribeda
- 16. Manchabandha Eco-Park

# Training of nature guides

At present due to seasonal fluctuation in tourists flow, the guides are not getting year round engagement. After development of more tourist sites and with diversification of ecotourism activities the requirement of the services of nature guides will increase manifold. Local youth will be selected and will be given quality training to cater to the need of various kind of tourists. Educated nature guides will be created to cater to overseas tourists. The guides will be trained on bird and tree identification, skill in English and other languages, knowledge of local culture, oratory skill, etiquettes etc.

# **Regulation of Vehicle**

The plying of outside and private vehicles will be gradually reduced. It is proposed to initially procure four vehicles departmentally with funding from District Administration or other sources for transportation of tourists.

## **Souvenir Shop**

At present two souvenir shops are running at Jashipur and Pithabata near the tourist booking counters promoting local artefacts and souvenir items. Local women SHGs have been involved in managing the Souvenir Shop at Jashipur. One new souvenir shop will be opened in side Tourist complex at Ramatirtha which will also be managed by local SHG/EDC. Local artisans will be given skill development training on making of artefacts out of bamboo and sabai grass and their products will be marketed through the SHGs/EDCs at the souvenir shop.

# **Surveillance at Entry Gates**

Surveillance will be increased at all the entry and exit gates with installation of close circuit cameras. One pair of cameras has already been installed at Kaliani Entry Gate.

# **Infrastructure Development**

The details of infrastructure proposed to be developed at different tourist spots as well as proposed new spots have been given in Annexure LXIII. Apart from these it is proposed to develop the office establishment of Deputy Director, Tourism & Research at Jashipur with the followings.

- 1. Office of the Dy. Director, Tourism & Research
- 2. Residence of the Dy. Director, Tourism & Research
- 3. Six nos staff quarters
- 4. Visitors' Orientation Hall

#### **Eco-Tourism Guidelines and Constitution of Park Welfare Fund**

On 15.10.2012 NTCA have formulated a comprehensive guideline for management of eco-tourism in tiger reserves called as the National Tiger Conservation Authority (Normative Standards for Tourism activities and Project Tiger) guidelines, 2012. Govt of Odisha vide Notification No 14990 Dated 08.08.2012 have issued the Odisha Forestry Sector- Eco-tourism Policy (Appendix LXiV). The prescriptions of the above guidelines will be followed while managing eco-tourism activities in and around Similipal Tiger Reserve.

Following regulation are suggested for different categories of stakeholders

## For the Park Management

The following operational guidelines are proposed:

- The eco-tourism planning should be flexible, site-specific and participatory, and should form part of a larger eco-development/ eco-regional plan for the area
- Assessment of existing infrastructure, surface transportation, air service, road, electricity, water supply, law and order situation

The eco-tourism package should invariably include: Simple, adequate boarding and lodging facilities, in tune with the environment and the general setting of the landscape □ Road network within the identified tourism zone □ Self - guided Nature trails Transportation options Interpretive Centres Way-side exhibits ■ Signage Observation towers Public conveniences Garbage disposal facility □ Living quarters for staff/ personnel Structures with an exotic look causing visual pollution and non-compatible and unaesthetic architecture should be avoided • Site-specific micro - planning for community based eco-tourism should be resorted to Facilitating soft-loans for identified beneficiaries • Temporary housing structures blending with the surrounding should be encouraged • Environmental, physical & social carrying capacities to limit the various developmental activities in the fringe area to be identified for eco-tourism • Mechanism to ensure continuous monitoring of adverse effects of tourism for quick redressal should be devised Recognize eco-tourism operators, provide incentives to deserving cases and award quality labels • Provide visitor information & interpretation services (bilingual) covering: "Do's" and "Don'ts" ■ What to see? □ Where to see?

(Brochures, leaflets, guide service, visitor centres)

- Periodic training programmes on eco-tourism should be conducted for tourism administration, planners, operators and general public
- Ensuring training programme to the host community in:
  - □ Lodge ownership/ management
  - Basic education and awareness
  - Health and sanitation
  - □ Skill development for preparation of local souvenirs as appropriate
  - Codes of conduct
  - □ Forest and wildlife conservation
  - □ Litter control
  - □ Forging partnerships with tourists & tourism industry
  - □ Environmental management
- To evolve and implement eco-tourism package in a few selected sites initially as pilot projects

# **For Tour Operators/ Developers**

- To abide by the planning restrictions, codes and standards prescribed by the authorities
- Implementation of desired environmental principles through regulation
- Conducting EIA/ environmental audits for new/ ongoing eco-tourism projects
- Being sensitive to the conservation of endangered species & corridor value of the area
- To ensure construction of structures blending with the environment as per the prescribed building code
- To take into consideration the carrying capacity and sociological use-limits of the site while creating tourist facilities, and ensuring safety & convenience of tourists
- To use local material and design as far as possible, while avoiding over construction
- The planning, architectural design and construction of tourist facilities should use eco-friendly techniques viz., solar energy, recycling of garbage, harvesting of rain water, natural cross-ventilation, self-sufficiency in food through kitchen garden & farming
- Energy & water saving devices should be used apart from controlled sewage disposal
- Control of noise pollution, chemical pollution and air emissions
- Use of signage/ boards as per the standard prescriptions in the code

- Reduced use of environmental unfriendly items like asbestos, CIS, pesticides, inflammable material
- Respecting the historic and religious sites in the area
- Providing appropriate interpretive service to visitors for communication with nature & local culture
- Ensuring proper marketing of eco-tourism products
- Ensuring training of staff on environmental issues
- Ensuring safety and security of visitors
- Respecting local inhabitants, culture & involving them in various activities and vocations as far as possible

## For the Visitors

- Abiding by the code of conduct, "Do's" & "Don'ts"
- Helping conservation, apart from protecting any site natural or cultural, which may be adversely affected by tourism
- Avoiding wastage of resources
- Avoiding littering & carrying back all non degradable litter
- Leaving the camp sites clean before departing
- Avoiding removal of plants, seeds, drift wood from the site
- Respecting local culture/ customs
- Respecting holy places
- Strictly adhering to the safety precautions

# **For the Host Community**

- Respect the value of environment and cultural heritage
- Avoid overusing the area
- Co-operate with the authorities in ensuring healthy eco-tourism
- Realize and react to the threat of investors who see opportunities and exploit the locals
- Be friendly with the visitors as effective "nature guides" & "conservationists"

# **Carrying Capacity**

# Estimation Of Carrying Capacity Of Similipal Tiger Reserve (AS per NTCA guidelines)

# A) Physical Carrying Capacity (PCC)

#### Criteria:

- Vehicular movement is permitted on forest roads only.
- There is a required distance of at least 500mt between 2 vehicles to avoid dust.
- At least 4 hours are needed for a single park excursion.
- Similipal Tiger Reserve is open to tourists for 7 months in a year and 11 hours per day.
- Total 130 Kms roads are opened for tourism.

PCC = 
$$A \times v/a \times Rf$$
  
Where A = 130 Kms  
 $v/a = 2$  vehicles / Km

Rf (Rotation factor) = Opening period = 
$$11 \text{ hours}$$
 = 2.75  
Avg. time of one visit 4 hours  
PCC =  $130 \times 2 \times 2.75 = 715 \text{ visits / day}$ 

## B) Real Carrying Capacity (RCC)

RCC = PCC × 
$$\underline{100 - Cfe}$$
 ×  $\underline{100 - Cfw}$  ×  $\underline{100 - Cf1}$   
 $\underline{100}$   $\underline{100}$   $\underline{100}$ 

$$= (20 \times 2) + (10 \times 3) / 130 = 53.8 \%$$

Cfw (Disturbance to wildlife)

Eimiting months /yr 100
Tourism months / yr

Cfw<sub>1</sub> (spotted deer) = 
$$(2/7) \times 100 = 28.6 \%$$

Cfw<sub>2</sub> (tiger) = 
$$(2/7) \times 100 = 28.6 \%$$

$$Cfw = Cfw_1 + Cfw_2 = 57.2 \%$$

 $Cf_1$  (Temporary closing of road) – For maintenance and other managerial reason, 2 weeks may be taken into account.

Total weeks / yr opened

$$=$$
  $(2/28) \times 100 = 7.1 \%$ 

$$RCC = 715 \times 100-53.8 \times 100-57.2 \times 100-7.1$$

100 100 100

= 127 visits / day.

# C) Effective Permissible Carrying Capacity (ECC)

Owing to storage of staff, inadequate infrastructure, the management capacity (MC) is taken as 50 %.

= 127 × 50 %

= 63.5 or 60 vehicles / day

Hence, the Effective Permissible Carrying Capacity for Similipal Tiger Reserve for a single day is 60 vehicles per day.

# **Park Welfare Fund**

A portion of the revenue generated from tourism and deposited with the Foundation will be kept apart for park welfare which will be decided by the Executive Committee of the Foundation. The Park Welfare Fund will be utilised for prosecution expenses, collecting secret information, expenses for functioning and administration of Eco development programmes in Tiger Reserve, contingencies in day to day functioning, medical relief to staff and EDC members, organizing protection camps, publicity and extension of Eco tourism programmes etc.

## **Interpretation Programme**

A properly designed PA interpretation program would serve to awaken public awareness of the park purposes and policies and develop a concern for its protection. It would also educate the visitor to appreciate the importance of the PA to the region and the nation and thereby create a constituency in support of the PA. This group can become an important ally in lobbying for political support for conservation.

One Interpretation center has been developed at Ramtirtha in technical assistance with CEE, Ahmedabad to educate the visitors on the PA, the objectives of the PA and the policies that govern its management. It is also proposed to develop another Interpretation Centre though in a small scale, near Pithabata Entry Gate.

There are a number of techniques available to communicate information about the PA. The following are widely used methods for communicating with visitors:

- brochures and leaflets
- signage
- · specialized guides and checklists
- nature camps
- self-guided and guided trails and tours
- audio-visual presentations
- field demonstrations and
- exhibits etc.

However it must be recognized that for maximum effectiveness, these programs must be simple, easy to interpret and understand, in the local language, directly related to the local situation, with low technology inputs and costs, and easy to maintain.

#### **Nature Education and Awareness**

Considering the immense volume of problems and seriousness of measures that need to be taken to conserve bio-diversity, socio-economic and cultural diversities of communities residing inside and outside the Park, a comprehensive strategy on Education and Communication at various levels is proposed. Such an education it is felt, would bridge the gap between the Park staff and the communities, build better working relations, coordination and enhance the role of stakeholders.

All sections of society are involved, directly or indirectly, in harvesting resources, in managing the resources and in making decisions on resource planning. Thus, target audience for Environmental Education would necessarily encompass all ages and all levels of education and society. Any strategy for Environmental Education must necessarily be multi-pronged reaching out simultaneously to the different target

groups through different methods, approaches and media. Thus, a strategy for Environment education has to be integrative, problem oriented, practical, continuous and diversified. Target groups identified are as follows:

- Communities residing within and in the fringe villages of the Park.
- Park Managers
- Personnel from other Government departments
- Non Governmental Organisations (NGO's)
- Visitors
- Tourist Organisations
- Students
- Decision makers
- Media
- Researchers

#### **EDUCATION STRATEGY & ACTION PLAN**

The Environmental Education strategy is grouped under two categories, awareness and action. Awareness programmes aim at improving awareness of different groups on various issues related to conservation aspects. Action programmes essentially aim at enhancing the skills of different target groups on various technologies and practices and improve the life of local communities which in turn will trigger the action for better Park Management.

The Park would develop its own environmental education and awareness (EEA) strategy and plan. It would include identification of the different issues and target groups to be covered by the program; the nature and type of activities for each target group; the programs to link PA interpretation centers with extension and education; linkages with other EEA programs of NGOs, universities, and schools, and institutional, informational, research, training, man power, financial and organizational needs for its design and implementation.

#### **Activities to be undertaken:**

- i. Community interaction for conservation awareness
- ii. Orientation on bio-diversity conservation and the Ecodevelopment Project
- iii. Educating farmers, women folk, youth, school children and teachers about village eco-development activities, improving skill and change in attitude towards propagation of non-conventional energy devices.

- iv. Educating the elected representatives of the local self Government to involve themselves in the project.
- v. Building a rapport between the villagers and the PA authorities.
- vi. Conduct street plays in different villages using local folk media, to build up an awareness of the project.
- vii. Conduct rallies to spread the cause of conservation.

# **Education Programs for School Children**

Educating school children in TR neighbourhoods on the values and importance of PAs is an effective strategy for getting broad-based long-term support for conservation. School children and youth can be brought to the TR to provide them with an experience and understanding of its role and importance; or the conservation message can be taken to the classrooms (through lectures and talks, audio-visual presentations etc.). The former could use day visits to the TRs and nature camps; or it could involve groups (particularly of higher grade students) in short assignments to get them involved in TR activities (such as setting up nature trails, animal surveys and census, establishing botanical collections or study topics of interest, etc.,). These programs would require simple and inexpensive accommodation facilities such as dormitories or tents.

# "Friends of Similipal Tiger" Initiative

It is a new initiative by Similipal Tiger Reserve Management since 2012 to create a group of volunteers from among the school students around the tiger reserve on the "Catch them Young" principle. The objective is to motivate them towards conservation of forest and wildlife so that they will spread the message among their friends, relatives, elders and villagers and desist them from the pernicious practice of poaching of wild animals. Continuous follow up with the volunteers, taking them for nature excursion, group discussion etc are some of the activities to be taken up.

## **Mass Media Campaigns for Creating Public Awareness**

The use of mass media in developing countries has shown phenomenal growth in recent years. India's rapid advance in opening up its markets and liberalizing its economy, is likely to increase enormously the use of radio, television, print media and other communication media. The mass media can and should be used for urban receivers. At this level, schools and universities, policy makers, and bureaucrats can all be successfully reached through distance education and general

programs; the wide reach of mass media gives it enormous potential for disseminating and educating the general public and national and state level decision makers of the country. At the rural level, however, being tailored to local-specific issues, it has less flexibility in providing education and awareness.

# Ongoing activities by STR management

- i. "Friends of Similipal Tigers" initiative involving school students.
- ii. School contact programme and student environment awareness rallies.
- iii. Mass awareness campaigns in villages on forest fire, bio- diversity.
- iv. Nature excursion programme for students in Similipal Tiger Reserve
- v. Training workshop for forest department staff.
- vi. Exposure visit for the trainees to study the flora and fauna of the Park.
- vii. Awareness programme through radio programme "Similipalara Swara".

#### Tourist Feedback and Its Evaluation

Feedback helps in rectification of deficiencies and further improvement of a programme. A good feedback also boosts the enthusiasm of the people involved in implementation of that particular programme. Many factors, which determine a person's enjoyment of a visit to the Park, result from the courteousness and efficiency of staff, provision of information, quality and safety of amenities. To know more about the tourist's opinion, a questionnaire would be most appropriate. Feedback facilities will be made available in the following forms.

- 1. Visitor books will be made available at booking counters at Pithabata&Jashipur, exit check gates and tourist accommodation places at Gurguria, Jamuani, Ramatirtha and also tourist spot at Chahala.
- 2. Feedback format to be uploaded in the official website <a href="www.similipal.org">www.similipal.org</a> where the visitor can fill up the form online.
- 3. Through official e-mail: <a href="mailto:rccfbaripada@gmail.com">rccfbaripada@gmail.com</a> or through FAX to 06792-252593.

# 4 ECODEVELOPMENT ZONE (102.3 km<sup>2</sup>)

The Ecodevelopment zone is confined to 102.3 km² of the village area where mainly agriculture products are produced.

# **Policy and Institutional Frame Work**

The main cause of destruction and degradation of forests is poverty among the people who live in and around forests and are dependent on the forest

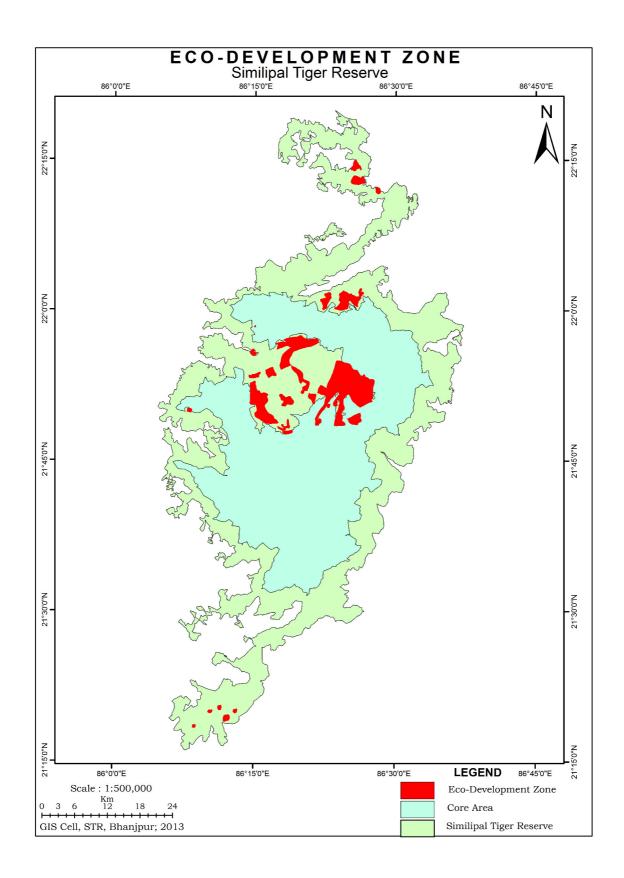
lands for their basic needs. It is true that the problems in wildlife conservation are intricately related to the quality of the local people. Unless this underlying problem is solved, efforts to ensure wildlife conservation can hardly succeed. This means that the conservation efforts should be directed towards solving the problem of people living adjacent to the forests. Involving people's participation in protecting natural resources is a part of the National Forest Policy (1988) of the Government of India. This strategy is also referred to as people's participation/community participation/joint forest management. Jusoff and Majid (1995) while noting the acute problems in conservation when dense rural population exist in the neighbourhood of forests, opined that conservation efforts can't be effective without the active co-operation and participation of people living in and near the forest areas. Experiences in protecting the biodiversity of North-East India also revealed that unless financial income is generated and there is economic stake for the local people the biodiversity conservation goals might not be achieved to the desired level. It is possible to ensure sustainable development has to be ecologically harmonious and economically efficient and must aim at local self-reliance. The South Pacific Biodiversity Conservation Programme (SPBCP) also recommends the conservation of biodiversity goals by facilitating the involvement of local communities and other related government agencies addressing the issues of ecologically sustainable use of natural resources. Of late, the concept of people's participatory approach is in practice for management of natural resources in several parts of the globe.

The policy of Govt. of Orissa on Joint Forest Management framed during 1998 is being followed. EDCs in protected areas and VSS in other areas are being formed. As on December,2012, 161 nos. of EDCs and 680 nos. of VSS have been formed. Confederation of the VSS and EDCs has been formed known as Forest Development Agency in three Divisions. Part of the buffer area is also part of Similipal Sanctuary and a small part of Hadgarh Sanctuary. In addition, the buffer area of the Tiger Reserve falls in the Similipal Biosphere Reserve which was declared on 22.06.1994. Since that time, a variety of eco-development and livelihood-development activities have been taken up. One Eco-technology centre will be established at Nawana which is the central place of the TR with an Eco-development Officer and his assistant.

The Concept of Eco-Development is catching up as an alternative strategy for Forest Protection and Conservation, involving local communities in the management of the Protected Areas. The Kalakad-Mundanthurai Tiger Reserve, Kanha Tiger Reserve have shown leadership in the field and successfully evolved and implemented eco- development strategy and brought up a model of eco-development, which is highly acclaimed. The same model is being adopted and replicated for Similipal Tiger Reserve by making local level adjustments imperative for matching ground level situation.

In STR, about 15,000 people live inside the Tiger Reserve. Hence, the role of Eco-Development committee will be of utmost importance and significance. The Eco-development objectives of Similipal TR have been designed in line with the general theme of eco-development philosophy of KMTR model, that helps effective conservation of the forests through the economic development of the forest fringe dwellers by adopting an active strategy evolved through micro-planning strategy.

The NTCA has issued exclusive guidelines for implementing the buffer zone activities in ensuring co-exisiting agenda.



# 3. Ecodevelopment / PES / Sustainable livelihood / District level local development

- 1) Village level micro planning for benefits to local people on a quid-pro-quo basis (involving VFC/EDC)
- 2) Innovative use of JFM / REDD+/ PES / recycling of tourism gate receipts to Ecodevelopment Committees
- 3) Benefits from district level developmental works (convergence), interalia, covering
  - (i) public health and family welfare
  - (ii) food and nutrition security
  - (iii) education
  - (iv) natural resource management and water security
  - (v) sanitation
  - (vi) roads
  - (vii) energy
  - (viii) housing, and
  - (ix) livelihoods

#### **Institutional Framework**

The institutional mechanism will be adopted in attaining the goal as per the policy of buffer zone, Exclusive staff headed by the Eco Development Officer in the rank of Deputy Conservator of Forests supported by two Ranger and six Foresters are needed to implement the Eco-development activities in the buffer zone. Ecologist and Computer Operator will be needed to support the eco-development officer.

NGO linkage: Sufficient NGOs are available to associate as part of project support team. Project Sociologist,

- Financial empowerment of EDCs.
- Transparency and joint account system; EDC chairman and member secretary jointly operate the accounts.

- People's contribution of 25% in all activities: Government contribution 75% only for all activities.
- Successful mutual trust building and mutual rapport building between the Forest fringe dwellers and Forest department staff.
- Dedicated project team headed by one Chief Conservator of Forests and Field Director and supported by Principal Chief Conservator of Forests and Chief Wildlife Warden by giving a free hand for all field activities.

This can be better achieved through the Similipal Tiger Conservation Foundation.

#### **EDC: Similipal Tiger Reserve**

Similipal Tiger Reserve lies on the North Eastern Region of Odisha. It is surrounded by Baripada Forest Division, Karanjia Forest Division and Rairangpur Forest Division. The heritage of these rich floral assemblages, diverse habitats, terrain, climate, the location along with the tribal communities gives an important scientific, educational, and recreational value for the tiger reserve. The tiger reserve management does not legally allow people to depend on the forest for any resources to be extracted from the sanctuaries wihin buffer areas. Thus, the concept of eco development is catching up as an alternative strategy for forest protection and conservation, involving local communities in the management of protected areas. The KMTR/Pench/Periyar TR have shown leadership in the field and successfully evolved and implemented eco – development strategy and brought up a model of eco – development which is highly acclaimed. The same model is being adopted and replicated for Similipal by making local level adjustments imperative for matching ground level situation.

#### **Vegetation and Important Fauna**

- a) Tropical Dry Deciduous Forests with tall grasses on the hill slopes Key fauna: Gaur, Sambar, Elephants, Tiger, Panther, Hyaena, Sloth bear
- b) Open Grasslands with sparse vegetation on hill tops
  Key fauna: Four horned antelope, Sambar, Hyena, Leopard, Wild dogs, Sloth
  bear
- c) Dry Mixed Deciduous patches along the foothills
   Key fauna: Tigers, Leopard, Sloth bear, Hyena, Elephants, Gaur, Sambar,
   small carnivores
- e) Riverine Forests along the Khairi-bhandan and Budhabalanga,Deo perennial rivers:

Key fauna: Tigers, Leopard, Elephants, Gaur, Chital, Sambar, Sloth bear, Hyeana

#### **EDC Vision**

The aim of Eco-Development is catching up as an alternative strategy for Forest Protection and Biodiversity Conservation Programme, involving local communities in the management of the Protected Areas. Ecological development has to be achieved by adopting a strategy where forest fringe dwellers have zero dependency and resultant impact on the bio-resources of the Tiger Reserve. It will not only conserve the biodiversity, it will help us in achieving the goal of peaceful co-existence of Man and Animal.

# **Livelihood Support Initiatives through Village Micro Plan**

The micro-planning is the essential component of the eco-development and includes involving people in Social Mapping, Resource Mapping, Semi-structured Interview, Wealth Ranking, Institutional Diagram, Past System Of Management, Pair-Wise Ranking, Seasonality Analysis other techniques to understand micro-level situation of the village. The microplan includes community asset building, individual income generation activities, alternate energy and energy conservation devices, biomass regeneration, and human resources development suitable for the area. The micro plan is prepared by Village Forest council, General body members, NGOs and Forester, Ranger and Forest guard.

#### **Micro Planning:**

To be Prepared by	Eco Development Committee, General body members, NGO's		
	and Eco-development Ranger, Forester and Forest guard		
Process	PRA based processed approach		
Approved by	Field Director		
Implemented by	Eco Development Committee		

#### Micro plan includes

- Community asset building
- Individual income generation activities
- Alternate energy and energy conservation devices
- Bio-mass regeneration
- Human resources development

The village eco-development activities drawn out of Participatory Learning & Action based Micro Planning may be of the following kinds:

- a. Entry point activities to enlist the support of the people.
- b. Community asset building to create facilities for the local people.
- c. Micro credit programme to facilitate starting of micro enterprises for attaining sustainable alternative livelihood options focusing on forest dependent people.
- d. Income generation activities, in addition to livelihood options emanating out of PA management like protection, fire-protection and tracing, eco-tourism services *etc*, to upgrade the economic status of the poor.

The eco-development is to be implemented in the Buffer Zone and Zone of Influence of the Protected Area. The efforts must be made to create at least one eco-development committee in each Range to cover all the areas of the core zone and buffer zone.

Ecological development has to be achieved by adopting a strategy where forest fringe dwellers have zero dependency and resultant impact on the bioresources of the Tiger Reserve. It will not only conserve the biodiversity, it will help us in achieving the goal of peaceful co-existence of Man and Animal.

#### **Specific Issues**

The Similipal Tiger Reserve Management does not legally allow people to depend on the forest for any resource within the limits of Similipal Sanctuary as well as Hadgarh Sanctuary save the rights accrued through FRA.. This includes collection of non-timber forest produce like honey, soap-nut, honey and collection of mulching materials from the forest. The resource available in the forest is meant for wildlife. Tribals who depend on the forest for their sustenance traditionally (collection of fuel wood, NTFP, grazing impact, poor land use pattern) they will be given their dues as per tribal rights act only in the buffer zone. The employment opportunities will be given to tribals and local people in fire controlling work and anti-poaching watchers.

#### **Integration of Rural Development Programme**

Good relationship and liaison will be established between other departments such as ITDA, DRDA, Health, Agriculture, Horticulture, Sericulture, Animal husbandry, Public Works Department, Highways, Tourism, etc and the development works will be funnelled to these fringe villages so as to improve their lifestyle and livelihood Improvement. In order to ensure this bondage, the Line

Departmental meetings are to be conducted. The services of the other members in the Tiger Foundation be utilized to achieve defined goal.

Depending upon site attributes (climate, terrain, soils, present patterns of farming, fishing, livestock raising, practices of other resource use, status of conservation/degradation, potential for restoration, variety of non-wood forest products, local skills, existing and possible infrastructure etc.) a holistic site-specific package of measures in an appropriate combination most suited to the given site should emerge as a result of a fully participatory planning process, involving local people, NGOs and government agencies (concerned with land and resource use, and rural development) as conducted by the PA management with the coordinating assistance of district administration.

# A. In Forests, grasslands & Scrub-savannah lands

- (i) Orientation of forestry operations for the concurrent promotion of biodiversity conservation and meeting resource needs and generating employment for local people.
- (ii) Joint management of forests, grasslands and scrub-savannah lands with formalized prior agreements for substantial sharing of (even exclusive claim on) usufruct, in return for direct contribution to protection and conservation.
- (iii) Organized collection of important non-wood .forest products with measures to ensure long term sustenance of productivity.
- (iv) Cultivation and/or organized collection of medicinal plants, essential oil bearing herbs, mushrooms, pepper, cardamom, etc, which is compatible with other forestry objectives, especially conservation and other local interests.
- (v) Preferential and concessional availability of wood and non-wood resources to local people directly participating in conservation of forest and other resources.
- (vi) Pasture improvement through weed suppression/eradication and enrichment planting with complete or rotational closures.
- (vii) Economic employment generation through weed suppression *e.g. Lantana* harvests for pulp, chipboard or basket making on small or cottage industry scale.
- (viii) Harvest of green grass and plant fodder during monsoon in designated areas (if necessary, rotational) in the 'conservation' and 'extension' buffer zones.

- (ix) Harvest of grass at the end of monsoon and providing hay in return for cooperation in observance of regulated grazing/lopping.
- (x) Preferential employment to locals in all the above works.

#### B. In private farms

- Improved dry farming techniques (improved seed, manure/ fertilizer regimes).
- Efficacious water harvesting (surface and ground water).
- Soil conservation measures.
- Preference to cash crops *e.g.* pulses, oil seeds, spices, cotton, medicinal plants.
- Agro forestry.Rubber plantation
- Sericulture & horticulture with assured employment through these on one's own land and from other community works, in order to tide over the 'gestation period'.
- **Chum areas.**:Partial switch over to agro-forestry and/or cash crops (including medicinal plants and plantation crops) with assured employment through these work on one's own land and on other community works, in order to tide over the 'gestation period'.
- Apiculture- Since Similipal Honey has a special preference in the markets of Baripada, Jashipur, Balasore and in major cities of Odisha and nearby West Bengal, Jharkhand, the local variety bees may be reared with proper marketing policy.

# **C.** Minor Irrigation

- (i) Simple diversion or diversion cum storage type micro-minor irrigation schemes will be implemented on the numerous perennial Nallah and streams of Similipal within the ambit of Wildlife Protection Act 1972, including development of village tanks with preferential employment to local people.
- (ii) Lift irrigation schemes using micro-hydel (or grid where available) power or pump sets, based on rivers, reservoirs and wells.
- (iii) Bore well irrigation, where feasible.

#### D. Animal Husbandry, dairying and pottery crafts

(i) Phased reduction in population of scrub livestock and improvement of breed through controlled fertilization of female stock in proper health and age with males of better local breeds, aided by sterilization of scrub bulls.

- (ii) Goatary and sheep raising subject to stipulations suggested under 'A' above and Australian or hybrid of it may be promoted with strict restriction of stall feeding and with proper vaccination.
- (iii) Cooperative dairying with marketing support and proper marketing of The milk, diary products such as Ghee, Cheese, butter, buttermilk at the village level .
- (iv) Support to small scale enterprises based on pottery or terracotta crafts and Marketing at sale points to the eco-tourists.

#### E. Fisheries

- (i) Exclusive rights to organized cooperatives/user groups of local people in all situations, subject to observance of regulations for sustainability and optimal economic productivity especially, closed areas/seasons and mesh size of fishing nets, and cooperation in ensuring ban on use of explosives and other forms of poaching.
- (ii) Marketing support backed by cold storage and appropriate transport arrangements.

#### F. Infrastructure

- (i) Biogas plants/Gasifier/solar power/
- (ii) Wind mills/ Wild power mills (Especially in Kaliani and at Tulsibani/Jamuani area where continuous stream of wind flow towards Northern side which can run the wind mills 8-10 hours in the afternoon to midnight) for energy for cottage industries and local value addition by processing the cerals, nuts, pulses, spices etc..
- (iii) Piped (gravity) supply, hand pump or open wells for drinking water.

#### **G. Cottage Industry & Handicrafts**

(i) Promotion based on local skills with appropriate technological and infrastructure support.

- (ii) Curing/processing of collected/cultivated products *e.g.* medicinal herbs and essential oil for value addition.
- (i) Investigation of potential plants/products by pursuing ethno botanical and ethno zoological studies and rich development for consumption/marketing.

#### **Development Projects**

- (i) Obligated to have a local orientation so that they become part of local area development and in no case upset local people's resource equations, Appropriate compensation/alternatives to be built into project costs.
- (ii) Obligated to compensate by providing inputs into site-specific packages of ecodevelopment measures *e.g.* lift irrigation along reservoir and along the river upstream and downstream.
- (iii) Obligated to allow (where admissible  $vis-\dot{a}-vis$  the PA) local people to farm in draw down areas by providing lift irrigation facilities.
- (iv) Preferential employment to locals, if necessary after arranging education and/or training.

# **Monitoring and Evaluation**

The entire eco-development programme shall be monitored by the Deputy Director on a regular interval vis-a-vis the course of action on spatial and temporal grounds and subsequently once in 3 months by the Field Director and Chief Conservator of Forests. The success of the programme depends upon creation of active and vibrant eco-development committees that can be ensured by proper monitoring. It may be appropriate a set of monitoring parameters that can be used for the purpose of reporting on periodical basis. NGO's could also be involved in monitoring and implementing the program. Those NGO's that are involved in monitoring the eco-development program should interact with people at regular interval and discuss the problem faced by them in implementing the program this will help in sustainable development of eco-development committee. At the same time evaluation of the programme will give chance for correction at different stages as also the real impact of the programme to achieve the desired objectives. The evaluation can better be done with the help of an internal or external system. A monitoring proforma can be developed for evaluation.

# **Implementation Strategy**

# **State Level Monitoring Committee**

The entire eco-development programme will be monitored by the Field Director on a regular interval vis a vis the course of action on spatial and temporal grounds. The success of the programme depends upon creation of active and sensitive eco-development committees that can be ensured by proper monitoring. It may be appropriate if the overall implementation is monitored by forming State Level Monitoring Committee for timely evaluation of the programme which will give chance for correction at different stages as also the real impact of the programme to achieve the desired objectives.

As per the provisions laid down in the section 38 V (i) of the Wildlife (Protection) Act 1972 Amendment Act 2006, the State Government have constituted a Steering Committee for ensuring Coordination, monitoring all activities related to protection of tigers, co-predators and their prey animals. The notification has been given in Annexure XI.

# **Tiger Conservation Foundation and District Level Coordination Committee Tiger Conservation Foundation**

The section 38-X of the Wildlife (Protection) Act 1972 as amended in Act No. 39 of 2006 states that the State Government shall establish a Tiger Conservation Foundation for tiger reserves within the state in order to facilitate and support their management for conservation of tiger and bio-diversity and, to take initiatives in eco-development by involvement of people in such development process. In pursuance to this amendment, Tiger Conservation Foundation of Similipal Tiger Reserve has been established. The function of the foundation and its members as per deed of trust approved by government has been discussed in details in Annexure XII.

#### District level co-ordination committee for Eco-Development Activities

It is to mention that while implementing the Eco Development activities in the fringe villages, it would be essential to associate different development departments viz. Animal husbandry, Horticulture, Primary Health, Agricultural, Soil Conservation, Fishery, Tribal Welfare, Small Industries, Khadia- Mankidia Development Agency, etc., While in selected areas experts from such departments may be required to be taken on deputation for planning/ implementing the eco-development programmes, it will be important to ensure that these departments are actively associated with the scheme. It will therefore be necessary to constitute a District level Coordination Committee under the chairmanship of District Collector, Mayurbhanj, Divisional Forest Officers of Buffer Divisions, Project Administrator ITDA, Project

Director DRDA, District Veterinary Officer,CDMO, as members with the Deputy Director of the Similipal Tiger Reserve as the Member Secretary. This would also facilitate Sectoral integration and pooling resources. The Committee should include representatives of the line departments, the NGOs and the concerned Grama Panchayat President. The Committee should meet at least once in three months and the minutes of the meetings should be included in the proposals for Central assistance under the Project Tiger Scheme. The Field Director may consider payment of a modest honorarium to the committee members for attending the committee meetings and the expenditure on this account can be charged to the appropriate Budget head which will be allotted from the State Government.

# Formation of the Eco-development Committees (Edc's) Confederation of Edcs and other Supporting Institutions Like Self Help Groups (Shgs) And Nature Clubs.

# Eco-Development Committee (EDC)/ Vana Samrakshan Samiti (V.S.S.) in buffer area out side the PA i.e. (Similipal Sanctuary):

The constitution of eco-development committees/VSS has to be made with following guidelines as per the Odisha Joint Forest Management Resolution 2011.

- (i) Ordinarily there will be one VSS/EDC for a single village. One VSS may also cover more than one village or there may be more than one committee in a village especially large in size. Other Forest Protection groups, if any would also be covered under this Resolution.
- (ii) All adults of the village will be the members of the VSS/EDC. They may pay an enrolment fee determined by the General Body (GB) of VSS/EDC.
- (iii) The Palli Sabha shall send its Resolution to the Range Officer concerned regarding constitution of VSS / EDC for his record and communication to the DFO concerned for registration at the Division level.

#### **Structure of the Executive Committee**

For every EDC an executive committee shall be selected comprising the following members.

i. The Palli Sabha shall elect the Chairperson, the Vice-Chairperson, the Secretary and the Treasurer and a minimum of other 11 (eleven) members to constitute the Executive Committee. At least 50% of the members of the EC shall be women. The number of SC & ST members in the Executive Body shall be in proportion to their membership in VSS / EDC. There should also be representation from the group of community, who do not have any livelihood support other than depending on the forests.

ii. Either the Chairperson or Vice-Chairperson shall be a woman.

The composition of the EC shall be as follows:

1. Chairperson 1 Elected Member
2. Vice-Chairperson 1 Elected Member
3. Secretary 1 Elected Member
4. Treasurer 1 Elected Member
5. Ward Members ( Concerned) Ex officio Member (s)
6. Members 11 Elected Members
7. Local Forest Guard 1 Ex officio Member

- iii. The Range Officer concerned will act as the Returning Officer for conducting the election of the EC. It shall be the responsibility of the Returning Officer to ensure that the representation in the EC is in accordance with reservation specified in Para-i above.
- iv. The EC will have tenure of 3 years at a time

### Meeting:

- (i) General Body (GB)
- (a) The GB meeting of the VSS / EDC shall be held at least once in every six months. It can also be called as and when required.
- (b) The Secretary with the approval of the Chairperson will convene the meeting of the GB. Ordinarily a 15 days' notice would be necessary for convening the meeting. A copy of the notice will be sent to the Gram Panchayat.
- (c) The Chairperson and in his absence the Vice-Chairperson shall preside over the meetings.
- (d) 50% of the members of the VSS / EDC will constitute the quorum for the GB.At least one third of the members present should be women.
- (e) Under special circumstances, a special meeting of the VSS/EDC can be convened provided at least one third of the members agree to convene such a meeting and make such a request to the Chairperson in writing. Where the Chairperson does not convene the meeting, the Secretary shall convene the GB meeting with the approval of the Vice-Chairperson. In all such cases, a three days' notice would be necessary indicating the purpose of the said meeting.

The decision in such meeting shall be taken by a minimum of 2/3rd members of VSS / EDC.

- (f) The Secretary shall record the proceedings and get them approved by Chairperson. A copy of the proceedings would be either pasted in a register or preserved in a guard file. A copy of the Resolution will be forwarded to the Forest Range Office and the Gram Panchayat under the signature of the Secretary.
- (g) The Executive Committee shall be elected by GB at least one month before

expiry of its tenure.

- (ii) Executive Committee (EC)
- (a) EC would meet as often as possible and necessary, but not less than once in two months.
- (b) The meeting will be presided over by the Chairperson and in his absence by the Vice- Chairperson.
- (c) The quorum for any meeting of the EC shall be 50% of its membership, out of which at least one-third shall be women.
- 6. Duties and responsibilities of VSS / EDC:
- (i) The members of the VSS / EDC shall individually and collectively protect the forest, wildlife and biodiversity.
- (ii) The VSS / EDC shall put in necessary efforts so that adjoining catchments area, water resources and other ecologically sensitive areas are protected.
- (iii) The VSS/ EDC shall place adequate emphasis on plantation of indigenous medicinal and NTFP species in the forests as well as outside the forest area adjoining the village.
- (iv) The VSS / EDC shall ensure that the decisions taken in the Palli Sabha to regulate access to community forest resources and stop any activity which adversely affects the wildlife, forests and the biodiversity, are complied with.
- (v) The General Body of the VSS /EDC shall have the powers to remove and/or substitute any elected member of the EC by a two third majority of the members if the concerned member does not discharge his/her duties satisfactorily.
- 7. Duties and responsibilities of the Executive Committee (EC):
- (i) The EC shall carry out the day-to-day business of the VSS / EDC as per provisions of the Resolution. The EC shall prepare the Micro Plan and Annual Work Plan for the assigned forest area and integrate other developmental activities outside the forest area associated with the forest based livelihood system and get it approved by the VSS /EDC after technical scrutiny by the Forest Range Officer concerned. The EC shall be responsible for managing and implementing the Micro Plan and Annual Plan and other decisions of the General Body of VSS / EDC.
- (ii) The EC shall be responsible for protection of the forests assigned to the VSS /EDC and extend their assistance to the Forest Department for apprehending the offenders who commit forest offences. If the members of the VSS / EDC play a significant role in detection of forest offence and seizure of the forest produce within their village limits, they will be entitled for a fixed percentage of the value of the forest produce (except in case of WL Trophies) so seized as per procedure laid down in Para. 11(iii).
- (iii) The EC in consultation with the GB shall evolve methodology on all issues relating to membership, conflict resolution, prevention of encroachment,

exercise of customary rights and use of the permissible forest resources such as NTFP including Bamboo.7

(iv) The EC shall be responsible to account for and manage the funds and other resources received from the Government, other agencies and funds internally generated, if any. For this purpose a joint account called VSS account/EDC account shall be opened in any commercial, rural or Co-operative Bank recognised by the RBI or in any post office, which shall be operated, jointly by the Secretary and the Treasurer of the VSS / EDC.

Utilisation Certificate relating to the expenditure incurred shall be jointly signed by the Chairperson and the Secretary and submitted to the authorities concerned.

- (v) The EC shall be responsible for managing funds received by VSS / EDC by maintaining and operating VSS / EDC account as per the procedure detailed in Annexure A.
- (vi) The EC shall try to establish marketing linkage for various NTFP items and other micro-enterprise products for securing better returns for the members. The Forest Department will provide necessary support in this regard.
- (vii) Annual account of VSS / EDC shall be placed before the GB for its approval.

#### Role of Palli Sabha:

As per the 73rd Amendment of the Constitution, certain powers and responsibilities have been vested on the PRIs. Therefore it is necessary to define the relationship between village level institution like VSS / EDC and the PRI and establish a linkage with the Palli Sabha.

- (i) Regarding protection and conservation of forest, wildlife and environment, the EC shall work as a Sub-Committee of Palli Sabha.
- (ii) If the work of the EC of any VSS / EDC is found to be detrimental to forest conservation and against the larger and long term interests of the people, the VSS / EDC may recommend for dissolving and reconstituting the EC. The Palli Sabha, on receipt of such recommendation may enquire into the matter and forward its findings to the Divisional Forest Officer for necessary action. The Divisional Forest Officer, after examining the merit will dissolve the EC and advise the GB of VSS / EDC for its reconstitution. Such dissolution will be formally placed by the DFO before the District Level Steering Committee in its next meeting for information.

#### Role of the Forest Department (STR Authority and DFOs):

- (i) To register the VSS / EDCs and maintain close liaison with them.
- (ii) To support the VSS / EDCs in identifying and apprehending the forest offender(s).
- (iii) To take action as per law in cases where VSS / EDC members have handed over the offender(s) and forest produce involved in the offence.

- (iv) To assist in capacity building of VSS / EDC members on different aspects of forest management, planning, silviculture, nursery technology, forest laws, accounting, book keeping, micro-enterprise development, value addition and processing of NTFPs etc.
- (v) To provide technical help to the VSS / EDCs in preparation and implementation of the Micro plan/ annual work programme.
- (vi) To invite suggestion from the VSS / EDCs while preparing the Working Plan /Management Plan of the concerned Forest Area / Protected Area.
- (vii) To sign Memorandum of Understanding with the VSS / EDCs and ensure sharing of benefit as per norms in vogue.
- (viii) To establish co-ordination with other departments/agencies for successful implementation of the micro plans and related area development programmes.
- (ix) To facilitate the process of discharging the duties and resolving the conflicts by the ECs.

#### Micro Plan:

- (i) After constitution of the EC, as soon as possible, a Micro Plan shall be prepared by the members of the Committee through a participatory process involving VSS Members and with the technical input provided by the field officers of the Forest Department.
- (ii) The Micro Plan shall be prepared for conservation and sustainable management of the assigned forests while integrating other developmental activities outside the forest area associated with the forest based livelihood system, with participation and involvement of line departments, wherever necessary.
- (iii) The Micro Plan will primarily prescribe afforestation with priority for plantation of indigenous medicinal and NTFP species, soil and moisture conservation measures and activities to be undertaken for livelihood support of the forest dependent communities. It may also incorporate formation of SHGs and micro-enterprises that could be undertaken based on locally available resources and may include activities such as:— eco-tourism, farm forestry, Agro forestry, Silvi-pasture development, promotion of fuel-efficient devices, animal husbandry, pisciculture, bee keeping, mushroom cultivation, tassar etc.
- (iv) The Micro Plan shall indicate the choice of species in different plantation schemes and models. It shall contain a detailed silvicultural operations plan, which shall be consistent with the prescriptions of the overall working plan covering the area or the Wildlife Management Plan of the Protected Area.
- (v) The Micro Plan so prepared shall be in consonance with the existing laws of the land.

- (vi) The Micro Plan shall also detail out the various NTFP items that can be collected. This shall be done with due regard to the carrying capacity, productivity and biodiversity of the local eco-system.
- (vii) The draft Micro Plan prepared by the EC, will be scrutinized by the Forest Range Officer from the technical, financial and legal point of view. After that the same shall be placed before the GB for deliberation and approval.

# **Usufruct sharing:**

- (i) The VSS / EDC shall be entitled to the usufructuary benefits from the assigned forests as under:—
- (a) Usufructs like fallen leaves, fodder grasses, thatch grass, broom grass, fencing materials, brushwood, fallen lops, tops and twigs to be used as fuel shall be available to the members free of cost.
- (b) All intermediate yields in the shape of small wood, poles, firewood etc as may be obtained as a result of silvicultural operations and bamboo harvested in VSS / EDC assigned area shall be made available to the VSS / EDC members in a manner as may be decided by EC. If sold at a price, the funds so obtained shall be deposited in the VSS / EDC account.
- (c) In case of Kendu leaves and specified forest produce other than bamboo, if any, the VSS will have the right to collect the same from the assigned forest but these items will be disposed of as per the prevailing provisions of Government and practices.
- (d) While maintaining the forest cover in perpetuity, if any major harvest or final felling occurs in the assigned forest, the same shall be taken up by the forest department as per the prescription of the working plan/ duly approved micro plan. In case of natural calamities, harvesting of wind-fallen trees shall be treated as final harvest. Priority will be given to the members of the VSS /EDC for salvaging and harvesting work. Valuation of the produce so obtained shall be done and information shared with the VSS /EDC and the produce will be sold / disposed of by the forest department or by agents of the forest department. The VSS / EDC will receive 50% share of the sale price after deduction of proportionate harvesting cost and this will be deposited in the "VSS account". The VSS may also opt for 50% of the forest produce so harvested if it is for their bonafide domestic use and they agree to pay the proportionate cost of harvesting.
- (e) In case of village woodlots created and maintained by the VSS / EDC on non forest land, all usufructs including interim and rotational harvests shall go to the VSS / EDC.
- (f) In the event of a natural calamity occurring in the village there may be a demand for house building materials and other forest produce from the assigned forest. In such cases, the VSS / EDC may go for harvesting the required quantity of timber or other forest produce as a deviation to the Micro

Plan, with due approval of the Divisional Forest Officer concerned.

- (ii) The EC shall be responsible for the distribution of the usufructuary benefits equitably among the members of the VSS. Need of the group or community, who do not have any livelihood support other than depending on the forests, should be specially considered.
- (iii) In cases where member/ a group of members of the VSS /EDC play a major role in the collection of intelligence, detection and seizure of illegal forest produce in transit the concerned VSS/EDC shall be entitled to the prescribed percentage of the sale price of the forest produce as per Rule 4 (3) of the Orissa Rewards for Detection of Forest Offences Rules, 2004. Such amount shall be deposited by the DFO in the "VSS account/EDC account" after disposal of the seized produce following due procedure of law.

### **Fund Flow and Management**

The following procedure shall be adopted for managing the fund flow to the EDC.

- a) A Joint Account, Jointly operated by the Member Secretary (Forester) and the Chairman of the EDC shall be opened in a nearby bank.
- b) Field Director /Deputy Director shall directly send the cheque to the EDC account;
- c) Initially only 25 per cent of the project contribution or Rs 50,000 which ever is higher shall be issued to each EDC, and subsequent amount depends upon the micro-plan.
- d) Funds from the EDC account can be drawn only for the items of works passed in a resolution by the Village Forest Committee.
- e) Village Forest Committee (Chairman) will maintain the cash book through Member Secretary;
- f) Printed cash books will be supplied by the Forest Department.
- g) The accounts of EDC shall be audited by the local fund audit and also by chartered accountant.
- h) Guiding rules for each household enrolled as members, the amount is deposited at the rate of Rs 1,600 per household; micro plan amount for each village will be calculated on the basis of number of households enrolled in the EDC and at the rate of Rs 1,600 per household.

#### **Conflict Resolution:**

(i) In case of intra village conflict in matters of implementation of Joint Forest Management, the Executive Committee of the VSS/ EDC shall endeavour to amicably resolve the conflict. If it fails to resolve the conflict, it shall bring the same to the notice of the Palli Sabha and try to sort out the issue. If the conflict still remains, the same would be referred to the Sub Divisional Level Steering

Committee formed in the line of the SDLC under FRA, 2006 and their decisions would be final.

(ii) In case of inter village conflict; the same would be referred to the Sub Divisional Level Steering Committee and their decisions would be final.

### Memorandum of Understanding (MoU):

- (i) To ensure smooth working relationship between the Forest Department and the VSS /EDC and also to bring in a sense of ownership, empowerment and accountability a MoU shall be signed between the FD and VSS / EDC delineating the duties and responsibilities of the parties concerned.
- (ii) The Chairperson of the VSS will sign the MoU on behalf of the VSS while the Range Officer concerned will sign the same on behalf of Forest Department. Other members at the EC will also be signatory to the MoU as witness while the concerned local forest officials such as:— the Forester and Forest Guard will sign the MoU as witness.
- (ii) The MoU shall be in the prescribed form (Form-5).

### **Steering Committee:**

(i) There shall be Steering Committees at the Sub Division Level, District Level and at the State Level.

**Sub Division Level Steering Committee (SDLC):** This committee shall comprise of the following members:—

(a) Sub Collector : Chairperson

(b) Assistant Conservator of Forests: Member Convener

(c) An Officer of the Tribal Welfare Department: Member

in-charge of the Sub-Division

(d) Sub Divisional Police Officer (SDPO): Member
 (e) Forest Ranger concerned: Member
 (f) Tahashildar concerned: Member
 (g) Chairperson of the Panchayat Samiti: Member

concerned

(h) Zilla Parishad member : Member(i) Two Chairpersons/Vice-Chairpersons of : Members

VSS/EDC (to be nominated by the DFO).

- (iii) The SDLC will be responsible to resolve all cases of intra village and inter village conflicts as referred to them in regards to smooth functioning of VSS / EDC.
- (iv) The SDLC will meet at least once in every quarter and shall facilitate functioning of the VSS / EDC and provide necessary support and guidance to them.
- (v) The SDLC will facilitate the VSS / EDC for protection and sustainable management of forests, forest based livelihood and holistic development of the villages.
- (vi) The SDLC may invite the representatives of the committees concerned and other such peoples' representatives, reputed persons / organizations working in the field of forest management to their meetings as per requirement.

**District Level Steering Committee (DLSC):** This committee shall comprise of the following members:—

(a) District Collector: Chairperson

(b) Divisional Forest Officers: Member

(Territorial and Wildlife)

(g) PA, ITDA:

(c) ADM dealing with land matters : Member (d) Deputy Director (Agriculture) : Member (e) Chief District Veterinary Officer : Member (f) PD, DRDA : Member

(h) District Welfare Officer : Member

(i) Deputy Director Horticulture : Member

(j) Soil Conservation Officer: Member (k) 5 VSS (Chairperson/ Vice-Chairperson: Member

(at least 2 women) (to be nominated by the DFO)

- (viii) The DFO concerned having the jurisdiction over the district headquarters will be the Member Convener of the meetings of DLSC.
- (ix) The tenure of the non-official members will be three years.
- (x) The DLSC may co-opt NGOs or other experts as members with credibility and experience of working on forest related issues.
- (xi) The DLSC will meet at least once in six months and shall facilitate functioning of the VSS / EDC and provide necessary support and guidance to them.
- (xii) The DLSC will oversee protection and sustainable management of forests, forest based livelihood and holistic development of the villages.

Member

# **State Level Steering Committee (SLSC):** The constitution of the State Level

Steering Committee shall be as under:—

1. Minister (Forest) : Chairperson

2. Chief Secretary : Vice-Chairperson

3. Principal Secretary, F & E Department : Member 4. Principal CCF (O) : Member

5. PCCF (WL) : Member

6. 2 D.F.Os./One RCCF from field to be : Member

nominated by PCCF (O) on rotation basis

7. Secretary, Revenue Department : Member 8. Secretary, Rural Development Department : Member 9. Secretary, Home Department : Member 10. Secretary, PR Department : Member

11. Secretary, SC & ST Department : Member
12. Chief Conservator of Forests (Central) : Member

13. Director, Orissa Watershed : Member

**Development Mission** 

14. Two representatives of : Member

Civil Society Organisations / Experts to be nominated by F&E Department

15. Special Secretary, F& E Department : Member

16. Chairpersons of two VSS / EDC

to be nominated by the PCCF (O) : Member

17. CCF (Plan, Programme & Afforestation),

Office of PCCF, Orissa : Member-Convener

- (xiv) The non-official members of the State Level Steering Committee will have tenure of three years.
- (xv) The Committee shall meet at least once in a year to guide the process of participatory forest management.
- (xvi) Changes in the Resolution, if any shall be placed before the SLSC for approval and recommendation to Government.

#### **Livelihood Support Initiatives through Village Micro Plan**

The micro-planning is the essential component of the eco-development and includes involving people in Social Mapping, Resource Mapping, Semi-structured Interview, Wealth Ranking, Institutional Diagram, Past System of Management, Pair-Wise Ranking, Seasonality Analysis other techniques to understand micro-level situation of the village. The microplan includes community asset building, individual income generation activities, alternate energy and energy conservation devices,

biomass regeneration, and human resources development suitable for the area. The micro plan is prepared by Village Forest council, General body members, NGOs and Forester, Ranger and Forest guard.

The village eco-development activities drawn out of Participatory Learning & Action based Micro Planning may be of the following kinds:

- a) Entry point activities to enlist the support of the people.
- b) Community asset building to create facilities for the local people.
- c) Micro credit programme to facilitate starting of micro enterprises for attaining sustainable alternative livelihood options focusing on forest dependent people.
- d) Income generation activities, in addition to livelihood options emanating out of PA management like protection, fire-protection and tracing, ecotourism services *etc*, to upgrade the economic status of the poor.

### **Integration of Rural Development Programmes**

The present level of involvement of local communities in the activities of Similipal is barely conspicuous. There is a need to do the stake-holders analysis correctly. The local communities make lot of sacrifices of their developmental needs for the sake of conservation and their sacrifice need to be adequately compensated by involving them, creating livelihood opportunities for them and also by channelizing the resource generation in a way that it helps them in meaningful livelihoods.

The strategies for implementation of Eco- development and livelihood activities with co-ordination of line agencies has been elaborated in core plan .

#### **Monitoring and Evaluation**

The entire eco-development programme has to be monitored by the Field Director and Deputy Director on a regular interval—vis a vis the course of action on spatial and temporal grounds. The success of the programme depends upon creation of active and sensitive eco-development committees that can be ensured by proper monitoring. It may be appropriate a set of monitoring parameters that can be used for the purpose of reporting on periodical basis. NGO's could also involve in monitoring and implementing the program. Those NGO's that are involved in monitoring the eco-development program should interact with people at regular interval and discuss the problem faced by them in implementing the program. At the same time evaluation of the programme will give chance for correction at different stages as also the real impact of the programme to achieve the desired objectives. The

evaluation can better be done with the help of an internal or external system with the following vision.

- 1. Improve the livelihood activities for villagers .
- 2. Enhance the living standards among villagers.
- 3. All basic amenities to be augmented in village.
- 4. Improve education level for both sexes.
- 5. Increase annual Income for every one in the village.
- 6. Ensure proper health care for villagers.
- 7. Develop a mechanism to earn more revenue from domestic livestock, by way of hybrid milch animals .
- 8. Houses for every family in the village.
- 9. Solar/windmill Power Supply for the village.
- 10. Water augmentation to be done for drinking and irrigation purpose.
- 11. Develop a strategy to earn more money through collection of NTFP products.
- 12. Proper harvesting techniques to be imparted for villagers to prevent destruction of forests while collecting NTFP products.
- 13. Improve the number of working days for villagers to meet out their daily livelihood.
- 14. Ensure that land based activities are well conceived among the villagers as part of their sustainable livelihood programme.

# Mainstreaming with various Production Sectors Forestry

In the buffer zone area, the forestry sector has to play a major role for enhancing the productivity of unproductive land in adjoining villages through raising of indigenous tree crop. The afforestation activity in degraded forests will enhance the bio-diversity. The Reserved Forests in the buffer zone of the tiger reserve which are covered under working plans have and where Selection coupes have been formed, tree felling have not been done due to want of commercially available tree of exploitable girth. However, in future tree felling in those coupes if required, will be regulated to a lesser degree of intensity to avoid large scale canopy openings and to ensure that canopy cover does not fall below 40% in winter months. The timber exploitation activities in coupes shall be staggered in such to ensure minimum edge effect. The plantation activity shall be staggered to safeguard from induced edge effect, especially near human settlement. Only species indigenous to the locality shall be permitted to be planted.

- Ecosystem management required
- Ecological availability of a tree should be ascertained before removal
- A tree should be considered ecologically available if

- (a) Its removal does not create a gap beyond 43 to 45%.
- (b) The regeneration of species at various formation levels within a radial distance of twice the crown radius of the tree being selected for felling should have an 'established' status.

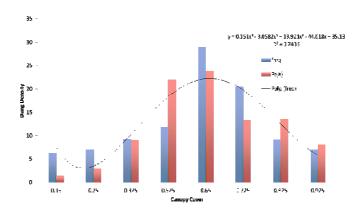
# **Tree fellings / Thinnings**

- No clear felling and other silvicultural systems promoting concentrated regeneration
- No conversion to uniform forests
- A high forest system with diffused regeneration should be preferred
- Status of regeneration should be an overarching consideration to permit felling
- Areas having considerable disturbance should not be felled

# **Tree fellings / Thinnings**

Canopy class and wild dung presence

Mid-Value	Wild dung	SE	Freq.
0.15	10.52	0.79	6
0.25	11.68	0.71	7
0.375	15.46	1.08	9
0.525	19.56	2.75	12
0.65	47.86	19.30	29
0.725	33.92	14.03	20
0.825	15.22	7.21	9
0.925	11.72		7



- After due consideration to regeneration/status, the relationship between canopy class and wild ungulate dung presence should be used as a guide to prescribe the stem removal
- Buffer / corridor areas should be managed for wild ungulates at a level which is 30% lower than the optimal levels in core areas
- In general, the relationship between mean ungulate density and canopy class intervals in a sal / tree dominated forests, with polynomial curve fitting shows that the 80% lower bound corresponds to a canopy cover of 43% (computed for sal forests of Central India; similar relationships need to be developed for other forest types to facilitate inference)
- Thus, for sal forests of Central India, the timber harvest in the buffer / corridor area may be permitted in a selective manner so that the canopy cover does not fall below 43% during winter months. This strategy will minimize tigerhuman conflict while permitting selective extraction of timber species
- More openings will permit more light while fostering more regeneration thereby attracting wild ungulates and tigers
- The idea behind buffer / corridor management is to sustain it for gene flow, while not elevating its status to that of core area in terms of wildlife abundance

# **Agriculture**

The buffer zone villagers of the Similipal Tiger Reserve are raising agriculture crop for the livelihood. But some of the crops being raised in outer buffer area are not eco friendly. Frequent usage of banned pesticide and insecticide is also causing injury to the Carnivores and Herbivores. Eco friendly agriculture practices have to be encouraged to avert the chances of poisoning, poaching and man-animal conflict. A ban have been imposed since 2012 on entry of highly poisonous insecticides in to the villages in side the sanctuary. Awareness programmes shall be organised with help of agriculture department for use of organic manureand bio pesticides in the

agriculture fields in side the tiger reserve. A special strategy will be adopted in coordination with agriculture department for monitoring the sale of pesticides in local outlets to prevent poisoning of wild animals or leaching of such pesticides in water courses resulting in wildlife mortality.

# <u>Integrated Development (Development Through District Administration )</u> Eco development

The concept of eco-development is catching up as an alternative strategy for Forest Protection and conservation, involving local communities in the management of the Protected Areas. The Kanha, Kalakad-Mundanthurai, Pench, Periyar Tiger Reserves have shown leadership in the field and successfully evolved and implemented eco-development strategy and brought up a model of eco-development, which is highly acclaimed. The same model is being adopted and replicated for Similipal by making local level adjustments imperative for matching ground level situation. The successful area of other tiger reserve will be visited by the staff and locals for exposure visit at regular interval.

### **Objectives**

The Eco-development objectives of Similipal have been designed in line with the general theme of eco-development philosophy of a successful model observed in other Tiger Reserve, that helps effective conservation of the forests through the economic development of the forest fringe dwellers by adopting an active strategy evolved through micro-planning. Ecological development has to be achieved by adopting a strategy where forest fringe dwellers have zero dependency and resultant impact on the bio-resources of the Sanctuary.

Accordingly, the main Eco-development objectives of Similipal TR are

- a. To provide opportunities for local people to participate in TR management through an institutional mechanism.
- b. To establish committed Eco-development committees concerned with conservation by educating, motivating and eliciting participation in buffer villages.
- c. To create awareness among the target villages about the value of the TR focusing on the vision of protecting world famous conservation unit and need for conserving it using different media.
- d. To achieve reduction in resource dependency on forests of the Similipal TR by providing alternative livelihoods thereby leading to habitat improvement and conservation.
- e. To enhance the capacity and upgrade skills of local people for alternate non-forest dependent economic activities by way of organizing training courses, workshops and field visits.

f. To promote collaboration of local people in conservation by reducing adverse impacts of local people on biodiversity and also to reduce the adverse impact of TR on local people by mitigating Man-Animal conflict.

#### **Development through District Administration**

- Co ordination with various institutions and line agencies to obtain their financial support and expertise to implement various EDC activities through District administration also.
- ii. Developing specific proposals with the themes of EDC to obtain corpus funds from various donors.

# **Proposed Activities**

- a. Public Telephone Booths through WLL base stations for the Buffer Villages to be provided by the BSNL where ever possible.
- b. Establishing Training Centres for Tailoring and Associated Activities
- c. Small cottage industries, especially candle manufacturing, bamboo & sabai grass products,
- d. Small Petty Shops, Snacks centre, Souvenir shops.
- e. Dairy Farms with hybrid milching animals.
- f. Community Apiculture and processing/packaging units of Honey.
- g. Formation of MedicinalGardens and processing.
- h. Weaving Units.
- i. Supply of bullocks for land based activities.
- j. Agriculture Improvement Land based activities.
- k. Sale of NTFP products with value added products.
- I. Integrated Poultry Farms.
- m. Fish Farm.
- n. Viable and Suitable Eco Tourism activity: (Only a few Selected Modules)
- o. Promoting Women Self Help Group.
- **p.** Developing plant nursery for afforestation schemes.

All the above activities can be taken up by the line departments in coordination and consultation with Field Director of Similipal Tiger Reserve.

#### **Tea and Coffee Estates**

There is no tea or coffee Estates.

#### **Road Transport**

The existing road network is sufficient. No more road is to be allowed in the buffer zone. Otherwise, it will hamper the movement of Carnivores and Herbivores since the Southern part of the buffer zone area is very good habitat for the wild animals and tigers. On the Goudabhanga (Satkosia) —Thakurmunda- Karanjia road, functional speed breakers at every kilometer need to be established in the portions passing through the forests. Similarly speed breakers will be provided through NH authority in Karanjia-Jashipur-Bisoi portion of NH- 6 and Bisoi-Bangiriposhi portion of NH-6.

Mitigation strategy for linear infrastructure and other projects (roads/highways/railway lines/power transmission lines/irrigation canals/open mills/wind mills)

- Roads/highways: creation of overpasses / underpasses, speed regulation, , closure to traffic
- Railway lines: SOP for information exchange through wireless, speed regulation, barricades, underpasses,
- Power transmission lines: insulation, surveillance, MOU with electricity boards, special patrolling, under ground cabling, adequate height,
- Irrigation canals: covering, crossing for animals movement
- Open wells : covering, closure of abandoned wells
- Wind mills: both offsite and onsite measures are required to prevent turbine collisions with avifauna.

#### Industry

Only Eco Friendly cottage industry will be encouraged.

#### **Mining**

No mining activity is at present in buffer zone.

# **Thermal Power Plants**

There is no Thermal Power Plants in the buffer zone area.

# **Irrigation Products**

A few irrigation channels are found in the buffer zone. No large and medium irrigation project will be allowed inside. Micro irrigation outside the sanctuary area shall be done only after proper study regarding their probable impact on the habitat.

#### Mitigation strategy for dams and hydro power sectors

- The impacts include:
  - First order impacts (barrier effects, effects on water quality, water quantity, flow regime and sediment load)
  - Second order impacts (impact on terrestrial environment affecting primary production-planktons, aquatic flora), morphology (channel form, substrate composition)
  - Third order impacts (impact on terrestrial environment affecting invertebrates, fish, birds and mammals)
- Mitigation measures are required to address impacts due to dams construction as well as its operation
- The mitigation plan should include onsite as well as offsite initiatives based on best global practices
- Retention of dead trees in submergence areas as 'snags' for water birds and aquatic fauna
- Prohibiting the reduction of river flow to 'zero' or 'critical' levels which would have a deleterious affect on local flora and fauna especially aquatic species permitting migration across dams through mitigation e.g. fish ladder etc.
- Mimicking the water release to the natural flooding regime
- Ensuring control of aquatic weeds and disease factors
- Safeguarding downriver flood protection
- Safeguarding against water pollution
- Appropriate fish management measures to benefit local communities through the tiger reserve management. Illegal fishing is a problem in tiger reserves like Pench and Satpura
- Site specific watershed management to safeguard against sedimentation
- Prescribing timings for use of access roads, and regulation on the maintenance infrastructure and retaining it to the minimum
- Prohibiting new, associated developmental projects in the core / critical tiger habitat
- Contributing resource support to the core / critical tiger habitat management as a 'compensatory' measure for loss of natural habitat
- Evolving and implementing a SOP, in collaboration with the tiger reserve management for rescuing wild animals from drowning
- Annual monitoring of the spatial use pattern of wild animals in the area, which should also include monitoring the development of related infrastructure
- Periodic monitoring of water quality and river ecosystem recovery
- Fostering re-vegetation of the construction site with indigenous species

#### **Communication Projects**

Projects with minimum impacts will be allowed subject to NTCA guidelines.

# 5 Biodiversity Conservation Zone (18 km²)

#### Wildlife management in Buffer Areas

- Buffer areas require a 'coarse filter' approach for maintaining a variety of plant / animal species
- · Day to day monitoring
- Habitat amelioration (compensatory nature)
- Fostering indigenous fodder / fruit species
- Maintaining existing water points
- No drastic habitat interventions
- Cropping pattern / harvesting to factor in cover values
- Inherent / induced diversity indices need to be computed for maintaining the edges (without enhancing them)
- Human-wildlife interface issues to be addressed
- Treatment for riparian zones / unique features
- Retention of dead trees, snags
- Restoration / protection of existing corridors

The Biodiversity Conservation Zone is meant to identify, prioritise and conserve areas/patches rich in biodiversity within the buffer area. They can be any of the following

- a) A patch of forest rich in overall floral diversity
- b) A patch of forest rich in indigenous cultivars, medicinal plants
- c) A patch of forests rich in interesting plant groups like orchids
- d) A patch of forests, which supports special habitats/ microhabitats like dens, cliffs, overhangs etc
- e) Various known corridors (vegetal/non-vegetal), forest patches linking to other divisions eg. Riverine patches, nalla beds, unique habitat features, gullies etc.

The special habitats will be demarcated, conserved by engagement of special watchers, installation of barriers in routes, signages at each human entry point with Do's and dont's. Regular monitoring of the site will be taken up to assess habitat condition, use by animals etc.

Some special habitats of a few wild animals have been identified as given below. The mapped area has been provided at the annexure.

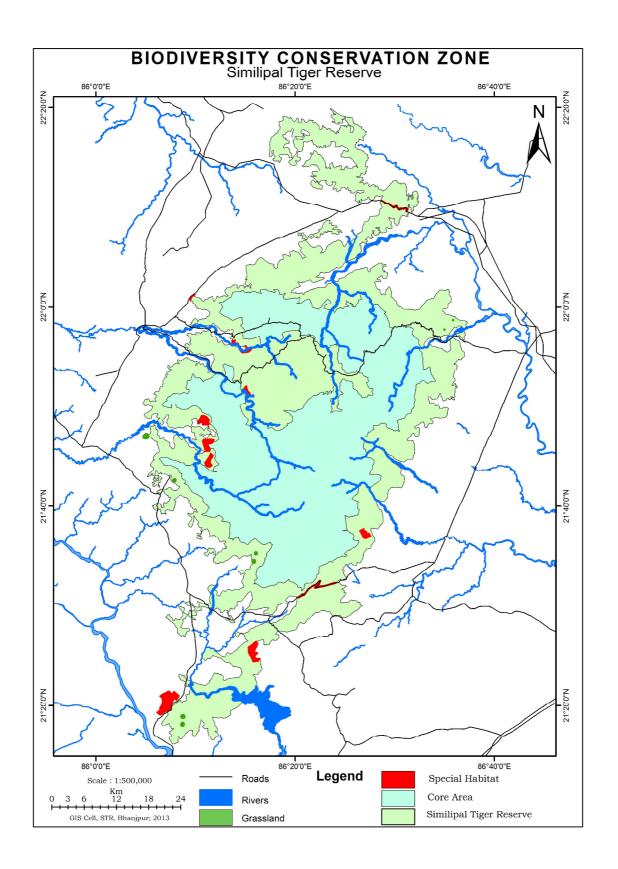
- Peacocks in Rangamatia area of Notto R.F.,
- Vultures in Pulihari of Udala Range,
- Porcupines available in large numbers in Rangamatia of Notto R.F. of Baripada Division.

- Gaurs in Similipal R.F. in Manada Range,
- Pythons in Rajupal area of Manada Range of Rairangpur Division.
- Mouse deers, Red Jungle fowls found in plenty in Kendumundi and Gurgudia Ranges of Karanjia Division.

Similipal is an unique habitat for varieties of butterflies native to the area .Hence in situ conservation measures will be taken up for the butterflies of Similipal to stabilize the ecosystem. The special habitats are relatively different than the other wildlife habitats in the buffer area of Similipal Tiger Reserve. These habitats are under threat due to degradation by the biotic interference. Hence a strict conservation measures to be taken up through annual action plans submitted by the respective buffer D.F.Os and regular monitoring of the special habitats of the above animals and strategic actions will be taken up with proper conservation and habitat improvement activities.

Apart from the above, following important patches have been identified which are serving as corridors connecting the forest patches within the tiger reserve as well as with other forests outside the reserve. These are critical patches from the point of migration of animals as the connectivity is disturbed due to passing of some important roads in these patches.

- Forest patch connecting Bidhubhandar PRF and Tunguru RF on the northern side which is an important corridor for movement of wild elephants. National Highway No. 6 is passing through in a stretch of about 7 km. Langurs and macaques congregate on the road in that stretch in hope of getting food thrown by the commuters.
- 2. On the norther western side of the tiger reserve, small animals move between Similipal and Badampahad RF crossing NH 6 at a point near Chheligodhuli.
- 3. On the southern side, animals movement is noticed between Notto RF and Satkosia RF where the state highway is passing through a stretch of about 15 km.
- 4. The forest patch connecting Satkosia RF in STR to Santoshpur RF of Keonjhar(wildlife) Division is an important corridor for elephants and tigers in particular and wildlife in general.



#### **Strategies:**

- Special conservation area to be demarcated with proper signage at important foot trails with importance of the wild animals and their role to the ecosystem in Odia, English and Santhali/Bathudi language for better understanding and local awareness.
- Local people to be made aware of the ban of insecticides, fertilizers, chemicals in the crop field and make use of bio fertilisers, bio insecticides like neem oil cakes, neem oil instead.
- Restricted use of the demarcated area from collection of NTFP by the locals. And ban of entry of domestic cattle in to the special habitats.
- Soil and moisture conservation measures to improve quality of forest and improve the degraded sites.
- Proper sanitation of the saltlicks, waterholes, caves, grasslands from poisons traps, snares, baits etc by regular patrolling.
- Regular vaccination of cattle, goats, sheep of the villages which have risk to enter in to these habitats accidentally.
- Ban of diclofenac sodium or it's derivatives in cattle and domestic pets by the veterinary surgeons /livestock inspectors in entire buffer area for conservation of vultures. Alternative medicines to be supplied to the Vets in subsidized prices.
- Payment of incentives to the locals protecting and conserving the protected wildlife and their habitats.
- EDCs/VSSs to be activated by providing various livelihood activities through microplans and their involvement to be made for conservation of the wildlife available at a close proximity to the village area.
- For butterfly conservation an eco-friendly enclosure by netlons/wiremesh house will be created by naming Butterfly Park and proper conservation measures will be taken to protect endangered/ rare species of the butterflies.
- Signages and caution boards shall be fixed on the roads to aware the commuters regarding passing of wild animals. Awareness boards for commuters regarding movement of monkeys with pledge not to feed those monkeys will be fixed on NH 6 near Bidhubhandar PRF. Proper surveillance in those areas will be kept.

#### 7.2.0 Theme Plans

The goal of the plan is to restore, maintain and enhance the biodiversity, habitat and conservation value of the Reserve as to ensure perpetuation of the tiger as flagship species. This can be ensured through a multifaceted approach to the complexity of the problems noticed at the time of management. They are:

- 1. Protection
- 2. Control of forest fire.
- 3. Boundary maintenance

#### 1. Protection

A Security Plan for protection of Similipal Tiger Reserve have been prepared for both the core and buffer area and given in the Theme Plans in Chapter 7 of Core Area plan.

#### 2. Control of forest fire.

Out of the total area of the TR, 580 km<sup>2</sup> of forests under dry deciduous hill forests, high level sal forests and grassland are very much prone to fire during the period from February to May. The fire is mostly intentional i.e. people set fire for collection of non-wood forest produce and Akhanda Shikar. At times it is caused by the timber smugglers, carelessness of tourists and passersby. The objectives of control of forest fire are

- > To prevent fire spreading into the forests so that the ground flora and fauna are well protected.
- > To ensure germination of seeds and thereby maintain the stand with trees of all girth classes.
- ➤ To protect the humus, snags and down trees which harbour a lot of organisms.
- ➤ To eradicate coarse grasses giving place to annual grasses palatable to the herbivores.
- To maintain the ambush cover for the prey animals and refuge cover for all animals for reproduction.

#### **Strategies:**

The strategies discussed in Chapter 7 of Core Area Plan will be adopted for the buffer area also.

#### 3. Boundary Maintenance

The total length of buffer boundary is 1059.05 Km and length of core boundary is 386.87 km. There are 65 villages in the buffer area of Similipal Tiger

Reserve and 1200 villages within 10 km from periphery of the Sanctuary. There is pressure of encroachment of Reserve from these villages in future.

# **Strategies:**

- The cause of encroachment is because of low productivity from the land under agriculture. Hence attempts will be made to put more inputs in the form of irrigation, creation of water body in the periphery of the sanctuary or tail-end of the major rivers to provide water for agricultural purposes, use of bio fertilizer and change of cropping pattern so that the people concentrate on intensive agriculture against extensive one.
- Through awareness the local people need to be sensitized on the penal provisions in Wildlife (Protection) Act, 1972 and Orissa Forest Act for destruction of habitat and encroachment of forestland respectively.
- Pillar maintenance and new pillar posting where required will be done on the boundary of the reserve along the village boundaries.
- All the boundary and pillar positions will be digitized with preparation of map showing geo-coordinates.
- Regular inspection of the boundary with yearly inspection programme for all the staff and officers will be chalked out in each Division.
- The area where forest rights have been given will be properly shown in the map.

#### INTRODUCTION

As per National Wildlife Action Plan-2002. Monitoring and Research are tools for a better understanding of nature, its functions and to enable optimum or sustainable utilisation of its resources, as well as to evaluate the conservation status of species and habitats and the extent of impact of conservation endeavours undertaken. Such understanding will also help reduce man-animal conflicts. There is a marked deficiency in baseline biological data and on information we need to manage and monitor Buffer Areas. Little is known about the impact of human activities on wildlife habitats, or about the full range of benefits that flow from biodiversity-rich old growth, natural forests and ecosystems. Not much is known about techniques, which could *inter alia* help restore, at a very minimal cost, degraded habitats. Research for making use of ethnic knowledge in wildlife conservation and management as well as in applied research to obtain IPR's (Intellectual Property Rights) capable of benefiting the local communities and country should receive special attention.

# 8.1 RESEARCH PRIORITIES, MAIN PROJECTS AND IMPLEMENTATION Overall Research Priorities = STR

The NWAP suggests the following actions required for this purpose.

 Networking between NCF, IISc, WWF, WII, BNHS, SACON, BSI, ZSI and other interested universities like Utkal University, Fakir Mohan University, North Odisha University, IIT Kharagpur and colleges should help evolve integrated, multidisciplinary research in representative ecosystems. This will require greater financial allocations for field research and monitoring through centrally sponsored schemes.

#### **Research Activities: Buffer Zone**

- 1. Research priorities to be focussed on monitoring populations of flag ship species and other endangered species and their habitat condition.
- 2. Review current management practices and translate research findings into management applications and effective monitoring systems.
- 3. Study ethnic knowledge and apply it to wildlife management and work with communities to obtain reports to benefit both the communities and the nation.
- 4. Monitor and document the impact of human activities on natural habitats, including the spread of disease, impact of fires started to facilitate grazing and NTFP collections within and outside PAs.

- 5. Document and assess damage done by large projects and intrusions, such as dams, mines, canal systems, roads and the use of pesticides and chemicals.
- 6. Identification of wildlife corridors and management strategies
- 7. Impact of plant weeds on eco system.

#### 8.2 MONITORING AND FRAMEWORK

The following key areas of research and monitoring need to be focussed.

- 1. The Habitat Quality Assessment. The quality of habitat, its degradation, fragmentation, anthropogenic pressures have definitive effects on elephant conservation. In general, protection against and habitat loss and degradation in buffer zone needs attention which pose threats for their survival. Therefore management option is to look at habitat at landscape level rather than individual protected areas in order to conserve elephants and other herbivores and carnivores. The research support is key to assess the quality of habitat, its fragmentation, impact of anthropogenic pressures on the elephant distribution, at the same time studying impact of elephants on the vegetation, weed distribution and abundance and their impact on the habitat and local flora, so that the suggestions are made part of management options.
- 2. **Development activities** in 10 km radius of the Reserve such as residential buildings, industries and minor mineral quarries closer to the corridors and other human activities need proper impact assessment studies to enforce regulation.
- 3. **Anthropogenic** pressure such as cattle grazing, fuel would collection and woodcutting especially in Eastern/Southern/Western parts of the Reserve, manelephant conflict, identification of specific forest dependents, would help for appropriate management interventions.
- 4. **The research** support on pathological issues, estimation of parasite loads, helminthes infestations and their ecology, incidences of zoonosis, threat of large cattle population in terms of infestations, to develop and standardize methodologies for disease surveillance epidemiology of wildlife is much solicited. The specific recommendations on these aspects need to be brought into management action.
- 5. **Undertake long term projects** to assess the water contribution of and buffer zone forests in terms of lean season flows, ground water recharge and flood and drought mitigation.

- 6. **Study of ethnic knowledge** with anthropological / social science institutions with a view to apply such knowledge to wildlife management and to obtain reports to benefit local communities and the nation.
- 7. **Habitat improvement** study is needed since density of herbs and shrubs is very poor in buffer zone.

#### 8.3 TRAINING

The challenging wildlife conservation scenario today requires committed wildlife managers who possess scientific competence and social awareness aided by communication skills. They also need sharp detection and enforcement capabilities against organised criminal elements nursed by big-money illegal trade. Accomplished wildlife biologists and social scientists are also necessary. Frontline staff equally must have similar skills at the grassroots level. The current capacity building and personnel management planning, HRD and management measures need to be greatly strengthened to meet these challenges. Training programmes aimed at upgrading the skill levels of the staff to match these challenges have to be part of routine rather than exception.

The field staff at the level of Foresters, Forest Guards and Sabuja Bahini(Watchers) and the anti-poaching watchers to be trained regularly in wildlife monitoring works, organizing and conducting wildlife census work, recording population structure of wild animals like chital, Sambar, elephant and gaur on a regular basis when they go for their perambulation.

They should also be trained in taking photograph of tiger and leopard pugmarks for further analysis to identify individual animals. They need to be trained to use the modern equipments like range finders, field compass, Global Positioning System (GPS) etc. And to use these equipments in their regular work like fire mapping and plantation mapping etc. They will be also be trained to distinguish various predator scats. Further analysis of predator scats collected by field staff will reveal food habit of carnivores. They need to also be trained to collect the jaw bones from predator kills to assess the age of animals killed by predators.

#### On the job training

Effective management of wildlife and their habitat requires rigorous training in wildlife management. They will be given refresher courses at least once in a year's interval. The course need be conducted with the help of experienced field Biologists. Case study based demonstration that forest and wildlife conservation and ecologically sound rural development are mutually complementary can be arranged. The training workshops need to be conducted in Wildlife crime investigation, recording evidences, preparation of charge-sheets, and trial of offences for successful

prosecution. This needs to be done with the help of local judiciary, the police and other law enforcement agencies, apart from certain NGO's working in the field.

#### Formal training courses

In addition to the refresher course for field staff they can be sent for regular formal courses in Odisha Forest Rangers/Foresters College/ Schools at least once in two years. Rangers need to be sent to Wildlife Institute of India for Ranger (Certificate Course) Training their performance during the course to be evaluated strictly and only those who pass the course should be given promotion for higher level postings.

#### Establishing a learning centre at Jashipur

A learning centre can be created at Jashipur in order to store the biological specimens collected by field staff. Biological specimens such as lower jaw of deers and elephants can be kept over there, pugmarks and hoof marks of various animals, herbarium specimens of plant specimens should be kept. Field staff should be asked to visit and make use of the centre. There is also a need to develop reference handbook for the staff in Odia, specifically for Similipal field staff that they can refer. About 10 lakh rupees for the building and 10 lakhs for internal decoration and for the reference library to be provided for the above centre.

A model training need to be prescribed incorporating all the above programmes.

#### 8.4 HUMAN RESOURCES DEVELOPMENT PLAN

The objective is to create such an environment in the working condition in the buffer zone that the project personnel are encouraged to give out their beat in achieving the aims and objectives of management.

The strategy adopted for this purpose would be to closely examine all aspects of human resources development namely training, discipline, team building, facilities for staff, special allowances and general service conditions and constant work on improving all these aspects.

It is proposed to give comprehensive training on biodiversity conservation and livelihood improvement strategies as part of the Biodiversity Conservation and Rural Livelihood Improvement Project.

It is also proposed to provide training in handling fire arms, shooting practice, swimming, jungle patrol, night camping, evidence collection, census, conservation laws and road and building maintenance etc., as a regular activities through out the year.

#### **Housing Facilities**

Staff Housing Facilities in this project are easily the best in the state forest department. These are proposed to be further improved so that every staff member working in the buffer may have housing and other facility. Annual maintenance and special repairs has to be carried out for all the residential buildings.

#### **Project Allowance:**

Project allowance is now being given to the staff working in the reserve management.

#### **Facilities for Children's Education**

In addition to above allowance a special allowance for the childrens of the staff of buffer zone studying may be provided at Rs.1000/- per month to meet the boarding facilities. This will motivate the staff.

#### **Medical Facilities**

Most of the staff is working in inaccessible areas. Therefore, Para Medical centre may be opened at a suitable place in the buffer zone. First Aid Equipment should be provided at easily accessible locations.

Staff should be sent for First Aid course conducted by Red Cross of St.John Ambulance Institute so that they are available at our disposal to administer first aid at the time of emergency.

Anti snakebite treatment: The antidote (anti venom) for snake bite will be procured and always kept in readiness at all the Range Offices. This is very important and urgent. Necessary facilities will be provided at the proposed tribal medical centre for the same.

#### Water Supply

Proposals have been made in this plan to establish water supply to all staff colonies and quarters with separate connection and suitable motors depending on the requirement. Periodical maintenance is also necessary for the same. A subcommittee may constitute with the Chairman of Forest Range Officer and representative from Range Staff to assess and executive the water requirements to the staff quarters in all the ranges. The existing facilities are not adequate and it is necessary to provide basic facilities without any compromise.

#### **Food Allowance**

The patrolling staffs require fooding supply in terms of package since the cost of food rations including transportation is much higher in the interior areas where

staff work. Hence a special fooding allowance of Rs 1000/ per month/person need to be provided for the staff working inside the Tiger Reserve

#### **Awards**

Merit Certificate will be issued to deserving staff during wildlife week celebrations. Suitable recommendations need be sent for State Level Award. A separate protocol will be set up to identify suitable field staff, drivers and office staff for the purpose.

#### **Rewards**

Suitable Rewards need to be given to Eco Staff as well as Protection Staff based on their performance in loan recovery, in Preventing Fire, Poaching Incidences and other discipline matters.

#### 8.5 WILDLIFE HEALTH MONITORING

"Wildlife disease has been defined as any condition which jeopardizes the survival of an animal in a particular environment. This is a broad definition but one most useful in considering diseases of wildlife (Richard..1971)".

Diseases caused by pathogens are inherent events of the natural system, like predation by predators. Like increasing incident forest fires, the role of parasites and pathogens need particular attention in the present day environment of habitat encroachment, disturbance and fragmentation. Disease of wildlife occurs in many different forms in a wide range of animal species and populations. Diseases, when expressed in free-ranging animals, can have significant effect on wildlife ecologies. Whilst some diseases exist as symptom less, sub clinical infections without any obvious ecological impact and of no consequence for domestic animals or humans, occasionally there are dramatic epizootic outbreaks characterized by high morbidity and mortality.

In the wild the cause of mortality could be due to intrinsic and extrinsic factors and generally they are: starvation, diseases, parasite, predation, pollution, poisoning, accidents, poaching etc, Treatment of individual is not possible in case of diseases of wildlife. Preventive medicine is a far more effective means of dealing with diseases in free living animals. Disease in a wildlife population is rarely simple, one cause, one effect situation. Usually it is the product of profound changes in the environment. Eg. Diclofenac poisoning in Vulture leading to crash in their population in Indian subcontinent. Disease management in free-raging wild animals is attempted not by treating individual sick animals but by manipulating those factors that play a role in transmission of disease. Surveillance and monitoring programmes are the first steps towards providing an appropriate level of understanding of the health status of wildlife populations. The basis for developing and maintaining such a capability

includes the management of wildlife population and their habitats, the security of animal based export trade and translocation of animals, the protection of natural biodiversity values and to safeguard public health.

The details of existing wildlife health management, key problem, remedial action an proposed management plan has discussed in detail in core plan in Chapter 12. The facilities at core zone can be utilized for buffer zone as well.

#### 8.6 MORTALITY SURVEY

Wildlife natality and mortality are interrelated. Usually animals with high levels of natality will also have high level of mortality. Normal mortality and natality has been reached during the evolutionary history of the animal and the net population should yield some harvestable surplus. Mortality has one beneficial point for the population since it culls the inferior animals and improves the quality of animal population, because it is a mechanism of natural selection. But mortality, when noticed often causes concern with lay people. However an increase in mortality rate for species concerned has to be considered seriously. Death due to unknown etiology must be investigated thoroughly. Mortality due to anthropogenic pressure must also be investigated.

Mortality survey is an important tool for monitoring a population in the TR as important as population estimator. Abnormal mortality has to be recognized and handled with due importance.

- 1. Newly Emerging Infectious Disease(EID),
- 2. Diseases of anthropogenic origin; epidemics of infectious diseases 'spill over' effect from stray cattle and dogs, and other human sources.
- 3. Mortality related to man-made cause like road kill, train accident, poaching or hunting, electrocution, poisoning, dynamite blast hidden in the agricultural fields, and man made structure such as wells, etc..
- 4. Mortality related to natural origin like aging, predation, flood, parasitism, fall and death, malnutrition, starvation, drought, in fight and injuries, territory fighting, density dependent death etc
- 5. Mortality related to pollution from industrial units and quarries, contaminants, drug residue like diclofenac, etc

Mortality rates than the normal can lead to serious conservation problems because it reduces the population to abnormally low levels or even wipe out a population. This is of greater importance if the animal under conservation is seen only in smaller areas in few number like vulture, lion of Gir, Hangul of Dachigam or brow antlered deer at Keibul Lamjo, because of exclusive nature of these animals in these areas.

Systematic mortality survey and data collection over the period must be analyzed and the end result can be used to strengthen wildlife management in a scientific way. This has to be handled most professionally by a wildlife manager. The standard recommendation for mortality is the old dictum of 'remove the cause' is not always possible in wildlife management because asserting the cause and its removal is not easy in wildlife. Wildlife manager often has little control over the ecological factors. Evaluation of habitat quality \may be done if death occurs due to malnutrition and starvation. Poor health can lead to excessive predation. But other man-made etiological factors like cattle grazing, highways cutting across the Reserve, poaching or hunting, electrocution, poisoning, dynamite blast hidden in the agricultural fields, and man made structures such as wells, pollution from industrial units and quarries, contaminants, drug residue like diclofenac, etc., should be handled in a professional manner.

GPS locations of poaching or hunting cases, recorded and plotted on a GIS map will provide information to strengthen protection. Similarly GPS locations of disease out-break recorded will also be useful to understand the disease epizootology. By understanding their pattern of disease out breaks, the mechanisms of spread from cattle or by other causes, timely preventive and control measures can be taken.

#### **Existing Mortality Survey**

Presently there is no systematic survey for carcasses of dead animals. If the Forest department staff on their regular field patrols, come across any carcass of a Schedule-I species, they will report this to their range head quarters. The Range Officer will in turn request the Forest Veterinary Assistant Surgeon to conduct a postmortem and to report the cause of death. There is no proper documentation on the mortality on the prey base, that die of natural causes. This has to be done systematically for scientific management.

#### **Proposed management of mortality**

#### **Mortality Survey and data collection**

The field staff during their regular patrol in their respective beat area needs to look for death of all animals including natural kill by a carnivore and report to the concerned range officer on a daily basis. Each range office to maintain a mortality survey register and death details to be entered then and there and an abstract of same fact in a specified format with digital photograph submitted to the office of the field director and office of the Forest Veterinary Assistant Surgeon. In case of other natural death (other than kill by a carnivore), death due to diseases and poaching should be immediately informed to the Forest Veterinary Assistant surgeon with proper requisition letter to conduct post-mortem examination. Subsequently the fact

also should report to the O/o the Field Director cum Regional Chief Conservator Forests, Baripada.

#### **Training on Mortality Survey**

Periodical training to the Forest Field staff for collection of details on mortality need to be given regularly to maintain proper records by the wildlife health monitoring and Forest Veterinary Unit.

#### **NTCA Guidelines for Tiger Mortality**

On 17.12.2012 NTCA have issued a Standard Operating Procedure to be followed in case of tiger death which will be scrupulously followed.

#### Developing a wildlife disease monitoring laboratory having Forensic department:

A sophisticated lab needs to be developed for regular wildlife disease surveillance and other tiger DNA mapping related molecular work and meat speciation or forensic work. Building, infrastructure and above mentioned man power like molecular scientists and labarotory technician is required to develop a sophisticated laboratory at Baripada under the supervision of the Field Director..

#### **Vehicles (Animal Ambulance)**

Two vehicles, fully furnished ambulance equipped with facilities such as a winch and pulley, Stretures, Nets, ropes, animal mask, dis-infectants, Bandages, Medical life support instruments to treat and bring the injured wild animals to be kept under surveillance at two rescue centres proposed in Gurguria and Nawana.

#### **Animal Restraining/ tranquilizing units:**

Minimum three experts in problematic wild animal restraining/ tranquilizing fields need to be built up by procuring tranquilizing guns, restraining chemicals, other supporting equipments and training of suitable staff as well as VASs at Baripada, Karanjia and at Udala for dealing problem wild animals in and around the Tiger reserve. Sufficient funds need to be provided for this programme.

#### Wildlife Rescue Centres at Gurguria/ Nawana:

Wildlife rescue centres having sufficient space for rescued animals from outside/inside the Tiger reserve area are required to be made to give proper treatment and ground for rehabilitation in to their native habitat. Hence sufficient fund need to be provided by the funding agencies for building such rescue centres with recruitment of animal care assistants, vet surgeons. Each animal rescue centre must have separate cages , wards for Elephants, Tigers/ Leopards, Herbivores and for small animals, birds, reptiles.

#### Establishment of GIS Laboratory at Baripada in the Office of the Field Director:

A well furnished building with high capacity computers and Latest GIS software, printers of A4, A3 and A1 size map printing facilities, Air conditioned rooms/equipments, Electric power back up system, and security system to protect database and the system need to be established at Headquarters and sufficient fund provision to be provided. GIS lab will play a vital role in monitoring of various parameters in STR.

#### **Recruitment of Sociologists/ Field Biologists and Veterinary Assistant Surgeons:**

Sufficient fund require to be supplied for recruitment/engagement of one sociologist for round the year survey, monitoring of socio-economic status of tribal and other forest dependant local people living in and around the Tiger Reserve. One GIS assistant and computer assistant need to be engaged for the GIS cell. One wildlife trained V.A.S. need to be engaged in Field director's office for overall monitoring of wildlife health and rescue operations, and relocation of problem animals.

Periodical training to the field staff on Wildlife disease and monitoring as a capacity building.

#### **Disease Preventive Measure Programme.**

- 1) Periodical vaccination of village cattle against contagious diseases and de-worming
- 2) Elimination of dog in protected areas
- 3) Periodical vaccination and de-worming stray dogs in fringe areas
- 4) Continuous monitoring of infectious disease by sending sample from each possible wildlife death

#### Mortality survey form (filled by a forest field staff)

	Date and time:
Name of the Range:	
Section:	<u> </u>
Beat :	
Compartment:	
Location :	
GPS co-ordinates :Lat:	Long:
Species :	<del></del>
Age :	

Sex		:									
Signs carcass	::				around						the
Signs					on						the
	ice / pro	bable ca	use of								
Mortal	Name of the Forest field staff and Signature  Mortality survey abstract (to be filled in by the Range Head-quarters)				nature						
Mortal	ity surve	y abstra	ct for th	e month	of		Year				
Name o	of the Fo	rest Div	ision:						_		
Range:											
					Locatio	n					
No	Date	Species	Sex	Age	Beat	Compartment	Location	GPS	coordinates	Cause of death	Remarks

Submitted to the Field Director cum Regional Chief Conservator of Forests

Copy to Forest Veterinary Assistant Surgeon Signature of the Range Officer

#### TIGER POPULATION AND HABITAT ASSESSMENT

#### 9.1 DAILY MONITORING PROTOCOL

For designing, implementing, and evaluating the success of any conservation program for endangered species, it is imperative to monitor the status, distribution and trends in the populations of the target species. The monitoring program to be transparent in its approach, and holistic, addressing an array of parameters related to the survival of the species by using the blend of best available science and technology Jhala *et al* (2008).

Daily monitoring task to be planned and sincerely executed by the ground staff like the forest guards and the anti poaching staff which involve simple observations on a regular basis and keeping track of the said observations discreetly and meticulously. The daily walk of a forest staff is a tool that could be effectively used for monitoring of different animal populations across different seasons and habitats. The observations should include:

- 1. Number and species of animals seen during any patrolling through the forest. For every walk the total kilometres walked to be noted down with time and intervals of rest. Effort will be made to see that every walk is taken during more or less at a fixed time during the day all though the year.
- 2. Number of different signs of carnivores like pugmark, scrape, rake, scat encounter and kill to be noted down on every walk. Effort be given towards identifying the species for which signs are being registered along with some special notes if any.
- 3. Care to be taken in maintaining as much silence as possible during the walks and noting down the associated information for habitat and weather. The records of these walks if maintained properly and compared over time can provide reliable information towards understanding and deriving an overall idea about the forest health.
  - Reporting and database maintenance are the two most important part of the entire program. Data collected during these daily walks should be collected and compiled by the office if possible at the beat range level and should be able to produce when and where needed.

## 9.2 TIGER POPULATION ESTIMATION FRAME WORK: BUFFER ZONE Sampling For Tiger, Leopard and Other Carnivores Encounter Rate

Obtain data on the presence, absence and intensity of use of a beat by tigers and other carnivores, we will quantify the abundance of tiger, leopard and

carnivores sign in an area. The following procedure needs to be followed for data collection:

- A beat will be considered as a sampling unit.
- Areas within the beat that have the maximum potential for tiger occupancy will be intensively searched.
- Since tiger and leopard have the tendency of using dirt roads, trails, foot pats, river beds and nullahas, these landscape feature within the beats need to be searched intensively
- One to three persons who know the terrain and habitat features of the beats should conduct the search for tiger sign.
- There should be 3-5 separate searches (in different compartment within the beat and /or at different times 1-5 days apart) each search covering about 4-6km distance in areas having the best potential for tiger presence .It is important to record the distance covered and the time spent during each search separately and accurately. If time is spent resting or in other activities while conducting search, this duration should be reported separately. If possible the GPS coordinates of the beginning point of each search path should be recorded.
- The total minimum distance covered while searching for tiger and other carnivore sign should be 15km per beat.
- Tiger and leopard signs should be classified into following categories 1) Pugmark trails, 2) Scat(Old: dry with hair and bones visible; Fresh: dry but intact with shiny surface; Very Fresh: soft, moist, and smelly, 3) Scrapes,4) Scent marks( spray, rolling ), 5) Rake marks on trunks, 6) Actual sighting , 7) Roaring ( vocalization) 8)Kills (Predation on wild prey).
- A brief description of the topography and forest type is to be recorded for each sign.
- In the case of pugmark trails, each trail set is considered as one sign (not each pugmark as one sign). In case a tiger (or other carnivore) continues to walk along a dirt road for a long distance ( say 1 km), then this should be considered as one sign, and a comment recorded in the remarks section of the data regarding distance covered by a pugmark trails of a single tiger.
- Tiger and leopard signs if encountered outside the sampling route should also be recorded with GPS coordinates (if available) and with appropriate comments.
- Special emphasis should be given to sign of tigress and leopards with cubs and any authentic evidence of cubs (sighting of cubs, lactating tigress, tracks, etc.) obtained within the past twelve months should be mentioned in the data sheets.
- While sampling for tiger and leopard signs of any other carnivores that are encountered.

- The number of livestock killed by predators within the past three months needs to be recorded in the questionnaire following the data sheet.
- It is important to report data sincerely. It is likely that there may be reliable information that tiger /leopard is present in the beat being sampled, but no tiger /leopard signs are recorded during the intensive search survey. In such cases, mention should be made in the remarks column of the data sheets. However, failure in obtaining tiger sign from a beat is equally important as recording tiger/ leopard sign and for appropriate analysis of this data the actual should be reported.

#### **Sampling For Ungulates Encounter Rate**

This protocol outlines a simple method for quantifying ungulates abundance in an area based on visual encounters while walking along fixed line transects.

The following numbers of transect lines of 2 km length have been made which will be kept as permanent lines and will be maintained regularly.

Name of Division	No of transect lines
Baripada	29
Karanjia	48
Rairangpur	28

The following procedure needs to be followed for data collection:

- A beat would be considered as the unit for sampling.
- After considering shape, size, vegetation and terrain type of the beat, a transect line of a minimum of 2 km and not exceeding 4km will be marked for sampling.
- The transect line should traverse similar habitat (broad vegetation types) as far as possible. If the beat is composed of 2 or 3 distinct vegetation types eg. Mixed Teak Forest comprising 40% of the beat and the remaining 60% comprised of Miscellaneous forest with bamboo, then 2 separate line transects should be marked for sampling.
- The line transect within a beat may be broken up into 2 or more segment so that each segment has a minimum length of 2km and traverse similar habitat.
- Care should be taken that a line transect is not located near a busy road nor should it run parallel to a river or other features of the landscape which may bias sighting of ungulates.
- For each transect the point of beginning and end point coordinates (Latitude and Latitude) should be recorded by a global positioning system.

- The broad forest type and terrain type that the transect traverses needs to be recorded.
- Each transect should be walked by 1-2 persons during the early morning hours (6:30AM to 8:30AM). Preferably one of the persons walking should be a good field person who is able to spot wildlife.
- A record should be kept of all mammals and peafowl seen during the walk.
   For each sighting the following need to be recorded: 1) serial no of sighting,
   2) time of the sighting, 3) species (eg. Sambar, Chital, Elephant, Wild Pig, Peafowl, Langur, etc.),
   4) group size number of animals of the same species in the group as accurately as possible. Animals are considered to belong to two different groups if the closest animals from groups are separated by a distance of over 30m.
- If possible number of young (fawn / calves less than 1 year of age) seen in the group should also be recorded.
- A broad habitat category (vegetation and terrain type) needs to be recorded for each sighting eg. S.No.5. 12 chital (10 adult and 2 young) were seen at 6:40am, in mixed teak forest, gently undulating terrain.
- Each line transects needs to be walked atleast on three different mornings for estimating ungulate encounter rates.

#### Sampling for Vegetation, Human Disturbance and Ungulate Pellets

To quantify the habitat parameters and determine relative abundance of ungulates sampling will be done along the same line transect on which ungulate encounter rates were estimated. For economy of time and effort it would be possible to first sample the line transect during early morning hours for ungulates encounter rate and then while returning along the same line, sample for vegetation and ungulate pellets. Sampling for vegetation, ungulates dung and human disturbance will be done only once on a transect.

- Again the beat will be sampling unit, and sampling will be done along the established line transect.
- For beginning and end point coordinates of the line transects need to be recorded using a GPS unit.
- The principle of line transects as explained in the section on ungulate encounter rates is applicable here.
- Vegetation would need to be quantified visually at the following categories for each plot:

#### 15m radius circular plot

1) Broad vegetation type and associated terrain type eg. mixed teak forest on hilly terrain, sal forest on flat land etc.

- 2) Within the distance of approximately 15m of the observer the five most dominant trees (over-story, all vegetation >6ft. in height, including bamboo) need to be listed in the order of dominance (abundance).
- 3) The observer needs to list the 5 most dominant shrub species (middle –story, vegetation >20cm &<6ft.) in order of dominance (abundance) within 15m of the location. He needs to categorize shrub density (under story vegetation) as absent, very low, low, medium, and dense. Shrubs will be assessed on five point scale (0 to 4 i.e. absent to most abundant) for density estimation.
- 4) If weeds are present their abundance needs to scored on 0 to 4 scale (0 being absent and 4 for high abundance) and the three most common weeds seen in 15 m need to be listed in order of abundance.
- 5) Within the same 15m distance the observer needs to record number of signs of looping, wood cutting, and presence /absence of human foot trail. Mention needs to be made if people and or livestock are seen from the plot.
- 6) The observer needs to visually quantify the canopy cover at the location. The observer should subjectively classify the proportion of the sky above him that is covered by canopy foliage and categorize it into <0.1, 0.1- 0.2,0.2-0.4,0.4-0.6,0.4-0.6,0.6-0.8,>0.8 canopy cover.
- 7) A mention need to be made in the data sheet regarding the number of permanent human settlement, human population and livestock population present in the beat.
- 8) A mention needs to be made based on the observers' knowledge if any non timber product is collected from the beat. If yes which NTFP and to score the magnitude of collection on a 5 point scale (0- no collection, 4- high rate of collection)
- 9) If the beat was burnt, the proportion burnt in the past 3 years needs to be mentioned in the data sheet.

#### 1m radius circular plot

The plot should be laid 5m away from the centre of the 15m circular plot. The observer needs to use a 2m long stick to define an imaginary circle around him with the stick as the diameter. Within this circular plot (2m diameter) the observer needs to a) quantify the percent ground cover, i.e. the proportion of ground covered by herbs, grasses, litter and bare ground b) List the 3 most dominant grass species, and herb species in order of abundance.

#### **Sampling for Ungulates Pellets**

Ungulates abundance will also be indexed by enumerating their faecal pellets. This exercise will be done on the same line transect that has been sampled for

ungulate encounter rate. To save time, this exercise could be done after the line transect has been sampled in the early morning for ungulates encounters.

- At every 400m along the transect (line of walk) the observer needs to sample an area of 2m by 20m, perpendicular to the transect for quantifying ungulates pellets. This is done by using the 2m long stick held at the centre horizontally in his hand and by slowly, 20m right and left of the transect alternately at every 400m.
- All ungulates pellets encountered need to be recognized to ungulates species and recorded in the appropriate columns.
- The number of individual faecal pellet need to be counted. In the case the pellets occur in the large heaps, then they should be categorized into the following categories A(50-100), B (100-200 and C (>200).
- In areas where small livestock like sheep and goat are known to be grazed, it is possible that faecal
- pellets of these can be confused with wild ungulates especially those puff chital. In such areas, a mention needs to be made that goat or sheep graze the area.
- In the last row of the data sheet the observer needs to report if ungulates/animal listed in the data sheet occurs in the sampled beat to the best of his knowledge irrespective of whether its pellets/ dung were recorded in the plots.

#### Phase II

The data from phase I one will be plotted in geographical information system (GIS) to develop a presence/absence map for tigers, at the beat or range level across the park. The presence/absence map is then to be used to develop a resource selection probability function using attribute data on transportation network (i.e., linear features such as roads and train tracks), forest cover, normalized difference vegetation index (NDVI), vegetation cover, terrain model, hydrology, and night light satellite (to represent human disturbance). The output of this phase will be a map with relative rankings of high, medium, and low probability of tiger occurrence throughout the park.

This data could be assembled and processed by any institution that has GIS facility and are eager to provide them. Outsourcing of this work would be helpful keeping in mind the feasibility and the amount of technicality that is supposed to be involved. This data once generated can serve as the inventory for the park and could be subsequently used by the park on future occasions.

#### Phase III

Estimation of tiger and ungulate abundance will be done by using intensive sampling. The habitat rank map for tiger developed in phase II will be used to draw a sample of location for intensive density estimation of tiger and ungulates density. Tiger population will be estimated using photographic mark- recapture sampling techniques in medium and high density (probability) areas. The following frameworks are tiger densities estimation by Capture recapture frame work and ungulate densities by Distance sampling.

#### Estimation of tiger populations using capture recaptures frame work

With the first animal triggered photograph being taken in 1877 (from Cutler and Swann, 1999), remote photography has been used to study avian nest predation, feeding ecology, nesting behaviour, determining activity patterns, presence – absence monitoring and estimating population parameters. The increasing popularity of remote photography in wildlife research has led to the development of a large variety of equipment and methods (Kucera and Barrett 1993).

With the help of remote photography the elusive lives of cryptic animals have been better understood (eg. Pierce *et al.*1998). Since previously all other information regarding cryptic animals, carnivores in particular, were derived either from direct observations or indirect signs, remote photography studies have proved more successful (Kucera and Barrett 1993). From the times of Champion (1928) photographing cryptic animals such as the tiger (*Panthera tigris*) in the Indian subcontinent using remote photographic techniques has sought popularity.

With developments in capture – recapture theory (Otis *et al.*, 1978, Pollock *et al.*, 1990) and the use of cameras to capture individually marked or identifiable animals and photographically recapture them, resulted in the use of cameras for estimating population parameters. Since individual tigers are readily identifiable using the stripes on the body (Schaller 1967, McDougal 1977, Karanth 1995, Franklin *et al.*, 1999), the sight-resight (White 1996) or capture-recapture approach can be used to estimate population parameters. The capture – recapture theory requires that all individually identifiable animals will have to be identified with surety. By estimating the capture probability p - hat an estimate of the population size (N) is arrived at (Nichols 1992). Owing to the large number of estimators available for estimating the population size (N) various computer programs have been formulated to aid analysis (eg. White 1996).

Karanth (1995) developed and implemented a method of photographic capture-recapture analysis to aid estimate and monitor tiger populations. Years of using this method of analysis has proved that photographic capture recapture sampling is a reliable technique for estimating abundances of tiger and other cryptic animals (Karanth and Nichols 1998, 2000, 2002, O'Brien *et al.*, 2003, Trolle and Kery 2003, Karanth *et al.*, 2004b).

However most published studies report population sizes accompanied by low levels of precision (eg. Karanth and Nichols 1998, 2000, Silver *et al.*, 2004) and low sample sizes (Kawanishi and Sunquist 2004). It is only recently that issues regarding sampling design related to photographic capture-recapture analysis are being discussed (Wegge *et al.*, 2004). This brings to notice that though this method of population estimation has proven successful, issues regarding sampling require rigorous field validation so as to improve the quality of the results thus obtained.

#### Estimating tiger population using photographic capture-recaptures

In order to estimate the population density of tigers in the study area photographic capture recapture analysis was chosen as an appropriate method (Karanth 1995, Karanth and Nichols 1998). The sampling design was modified to suit field conditions. Each site two cameras are equipped to photograph both flank of the tiger at every capture. The cameras are placed within wooden housings so as to protect the units from weather and animal damage. As to photograph the two flanks of individual tigers to aid individual identification.

These trapping sites are selected based on presence of tracks, scats and other evidence indicative of frequent tiger activity so as to maximise the capture probabilities of tigers (Karanth 1995). An important consideration is to ensure coverage of the entire area, without leaving holes or gaps that were sufficiently large within which any tiger have a zero capture probability. Therefore trap placement was planned with a minimum of 1.65 km inter trap spacing. Owing to the good network of roads all trapping sites in each of this should be checked on a daily basis.

Following the identification of tigers from the photographic captures using stripe patterns capture histories will be developed. The capture history for an animal  $t_x$  consists of a row vector of 15entries, denoting the number of sampling occasions. Each entry, denoted as  $X_{ij}$  for an individual i on occasion j, assumes a value of either "0" if the animal is not photographed on that particular occasion, or "1" if the animal is photographed on that occasion. Referred to as an X matrix (Otis  $et\ al.$ , 1978) this data matrix will be used to estimate tiger population size N.

The capture history data will be analyzed using program CAPTURE (Otis et al., 1978, White et al., 1982, Rexstad and Burnham 1991), software developed to implement closed-population capture-recapture models. Program CAPTURE computes the estimate of N under seven different models which differ in their assumed sources of variation in capture probability (p - hat).

Since it is aimed to estimate the density (D) of tigers in the study area, the population size (N) is divided by the effective sampled area (A(W)). In trapping studies, A(W) is calculated by assuming that the perimeter traps represent the minimum sampling area A. The mean maximum distance d between recaptures of individual animals is calculated and the boundary strip width W is calculated as W = d/2 (Dice 1938, Wilson and Anderson 1985). The boundary W is then added to the

minimum sampling area A on a GIS domain and A (W) thus calculated. Theestimates of density and population size are evaluated using two principle measures: bias and precision.

#### Estimating ungulate density by distance sampling

Densities of the prey species is estimated using the line transect method (Anderson *et al.*, 1979, Burnham *et al.*, 1980, Buckland *et al.*, 1993). Line transects have been found to be very effective and reliable in estimating densities of ungulates in the Indian Subcontinent (Karanth *et al.*, 2004a). With the hypothesis that detection probability is related to the distance between animals and the point of observation, the obtained estimates of density are in effect adjusted for no detection bias.

Line transect data will be collected between 06:15 hrs and 09:30 hrs by two observers. On every walk the followings were noted –

- i. Species and group size: On every detection the name of the species will be noted along with the sex.
- ii. Position: Observation of animal clusters or individuals has to be noted as distance from the start.
- iii. Sighting angle: Using a hand held compass (SUNNTO), the bearing of the animal clusters or individuals are taken. Since the bearing of walk is determined the angle of sighting will be calculated.
- iv. Sighting distance: Using a laser range finder the distance to the animal cluster or individual is measured from the point of observation.

The line transect data will be analysed using program DISTANCE 4.1 (Buckland  $et\ al.$ , 1993, Laake  $et\ al.$ , 1993). For reliable estimates of prey species density a minimum number observations are required in order to be able to reliably model the detection function. As a rule of thumb, it is often difficult to get a robust result with less than 60-80 observations, although the number depends on the characteristics of the species (Burnham  $et\ al.$ , 1980).

This is a more appropriate method of calculating the prey density (*D*) and the associated Coefficient of Variance (CV %) since it takes into account the temporal variation in species detection (Jathanna 2001). In a more straight forward approach to the calculation of the prey densities from a line transect, each temporal replicated is treated as a separate effort and thus the variance is underestimated.

### 9.3 HABITAT ASSESSMENT FRAMEWORK

#### **Prey base improvement:**

a. Assessment of fodder availability:
 Objective: to estimate quantitatively the extent of fodder availability for animals in different areas of buffer zone.

#### Methodology:

- Based on the logistics few permanent/semi permanent vegetation plots of 1 sq m are to be established in different locations of the buffer zone. In which equal number of plots are kept as control and grazed ones.
- In each of these plots regular extraction of biomass to be carried out and the collected biomass is to be divided as grass, non grass and other dry materials.
- Fresh and dry weight of the biomass is to be measured so as to know the exact amount of biomass.
- Collected biomass samples are to be subjected to nutrient analysis. **Expected outcome:**
- Such type of quantitative exercise in biomass availability will indicate the grazing pressure on biomass in different locations of the buffer zone.
- It also indicates the seasonal dependency of animals on the biomass.
- The result is very important in assessing the extent of nutrient availability.
- The obtained data can be correlated with soil moisture, rainfall, and other weather parameters so as to know the influencing factor for balanced production and supply of biomass in the buffer zone.

#### 9.4 SPATIAL DATABASE DEVELOPMENT

Development of spatial data base with the data collected during the monitoring phases and subsequent programs will be out sourced to scientific organization equipped for the job and technical support of experts in the said field will be sought.

#### 9.5 ANALYSIS AND REPORTING FRAMEWORK

Analysis of the data collected by the forest department will be done by Research Officer at the Office of the Field Director. The recommendations of the Research Bodies will be considered during any decision making for the park.

A half yearly report from each Range will be collected by the office of the Field Director regarding the proceedings and forth coming programs of the Range and a half yearly report will be mandatory for each Range that will describe the activities of he Range in detail during the year.

#### PROTECTION AND INTELLIGENCE GATHERING

#### 10.1 DEPLOYMENT OF NATIVE WORK FORCE

Similipal Tiger Reserve and adjoining buffer zone area is surrounded by about 1200 villages and have a constant threat of poaching,, hunting and illegal trade. From last 5 years, protection is continuously being strengthened and the chances of poaching have been averted except for the period when the Leftwing extremism affected the protection system in 2009. Protection is one of the major and important concerns for the buffer zone. The existing staff pattern is not sufficient to counter the problem in a better way. Participation and involvement of local people in protection by way of social fencing will help the department in controlling the illegal activities. Although an effort has been made to control the area with a native work force and there is strong networking and anti poaching watchers, it needs further strengthening to counter any threat in the buffer area of the reserve. The anti-poaching net work which is functioning well and help in the management to protect the viable diversity.

#### 10.2 PATROLLING STRATEGY INCLUDING JOINT PATROLLING

#### a) Highway Patrolling including night raid patrolling

Patrolling in the Similipal Tiger Reserve and buffer zone area needs a strong base after the declaration of Tiger Reserve. At present, highway patrolling is being taken up but one or two squad is not sufficient to face the problem in Eastern, Western and Southern sides of the Tiger Reserve. More patrolling squad is needed to be deployed at Kaliani check post, Tulsibani Check Naka Post Pithabata check Naka Post to protect Buffer Zone. Additional force of 6+1 are required to be deployed in Godbhanga Check gate, Dangadiha Check gate, It needs to monitor the movement of vehicles to curb the menace of poaching, hunting or illegal trade. There will be different forms of patrolling.

One is highway patrolling which can be confined only at the main highways leading to West Bengal and Jharkhand with sufficient number of staff with weapons and other modern equipments. Intensive forest patrolling squad will be of three type 1. Walking squad 2.Vehicular squad and 3.Elephant squad to cover inaccessible areas. Patrolling on elephant back is needed only in tall grass habitats. Camp elephants can be utilized for this service only in certain period. The Tiger force under the control of Field Director can be used to counter the emergency problem and for surprise raid.

#### **Joint Patrolling**

For joint patrolling and coordination among the core and buffer staff the entire tiger reserve have been divided into three landscapes as given below.

Landscape No.	Name of Core Ranges	Name of Buffer Ranges
Landscape No. 1	National Park	Dudhiani
	Nawana North	Gurguria
		Kendumundi
		Satkosia
Landscape No. 2	Jenabil	Udala
	Upper Barakamuda	Kaptipada
	Nawana South	Thakurmunda
Landscape No. 3	Pithabata WL	Pithabata
	Chahala	Dukura
		Bangriposi
		Manada
		Bisoi

The Range Officers will meet at Landscape level regularly and chalk out strategies for joint patrolling and other activities relating to protection. The ACFs of the concerned Divisions will coordinate and also attend the Landscape level meetings without fail.

#### **Anti-poaching operation**

The details of protection system dealt in detail in core plan Chapter7.

#### 10.3 MAINTENANCE OF VILLAGE LEVEL CRIME DOSSIER:-

Since the buffer zone area is adjoining human habitation. Each range can develop village level crime dossier keeping the past history of all the accused collected from records. Crime record must have certain details about the criminal such as his past record, occupation, present residence, past employment, a recent photograph etc. This will help the staff to have a close watch.

- a) One copy of the dossier will be with the Deputy Director and one with Field Director.
- b) Crime dossier record of inter state accused can be maintained by the Deputy Director of the Tiger Reserve with the help of the Range Officer. From neighbouring State similar information can be obtained and dossiers of accused can be exchanged. This will help both the State to have a watch on the criminals. The photographs of the usual offenders can be given to patrolling staff. This will help in checking the movement of usual offenders from one place to another.
- c) Informers in the tiger landscape in different villages is very important to control poaching.

#### 10.4 FIRE PROTECTION:

Fire protection measures have been discussed in Chapter 7 under the theme plan of fire control.

#### 10.5 INTELLIGENCE GATHERING AND CO-ORDINATION-

There will be strong net work of local intelligence gathering. Each Ranger will keep a record of informants and day to day information collectedwill be maintained in Division office of Karanjia, Baripada and Rairangpur area. This local intelligence report will be reviewed by the Field Director once in fortnight to get details of the usual offenders, suspected offenders and casual offenders, Apart of this, local intelligence net work will also help in managing and taking immediate action. Same intelligence net working can be extended and shared with the neighbouring States to have a periodical watch on the criminals.

The above measures would yield a potential result in managing the buffer area, especially from protection aspects in the long run.

#### Proposed Steps for improving protection measures in buffer areas

- a) More check posts in vulnerable areas with communication facilities
- b) Periodical surveillance in village areas with proper net working
- c) Increasing separate ground squads to prevent poaching incidences for meat purposes
- d) Proper arm training to be ensured for the ground staff with STF police
- **e)** Providing training to the ground staff in dealing poaching incidences in the field.

The strategies and method of carrying out intelligence gathering has been outlined in core plan in Chapter No.7 under Theme Plan for Protection.

#### ORGANIZATION, ADMINISTRATION AND BUDGET

# 11.1 BUFFER AREAS COORDINATION COMMITTEE AND ITS LINKAGE WITH TIGER STEERING COMMITTEE AND TIGER CONSERVATION FOUNDATION

The buffer zone management will be organized in coordination with the following committees.

As per G.O. Notification No 565 of Environment and Forests (FR-V) Department Dated 08.01.2010 ,a State Level Steering Committee for tiger conservation for ensuring coordination, monitoring , protection and conservation of tiger, co-predators and prey animals within the tiger Range under sub sections (1) and (2) of section 38-U of the Wildlife (Protection) Act 1972 (Central Act, 53 of 1972) has been constituted. The details of members are furnished in the Annexure XI.

The section 38-X of the Wildlife (Protection) Act 1972 as amended in Act No. 39 of 2006 states that the State Government shall establish a Tiger Conservation Foundation for tiger reserves within the state in order to facilitate and support their management for conservation of tiger and bio-diversity and, to take initiatives in eco-development by involvement of people in such development process. In pursuance to this amendment, Similipal Tiger Conservation Foundation have been formed and become functional with holding of its first Governing Body Meeting on 28.06.2012. The detailed guide lines / deed of trust isfurnished in the Annexure XII.

The method of administration has already been dealt in chapter no: 3.6

# 11.2 COORDINATION WITH ECODEVELOPMENT COMMITTEES, CONFEDERATION AND OTHER LINE AGENCIES / DEPARTMENTS / PRODUCTION SECTORS.

#### **Development through District Administration**

- a) Co ordination with various institutions and line agencies to obtain their financial support and expertise to implement various EDC activities through District administration also.
- b) Developing specific proposals with the themes of EDC to obtain corpus funds from various donors.

#### **Proposed Activities**

- 1. Public Telephone Booth for the Village
- 2. Establishing Training Centres for Tailoring and Associated Activities
- 3. Small cottage industries, especially candle manufacturing, bamboo products, Terracotta items
- 4. Small Petty Shops, souvenir shops

- 5. Dairy Farms with hybrid milch animals
- 6. Community Apiculture, processing packaging unit
- 7. Formation of Medicinal Gardens
- 8. Weaving Units
- 9. Supply of bullocks for land based activities
- 10. Agriculture Improvement Land based activities
- 11. Sale of NTFP products with value added products
- 12. Integrated Poultry Farms
- 13. Fish Farm
- 14. Viable and Suitable Eco Tourism activity: (Only a few Selected Modules)
- 15. Promoting Women Self Help Group
- 16. Developing medicinal plant nursery for Odisha State medicinal plant Board.

All the above activities can be taken up by the line departments in coordination and consultation with Field Director of Similipal Tiger Reserve.

#### 11.3 STAFF DEPLOYMENT

The staff working in the buffer areas of Similipal Tiger Reserve is at present under the administrative control of the Field Director Similipal TR.

#### 11.4 FUND RAISING STRATEGIES

With the formation of the Tiger Conservation Foundation the funding source shall be as briefed in the core plan vide chapter No: 13.5.

- The income generated from levying tourist entry fees and ecodevelopment surcharge on visitors to Similipal tiger reserve, compounding fees, elephant ride charges, rest house rents and income through vehicle ride etc shall be pooled into the fund of Tiger Conservation Foundation of Similipal.
- Contribution from other sources such as fund raising for the Similipal Tiger Reserve at National as well as International level as permitted by law and Government orders.
- Grant, donation, or assistance from any kind from any individuals or organizations including foreign Governments and external agencies as permitted by law and Government orders.
- By any other activity as permitted by law and in confirmative with the terms and conditions of the deed of trust.

#### 11.5 SCHEDULE OF OPERATIONS

The following schedule of operations are prescribed for successful implementation of the Management of buffer zone of Similipal Tiger Reserve apart from the present operation as is followed by the concerned territorial forest divisions.

1. For Silvicultual operation / Weed Management, Fire Management

Demarcation / preparation of site /

survey etc., - January to April

Planting / Removal of Weeds,

burning etc., - May

2. Protection

Engaging anti-poaching watcher to

look after the protection works - April to March of next

year.

3. Fire protection

Engaging Fire watchers - January to June

Fire line scrapping - November to December

#### INTRODUCTION OF THE AREA

Wildlife corridors have been broadly defined as landscape elements linking historically connected habitats in order to facilitate movement and offset possible long term negative impacts of inbreeding and genetic isolation. Studies during the last few years have indicated that wildlife corridors have emerged as a critical conservation strategy that can help minimise genetic isolation, offset fragmentation problems, improve animal dispersal, restore ecological processes and reduce of man animal conflict. Corridors may also help facilitate the re-establishment of populations that have been reduced or eliminated due to random events. This may potentially moderate some of the worst effects of habitat fragmentation. Wildlife corridors are important for large species requiring significant sized ranges; however, they are also vital as connection corridors for smaller animals and plants as well as ecological connectors to provide a rescue effect.

#### 1. THE EXISTING SITUATION

The important connectivity with Similipal Tiger Reserve requiring management attention are patches of forests connecting Similipal TR to Badampahar R.F. in western side, Kuldiha Sanctuary in the south-eastern side and up to Santospur RF in Keonjhar District in south-western side respectively. All the corridors are very important area for wild animal migration which needs to be protected from further degradation by human interferences. Tigers, Elephants, Leopards, Sloth Bear and big herbivores such as Mouse deer, Chitals and Boar are often found in these areas and are believed to be using the corridors. These are potential dispersal routes for the animals mentioned above. It is also believed that tigers were using these corridors on previous occasions to migrate from Similipal to other potential areas like Kuldiha Sanctuary located in the eastern part in the neighboring district i.e. Balasore, Satkosia Tiger Reserve in Angul passing through forest areas of Keonjhar and Dhenkanal Districts and Dalma sanctuary of neighboring Jharkhand state through Badampahar. Similipal is the source of largest breeding tigers in eastern ghat. Thus these corridors provide a potential dispersal route to tigers and other co- predators in future if proper protection measures are taken.

## 1.1 BRIEF DESCRIPTION OF THE AREA AND SIGNIFICANCE FOR TIGER CONSERVATION.

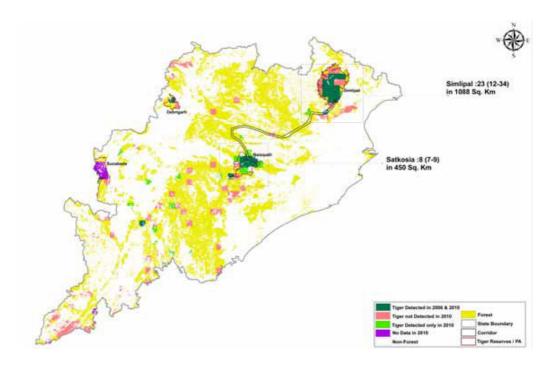
#### 1.1.1 Delineation of Corridors (Macro level & Micro level)

Macro level delineation of corridors connecting Similipal Tiger Reserve to other Protected Areas and other major wildlife habitats have been done based on the report on country level assessment of tigers done in 2010 by NTCA which has identified potential tiger corridors as well as the connectivity lying in adjoining areas of Similipal Tiger Reserve. For assessment of the existing situation of Similipal -Santospur corridor, joint inspection of the corridor with adjoining area DFOs was done Assessment of prey base and carnivore signs in the corridors was conducted in October, 2013 as per protocol of Phase-IV monitoring for which necessary field training was imparted to the staff of corridor areas on 08.10.2013 for Similipal – Kuldiha corridor and on 11.10.2013 for Similipal – Santospur and Similipal – Badampahar corridors. The data obtained thus were analysed and assessed. A meeting was held with all the adjoining area DFOs on 04.04.2014 for discussion on ground truthing for micro level delineation of the corridors as per NTCA guidelines basing on the sign survey report of the corridors. Similipal - Kuldiha corridor was jointly inspected by concerned DFOs on 22.04.2014 before demarcating the area at the micro level. The ground truthing reports of adjoining area DFOs were incorporated in GIS domain at Tiger Reserve headquarters for micro level delineation of the corridors.

#### 1.1.2 Similipal-Santospur Corridor (Area: 113.46 km²)

During 2010 country level assessment of tigers a potential connectivity between Similipal and Satkosia Tiger Reserves of Odisha was identified. This lies in the south-western part of Similipal Tiger Reserve connecting Satkosia RF and Noto RF of Similipal Tiger Reserve to Satkosia Tiger Reserve through forest blocks of Keonjhar and Dhenkanal District covering five forest Divisions. The portion of the corridor falling in Similipal landscape from Similipal TR up to Santospur RF in Keonjhar Wildlife Division is discussed in this plan.

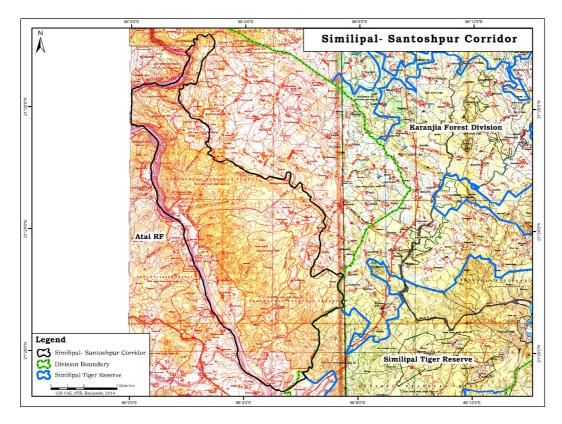
Apart from movement of tiger, this was also an earlier migration route between two largest elephant habitats of Orissa i.e., Similipal and Satkosia. The migration route covers the districts like Angul, Dhenkanal, Cuttack and Keonjhar. In course of time, this has fragmented and does not appear to exist at present. Safeguarding the genetic exchanges amongst wildlife populations, located in these two spatially separated but biologically rich PAs, is a prerequisite for the longevity of these conservation areas.



Above: Corridor connecting Similipal and Satkosia (Source: Status of Tigers, Copredators and Preys in India, 2010, WII)



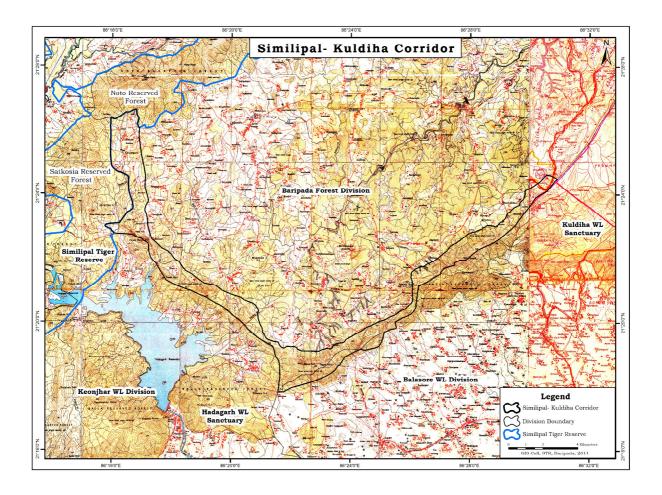
Above: Corridor connecting Similipal and Satkosia (Source: Status of Tigers, Co-predators and Preys in India, 2010, WII)



Above: Similipal- Santoshpur Corridor

#### 1.1.2 Similipal-Kuldiha Corridor (Area: 38.15 km²)

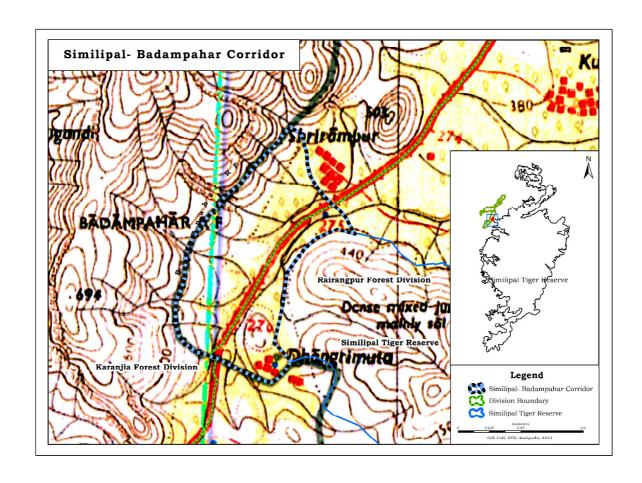
In the Extreme south-eastern side, the area joins the Satkosia R.F. of Similipal Tiger Reserve with Hadagarh sanctuary of Keonjhar (WL) Division and Kuldiha Sanctuary of Balasore District. Movement of wild elephants occur from Similipal R.F. to Kuldiha Sanctuary of Balasore WL Division which is quite important for exchange of gene pool between different meta populations.



Above: Similipal-Kuldiha Corridor

#### 1.1.4 Similipal-Badampahar Corridor (Area: 1.15 km²)

It lies in the western side where a small strip of 115.87 ha (1840 meters long) joins the Similipal Tiger Reserve with Badampahar R.F. The NH 6 passes through this patch of forest. The forest is enriched with Sal and its associates and lies between hamlets of Dhangirimula and Srirampur of village Chelligodhuli under Gurguria Range of Karanjia Division.



Above: Similipal-Badampahar Corridor

### **1.1.5** Geo coordinates of Corridor boundaries

Similipal – Santospur Corridor

Sl. no	Longitude	Latitude
1	86°00'01.296"	21°28'28.801"
2	86°00'30.427"	21°28'40.393"
3	86°00'52.841"	21°28'43.064"
4	86°01'05.286"	21°28'38.104"
5	86°01'27.336"	21°28'40.170"
6	86°01'47.690"	21°28'48.288"
7	86°01'53.440"	21°28'54.775"
8	86°02'04.898"	21°29'27.272"
9	86°02'09.197"	21°29'33.886"
10	86°02'04.924"	21°29'40.398"
11	86°02'00.661"	21°29'45.625"
12	86°02'11.893"	21°29'57.563"
13	86°02'17.128"	21°29'58.456"
14	86°02'19.230"	21°30'00.360"

15	86°02'17.074"	21°30'06.628"
16	86°02'19.248"	21°30'11.376"
17	86°02'23.302"	21°30'10.451"
18	86°02'24.648"	21°30'15.278"
19	86°02'29.029"	21°30'20.466"
20	86°02'36.586"	21°30'17.755"
21	86°02'42.115"	21°30'16.067"
22	86°02'47.242"	21°30'19.451"
23	86°02'49.801"	21°30'21.632"
24	86°02'56.976"	21°30'14.360"
25	86°03'01.390"	21°30'07.499"
26	86°03'01.876"	21°30'03.416"
27	86°03'00.749"	21°29'59.752"
28	86°02'58.722"	21°29'53.070"
29	86°02'47.065"	21°29'43.109"
30	86°02'45.024"	21°29'39.008"
31	86°02'38.173"	21°29'32.086"
32	86°02'34.094"	21°29'23.028"
33	86°02'30.746"	21°29'07.951"
34	86°02'25.793"	21°28'52.003"
35	86°02'22.405"	21°28'43.162"
36	86°02'19.277"	21°28'42.434"
37	86°02'12.833"	21°28'38.964"
38	86°02'05.651"	21°28'41.401"
39	86°02'04.438"	21°28'36.462"
40	86°01'59.084"	21°28'32.689"
41	86°01'53.962"	21°28'33.665"
42	86°01'48.893"	21°28'38.629"
43	86°01'45.268"	21°28'36.610"
44	86°01'46.283"	21°28'29.129"
45	86°01'48.569"	21°28'22.231"
46	86°01'48.716"	21°28'15.463"
47	86°01'47.381"	21°28'10.301"
48	86°01'55.726"	21°27'59.699"
49	86°02'04.006"	21°27'49.745"
50	86°02'09.614"	21°27'44.291"
51	86°02'11.022"	21°27'38.707"
52	86°02'20.130"	21°27'35.208"
53	86°02'27.258"	21°27'34.927"
54	86°02'49.643"	21°27'20.318"
55	86°02'51.814"	21°27'04.626"
56	86°02'49.823"	21°26'52.674"
57	86°02'47.195"	21°26'50.723"
58	86°02'40.290"	21°26'45.226"
59	86°02'46.309"	21°26'41.014"

60	86°02'52.660"	21°26'38.926"
61	86°02'55.561"	21°26'33.418"
62	86°02'48.696"	21°26'28.648"
63	86°02'53.138"	21°26'24.284"
64	86°02'59.687"	21°26'20.879"
65	86°03'02.300"	21°26'14.784"
66	86°03'09.587"	21°26'10.867"
67	86°03'21.809"	21°26'11.620"
68	86°03'27.648"	21°26'14.989"
69	86°03'41.584"	21°26'08.725"
70	86°03'48.607"	21°26'02.998"
71	86°03'52.387"	21°26'02.656"
72	86°03'56.624"	21°25'59.344"
73	86°04'03.911"	21°25'55.682"
74	86°04'11.636"	21°25'52.075"
75	86°04'19.718"	21°25'48.468"
76	86°04'26.497"	21°25'47.813"
77	86°04'33.928"	21°25'45.408"
78	86°04'41.401"	21°25'42.038"
79	86°04'46.384"	21°25'38.968"
80	86°04'52.777"	21°25'38.568"
81	86°04'58.609"	21°25'43.226"
82	86°05'13.794"	21°25'39.760"
83	86°05'29.317"	21°25'37.801"
84	86°05'32.395"	21°25'41.581"
85	86°05'34.073"	21°25'48.904"
86	86°05'40.146"	21°25'51.305"
87	86°05'43.040"	21°25'46.675"
88	86°05'42.619"	21°25'40.480"
89	86°05'39.736"	21°25'31.256"
90	86°05'42.630"	21°25'24.215"
91	86°05'49.481"	21°25'21.187"
92	86°06'00.274"	21°25'28.384"
93	86°06'05.159"	21°25'29.154"
94	86°06'07.470"	21°25'23.502"
95	86°06'07.470"	21°25'17.846"
96	86°06'14.152"	21°25'12.194"
97	86°06'19.033"	21°25'09.109"
98	86°06'25.459"	21°25'02.683"
99	86°06'23.918"	21°24'57.287"
100	86°06'32.141"	21°24'49.835"
101	86°06'41.393"	21°24'44.698"
102	86°06'56.297"	21°24'24.653"
103	86°06'51.415"	21°24'15.916"
104	86°06'57.838"	21°24'04.093"

105	86°06'50.584"	21°23'59.471"
106	86°06'46.228"	21°23'51.544"
107	86°06'44.582"	21°23'38.519"
108	86°06'38.452"	21°23'20.954"
109	86°06'32.504"	21°23'03.710"
110	86°06'27.400"	21°22'53.033"
111	86°06'25.132"	21°22'50.390"
112	86°06'26.647"	21°22'44.962"
113	86°06'27.230"	21°22'40.073"
114	86°06'26.636"	21°22'29.071"
115	86°06'32.000"	21°22'26.209"
116	86°06'44.453"	21°22'32.545"
117	86°06'52.002"	21°22'37.747"
118	86°07'01.402"	21°22'40.552"
119	86°07'08.404"	21°22'37.844"
120	86°07'20.287"	21°22'30.688"
121	86°07'28.812"	21°22'33.215"
122	86°07'24.053"	21°22'26.440"
123	86°07'17.882"	21°22'16.932"
124	86°07'15.571"	21°22'09.736"
125	86°07'21.223"	21°21'59.458"
126	86°07'25.594"	21°21'54.832"
127	86°07'28.164"	21°21'50.976"
128	86°07'28.164"	21°21'43.780"
129	86°07'24.564"	21°21'39.668"
130	86°07'29.190"	21°21'33.246"
131	86°07'28.164"	21°21'29.390"
132	86°07'02.978"	21°21'22.709"
133	86°06'52.700"	21°21'14.742"
134	86°06'23.148"	21°20'57.782"
135	86°06'30.600"	21°20'48.016"
136	86°06'37.778"	21°20'45.121"
137	86°06'38.567"	21°20'32.082"
138	86°06'35.996"	21°20'09.982"
139	86°06'22.374"	21°19'43.770"
140	86°06'23.918"	21°19'30.666"
141	86°06'18.522"	21°19'30.666"
142	86°06'13.547"	21°19'21.356"
143	86°06'03.269"	21°19'20.071"
144	86°05'54.787"	21°19'22.127"
145	86°05'53.502"	21°19'20.842"
146	86°05'56.072"	21°19'12.875"
147	86°05'52.220"	21°19'04.908"
148	86°05'47.335"	21°18'55.400"
149	86°05'25.235"	21°18'42.552"

150	86°05'13.157"	21°18'42.037"
151	86°04'55.553"	21°18'54.756"
152	86°04'44.634"	21°19'02.852"
153	86°04'38.723"	21°19'09.019"
154	86°04'27.930"	21°19'14.160"
155	86°04'16.108"	21°19'24.823"
156	86°04'10.196"	21°19'32.534"
157	86°04'02.813"	21°19'52.871"
158	86°03'42.847"	21°20'38.198"
159	86°03'28.573"	21°21'06.901"
160	86°03'10.800"	21°21'22.964"
161	86°02'39.523"	21°22'21.324"
162	86°02'32.557"	21°22'41.581"
163	86°02'28.529"	21°22'46.592"
	86°02'26.934"	21°22'58.588"
164	86°02'21.350"	
165		21°23'09.658"
166	86°02'22.650"	21°23'21.538" 21°23'28.774"
167	86°02'23.708"	
168	86°02'22.654"	21°23'41.258"
169	86°02'23.338"	21°23'55.745"
170	86°02'16.958"	21°24'01.523"
171	86°02'08.477"	21°24'14.371"
172	86°01'52.504"	21°24'28.001"
173	86°01'44.710"	21°24'31.846"
174	86°01'30.468"	21°24'32.702"
175	86°01'20.510" 86°01'17.072"	21°24'36.554" 21°24'44.190"
176		21°24'49.748"
177	86°01'10.603"	
178	86°01'12.173"	21°25'01.974"
179	86°01'07.482"	21°25'16.234"
180	86°00'58.320"	21°25'26.076"
181	86°00'56.264"	21°25'44.479"
182	86°01'00.620"	21°25'53.108"
183	86°01'02.640"	21°26'06.976"
184	86°01'03.097"	21°26'21.005"
185	86°01'08.879"	21°26'33.371"
186	86°01'12.292"	21°26'38.105"
187	86°01'14.700"	21°26'48.502"
188	86°01'00.779"	21°27'05.220"
189	86°00'45.410"	21°27'18.864"
190	86°00'37.793"	21°27'23.465"
191	86°00'23.443"	21°27'25.315"
192	86°00'16.693"	21°27'24.242"
193	86°00'00.050"	21°27'28.800"
194	86°00'01.022"	21°28'02.539"

### Similipal – Kuldiha Corridor

	Latitude
86°16'48.71"	21°26'35.02"
86°15'57.52"	21°26'22.39"
86°16'00.74"	21°24'48.91"
86°16'32.32"	21°24'31.78"
86°16'41.58"	21°23'32.34"
86°15'45.92"	21°23'00.06"
86°16'03.40"	21°22'46.37"
86°17'13.82"	21°22'24.15"
86°17'50.76"	21°21'17.56"
86°20'04.77"	21°20'11.33"
86°21'23.76"	21°19'14.66"
86°21'34.64"	21°17'49.11"
86°22'53.42"	21°18'11.78"
86°23'49.11"	21°18'54.84"
86°24'38.64"	21°19'10.09"
86°25'07.82"	21°19'41.36"
86°26'07.29"	21°20'21.27"
86°26'16.71"	21°21'08.38"
86°27'29.18"	21°21'48.30"
86°29'05.63"	21°22'42.09"
86°30'11.70"	21°23'54.42"
86°30'55.17"	21°24'29.11"
86°30'33.54"	21°24'36.57"
86°29'50.22"	21°24'07.27"
86°29'27.67"	21°23'35.37"
86°28'32.48"	21°23'01.29"
86°26'02.84"	21°21'34.66"
86°26'05.11"	21°20'41.48"
86°23'48.60"	21°19'23.82"
86°22'32.84"	21°19'06.24"
86°21'52.23"	21°19'14.61"
86°21'22.84"	21°19'24.57"
	86°16'00.74" 86°16'32.32" 86°16'41.58" 86°15'45.92" 86°16'03.40" 86°17'13.82" 86°17'50.76" 86°20'04.77" 86°21'23.76" 86°21'34.64" 86°22'53.42" 86°23'49.11" 86°24'38.64" 86°25'07.82" 86°26'07.29" 86°26'16.71" 86°30'55.17" 86°30'55.17" 86°30'55.17" 86°30'33.54" 86°29'50.22" 86°29'50.22" 86°29'50.21" 86°29'50.21" 86°29'50.21" 86°29'50.21" 86°29'50.21" 86°29'50.21" 86°29'50.21" 86°29'50.21" 86°29'50.21" 86°29'50.22" 86°29'50.22" 86°29'50.22"

33	86°20'57.90"	21°19'56.74"
34	86°20'48.65"	21°20'32.20"
35	86°19'28.85"	21°21'08.55"
36	86°18'28.37"	21°21'35.80"
37	86°17'40.07"	21°22'18.45"
38	86°17'11.89"	21°23'00.67"
39	86°17'12.91"	21°23'45.34"
40	86°17'06.89"	21°24'33.85"
41	86°16'54.60"	21°26'03.44"

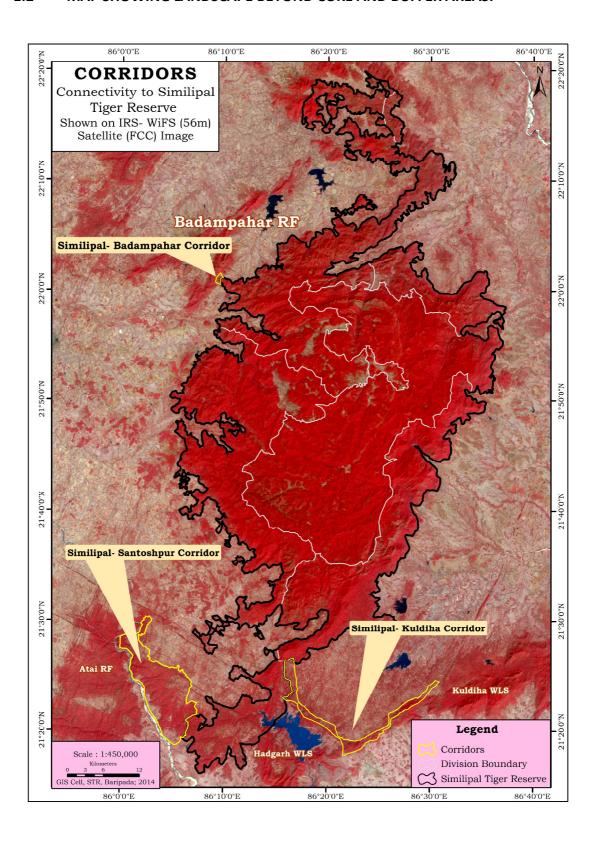
### Similipal – Badampahar Corridor

S1. No	Longitude	Latitude
1	86°09'33.82"	22°01'31.81"
2	86°09'20.27"	22°01'18.24"
3	86°09'17.06"	22°01'15.90"
4	86°09'07.62"	22°01'03.89"
5	86°09'06.93"	22°00'56.40"
6	86°09'04.84"	22°00'51.48"
7	86°09'04.78"	22°00'45.63"
8	86°09'05.72"	22°00'42.88"
9	86°09'09.71"	22°00'39.38"
10	86°09'15.25"	22°00'37.86"
11	86°09'26.63"	22°00'32.75"
12	86°09'28.53"	22°00'32.38"
13	86°09'30.14"	22°00'32.86"
14	86°09'33.51"	22°00'37.57"
15	86°09'29.53"	22°00'41.54"
16	86°09'31.68"	22°00'50.42"
17	86°09'32.72"	22°00'58.06"
18	86°09'39.96"	22°01'05.99"
19	86°09'45.26"	22°01'08.16"
20	86°09'49.69"	22°01'07.03"
21	86°09'47.26"	22°01'11.06"
22	86°09'40.30"	22°01'17.65"
23	86°09'37.49"	22°01'25.98"
24	86°09'35.89"	22°01'30.71"

# 1.1.6 Disturbances in Habitat Corridors (railway lines, cleared transmission line, etc.).

- 1. Similipal Santospur Corridor: This was also an earlier migration route between two largest elephant habitats of Odisha i.e., Similipal and Satkosia. The migration route covers the districts like Angul, Dhenkanal, Cuttack and Keonjhar. In course of time, this has fragmented and does not appear to exist at present. At present movement of elephants in this tract has been restricted due to disturbance and fragmentation of corridor as a direct fall out of intensive mining in Sukinda and Daitari areas and industrial development in Talcher and Angul areas. The corridor has also been disturbed due to heavy traffic in NH-215 beyond Santospur and Atei RF adjoining Baitarani river and due to major irrigation projects.
- 2. Similipal Kuldiha Corridor: The corridor has been affected by encroachment of land, un-authorized operation of stone quarries and other developmental works causing threat for the survival of the pachyderms. The corridor is also highly disturbed by human activities such as sal leaf collectors, firewood collectors and cattle graziers.
- 3. Similipal Badampahar Corridor: The corridor is disturbed by the heavy traffic of goods and mining mineral trucks, cars, buses, small utility vehicles (SUV),noisy tractors on the NH No.6 round the clock and often wild animal mortalities are noticed on the road by the speeding vehicles.

#### 1.2 MAP SHOWING LANDSCAPE BEYOND CORE AND BUFFER AREAS.



#### 1.3 MAJOR LAND USE CLASSIFICATION IN THE AREA.

Major Land use	Area under major land use in Ha.			
	Similipal –	Similipal – Kuldiha	Similipal -	
	Santospur Corridor	Corridor	Badampahar	
			Corridor	
Very dense forest	397.95	191.03	6.38	
Moderately dense	5742.81	1325.00	70.77	
forest				
Open forest	1584.99	1497.31	25.40	
Water body	396.93	12.21	0.0	
Other non-forest/	3224.09	789.82	13.32	
village area				
Total	8012.32	3815.37	115.87	

## 1.3.1 Reserved Forest/ Proposed Reserve Forests/Unclassified StateForests (Divisions/ Range/Blocks/ Beats).

Name of the Corridor	Forest Divisions	Ranges	Sections	Beats	Forest Blocks
Similipal- Santospur	Keonjhar Wildlife	Anandapur	Budhikuda	Budhikuda	Gayalmunda RF
Suntospun	Division			Taneipal	Santospur RF
			Gayalmunda	Gayalmunda	Santospar III
				Panasadiha	
Similipal- Kuldiha	Baripada Division	Kaptipada	Sarata	Noto	Sukhuapata Hill Block
Kalama	DIVISION	777131011	Sarisua	Sarisua	Kaithagadia
				Raipal	Forest
	Balasore Wildlife	Soro	Kupari	Balihudi	
	Division			Kupari	
				Kaithagadia	
Similipal- Badampahad	Karanjia	Gurguria	Gurguria	Sanjuabani	

### 1.3.2 Villages/ Towns/ Cities (Districts, Sub-Divisions, Blocks, Panchayats)

Name of	District	Tahasil	Village	Area	No of	Population
Corridor				in Ha	Household	
Similipal-	Keonjhar	Anandapur	Ratuan	273.16	114	583
Santospur			Taneipal	489.38	216	912
			Budhikud	301	121	539
			Santospur	408	136	621
			Singinali	116.08	49	264
			Dumuria	140.20	306	1340
			Purunapani	381.72	99	392
			Palabani	160	42	201
			Baigundi	265.14	79	404
			PunasiJharana	434.71	209	893
			Badudighara	370.78	86	455
			Rotijhari	243.65	93	392
			Kantala	330	143	569
			Gendabasa	78.3	5	25
			Bhalughara	435	152	610
			Haribeda	104	31	160
Similipal-	Mayurbhanj	Thakurmunda	Noto	987	373	1705
Kuldiha			Garhasahi	222.14	78	323
			Karanjagadia	401.87	86	402
			Barakunria	269.0	116	394
			Tenda	245.33	363	1678
			Suranga	101.03	34	112
Similipal- Badampahar	Mayurbhanj	Jashipur	Chelligodhuli	178.65	66	288

#### 1.3.5 Quality of Habitat

The vegetation types are same as that of the core area. However, occurrence of dry deciduous forest type is more marked in the north-western edges of the reserve; the percentage of moist deciduous and semi-evergreen forests is correspondingly lower in the adjoining area. The canopy is also more open here with the forests subject to increased biotic pressure mainly illicit felling and grazing. In the Badampahad corridor, Sal is the predominant species where as Kuldiha- Similipal corridor is facing huge biotic pressure from the nearby villagers as a result the forest has become open and scrub land. However the clear felled trees have signs of regeneration of Sal Jamun, Hollarrhena, Butea etc and if protected can turn in to dense forest.

#### 1.4 STATEMENT OF SIGNIFICANCE (NOT COVERED UNDER 1.1 ABOVE).

All the corridors are very important area for wild animal migration which needs to be protected from further degradation by human interferences. Tigers, Elephants, Leopards, Sloth Bear and big herbivores such as Mouse deer, Chitals and Boar are often found in these areas and are believed to be using the corridors. These are potential dispersal routes for the animals mentioned above.

#### 1.5 GEOLOGICAL ATTRIBUTES AND HYDROLOGY.

The water resources in the adjoining areas of the Tiger reserve is very rich with perennial water sources in the form of Nullahs, tributaries of the rivers i.e. Budhabalanga, Salandi and Baitarani.. These flow through the districts of Mayurbhanj, Balasore, Keonjhar and Bhadrak and serve as life-lines for the districts and finally winds their way to the Bay of Bengal. The other tributaries are Palpala, East Deo, West Deo, Khairi, Tel, Sanjo, Bherol etc. along with many rivulets and nullahs most of which are perennial. An analysis of water availability in the area has shown that more than 50% of the streams carry water during the driest period of the year although the rest get totally dry.

#### 1.6 VEGETATION TYPES:

The forests of Similipal – Santospur corridor are mainly dense Sal forest, open Sal forest, dense mixed forests and degraded/scrub forest. The slope percentage of this route varies from gentle sloping (3-5%) to strongly sloping (10-15%). In the Badampahad corridor, the Sal forms 50% to 90% of the standing crop. Quality of sal being 'IV' on the steep drier aspects and 'II' on gentler slopes with deep soil and cooler aspects. Quality-I Sal occurs in small pockets under good soil and climatic conditions. In Similipal – Kuldiha corridor, the forest type pertaining to Reserve forest i.e. Notto is confined to good quality of Sal. Main associates of Sal are

Piasal, Sisoo, Bandhan, Asan, Dhaura, Kuruma, Kusum, Jamu, Mai etc. The proportion of Rai, Mai & Sidha increases on sloppy area where moisture content decreases. The canopy density varies from 0.4 to 0.6 due to heavy biotic interference. The regeneration is adequate throughout the area and profuse mostly in valleys. The Medicinal shrubs like, Banahaldi, Patalagaruda, Asoka, Amla etc. are available sporadically. Some Sal indicators plants like, Flemingia, Combretum, Karada etc are found in these areas. This Reserve forest comes under selection working circle. The forest type pertaining to area other than reserve forest, the vegetation is bushy in nature having sporadic distribution of mother trees like Sal, Kusum, Mahul, Dhaura, Asan, Char, Kaim etc. The forest which is found in a bushy form are miscellaneous in nature having preponderance of Chara, Asan, Dhaura, Karada, Mahula, Jamu, Atundi, Muturi, Siali and intrusion of weeds species like Eupatorium & Lantana are found in patches and also some phoenix species are available.

The various forest types met with in this landscape is given below.

#### • Northern Tropical Semi-evergreen Forests. (Type: 2b/c3)

The species found under this forest type depending upon the soil and micro climatic conditions are as follows:-

#### On Stream Beds

Salix terasperma, Trewia nudiflora, Macaranga peltata, Aphanamixis polystachya, Symplocos laurina, Glochidion spp., Bischofia javanica, Syzygium cumini, Pongamia pinnata, Diospyros peregrina, Saraca indica and at places Terminalia arjuna.

#### Damp Areas.

Bombax ceiba, Alstonia scholaris, Ficus spp., Polyalthia cerasioides, Anthocephalus cadamba, Dillenia pentagyna, Litsea spp., and Citrus spp. are met with.

#### Northern Tropical Moist Deciduous Forests (Type: 3C/C2e)

The common species of trees found in this type of forests are *Terminalia* sp., *Pterocarpus marsupium*, *Anogeissus latifolia*, *Schleichera oleosa*, *Adina* cardifolia, *Toona ciliata* (rare), *Michelia champaca*, *Mangifera indica*, *Bombax ceiba*, *Careya arborea*, *Dillenia pentagyna*, *Gmelina aroborea*, *Garuga pinnata*, *Lannea coromandelica*, *Syzygium cumini*, *Ougeinia* dalbergioides, *Xylia xylocarpa*, *Kydia calycina*, *Lagerstroemia parviflora*, *Bridelia retusa*, *Mitragyna parvifolia*, *Trema orientalis*, *Emblica officinalis*, *Zizyphus spp.*, *Cassia fistula*, *Buchanania lanzan*, *Sterculia villosa*, *Miliusa* 

velutina, Helicteres isora, Indigofera pulchella, Croton oblongifolius, Colebrookia oppositifolia, Flemingia chappar, Strobilanthes spp., Wendlandia exserta, Imperata cylindrical, Themeda caudate, Cymbopogon martini, Eulaliopsis binata, Thysanolaena maxima, Curcuma aromatica, Bauhinia vahlii, Millettia auriculata, Smilax macrophylla, Combretum decandrum, Disocorea spp., Asparagus racemosus. Ferns and orchids are found in moist places. Ferns- Adiantum spp., Doryopteris spp., Cyathea gigantean, Spinulosa spp., Cyclosorus spp. and Holtt Tree Fern.

#### Dry Deciduous Hill Forests (Type: 5B/C1c and 3C/C3)

It is spread in the southern Similipal corridors with steep and exposed slopes, this type of forest has sal as major species covering upto 30% of the crop. Other associates are *Anogeissus latifolia, Sterculia urens, Boswellia serrata, Dalbergia latifolia, Cleistanthus collinus, Gardenia gummifera, G. latifolia, G. turgide, Erythrina suberosa, Cochlospermum gossypium, Helicteres isora, Nyctanthes arbortristis with an abundance of herbs, shrubs and grasses as ground cover.* 

#### • Grass Land and Savannah. (Type: 3C/DS-I)

The grasslands found in corridor are in small patches especially along nallah banks .the species are-

Apluda mutica, Arundo donax, Eragrostis atrovirens, Phragmitis karka, Sporobolus indicus, Sacciolepsis indica.

#### 1.7 WILD FAUNA AND HABITATS.

Many wild animals including some endangered ones like tiger, panther, elephant, gaur and four horned antelope etc. are found in different levels of abundance. Ratel, pangolin, giant squirrel, flying squirrel, sambar and chital are among the other few worth mentioning. The presence of the big cats in the corridors is reported from time to time.

## 1.8 MAJOR CHANGES IN THE LANDSCAPES (SETTLEMENTS / OTHER INFRASTRUCTURE).

There is no major changes reported in the recent past except widening of National Highway 6 at the Badampahar- Similipal corridor about a decade back . The number of heavy vehicles plying in this road has increased many fold since then. The human settlements were there but the human and cattle population have increased significantly leading to thinning of the forest patches.

#### 1.9 ADMINISTRATION AND ORGANIZATION.

The administrative set up of the corridors (Divisions, Ranges, Sections & Beats) have been shown in Para 1.3.1. The Similipal- Kuldiha and Similipal – Badampahar corridors are coming under territorial jurisdiction of Baripada Circle under administrative control of Field Director, Similipal Tiger Reserve cum Regional Chief conservator of Forests, Baripada. The territorial jurisdiction of Similipal – Santospur corridor of Keonjhar Wildlife Division is lying in Rourkela Circle under administrative control of Regional chief Conservator of Forests, Rourkela. A proposal has been submitted to Government for bringing the Keonjhar Wildlife Division under administrative control of Baripada Circle since important areas of the Division including the Hadgarh Sanctuary is lying in the Similipal landscape.

#### STATUS OF TIGER AND CO-PREDATORS

## 2.1 DISTRIBUTION AND ABUNDANCE STATUS WITH TYPE OF USE BY THE TIGER AND CO-PREDATORS.

Presence of tiger has not been reported in the tiger sign surveys in the recent past. But cases of cattle kill are being reported in Satkosia RF of Karanjia Division and Santospur RF and Hadgarh Sancturay of Keonjhar WL Division which shows presence of tiger in the area and using the corridor. It is also believed that tigers were using these corridors on previous occasions to migrate from Similipal to other potential areas like Kuldiha Sanctuary located in the eastern part in the neighbouring district i.e. Balasore, Satkosia Tiger Reserve in Angul and Dalma sanctuary of neighbouring Jharkhand state. Similipal is the source of largest breeding tigers in eastern ghat. Thus these corridors provide a potential dispersal route to tigers and other co- predators in future if proper protection measures are taken, hence the significance.

#### 2.3 PREY-PREDATOR RELATIONSHIPS.

The available prey base in the adjoining buffer areas is much less when compared to the core area. Large prey favoured by the Tiger, like Sambar remains confined to a few pockets on the hill side. However, Boar & Langur are distributed widely. Low prey base in the corridor is leading to cattle lifting by tiger.

#### 2.4 PHASE IV TIGER MONITORING IN CORRIDOR AREA

During 2013, 17 permanent line transects was laid in Satkosia- Santospur Corridor and 14 permanent transects laid in Similipal- Kuldiha Corridor. Relative abundance of prey animal and carnivore signs was collected in both the corridor areas in November 2013 as per Phase IV tiger monitoring protocol.

#### 2.4.1 Satkosia- Santospur Corridor:

#### Carnivore Signs

Satkosia- Santospur Corridor area is representing total four beats. Tiger and their copredator sign survey was conducted in this potential area. Total 42 carnivore signs was observed in four beats (n = 60 km) in 15 km surveyed in each beat. The sign encounter rate (ER) is 0.7/Km of the area. Major carnivore signs including Sloth bear, Hyena, Jackal and Fox. Sloth bear sign was maximum in the area. Tiger and leopard sign was not observed during the survey.

#### Prey abundance (Density)

Prey abundance was estimated through distance line transect method and distance 6.0 software was used. Prey animal sighted along the transect line including Barking deer, Chital, Wild pig, Langur, Rhesus and Hare. Total prey observation was carried out n = 64, in an effort of 102 km by monitoring 17 line transects of 2 km length during the month of November 2013 covering Satkosia- Santospur Corridor to estimate the density of major prey species for tigers and co-predators. However, individual prey sighting was poor and therefore cumulative sighting of all prey species were taken into account. Overall or average prey abundance was estimated to be 15.9±2.3 per km² (Table 1).

Table 1 Overall density estimate of key prey species for Satkosia- Santospur Corridor

Prey	Density ± SE (Km <sup>2</sup> )	Effective (ESW)	Strip	Width	Model Selection
Average prey	15.9 ± 2.3	23.9 ± 1.8			Uniform/Polynomial

#### 2.4.2 Similipal- Kuldiha Corridor:

#### Carnivore Signs

Similipal- Kuldiha Corridor area is representing total 6 beats. Tiger and their copredator sign survey was conducted in this area. Total 27 carnivore signs were observed in six beats (n = 90 km) in 15 km surveyed in each beat. The sign encounter rate (ER) is 0.3/Km for the area. Major carnivores included Leopard, Wolf, Sloth bear, Hyena and Jackal. Sloth bear sign was maximum in the area. Tiger sign was not observed during the survey in the corridor. Only one leopard sign was observed.

#### *Prey abundance* (Density)

Prey abundance was estimated through distance line transects method and distance 6.0 software was used. Prey animal sighted along the transect line including 12 numbers of Cattle, 3 numbers of Wild pig and 9 Langurs. Total prey observation were carried out n = 24, in an effort of 84 km by monitoring 14 line transects of 2 km length during the month of November 2013, covering Similipal- Kuldiha Corridor to estimate the density of major prey species for tigers and co-predators. The sighting record was nil in all transect lines in corridor area except one transect in Sarat and two transect lines laid in Sarisua section of Kaptipada range. Therefore, prey density estimation was not possible due to low intensity of sighting.

#### 2.5 ASSESSMENT OF THREATS.

- Subsistence hunting of wild animals by the local tribes.
- Poaching for the purpose of selling of meat is occasional and confined to the forest fringes.
- Targeted poaching for ivory by people coming from outside, with the help of local people.
- Gradual loss of habitat by way of illicit felling of trees
- Grazing of huge flock of cattle inside the forests
- The incidence of fire during summer
- Growing human-wildlife conflicts
- Loss of connectivity due to development projects
- Quarrying of stones in the areas adjoining the corridors

# LAND USE PATTERNS AND CONSERVATION-MANAGEMENT ISSUES

## 3.1 SOCIO-ECONOMIC PROFILE OF VILLAGES AND RESOURCE DEPENDENCY AND HUMAN-WILDLIFE MUTUAL IMPACTS.

There are 23 villages lying in the three corridors of Similipal. More than 70% of the population are tribal. There is no major industry in the adjoining area of Similipal. The villagers are dependent mostly on rain fed agriculture and on the forest for timber, firewood, cattle grazing and NTFP collection. There are a number of villages adjoining the corridor areas that also put a pressure on forest resources of the corridors. In Similipal – Kuldiha corridor a substantial population are engaged as labourers in a number of stone quarries running in adjoining areas.

#### 3.2 ASSESSMENTS OF INPUTS OF LINE AGENCIES/ OTHER DEPARTMENTS.

The line departments such as Revenue, Irrigation, Rural Development., Horticulture, Agriculture and Soil-conservation department have been working in these areas. Morrum roads are maintained by RD department, cement concrete road in villages constructed by Panchayats with the help of local BDOs, backyard plantation have been taken up by Horticulture department in which hybrid mango, guava, papaya etc. have been provided to villagers. Agriculture department has provided good quality paddy seeds, fertilizer and insecticides. Soil conservation department have made landscape levelling of the high gradient and hilly lands in the corridor areas.

#### **VISIONS, GOALS, OBJECTIVES AND PROBLEMS**

The National Wildlife Action Plan for 2002-2016 has reiterated the need to identify and preserve wildlife corridors. It has been proposed that all wildlife corridors be given the status of 'ecologically sensitive areas' under the provisions of the Environmental (Protection) Act, 1986.

The historical demography of tigers provides strong evidence that a population doubling is possible in the context of large landscapes where habitat connectivity allows for tiger ecology to persist. Tigers can disperse over 100 km from their natal areas to establish territories, and immigration across the landscape of contiguous, suitable habitat likely played a large role in population recovery (Sunquist et al. 1999). However, tigers are reluctant to cross more than a few kilometres of unsuitable land cover (Smith 1993). Without connectivity, tiger populations might not have rebounded in the hunted areas. Below we provide evidence from recent events to indicate how habitat connectivity contributes to population recovery and persistence. The extirpation of tigers from Sariska and Panna, two of India's premier tiger reserves, in 2005 and 2009, respectively (Gopal et al. 2010), is evidence of how the lack of connectivity can preclude tiger population recovery and re-colonization. Because neither is connected to other reserves through habitat corridors, the government had to transport tigers by helicopter to attempt to re-establish populations in these reserves.

India with its population of about 25,000 wild elephants enables us to enjoy such sights even now in many of our protected areas. Yet, degradation, characterised by an abundance of unpalatable species, fragmentation and shrinkage of forest cover to accommodate an ever increasing human population (1.1 billion now) and associated developmental activities, pose great threats to a wide range of species, including the tiger and the elephant.

The population of elephant at the tri-junction of three northern districts of Odisha (Mayurbhanj, Balasore and Keonjhar), which has the luxury of living in a large interconnected landscape (Similipal, Kuldiha and Hadgarh) is more than one fourth of elephant population in Odisha, and therefore this landscape, which also has significant populations of other charismatic species such as the tiger and the gaur, warrants the best possible protection and management.

#### 4.1 VISION:

With the above background, the vision statement for corridors of Similipal Tiger Reserve will be:

"A commitment to nurture Similipal and surrounding Landscape into a Conservation Unit and priority given to protect and manage the corridor area, where wildlife representing entire pyramid of life can happily dwell and co-exist in viable populations, without fear of man, preserving eco-systems, ecological services and the processes, with people benefiting out of the interactions in the present and future generations and making a safe passage of dispersing wildlife. "

#### 4.2 MANAGEMENT GOALS:

The management goals for the adjoining Zone of Similipal Tiger Reserve are to;

- a. Address Long term conservation of the natural resources, specifically wildlife, of Similipal and nearby protected area and reserve forests consistent with the national policies and directives.
- b. Eliminate the biotic influences deleterious to the eco-system and the existing bio-diversity.
- c. Enhance the livelihood status of local people and reduce their dependency on the viable landscape.
- d. Create the quintessence of conservation awareness amongst a range of stakeholders.

#### 4.3 MANAGEMENT OBJECTIVES:

With the vision and goals stated above, long term objectives are set forth as under:-

- Protection and conservation of the flora and fauna with special reference to the Tiger and its co-predators and their corridors.
- To reduce man- wildlife conflicts.
- Convergence of production sectors for wildlife conservation.
- To enhance the efficiency to work of the local people by educating them and providing health care benefits to the human being as well as cattle.
- To augment the propensity of the people to accept various poverty alleviation programmes taken up by other Agencies by associating the NGOs and engagement of local youth on forest protection measures.
- To facilitate safe movements of tigers and its' co-predators and their prey base in the corridor area.

#### 4.4 PROBLEMS IN ACHIEVING OBJECTIVES:

 Objective-Protection and conservation of the flora and fauna with special reference to the Tiger and its co-predators and their corridors.

#### **Problems:**

- i) Human settlements are very close to the corridors and highly populated and Forests dependency is very high
- ii) Stone quarries, and mining activity are existing.
- iii) Similipal-Badampahar corridor is intersected by National Highway having heavy traffic round the clock.
- To reduce man- wildlife conflicts.

#### Problem:

- i) Crop fields are very close to the corridors. Paddy, Ragi, Maize are usually grown by the villagers, which attract the wildlife such as Chital, Sambar, Elephants, the resultant damage creates man- wildlife conflicts.
- ii) Lack of adequate funds for compassionate grants.
- iii) Tribal locals are poor and often hunt the herbivores to supplement their protein requirements by killing the wildlife coming to their crop field..
- iii) Mass hunting practice "Akhand Shikar" by local tribes
- Convergence of production sectors for wildlife conservation.

#### **Problems:**

- i) Lack of co-ordination among the line departments and other production sectors.
- ii) Insufficient database of the developmental activities by various production sectors.
- iii) Lack of common forum where an integrated action plan can be made by the line departments.
- To enhance the efficiency of the local people by imparting education, awareness and various livelihood training.

#### **Problems:**

- i) Illiteracy, backwardness and poor socio-economic conditions of the local villagers
- ii) Lack of alternative livelihood options
- iii) Lack of proper communication facility.

- To augment the propensity of the people to accept various poverty alleviation programmes taken up by other Agencies by associating the NGOs and engagement of local youth on forest protection measures.
  - Problem:
  - i) People are less ambitious
  - ii) Availability of work in illegal stone/metal chip quarries
  - ii) Lack of efforts by local NGOs.
- To facilitate safe movements of tigers and its' co-predators and their prey base.

#### **Problems:**

- i) Large populated human settlements found close proximity to the
- ii) More biotic interference such as firewood collection, cattle grazing, Sal leaf collection in corridor area
- iii) Large number of metal chips quarries makes the corridors noisy, crowded and disturbed for the wildlife.

## 4.5 STRENGTHS-WEAKNESSES-OPPORTUNITIES-LIMITATIONS(SWOT) ANALYSES:

#### Strengths

- Extensive largely intact forests rich in biodiversity and forestry resources,
   Suitable for the tigers and co-predators for their migration to other areas like
   Kuldiha sanctuary, Saranda forests, Satkosia TR and Dalma sanctuary.
- Length of the corridors is more and dense enough to provide shelter to the migrating wildlife.
- Largest breeding population of tigers in Similipal

#### Weakness

- Extremely backward and poor socio-economic conditions of the people.
- High and Increasing population of the adjoining villages with high dependence on forests
- High population of unproductive cattle and livestock.
- Increasing man-wildlife conflicts
- Existing quarries and mining activities

#### **Opportunities**

- To work out a model multi-pronged strategy for rural development based on agro-horticulture
- To develop a sustainable model of NTFP harvesting & marketing
- To develop an Education centre for awareness of villagers and nature lovers

#### Limitations

- Very low levels of literacy and complacent tribal population with limited aspirations.
- Busy and crowded National High Way passes through Badampahar corridor.
- Inhospitable terrain, climate and endemic malaria-prone area.
- Very poor socio-economic condition of local residents.
- Conflict of interest in an underdeveloped district with a few mining /quarry activity deploying many local people but destructive to wildlife.
- Restocking of forest in stone quarry and mining areas is difficult.

#### **MANAGEMENT STRATEGIES**

## 5.1 DELINEATION OF CORRIDORS AND OTHER HABITAT USED BY TIGERS AND CO-PREDATORS.

The corridor areas is divided into the following zones

- 1. Traditional Use & Forestry Zone (TUZ)
- 2. Eco-development Zone
- 3. Eco-education Zone
- 4. Biodiversity Conservation Zone

#### 1. Traditional Use and Forestry Zone (TUZ) Zone

The TUZ is the area within revenue forests that connects Similipal with Kuldiha and Similipal with Badampahar R.F. It also includes the Gayalmunda RF and Santospur RF in the Similipal – Santospur corridor. The adjoining area of the Similipal Tiger Reserve will be considered as Forestry zone spreading over entire corridors where plantation of native species and fruit bearing species, wild banana, palatable grasses, soil and moisture conservation measures will be taken up in the Blank/ open areas.

#### **Strategies**

The plan prescribes the improvement of habitat by adopting the following measures.

- As the name suggests, traditional use of the adjoining villages need to be permitted which means regulated livestock grazing is allowed, and collection of NTFPs and firewood is permitted for the bonafide use of adjoining villages.
- Resource use regulations *prima facie* need to be tied to wildlife habitat needs and regulated through VSS.
- Fire needs to be prevented by involving the people.
- Grazing area to be earmarked.
- ➤ The boundary is to be surveyed, demarcated and mapped and fresh proposal to be submitted to declare the forest as Reserve Forest under Orissa Forest Act, 1972.

- Enrichment planting of favourable species of wildlife in blank patches. Planting of grasses at suitable places.
- Encouragement of undergrowth, middle storey and ground flora in the Forest.
- Fruit bearing trees like Harida (*Terminalia chebula*), Bahada(*Terminalia belerica*), Anla(*Emblica officinalis*), *Ziziphus* species, *Ficus* species will not be felled.
- Soil and water conservation measures will be taken up.
- The forest blocks which are covered under working plans have been Included under improvement working circle and rehabilitation working circle where there is no prescription for tree felling by making annual coupes. Hence there would not be situation of canopy opening by intense forestry practice.

#### **SCOPE OF MANAGERIAL INTERVENTIONS**

- (i) Providing ecologically sustainable livelihood options to local people in collaboration with various sectors/organizations.
- (ii) Incentivizing local people for protecting forests and wildlife (PES, Ecotourism).
- (iii) Ensuring retrofitting measures in sectors of development with reciprocal commitments.
- (iv) Ensuring active management in areas where tiger / Co predators / wild ungulates co-occur with people to minimize human-wildlife interface conflicts.
- (v) Ensuring monitoring of tiger / wildlife on a periodic basis in standardized manner, amenable to scientific inference.
- (vi) Ensuring surveillance and protection of tiger and wildlife.
- (vii) Building up the capacity of field staff and local people as a part of an adaptive management to ensure effective implementation.
- (viii) In case the buffer comprises of protected area then managerial interventions should be inconformity with the provisions of the Wildlife (Protection) Act, 1972.

#### **Forestry**

- Ecosystem management required
- Ecological availability of a tree should be ascertained before removal
- A tree should be considered ecologically available if
  - (a) Its removal does not create a gap beyond 43 to 45%.

(b) The regeneration of species at various formation levels within a radial distance of twice the crown radius of the tree being selected for felling should have an 'established' status.

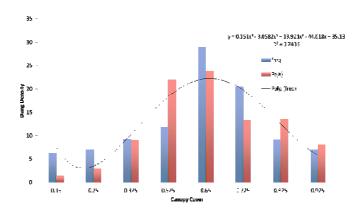
#### Tree fellings / Thinnings

- No clear felling and other silvicultural systems promoting concentrated regeneration
- No conversion to uniform forests
- A high forest system with diffused regeneration should be preferred
- Status of regeneration should be an overarching consideration to permit felling
- Areas having considerable disturbance should not be felled

Tree fellings / Thinnings

Canopy class and wild dung presence

Mid-Value	Wild dung	SE	Freq.
0.15	10.52	0.79	6
0.25	11.68	0.71	7
0.375	15.46	1.08	9
0.525	19.56	2.75	12
0.65	47.86	19.30	29
0.725	33.92	14.03	20
0.825	15.22	7.21	9
0.925	11.72		7



- After due consideration to regeneration/status, the relationship between canopy class and wild ungulate dung presence should be used as a guide to prescribe the stem removal
- Buffer / corridor areas should be managed for wild ungulates at a level which is 30% lower than the optimal levels in core areas
- In general, the relationship between mean ungulate density and canopy class intervals in a sal / tree dominated forests, with polynomial curve fitting shows that the 80% lower bound corresponds to a canopy cover of 43% (computed for sal forests of Central India; similar relationships need to be developed for other forest types to facilitate inference)
- Thus, for sal forests of Central India, the timber harvest in the buffer / corridor area may be permitted in a selective manner so that the canopy cover does not fall below 43% during winter months. This strategy will minimize tigerhuman conflict while permitting selective extraction of timber species
- More openings will permit more light while fostering more regeneration thereby attracting wild ungulates and tigers
- The idea behind buffer / corridor management is to sustain it for gene flow, while not elevating its status to that of core area in terms of wildlife abundance

#### **Collection of NTFP**

- NTFP collection should not be permitted in areas with maximum disturbance and unestablished regeneration status, as this would adversely affect the demography of such species.
- The regeneration status of NTFP species in the buffer / corridor area should be compared with its status in the core / critical habitat.
- Collection should not be permitted in areas having endangered arboreal fauna.
- No lopping / felling should be permitted during NTFP collection.
- Collection should not disturb 'canopy bridges' in an area.

- The timings for NTFP collection should be regulated while avoiding early morning or late evening.
- The patterns of NTFP collection should be studied for prescribing ecologically permissible collection.
- The quantum of NTFP collected in an area should be regulated, considering its consumption by wild animals.
- An estimation of the availability of NTFP (fruit / tuber / leaf) should be done (example: for total fruit crop estimation, considering several categories of branches and the number of fruits per branch etc.).
- Fire should not be used to promote new flush of leaves (usually done for Tendu), as this would lead to forest fire.
- Fruit removal affects frugivory, hence fruit tree should be fostered.
- The density of NTFP species in the buffer / corridor area should be compared with their densities in the core / critical tiger habitat. In low density areas such NTFP species should not be permitted for extraction.
- A chart depicting NTFPs collected in various areas within the division over months during a year should be prepared for close monitoring.
- Different parts of a tree / plant / shrub / herb are harvested as NTFP and many of them are valuable as medicinal plants. To avoid overexploitation, it is important to prescribe site specific indicators for their ecologically sustainable management, vis-à-vis the regeneration status.
- The nursery techniques of NTFP species (especially those having medicinal value) should be fostered through the community linked to incentives for growing subspecies.
- Regulation through PES (Payment for Ecosystem Services)

#### **Collection of NTFP**

Indicators to avoid over exploitation of NTFP

NTPF harvested	part	Indicators
Fuelwood		<ul> <li>Regeneration status</li> <li>Intensity of girdling/cutting of young trees (number of stumps per unit area)</li> <li>Change in the rate of extraction</li> <li>Quantum of dead/fallen twig branches on forest floor</li> </ul>
Leaves		<ul> <li>Reduction in canopy cover</li> <li>Reduction in leaf litter</li> <li>Regeneration status</li> </ul>

	<ul><li>Weed invasion</li><li>Change in species composition</li></ul>
Fruit/flower/seed	<ul> <li>Regeneration status</li> <li>Annual productivity per sample tree vis-à-vis the productivity in core/critical tiger habitat</li> <li>Method of harvesting</li> <li>Season of harvesting vis-à-vis requirements of wild animals (fruit/flower/seeds act as 'qualifiers' in a habitat, and their total harvesting would reduce such welfare factors)</li> </ul>
Bark	<ul> <li>Girdling</li> <li>Tree mortality</li> <li>Regeneration status</li> <li>Number of dead stems per unit area</li> </ul>
Rhizome	Regeneration status

#### Fuel / fodder collection

- (a) Grazing should be regulated in a rotational manner, and prophylactic immunization should be done for village livestock.
- (b) Since the unrecorded removal from forest exceeds the recorded removal in many States, fuel / fodder collection should not be permitted in disturbed areas or compartments with poor regeneration status. Such areas should be prescribed a 'recovery' period before reopening them for fuel / fodder collection.
- (c) A 'safe lopping index', based on site specific studies should be prescribed for fodder removal on a rotational basis.

#### 2. Eco-development zone

There are 23 villages within this zone. An area of 1.2 km<sup>2</sup> of the forest from the total area of the TUZ has been earmarked to the adjoining villages for bonafide use of the people. An Eco-development officer will be engaged on a contractual basis to co-ordinate and plan all eco-development activities.

#### Strategies.

- 1) Village level micro planning for benefits to local people on a quid-pro-quo basis (involving VFC/EDC)
- 2) Innovative use of JFM/ recycling of tourism gate receipts to Ecodevelopment Committees
- 3) Benefits from district level developmental works (convergence), interalia, covering
  - (i) public health and family welfare
  - (ii) food and nutrition security
  - (iii) education
  - (iv) natural resource management and water security
  - (v) sanitation
  - (vi) roads
  - (vii) energy
  - (viii) housing, and
  - (ix) livelihoods
  - Eco-developmental activities like construction of check dam in adjoining area for the benefit of both animal and people need to be permitted.
  - Resource use regulations *prima facie* need to be tied to wildlife habitat needs.
  - Entry into the TUZ is to be regulated by providing identity cards to the villagers of the adjoining villagers.
  - Fire needs to be prevented by involving the people of the adjoining villages.
  - > Compartment or part of the compartment needs to be earmarked for villagers for the grazing of their cattle.

#### 3 Eco-education Zone

Similipal Tiger Reserve draws the attention of nature lovers, wildlifers and conservationists for its rich and diverse flora, fauna and splendid natural beauty. The Sanctuary remains open to visitors tentatively from 1<sup>st</sup> November to 15<sup>th</sup> June. Ideal season of visit is from November to February. Arrival of tourists reaches peak

during December and January. Camping facilities have been developed in the periphery along the bank of the river Khairi-Bhandan at Ramatirtha, Lulung and Deokund for groups coming to picnic. These tourists require to be educated by making a corridor interpretation centre and a corridor view watch tower require to be constructed at a suitable point to educate the tourists .

#### 4 Biodiversity Conservation Zone

The Biodiversity Conservation Zone is meant to identify, prioritise and conserve areas/patches rich in biodiversity within the corridor area. They can be any of the following

- a) A patch of forest rich in overall floral diversity
- b) A patch of forest rich in indigenous cultivars, medicinal plants
- c) A patch of forests rich in interesting plant groups like orchids
- d) A patch of forests, which supports special habitats/ microhabitats like dens, cliffs, overhangs etc
- e) Various known corridors (vegetal/non-vegetal), forest patches linking to other divisions eg. Riverine patches, nalla beds, unique habitat features, gullies etc.

The special habitats will be demarcated, conserved by engagement of special watchers, installation of barriers in routes, signages at each human entry point with Do's and dont's. Regular monitoring of the site will be taken up to assess habitat condition, use by animals etc.

#### 5.2 PRIORITIZATION OF LINKAGES

The linkage prioritization is as follows, The Similipal – Santospur and Similipal - Kuldiha corridors are more important for tigers and elephants than the Similipal-Badampahar corridor as Badampahar RF is more degraded and prone to the biotic interference. The tiger population will use this corridor gradually as the prey base grows over the period in Badampahar RF.

# 5.3 DEVELOPMENT OF INTEGRATED LANDUSE APPROACH FOR THE AREA COMMENSURATE WITH TIGER CONSERVATION AND CO-EXISTENCE AGENDA (FORMULATION AND COORDINATION).

Integrated approach to the area development programme will be taken up with all Line departments, NGOs, with forest department. Microplan based development to be taken up to uplift the economic condition of the people living around the corridors. Multiple farming such as poultry, piggery, honey production, Sericulture, dairy farming, cash crop raising, fishery, cottage industry, value addition to the forest products and marketing of the produce will be made in aggressive manner to raise of the economic condition of the people to reduce forest dependency.

- 5.4 WILDLIFE MANAGEMENT IN TERRITORIAL FOREST AREAS (IDENTIFICATION AND INCLUSION OF PRESCRIPTIONS IN THE WORKING PLANS OF RESPECTIVE DIVISIONS AS PER WORKING PLAN CODE).
  - Buffer / corridor areas require a 'coarse filter' approach for maintaining a variety of plant / animal species
  - · Day to day monitoring
  - Habitat amelioration (compensatory nature)
  - Fostering indigenous fodder / fruit species
  - Maintaining existing water points
  - No drastic habitat interventions
  - Cropping pattern / harvesting to factor in cover values
  - Inherent / induced diversity indices need to be computed for maintaining the edges (without enhancing them)
  - Human-wildlife interface issues to be addressed
  - Treatment for riparian zones / unique features
  - · Retention of dead trees, snags
  - Restoration / protection of existing corridors

The existing working plan prescriptions will be adopted in the Badampahar RF and Satkosia RF to manage the wildlife habitats and minimized forestry production such as timber collection, NTFP collection in a restricted manner. All these areas have been included in the rehabilitation working circle with an overlapping wildlife management circle.

5.5 ZONE PLAN MANAGEMENT STRATEGIES (PROTECTION, HABITAT MANAGEMENT AND HABITAT RESTORATION, SUPPLEMENTING DECLINING LOCAL POPULATIONS ANDFACILITATING THEIR RECOLONISATION):

Mitigation strategy for linear infrastructure and other projects (roads/highways/railway lines/power transmission lines/irrigation canals/open mills/wind mills)

- Roads/highways: creation of overpasses / underpasses, speed regulation, , closure to traffic
- Railway lines: SOP for information exchange through wireless, speed regulation, barricades, underpasses,
- Power transmission lines: insulation, surveillance, MOU with electricity boards, special patrolling, under ground cabling, adequate height,
- Irrigation canals : covering, crossing for animals movement
- Open wells : covering, closure of abandoned wells

• Wind mills: both offsite and onsite measures are required to prevent turbine collisions with avifauna.

#### **Mining/ Quarrying**

No mining activity is at present in corridor. However, a number of quarries of minor minerals are operating in revenue land adjoining to Similipal – Kuldiha corridor causing disturbance to the movement of animals. These quarries need to be closed. All the non-functional and closed quarries will be reclaimed by filling the pits with quarry overburdens and planting over it for soil stabilisation. No new quarry shall be allowed to operate.

#### Mitigation strategy for dams and hydro power sectors

- The impacts include:
  - First order impacts (barrier effects, effects on water quality, water quantity, flow regime and sediment load)
  - Second order impacts (impact on terrestrial environment affecting primary production-planktons, aquatic flora), morphology (channel form, substrate composition)
  - Third order impacts (impact on terrestrial environment affecting invertebrates, fish, birds and mammals)
- Mitigation measures are required to address impacts due to dams construction as well as its operation
- The mitigation plan should include onsite as well as offsite initiatives based on best global practices
- Retention of dead trees in submergence areas as 'snags' for water birds and aquatic fauna
- Prohibiting the reduction of river flow to 'zero' or 'critical' levels which would have a deleterious affect on local flora and fauna especially aquatic species permitting migration across dams through mitigation e.g. fish ladder etc.
- Mimicking the water release to the natural flooding regime
- Ensuring control of aquatic weeds and disease factors
- Safeguarding downriver flood protection
- Safeguarding against water pollution
- Appropriate fish management measures to benefit local communities through the tiger reserve management.
- Site specific watershed management to safeguard against sedimentation

- Prescribing timings for use of access roads, and regulation on the maintenance infrastructure and retaining it to the minimum
- Prohibiting new, associated developmental projects in the core / critical tiger habitat
- Contributing resource support to the core / critical tiger habitat management as a 'compensatory' measure for loss of natural habitat
- Evolving and implementing a SOP, in collaboration with the tiger reserve management for rescuing wild animals from drowning
- Annual monitoring of the spatial use pattern of wild animals in the area, which should also include monitoring the development of related infrastructure
- Periodic monitoring of water quality and river ecosystem recovery
- Fostering re-vegetation of the construction site with indigenous species

#### **Communication Projects**

Projects with minimum impacts will be allowed subject to NTCA guidelines.

#### 5.6 THEME PLANS

The goal of the plan is to restore, maintain and enhance the biodiversity, habitat and conservation value of the corridor as to ensure perpetuation of the tiger as flagship species. This can be ensured through a multifaceted approach to the complexity of the problems noticed at the time of management. They are:

- 1. Control of illicit felling of trees and poaching.
- 2. Control of forest fire.
- 3. Man-wildlife conflict mitigation.
- 4. Control of grazing.
- 5. Habitat Improvement

#### 5.6.1 Control of illicit felling of trees and poaching.

The illicit felling of trees occurs throughout the year in general but during the monsoon period it is intensive. Likewise the poaching of wild animal is more during winter and summer and almost negligible during the rainy season. At present because of inadequate field staff people are accustomed to illicitly fell selective trees of Bija (*Pterocarpus marsupium*) ,Sal (*Shorea robusta*), Kaim( *Adina cordifolia*) and Kasi (*Bridelia retusa*) from the forest in adjoining area of Similipal. These species are gradually decreasing from the forests owing to large scale demand in the adjoining urban areas of Baripada, Balasore, Bhadrak and adjoining States of

Jharkhand and West Bengal. Similarly poaching of wild animals though controlled prevails in the Compartments adjoining to villages.

#### The strategies

- Minimum 10 camps will be created in these areas, 4 camps each in the Similipal- Kuldiha & Similipal- Santospur Corridor and 1 camp in the Badampahar-Similipal corridor.
- In each camp 10 to 12 persons shall be deployed with fire arms and walki talkies who will patrol over the area and collect information on activities of poachers and wood cutters from the field signs and if confronted they will apprehended the culprits and recover the seized produce.
- The timber smuggling routes have been identified and strict patrolling measures will be enforced along the routes.
- Through a network of spies engaged on incentives, the information on hoarding of timber, entry of poachers into the forest and possession of body parts of wild animal will be collected and immediate action will be taken.
- There is provision for reward for seizure of forest produce, which is given from
  the sale-proceeds of the forest produce seized. Such benefits do not accrue in
  case of cases under Wildlife (Protection) Act and the materials seized are not
  disposed of by sale. In order to encourage the staff as well as the local people
  special awards will be given to the staff / informants involved in detection of
  the case.
- Training and workshops on various changes in Forest laws, procedure to deal with the preparation of case records and detection of case will be organized.
- Training on handling of firearms including maintenance will be imparted to the staff at regular intervals.

#### 5.6.2 Control of forest fire.

Out of the total area of the corridor forests, which are under dry deciduous hill forests, high level sal forests and grassland are very much prone to fire during the period from February to May. The fire is mostly intentional i.e. people set fire for collection of non-wood forest produce and Akhanda Shikar. At times it is caused by the timber smugglers, carelessness of tourists and passersby. The objectives of control of forest fire are

➤ To prevent fire spreading into the forests so that the ground flora and fauna are well protected.

- To ensure germination of seeds and thereby maintain the stand with trees of all girth classes.
- ➤ To protect the humus, snags and down trees which harbour a lot of organisms.
- ➤ To eradicate coarse grasses giving place to annual grasses palatable to the herbivores.
- To maintain the ambush cover for the prey animals and refuge cover for all animals for reproduction.

#### **Strategies:**

The fire season in Mayurbhanj starts from 1<sup>st</sup> February and continues up to 31<sup>st</sup> May or till receipt of first shower of pre-monsoon. It causes a lot of harm to the flora and micro-fauna. In order to make these corridors free from fire, the following measures are laid down.

#### • Preparation of Fire Map:

The fire map of entire Range need to be prepared Range-wise showing therein the different type of fire sensitive zones in a topo sheet (1:50,000); so that it will be easier to draw the attention of the management. It can be divided into three zones viz:

- i) Fire sensitive zones
- ii) Medium fire prone areas
- iii) Less fire prone areas

The map may not be up to scale; but should be approximate and to be prepared after field inspection. Different zones will be coloured with vermilion red, pink and yellow respectively. The parameter to determine the proneness to fire is:

- i) Nearness to habitation.
- ii) Type of forest (microclimatic)
- iii) Passages through the forest
- iv) Distance from the water bodies

#### • Prevention of fire:

Always it should be the motto to work with the principle of "Prevention is better than cure". To achieve the objective the following steps are to be taken:

<u>Creation of awareness</u>: The evils of forest fire and the duties of the villagers residing on the fringes and enjoying the usufructs as per section 84 and 86 of Orissa Forest Act, 1972 and the penal provision u/s 27 will be disseminated among the people through beating of drums, posters, handouts and slides.

<u>Provision of incentives</u>: In adjoining area villages have been identified which are to be involved in the protection of forests, especially from fire. These villages are allotted to different Ranges of Similipal Tiger Reserve and Territorial Divisions to motivate the villagers against fire. The motto will be to prevent forest fire by weaning them away through incentives. The advantage of prevalent mechanism of Joint Forest Management through VSS/EDC may be taken in order to achieve the goal. The incentives to each village will be determined depending upon the size of the village, the size of the forest and the length of boundary of such forest.

- ii. <u>Clearance of fire lines</u>: All the forest boundaries, roads and foot paths passing through or touching the forest will be taken as fire lines and they will be cleared of the leaves and other inflammable material. In case of forest roads at least 3mtr on either side will be maintained clean and in case of live foot path a 6mt strip to be cleaned. The cleanliness to be maintained thereafter weekly. If the patch of forest in sensitive zones as per map is too big, then the area is to be suitably divided into sub-areas with artificial fire lines of 3 mtr wide.
- iii. <u>Deployment of fire watchers</u>: Sufficient number of firewatchers are to be deployed on the fire lines who will patrol over the area to give information on incidence of fire. Care will be taken to select non-controversial person as firewatchers.

#### Fire fighting:

In order to combat the fire, fire-fighting squads at the rate of one per Range are to be pressed into operation. The personnel to be recruited in the squad and as firewatcher are to be properly trained by field demonstration. Their work will be to:

- i) Prevent forest fire in collaboration with the villagers to whom incentives have been given.
- ii) Extinguish the fire on receipt of information on out-break of fire.
- iii) Patrol over the area in medium fire prone areas and less fire prone areas when they are not in duty in (i).
- iv) Monitor and evaluate the control of forest fire during and after the fire season is over respectively.

One vehicle with VHF connection will be provided to them. They will be provided with bill-hook/axe, torch-light and water bottles. The vehicle and the squad will work round the clock from  $\mathbf{1}^{\text{st}}$  February to  $\mathbf{31}^{\text{st}}$  March. They will promote

awareness in the fringe villages, prevent fire with assistance of the VSS/EDC concerned, extinguish the fire if set in and evaluate the effectiveness of the incentives for consideration of award at the Range/Division/Circle level. The squad will consist of daily wagers along with the Forester and Forest Guard of the concerned Section/Beat.

The amount earmarked for fire fighting includes the cost of creating awareness, clearance of fire lines, deployment of fire watchers and spies, beating of the fire, recruitment of fire fighting squad on daily wages, equipments, rewards, hiring of vehicles and cost of POL

#### Post-fire operations:

In spite of all the precautions, if fire breaks out, immediate steps to be taken to extinguish it and the gutted area to be measured and mapped out, the loss to be assessed and the reasons for fire along with responsibility need to be fixed.

#### Accountability:

• The staff will be accountable for fire in their area and necessary disciplinary action will be taken against them.

S.L. No	Post	Accountability
1	Field Director cum R.C.C.F., Baripada Circle	Overall fire management of the Entire Circle and daily monitoring with D.F.O.s
2	D.F.Os and Deputy Directors.	They will be accountable for overall area of the divisions/ area under their jurisdiction to manage fire problems with daily monitoring with ACFs and Range officers and preparation/implementation of fire management plan.
	A.C.F. and Assistant Directors	They will be accountable to look after fire control parties, vehicle movement, and communication of each fire incidence in the division, movement of additional division level party with all equipments, fire fighting equipments and fire mapping and implementation of prevention measures.
	Range officers	Range officers have to plan fire prevention measures before fire seasons, Implementation of Fire management plan, Monitoring fire incidences and controlling the situation immediately in their jurisdiction and inspecting each and every section of his Range areas.
	Section Officers	Section officers (Foresters) have to take action according to the Fire management plan, Monitoring fire incidences and controlling the situations immediately in their jurisdiction and inspecting each and every part of their section

areas. They have to monitor the fire prevention units to work in time, motivation to villagers not to ignite to fallen leaves. They have to look after every party whether well equipped with fire fighting measures, sufficient drinking water, motor vehicles or bicycles, communicating equipments and first aids. They have to report twice daily to the Range officers about the fire management in their sections.

**Beat Officers** 

Beat Officers (F.G.s) have to look after fire management activities in his jurisdiction as well as to assist the adjoining beat officers in fire prevention. They have to monitor the fire prevention units to work in time, motivation to villagers not to ignite to fallen leaves. They have to look after every party whether well equipped with fire fighting measures, sufficient drinking water, motor vehicles or bicycles, communicating equipments and first aids. They have to report twice daily to the section/Range officers about the management in their beats, seek more assistance immediately if fire incidence go beyond the control. They will be accountable for negligence in any activities.

Fire Watchers

They have to work in a team to prevent fire in forests. They are accountable for any fire incidence occurs due to their negligence and failure to report to Beat F.G.s/ Foresters in time.

#### 5.6.3 Man-wildlife conflict mitigation.

Since the time immemorial, Human wildlife conflict has been going on around the Similipal Tiger Reserve. But no incident of tiger attack or uplift of human beings by Leopard has been ever reported. Cases of cattle kill by big cats are occasional in corridor area particularly, in Similipal – Santospur corridor. Other wildlife cases such as Bear attack as well as Hyena attacks are known to occur but these are very accidental and causalities have been reported on this count in corridor area. Crop raiding and other depredation by elephants in corridors is confined to limited pockets. Following strategies are suggested for mitigation of man-wildlife conflict in corridor area.

Timely payment of compassion amount to the victims.

- Proper education on wildlife conservation to the people, especially to the children, lawyers, and legislatures on the subject is key to find a solution.
- Developmental programmes must be thoroughly tuned to protect animal rights. Prior to allowing forest diversion proposals, an Environment Impact Assessment must be done in which wildlife aspect should be examined carefully by an organisation having expertise on wildlife management and impose stipulations to ease out the problems that would arise due to execution of that project.
- Closure of all stone quarries around the Similipal Kuldiha corridor.
- Proper training to field staff on handling of conflict situation.
- Finally, man- animal conflict can be resolved with involvement of all sections of the society.

#### 5.6.4 Control of grazing.

Grazing is the worst form of biotic interference to the forests contrary to others, which is not felt by the people. It acts as a carrier of diseases to the wildlife, compact the soils and makes the forests more xerophytic. In order to strike out a solution to the problem of grazing, the following strategies are aimed at:

#### **Strategies**

- The people of the adjoining area will be educated to confine grazing of their cattle to the village forests only.
- In case, where the village forest is not sufficient enough to accommodate the
  cattle, the grazing will be allowed in TUZ on rotational basis. In this case the
  boundary limit for each village will be earmarked in consideration of the size of
  the cattle population in the village.
- In no case grazing will be allowed inside the corridor area.
- Through awareness the people would be sensitized to resort to stall feeding by collecting the fodder and keeping them in silo pits.
- The land earmarked for grazing "gochars" in the villages is to be restored and renovated.
- During elephant migrating seasons, alternative crop to paddy such as hot Chillies- BhutJolokia, Deogarh Chilli, Capsicum, Ground nuts, Radish, cotton, lemon crops to be raised by giving subsidy to the farmers.
- Chilli fencing, solar fencing and trenches to be raised around the villages to prevent elephant/wild pest entering in to the villages and crop fields.

#### 5.6.5 Habitat improvement

With the backdrop of the vastness of the area, the diversities of the habitat types and the diffused nature of the wild animal populations, it is necessary to adopt following strategies to improve the habitat congenial for the growth of wild animal population.

# **Strategies:**

# Improvement of existing meadows

The meadows are now invaded by sal saplings. These need to be uprooted and obnoxious and unpalatable grass and shrub species eradicated by ploughing the meadows. More palatable and indigenous grass species like *Cynodon dactylon* is to be sown in patches by fencing the area with the help of solar power fencing.

#### > Eradication of weeds

All weeds like *Lantana* and *Eupatorium* need to be uprooted and destroyed during rainy season.

# > Development of saltlicks

Both natural and existing artificial salt licks are to be maintained and enriched with application of salts and other minerals in consultation with the A.H. department

- All the saltlicks beyond the eye of the field staff are to be destroyed by application of neem oil as the poachers take the advantage of killing the animals there only.
- Staff will visit the saltlicks on patrolling duty every day morning and evening.

# Miscellaneous

- For dust baths during dry months and wallowing during the rains and winter as many spots as possible will be developed. These spots will be maintained by treating the same with tick repellents.
- Patch planting with the qualifier indigenous species will be taken up to provide shelter, food and fodder to the wild animals. Bamboos (Dendrocalamus strictus), wild banana, fruit bearing species such as Jamun, berries, are to be planted extensively.
- Molecules of refuges and shelters will be provided for the tiger and its prey animals in dispersed pockets all over the corridor wherever possible.
- In large open valleys, viable patches of scrub and woodland will be created to provide the disperse edge of shelter for fuller use of the available fodder.
- Entrance holes will be made at the base of hollow trees where there is no such entrance – to make those available as shelters for the wild animals like mouse deer.
- Dense growth of climbers like *Combretum* and *Milletia* will be cut in the corridor area. But *Bauhinia vahlii* not be cut as it serves as an important food plant for elephants during scarcity.
- Forest ponds, water harvesting structures, waterholes to be raised in adequate numbers in the corridors to meet water scarcity in the area.

• Sign boards showing elephant corridor, speed breakers, wildlife corridors, will be raised to educate the people moving around.

# Improvement of wild animal health

The health of wild animals inside Similipal is noticed to be good except elephants. They are seen to be suffering from formation of abscess, gastroenteritis and some congenital diseases. The principal prey animals like sambar and wild boar available in good numbers are seen to be very healthy. Monkeys, chital, gaur and other animals are observed to be free from any diseases. However, regular vaccination of the cattle in the adjoining villages needs to be made. The carcass of the cattle will be disposed of by burning. Similarly death of any wild animal due to poisoning and suffering from any infectious disease will also be burnt.

# **People participation**

Forest and Forestry cannot be isolated from the people. It is necessary to march forward along with the people leaving within and around the Managed Area.

# Strategy:

- Health camp It is a confidence building measure and as there is no medical facility available in remote villages around the TR, it is our sacred duty to act as a facilitator for providing medical aid to the people at the time of need. This will not only act a confidence building step to restore the lost confidence which the people reposed on Forest Department earlier when they were allowed to enjoy the forest resource without any hindrance. For the purpose health camps will be organized in each cluster of village at least twice in a year i.e. during the rainy season and spring, which are very much prone to diseases due to climatic changes. Volunteer health workers will be selected from the villagers and trained on basic health care practices by the Doctors of allopathy and homeopathy and they will be provided with health kids for emergency treatment of the people around the TR.
- Creation of awareness- The harms inflicted by the local people are due to lack of education and provocation of superstitions, religious stigma. The poaching, cutting of trees / adoption of new methods of eco-technology, Joint Forest Management and carelessness towards own health are the result of such factors. This can be eradicated from their mind by way of educating them and creating awareness among them through facilitators like NGOs.

# **ECO-DEVELOPMENT AND LIVELIHOODS**

6.1 CONSTITUTION OF ADJOINING CORRIDOR AREA MANAGEMENT COMMITTEE (WITH REPRESENTATION OF DIFFERENT FOREST DIVISIONS, LINE AGENCIES AND OTHER STAKEHOLDERS) AND LINKAGES WITH TIGER CONSERVATION AUTHORITY.

The Adjoining corridor area management committee will be formed under the chairmanship of Field Director, STR cum Regional Chief Conservator of Forests and this committee will also act as Monitoring Committee of the activities taken up in the adjoining area. The committee meeting will be convened every six months interval to make convergence of the action plans for collective effort of development of the adjoining areas.

1)	The Field Director, STR cum Regional Chief Conservator of Forests Baripada.	Chairperson
2)	District Magistrates cum Collector, Baripada and Balasore	Member
3)	Divisional Forest Officer, Baripada	Member
4)	Divisional Forest Officer, Karanjia Division	Member
5)	Divisional Forest Officer Balasore WL Division,	Member
6)	Divisional Forest Officer, Keonjhar WL Division,	Member
7)	The Deputy Director, Similipal Tiger Reserve.	Member
8)	The Deputy Director, Tourism and Research, Similipal Tiger Reserve.	Member
9)	Block Development Officer, Kaptipada	Member
10)	Block Development Officer, Khaira	Member
11)	Block Development Officer, Jashipur	Member

12)	Executive engineer, Rural development, Baripada.	Member
13)	District Soil Conservation Officer Baripada	Member
14)	District Agriculture Officer, Baripada	Member
15)	District Horticulture Officer, Baripada	Member
16)	District Veterinary Officer, Baripada	Member
17)	District Fishery Officer, Baripada	Member
18)	District Sericulture Officer, Baripada	Member
19)	P.A ITDA, Baripada	Member
20)	Project Director. D.R.D.A, Baripada.	Member
21)	Chief District Medical Officer, Baripada	Member
22)	Superintendent of Police, Baripada.	Member
23)	Block Chairman of Kaptipada Block	Member
24)	Block chairman of Jashipur Block.	Member

# 6.2 FORMATION OF ECO-DEVELOPMENT COMMITTEES (EDCS) AND SUPPORTING INSTITUTIONAL FRAMEWORK (CONFEDERATION OF EDCS, SELF HELP GROUPS AND NATURE CLUBS)

The policy of Govt. of Orissa on Joint Forestry Management framed during 1998 and the resolution of Odisha Joint Forest Management, 2011 will be followed for formation of EDCs in protected areas and VSS in the corridor areas. Hence immediate formation of the EDcs /VSS in above 12 villages will be taken up.

# 6.3 LIVELIHOOD SUPPORT INITIATIVES THROUGH VILLAGE MICRO-PLANS SUPPORTED BY TIGER CONSERVATION FOUNDATION AND OTHER LINE AGENCIES:

Micro plans for each EDC / VSS to be formed and Forest development work synchronized with livelihood support to the villagers are being taken up over the area. Microplans are developed after conducting effective PRA exercises with the targeted villagers. Help and support of local NGOs are being taken for this purpose

#### 6.4 MONITORING AND EVALUATION

In order to monitor the programme, control rooms in the Division and Range Officers with the help of Forest range Officers and Foresters respectively will function round the clock. In the Circle Office, it will remain open, which will be manned by the Foresters. After the fire season is over, the entire area is to be inspected by the concerned Divisional Forest Officer and suggest the names of Forest Guards who have prevented the fire and similarly of the villages. On receipt of the report, a team at the Circle level will evaluate the work and the officers/villages showing outstanding work will be rewarded, on the World Environment Day. Efficacy of fire protection work in all the Divisions will be evaluated through a team to be framed by the concerned Divisional Forest Officer with the Asst. Conservator of Forests of the Division as its head who will be go round the forest and evaluate the damages done to the forest and the negligence of staff in duty to the Divisional Forest Officer, who in term will report the matter with the Field Director cum Regional Chief Conservator of Forests, Baripada after taking necessary action at his end.

### 6.5 MONITORING OF TIGER MOVEMENT IN THE CORRIDORS

Protection and monitoring of tiger movement in the corridors is important. Part of the corridor on the western side proposed in this plans falls under jurisdiction of Keonjhar Wildlife Division which is outside the administrative control of Field Director, Similipal Tiger Reserve. Hence to monitor the movement of tiger in this corridor and for sharing of information on cattle kills and other protection related matter there will be quarterly coordination meeting between the Field Director, Similipal Tiger Reserve and DFO, Keonjhar Wildlife Division along with other forest officials and the Chief Wildlife Warden will be kept informed at regular intervals.

# TIGER POPULATION AND HABITAT ASSESSMENT

# 7.1 DAY TO DAY MONITORING PROTOCOL:

# **Daily Monitoring Protocol**

For designing, implementing, and evaluating the success of any conservation program for endangered species, it is imperative to monitor the status, distribution and trends in the populations of the target species. The monitoring program will be transparent in its approach, and holistic, addressing an array of parameters related to the survival of the species by using the blend of best available science and technology Jhala *et al* (2008).

Daily monitoring task will be planned and sincerely executed by the ground staff like the forest guards and the anti poaching staff which involve simple observations on a regular basis and keeping track of the said observations discreetly and meticulously. The daily walk of a forest staff is a tool that could be effectively used for monitoring of different animal populations across different seasons and habitats. The observations should include:

- 1. Number and species of animals seen during any patrolling through the forest. For every walk the total kilometres walked will be noted down with time and intervals of rest. Effort will be given that every walk is taken during more or less at a fixed time during the day all though the year.
- 2. Number of different signs of carnivores like pugmark, scrape, and rake, scat encounter and kill to be noted down on every walk. Effort will be given towards identifying the species for which signs are being registered along with some special notes if any.
- 3. Care will be taken in maintaining as much silence as possible during the walks and noting down the associated information for habitat and weather. The records of these walks if maintained properly and compared over time can provide reliable information towards understanding and deriving an overall idea about the forest health.
  - Reporting and database maintenance are the two most important part of the entire program. Data collected during these daily walks will be collected and compiled by the office if possible at the beat range level and to be produced when and where needed.

# Tiger Population Estimation Framework(Phase-I, Phase-II and III)

# Phase-I Similipal Tiger reserve adjoining area:

- a. Baseline data on tigers and prey
  - i. Equipment
    - Camera traps 20 pairs for main study area + 5 pairs for general survey of areas outside main study area
    - Range finders 6
    - Compass 6
    - Digital camera 10x zoom lens, 6-8MP 6 cameras
    - 2 laptops basic
    - 3 Vehicles
    - Microscope
  - ii. Staff
    - Four staff (2 + 2)
    - Five field asst.
  - iii. Field running cost (2 field stations Sarat, Jashipur)
  - iv. Workshop/training tiger monitoring and related study/survey methods

# 2. Cattle grazing

- a. Assess the impact (and extent) of cattle on the habitat and environment (water security)
- b. Identify potential alternative sources of livelihood; get the govt. to initiate programs on reduction of scrub cattle.
- c. Pilot program
  - i. Satkosia- Sarat

# 3. Poaching

- a. Assessment of existing anti-poaching capabilities with gaps including crime map/database at landscape level
- b. Identify mechanisms to close gaps (redeployment of staff and infrastructure support)
  - i. Establishing additional anti-poaching squads (or camps) –
     Karanjia Division (new Chheligodhuli.) Baripada Division –
     (Sarat, Baghachua, Kalamgadia, Sripadmanjari) . including communications and personnels and camping kits, etc.)
  - ii. Wireless network (5 base sets; 20 walkie talkies with spare batteries, 5 charging stations)
  - iii. Transport pickup (Mahindra)- 3 Nos. and 11 motorcycles
- c. Intelligence network (TRAFFIC involve) anti-poaching specialist group
  - Get govt. to agree
  - Training
  - Transport
  - Funds
  - Forensic support
- d. Interstate Workshop (WCB, TRAFFIC, FD, PD, WWF)

- e. Basic training for Safety; rest of landscape upgraded training
- 4. Habitat management
  - a. Baseline information on vegetation and monitoring
  - b. Water
    - i. Estimate the water potential of the area
    - ii. Improvements in the water availability for animals.
  - c. Weeds
    - i. Gather baseline data on weeds (extent, impact, etc.) main lantana and supporting data on other species
    - ii. Highlight issues to govt.
    - iii. Test options for containing weed in weed free areas work with the FD in Similipal in their existing weed removal by monitoring and another site outside in the buffer.
    - iv. and removal methods infested areas (Eupatorium and lantana all processing machines like bricket and lantana wood panels, baskets TA to organize this).
- 5. Document Landscape Vision
  - a. Preparing a framework
  - b. Preparing a working document
  - c. Consultation process
  - d. Workshop to finalize vision and completion of vision document with complete framework for conservation within the landscape
- 6. Threats from developmental projects/new houses in revenue villages.
  - a. Identify, map and evaluate all development threats within the conservation landscape
  - b. Reports and advocacy on existing threats
    - i. Satkosia-Thakurmunda- Dangadiha Road
    - ii. Podadiha- Dangadiha corridor road.
    - iii. JashipurCheligodhuli- Manada road
- 7. Communicating/Advocacy supporting the Salandi, Khairi/ Deo watersheds in adjoining area
  - a. Brochure (watershed argument)
  - b. Two posters
  - c. Built a communication strategy for watershed

# 7.2 TIGER POPULATION ESTIMATION FRAME WORK: CORRIDORS

# Sampling For Tiger, Leopard and Other Carnivores Encounter Rate

Obtain data on the presence, absence and intensity of use of a beat by tigers and other carnivores, we shall quantify the abundance of tiger, leopard and carnivores sign in an area. The following procedure needs to be followed for data collection:

- A beat will be considered as a sampling unit.
- Areas within the beat that have the maximum potential for tiger occupancy will be intensively searched.
- Since tiger and leopard have the tendency of using dirt roads, trails, foot pats, river beds and nullahas, these landscape feature within the beats need to be searched intensively
- One to three persons who know the terrain and habitat features of the beats will conduct the search for tiger sign.
- There will be 3-5 separate searches (in different compartment within the beat and /or at different times 1-5 days apart) each search covering about 4-6km distance in areas having the best potential for tiger presence .It is important to record the distance covered and the time spent during each search separately and accurately. If time is spent resting or in other activities while conducting search, this duration will be reported separately. If possible the GPS coordinates of the beginning point of each search path will be recorded.
- The total minimum distance covered while searching for tiger and other carnivore sign will be 15km per beat.
- Tiger and leopard signs will be classified into following categories 1) Pugmark trails, 2) Scat(Old: dry with hair and bones visible; Fresh: dry but intact with shiny surface; Very Fresh: soft, moist, and smelly, 3) Scrapes,4) Scent marks( spray, rolling ), 5) Rake marks on trunks, 6) Actual sighting , 7) Roaring ( vocalization) 8)Kills (Predation on wild prey).
- A brief description of the topography and forest type is to be recorded for each sign.
- In the case of pugmark trails, each trail set is considered as one sign (not
  each pugmark as one sign). In case a tiger (or other carnivore) continues to
  walk along a dirt road for a long distance ( say 1 km), then this will be
  considered as one sign, and a comment recorded in the remarks section of
  the data regarding distance covered by a pugmark trails of a single tiger.
- Tiger and leopard signs if encountered outside the sampling route will also be recorded with GPS coordinates (if available) and with appropriate comments.
- Special emphasis should be given to sign of tigress and leopards with cubs and any authentic evidence of cubs (sighting of cubs, lactating tigress, tracks, etc.) obtained within the past twelve months will be mentioned in the data sheets.
- The number of livestock killed by predators within the past three months needs to be recorded in the questionnaire following the data sheet.
- It is important to report data sincerely. It is likely that there may be reliable information that tiger /leopard is present in the beat being sampled , but

no tiger /leopard signs are recorded during the intensive search survey. In such cases, mention will be made in the remarks column of the data sheets. However, failure in obtaining tiger sign from a beat is equally important as recording tiger/ leopard sign and for appropriate analysis of this data the actual will be reported.

# **Sampling For Ungulates Encounter Rate**

This protocol outlines a simple method for quantifying ungulates abundance in an area based on visual encounters while walking along fixed line transects. The following procedure needs to be followed for data collection:

- A beat would be considered as the unit for sampling.
- After considering shape, size, vegetation and terrain type of the beat, a transect line of a minimum of 2 km and not exceeding 4km will be marked for sampling.
- The transect line will traverse similar habitat (broad vegetation types) as far as possible. If the beat is composed of 2 or 3 distinct vegetation types eg. Mixed Teak Forest comprising 40% of the beat and the remaining 60% comprised of Miscellaneous forest with bamboo, then 2 separate line transects will be marked for sampling.
- The line transect within a beat may be broken up into 2 or more segment so that each segment has a minimum length of 2km and traverse similar habitat.
- Care will be taken that a line transect is not located near a busy road nor should it run parallel to a river or other features of the landscape which may bias sighting of ungulates.
- For each transect the point of beginning and end point coordinates (Latitude and Latitude) will be recorded by a global positioning system.
- The broad forest type and terrain type that the transect traverses needs to be recorded.
- Each transect should be walked by 1-2 persons during the early morning hours (6:30AM to 8:30AM). Preferably one of the persons walking will be a good field person who is able to spot wildlife.
- A record will be kept of all mammals and peafowl seen during the walk. For each sighting the following need to be recorded: 1) serial no of sighting, 2) time of the sighting, 3) species (eg. Sambar, Chital, Elephant, Wild Pig, Peafowl, Langur, etc.), 4) group size number of animals of the same species in the group as accurately as possible. Animals are considered to belong to two different groups if the closest animals from groups are separated by a distance of over 30m.
- If possible number of young (fawn / calves less than 1 year of age) seen in the group will also be recorded.

- A broad habitat category (vegetation and terrain type) needs to be recorded for each sighting eg. S.No.5. 12 chital (10 adult and 2 young) were seen at 6:40am, in mixed teak forest, gently undulating terrain.
- Each line transects needs to be walked atleast on three different mornings for estimating ungulate encounter rates.

# Sampling for Vegetation, Human Disturbance and Ungulate Pellets

To quantify the habitat parameters and determine relative abundance of ungulates sampling will be done along the same line transect on which ungulate encounter rates were estimated. For economy of time and effort it would be possible to first sample the line transect during early morning hours for ungulates encounter rate and then while returning along the same line, sample for vegetation and ungulate pellets. Sampling for vegetation, ungulates dung and human disturbance will be done only once on a transect.

- Again the beat will be sampling unit, and sampling will be done along the established line transect.
- For beginning and end point coordinates of the line transects need to be recorded using a GPS unit.
- The principle of line transects as explained in the section on ungulate encounter rates is applicable here.
- Vegetation would need to be quantified visually at the following categories for each plot:

# 15m radius circular plot

- 1) Broad vegetation type and associated terrain type eg. mixed teak forest on hilly terrain, sal forest on flat land etc.
- 2) Within the distance of approximately 15m of the observer the five most dominant trees (over-story, all vegetation >6ft. in height, including bamboo) need to be listed in the order of dominance (abundance).
- 3) The observer needs to list the 5 most dominant shrub species (middle –story, vegetation >20cm &<6ft.) in order of dominance (abundance) within 15m of the location. He needs to categorize shrub density (under story vegetation) as absent, very low, low, medium, and dense. Shrubs will be assessed on five point scale (0 to 4 i.e. absent to most abundant) for density estimation.
- 4) If weeds are present their abundance needs to scored on 0 to 4 scale (0 being absent and 4 for high abundance) and the three most common weeds seen in 15 m need to be listed in order of abundance.
- 5) Within the same 15m distance the observer needs to record number of signs of looping, wood cutting, and presence /absence of human foot

- trail. Mention needs to be made if people and or livestock are seen from the plot.
- 6) The observer needs to visually quantify the canopy cover at the location. The observer should subjectively classify the proportion of the sky above him that is covered by canopy foliage and categorize it into <0.1, 0.1- 0.2,0.2-0.4,0.4-0.6,0.4-0.6,0.6-0.8,>0.8 canopy cover.
- 7) A mention need to be made in the data sheet regarding the number of permanent human settlement, human population and livestock population present in the beat.
- 8) A mention needs to be made based on the observers' knowledge if any non timber product is collected from the beat. If yes which NTFP and to score the magnitude of collection on a 5 point scale (0- no collection, 4- high rate of collection)
- 9) If the beat was burnt, the proportion burnt in the past 3 years needs to be mentioned in the data sheet.

# 1m radius circular plot

The plot will be laid 5m away from the centre of the 15m circular plot. The observer needs to use a 2m long stick to define an imaginary circle around him with the stick as the diameter. Within this circular plot (2m diameter) the observer needs to a) quantify the percent ground cover, i.e. the proportion of ground covered by herbs, grasses, litter and bare ground b) List the 3 most dominant grass species, and herb species in order of abundance.

# **Sampling for Ungulates Pellets**

Ungulates abundance will also be indexed by enumerating their faecal pellets. This exercise will be done on the same line transect that has been sampled for ungulate encounter rate. To save time, this exercise could be done after the line transect has been sampled in the early morning for ungulates encounters.

- At every 400m along the transect (line of walk) the observer needs to sample an area of 2m by 20m, perpendicular to the transect for quantifying ungulates pellets. This is done by using the 2m long stick held at the centre horizontally in his hand and by slowly, 20m right and left of the transect alternately at every 400m.
- All ungulates pellets encountered need to be recognized to ungulates species and recorded in the appropriate columns.
- The number of individual faecal pellet need to be counted. In the case the pellets occur in the large heaps, then they should be categorized into the following categories A(50-100), B (100-200 and C (>200).
- In areas where small livestock like sheep and goat are known to be grazed, it is possible that faecal pellets of these can be confused

- with wild ungulates especially those puff chital. In such areas, a mention needs to be made that goat or sheep graze the area.
- In the last row of the data sheet the observer needs to report if ungulates/animal listed in the data sheet occurs in the sampled beat to the best of his knowledge irrespective of whether its pellets/ dung were recorded in the plots.

#### Phase II

The data from phase I one will be plotted in geographical information system (GIS) to develop a presence/absence map for tigers, at the beat or range level across the park. The presence/absence map is then to be used to develop a resource selection probability function using attribute data on transportation network (i.e., linear features such as roads and train tracks), forest cover, normalized difference vegetation index (NDVI), vegetation cover, terrain model, hydrology, and night light satellite (to represent human disturbance). The output of this phase will be a map with relative rankings of high, medium, and low probability of tiger occurrence throughout the park. This data could be assembled and processed by any institution that has GIS facility and are eager to provide them. Outsourcing of this work would be helpful keeping in mind the feasibility and the amount of technicality that is supposed to be involved. This data once generated can serve as the inventory for the park and could be subsequently used by the park on future occasions.

### Phase III

Estimation of tiger and ungulate abundance will be done by using intensive sampling. The habitat rank map for tiger developed in phase II will be used to draw a sample of location for intensive density estimation of tiger and ungulates density. Tiger population will be estimated using photographic mark-recapture sampling techniques in medium and high density (probability) areas. The following frameworks are tiger densities estimation by Capture recapture frame work and ungulate densities by Distance sampling.

# 7.3 ESTIMATION OF TIGER POPULATIONS USING CAPTURE RECAPTURES FRAME WORK

With the first animal triggered photograph being taken in 1877 (from Cutler and Swann, 1999), remote photography has been used to study avian nest predation, feeding ecology, nesting behaviour, determining activity patterns, presence – absence monitoring and estimating population parameters. The increasing popularity of remote photography in wildlife research has led to the development of a large variety of equipment and methods (Kucera and Barrett 1993).

With the help of remote photography the elusive lives of cryptic animals have been better understood (eg. Pierce et al.1998). Since previously all other information regarding cryptic animals, carnivores in particular, were derived either from direct observations or indirect signs, remote photography studies have proved more successful (Kucera and Barrett 1993). From the times of Champion (1928) photographing cryptic animals such as the tiger (*Panthera tigris*) in the Indian subcontinent using remote photographic techniques has sought popularity.

With developments in capture – recapture theory (Otis *et al.,* 1978, Pollock *et al.,* 1990) and the use of cameras to capture individually marked or identifiable animals and photographically recapture them, resulted in the use of cameras for estimating population parameters. Since individual tigers are readily identifiable using the stripes on the body (Schaller 1967, McDougal 1977, Karanth 1995, Franklin *et al.,* 1999), the sight-resight (White 1996) or capture-recapture approach can be used to estimate population parameters. The capture – recapture theory requires that all individually identifiable animals will have to be identified with surety. By estimating the capture probability p - hat an estimate of the population size (N) is arrived at (Nichols 1992). Owing to the large number of estimators available for estimating the population size (N) various computer programs have been formulated to aid analysis (eg. White 1996).

Karanth (1995) developed and implemented a method of photographic capture-recapture analysis to aid estimate and monitor tiger populations. Years of using this method of analysis has proved that photographic capture recapture sampling is a reliable technique for estimating abundances of tiger and other cryptic animals (Karanth and Nichols 1998, 2000, 2002, O'Brien *et al.*, 2003, Trolle and Kery 2003, Karanth*et al.*, 2004b).

However most published studies report population sizes accompanied by low levels of precision (eg. Karanth and Nichols 1998, 2000, Silver *et al.*, 2004) and low sample sizes (Kawanishi and Sunquist 2004). It is only recently that issues regarding sampling design related to photographic capture-recapture analysis are being discussed (Wegge*et al.*, 2004). This brings to notice that though this method of population estimation has proven successful, issues regarding sampling require rigorous field validation so as to improve the quality of the results thus obtained.

# Estimating tiger population using photographic capture-recaptures

In order to estimate the population density of tigers in the study area photographic capture recapture analysis was chosen as an appropriate method (Karanth 1995, Karanth and Nichols 1998). The sampling design was modified to suit field conditions. Each site two cameras are equipped to photograph both flank of the tiger at every capture. The cameras are placed within wooden housings so as to

protect the units from weather and animal damage. As to photograph the two flanks of individual tigers to aid individual identification.

These trapping sites are selected based on presence of tracks, scats and other evidence indicative of frequent tiger activity so as to maximise the capture probabilities of tigers (Karanth 1995). An important consideration is to ensure coverage of the entire area, without leaving holes or gaps that were sufficiently large within which any tiger have a zero capture probability. Therefore trap placement was planned with a minimum of 1.65 km inter trap spacing. Owing to the good network of roads all trapping sites in each of this should be checked on a daily basis.

All rolls of film used during the trapping have to given a unique identity (e.g. Block1/Trap1/Roll1) enable us to correctly note the date, time and location of the photographs resulting from each photograph. Every tiger capture will be given a unique identification number (e.g.  $t_1$ ) after examining the stripe pattern on the flanks, limbs and fore-quarters (Schaller 1967, McDougal 1977, Karanth 1995, Franklin *et al.*, 1999).

Following the identification of tigers from the photographic captures using stripe patterns capture histories will be developed. The capture history for an animal  $t_x$  consists of a row vector of 15entries, denoting the number of sampling occasions. Each entry, denoted as  $X_{ij}$  for an individual i on occasion j, assumes a value of either "0" if the animal is not photographed on that particular occasion, or "1" if the animal is photographed on that occasion. Referred to as an X matrix (Otis  $et\ al.$ , 1978) this data matrix will be used to estimate tiger population size N.

The capture history data will be analyzed using program CAPTURE (Otis et al., 1978, White et al., 1982, Rexstad and Burnham 1991), software developed to implement closed-population capture-recapture models. Program CAPTURE computes the estimate of N under seven different models which differ in their assumed sources of variation in capture probability (p - hat).

Since it is aimed to estimate the density (D) of tigers in the study area, the population size (N)is divided by the effective sampled area (A(W)). In trapping studies, A(W) is calculated by assuming that the perimeter traps represent the minimum sampling area A. The mean maximum distance d between recaptures of individual animals is calculated and the boundary strip width W is calculated as W = d/2 (Dice 1938, Wilson and Anderson 1985). The boundary W is then added to the minimum sampling area A on a GIS domain and A (W) thus calculated. The estimates of density and population size are evaluated using two principle measures: bias and precision.

# Estimating ungulate density by distance sampling

Densities of the prey species is estimated using the line transect method (Anderson *et al.*, 1979, Burnham *et al.*, 1980, Buckland *et al.*, 1993). Line transects have been found to be very effective and reliable in estimating densities of

ungulates in the Indian Subcontinent (Karanth *et al.*, 2004a). With the hypothesis that detection probability is related to the distance between animals and the point of observation, the obtained estimates of density are in effect adjusted for no detection bias.

Line transect data will be collected between 06:15 hrs and 09:30 hrs by two observers. On every walk the followings were noted –

- i. Species and group size: On every detection the name of the species will be noted along with the sex.
- ii. Position: Observation of animal clusters or individuals has to be noted as distance from the start.
- iii. Sighting angle: Using a hand held compass (SUNNTO), the bearing of the animal clusters or individuals are taken. Since the bearing of walk is determined the angle of sighting will be calculated.
- iv. Sighting distance: Using a laser range finder the distance to the animal cluster or individual is measured from the point of observation.

The line transect data will be analysed using program DISTANCE 4.1 (Buckland  $et\ al.$ , 1993, Laake  $et\ al.$ , 1993). For reliable estimates of prey species density a minimum number observations are required in order to be able to reliably model the detection function. As a rule of thumb, it is often difficult to get a robust result with less than 60 – 80 observations, although the number depends on the characteristics of the species (Burnham  $et\ al.$ , 1980).

This is a more appropriate method of calculating the prey density (*D*) and the associated Coefficient of Variance (CV %) since it takes into account the temporal variation in species detection (Jathanna 2001). In a more straight forward approach to the calculation of the prey densities from a line transect, each temporal replicated is treated as a separate effort and thus the variance is underestimated.

# 7.4 HABITAT ASSESSMENT FRAMEWORK

# **Prey base improvement:**

a. Assessment of fodder availability:
 Objective: to estimate quantitatively the extent of fodder availability for animals in different areas of buffer zone.

# Methodology:

- Based on the logistics few permanent/semi permanent vegetation plots of 1 sq m are to be established in different locations of the buffer zone.
   In which equal number of plots are kept as control and grazed ones.
- In each of these plots regular extraction of biomass to be carried out and the collected biomass is to be divided as grass, non grass and other dry materials.

- Fresh and dry weight of the biomass is to be measured so as to know the exact amount of biomass.
- Collected biomass samples are to be subjected to nutrient analysis.

# **Expected outcome:**

- Such type of quantitative exercise in biomass availability will indicate the grazing pressure on biomass in different locations of the buffer zone.
- It also indicates the seasonal dependency of animals on the biomass.
- The result is very important in assessing the extent of nutrient availability.
- The obtained data can be correlated with soil moisture, rainfall, and other weather parameters so as to know the influencing factor for balanced production and supply of biomass in the buffer zone.

# **Spatial database development**

Development of spatial data base regarding the data collected during the phase-II should be out sourced to scientific organization equipped for the job and technical support of experts in the said field should be sought.

# 7.5 ANALYSIS AND REPORTING FRAMEWORK

Analysis of the data collected by the forest department will be done by some Research Officer at the Office of the Field Director. The recommendations of the Research Bodies will be considered during any decision making for the park.

A half yearly report from each Range will be collected by the office of the Field Director regarding the proceedings and forth coming programs of the Range and a half yearly report will be mandatory for each Range that will describe the activities of he Range in detail during the year.

# ORGANIZATION, ADMINISTRATION AND BUDGET

# 8.1 COORDINATION COMMITTEE FOR EFFECTIVE IMPLEMENTATION AND MANAGEMENT AND LINKAGES WITH TIGER STEERING COMMITTEE AND TIGER CONSERVATION FOUNDATION.

An adjoining area co-ordination committee will be formed with the following members:

- Regional chief Conservator of Forests & Field Director, Similipal Tiger Reserve, Chairperson
- 2. Deputy Directors, Similipal Tiger Reserve, Baripada, Convener
- 3. Deputy Director Ecotourism and Research, STR, Jashipur, Member
- 4. Divisional Forest Officer, Baripada / Karanjia / Rairangpur, Members

The respective DFOs will have regularly liaise with the various line agencies/departments and the EDCs. The summary of these meetings shall be reduced to writing and shall be furnished to the Field Director during the monthly Core-Buffer co-ordination meeting.

# 8.2 EDC COORDINATION.

EDCs /VSS will be made in 12 villages in the Adjoining areas. These EDCs/VSS will be activated by regular meeting by the forester and range officer concerned every month. The people will be made aware of the importance of the corridor

# 8.3 STAFF DEPLOYMENT, PROTECTION STRATEGY AND LINKAGES WITH TIGER CELL AND BUFFER ZONE STRIKING FORCE.

Deployment of staff will be as per the details mentioned in previous para.

# 8.4 SCHEDULE OF OPERATIONS.

Schedule of operation is merged with and would be done as per the core plan.

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#### ANNEXURE I

### NOTIFICATION OF SIMILIPAL RESERVE FOREST

# GOVERNMENT OF ORISSA DEVELOPMENT (FOREST) DEPARTMENT

# **NOTIFICATION**

Bhubaneswar, the 30<sup>th</sup> November, 1959

No.- 12F/139/(M/2) 59-41376/D. In pursuance of Sub-Section (3) of section 20-A of the Indian Forest Act. 1927 (XVI of 1927) as amended subsequently in its application to the State of Orissa by Orissa Act XI of 1954, the State Government do hereby certify that the documents mentioned in the schedule hereto annexed had been prepared under the authority of the ruler of Mayurbhanj State before the date of merger and have been under the authority of the State Government continued to be recognized maintained and acted upon thereafter.

#### Schedule

- 1. The MayurbhanjForest Manual.
- 2. Working Plan for the Similipal and Notto reserves MayurbhanjState for the year 1947-48 to 1966-77.
- 3. Register of reserve forests of Western Division.
- 4. Register of reserve forests of Northern Division.
- 5. Register of reserve forests of Southern Division.

By Order of the Governor,

G.C. Das Secretary to Government.

Memo No. 51377 / dt- 30.11.59

Copy forwarded to the Chief Conservator of Forests, with reference to his letter no. 20492/3F-429/57 dt.14.11.58. The documents except the Mayurbhanj Forest Manual are returned herewith.

Sd/-Under Secretary to Government.

# **ANNEXURE II**

# NOTIFICATION OF SIMILIPAL RESERVE FOREST IN MAYURBHANJ FOREST MANUAL

# **Appendix IV of Mayurbhanj Forest Manual**

# Notification under Sections 19 and 28 of IndianForest Act.

The Chief of Mayurbhanj is pleased to declare under section 19 of the Indian Forest Act as amended by Act V of 1980, the following areas as Reserved Forests.

The boundary is as follows:

NORTH: A straight line from Kanchinda across the hill to Kotas thence along the foot of the hills dividing Bamanghati and Similipal Pergannah adjoining the villages of Alapani, Tamarband, and Cheligudri.

WEST: From Cheligudri along the foot of the hills to Jamboni and Rajupal and thence along the bed of the Khairibhandan river to Kaliani, thence along the foot of the hills dividing Panchpir and Similipal adjacent to the villages of Kumrabadi, Kantinkna, Bargoria, Barakamra, Mirginondi, Kuspoda, Bishpur, Kendumundi, Godabindha, and Mithwani.

SOUTH: Thence along the foot of the hills adjoining the villages of Barbil, Kirkichipal and Dongadiha, and thence along the main road to Kulialam village boundary and thence along the foot of the range of hills dividing Similipal and the Pergannahs of Podadiha, and Kaptipada up to Taldiha.

EAST: Thence along the foot of the hill range dividing Similipal and the Pergannahs of Khunta, Nuagaon, thence along the foot of the range of hills near Kendna, Kakorpani, Kankulia, Lulung, Chondro pahar of Baldiha pirh and continuing on along the foot of the hills to Kusumbond and thence on to Kanchinda the starting point.

# ANNEXURE III PRELIMINARY NOTIFICATION OF SIMILIPAL NATIONAL PARK

Government of Orissa F. & A. H. Department NOTIFICATION -The who Bhubaneswar, dated the 6th Aug. 1980 18709/FTAH. Whereas it appears to the State Government, No.8F(T)-44/80. that the northen area of Similipal Reserve Forest situated in the Mayurbhanj district as specified in the Schedule annexed hereto, by reason of the ecological, faunal, floral, geomorphological and zoological associations and importance, need be constituted as a National Park for the purpose of protecting, propagating and developing wild life therein and its .... environment. Now, therefore, in exercise of the powers conferred by sub-Section (1) of Section 35 of the Wild Life (Protection) Act, 1972 (53 of 1972, the State Government do hereby declare its intention to constitute the said area as the North Similipahar National Park. "ccordingly it is hereby notified for the information of all persons likely to be affected thereby that any person claiming any right in or over the land specified in the said Schedule may prefer his claim within a period of two months from the date of issue of proclamation by the Collector, Mayurbhanj as ! required by sub-Section (3) thereof, Claims prefered within the aforesaid period shall be taken up for disposal by the State Government. The limits of the area which is intended to be declared as National Park are indicated in the Schedule enclosed. By order of the Governor Premananda Tripathy
BECRETARY TO COVERNMENT. M.No. /FI AH Bhibaneswar, dated the 6th Aug. 1980 Copy forwarded to the Director, Printing, Stationary and publica a, Cuttack for favour of publication in the next issue of Orissa ary and publica tions, Orissa, Gazette. This is statutory, he is requested to supply 200 copies of the said notification to this Department. Under Secretary to M.No. 18705/FFAH. at. 6.8.80 Copy forwarded to the P.S. to Chief Secretary/ Revenue Divisional Commissioner, Central Divn., Cuttack/ All Departments of Government/ All Heads of Departments/ Collector, Mayurphanj/Field Director, S.T.R., Beripada C.F., Angul/D.F.O.Baripada/ Karanjia/C.W.L.W., M.D., S.F.D.C., Cuttack for information. J. 14 . 1 . It! Under Secretary to Covernment. 18706 FT AH. dt. 6.5.80 Copy forwarded to the Director, Project Tiger, Government of Ministry of Agriculture and Irrigation (Department of Agriculture) No. J-110/25 22/ 8-FRY (PT) dt.19.5.80

Patra.

# Schedule (North Similipahar National Park)

· The boundary of the North Similipal National Park is described below in a clockwise manner starting from the peak of Baraghati Park. 3 Km. to the north of Chahala. Starting from the top of Baraghati Parbat the boundary proceeds downhill in south-east direction to cross the Chahala-Talabandh road then in a sourtherly arch along the spur close to the eastern side of Chahala-Talabandh road till it reaches Makraghati. From Makraghati it takes an easterly direction on the ridge forming the water shed lying between Kairakacha hala and Kuam nala to the top of the Makraghati hill. Thereafter it takes a south-easterly direction downhill over a distance of 2.5 Km., and then proceeds due east till it crosses the Kairakacha nala and then takes forward up the hill along its tributary nala from the east south east to reach the saddle between two north-eastern peaks of the hill range to the south-east of the Kairakacha nala. From this saddle the boundary moves north-north-east sf the Kairden branker maintain this saddle over a short distance to the second peak where from it descends straight down in north-western direction over a distance of 3 km, to the mid-slope. It then takes the arch of that spur in north-easterly direction till it reaches the confluence of Kairakacha nala and its tributory from the eastern face of that spur. From the confluence it takes east-south-east direction to meet the Koljhari-Talbandh footpath and then proceeds a short distance along the footpath. Further on after leaving the footpath it moves north-east on the ridge leading towards Charabandha village. At the last peak of this ridge where the ridge takes a north-west turn to the peak of Charabandha Buru the boundary line turns sharply straight down hill in the east-south-east direction to reach the boundary of Charabandha-Bantia village enclosure in the Similipal Reserve Forests. Thereafter the boundary line follows all along the village boundary in a southerly direction and then in the north-easterly direction to leave the village boundary opposite to where it had joined the same on the western side. It then continues uphill in the north-eastern direction over a distance of 2 kg where it turns east and then south-east down the slope to meet the villa boundary of Kusumtota in Chakdipir. Therefron it takes the southern boundary of Kusumtota and proceeding to the east it closses river Burhabalang. After crossing river Burhabalang it continues on the periphery of Purmapani, Burudih, Kukurbhuka and Bhaduakacha in a sequential direction of east northeast, north north-east ) and finally south-east to leave the village boundary close to the trijunction of village Bhaduakacla, Phuljhara and Similipal Reserve Forest wherefrom it takes due south-east toward the upper reaches of the nala that enters the Chakdipir enclosur, in the Similipal Reserve Forests at the aforesaid trijunction. The boundary line of the North Similipal National Park continues then to climb steeply it till it reaches the first peak on the ridge. There it takes a turn to the north-north-east along the ridge over a distance of 2 kms, to the next neak where it turns and

draining the northern face of Kusumbani hill, After meeting Kadkai nadi the bounds line courses along the bed of the said river in a 'Z' curve and thereafter, leaving the righted it takes a north through north-east direction to the top of Murmurant ghati on the Nigirda-Hatigadia footpath. From Murmurani ghati the boundary line proceeds in the south-east through southerly direction along the ridge that divides the water-shed between Kadkai and Boramgandha hala and thereafter, in the casterly through south-east direction along the water-shed lying between Munibasa and Boramgandha nala to meet the Palpala River about a kilometre to the west of Lulung Forest Rest House. Proceeding downstream along the river, the North-Similipal National Par boundary line joins Similipal Reserve Forest boundary line close to the Lulung Forest Rese House, After joining the reserve forest boundary line, the North Simili pal National Park boundary line follows it in a north-easterly direction by the side of river Palpala to the point, where it is forded. There it takes a sharp southeasterly turn coinciding with the reserve forest boundary line to cross the river Palpala and the Lulung-Rithabata road. Coinciding with the reserve forest boundary line, it continues thereafter in general easterly direction to pass in between Sitakund fall and Govindchandrapur village to the southern outskirts of Village Lalpani. There it skirts the same village in a northerly loop coinciding with the reserve forest boundary line and continues north to village Lakshmiposi. From Laksh miposi the North Similipal National Park boundary moves coinciding with the reserve forest boundary in south-east and southerly direction on the fringe of village Goripokhari and Kakurpani. A little over a kilometre to the south of Kakurpani, the joint boundary lines of the North Similipal National Park and the Similipal Reserve Forests from a north west through south west through easterly loop, and then together they follow generally a southern direction with the villages Digdiga, Kondu jharan, Besarpani and Chekamara lying to their east, At Chekamara together they turn to the west and after covering about 2 km, they proceed north, north-west through 1.5 km, where they take an acute turn south, south-west to the northwestern corner of village Chandanchaturi. At this point the North Similipal National Park boundary leaves the Similipal reserve forest boundary, climbs up the steep slope in a north-north-west through porth-west direction to the top of Sunpokhari hill. From this hill top, the North Similipal National Park boundary line continues along the ridge and its main spur in north-north-western direction till it reaches Palpala nadi. Thereafter it follows that the river in the upstream direction bypass ing the Kachudahan Forest Rest House to its north and crossing the Copinathpur Lulung road 4 times in its course till it reaches, near village Copinathpur the boundary of enclosed Similipalgarh village complex in the central region of Simili reserve forest. From here, the North Similipal National Park boundary follows the boundary of aforesaid village complex first in the northern direction and than in western direction touching in its course the village Nigirda and Kukurbhuka Continuing its course with the boundary of the onclosed villages, it then take the north through west direction to reach the river Burhabalang where it turn south and moves upstream along the river over a distance of 1 km. After that the

Contd 3...

oint boundary line leaves the river and take a south-western course ov istance of about 3 Kms, to a point due north-west of the Nawana Forest Rest ouse. There, the North Similipal National Park boundary line leaves the illago enclosure boundary line and climbs up the hill in south westerly direc ion. On roaching the ridge situated due west of village Nawana, the National ark boundary follows that ridgo which divides the watersheds of river Balanga nd Bangiar river and further on the watersheds of Bangiar and Bhandan river. rom the hill top at the far north side of this hill, the boundary line descent orth down the slope to reach the Barheipani, Hatnabeda-Uski village complex aclosure boundary. It then follows the aforesaid villages enclosure boundary ino winding its course generally in the eastern direction to cross the Nawana irheipani road and then proceeds in the north through north-west direction, ong the said boundary to the east of village Ulidihi. Thereafter, it leaves w village boundary and then climbs in a north-east direction up the hill to a ridge. Along the ridge, it follows the dividing line between the water-short Burhabalang and Baandan all through first in the north-western direction, th a north with the northerly turn to the second peak where it turns in a right zle to the west and then from the third peak to the far west of this ridge is scends down the spur to Jaradiha abandoned camp site. From Jaradiha it goe: it south west direction and after crossing the Jaradiha nala it climbs upto intrijunction point bench mark on Brundaban hill turning in its course due th-west to reach that hill. I com Brundsban peak, the boundary line descends th-west along the spur and crossing Charala-Jamuani road it climbs up the osite spur taking 'S' curve more towards the north to the highest peak, situ south of Daldali. From this peak the boundary line follows the northern spin Withe slope to Daldali and from Daldali it climbs north-north-east to the top where it turns east along the ridge and finally moves north-east to h Baraghati, the starting point of this boundary description of North lipal National Park.

Government of Orissa

Rorest Fisheries and A.H. Department

Notification

Notification

No.1925 / Fraii. Dated Hubares war the 17th June 1986

148 H 1921

Whereas the portion of Similipal Wildlife Sanctuary in the district of Mayurthanj lying between 86°6 to 86°40 E longitude and 21°40° to 22°0°N latitude consisting of compartment numbers Balanga east 9,16 (part),17,18,21,22,23,24, Palpala 14,15,16,17,18 and 19: East Feo 1,2,5,6,7 (part),9,10 and 11 (part), Sanjo 7,8,9 (part), 13,14,15 and 17 (part): Tk-1,2,3,4,5 (part) 7 (part),51.6(part),11 (part). West Peo 15,17 (part) 18,20,21,22,2324,25,26,27,28,30,31 and 32 Khadkhei 14,17,18,19,20,21,22,23,25,26,27 of Similipal R.F. covering an area of 542.7 sq.kms. as per details furnished in schedule by reason of its ecological, faura, floral geomorphological and zoological association and importance needs to be constituted as a National Park for purpose of protecting, propagating, developing wildlife therein and its environments.

Now, therefore, in exercise of the power conferred by sub-section(I) of Section 35 of the Wildlife (Protection)Act. 1972 (Act 53 of 1972), the State Government do hereby intend to constitute the above area as the National Park to be named as "the Similipal National Park" in addition to the area already notified in G.O.No.8F(T)-44/8O-18703/FFMH dated the 6th August, 1980. Accordingly it is hereby notified for the information of all persons likely to be affected thereby that any person claiming any right in or over the land specified in the said Schedule may prefer his claim within a period of two months from the date of issue of proclamation by the Collector,

Mayurhanj as required by Sub-section(3) thereof. Claims preferred within the aforesaid period shall be taken up for disposal by the State Government. The limits of the area which is intended to be declared as National Park are indicated in the Schedule among hereto.

By order of the Governor S.L.Chatterjee Secretary to Government

Memo No. 1926 / FFAII deted, the Hubers sar 11th June.86

Copy forwarded to the Mirector, Printing, Stationery and Publications, Orissa, Guttack for favour of publication in the next issue of Orissa Gazette. This is statutory. He is requested to supply 200 copies of the said notification to this Peperhant.

Deputy Secretary to Government

Memo No. 1927 / dt. 11th June, 86

Copy forwarded to the Private Secretary to Chief Secretary /
Revenue Pivisional Commissioner, Central Pivision, Cuttack/All Repartments of Government/Chief Conservator of Forests, Orissa / '11 Heads of Departments/Collector, Mayurthanj / Addl. Chief Conservator of Forests (Wild Life) Orissa/Field Director, Similipal Tiger Reserve, Baripada / Conservator of Forest, Angul / Divisional Forest Officer, Baripada / Karanjia / Managing Director, Similipahar FForest Development Corporation, Baripada for information.

Deputy Secretary to Government

Memo No.1953 / dtt 14th June, 1986

Cony forwarded to the Director, Project Tiger, Government of India, Ministry of Environment and Forest (Perartment of Forest and Wild Life) (Project Tiger Section, Shastri Bhawan, New Delhi for information.

Pe puty Secretary to Government

Memo No. 19529 / dt. 11th June, \$6

Copy forwarded to Guard file ( 25 copies) for information.

Deputy Secretary to Government

n.s./

# ANNEXURE IV GAZETTE NOTIFICATION OF SIMILIPAL NATIONAL PARK

Aut in

THE ORISSA GAZETTE, JUNE 27, 1986/ASADHA 6, 1908

231

#### SCHEDULE

The extended c re of Similipal Tiger Reserve named as South Similipal National Pack constitute the following compartments covering an area of 542.7 Sq. Kms.

Compt. No. [BLE-24, 23, 22, 21, BLW-16 (Part), 17, 18, 9, p-15, 16, 19, 16, 17, 14
ED-1, 2, 5, 6, 9, 10, 11 (part), 7 (p)
SJ-13, 15, 17 (p) 14, 7, 8, 9 (p), TK-1, 2, 3, 4, 5, (p), 7 (P) SI-6 (p), 11 (p), Dee-15, 17 (p), 18, 20, 21, 22, 23, 24, 25, 26, 27, 28, 30, 31, 32, Kh, 14, 17, 18, 19, 20, 21, 22, 23, 26, 27].

#### BOUNDARY DESCRIPTION

The boundary line of the extended core starts from the trijunction point of compartment No. P—12, p—15, Sj—4 on Sunpekhari bill of the North Similipal National Park. From there it follows the common line between compartment No. P—14, and Sj—4 and proceed south west direction till Gurusadar Pahar (GT—station with bonth mark 897 Mts.). Then it follow towards south along the common compartment line between P. 15 and Sj—4. Then it follows common compartment line between P-16 and Sj-4, P-16 and Sj-5, P-19 Sj-6 and reaches the G. T. point on Murari peak (959 mt.). From Murari peak it follows the common compartment line between P-19, Sj-6 till it reaches peak of Baidyanath Parbat. Then it turns west and follows the compartment line between P. 18 and Sj. 10 and reaches Balpani Dand. Then it decends to Balpani nala and reaches Kharighati peak and then proceeds south ward and crosses Dhundubasa nala at the head of Dhundubasa fall. From there it ascends the peak and proceed south along the common compartment line of Sj-8 Sj-9, then Sj-14 and Sj-15 reaches the peak (916 mt.). From this peak it decends to Chaturipani nala towards south and crosses the nala on fall head and ascends to the peak (882 m.). Then the line proceeds towards south and reaches Baniabasa-Jenabil forest road. It follows the common compartment line between ED-2 and Sj-17 ED-2 and ED-3, ED-6 and ED-3 till it reaches East Deo nadi at the junction of Hatisal and Banispada nalas. From this junction it follows south wards on the water shed line of Banispada nala and Paladar nadi and passes through Tangpahar 884 m. and Mankada pabar ridge till it reaches trijunction of compartment No. E-11, E-13 and TK-1, It proceeds further south along the common compartment line of ED-13 and TK-1 till it reaches trijunction point of ED-13, TK-5 and TK-6. From this point the core line proceeds south along the ridge, then turns west and crossed the main nala in compartment No. TK-7. It proceeds further west wards on the ridge, crosses Deodar nadi in compartment No. Sl. 11, th

crosses Nekarancha nadi in the same compartment. From Nekarancha nadi it runs west and Filows the water shed between Deo nala and Chonrakha nadi, Deo nala and Loran an Chanchali nadi in betweer compartment No Sl. and WD-26, TL and west Deo 26 and pe 3 over Namo pahar, follows common line of TL-7-WD-23, TL-5 and WD-23. Then it crosses west Deo nadi at the junction of compartment line west Deo 23 and W. Deo 17. It runs north wards and crosses W. Deo nadi and climbs up the hill (PH-907 mtr.) it further runs north along the western boundary of compartment W. Deo 18, Deo-15, Khariar 18 and joins village boundary of Kabatghai villages. It follows the western boundary of Kabatghai village, runs along Khairi nala and then reaches village boundary of Badkasira village. It runs east ward on Pitalsij nala till it reaches western boundary of Khejuri village, It then follows north wards along the western boundary of compartment No. KH-13, KH-14, BLW-18, BLW-16 and meets western boundary of village Gharbashi. It then follows the southern village boundary of Astakumar, Garh Similipal, Saruda Budhabalanga, Makabadi, Gopinathpur and meets the north Similipal National Park at Palpala nala. It then runs along the southern boundary of North Similipal National Park till it reaches the starting point.

# MINING AND GEOLOGY DEPARTMENT N TIFICATION

The 18th June 1986

S. R. O. No. 586/86—In exercise of the powers conferred by sub-section (1) of section 15 of the Mines and Minerals (Regulation and Development) Act, 1957 (67 of 1957), the State Government do hereby make the following rules to amend the Orissa Minor Minerals Concession Rules, 1983, namely:—

- (1) These rules may be called the Orissa Minor Minerals Concession (Amenedment) Rules, 1986.
  - (2) They shall come into force on the date of their publication in the Orissa Gazette.

2. In the Orissa Minor Minerals Concession Rules, 1983 (hereinafter referred to as the said rules) in rule 10 and sub-rule (2) of rule 14, the following proviso shall be inserted, namely:—

"Provided that where any such application is refused or deemed to have been refused for no fault of the applicant, the application fee shall be refunded.'

3. In the said rules, in sub-rule (4) of rule 24, the following provise shall be inserted, namely:—

"Provided that where any such application is rejected for no fault of the applicant, the application fee shall be refunded."

[No. 7203-M.G.]

By order of the Governor

P. C. NAYAK

Additional Secretary to Government

# ANNEXURE V NOTIFICATION OF SIMILIPAL TIGER RESERVE

Government of Orissa Forest & Environment Department

NOTIFICATION

Dated Bhubaneswar, The 31st December 2007

No.8F(T)-9/2007/ 20801/F&E, In exercise of the powers conferred by Section 38V of the Chapter IVB of the Wildlife ( Ptoection) Act, 1972 and with prior in principle approval of National Tiger Conservation Authority, State Government do hereby notify the area described in the Schedules A, B1, B2 as the Similipal Tiger Reserve, and the area described in Schedules C1 and C2 as the "Core Area or Critical Tiger Habitat of Similipal Tiger Reserve".

### SCHEDULE - A: LOCATION AND AREA OF THE TIGER RESERVE

The Similipal Tiger Reserve is located in the district of Mayurbhani and the geocoordinates of the extreme points on the Tiger Reserve boundary are between 20°17'N to 22°34' N latitudes, and 85°40'E to 87°10' E longitudes. The area of the Tiger Reserve is as follows: Core area (Critical Tiger Habitat):

1194.75sq. kms.

Buffer area:

1555.25sq. kms.

Total 2750.00sq. kms.

### SCHEDULE - B1: DESCRIPTION OF THE OUTER BOUNDARY OF SIMILIPAL TIGER RESERVE

Similipal Tiger Reserve comprises of area of 2750sq.kms, and covers Similipal RF and the surrounding contiguous Reserve Forests and proposed Reserve Forest blocks, 64 villages inside Similipal RF, 5 villages inside Satkosia RF and 3 villages inside Tungru RF, with the boundary of the Tiger Reserve described hereunder and the list of forest blocks comprising the Tiger Reserve given in Schedule-B2.

# Boundary description of Similipal Tiger Reserve

The boundary of the Similipal Tiger Reserve starts from pillar No.1 of Similipal RF near village Majhigaon on the western bank of River Budhabalanga and follows the Similipal RF boundary till it reaches the northern boundary of Baldiha RF and proceeds along the boundary of Baldiha RF till it meets the Similipal RF boundary. Then it runs along Similipal RF boundary up

to common pillar of Lulung-Purunapani RF and Similipal RF at Pillar No.526 from when proceeds along eastern and southern boundary of Lulung-Purunapani RF up to Pillar No.596 of Similipal RF on the northern bank of Palpala River. Thereafter the boundary runs along Similipal RF boundary up to Pillar No.1381 of Similipal RF where it meets Noto RF on its eastern boundary near village Manabhanga. Then it proceeds along eastern and southern boundary of Noto RF up to junction of Noto RF and Satkosia RF near village Noto. The boundary then runs along the eastern and southern boundary of Satkosia RF till intersects the road leading to Kadalipal and further proceeds southward along the road till it touches the road connecting both the hamlets of Dudhiabahali on the northern side of Noda RF, and takes a turn east ward along the said road till it crocess tributary of Ghagranala. From there the boundary follows the course of the tributary downstream till it touches the eastern boundary of Noda RF and runs along the eastern, southern and western boundary of Noda RF up to village Dudhiabahali where it touches a tributary of Ghantia nallah and thereafter runs upstream till it touches the southern boundary of Satkosia RF. Then it runs clock wise along the boundary of Satkosia RF common point of Goudiabahali VF with Satkosia RF. Then it turns towards west till touches Goudiabahali RF in its south from where it runs clockwise along Gaudiabahali RF till touches the southern bank of Salandi River and run up stream along the bank of the said river up to the meeting point of Gaudiabahali VF from where it follows the VF boundary till it reaches Satkosia RF boundary near village Khudisila. From Khudisila it follows the course of Satkosia RF boundary up to western boundary of Noto RF in a clockwise direction, up to the junction of Noto RF and Similipal RF on Podadiha-Dangadiha road i.e., pillar No.1458 of Similipal RF. From pillar no. 1458 the boundary runs westward along the boundary of Similipal RF, outer boundary of Dangadiha RF, Bhejidiha RF, Mankadabeda RF up to the meeting point of Badbil RF with Similipal RF at pillar no.1585. Thereafter the boundary line runs along Badbil RF in clockwise direction up to tributary of Gobra nallah and follows the tributary along the downstream up to meeting point of the tributary with Baliabeda-Jamkhejuri road and boundary of Bhadubeda RF and goes clockwise along the boundary of the RF till it meets another tributary of Gobra nallah on the northern side of the RF. Then it runs in north-east direction of the said tributary till it touches Badbil RF boundary in the south and follows the boundary of Badbil RF up to the meeting point of Thakurmunda-Baliabeda road and Handiphuta RF, from where it takes a turn towards the west and runs along the boundary line of Handiphuta RF encompassing Taramara RF and again reaches Handiphuta RF and runs along the boundary of Handiphuta RF till it touches the boundary of Badbil RF at the intersecting point of Thakurmunda-Baliabeda road at

the southern side of village Mankadbeda. From Mankadabeda it runs towards north along the boundary line of Badbil RF till it touches Similipal RF boundary on the southern side of Purunapani village at pillar no.1603. Then the boundary traverses the boundary of Similipal RF encompassing Ghorabindha RF, Asankudar RF and Dangapani RF up to Salaibeda RF. Then it goes southward along the Salaibeda RF up to the meeting point of a nallah in the extreme south and follows the nallah downstream up to the meeting point of Chheratangar RF from where it goes westward along the Chheratangar RF up to the point of intersection of a nallah near village Saleibeda from where it goes along Salaibeda VF boundary up to the meeting point of VF boundary and dry nallah with the boundary of Salaibeda RF and then it goes along the western boundary of Salaibeda RF in northern direction and covers the rest of the boundary till touches the Similipal RF at pillar no.1823. Then the boundary line further proceeds along Similipal RF boundary up to meeting point of Similipal RF boundary and Kendumundi RF boundary on Kendumundi-Ranibhol road. From there it proceeds towards south and encircle Kendumundi RF till it again meets with Similipal RF at pillar no. 1899 on the northern aspects of Dindarani parvat. Thereafter proceeds up to crossing of Bhirol nadi in north-east side of Bisipur village and touches the boundary of Bisipur RF. After encompassing Bisipur RF the boundary continues to run along Similipal RF boundary up to village Rugudihi where it meets the southern boundary of Mahubhandar RF. Then encompassing Mahubhandar RF in clock-wise direction the boundary line touches Similipal RF boundary at pillar No.3581 near village Purunabalichua and continues to follow the boundary of Similipalr RF upto village Makuna at pillar No.3690. Thereafter, the boundary proceeds along the boundary of Bidhubhandar demarcated Forests near village Dantuani and outskirts the villages Chuakankar, Deopata and Rajabasa up to the crossing point of river Dangadakhal. Then the boundary follows the upstream of the said river up to Dudhkundi village and follows the boundary of Tunguru RF outskirting the villages Dudhkundi, Khadambeda, Argalabindha, Kesargadia, Sunajudia, Gargadi, Edelbeda, Paunsia, Nuagaon, Dalki, Baliam, Sapaghera and Tunguru up to Tunguru village. From Tunguru village it proceeds in eastern direction along the footpath up to Tunguru RF and proceeds along the boundary of Tunguru RF up to village Bhejidiha. Then it touches the Sadar Sub-Division boundary and continues along the Sub-Division boundary in northward direction till it touches the boundary of Sarali RF near village Hatisal. Thereafter, the boundary follows the road in a westerly direction up to village Jhumkapadi; and again follows the road in a northerly direction, and then in northeast direction up to Loda village. Here the boundary encircles the village and follows upstream of the dry tributary of Katra nallah up to peak of Sarali pahad. Then the boundary follows the

downstream of the said nallah in south-west direction where it touches the boundary of SaralieF near village Jamudihi and follows the boundary in westward direction up to crossing of another dry tributary of Katra nallah and touches Kanpat RF. The boundary runs along the boundary of Kanpat RF in western direction outskirting the village Daleidihi, Saranda, Bara Bantha, Marudihi, Kahubera, Khejuri and Luhasila. From Luhasila it runs in north-east direction along the foot path till it touches boundary of Kanpat RF. From where it proceeds along the boundary of Kanpat RF excluding the villages Marhaikacha, Kaduani, Arjunpani, Bhadupani, Tandipani, Kumardubi, Kakudiruma till it reaches the tributary of Bankbahal Nadi and proceeds along the boundary of Kanpat RF. From there it follows in north-west direction along the boundary line of Kanpat RF excluding the villages Betajharan, Baradihi, Badajharan, Madansila, up to a dry tributary of Bankbahal Nadi and follows upstream of the dry tributary till it reaches the ridge near the village Baigankudar and proceeds along the ridges till it crosses a foot path at village Badbil. Then it proceeds along the footpath which leads to village Bhasanakacha till it crosses a tributary of Bagdoba nallah and follows the upstream of the nallah up to village Chhatarmanda till it touches Kanpat RF. The boundary then follows along the boundary of Kanpat RF excluding the village Bhimkhand, Dumurikudar, Pahadpur and crosses Katrajhar nallah and continues to run out skirting the villages Budhamara, Kumardungri, Dhantanagar and continues up to Sarali RF. Then the boundary goes along Sarali RF till it reaches inter-state boundary of Orissa-Jharkhand near village Kankadbeda. Thereafter, the boundary proceeds along the State boundary in eastern direction up to crossing of Kodia nallah near village Batikacha and touches the boundary of Kanpat RF excluding the village Dumurkudar, Chirudihi, crosses Katra nallah near village Kulapata and touches the boundary of Sarali RF from where it runs along the boundary of Sarali RF up to a foot path. From the footpath, the boundary runs along the boundary of Kukuda-anda forest up to the crossing of SukhilaKatra nadi after crossing the villages Kukudaanda and Pradhansahi. Then it follows the upstream of SukhilaKatra nadi up to Hatisal village outskirting the villages Duarsuni, Hatichhad, Tarna and Bhejidihi and then runs along the boundary of Tunguru RF up to crossing of Dongidakhal nallah and follows the down stream of nallah till it touches Bidubhandar forest. Then the boundary follows along the boundary of Bidubhandar forest in clockwise direction excluding the villages Nitei, Mundakata, Dighi, Mahulbarei, Baghiabeda, Kitabeda, Shimsahi, Bandhasahi, Bhagirathipur and touches Similipal RF boundary at pillar No.3708. After that it follows the boundary of Similipal RF outskirting the villages Kumarghutu, Kumbhirmundi, Ghatkuanri, Burudihi, Talabandha, Kadamdiha and Kusumnala up to Majhigaon where it meets pillar no.1 of Similpal RF.

# SCHEDULE – B2: LIST OF FOREST BLOCKS INCLUDED IN SIMILIPAL TIGER RESERVE

Name of the forest block	Area (km <sup>2)</sup>
Similipal RF, including the 64 villages situated inside the RF	2271.78
block	
Lulung-Purunapani RF	2.23
Baldiha RF	1.10
Noto RF	77.07
Bhejidiha-I RF	1.60
Bhejidiha-II RF	0.18
Nada RF	3.52
Satkosia-1 RF	137.33
Satkosia-2 RF	2.08
Satkosia-3 RF	3.54
Gouriabahali RF	1.82
Mankadabeda(Manikbeda) RF	2.08
Dangadiha RF	0.97
Badbil RF	9.43
Bhadubeda RF	1.11
Handiphuta RF	3,06
Taramara RF	6.50
Ghorabindha RF	1.68
Dangapani RF	1.05
Salaibasa RF	1.26
Cheratanagar RF	8.00
Kendumundi-I RF	1.48
Kendumundi-II RF	6.48
Bisipur-I RF	4.21
Bisipur-II RF	0.74
Tungru RF-I	6.10
Tungru RF-3	4.46
Tungru RF-4	4.65
Tungru RF-5,	9.12
Tungru RF	12.24
Kanpat RF	46.40
Sarali RF	20.29
Mahubhandar RF	10.49
Bidhubhandar proposed RF and non- RF land of 8 villages situated within Satkosia and Tungru RF blocks	85.95
Total	2750.00sq.km

# SCHEDULE - C1 DESCRIPTION OF THE BOUNDARY OF THE CORE AREA / CRITICAL TIGER HABITAT OF SIMILIPAL TIGER RESERVE

The core area or Critical Tiger Habitat of Similipal Tiger Reserve covers 1194.75km<sup>2</sup> in Similipal RF as per the boundary described hereunder, which is constituted of reserve forest blocks mentioned in Schedule-C2.

# Description of the boundary of the core area / critical tiger habitat of Similipal Tiger Reserve

The boundary line of the core area starts from the trijunction point of compartment no.P12, P15, SJ4 on Sunpokhari hill of the North Similipal National Park. From there it follows the common line between compartment no.P15 and SJ4 and proceeds south west direction till Gurusadar pahad (GT station with bench mark 897mts.). Then it follows common compartment line between P16 and SJ4, P16 and SJ5, P19 and SJ6 and reaches the GT point on Murari peak (959 mts.). From Murari peak it follows the common compartment line between P19 and SJ6 till it reaches the peak of Baidyanath Parbat. Then it turns west and follows the compartment line between P18 and SJ10 and reaches Belpani danda. Thereafter it descends the Belpani nala and reaches Khairighati peak. Then proceeds southward and crosses Dhundubasa nala at the head of Dhundubasa fall. From there it ascends the peak and proceed south along the common compartment line of SJ8 and SJ9 till it reaches the common point of compartment no. SJ8,9, 14 and 16. From there it proceeds down stream up to 1250mts along a tributary of Sanjo nala and ascends the peak up to a bench mark 745mtr in northward direction bisecting SL17. After that it descends down along a dry nala in eastward direction till it reaches trijunction point of SJ16, SJ17 and SJ18. From there it proceeds along the common compartment line of SJ17 and SJ18, ED3 and SJ18, ED3 and ED4, ED3 and ED8. Then follows the southern boundary of ED3 in westward direction till it reaches east Deo river at the junction of Hatisal and Banspada nala. From this junction it follows southward on the watershed line of Banspada nala and Paldar nadi and passes through Tangi pahad (884mtr.) and Mankaria pahad ridge till it reaches junction point of compartment no. ED7(P1), ED7(P2), ED11(P1) and ED11(P2). From there it proceeds along the eastern and southern boundary of ED11(P2) and common boundary of compartment no TK1 and ED13, TK5 and TK6, TK5 and TK9 till it meets Thakthaki nala then it proceeds southwest

direction and climbs the peak and thereafter descends along a dry nala, crosses Nochhipur -Bharjabasa foot path and climbs another hill along a dry nala till it reaches the peak at the trijunction point of TK7, TK8 and TK10 bisecting compartment no.TK8. Then it proceeds southward in clockwise direction along the common boundary of TK7 and TK10, TK7 and TK11. From their it follows the eastern boundary of SL18 till Kenduchua hudi (GT bench mark 787 mts.) and continuing along a dry nala leads to Salandi river in westward direction and reaches Podadiaha-Dangadiha road which is the extreme southern boundary bisecting SL18. Then it runs westward along the common boundary of SL10 and SL17, SL13 and SL17, SL13 and SL16, SL13 and SL15 till it meets the eastern boundary of SL-12 which is the extreme point of the south-western boundary of the core area. Then it ascends north ward along the common boundary of SL-13 and SL-12, SL-8 and SL-7, SL-8 and SL-4, SL5 and SL4 making a loop from where it further goes towards west along SL-2 and SL-4, SL1 and SL4, SL1 and SL3, TL-9 and TL-10 till it reaches a tributary of Sim nadi. From there it follows along the down stream of the said tributary till the junction point of TL9, TL8 and TL7 bisecting TL9 and follows the common boundary of TL8 and TL7, TL7 and TL6 till it touches the eastern boundary of TL5 from there it follows Bisipur-Dolapahad foot path in westward direction bisecting TL5, TL4, TL3. Then it proceeds northward direction and then follows the common boundary of TL3 and TL2 in northwest direction upto a tributary of Virol nadi and follows the downstream of a dry nala till it confluences with Virol nadi. Thereafter the boundary line climbs up western side of a hillock and continues to run along the ridges upto the bench mark 720mt. From the bench mark it descends down in north direction keeping Bhalughar pahad towards right along a dry nala and touches the common boundary of WD10 and TL1 and thus bisecting TL1 and then continues in eastward direction along the common boundary of WD11 and TL1, WD11 and TL2, WD12 and WD19, WD12 and WD17, WD13 and WD17, WD13 and WD18 upto common point of WD13, WD-17 and WD-18 from where it rises towards north along the boundary of WD13 and WD14 upto trijunction point of WD13, WD14 and WD8. Then the line takes sudden 'U' turn towards west and runs along the ridges up to 3rd peak in northward bisecting WD8 and again takes a 'U' turn towards GT bench mark 835mtr and follows the common boundary of WD8 and WD16 in northern direction. Thereafter it follows the common boundary of compartment WD16 and WD9 up to a waterfall. From there it follows 100mtr along a foot path leading to Ramjodi village and then continues to run along the peaks nearer to Ramjodi and Pahadpur villages in northwest direction and finally touches the common boundary of WD9 and WD7 bisecting WD9 and 7. Again it proceeds along the said compartment line till it reaches a 'U' shape turn and follows a

dry nala along the down stream up to confluence with Kula nala. Again the boundary runs along the stream of Kula nala in northward and then along a dry nala in westward direction bisecting compartment no.WD7 and WD5 till it reaches Khejuri village. After that it proceeds along the outer line of Khejuri village outskirting it from core area along compartment no. WD3 and then it runs in southeast direction along the common boundary of WD3 and WD2, WD3 and WD1, KH7 and KH5 up to a trijunction point of compartment KH5, KH6 and KH7. Thereafter it runs in southward direction, then eastward along the common boundary of KH6 and KH7, KH6 and KH8 up to river Khairi. The boundary line then goes along the up streams of the said river and cuts KH2 into two parts and meets KH1 in it southeast compartment line. From there it runs along the common line of KH2, BH14 and KH3 up to village Nangighosra from where it goes along the village line of Nangighosra, Gudgudia, Kumari, Saharpat out skirting the villages and then passes inside KH10, 15,16,17,19 and touches the common boundary of KH13 and Kh19. Then it runs anticlockwise along the balance length of KH13, KH19 till it meets the southern boundary of KH12. From where it runs towards east along the southern and eastern boundary of KH12 till it join the common point of KH12, BH18, BLW16 and BLW18. Then the line runs inside BLW16, 17,18, BLE23,22,21 and P14 up to the common line of P14, 10 and BLE20 near village Gopinathpur. From there it goes along the western line of P10, P6 and southern line of BLE19 upto a point 400mtrs from the village boundary and ascends northward inside BLE19 till it touches Gitilpidi-Joranda forest road on the southern line of BLE17 from where it proceeds in northern direction inside BLE17 along the said road up to the common point of BLE17, 16 and 13 near Joranda waterfall. Then it proceeds westward along a dry nala to join the foot path for Joranda fall to Barehipani fall and continuous to runs along the said path till it meets the eastern bank of river Budhabalanga. Thereafter the line proceeds down streams of the said river up to the common point of BLW14 and 15 keeping Barehipani waterfall towards right side. From there it runs along the common line of BLW14 and 15 and takes a turn towards north inside BLW14 and meets the southern line of compartment no,BH7. Then it changes it course in westward direction inside BH7 and BH6 till it meets bank of river Bhandan near village Asanbani and follows the northern boundary of village and runs along the southern line of BH6 and BH5 up to the northern bank of river Bhandan, from where it crosses the western line of BH5, southern and western line of BH4. Thereafter it bisects BH3 and proceeds first in northward direction along common boundary of BH2 and BH3 then in westward direction along common boundary of KD10 and BH2, KD9 and BH1, KD9 and KD8. From there the line bisects KD9, KD6 and KD7 till meets the bijunction of compartment line of KD5 and KD7 and southwest corner and moves

in eastward direction along common boundary of KD5, KD7, BLW5 and BLW7 after that the line passes through BLW7, BLW8, BLW12, BLW13, BLW10, BLE4 and BLE5 till meets the common line of BLE3, BLE10 and BLE9. From there the line goes in southward direction along the western line of BLE9 up to common point of BLE8, BLE10 and BLE11 (P2). Then the line turns towards east along the northern line of P1 and P2 and descends down towards south along the eastern line of P2 till it meets the northern bank of river Palpala. From there the boundary goes almost in southward direction following upstream of a dry nala and then through the peak of Kalipahad. Thereafter it follows another dry nala along down stream leading to Sitakund nala and continues to run along the common boundary of P12 and P13, P12 and SJ3, P12 and SJ4 where it finally meets the starting point.

SCHEDULE - C2

CONSTITUTION OF THE CRITICAL TIGER HABITAT OR

CORE AREA OF SIMILIPAL TIGER RESERVE

Sl. No.	Compartment	Area in km²		Compartment	A : 12
	No.				Area in km <sup>2</sup>
1	BH-3(P2)	7.06		BLW-8(P2)	5.72
	BH-4	7.05		ED-1	11.06
3	BH-5	4.81	35	ED-10	11.16
4	BH-6(P2)	7.37	36	ED-11(P-1)	5.83
5	BH-7(P2)	4.99	37	ED-11(P-2)	5.51
6	BLE-13	9.17	38	ED-2	4.93
7	BLE-14	л 8.35	39	ED-3	7.78
8	BLE-15	7.55	40	ED-5	6.57
9	BLE-16(P2)	6.46	41	ED-6	11.89
10	BLE-17(P2)	5.02	42	ED-7(P-1)	1.82
11	BLE-18	10.93	43	ED-9	8.05
12	BLE-19(P2)	8.64	44	KD-10	10.89
13	BLE-21(P2)	7.56	45	KD-11	11.5
14	BLE-22(P2)	7.24	46	KD-6(P2)	6.47
15	BLE-23(P2)	7.43	47	KD-7(P2)	6.79
16	BLE-24	6.06	48	KD-9(P2)	10.13
17	BLE-4(P2)	8.44	49	KH-10(P2)	7.95
18	BLE-5(P2)	9.39	50	KH-14	10.63
19	BLE-6	10.57	51	KH-15(P2)	9.17
20	BLE-7	8.76	52	KH-16(P2)	9

21	BLE-8	6.92	-	53	KH-17(P2)	10.55
22	BLE-9	6.61		54	KH-18	10.55
23	BLW-10(P2)					14.9
		0.15		55	KH-19(P2)	8.29
24	BLW-11	14.18		56	KH-2(P2)	12.09
25	BLW-12(P2)	10.64		57	KH-20	10.9
26	BLW-13(P2)	8.81		58	KH-21	10.48
27	BLW-14(P2)	8.33	2 1	59	KH-22	16.67
28	BLW-16(P2)	1.15		60	KH-23(P-1)	4.25
29	BLW-17(P2)	5.11		61	KH-23(P-2)	5.35
30	BLW-18(P2)	11.27		62	KH-24	11.23
31	BLW-19	9.68		63	KH-25	10.8
32	BLW-7(P2)	1.48		64	KH-26	11.06
32	BB (1-7(12)	1.40		104	11-20	11.00
SI.	Compartment	Area in				·
No.	No.	km <sup>2</sup>	-	SI. No.	Compartment No.	Area in km²
65	KH-27	11.66	<del></del>	106	TK-2	7.18
66	KH-7	10.92		107	TK-3	11.14
67	KH-8	11.96		108	TK-4	7.18
68	KH-9	11.71			TK-5(P-1)	8.92
69	P-1	10.61			TK-5(P-2)	2.23
70	P-10	12.21	×	111	TK-7(P-1)	4.23
71	P-11	14.59			TK-7(P-2)	5.17
72	P-12	9.29		113	TK-8(P2)	2.93
73	P-14(P2)	13.46		114	TL-1(P2)	3.3
74	P-15	8.06		115	TL-2(P2)	6.35
75	P-16	10.05		116	TL-3(P2)	4.2
76	P-17	8.85		117	TL-4(P2)	5.35
77	P-18	10.2		118	TL-5(P2)	7.39
78	P-19	10.86		119	TL-7	7.54
79	P-2	8.7		120	TL-9(P2)	4.68
80	P-6(P-1)	6.91		121	WD-14	6.66
	P-6(P-2)	6.55			WD-15	7.91
82	P-7	9.53			WD-16	8.48
83	P-8(P2)	5.03	<del></del>		WD-17(P-1)	2.5
84	SJ-13 ,	10.14			WD-17(P-2)	9.82
85	SJ-14	8.27			WD-18	13.35
86	SJ-15	9.63			WD-19	
87	SJ-16(P2)	5.75			WD-20(P-1)	6.15
88	SJ-17(P-1)	10.43		129 130	WD-20(P-2)	11.48
89	SJ-17(P-2)	0.88		131	WD-21 WD-22	7.57
90	SJ-7	9.46 7.91		131	WD-22 WD-23	10.72
91	SJ-8	[		132	W D-23	10.72

				Total	1194.75
105	TK-1	8.12	146	WD-9(P2)	7.35
104	SL-9	6.55	145	WD-8(P2)	2.04
103	SL-8	9.32	144	WD-7(P2)	6.08
102	SL-6(P-2)	3.98	143	WD-5(P2)	, 5.11
101	SL-6(P-1)	9.26	142	WD-32	11.43
100	SL-5	9.84	141	WD-31	11.24
99	SL-2	4.85	140	WD-30	8.61
98	SL-18(P2)	4.02	139	WD-3	9.41
97	SL-13	12.95	138	WD-29	9.38
96	SL-11(P-2)	5.72	137	WD-28	10.64
95	SL-11(P-1)	4.53	136	WD-27	12.78
94	SL-10	15.26	135	WD-26	10.95
957	SL-1	8.55	134	WD-25	* 7.59
92	SJ-9(P-1)	5.37	133	WD-24	7.57

#### BY ORDER OF THE GOVERNOR

## H. S. CHAHAR PRINCIPAL SECRETARY TO GOVERNMENT

Memo No.20802/F&E., Dated- 31.12.2007

Copy forwarded to the Director, Printing, Stationary & Publication, Orissa, Cuttack with a request to publish the Notification in the next issue of Orissa Gazette.

500 (five hundred) copies of the Gazette Notification may please be sent to this Department for reference & use.

Additional Secretary to Government 31.12.07

Memo No20803/F&E., Dated-31.12.2007

Copy forwarded to P.C.C.F(O)/ PCCF (WL) & CWLW, Orissa/ C.F. & F.D., STR, Baripada/ All Conservator of Forests/ All D.F.Os for information and necessary action.

Memo No.20804/F&E., Dated-31.12.2007

Copy forwarded to Dr. Rajesh Gopal, Member Secretary, National Tiger Conservation Authority, Bikaner House, Annex-V, Shahjahan Road, New Delhi-110011 for information and necessary action.

Additional Secretary to Government
81.12-07

Memo No20805/F&E., Dated-31.12.2007

Copy forwarded to all Departments of Government/ All R.D.Cs/ All Heads of Departments/ All Collectors for information.

Additional Secretary to Government

31-12-07

Memo No.20806/F&e., Dated-31.12.2007

Copy to All Sections of Forest & Environment Department/G.F. (20 copies) for information.

Additional Secretary to Government

31.12.09

## ANNEXURE VI NOTIFICATION OF SIMILIPAL SANCTUARY



# EXTRAORDINARY

### PUBLISHED BY AUTHORITY

No. 869 CUTTACK, TUESDAY, MAY 6,

2008 / BAISAKHA 16,

1930

#### FOREST AND ENVIRONMENT DEPARTMENT.

#### NOTIFICATION

#### The 23rd April 2008

No. 6484 / 8F(WL)2/2008 / F&E, Whereas the State Government in exercising the powers conferred by sub-section(1) of section 18 of the Wildlife(Protection) Act, 1972 (53 of 1972), have declared the whole of the Similipal Reserve Forest area situated in Mayurbhanj District as Similipal Sanctuary vide notification no.30467/FFAH, dt. the 3<sup>rd</sup> December 1979,

Whereas, under section-19 to 25 of the said Act, the Collector and District Magistrate, Mayurbhanj has duly enquired into, and determined the existence, nature and extent of the rights of persons within the limits of the said sanctuary,

Now therefore, in exercise of the powers conferred under Section 26A of the Wildlife (Protection) Act, 1972 (53 of 1972), the State Government do hereby declare the area as described in Schedules A & B to be a sanctuary known as "SIMILIPAL WIDLIFE SANCTUARY" with effect from the date of publication of this notification in *Orissa Gazettee*.

## Schedule "A"

Location: 86°04' to 86°-37' East longitude 21°-30' to 22°-08' North latitude.

Area of sanctuary:

(i)Area of Similipal reserve forest -

2271.78 Sq.Kms

(as computed through GIS)

(ii) Less-Area of Royati land in 57 villages

34.83 Sq.Kms.

situated within the sanctuary

2306.61 Sq.Kms.

Area of the Sanctuary:

### Schedule 'B'

#### Boundary description of Similipal sanctuary

The Sanctuary boundary is coincident with Similipal Reserve Forest, which is described, as below in a clockwise direction.

The boundary line starts from a point situated on the eastern side of National Highway No.-6, 275 km from Calcutta and 11 km from Jashipur. It then proceeds in general south-east, north-east and east direction skirting village Dumuria, Bankati, Majurbeka and Tamalbandh and encircling Chheligudri and Barapahar hill to meet Kalika nala at a point where the nala emerges from the Reserve Forest boundary line. The boundary line then follows sequentially to northwest, northeast and southeast around the hill skirting Andharjhari, Burhikhamari, Jambani, Tambajhari, Raikarkacha villages respectively. From Bankidihi the boundary line runs in a winding north-east direction bordering villages Kasipani, Talakbadi, Rangamatia, Rugridihi, Osadala, Ghorabandha and Ektali to meet Sankocha nadi around Kuarighatia, Tuarburu and Dalaburu hill making three 'U' loops at Kasipani, Rangamatia and Osadala villages. The point where Sankocha nala crosses the Reserve Forest boundary marks the northernmost limit of the Sanctuary.

After crossing the above nadi the boundary line proceeds in south-east, south and in a winding south-west direction respectively around Kalighati and Sundia parbat and on the western side of Bangriposi-Talbandh railway line to the Talbandh village enclave adjoining the village boundaries of Bhagirathipur, Chandbil, Kanchinda, Kamarghutu, Kumirmundi, Hatibari, Sarbatia, Domuhani, Chatkuari, Kitabera, Sarjamdih, Uperbera, Baliadhipa, Burudih and Talbandh villages to a point due 3 km north-east from Baraghati peak. From this point the Sanctuary boundary line takes a sharp turn and proceeds in a winding north-east direction encircling the Talbandh enclave to meet Burhabalang river at distance of 8 km passing through the village boundaries of Kadamdih, Rengalbera, Salghati, Majhigaon. After crossing river Burhabalang, the boundary line continues in the same direction on the foothills of Baldia parbat on the southern and eastern sides of Sorispal, Betjharan and on the southern side of Chaturahi and Ghatiduba villages. Thereafter it makes a 'U' loop on the northeastern side of Baldiha parbat and again continues in the northeast direction around Petua parbat up to Hatrabeda village. Here the boundary line takes a sharp southerly direction surrounding Petua parbat. Thereafter it sequentially follows southwest, south, south southeast and south east directions making an area on the foothills of Bankjora and Ghoragada parbat touching the village boundaries of Masinabhilla, Rajabasa and Hathigadia to reach Borangandha nala. After crossing Borangadha nala, the boundary line runs due east then in a general north east and east directions bordering the villages Hatidapand, Kundalabani and Gendapokhari on the foothill of Chattan

buru. From Gendapokhari village, it proceeds in south-southeast and southwest directions along the foothills skirting Modrajori and Alubani villages to meet Boram khal. Crossing Boram khal the Sanctuary boundary goes south and southeast on the foothills of Kanialucha pahar and Chandripahar. On the foothill of the eastern spur it makes a sharp turn and proceeds in a general southwest direction bypassing Jhinei and Tatajori villages to meet Purunapani nala draining to western portion of Chandripahar and eastern portion of Champagarh pahar. After crossing Purunapani nala, it runs along the foothills of Champagarh pahar in south-west and south directions for a short distance and then makes a sharp western turn at right angles to meet Lulung village boundary. It then proceeds in south-southwest and southeast direction to meet river Palpala to the south of Lulung Forest Rest House. The Sanctuary boundary then takes a northeastern direction by the side of river Palpala where it is forded Lulung-Pithabata road. There it takes a sharp south easternly turn to cross the river and the road. It continues thereafter in general eastern direction to pass in between Sitakund fall and Govindchandrapur village to the southern outskirts of village Lalpani. There it forms a northerly loop and continues north to village Lakshmiposhi. From Lakshmiposhi the Sanctuary boundary moves in south - east and south-southeast direction on the fringe of village Goripokhari, the latter marking the eastern most limit of the Sanctuary.

A little over a Kilometer to the south of Kukurpani, the boundary line forms a inward northwestern loop and then it takes a general southern direction with villages Digdiga, Kendujharan, Besarpani and Chekamara lying to east. At Chekamara, it turns to the west and after covering about 2 km it proceeds north northwest through 1.3 km. Where it takes an acute turn south southwest to the north-west corner of village Chandanchaturi. From Chandanchaturi it follows the foothills of Gurusadar pahar towards northwest direction to meet the Garisa nala draining the eastern face of Gurusadar pahar. After crossing the Garisa nala it courses the foothills in a winding southeast direction skirting the village Champagarh upto Purnachandrapur village. From this point it turns along the foothills of Murari and Baidyanath parbat in south-southwest and south-west direction by passing village Agnikumari, Sonpokhari and Sapanchua to meet Asakpara nala draining the southern part of the last mentioned. From this point the Sanctuary boundry goes round the foothills of Betjharna parbat and Kansasura pahar first in the north-east then in south, then in west and finally in north-west direction bordering villages Rangamatia, Debak, Nuagaon, Mahuldiha and Baniabasa and crossing Sanjo river once to the western limit of Sanjo valley. The boundary line retreats in general southeast and south-southeast directions around Bankasala hill up to Kanhaidihi village. It then follows in west, south and finally in west direction around Indurgaura hill bordering villages Phulbari and Jamudiha to meet river East Deo near Balma village. After crossing the river the boundary line Sharply turns to south-east, south and south west directions around Kobi pahar to meet Kantiali nala, a tributary of East Deo and draining Bhairimundi and kobipahar hills, touching

Manikapur village on its way. The Sanctuary boundary line then proceeds due east for short distance there after making a sharp turn to south, south- east and south south-west on the western side of Badadangua, Anantapur, Patharkhani, Beguniapotta, Chitrabania, and Karatia Sahi to meet Balunala. Passing Balinala it arches round the hill in east west direction near Junapahar villages to meet Thakthakinala. From here the boundary line courses along the foothills in a general southerly direction to meet Udala-Thakurmunda road due north of Kadamsole village. From this point the boundary line runs to the north of the road up to Manabhanga village the trijunction point of Similipal reserve forests, Noto Reserve Forests and Manabhanga village crossing Kushabhadra nala through its mid-way. The boundary line then follows Udala-Thakurmunda road, which separates Similipal reserve forest to its north and Noto reserve forest to its south in a general southwest direction touching Banjhikusum Up to village Dangadiha where, it comes close to river Salandi, it then leaves the road, crosses the river Salandi, and then follows sequentially west, south-west, south south-west and finally west to meet the southern limit of the boundary near Patrapada village. From here, the Sanctuary boundary runs generally west direction up to 5 km. Turning sharply due north skirting Kirkichipal village to its west to meet Kantiali nala. From this point the boundary line goes southwest, south and west along the foothills of Baldia hill. Thereafter it goes around Baldia hill first in north north-west then followed by a general winding direction of north east and north to meet Gobarjhora nala touching the village boundaries of Purunapani, Keshdiha, Chamarasahi, Mandajhari. Here onwards the boundary line takes a general southwest direction up to Ghorabindha village and surrounding the main spur of Ghorabindha parbat it precedes in a winding northeast direction up to Ranibhol village meeting the eastern tributary of the Sim nadi. Here on the Sanctuary continues in a winding northwest direction along the foothills of Asankudar and Jamburu hills by passing Asankudar, Khaparkhia, and Badmahuldiha up to Ranibhol (Kendumundi) village where it meets Tel nadi. Crossing the river Tel it follows the foothills Sequentially west, northwest and east directions by passing Kendumundi village at the main spur of Dindarani parbat and forming a loop around it. Thereafter boundary line takes a sharp turn to general northwest along the foothills and bending to north for a short distance around the western spur of Meghuri pahar it crosses Bhirol nala near Bispur village, it proceeds further on in a general general north-west direction up to Thakurjharan village and then leads north and finally north east around the hill to a point near Meludihi village. From this point it takes to northwest and north direction to meet West Deo riverat its eastern bank near Gopalpur village. The Sanctuary boundary then proceeds to east, then takes a winding south east turn to enter Dudhiani villages enclave near Devigarh village surrounding Devigarh pahar and by-passing villages Thakurmapatna, Samohandrapur and San Ramachandrapur. At San Ramchandrapur it rebounds first in north north-west and then in a general direction of south east around the hills to meet river Deo touching Rangamatia, Khalpara and Burigaon villages. At Burigaon it follows the village boundary along the foothlis and crossing river

Deo thrice takes a northwest through north-northwest direction to join the Northern boundary & Dudhigni village on the eastern bank of Kalanala. It then follows a wavy east through south east direction along the foothills and looping round Burudihi and Ramihori villages finally follows a winding north west through south west direction to a point meeting the western bank of Kala nala where the boundary line had met its eastern bank earlier touching Paharpur and Jalda villages. From here the boundary line arches round the hill first in the west and then in north direction winding in its course to emerge final in south west direction to meet Barakamara village boundary. It goes along the foothills thereafter up to Udibasa village making two loops first near Barakamara village and second near Hatibari village due south west around two spurs radiating from Kadiburu hill enclosing Purunapani village in the trough. From Udibasa the boundary line arches around Guntipat pahar, the third sour from Kadiburu making a westward loop adjoining Paharmark and Anantasahi villages making the western most limit of the sanctuary. It then precedes in a winding north then northeast through north-northeast direction adjoining villages Bariadihi, Kalaitumba, Kanchikna, Kumdabari, Tilabari and Puragarh villages. From Puragarh village the boundary line enters the Kaliani enclave in a winding southwest direction followed by southward direction touching villages Kaliani, Olakudar, Utras and Tamaksila. From Tamaksila the boundary lines follows the foot hills to east for a short distance, crosses river Khairi and proceeds in winding north direction touching the village Kadagharuan. From this point it goes in a zigzag manner generally due west up to village Dhalabani on the northern bank of the river Khairi to a point due north where it had entered the Kaliani enclave. The boundary goes to a winding north around Nachuani buru hill touching villages Bhalupani and Chadripahadi. From Chadripahadi the Sanctuary boundary enters the Jamuani enclave arching round Nachuani buru on its northern bank touching villages Karanjabali, Pudagarh, Mohanpur, Tingria, and Palagoda. From Palogada the boundary line courses along the southern bank of river Bhandan upstream, crosses it near Rajupal village and then goes on its northern side first to west then in north north east direction touching villages Kundagarh, Bhadusol and Jamuani to a point where it meet Hatimundi nala, a tributary of Bhandan. After crossing Hatimundi ma; a mear San-ihili village it proceeds in a sequential direction of west, north west and west on the northern bank of the river Bhandan touching Bada jhili and Tulsibani village, the later marking the beginning of Jamuani enclave. From Tulsibani the boundary line proceeds to north east and after crossing Gohira nala twice near Murgaghutu village runs in a winding north east and then north west directions inwardly arching round the villages Naikabeda, Akbrasal, Ichhaghutu, Bada sialinai, Chheligoduri and Dhangrimuta to join by the side of National Highway 6 the starting point of this description sanctuary Similipal Tiger Reserve boundary.

SCHEDULE-C Revenue villages existing within Similipal sanctuary where rights have been admitted in respect of rayati land holdingsland available, and population as per 2001 census.

SI No.	Name of Revenue Village	Total land Available in the village as per ROR ( in Ac)	Total Rayati land available in the village as per ROR ( in Ac)	Total Govt. land available in the village as per ROR ( in Ac)	Total population of the village
(1)	(2)	(3)	(4)	(5)	(6)
1	Asanbani	412.94	48.80	364.14	150
2	Badakasira	241.60	115.72	125.88	230
3	Bad-Uski	334.34	241.73	92.61	241
4	Barigan	336.09	177.36	158.73	182
5	Bharadachua	88.91	64.98	23.93	90
6	Bilapaka	209.34	127.73	81.61	267
7	Chandikhaman	143.97	103.20	40.77	158
8	Gudgudia	394.87	176.10	218.77	526
. 9	Khediadunguri	350.02	36.87	313.15	110
10	Khejuria	423.61	212.15	211.46	418
11	Kolha	397.45	200.65	196.80	227
12	Kundabil	451.95	196.47	255.48	372
13	Kuanribil	a 656.46	311.68	344.78	346
14	Kumari	417.22	198.80	218.42	293
15	Kusumi	321.12	137.01	184.11	231
16	Nenjaghosara	278.12	169.44	108.68	85
17	Nuniagoda	275.07	157.57	117.50	182
18	Rautola	381.74	182.20	199.54	259
19	Sankasira	252.32	69.59	182.73	184
20	San-Uski	202.76	152.91	49.85	233
21	Saharpat	365.73	170.78	194.95	298
22	Astakuanr	1069.69	417.69	652.00	445
23	Balarampur	884.00	229.15	654.85	324
24	Bandirabasa	239.32	135.66	103.66	240
25	Barehipani	1340.43	1071.25	269.18	473
26	Barsia	890.84	287.70	603.14	403

		7			(
(1)	(2)	(3)	(4)	(5)	(6)
27	Budhabalanga	787.09	83.61	703.48	249
28	Chakunda Kacha	63.83	22.27	41.56	29
29	Similipal	1001.09	190.78	810.31	417
30	Gopinathpur	1177.17	118.08	1059.09	217
31	Haladia	293.24	119.86	173.38	132
32	Jajadihi	115.48	33.09	82.39	126
33	Kiajhari	156.30	100.70	55.60	185
34	Kukurbhuka	2160.39	94.31	2066.08	300
35	Kolajhari	176.72	97.72	79.00	78
36	Lembujharan	379.76	104.49	275.27	123
37	Makabadi	659.83	193.43	466.40	241
38	Nawana	1333.69	244.50	1089.19	1043
39	Nikhirda	752.32	92.53	659.79	60
40	Phulbaria	124.23	113.01	11.22	80
41	Raipal	321.72	162.01	159.71	148
42	Saruda	438.14	69.53	368.61	139
43	Charbandh	288.92	226.90	62.02	449
44	Dantiakaacha	107.29	46.00	61.29	89
45	Ahalapani , #	176.91	100.86	76.05	113
46	Amdapani	197.28	129.66	67.62	182
47	Barubeda	418.24	170.43	247.81	162
48	Basilakacha	43.28	22.41	20.87	578
49	Bhaduakacha	138.34	42.83	95.51	23
50	Chakidi	140.15	90.55	49.60	155
51	Jamutalia	199.45	127.56	71.89	107
52	Jerkani	149.97	69.23	80.74	88
53	Khadjjhati	72.67	34.92	37.75	78
54	Kukurbhuka	192.35	107.53	84.82	147
55	Kusumtota	213.58	77.77	135.81	65
56	Phuljhara	187.38	37.14	150.24	138
57	Purunapani	122.47	86.55	35.92	242
	Total	23949.19	8603.45	15345.74	13150

# GEO CO-ORDINATES OF BOUNDARY PILLARS OF SIMILIPAL SANCTUARY

Pillar No		Latitude(N	orth)		Longitude(East)	à
	Deg	Min	Sec	Deg	Min	Sec
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1	22	02	39.8	86	23	48.7
2	22	02	41.5	86	23	53.2
2	22 .	02	39.0	86	23	57.8
4	22	02	36.8	86	23	59.8
5 6	22	02	35.5	86	24	02.1
. 6	22	02	33.3	86	24	04.8
7	22	02	36.3	86	24	11.3
8	22	02	40.3	86	24	11.3
9	22	02	41.8	86	24	12.6
10	22	02	44.3	86	24	13.6
11	22	02	50.0	86	24	16.0
12	22	02	51.0	86	24	17.3
13	22	02	52.6	86	24	23.2
14	22	02	55.1	86	24	27.0
15	22	02	58.1	86	24	30.9
16	22	03	02.1	86	24	36.5
17	22	03	8.00	86	24	44.1
18	22	03	00.2	86	24	46.6
19	22	03	03.7	86	24	54.8
20	22	03	10.9	86	25	8.00
21	22	03	16.3	86	<b>25</b>	08.6
22	22	03	17.0	86	25	09.4
23	22	03	17.2	86	25	10.7
24	22	03	18.5	86	25	12.2
25	22	03	20.9	86	25	13.6
26	22	03	22.8	86	25 25	15.0
27	22	03	24.3	86 86	25 25	16.7
28 29	22	, # 03 03	25.3	86	25 25	18.8
30	22 22	03 03	26.1 27.3	86 86	25 25	21.8
31	22		29.0	86		24.5
32	22	03 03	30.8	86	25 25	32.6 35.8
33	22	03	33.3	86	25 25	33.4
34	22	03	33.7	86	25 25	34.3
35	22	03	33.4	86	25 25	37.2
36	22	03	34.5	86	25 25	39.8
37	22	03	35.7	86	25 25	41.0
38	22	03	37.2	86	25	42.9
39	22	03	38.4	86	25	44.0
40	22	03	39.9	86	25	43.8
41	22	03	40.9	86	25	43.4
42	22	03	42.4	86	25	43.2
43	22	03	44.0	86	25	44.2
44	22	03	44.3	86	25	45.3
45	22	03	45.1	86	25	46.4
46	22	03	45.4	86	25	47.9
47	22	03	46.9	86	25	49.6

			9			
(1) 48 49 50 51 52 53 55 56 57 58 96 61 62 63 64 65 66 67 71 72 73 74 75 76 77 78 98 81 82 83 84 85 86 87 88 89	(2) 22 22 22 22 22 22 22 22 22 22 22 22 2	(3) 03 03 03 03 03 03 03 03 03 03 03 03 03	9 (4) 45.2 43.5 45.6 45.9 47.3 48.2 49.1 50.4 50.7 51.3 51.6 52.0 52.3 53.5 54.7 56.8 52.9 57.5 57.7 58.0 58.2 58.1 00.6 03.1 02.5 02.9 01.2 59.3 54.9 50.4 47.6 42.2 36.8 32.8 41.6 45.2 48.9 53.8 54.3	(5) 86 86 86 86 86 86 86 86 86 86 86 86 86	(6) 25 25 25 26 26 26 26 26 26 26 26 26 26 26 26 26	53.8 55.1 57.7 59.4 02.0 04.9 07.9 10.5 12.7 15.3 17.3 18.9 20.9 24.1 26.6 33.0 32.6 34.6 34.6 34.6 34.8 49.9 53.2 57.7 59.7 02.1 05.6 07.6 09.2 08.4 08.7 11.7 17.8 24.6 23.9 24.0
84 85 86 87 88	22 22 22 22 22 22	03 03 03 03 03	32.8 41.6 45.2 48.9 53.8	86 86 86 86 86	27 27 27 27 27	17.8 24.6 23.9 20.5 24.0
90 91 92 93 94 95	22 22 22 22 22 22 22 22	03 03 04 04 04 04 04	54.3 55.8 01.4 04.0 06.8 06.7 08.8	86 86 86 86 86 86	27 27 27 27 27 27 27	28.2 31.2 36.5 31.1 41.6 42.7
96 97 98 99	22 22 22 22 22	04 04 04 04 04	10.7 12.5 14.1 16.7	86 86 86 86	27 27 27 27 27	45.6 49.1 51.5 55.5 58.4

(1)	(2)	(3)	(4)	(5)	(6)	(7)
100	22	07	16.8	86	27	59.6
101	22	04	19.2	86	28	04.8
102	22	04	20.6	86	28	07.9
103	22	04	22.1	86	28	09.8
104	22	04	24.6	86	28	11.7
105	22	04	24.7	86	28	15.9
	22	04	25.9	86	28	19.4
106		04	25.7	86	28	22.0
107	22	04	24.9	86	28	25.5
108	22		26.5	86	28	28.3
109	22	04		86	28	32.8
110	22	04	21.4		28	34.4
111	22	04	22.7	86		34.3
112	22	04	20.3	86	28	34.1
113	22	04	16.7	86	28	33.8
114	22	04	12.5	86	28	33.2
115	22	04	06.5	86	28	
116	22	04	04.3	86	28	33.8
117	22	04	1.1	86	28	34.6
118	22	03	53.4	86	28	35.0
119	22	03	53.3	86	28	35.4
120	22	03	55.1	86	28	35.6
121	22	03	52.3	86	28	35.9
122	22	03	49.9	86	28	34.8
123	22	03	46.4	. 86	28	34.7
124	22	03	44.0	86	28	35.2
125	22	03	41.7	86	28	35.0
126	22	03	37.7	86	28	33.7
127	22	03	35.9	86	28	34.6
128	22	03	32.1	86	28	35.0
129	22	03	28.7	86	28	35.5
130	22	<b>03</b> <sub>π</sub>	22.5	86	28	37.3
131	22	03″	19.6	86	28	38.2
132	22	03	16.1	86	28	37.7
133	22	03	13.1	86	28	36.4
134	22	03	10.7	86	28	32.7
135	22	03	08.6	86	28	29.2
136	22	03	06.3	86	28	23.6
137	22	03	02.5	86	28	20.5
138	22	03	00.0	86	28	15.7
139	22	02	57.7	86	28	11.5
140	22	02	55.7	86	28	07.8
141	22	02	51.8	86	28	09.4
142	22	02	45.8	86	28	08.2
143	22	02	40.8	86	28	06.3
144	22	02	38.5	86	28	01.1
145	22	02	36.2	86	27	51.4
	22	02	31.3	86	27	50.0
146	22	02	29.5	86	27	53.9
147	22	02	27.5	86	27	58.2
148	22	02	24.3	86	27	59.5
149		02	19.5	86	27	59.7
150	22	02	14.2	86	27	57.0
151	22	UZ	14.2	50	£.1	57.0

(1)	(2)	(3)	(4)	(5)	(6)	(7)
152	22	. 02	09.9	86	27	59.1
153	22	02	05.2	86	28	00.6
154	22	02	01.0	86	28	05.1
155	22	01	55.4	86	28	12.8
156	22	01	51.9	86	28	12.6
157	22	. 01	51.8	86	28	16.8
158	22	01	48.5	86	28	
159	22	01	48.7	86		23.0
160	22	01	45.6	86	28	21.9
161	22	01	41.0	86	28 28	23.3
162	22	01	36.0			25.8
163	22	01	30.5	86	28	24.7
164	22	01	24.2	86	28	23.6
165	22	01		86	28	28.8
			22.8	86	28	28.3
166	22	. 01	20.3	86	28	30.5
167	22	01	18.5	86	28	32.6
168	22	01	17.7	86	28	34.9
169	22	01	16.7	86	28	37.5
170	22	01	19.3	86	28	39.7
171	22	01	22.6	86	28	40.7
172	22	01	21.2	86	28	44.0
173	22	01	21.7	86	28	48.4
174	22	01	21.6	86	28	52.2
175	22	01	19.9	86	28	55.5
176	22	01	19.4	86	28	58.5
177	22	01	18.8	86	29	00.1
178	22	01	18.4	86	29	02.3
179	22	01	17.7	86	29	04.2
180	22	01	15.9	86	29	08.4
181	22	01	14.7	86	29	10.6
182	22	<sub>#</sub> 61	13.8	86	29	12.7
183	22	01	12.3	86	29	16.1
184	22	01	10.8	86	29	19.5
185	22	01	09.3	86	29	23.6
186	22	01	06.4	86	29	28.3
187	22	01	04.1	86	29	32.7
188	22	01	01.2	86	29	36.5
189	22	00	58.7	86	. 29	38.6
190	22	00	56.0	86	29	40.9
191	22	00	50.2	86	29	46.2
192	22	00	45.2	86	29	53.3
193	22	00	42.2	86	.29	57.9
194	22	00	39.8	86	30	01.5
195	22	00	37.0	86	30	06.0
196	22	00	34.6	86	30	06.3
197	22	00	31.4	86	30	07.0
198	22	00	25.1	86	30	04.8
199	22	00	22.2	86	30	08.0
200	22	00	19.4	86	30	11.4
201	22	00	16.5	86	30	15.4
202	22	00	13.8	-86	30	18.1
	1. 4				0354701	

(1) 203	(2) 22	(3) 00	(4) 11.7	(5) 86	(6) 30	(7) 18.1
204	22	00	7.1	86	30	22.4
205	22	00	5.1	86	30	24.3
206	22	00	5.6	86	30	27.1
207	22	00	02.6	86	30	29.7
208	22	00	02.6	86	30	32.3
209	21	59	57.5	86	30	32.3
210	21	59	53.3	86	30	38.2
211	21	59	53.3	86	30	40.3
212	21	59	50.7	86	30	42.6
213	21	59	50.3	86	30	46.4
214	21	59	50.4	86	30	49.1
215	21	59	50.0	86	30	53.5
216	21	59	49.8	86	30	54.7
217	21	59	49.6	86	30	56.7
218	21	59	49.6	86	30	59.3
219	21	59	49.4	86	31	01.4
220	21	59	49.5	86	31	03.3
221	21	59	48.6	86.	31	07.3
222	21	59	48.6	86	31	09.7
223	21	59	48.6	86	31	15.6
224	. 21	59	48.6	86	31	18.6
225	21	59	48.6	86	31	22.1
226	21	59	48.2	86	31	24.6
227	21	59	47.8	86	31	28.3
228	21	59	46.8	86	31	32.8
229	21	59	46.0	86	31	36.3
230	21	59	45.8	86	31	36.8
231	21	59	44.7	86	31	41.7
232	21	59	43.9	86	31	42.4
233	21	59	43.3	86	31	44.5
234	21	59	42.6	86	31	46.5
235	21	- 59	41.9	86	31	48.1
236	21	59	41.4	86	31	50.2
237	21	59	41.3	86	31	52.6
238	21	59	42.0	86	31	54.7
239	, 21	59	43.1	86	31	57.8
240	21	59	44.1	86	32	01.1
241	21	59	44.7	86	32	03.5
242	21	59	45.1	86	32	05.0
243	21	59	45.6	86	32	06.7
244	21	59	46.3	86	32	0.80
245	21	59	46.8	86	32	09.3
246	21	59	47.0	86	32	10.7
247	21	59	47.5	86	32	12.6
248	21	59	46.7	86	32	13.7
249	21	59	47.5	86	32	14.9
250	21	59	47.1	86	32	16.4
251	21	59	47.0	86	32	17.6
252	21	59	46.5	86	32	19.2
253	21	59	46.8	86	32	20.6

2000				13		
(1) 254 255 256 257 258 259 260 261 262 263 264 265 266 267 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 291 292 293 294 295 296 297 298 299 300 301 302 303 304	(2) 21 21 21 21 21 21 21 21 21 21 21 21 22 22	(3) 59 59 59 59 59 59 59 59 59 59	(4) 47.3 47.4 49.9 51.2 52.1 53.4 51.2 53.4 51.5 53.4 53.0 53.1 53.0 53.1 53.1 53.1 53.1 53.1 53.1 53.1 53.1	(5) 86 86 86 86 86 86 86 86 86 86 86 86 86	(6) 32 32 32 32 32 32 32 32 32 32 32 32 32	(7) 21.7 22.6 23.2 24.3 25.5 26.4 27.2 27.3 28.4 29.1 30.7 32.2 34.9 37.8 40.9 43.1 44.3 45.9 47.9 50.2 51.1 54.1 58.3 00.8 02.8 05.4 06.9 08.9 11.5 16.3 20.6 23.2 24.6 25.7 29.7 33.2 35.3 38.1 40.4 42.1 43.5 44.3 45.9 47.9 50.2 51.1 51.3 5
305	22	01	10.0 11.2	86 86	33 33	55.5 56.5

(1)	(2)	(3)	(4)	(5)	(6)	(7 <u>)</u>
306	22	01	12.8	86	33	57.7
307	22	01	13.5	86	33	57.9 6 58.3
308	22	01	14.0	86	33	59.0
309	22	01	15.6	86	33 33	59.4
310	22	01	16.5	86	33	59.9
311	22	01	17.5	86	33 34	00.7
312	22	01	18.4	86	34	01.3
313	22	01	19.9	86	34	02.1
314	22	01	20.7	86	34	02.9
315	22	01	22.0	86	34	03.6
316	22	01	23.2	86 86	34	05.0
317	22	01	23.6	86	34	05.8
318	22	01	25.5	86	34	07.1
319	22	01	27.1	86	34	08.2
320	22	01	28.2	86	34	09.0
321	22	01	29.6 30.7	86	34	10.0
322	22	01	31.6	86	34	10.5
323	22	01	32.4	86	34	10.9
324	22	01	33.7	86	34	11.4
325	22	01	34.3	86	34	12.3
326	22	01	35.0	86	34	12.9
327	22	01	36.2	86	34	13.5
328	22	01	36.7	86	34	14.3
329	22	01	37.9	86	34	15.5
330	22	01	40.0	86	34	17.8
331	22	01	42.3	86	34	19.5
332	22	01	43.2	86	34	21.7
333	22	01	45.7	86	34	22.1
334	22	01 01	46.0	86	34	25.7
335	22	01	47.2	. 86	34	26.4
336	22 22	01	47.1	86	34	28.9
337	22	01	47.1	86	34	30.0
338 339	22	01	47.4	86	34	31.5
340	22	01	47.5	86	34	32.7
341	22	01	47.3	86	34	33.4
342	22	01	47.1	86	34	34.0
343	22	01	47.1	86	34	35.2
344	22	01	47.1	86	34	36.4
345	22	0,1	47.3	86	34	37.9
346	22	01	47.0	86	34	39.6
347	22	01	47.0	86	34	42.7
348	22	01	46.7	86	34	44.9
349	22	01	46.6	86	34	46.6
350	22	01.	46.6	86	34	48.9
351	22	01	46.3	86	34	50.9
352	22	01	45.3	86	34	54.7 57.3
353	22	01	44.3	86	34	57.3 01.5
354	22	01	44.4	86	35	01.5
355	22	01	45.3	86	35 35	05.5
356	22	01	45.6	86	35 35	05.5 06.9
357	22	01	48.2	86	35	6.00

				1		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
358	<u>22</u>	01	49.0	86	35	09.0
359	22	01	48.8	86	35	10.1
36∂	22	01	48.8	86	35	11.4
361	22	01	48.5	86	35	12.5
362	22	01	47.8	86	35	13.9
363	22	01	47.0	86	35	14.5
364	22	01	45.9	86	35	15.1
365	22	01	44.5	86	35	15.6
366	22	01	43.2	86	35	16.4
367	22	01	42.4	86	35	16.7
368	22	01	41.5	86	35	17.2
369	22	01	40.7	86	35	17.7
370	22	01	39.7	86	35	18.5
371	22	01	38.1	86	35 35	19.3
372	22	01	37.0	86	35	
373	22	01	36.1	86	35 35	19.9
374	22	01	35.1	86		21.0 21.4
375	22	01	33.8		35 35	
376	22	01	32.5	86	35	22.0
377	22	01	30.8	86	35	22.2
378	22	01	30.1	86	35 :	23.0
379	22	01		86	35	22.2
380			28.7	86	35	22.2
	22	01	27.8	86	35 35	21.4
381	22	01	26.9	86	35	20.8
382	22	01	24.8	86	35	19.1
383	22	01	22.8	86	35	18.4
384	22	01	21.5	86	35	18.8
385	22	01	20.5	86	35	20.6
386	22	01	18.8	86	35	22.7
387	22	01	16.6	86	35	24.3
388	22	01	13.2	86	35	26.2
389	22	01	10.1	86	35	28.1
390	22	01	07.2	86	35	29.9
391	22	01	04.3	86	35	31.1
392	22	″ 01	02.0	86	35	31.9
393	22	00	59.6	86	35	32.5
394	22	00	57.2	86	35	32.8
395	22	00	55.1	86	35	33.5
396	22	.00	52.5	86	35	33.6
397	22	00	50.2	86	<b>35</b>	33.6
398	22	00	47.6	86	35	33.5
399	22	00	45.0	86	<b>35</b>	33.2
400	22	00	42.0	86	35	32.2
401	22	00	39.0	86	35	31.4
402	22	00	35.8	86	<b>35</b>	28.3
403	22	00	34.2	86	35	25.4
404	22	00	33.1	86	35	22.8
405	22	00	31.0	86	35	20.2
406	22	00	29.5	86	35	18.8
407	22	00	25.9	86	35	16.8
408	22	00	23.8	86	35	16.7
409	22	00	21.7	86	35	16.8

<b>(1</b> )	(2)	(3)	(4)	(5)	(6)	(7)
410	22	00	18.8	86	35	16.9
411	22	00	15.3	86	35	, 16.5
412	22	00	12.1	86	35	16.4
413	22	00	09.5	86	35	16.1
414	22 .	00	05.5	86	35	16.4
415	22	00	02.6	86	35	16.1
416	22	00	00.3	86	35	12.8
417	21	59	57.2	86	35	11.8
418	21	59	55.6	86	35	11.2
419	21	59	54.4	86	35	10.7
420	21	59	53.1	86	35	09.5
421	21	59	52.5	86	35	08.4
422	21	59	52.2	86	35	04.8
423	21	59	51.6	86	35	02.1
424	21	59	51.8	86	35	8.00
425	21	59	52.5	86	34	57.3
426	21	59	52.5	86	34	54.9
427	21	59	53.3	86	34	53.1
428	21	59	53.5	86	34	51.1
429	21	59	52.0	86	34	49.7
430	21	59	51.4	86	34	48.6
431	21	59	49.8	86	34	45.5
432	21	59	48.8	86	34	42.3
433	21	59	47.1	86	34	41.8
434		59	45.7	86	34	41.4
	21	59	43.2	86	34	42.5
435	21		40.2	86	34	43.7
436	21	59 59	36.7	86	34	44.6
437	21		33.4	86	34	43.9
438	21	59	33.0	86	34	47.3
439	21	59	32.1	86	34	51.0.
440	21	59 59	31.2	86	34	53.4
441	21		29.5	86	34	54.6
442	21	59	27.5	86	34	55.3
443	21	59 59	26.0	86	34	55.9
444	21	59	21.7	86	34	58.2
445	21 21	59 59	18.8	86	35	01.0
446	10.00	59	18.0	86	35	02.9
447	21	59	17.6	86	35	06.1
448	21	59	16.3	86	35	08.5
449	21	59 59	15.2	86	35	15.4
450	21		14.9	86	35	16.3
451	21	59 50	14.8	86	35	17.3
452	21	59 50		86	35	21.2
453	21	59 50	13.9	86	35	24.3
454	21	59 50	13.2	86	35	26.8
455	21	59	12.9	86	35	29.0
456	21	59	12.3	86	35 35	31.2
.457	21	59	11.8	86	35 35	34.5
458	21	59	11.6	86	35 35	37.5
459	21	59	11.0	86	35	42.3
460	21	59	0.7	86	35	44.0
461	21	59	05.9	OO	55	HT.U

			17			
(1)	(2)	(3)	(4)	(5)	(6)	(7)
462	21	59	Ò.4	<b>8</b> 6	35	46.0
463	9 21	59	04.5	86	<b>3</b> 5	.49.3
464	21	59	04.5	86	35	51.4
465	21	59	05.7	86	<b>3</b> 5	56.2
	21	59	02.6	86	<b>3</b> 5	57.8
466	21	59	01.1	86	35	58.3
467	21	58	59.3	86	35	59.2
468	21	58	56.1	86	36	00.7
469		58	35.5	86	36	02.4
470	21 21	58	52.5	86	36	05.5
471	21	58	51.7	86	36	07.9
472		58	50.6	86	36	10.5
473	21	58	47.2	86	36	14.3
474	21	58	45.5	86	36	16.1
475	21		44.7	86	37	17.5
476	21	58 58	44.0	86	36	20.1
477	21	58	43.2	86	36	22.7
478	21	58 58	42.4	86	36	28.5
479	. 21	58	42.1	86	36	31.1
480	21	58	40.9	86	36	34.1
481	21	58	40.5	86	36	36.7
482	21	58	39.9	86	36	40.5
483	21	58 50	39.0	86	36	44.5
484	21	58 50		86	36	47.6
485	21	58	37.6	86	- 36	48.7
486	21	58	34,5	86	36	51.7
487	21	58	32.2		36	52.1
488	21	58	21.7	86	36	52.2
489	21	58	26.3	86	36	50.7
490	21	58	24.3	86	36	48.6
491	21	58	21.4	86	36	47.4
492	21	58	19.4	86	36	45.2
493	21	58	15.7	86	36	43.6
494	21	58	12.6	86		41.0
495	21	58	11.2	86	36 36	37.8
496	21	58	09.2	86	36 36	31.4
497	21	58	10.6	86	36 36	27.2
498	21	58	11.5	86	36 36	23.6
499	21	58	11.9	86	36	21.6
500	21	58	10.3	86	36 36	18.9
501	21	58	08.5	86	36	16.1
502	21	58	06.2	86	36	
503	- 21	58	04.5	86	36	13.6
504	21	58	02.1	86	36	10.8
505	21	- 58	00.6	86	36	0.80
506	21	57	58.3	86	36	05.3
507	21	57	56.1	86	36	02.1
508	21	57	57.1	86	35	59.6
509	. 21	57	58.1	86	35	56.8
510	- 21	57	58.3	86	35	56.9
511	21	57	59.8	86	35	48.9
512	21	57	56.7	86	35	49.2
513	21	57	54.5	86	35	45.7

(1) 514 515 516 517 518 519 520 521 522 528 529 531 532 534 535 536 537 538 540 541 545 546 547 548 555 556 557 558 560 561 562 563 564 565	(2) 21 21 21 21 21 21 21 21 21 21 21 21 21	(3) 57 57 57 57 57 57 57 57 57 57 57 57 57	(4) 52.6 48.5 43.8 41.9 39.1 38.2 35.5 30.0 29.1 26.7 21.6 18.5 14.0 13.9 14.0 14.5 14.7 14.8 13.9 11.0 10.4 09.5 08.8 07.6 06.4 04.9 03.8 02.4 01.9 04.9 05.2 48.9 47.3 47.1 46.1 47.0 48.0 48.3 49.9 48.3 49.9 48.7 50.2 50.7 51.0 51.0 52.5 53.8	(5) 86 86 86 86 86 86 86 86 86 86 86 86 86	(6) 35 35 35 35 35 35 35 35 35 35 35 35 35	(7) 45.9 43.7 46.9 38.4 35.9 32.0 29.9 29.2 27.3 26.6 23.5 21.8 19.3 17.3 14.1 09.2 05.8 03.4 00.8 57.9 52.5 50.3 46.6 45.5 41.2 36.9 33.3 29.7 26.0 23.5 18.3 17.4 16.2 14.1 10.9 06.1 07.5 19.2 19.2 19.2 19.2 19.2 19.2 19.2 19.2

			19	)		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
566	21	56	52.6	86	33	31.6
567	4. 21	56	51.3	86	33	* 28.9
568	21	56	52.0	86	33	26.1
569	21	56	51.6	86	33	22.6
570	21	56	51.9	86	33	20.2
571	21	56	52.0	86	33	17.8
572	21	56	52.0	86	33	15.6
573	21	56	49.1	86	33	14.9
574	21	56	46.1	86	33	11.1
575	. 21	56	44.3	86	33	08.9
576	21	56	41.0	86	33	05.9
577	21	<b>- 5</b> 6	35.2	86	33	00.4
578	21	<b>5</b> 6	32.7	86	32	58.5
579	21	56	30.6	86	32	57.2
580	21	56	29.2	86	32	56.5
581	21	56	26.9	86	32	54.0
582	21	56	23.8	86	32	51.7
583	21	56	15.2	86	32	49.4
584	21	56	12.3	86	32	47.2
585	21	56	05.1	86	32	49.7
586	21	56	02.6	86	32	51.6
587	21	56	00.3	86	32	52.0
588	21	56	00.6	86	32	54.7
589	21	56	00.5	86	32	58.9
590	21	56	02.7	86	33	03.3
591	21	56	07.5	86	33	11.8
592	21	56	14.1	86	33	15.6
593	21	56	19.7	86	33	18.1
594	21	56	18.0	86	33	21.5
595	21	56	18.2	86	33	23.1
596	21	56	10.3	86	33	31.9
597	21	56	10.1	86	33	33.2
598	21	- 56	05.6	86	33	36.9
599	21	56	01.9	86	33	41.5
600	21	56	03.5	86	33	46.0
601	21	56	05.6	86	33	50.9
602	21	56	04.4	86	33	54.5
603	21	56	01.8	86	34	01.0
604	21	55	58.4	86	34	05.4
605	21	55	56.7	86	34	11.1
606	21	55	57.5	86	34	22.8
607	21	55	52.1	86	34	27.4
608	21	55	53.0	86	34	31.1
609	21	55	50.8	86	34	38.7
610	21	55	50.0	86	34	39.9
611	21	<b>5</b> 5	43.6	86	34	44.3
612	21	55	39.5	86	34	45.8
613	- 21	55	38.0	86	34	53.6
614	21	55	37.0	86	34	59.4
615	21	55	33.3	86	35	02.0
616	21	55	27.0	86	35	09.8
617	21	55	29.1	86	35	17.0
			5	(a) 70	7.7	

(1)	(2)	(3)	(4) 32.8	(5) 86	(6) 35	(7) 18.2
618 619	21 21	<b>5</b> 5 <b>5</b> 5 <b>5</b> 5	40.8 44.6	86 86	35 35	26.1 29.6
620 621	21 21	55	51.3	86 86	35 35	27.9 29.3
622 623	21 21	55 55	58.5 59.4	86	35	28.4 28.1
624	21	56 56	00.1 05.1	86 86	35 35	25.4
625 626	21 21	56	08.2	86	35 35	25.2 24.5
627	21 21	56 56	09.2 20.8	86 86	35	25.1 28.0
628 629	21	56	21.7 35.0	86 86	35 35	29.2
630 631	21 21	56 56	38.6	86	35	29.0 28.5
632	21	56	43.5 46.5	86 86	35 35	28.8
633 634	21 21	56 56	48.6	86	35 35	30.9 44.7
635	21 21	56 56	58.6 58.0	86 86	35	45.9
636 637	21	56	55.0	86 86	35 35	47.0 50.9
638 639	21 21	.56 56	53.0 50.1	86	35	53.8 59.8
640	21	56	41.0 42.2	86 86	35 36	04.5
641 642	21 21	56 56	41.8	86	36 36	06.2 10.5
643	21	56 56	39.3 38.1	86 86	36	12.9
644 645	21 21	56	38.5	86 86	36 36	18.3 21.09
646 647	21 21	56 56	35.7 32.1	86	36	22.6 24.8
648	21	<b>56</b>	28.9 24.5	86 86	36 36	25.4
649 650	21 21	56 56	18.6	86	36 36	25.3 25.1
651	21	56 56	13.8 06.0	86 86	36	27.4
652 653	21 21	55	57.4	86 86	36 36	30.5 34.7
654 655	21 21	55 55	48.4 43.3	86	36	35.6 36.2
656	21	55 55	39.0 36.1	86 86	36 36	37.8
657 658	21 21	55	34.7	86	36 36	41.9 48.2
659	21 21	55 55	31.4 26.3	86 86	36	52.1 53.2
660 661	21	55	23.4	86 86	36 36	53.0
662	21 21	55 55	18.8 13.5	86	36	52.6 52.5
663 664	21	55	09.7 03.8	86 86	36 36	50.0
665 666	21 21	55 55	00.5	86	36 36	50.0 49.4
667	21	54 54	58.6 53.9	86 86	36	46.7
668 669	21 21	54 54	51.1	86	36	45.0
		v				

(1)	(2)	(3)	(4)	(5)	(6)	(7)
670	21	54	47.4	86	36	39.1
671	21	54	45.1	86	36	<sub>*</sub> 36.7
672	21	54	38.5	86	36	36.9
673	21	54	35.6	86	36	35.5
674	. 21	54	32.5	86	36	32.8
675	21	54	30.6	86	36	28.7
676	21	54	33.9	86	36	28.1
677	21	54	39.7	86	36	27.7
678	21	54	43.3	86	36	25.3
679	21	54	45.9	86	36	24.4
680	21	54	46.8	86	36	20.3
681	21	54	48.8	86	36	13.3
682	21	54	50.1	86	36	08.5
683	21	54	46.1	86	36	09.0
684	21	54	41.2	86	36	09.9
685	21	54	40.3	86	36	09.4
686	21	54	36.6	86	36	06.0
687	21	54	30.5	86	36	04.3
688	21	54	27.8	86	36	02.6
689	21	54	23.9	86	35	57.6
690	21	54	22.9	86	35	54.0
691	21	54	18.6	86	35	49.7
692	21	54	18.4	86	35	53.6
693	21	54	18.5	86	35	57.8
694	21	54	18.6	86	36	1.2
695	21	54	14.6	86	36	6.1
696	21	54	8.9	86	36	8.8
697	21	53	59.4	86	36	8.6
698	21	53	56.6	86	36	8.2
699	21	53	52.8	86	36	5.8
700	21	53	51.2	86	36	4.9
701	21	53	47.5	86	36	2.3
702	21	· <b>*53</b>	43.4	86	36	1.5
703	21	53	42.1	86	36	0.9
704	21	53	39.6	86	35	56.6
705	21	53	36.9	86	35	55.9
706	21	53	35.6	86	35	52.3
707	21	53	31.1	86	35	51.3
708	21	53	26.1	86	35	50.6
709	21	5.	22.9	86	35	49.2
710	21	53	19.3	86	35	48.3
711	21	53	16.7	86	35	46.7
712	21	53	11.4	86	35	44.8
713	21	53	3.7	86	35	44.4
714	21	52	58.2	86	35	50.9
715	21	52	53.3	86	35	52.8
716	21	52	50.1	86	35	55.8
717	21	52	47.0	86	35	56.0
718	. 21	52	43.5	86	35	56.7
719	21	52	41.3	86	35	55.2
720	21	52	37.0	86	35	53.6
721	21	52	34.6	86	35	50.5
	0 <del>- 1</del> 0-					

(1) 722 723 724 725 726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750 751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 767 768	(2) 21 21 21 21 21 21 21 21 21 21 21 21 21	(3) 52 52 52 52 52 52 52 52 52 52 52 52 52	(4) 30.0 29.6 26.0 23.9 21.8 19.5 17.1 16.1 13.3 12.7 11.3 10.0 7.3 5.9 5.5 5.0 4.3 3.9 3.1 2.4 1.4 0.9 0.0 57.2 54.4 50.6 46.1 44.9 41.3 35.3 32.8 27.9 24.9 23.1 20.0 14.7 9.2 6.0 3.5 5.5 5.0 4.3 3.5 5.0 4.3 3.8 2.7 9.2 9.2 9.2 9.2 9.2 9.2 9.2 9.2 9.2 9.2	(5) 86 86 86 86 86 86 86 86 86 86 86 86 86	(6) 35 35 35 35 35 35 35 35 35 35 35 35 35	(7) 47.0 46.2 44.7 42.5 40.2 39.8 38.6 37.6 40.4 42.9 43.7 45.2 46.3 47.3 48.7 53.5 57.4 2.0 2.3 2.1 59.9 57.8 55.1 54.6 46.6 48.7 48.5 46.6 48.7 48.5 46.6 48.7 48.7 48.7 48.7 48.7 48.7 48.7 48.7
765	21	51	3.5	86	35	38.6
766	21	51	5.0	86	35	34.2
767	21	51	5.5	86	35	31.1
772	21	51	3.3	86	35	17.3
773	21	51	3.6	86	35	16.0

(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1)		51	5.9	86	33	19.7
826	21			86	33 .	11.7
827	21	51	7.8		33	9.9
828	21	51	6.3	86		
829	21	51	2.7	86	33	8.1
830	21	50	57.0	86	33	6.8
831	<sup>•</sup> 21	50	55.4	86	33	7.6
832	21	50	52.1	86	33	8.2
833	21	50	48.5	86	33	9.2
834	21	50	44.0	86	33	11.2
835	21	50	42.6	86	33	14.9
836	21	50	39.8	86	33	17.7
837	21	50	37.9	86	33	19.5
838	21	50	33.5	86	33	19.7
839	21	50	30.5	86	33	20.1
840	21	50	28.3	86	33	20.9
841	21	50	26.0	86	33	22.6
			25.3	86	33	24.8
842	21	50 50		86	33	29.2
843	21	50	25.2			
844	21	50	25.6	86	33	35.2
845	21	50	25.7	86	33	37.2
846	21	50	26.5	86	33	39.1
847	21	50	26.9	86	33	40.5
848	21	50	28.0	- 86	33	43.1
849	21	50	28.6	86	33	45.4
850	21	50	27.1	86	33	47.4
851	21	50	22.1	86	33	50.5
852	. 21	50	18.7	86	33	54.8
853	21	50	18.4	86	33	54.9
854	21	50	17.7	86	33	55.8
855	21	50	11.0	- 86	33	54.3
856	21	50	6.2	86	33	52.3
857	21	50	2.1	86	33	51.6
858	21	50	1.3	86	33	52.6
859	21	<i>. "</i> 50	2.7	86	33	53.9
860	21	50	3.5	86	33	58.5
861	21	50	4.8	86	34	2.5
862	21	50	6.7	86	34	6.2
863	21	50	8.2	86	34	8.5
864	21	50	8.1	86	34	9.4
865	21	50	8.8	86	34	12.7
	21	50	8.4	86	34	13.4
866		50	8.2	86	34	15.0
867	21		7.4	86	34	16.1
868	21	50	6.2	86	34	17.1
869	21	50			34	18.3
870	21	50	3.8	86	34	19.6
871	21	50	0.5	86		20.5
872	21	49	57.0	86	34	
873	21	49	55.3	86	34	21.2
874	21	. 49	53.5	86	34	22.4
875	21	49	51.3	86	34	25.8
876	21	49	50.5	86	34	28.5
877	21	49	50.5	86	34	31.2

					25			7
(1)	(2)	(3)		(4)	(5)	(6)		(7)
878	21	49		51.9	86	34		
<b>8</b> 79	21	49		52.8	86	34	•	35.0
880	21	49		52.8	86		:	37.8
881	21	49		56.4	86	34		40.7
882	21	49		57.5		34		44.8
883	21	49			86	34		49.6
884	21	49		59.5	86	34		54.2
885	21			59.9	86	34		59.8
886	21	49		58.8	. 86	35		3.5
887		49		57.8	86	35		5.8
888	21	49		56.2	86	35		8.2
889	21	49		53.9	86	35		12.9
	21	49		51.3	86	. 35		14.3
890	21	49		49.1	86	35		17.1
891	21	49		45.1	86	35		16.8
892	21	49		42.7	86	35		13.8
893	21	49		43.3	86	35		12.3
894	21	49		39.3	86	35		11.5
895	21	49		35.3	. 86	35		9.4
896	21	49		28.9	86	35		10.6
897	21	49		23.5	86	35		10.5
898	21	49		20.9	86	35		10.6
899	21	49	9	20.9	86	35		8.0
900	21	49		19.9	86	35		9.4
901	21	49		12.3	86	35	9 - 2	8.2
902	21	49		7.9	86	35		6.9
903	21	49		4.3	86	35		5.4
904	21	49		1.2	86	35		1.8
905	21	48		58.7	86	35		1.5
906	21	48		56.3	. 86	34		58.4
907	21	48		56.7	86	34	9	53.9
908	21	48		56.2	86	34		49.1
909	21	48		54.9	86	34		45.8
910	21	n 48		53.7	86	34		44.2
911	21	48		52.2	86	34		43.2
912	21	48		49.5	86	34		40.3
913	21	48		46.7	86	34		37.0
914	21	48		45.6	86	34		33.0
915	21	48		45.6	86	34		31.0
916	21	48		45.7	86	34		27.4
917	21	48		47.5	86	34		21.9
918	21	48		48.4	86	34		19.2
919	21	48		49.0	86	34		18.3
920	21	48		50.3	86	34		
921	21	48		52.2	86	34		17.4
922	21	48		52.8	86	34		13.9
923	21	48		54.1	86	34		13.5
924	21	48		55.6	86	34		13.7
925	21	48		57.3	86	34		13.8
926	21	48		58.7	86	34 34		13.2
927	21	48		59.0	- 86	34		12.2
928	21	48		57.9	86	34		10.8
929	21	48		57.5 57.1	86	34 34		8.3
20.0 <del>7.0</del>		, 10	100	07.1	. 00	34		7.0

			26			
(1) 930 931 932 933 934 935 936 937 938 939 940 941 942 943 944 945 949 950 951 952 953 954 955 956 957 958 969 969 970 971 972 973 974 975 976 977 978 979 980 981	21 21 21	(3) 48 48 48 48 48 48 48 48 48 48 48 48 48	(4) 54.9 53.6 54.1 54.5 53.7 53.6 52.1 50.2 48.2 46.8 45.1 42.9 40.2 33.0 33.9 34.2 31.0 26.4 24.3 21.8 20.0 18.1 16.5 17.6 16.8 15.2 11.4 7.1 3.6 53.8 56.9 56.3 56.4 57.1 58.4 59.1 3.5 7.5 10.1 13.9 18.1 19.7 22.5 23.3 24.5 13.7 13.9 14.9 15.9 16.1 16.5 17.5 17.6 16.8 16.9	86 86	(6) 34 33 33 33 33 33 33 33 33 33 33 33 33	(7) 2.9 56.7 53.8 52.0 49.0 46.8 44.6 43.9 42.3 40.7 41.4 38.1 38.3 33.5 39.1 42.3 44.6 45.0 42.6 39.7 38.9 37.3 32.1 28.4 24.3 19.6 17.5 14.0 11.4 10.3 9.0 7.2 58.8 55.6 53.3 53.0 53.3 51.9 49.4 47.4 46.4 39.4 37.2 33.9 31.7 28.8 26.5 24.3 21.4

		Y	2	7		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
982	21	48	13.0	86	32	19.9
983.4	21	48	12.5	86	32	× 16.9
984	21	48	12.4	86	32	14.4
985	21	48	10.9	86	32	13.9
986	21	48	11.6	86	32	10.0
987	21	48	10.5	86	32	7.1
988	21	48	8.1	86	32	5.3
989	21	48	6.0	86	32	2.6
990	21	48	5.0	86	32	1.0
991	21	48	5.1	86	31	58.4
992	21	48	5.8	86	31	56.9
993	21	48	0.3	86	31	53.7
994 995	21	47	58.7	86	31	51.9
	21	47	56.2	86	31	51.3
996 997	21	47	53.9	86	31	51.2
998	21	47	49.6	86	31	51.0
999	21 21	47	47.2	86	- 31	51.2
1000	21	47	44.2	86	31	53.0
1001	21	47 47	43.1	86	31	53.8
1002	21	47	41.1	86	31	54.5
1003	21	47	38.5 37.7	86	31	54.8
1004	21	47	35.3	86	31	54.0
1005	21	47	34.0	86	31	51.6
1006	21	47	31.7	86	31	50.4
1007	21	47	29.2	86 86	31	50.7
1008	21	47	25.0	86	31	49.8
1009	21	47	22.7	86	31 31	49.1
1010	21	47	20.9	86	31	47.3
1011	21	47.	17.3	86	31	44.3
1012	21	47	12.7	86	31	42.2 37.6
1013	21	47	9.9	86	31	34.8
1014	21	47	8.7	86	31	33.0
1015	21	47	5.7	86	31	29.1
1016	21	47	4.7	86	31	26.6
1017	21	47	1.2	86	31	24.6
1018	21	47	0.3	86	31	23.7
1019	21	46	57.6	<b>86</b> :	31	23.1
1020	21	46	56.5	86	31	22.1
1021	21	46	<b>5</b> 5.2	86	31	20.0
1022	21	46	<b>5</b> 3.8	86	31	17.9
1023	21	46	52.6	86	31	15.5
1024	21	46	51.2	86	31	14.3
1025	21	46	49.8	86	31	13.5
1026	21	46	48.9	86	31	11.1
1027	21	46	50.6	86	31	9.0
1028	21	46	48.4	<b>8</b> 6	31	7.4
1029 1030	21	46	47.8	86	31	5.2
1030	21 21	46 46	45.4	86	31	4.3
1032	21	46	41.0	86	31	4.8
1033	21	46	38.5	86	31	6.9
. 4	*	~~	33.4	86	31	9.5

	(0)	(0)	(4)	<b>(5)</b>	(0)	/7\
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1034	21	46	34.6	86	31	15.2
1035	21	46	32.8	86	31	× 21.1
1036	21	46	31.7	86	31	23.2
1037	21	46	29.1	86	31	27.5
1038	21	46	28.3	86	31	31.3
1039	21	46	26.8	86	31	32.2
1040	21	46	23.9	86	31	32.9
1041	21	46	20.6	86	31	34.8
1042	21	46	15.5	86	31	37.4
1043	21	46	14.5	. 86	31	40.1
1044	21	46	11.9	86	31	43.5
1045	21	46	9.1	86	31	49.2
1046	21	46	8.4	86	31	51.6
1047		46	5.0	86		
	21				31	52.1
1048	21	46	1,7	86	31	52.5
1049	21	45	58.0	86	31	52.9
1050	21	45	55.2	86	31	52.9
1051	21	45	53,9	86	31	52.9
1052	21	45	51.1	86	31	53.4
1053	21	45	48.7	86	31	54.3
1054	21	45	45.8	86	31	54.9
1055	21	45	45.1	86	31	54.8
1056	21	45	43.9	86	31	54.8
1057	21	45	43.0	86	31	54.8
1058	21	45	39.6	86	31	54.1
1059	21	45	37.8	86	31	53.7
1060	21	45	35.8	. 86	31	53.0
1061	21	45	32.5	86	31	52.9
1062	21	45	28.1	86	- 31	53.5
1063	21	45	25.7	86	31	53.5
1064	21	45	23.8	86	31	53.7
1065	21	45	20.1	86	. 31	53.5
1066	21	45 <sub>/1</sub>	16.3	86	31	53.3
1067	21	45	14.0	- 86	31	51.1
1068	21	45	9.8	86	31	48.9
1069	21	45	7.9	86	31	47.5
1070	21	45	5.1	-86	31	45.6
1071	21	45	2.1	86	31	44.2
1072	21	44	59.2	86	31	42.4
1073	21	44	55.5	86	31	41.8
1074	21	44	50.6	86	31	37.3
1075	21	44	50.0	86	31	35.2
1076	21	44	51.0	86	31	31.4
1077	21	44	54.5	86	31	22.3
1078	21	44	53.1	86	31	18.7
1079	21	44	51.3	86	31	13.6
1080	21	44	52.8	86	31	8.8
1081	21	44	49.3	86	31	3.1
1082		44	45.7	86	30	59.4
	21					
1083	21	44	42.2	86	30	59.4
1084	21	44	36.3	86	30	56.8
1085	21	44	32.1	86	30	55.0
			· ·			

				29		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1086	21	44	29.6	86	30	53.3
1087	21	44	27.7	86	30	f 51.6
1088	21	44	27.1	86	30	50.3
1089	21	44	26.9	86	30	48.8
1090	21	44	28.3	86	30	42.7
1091	21	44	30.0	86	30	36.0
1092	21	44	30.5	86	30	32.1
1093	21	44	34.2	86	30	27.2
1094	21	44	35.5	86	30	23.6
1095	21	44	38.2	86	30	18.9
1096	21	44	40.7	86	30	16.1
1097	. 21	44	42.5	86	30	14.0
1098	21	44	45.2	86	30	9.0
1099	21	44	48.3	86	30	4.1
1100	21	44	49.0	86	30	0.6
1101	21	44	50.3	86	29	57.9
1101	21	44	54.7	86	29	52.4
1102	21	44	57.5	86	29	49.4
1103	21	44	59.8	86	29	46.3
1105	21	45	4.3	-86	29	39.6
1106	21	45	5.6	86	29	36.9
1107	21	45	7.6	86	29	29.5
1107	21	45	9.7	86	29	25.4
	21	45	10.2	86	29	21.5
1109 1110	21	45	15.0	86	29	14.9
	21	45	13.8	86	29	9.0
1111	21	45	21.2	86	29	0.3
1112	21	45	29.1	86	28	55.9
1113	21	45	31.2	86	28	53.2
1114	21	45	35.5	86	28	51.0
1115	21	45	39.8	86	28	48.3
1116	21	л <b>4</b> 5	44.9	86	28	44.4
1117	21	45	49.3	86	28	41.0
1118		45	51.1	86	28	41.1
1119	21 21	45	54.9	86	28	39.8
1120	21	45	58.2	86	28	36.8
1121	21	46	4.1	86	28	32.6
1122	21	46	6.2	86	28	25.9
1123	21	46	6.5	86	28	22.2
1124	21	46	6.6	86	. 28	18.9
1125	21	46	6.0	86	28	16.5
1126	21	46	7.1	86	28	14.7
1127	21	46 .	7.3	86	28	5.4
1128	21	46	4.5	86	28	2.6
1129		46	3.0	86	28	2.5
1130	21	45	59.9	86	28	7.5
1131	21	45	56.3	86	28	11.1
1132	21	45	54.0		28	17.2
1133	21	45	51.4	86	28	21.2
1134	21	45	49.2	86	28	27.4
1135	21	45 45	47.2	86	28	34.6
1136	21	45	45.1	86	28	40.5
1137	21	45	<del>-1</del> 0, I	00	25	

1150         21         44         41.1         86           1151         21         44         37.1         86           1152         21         44         31.1         86           1153         21         44         28.7         86           1154         21         44         28.0         86           1155         21         44         26.6         86           1156         21         44         24.4         86           1157         21         44         24.4         86           1158         21         44         17.3         86           1159         21         44         12.4         86           1160         21         44         12.4         86           1160         21         44         9.2         86           1161         21         44         9.2         86           1162         21         44         4.1         86           1163         21         43         58.5         86           1164         21         43         55.8         86           1165         21         43	29 29 29 29 29 30 30 30 30 30 30 30 30 30 30 30 30 30	27.2 39.2 40.9 43.9 44.8 50.5 56.0 0.7 3.5 9.0 17.6 18.4 20.3 21.5 21.7 22.2 23.1 22.7 24.4 26.9 28.3 29.0 30.2 31.8 34.1 34.3 36.4 37.2 38.7 40.7 43.9 46.2 45.8 46.8 46.1 46.0 46.9
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			31			
(1)	(2)	(3)	(4)	(5)	(6)	(7) /,
1190	21	42	29.2	86	30	46.6
1190	21	42	23.6	86	30	47.4
1192	21	42	20.5	86	30	47.6
1193	21	42	16.7	86	30	45.4
1194	21	42	12.0	86	30	45.2
1195	21	42	7.7	86	30	43.4
1196	21	42	4.1	86	30	41.5
1197	21	41	58.6	86	30	38.3
1198	21	41	54.0	86	30	38.3 35.4
1199	21	41	50.3	86	30	33.8
1200	21	41	49.5	86 86	.30 30	26.5
1201	21	41	53.6 54.4	86	30	22.7
1202	21	41	53.7	86	30	14.7
1203	21	41 41	55.2	86	30	9.5
1204	21	41	58.4	86	30	2.2
1205	21 21	41	59.5	86	29	57.1
1206 1207	21	41	56.4	86	29	51.0
1207	21	41	55.9	86	29	47.9
1209	21	41	56.7	86	29	43.9
1210	21	41	55.8	86	29	36.3
1211	21	41	54.6	86	29	30.7
1212	21	41	52.2	86	29	27.9
1213	21	41	49.1	86	29	27.2
1214	21	41	45.4	86	29	24.5
1215	21	41	42.7	86	29 29	21.5 17.2
1216	21	41	38.2	86 86	29	14.7
1217	21	41	33.8 31.3	86	29	11.1
1218	21	41 41	24.2	86	29	10.5
1219	21 21	41	21.2	86	29	11.1
1220 1221	21	41	9.7	86	29	10.7
1222	21	41	4.1	86	29	11.2
1223	21	41	1.0	86	29	10.8
1224	21	40	57.4	86	29	10.4
1225	21	40	52.2	86	29	6.4
1226	21	40	48.0	86	29	5.0
1227	21	40	42.5	86	29	0.7
1228	21	40	40.5	86	28	54.5 50.0
1229	21	40	42.5	86 86	28 28	40.1
1230	21	40	38.6 34.4	86	28	32.1
1231	21	40 40	33.8	86	28	22.3
1232	21 21	40	33.4	86	28	19.3
1233 1234	21	40	37.5	86	28	11.3
1234	21	40	32.8	86	28	11.4
1236	21	40	29.0	86	.28	3.6
1237	21	40	22.8	86	28	4.8
1238	21	40	15.0	86	28	6.7
1239	21	40	10.0	86	28	8.2
1240	21	40	6.7	86	28	10.5
1241	21	40	2.1	86	28	14.1

(1) 1242 1243 1244 1245	(2) 21 21 21 21	(3) 39 39 39 39		(4) 57.8 55.1 46.8 42.5	(5) 86 86 86 86	(6) 28 28 28 28	? : :	(7) 17.3 17.4 26.4 28.7 32.9
1246 1247 1248 1249 1250 1251 1252	21 21 21 21 21 21 21	39 39 39 39 39 39		36.5 31.5 23.4 17.7 10.4 3.3 0.3 52.4	86 86 86 86 86 86 86	28 28 28 28 28 28 28 28 28	И	38.3 39.8 42.2 42.6 44.1 44.1 43.4
1253 1254 1255 1256 1257 1258 1259	21 21 21 21 21 21 21 21	38 38 38 38 38 38 38		42.6 32.1 28.3 21.2 17.7 13.3 9.8	86 86 86 86 86 86	28 28 28 28 28 28 28		44.0 45.0 44.6 38.8 36.9 34.9 24.7
1260 1261 1262 1263 1264 1265 1266 1267	21 21 21 21 21 21 21 21	38 37 37 37 37 37 37		2.1 57.7 52.0 50.5 48.4 46.4 46.9	86 86 86 86 86 86	28 28 28 28 28 28 28		20.3 18.0 13.3 11.1 9.8 7.3 5.2 1.1
1268 1269 1270 1271 1272 1273 1274	21 21 21 21 21 21 21	37 37 37 37 37 37 37		48.7 49.0 49.2 50.0 51.6 52.8 54.0	86 86 86 86 86 86	27 27 27 27 27 27 27 27		57.9 54.6 46.8 39.4 36.5 33.3 31.2
1275 1276 1277 1278 1279 1280 1281	21 21 21 21 21 21 21	37 37 37 37 37 37 37		52.6 49.5 47.2 44.2 40.1 38.3 35.6	86 86 86 86 86 86	27 27 27 27 27 27 27 27		30.1 29.5 28.2 29.2 29.9 31.1 34.4
1282 1283 1284 1285 1286 1287 1288	21 21 21 21 21 21 21	37 37 37 37 37 37 37		28.7 26.1 23.8 17.8 15.4 12.8 10.8	86 86 86 86 86 86	27 27 27 27 27 27 27 27		35.2 35.9 36.1 39.3 40.5 41.4 44.3
1289 1290 1291 1292 1293	21 21 21 21 21	37 36 36 36 36	Ξ	2.7 59.3 54.3 49.8 42.5	86 86 86 86 86	27 27 27 27 27		46.2 49.5 53.0 50.7

(4)	(2)	(2)	(4)	(5)	(6)	(7)
(1)	(2)	(3)	(4)		27	49.9
1294	21	36	34.0	86		
1295	<b>×</b> 21	36	26.2	86	27	47.4
1296	. 21	36	21.2	86	27	45.6
1297	21	36	16.7	86	27	41.1
1298	21	36	9.9	86	27	36.8
1299	21	36	6.0	86	27	31.0
1300	21	35	59.2	86	27	30.3
1301	21	35	50.4	86	27	29.5
1302	21	35	48.6	86	27	23.5
1303	21	35	47.2	86	27	17.7
1304	21	35	43.8	86	27	10.6
1305	21	35	45.2	86	27	7.7
1306	21	35	45.5	86	27	3.5
1307	21	35	44.8	86	27	1.6
		35	42.1	86	26	59.7
1308	21					
1309	21	35	33.5	86	26	55.1
1310	21	35	29.5	. 86	26	52.3
1311	21	35	26.1	86	26	50.0
1312	21	35	22.2	86	26	48.4
1313	21	35	18.5	86	26	44.9
1314	21	35	16.7	86	26	44.2
1315	21	35	12.5	86	<sup>)</sup> 26	43.7
1316	21	35	7.1	86	26	42.7
1317	21	34	57.2	86	26	42.3
1318	21	34	48.2	86	26	38.3
1319	21	34	41.0	86	26	33.5
1320	21	34	33.2	86	26	30.8
1321	21	34	29.0	86	26	29.2
			23.2	86	26	27.4
1322	21	34				25.9
1323	21	34	20.0	86	26	
1324	21	34	18.8	86	26	24.4
1325	21	34	21.1	86	26	21.9
1326	21	34/	23.5	86	26	9.6
1327	21	34	20.9	86	26	9.7
1328	21	34	18.6	86	26	6.0
1329	21	34	15.5	86	26	8.6
1330	21	34	11.5	86	26	6.7
1331	21	34	5.0	86	26	0.7
1332	21	34	6.9	86	25	57.4
1333	21	34	6.4	86	25	54.0
1334	21	34	8.3	86	25	45.1
		34	18.0	86	25	35.3
1335	21			86	25	29.3
1336	21	34	19.4			
1337	21	34	19.2	86	25	24.7
1338	21	34	16.3	86	25	22.0
1339	21	34	12.1	86	25	18.9
1340	21	34	5.5	86	25	14.3
1341	21.	34	2.6	86	25	10.8
1342	21	34	6.4	86	25	7.7
1343	21	34	9.0	86	25	4.9
1344	21	34	13.3	86	25	4.2
1345	21	34	16.4	86	25	4.2
			100 y 15.53.00	# E		

			3	4		
. (1)	(2)	(3)	(4)	(5)	(6)	(7)
1346	21	34	18.6	86	25	0.2
1347	21	34	12.8	86	24	56.1
1348	21	34	6.5	86	24	53.2 48.9
1349	21	34	0.5	86	24 24	45.8
1350	21	33	56.3	86	24	42.7
1351	21	33	51.7 48.4	86 86	24	41.4
1352	21	33 33	45.0	86	24	39.7
1353	21 21	33	37.2	86	24	41.0
1354 1355	21	33	32.7	86	24	47.0
1356	21	33	31.0	86	24	47.5
1357	21	33	25.2	86	24	45.1
1358	21	33	20.1	86	24	43.8
1359	21	33	19.5	86	24	46.3
1360	21	33	19.2	- 86	24	50.4 50.8
1361	21	33	14.9	86	24 24	50.6 51.4
1362	21	33	14.5	86 86	24	56.6
1363	21	33	10.5 6.2	86	25	0.5
1364	21 21	33 32	58.7	86	25	1.2
1365 1366	21	32	55.5	86	25	1.5
1367	21	32	54.3	86	25	1.6
1368	21	32	51.4	86	25	2.1
1369	21	32	45.1	86	25	3.1
1370	21	32	43.1	86	24	58.8 51.7
1371	21	32	39.8	86	24 24	45.5
1372	21	32	36.9	86 86	24	43.3
1373	21	32	35.6 35.7	86	24	40.5
1374	21	32 32	41.5	86	24	31.9
1375	21 21	32	41.6	86	24	27.5
1376 1377	21	32	40.6	86	24	23.5
1378	21	л <b>32</b>	38.0	86	24	19.2
1379	21	32	29.6	86	24	13.3
1380	21	32	24.4	86	24	7.4
1381	21	32	20.8	86	24	11.1 8.4
1382	21	32	18.8	86 86	24 24	2.3
1383	21	32	18.4	86 86	23	57.3
1384	21	32 32	20.3 16.8	86	23	52.3
1385	21	32	16.7	86	23	50.4
1386 1387	21 21	32	14.2	86	23	48.1
1388	21	32	14.5	86	23	45.3
1389	21	32	16.2	86	23	36.2
1390	21	32	14.2	86	23	30.3
1391	21	32	14.2	86	23	23.6 19.8
1392	21	32	8.5	86	23 23	14.9
1393	21	32	8.4	86 86	23	0.1
1394	21	32	5.3 4.5	86	23	0.5
1395	21	32 32	3.7	86	22	56.8
1396	21 21	32	2.9	86	22	49.4
1397	. 21					

						25				
(1)		(2)		(3)		35 (4)	(5)	(6)		(7)
1398		21		32		1.5	(5)	(6)		(7)
1399	4	21		31	. 1	59.3	86 86	22		44.7
1400		21		31		58.2	86	22		×33.9
1401		21		31		59.1	86	22 22		30.5
1402		21		32	. `	1.2	86	22		27.6 23.9
1403		21		31		56.3	86	22		16.8
1404		21		31	į	51.2	86	22		11.0
1405		21		31		9.2	86	21		52.7
1406		21		31		52.1	86	21		56.6
1407		21		31		3.2	86	21		57.7
1408		21		31		9.3	86	22		3.2
1409		21		32		0.1	86	22		6.7
1410 1411		21 21		32		2.6	86	22		8.2
1412		21	,	32 32		6.3	86	22		10.3
1413		21		32		2.8	86	22		11.2
1414		21		32		4.5 2.2	86 86	22		15.1
1415	10	21		32		6.3	86	22 22		19.5 24.3
1416		21		32		4.0	86	22		30.2
1417		21		32		4.4	86	22		26.7
1418		21		32		3.6	86	22		24.6
1419		21		32		2.0	86	22		21.9
1420 1421		21		32		9.1	86	22		18.1
1422		21 21		32 32		7.9	86	22		16.4
1423		21		32		6.7 4.1	86 86	22		13.4
1424		21		32		2.3	86	22		10.4
1425		21		32		0.3	86	22		8.4 7.3
1426		21		32		7.0	86	22		5.1
1427		21		32		5.7	86	22	•	2.5
1428		21		32	1	1.1	86	21		58.9
1429		21		32		.3	86	21		51.7
1430	`	21		32,		.0	86	21		47.0
1431 1432		21		32		.0	86	21		44.5
1433		21 21		32 31		.2	86	21		36.4
1434		21		31		3.1 3.6	86	21		26.7
1435		21		31		7.7	86 86	21		18.0
1436		21		31		5.6	86	21 21		14.7 12.4
1437		21	<b>3</b> 8	31		5.8	86	21		10.0
1438	10	21		31		1.8	86	21		7.4
1439		21		31	42	2.0	86	21		5.7
1440		21		31		3.6	86	21	10	4.3
1441		21		31		i.1	86	21	** **	1.3
1442 1443		21		31		2.2	86	20		59.6
1444		21 21		31 31		.0	86	20		54.4
1445		21		31	19	.4	86	20		53.7
1446		21		31	16		86 86	20 20		52.5
1447		21		31	12		86	20		50.4 49.2
1448		21		31	8.		86	20		47.8
1449		21	8 2	31	, <b>7</b> .		86	20		46.0

	(0)	(2)	(4)	(5)	<b>(</b> 6)	(7)
(1)	(2)	(3)	8.6	86	20	44.2
1450	21	. 31	5.7	86	20	40.0
1451	21	31	5. <i>1</i> 5.4	86	20	37.4
1452	21	31	3.2	86	20	29.8
1453	21	31		86	20	27.2
1454	21	31	1.9	86	20	24.6
1455	21	30	59.7	86	20	22.9
1456	21	30	58.6 55.1	86	20	17.7
1457	21	30	54.8	86	20	15.0
1458	21	30	54.6	86	20	9.4
1459	21	30	54.1	86	20	9.3
1460	21	30	52.9	86	20	1.7
1461	21	30	58.4	86	19	59.3
1462	21	30	58. <del>4</del>	86	19	55.8
1463	21	30	58.7	86	19	54.3
1464	21	30	58.1	86	19	50.5
1465	21	30	58.6	86	19	48.3
1466	21	30	0.7	86	19	40.2
1467	21	31	0.4	86	19	38.9
1468	21	31	59.6	86	19	32.8
1469	21	30	0.3	86	19	30.9
1470	21	31 31	1.6	. 86	19	28.4
1471	21	31	2.7	86	19	21.0
1472	21	30	8.6	86	18	12.6
1473	21 21	30	6.6	86	18	11.6
1474	21	30	2.8	86	18	9.5
1475	21	30	1.7	86	18	9.1
147 <b>6</b> 147 <b>7</b>	21	29	59.9	86	18	9.9
1478	21	29	59.2	86	18	5.3
1479	21	29	57.8	86	18	2.0
1480	21	29	51.9	86	18	0.4
1481	21	a 29	46.6	86	18	0.2
1482	21	29	38.6	86	18	0.4 54.4
1483	21	29	32.4	86	17	54.4 51.0
1484	21	29	28.9	86	17	45.4
1485	21	29	31.8	86	17 17	37.9
1486	21	29	33.3	86	17	32.3
1487	21	29	35.9	86	17	28.6
1488	21	29	37.3	86 86	17	26.2
148 <b>9</b>	21	29	39.2	86	17	23.6
1490	21	29	40.3	86	17	20.4
1491	21	29	42.1	86	17	16.2
1492	. 21	29	43.7	86	17	8.8
1493	21	29	45.4	86	17	3.0
1494	21	29	46.5 47.4	86	17	1.2
1495	21	29	46.8	86	16	58.4
1496	21	29	46.1	86	16	54.8
1497	21	29	46.9	86	16	51.2
1498	21	29 29	47.7	86	16	47.4
1499	21	29	45.8	86	16	36.4
1500	21	29	45.2	86	16	31.2
150 <b>1</b>	21	29	-10.E	13.7		

(1)		(2)	(3)	(4)	(5)	(6)	(7)
1502		21	29	43.6	<b>86</b>	16	25.5
1503	4	21	29	42.2			25. <b>5</b>
					86	16	12.3
1504		21	29	40.9	86	16	8.0
1505		21	29	40.3	86	16	2.9
1506		21	29	37.7	86		
1507						15	55.0
	-	21	29	37.2	86	15	52.7
1508		21	29	40.6	- 86	15	48.7
1509		21	29	48.4	86	15	48.3
1510		21	29	50.4			
1511					86	15	45. <b>6</b>
		21	29	55.9	86	15	44.7
1512		21	30	0.3	86	15	42.6
1513		21	30	1.9	86	15	42.9
1514		21	30	5.8	86		
1515						15	42.3
		21	30	16.0	86	15	45.1
1516		21	30	22.2	86	15	45.7
1517		21	30	31.4	86	15	43.3
1518		21	30	35.2	86		
1519						15	42.2
		21	30	39.8	86	15	40.5
1520		21	30	41.5	86	15	40.0
1521		21	30	47.0	86	15	37.7
1522		21	30	49.4	86		
1523		21				15	37.0
			30	55.8	86	15	34.9
1524		21	31	0.8	86	15	33.4
1525		21	31	4.4	86	15	32.7
1526		21	31	28.4	86	15	
1527		21	31				25.0
				28.9	86	15	23.9
1528		21	31	24.3	86	15	17.8
1529		21	31 .	21.2	86	15	12.6
1530		21	31	18.7	86	15.	8.1
1531		21	31				
				16.7	86	15	2.3
1532		21	31	11.9	86	14	55. <b>5</b>
1533		21	31 <sub>π</sub>	8.1	86	14	53. <b>3</b>
1534		21	<b>31</b> ″	1.8	86	14	49.9
1535		21	30	58.4			
					86	. 14	41.3
1536		21	30	51.6	86	14	41.1
1537		21	30	44.4	86	14	35.3
1538		21	30	39.8	86	14	29.8
1539		21	30	32.9	86		
1540						14	21.6
		21	30	32.6	86	14	16.3
1541		21	30	34.0	86	. 14	10.5
1542		21	30	33.4	86	14	5.3
1543		21	30	31.9	86	14	3.3
1544		21	30				
				30.7	86	14	2.6
1545		21	30	24.5	86	14	3.0
1546		21	30	18.2	86	14	2.4
1547		21	30	7.6	86	14	0.2
1548		21	29				
				55.6	86	13	56.7
1549		21	29	51.8	86	13	50.9
1550		21	29	42.3	86	13	48.0
1551		21	29	41.8	86	13	42.8
1552		21	29	40.9	86		
1553						13	38.1
1000		21	29	43.5	<b>86</b> .	13	36.5

		(2)	(4)	(5)	(6)	(7) 28.3
(1) 1554	(2) 21	(3) 29	(4) 46.5	(5) 86	(6) 13	
1555	21	29	48.1	86	13	18.3 10.3
1556	21	29	58.7	86	13 13	3.9
1557	21	29	58.1	86 86	12	58.2
1558	21	29	51.8	86	12	52.5
1559	21	29	46.3 46.6	86	12	42.9
1560	21	29	46.4	86	12	43.2
1561	21	29 29	50.5	86	12	36.7
1562	21 21	29	51.1	86	12	33.9
1563 1564	21	29	47.3	86	12	26.7
1565	21	29	47.4	86	12	26.5
1566	21	29	48.3	86	12	19.2 18.4
1567	21	29	49.2	86	12 12	18.1
1568	21	30	0.5	86 86	12	.18.5
1569	21	30	9.4	86	12	16.6
1570	21	30	13.5 19.6	86	12	13.4
1571	21	30 30	24.6	86	12	12.0
1572	21 21	30	28.5	86	12	10.1
1573 1574	21	30	35.5	86	12	5.0
1575	21	30	45.6	86	12	3.0 2.4
1576	21	30	46.1	86	12 12	1.1
1577	21	31	0.1	86 86	12	3.1
1578	21	31	3.6	86 86	12	18.2
1579	21	31	5.2 8.7	86	12	19.8
1580	21	31 31	15.2	86	12	22.4
1581	21 21	31	21.8	86	12	24.6
1582 1583	21	31	26.1	86	12	26.3
1584	21	31	30.5	86	12	29.4 36.9
1585	21	31	29.8	86	12 12	41.5
1586	21	″ 31	34.5	86 86	12	43.4
1587	21	31	33.2 29.8	86	12	48.5
1588	21	31 1	32.7	86	12	52.8
1589	21 21	31 31	36.3	86	12	56.6
1590 1591	21	31	40.8	86	13	0.4
1592	21	31	42.8	-86	13	1.4 5.6
1593	21	31	42.4	86	13 13	10.1
1594	21	31	42.9	86 86	13	13.3
1595	21	31	43.4	86	13	20.3
1596	21	31	41.8 36.4	86	13	28.8
1597	21	31 31	37.1	86	13	34.0
1598	21 21	31	35.3	86	. 13	37.7
1599 1600	21	31	38.0	. 86	13	39.5
1601	21	31	41.8	86	13	44.1 47.2
1602	21	31	43.8	86	13 13	51.0
1603	21	31	43.4	86 86	13	0.9
1604	21	. 31	43.0	86 86	14	8.7
1605	21	31	42.4			

	Ŀ			39		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1606	a 21	31	43.8	86	14	14.1
1607	21	31	47.0	86	14	21.7
1608	21	31	47.8	86	14	23.7
1609 1610	21	31	49.2	86	14	25.8
1611	21 21	31 31	50.5	86	14	27.3
1612	21	31	51.6 53.5	86 86	14	31.2
1613	21	31	55.7	86	14 14	34.9
1614	21	31	56.8	86	14	37.5 39.6
1615	21	31	58.4	86	14	42.0
1616	21	31	58.8	86	. 14	42.7
1617	21	31	58.6	86	14	42.6
1618	21	32	2.6	86	14	42.5
1619	21	32	5.4	86	14	42.3
1620	21	32	9.7	86	14	40.4
1621 1622	21	32	16.1	86	14	37.5
1623	21 21	32 32	19.8	86	14	34.5
1624	21	32	25.7 31.2	86	14	33.6
1625	21	32	34.8	86	14	30.9
1626	21	32	41.6	86 86	14 14	31.6
1627	21	32	43.6	86	14	33.8 35.0
1628	21	32	49.5	86	14	38.6
1629	21	32	51.6	86	. 14	41.4
1630	21	32	58.2	86	14	41.3
1631	21	33	3.9	86	14	40.5
1632	21	33	7.7	86	14	44.0
1633	21	33	13.1	86	14	46.3
1634 1635	21	33	17.7	86	14	48.7
1636	21 21	33	19.1	86	14	49.0
1637	21	33 33 л	24.6 24.8	86	14	49.3
1638	21	33 n	20.0	86 86	14	43.2
1639	21	33	18.0	86	14 14	41.4
1640	21	33	16.1	86	14	35.1 33.9
1641	21	33	15.5	86	14	24.2
1642	21	33	15.3	86	14	21.9
1643	21	33	16.5	86	14	20.6
1644	21	33	17.6	86	14	20.1
1645	21	33	23.9	86	14	21.6
1646	21	33	26.7	86	14	16.9
1647	21	33	36.2	86	14	8.2
1648 1649	21	33	40.2	86	14	13.9
1650	21 21	33 33	41.0	86 86	14	15.6
1651	21	32	42.0 41.62	86	14	20.0
1652	21	32	43.62	86 86	14 14	33.82
1653	21	32	49.55	86	14	35.06 38.63
1654	21	32	51.62	86	14	36.63 41.41
1655	21	32	58.24	86	14	41.30
1656	21	33	3.95	86	14	40.53
1657	21	33	7.75	86	14	43.99
					¥	1

(1)	(2)	(3)	(4)	(5)	(6)	(7)
1658	21	33	13.15	86	14	46.31
1659	21	33	19.12	86	14	49.00
1660	21	33	17.76	86	14	48.72
	21	33	24.68	86	14	49.30
1661		33	24.82	86	14	43.19
1662	21	33	20.03	86	14	41.39
1663	21		18.06	86	14	35.11
1664	21	33		86	14	33.94
1665	21	33	16.13		14	24.21
1666	21	33	15.55	86		21.91
1667	21	33	15.34	86	14	20.63
1668	21	33	16.49	86	14	
1669	21	33	17.61	86	14	20.15
1670	21	33	23.92	86	14	21.59
1671	- 21	33	26.71	86	14	16.90
1672	21	33	36.23	86	14	8.25
1673	21	33	40.25	86	14	13.90
1674	. 21	. 33	41.03	86	14	15.62
1675	21	33	42.07	86	14	20.01
1676	21	33	36.85	86	14	31.23
1677	21	33	36.63	86	14	37.74
1678	21	33	39.38	86	14	45.67
1679	21	33	42.08	86	14	51.24
1680	21	33	42.39	86	14	56.92
1681	21	33	43.52	86	15	3.03
1682	21	33	47.95	86	15	9.89
1683	21	33	47.29	86	15	16.89
1684	21	33	51.51	86	15	19.21
1685	21	33	53.04	86	15	20.92
1686	21	33	58.58	86	15	20.92
	21	34	2.77	86	15	22.14
1687	21	34	8.04	86	15	25.81
1688		34	13.68	86	15	29.51
1689	21	. # 34	20.59	86	15	36.81
1690	21	. 34	27.68	86	15	36.29
1691	21	34	30.84	86	15	35.49
1692	21	34		86	15	31.31
1693	21	34	35.04 40.31	86	15	30.26
1694	21	34		. 86	15	26.45
1695	21	34	42.91	86	15	24.56
1696	21	34	56.56		15	25.94
1697	21	35	3.86	86		25.80
1698	21	35	17.11	86	15	
1699	21	35	17.05	86	15 45	17.41
1700	21	35	8.19	86	15	4.02
1701	21	35	4.07	86	14	59.57
1702	21	35	2.05	86	14	55.87
1703	21	35	4.20	86	14	44.49
1704	21	35	3.76	86	14	40.62
1705	21	35	4.15	86	14	39.02
1706	21	35	2.69	86	14	36.73
1707	21	35	0.93	86	14	32.15
1708	21	34	58.16	86	14	30.08
1709	21	34	56.50	86	14	28.77
.,						

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(1)	(2)	(3)	(4)	(5)	(6)	(7)
1710	21	34	56.23	86	14	26.79
1511	21	34	54.60	86		25.16
1712	21	34	53.43	86	14	24.33
1713	21	34	53.07	86	14	22.77
1714	21	34	50.88	86	14	19.80
1715	21	34	51.02	86	14	19.15
1716	21	34	50.63	86	14	17.71
1717	21	34	49.15	86	14	12.04
1718	21	34	51.92	86	14	8.58
1719	21	34	53.43	86	14	7.73
1720	21	34	55.24	86	14	5.39
1721	21	34	57.33	86	14	3.71
1722	21	35	0.37	86	13	58.77
1723	21	35	3.22	86	13	56.75
1724	21	35	4.90	86	13	55.16
1725	21	35	5.10	86	13	53.82
1726	21	35	5.37	86	13	48.78
1727	21	35	6.46	86	13	44.28
1728	21	35	7.53	86	13	42.16
1729	21	35	6.68	86	13	38.28
1730	21	35	6.24	86	13	37.31
1731	21	35	4.70	86	13	34.61
1732	21	35	2.39	86	13	13.31
1733	21	34	57.23	86	13	27.62
1734	21	34	55.08	86	13	22.99
1735	21	34	53.23	86	13	21.43
1736	21	34	50.48	86	13	18.02
1737	21	34	47.66	86	13	14.96
1737	21	34	44.83	86	13	12.33
1739	21	34	42.16	86	13	7.87
1740	21	34	38.89	86	13	
1740	21	. 34	35.80	86	13	4.44
1742	21		37.19	86	12	0.66
1743	21	. ≠ 34 34	38.11	86	12	56.77 53.10
1744	21	34	36.97	86		53.19 51.10
1745	21		32.20	86	12	51.19
1746		34 34		86	12	44.59
1747	21 21		26.86	86	12	37.82
1747	21	· 34 34	26.52	86	12 12	32.00 27.50
	21	3 <del>4</del> 34	27.74	86	12	
1749			29.74		12	24.45
1750	21	34	26.67	86	12	18.40
1751	21	34	23.55	86	12	13.91
1752	21	34	21.17	86	12	2.91
1753	21	34	20.75	86	12	0.08
1754	21	34	19.14	86	11	55.92
1755	21	34	20.48	86	11	53.80
1756	21	34	25.21	86	11	47.05
1757	21	34	29.23	86	11	46.49
1758	21	34	32.44	86	11	39.92
1759	21	34	34.29	86	11	36.41
1760	21	34	38.60	86	11	35.39
1761	21	34	45.42	86	11	37.82

			43			
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1814	21	37	35.45	86	11	8.68
1815	21	37	44.30	86	11	4.46
1816	21	37	43.07	86	11	2.05
1817	21	37	47.25	86	10	56.56
1818	21	37	42.29	86	10	49.56
1819	21	37	45.77	86	10	45.87
1820	21	37	49.58	86	10	40.92
1821	21	37	53.10	86	10	34.94
1822	21	37	57.07	86	10	30.35
1823	21	37	53.51	86	10	24.91
1824	21	37	55.15	86	10	17.90
1825	21	38	0.83	86	10	12.42
1826	21	38	5.04	86	10	1.00
1827	21	38	11.23	86	10	11.44
1828	21	38	12.21	86	10	6.53
1829	21	38	16.67	86	10	3.29
1830	21	38	20.28	86	10	5.46
1831	21	38	22.77	86	10	7.18
1832	21	38	26.75	86	10	9.80
1833	21	38	30.59	86	10	7.02
1834	21	38	34.57	86	10	3.74
1835	21	38	36.29	86	10	0.39
1836	21	38	42.84	86	9	55.72
1837	21	38	48.00	86	9	51.30
1838	21	38	52.15	86	9	48.27
1839	21	38	56.28	86	9	 45.44
1840	21	39	3.00	86	9	47.28
1841	21	39	7.30	86	9	45.44
1842	21	39	15.65	86	9	44.13
1843	21	39	20.36	86	9	37.45
1844	21	39	25.85	86	9	38.77
1845	21	<b>"39</b>	26.62	86	9	36.68
1846	21	39	29.37	86	9 9	41.22
1847	21	39	26.21	86	9	46.05
1848	21	39	28.96	86	9	48.55
1849	. 21	39	22.53	86	9	56.58
1850	21	39	27.15	86	10	2.10
1851	21	39	29.83	86	10	1.20
1852	21	39	33.36	86	9	56.05
1853	21	39	49.24	86	9	55.49
1854	21	39	46.94	86	9	48.24
1855	21	39	41.58	86	9	49.55
1856	21	39	42.93	86	9	41.55
1857	21	39	47.52	86	9	38.60
1858	21	39	49.16	86	9	32.17
1859	21	39	56.86	86	9	31.60
1860	21	39	58.94	86	, 9.	29.72
1861	21	39	57.72	86	9	27.05
1862	21	39	59.85	. 86	9	25.38
1863	21	39	58.99	86	9	23.16
1864	21	40	0.50	86	9	18.13
1865	21	40	6.93	86	9	20.50

(1)	(2)	(3)	(4)	(5)	<b>(6)</b>	(7)
1866	21	40	19.38	86	(6) 9	(7)
1867	21 .	40	24.21	86	. 9	25.46
1868	21	40	22.94	86	9	15.83
1869	21	40	24.37	86	9 1	15.38
1870	21	40	30.60	86	9	10.02
1871	21	40	37.03	86	9	10.80
1872	21	40	40.38	86		15.30
1873	21	40	43.50	- 86	9	7.19
1874	21	40	49.76	86	. 9	7.48
1875	21	40	51.69	86	9	6.46
1876	21	40	57.58	86	9	0.32
1877	21	40	55.78	86	8	53.15
1878	21	40	59.30	- 86	8	50.04
1879	21	41	1.68	86	8	41.48
1880	2	41	0.16	86	8	39.64
1881	21	41	9.26		8	36.48
1882	21	41	8.44	86	8	28.22
1883	21	41	11.68	86	8	26.75
1884	21	41	10.37	86	8	23.92
1885	21	41	12.13	86	8	22.04
1886	21	41	6.60	86	8	19.29
1887	21	41	3.28	86	8	14.46
1888	21	40	57.30	86	8	9.42
1889	21	41	1.56	86	8	6.27
1890	21	40	58.90	86	7	55.05
1891	21	40	58.44	86.	7	49.61
1892	21	40		86	7	44.96
1893	21	40	48.04	86	7	41.24
1894	21	40	42.35	86	7	43.20
1895	21	40	47.59 51.40	86	<u>7</u>	30.88
1896	21	40	51.49	86	7	21.88
1897	21	40 40 <i>#</i>	52.92 57.51	86	7	18.31
1898	21	40	57.51 50.64	86	7	20.16
1899	21	40	59.64	86	7	16.39
1900	21	40	55.34	86	7	12.58
1901	21	41	56.34 3.61	86	7	9.00
1902	21	41		86	7	7.38
1903	21	41	6.97 7.38	86	7	6.81
1904	21	41		86	7 7 7	6.03
1905	21	41	8.77 11.50	86	. 7	5.05
1906	21	41	11.59	86	<u>′</u>	3.94
1907	21	41	14.58	86	7	2.63
1908	21	41	17.29	86	7	1.16
1909	21	41	22.23 27.96	86	7	1.20
1910	21	41		.86	7	1.93
1911	21	41	33.69 35.01	86	6	59.97
1912	21	41	35.91	86	7 7	0.99
1913	21	41	38.81	86		2.88
1914	21	41	41.19	86	7	4.36
1915	21	41	41.23	86	7	5.75
1916	21	41	45.25	86		6.57
1917	21	41	47.25	86	. <u>7</u> .	7.14
.517	-1	. ~1	46.88	86	7	9.68

			45			
(4)	(2)	(3)	(4)	(5)	(6)	(7)
(1)	(2)	41	46.47	86	7	13.16
1918	21	41	46.19	86	7 🐣	15.37
1949	21	41	46.27	86	7	19.26
1920	21	41	45.90	86	7	22.09
1921	21	41	45.41	86	7	23.97
1922	21	41	44.92	86	7	26.68
1923	21	41	43.36	86	7	29.91
1924	21	41	43.12	86	, <b>7</b>	35.19
1925	21	41	42.26	86	7 7 7	39.08
1926	21	41	41.85	86	7	41.74
1927	21	41	41.68	86	7	45.18
1928	21 21	41	40.54	86	7	47.77
1929	21	41	40.29	86	7	50.92
1930	21	41	37.71	86	7	53.71
1931	21	41	42.79	86	7	58.83
1932	21	41	44.51	86	8	0.87
1933	21	41	46.19	86	8	4.56
1934 1935	21	41	48.11	86	8	7.96
1936	21	41	50.97	86	8	9.33 10.39
1937	21	41	53.30	86	8	12.15
1938	21	41	55.43	86	8	15.47
1939	21	42	0.72	86	8	16.70
1940	21	42	2.89	86	8 8	13.85
1941	21	42	4.87	86	8	11.06
1942	21	42	5.40	86 86	8 -	8.89
1943	. 21	42	7.00	86	8	6.39
1944	21	42	8.39	86	8	4.10
1945	21	42	10.07	86	8	1.77
1946	21	42	11.55 12.43	86	7	59.07
1947	21	42	17.07	86	7	55.91
1948	21	42	19.57	86	7	55.71
1949	21	42	21.74	86	7	54.31
1950	21	" 42 42	24.04	86	7	50.67
1951	21	42	25.47	86	7	47.64
1952	21 21	42	26.16	86	7	40.31
1953	21	42	28.66	86	7	40.31
1954 1955	21	42	28.17	86	7	37.94 34.70
1956	21	42	30.10	86	7	31.22
1957	21	42	31.53	86	7	30.07
1958	21	42	34.11	86	7 7	28.40
1959	21	42	36.77	86	7	27.54
1960	21	42	38.82	86	7	26.31
1961	21	42	40.99	86	7	24.83
1962	21	42	40.95	86	. 7	24.10
1963	21	42	45.74	86 86	7	24.83
1964	21	42	48.32	86	7	25.08
1965	21	42	50.24 54.17	86	7	25.57
1966	21	42	54.17 58.39	86	7	25.98
1967	21	42	58.84	86	7	27.00
1968	21	42	2.11	86	7	27.58
1969	21	43	2.11	-		

(1)	(2)	(2)	740			
1970		(3)	(4)	(5)	(6)	(7)
	21	43	4.57	86	7	* 28.11
1971	21	43	7.19	86	7	29.34
1972	21	43	8.71	86	. 7	24.83
1973	21	. 43	9.93	86	7	24.50
1974	21	43	11.49	86	7	22.05
1975	21	43	13.05	86	. 7	
1976	21	43	13.74	86	7	18.65
1977	21	43	16.49	86	7	15.82
1978	21	43	18.29	86	7.	13.45
1979	21	43	18.98	86	7	10.34
1980	21	43	20.81	86	7	7.80
1981	21	43	21.34	86	7.	4.96
1982	21	43	23.27	86		4.19
1983	21	43	24.50	86	. 7	0.62
1984	21	43	22.73	86	6	58.54
1985	21	43	20.07	86	6	57.51
1986	21	43	20.81		6.	55.38
1987	21	43	22.32	86	6	52.27
1988	21	43	22.90	86	6	49.98
1989	21	43	23.84	86	6	48.26
1990	21	43		86	6	44.20
1991	21	43	25.44	86	6	42.03
1992	21		26.51	86	6	39.63
1993	21	43	27.65	86	6	36.52
1994		43	28.84	86	6	34.76
1995	21	43	32.16	86	6	34.52
1996	21 21	43	32.61	86	6	31.94
1997		43	33.43	86	6	28.50
1998	21	43	35.64	86	6	26.29
1999	21	43	37.48	86	6	24.57
2000	21	43	39.16	86	. 6	21.29
2001	21	43	40.84	86	6	18.82
	21	43	42.39	- 86	6	16.74
2002	21	43	44.48	86	. 6	13.84
2003	21	43	45.22	86	6	11.46
2004	21	43	46.98	86	6	8.39
2005	21	43	48.29	86	6	6.06
2006	21	43	51.36	86	6	0.77
2007	21	43	52.79	86	-5	58.11
2008	- 21	43	54.28	86		55.28
2009	21	43	56.98	86	5 5 5 5	52.29
2010	21	43	57.39	86	5	50.32
2011	21	43	59.85	86	5	47.01
2012	21	44	3.08	86		45.00
2013	21	44	5.41	86	5 5 5	44.71
2014	21	44	8.94	86	5	
2015	21	44	11.88	86	5	44.63 40.66
2016	21	44	15.08	86	5	40.66
2017	21	44	17.86	86	5	39.51
2018	21	44	20.32	86	5 5	38.49
2019	21	44	22.86	86		37.59
2020	21	44	25.60	86	5	37.18
2021	21	44	28.22	86	5	38.16
	ested.	•••	20.22	00	5	39.47

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1212			40.					(T) (
(1)	40	(2)	(3)	(4)	(5)	(6	)	(7) (
2022		21	44	30.97	86	5		39.15
2023	6.8	21	44	34.00	86	5	.6	40.74
2024		21	44	36.62	86	. 5	4.0	42.87
			44	36.09	86	5		45.53
2025		21						
2026		21	44	35.95	'86	.5		44.61
2027		21	44	35.16	86	5		51.43
2028	1	21	44	34.70	86	5		54.31
2029		21	44	34.06	86	5		56.89
2030		21	44	33.43	86	5		59.97
2031		21	44	32.60	86	6		3.76
2032		21	44	34.90	86	6		4.40
			44	38.05	86	6		5.67
2033		21						
2034		21	44	41.06	86	6		6.72
2035	f	21	44	43.33	86	6		5.93
2036	10	21	44	45.46	. 86	6		1.30
2037		21	44	46.93	86	5		59.71
2038		21	44	48.72	86	5		57.14
2039		21	44	50.73	86	5		55.24
		21	44	52.92	86	. 5		52.88
2040								
2041	Ý	21	.44	54.17	86	5		51.03
2042		21	44	56.64	86	5		49.73
2043		21	44	59.38	86	5		47.84
2044		21	45	2.14	86	5		46.61
2045		21	45	6.42	86	5		43:87
2046		21	45	10.90	86	5		45.59
2047		21	45	9.12	86	5		48.06
								50.22
2048		21	45	12.21	- 86	5		
2049		21	45	12.81	86	5		50.98
2050		21	45	14.71	86	5		51.62
2051		21	45	13.90	86	.5		52.68
2052		21	45	16.44	86	5		52.66
2053		21	45	15.90	86	5		54.01
2054		21	. 45	20.61	86	5		57.50
2055		21	45	22.16	86	- 5		59.66
	5					6		
2056		21	45	25.03	86			1.53
2057		21	45	26.64	86	6		4.05
2058	9 - 5	21	45	29.05	86	6		5.48
2059	*:	21	45	31.24	86	6		6.61
2060	21	21	45	33.82	86	6		8.18
2061		21	45	37.13	86	6		7.57
2062		21	45	40.03	86	6		7.47
	3	21	45	43.72	86	6		6.70
2063								5.69
2064	* .	21	45	48.90	86	6		
2065		21	45	48.90	86	. 6	198	5.58
2066		21	45	51.35	86	6		4.04
2067		. 21	45	54.23	86	6		4.65
2068		21	<b>4</b> 5	56.72	86	6		3.76
2069	. 8	21	46	0.05	86	6		3.42
2070	a 5	21	46	3.13	86	6		3.02
	F		46	5.84	86	6		2.07
2071		21				0		
2072		21	46	8.44	86	6		0.90
2073		21	46	11.14	86	6		0.07

(1)	(2)	(3)	(4)	(5)	(6)	ľ	(7)
2074	21	46	13.62	86	5		58.79
2075	21	46	16.75	86	5		57.70
2076	21	46	20.63	86	5		57.65
2077	21	46	23.13	86	5		57.92
2078	21	46	25.68	86	5		58.89
2079	21	46	28.62	86	5		58.37
2080	21	46	32.05	86	5		57.58
2081	21	46	34.03	86	5		57.59
2082	21	46	35.83	86	.5		55.62
2082	21	46	36.63	86	. 5		52.09
	21	46	37.94	86	5		52.10
2084	21	46	39.73	86	5		47.03
2085	21	46	41.43	86	5		44.53
2086		46	42.92	86	5		42.28
2087	21	46	44.82	86	5		34.36
2088	21	46	46.38	86	5		36.87
2089	21	46	48.53	86	5		33.96
2090	21		49.85	86	5	;	31.40
2091	21	46	51.23	86	5	;	29.02
2092	21	46	52.86	86	5		26.51
2093	21	46	56.14	86	Š	5	24.81
2094	21	46		86	5	, 5	22.32
2095	21	46	58.87	86		5	20.69
2096	21	47	0.61	86		5	18.51
2097	21	47	3.57	86		5	16.63
2098	21	47	4.45	86		5	14.71
2099	21	47	5.51	86	ì	5	12.82
2100	21	47	7.10	86		5 .	9.82
2101	21	47	10.43			5	6.10
2102	21	47	12.94	86 86		5	8.72
2103	21	47	15.16	86		5	10.14
2104	21	47	18.14	86		5	11.92
2105	21	47	21.24	86		5	12.27
2106	21	47 ×	23.93	86	1	5	13.05
2107	21	47	27.43	86		5.	13.71
2108	21	47.	29.72			5	15.06
2109	21	47	33.22	86		5	15.51
2110	21	47	35.97	86		5	16.15
2111	21	47	38.74	86		5	16.74
2112	21	47	40.86	86		5	18.73
2113	21	47	44.65	86		5	18.42
2114	21	47	47.70	86		5	- 18.73
2115	21	47	51.08	86		5	16.43
2116	21	47	51.77	86	8	5	16.41
2117	21	47	55.33	86		5 5	15.61
2118	. 21	47	57.84	86		5	14.39
2119	21	48	10.18	86		5	16.50
2120	21	48	10.21	86 86		5	20.71
2121	21	48	10.34	86 86		5	22.99
2122	21	48	10.86	86 86		5	25.34
2123	21	48	10.86	86		5	37.03
2124	- 21	48	9.89	86		5	41.62
2125	21	48	10.57	86		5	

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(1)	(2)	(3)	(4)	(5)	(6)	(7)
2126	21	48	14.00	.86	5	41.78
2127	<b>⇒</b> 21	48	18.79	86	5	40.20
2128	21	48	19.04	86	5	44.86
2129	21	48	16.80	86	5	46.63
2130	21	48	10.37	86	5	51.61
2131	21	48	4.95	86	5	57.06
2132	21	48	1.35	86	5	56.90
2133	21	47	57.14	86	5	56.29
2134	21	47	53.48	86	5	55.11
2135	21	47	52.55	86	5	55.01
2136	21	47	48.47	86	6	0.82
2137	21	47	46.32	86	. 6	4.19
2138	21	47	43.08	86	6	6.12
2139	21	47	38.84	86	6	7.69
2140	21	47	35.56	86	6	7.02
2141	21	47	33.12	86	6	6.41
2142	21	47	26.57	86	6	
2143	21	47	26.34	86	6	4.29
2144	21	47	20.50	86		4.71
2145	21	47	20.28	86	6	7.37
2146	21	47	14. <del>4</del> 6	86	6	0.69
2147	21	47			6	3.23
2148			10.22	86	6	8.66
	21	47	9.04	86	6	12.99
2149	21	47	5.63	86	6	13.41
2150	21	47	0.14	86	6	14.81
2151	21	46	59.50	86	6	14.02
2152	21	46	54.49	86	6	14.28
2153	21	46	52.43	86	.6	14.50
2154	21	46	51.47	86	6,	16.37
2155	21	46	55.48	86	6	21.54
2156	. 21	46	56.77	86	6	26.77
2157	21	47	3.51	86	6	32.87
2158	21	47,	2.26	86	6	35.18
2159	21	46	55.93	86	6	37.30
2160	21	46	48.55	86	6	39.78
2161	21	46	46.75	86	6	46.84
2162	. 21	46	42.16	86	6	49.15
2163	- 21	46	37.56	86	6	55.90
2164	21	46	31.65	86	7	3.32
2165	21	46	29.66	86	7	6.91
2166	21	46	24.17	86	7	10.70
2167	21	46	23.79	86	7	18.12
2168	21	46	19.13	86	7	16.39
2169	21	46	10.75	86	7	21.04
2170	21	46	7.83	86	7	22.71
2171	21	46	4.13	86	7	20.98
2172	21	46	1.98	86	. 7	
2173	21	45	56.36	86	7 7	23.19
2174	21	45	51.77	86		27.72
2175	21	45	45.99		7 7	31.13
2176	21	45 45		86		34.56
2177			43.48	86	7	36.68
4.111	21	45	43.74	86	7	37.20
		The second secon				

(1) 2178 2179 2180 2181 2182 2183 2184 2185 2186 2187 2188 2189 2190 2191 2192 2193 2194 2195 2196 2197 2198 2199 2200 2201 2202 2203 2204 2205 2206 2207 2208 2209 2210 2211 2212 2213 2214 2215 2216 2217 2218 2219 2210 2211 2212 2213 2214 2215 2216 2217 2218 2219 2220 2221 2221 2222 2223 2224 2225 2226 2227 2228 2228 2229	21 21	45 45	(4) 42.07 47.79 50.61 53.66 59.03 13.86 19.48 28.51 39.02 47.49 54.80 56.96 0.30 4.91 6.72 11.30 15.95 13.46 13.18 5.72 1.50 56.61 50.26 47.85 43.84 47.37 48.61 50.70 54.36 52.64 50.47 44.65 41.64 40.07 33.55 33.76 28.93 22.56 20.83 9.80 7.77 4.97 1.69 0.32 59.74 58.97	86 86	(6) 77 77 77 77 77 77 77 77 77 77 77 77 77		(7) 40.41 46.51 45.71 45.29 50.20 46.32 46.06 44.10 41.91 40.38 40.71 43.80 45.96 49.62 55.20 56.88 8.08 9.29 12.38 15.15 16.87 25.18 24.58 33.85 34.58 33.85 34.58 33.85 34.58 49.23 49.23 49.39 56.42 56.83 1.52 8.47 9.12 15.33 14.75 14.23 19.50 23.81 30.01 33.61 39.31 44.29 55.00 55.00 56
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(1)	(2)	(3)	(4)	(5)	(6)	(7)
2230	21	45	47.66	86	9	57.98
2231 #	21	45	46.71	86	. 10	1 78
2232	. 21	45	42.66	86	10	* 8.06
2233	21	45	36.55	86	10	13.81
2234	21	45	30.08	86	10	9.91
2235	21	45	27.30	86	10	14.66
2236	21	45	25.40	86	10	8.93
2237	21	45	21.35	86	10	7.88
2238	21	45	17.72	86	10	7.38
2239	21	45	12.62	. 86	10	12.83
2240	21	45	21.64	86	10	26.90
2241	21	45	22.36	86	10	30.26
2242	21	45	25.53	86	10	35.81
2243	21	45	30.37	86	10	40.53
2244	21	45	30.16	86	10	42.84
2245	21	45	31.23	86	10	45.39
2246	21	45	32.98	86	10	46.11
2247	21	45	34.88	86	10	37.05
2248	21	45	36.93	86	10	35.78
2249	21	45	39.01	86	10	30.70
2250	21	45	40.99	86	10	24.89
2251	21	45	48.36	86	10	14.67
2252	21	45	55.30	86	10	3.57
2252	21	46	6.52	86	9	49.89
			7.36	86	9	40.51
2254	21	46 46	20.39	86	9	37.81
2255	21	46	23.21	86	9	33.15
2256	21		25.08	86	9	31.90
2257	21	46				29.44
2258	21	46	35.88	86	9 9	30.30
2259	21	46	46.36	86		34.66
2260	21	46	48.82	86	9	
2261	21	46	48.23	86	9	37.24
2262	21	,46	46.48	86	9	44.10 48.61
2263	21	46	40.27	86	9	
2264	21	46	43.59	86	9	57.85
2265	21	46	54.48	86	9	51.06
2266	21	47	0.67	86	9	49.99
2267	21	47	12.02	86	9	47.35
2268	21	47	18.71	86	9	45.72
2269	21	47	25.65	86	9	45.16
2270	21	47	26.18	86	9	38.44
2271	21	47	29.47	86	9	30.88
2272	21	47	36.02	86	9	29.09
2273	21	47	45.29	86	9	26.22
2274	21	47	58.00	. 86	9	24.23
2275	21	48	2.80	86	9	32.64
2276	21	48	4.82	86	9	36.00
2277	21	48	3.22	86	9	48.55
2278	21	48	1.79	86	. 9	53.48
2279	21	48	4.69	86	10	2.71
2280	21	48	7.49	86	10	13.27
2281	21	48	2.44	86	10	21.62

´ ·(1)	(2)	(3)	(4)	(5)	(6)	(7)
2282	21	47	52.46			(7)
2283	21	47		86	10	33.16
2284	21		51.19	86	10	37.60
		47	42.97	86	10	40.11
2285	21	47	43.17	86	10	43.54
2286	21	47	57.87	86	10	53.69
2287	21	47	58.19	86	11	0.62
2288	21	47	52.76	86	11	8.34
2289	21	47	44.67	86	11	7.18
2290	21	47	37.90	86	11	16.94
2291	21	47	32.58	86	11	22.42
2292	21	47	30.34	86	11	24.31
2293	21	47	21.24	86	11	26.99
2294	21	47	18.12	86	11	
2295	21	47	18.31	86		19.90
2296	21	47			11	12.79
2297	21	47	22.12	86	11	3.81
2298			16.42	86	10	55.31
	21	47	11.26	86	10	51.00
2299	21	47	12.64	86	10	42.59
2300	21	47	19.04	86	10	33.25
2301	21	47	19.26	86	10	24.11
2302	21	47	15.45	86	10	18.60
2303	21	47	14.56	86	10	21.84
2304	21	47	9.78	86	10	33.36
2305	21	47	6.25	86	10	36.73
2306	21	46	57.24	86	10	50.02
2307	21	46	50.10	86	10	
2308	21	46	45.56	86		51.19
2309	21	46	48.33	86	10	58.52
2310	21	46	52.71		11	3.40
2311	21	47		86	11	5.07
2312			4.14	86	. 11	14.42
	21	47	6.12	. 86	11	15.87
2313	21	47	16.20	86	11	20.03
2314	21	n 47	21.93	86	11	31.30
2315	21	47	15.63	86	11	34.01
2316	21	47	12.36	86	11	36.18
2317	21	47	0.83	86	11	41.76
2318	21	47	6.24	86	11	56.66
2319	21	47	6.89	86	11	56.22
2320	21	47	18.49	86	11	53.74
2321	21	47	25.99	86 '	11	50.31
2322	21	47	30.54	86	11	45.53
2323	21	47	34.41	86	11	41.69
2324	21	47	39.36	86	11	38.81
2325	21	47	45.71	86		
2326	21	47	47.81		11	25.54
2327	21	47		86	. 11	23.64
2328			54.43	86		8.13
	21	47	59.89	86	11	3.85
2329	21	48	5.09	86	11	1.17
2330	21	48	12.01	86	. 11	2.94
2331	21	48	11.67	86	10	50.89
2332	21	48	11.91	86	10	33.55
2333	21	48	14.45	86	10	29.44

(1)	(2)	(3)	(4)	(5)	(6)	(7)
2334	21	48	16.29	86	10	30.76
2335		48	24.06	86	10	*33.38
2336	21	48	28.20	86	10	26.15
2337	21	48	26.91	86	10	23.67
2338	21	48	23.04	86	10	16.75
2339	21	48	19.51	86	10	11.39
2340	21	48	20.73	86	10	9.38
2341	21	48	23.38	86	10	4.84
2342	21	48	24.16	86	10	4.39
2343	21	48	26.23	86	10	4.19
2344	21	48	33.25	86	10	3.27
2345	21	48	38.68	86	10	4.12
2346	21	48	43.81	- 86	10	2.36
2347	21	48	55.89	86	9	53.33
2348	21	48	48.83	86	9	41.96
2349	21	48	44.39	86	9	31.24
2350	21	48	38.37	86	9	32.71
2351	21	48	29.90	86	9.	33.92
2352	21	48	23.28	86	9	35.21
2353	21	48	16.70	86	9	
2354	21	48	14.80	86		31.71
2355	21	48	14.29	86	9	29.44
2356	21	48	7.16	86	9	29.37
2357		48			9	27.81
	21		4.86	86	9	26.76
2358	21	47	58.88	86	9	21.94
2359	21	47	58.54	86	9 9	20.51
2360	21	47	58.95	86	9	19.77
2361	21	48	0.72	86	9	17.32
2362	21	48	5.47	86	9	12.06
2363	21	48	11.27	86	9	5.82
2364	21	48	7.61	86	.8	57.00
2365	21	48	3.77	86	8	46.85
2366	21	48″	2.75	86	. 8	45.80
2367	21	47	53.79	86	8	37.89
2368	. 21	47	55.08	86	8	31.78
2369	21	47	55.93	86	8	27.50
2370	21	47	56.81	86	8	25.10
2371	21	48	0.92	86	8	14.13
2372	21	47	55.46	86	8	10.23
2373	21	47	58.68	86	8	4.05
2374	21	47	56.44	86	8 7	2.05
2375	21	47	50.64	86	7	53.43
2376	21	47	52.16	86	7	48.17
2377	21	47	54.10	86	7	41.01
2378	21	47	53.15	86	. <u>7</u>	37.58
2379	21	47	59.87	86	7	23.06
2380	21	47	57.70	86	<u>7</u>	17.59
2381	21	47	57.70	86	7	14.71
2382	21	47	57.97	86	7	10.88
2383	21	47	57.90	86	7	8.74
2384	21	48	0.92	86	7	6.97
2385	21	48	4.25	86	7	5.99

(1)	(2)	(3)	(4)	(5)	(6)	(7)
		48				(7)
2386	21		9.20	86	7	3.85
2387	21	48	19.58	86	7	3.88
2388	21	48	21.28	<b>8</b> 6	6	59.61
2389	21	48	24.37	86	6 .	59.78
2390	21	48	38.45	86	7	0.39
2391	21	48	45.04	86	7	0.97
2392	21	48	49.04	86	7	5.78
2393	21	48	51.28	86	.7	8.16
2394	21	49	4.72	86	7	8.70
2395	21	49	13.24	86	7.	6.36
2396	21	49	14.09	86	7	1.20
2397	21	49	9.27	86	6	59.07
2398	21	48	58.58	86	6	54.08
2399	21	48	52.57	86	6	48.99
2400	21	48	50.10	86	6	44.39
2401	21	48	48.36	86	6	40.30
2402	21	48	38.28	86	6	35.99
2403	21	48	35.13	86	6	37.75
2404	21	48	28.51	86	ő	41.08
2405	21	48	22.50	86	6	44.40
2406	21	48	19.48	86	6	41.99
2407	21	48	15.75	86	6	
						36.50
2408	21	48	15.14	86	6	34.12
2409	21	48	14.66	86	6	29.27
2410	21	48	20.60	86	6	21.87
2411	21;	48	23.52	86	6	20.55
2412	21	48	25.15	86	6	20.41
2413	21	48	25.01	86	6	18.65
2414	21	48	22.27	86	6	15.46
2415	21	48	26.24	86	6	10.26
2416	21	48	29.97	86	6	9.18
2417	21	48	39.10	86	6	4.70
2418	21	48	48.09	86	6	8.30
2419	21	48	51.11	86	6	15.32
2420	21	48	55.12	86	6	17.90
2421	21	48	55.97	86	6	17.09
2422	21	48	55.12	86	6	13.39
2423	21	48	57.70	86	6	5.31
2424	21	48	58.95	86	6	1.61
2425	21	49	0.89	86	6	1.78
2426	21	49	6.01	86	6	1.41
2427	21	49	9.78	86	6	1.47
2428	21	49	12.15	86	6	5.78
2429	21	49	21.76	86	6	4.87
2430	21	49	21.04	86	6	1.98
2431	21	49	23.32	86	5	59.61
2432	21	49	21.35	86	5	56.25
2432	21	49	22.13	86	5	44.61
2434	21	49	16.67	86	5	38.30
2435		49 49	18.60	86	5	36.29
2435	21	49 49		86		34.63
	21	49 49	13.54	86	5	
2437	21	49	9.17		5	33.17

(1)	(2)	(2)	' (4)	(5)	(0)	(7)
	(2)	(3)	(4)	(5)	(6)	(7)
2438	ى <b>21</b>	49	4.25	86	5	29.03
2439	21	48	54.68	86	5	27.67
2440	21	48	51.42	86	5	26.69
2441	21	48	49.28	86	5	26.49
2442	21	48	48.16	86	5	24.08
2443	21.	48	47.48	86	5	23.06
2444	21	48	46.84	86	5	21.70
2445	21	48	47.55	86	5	15.46
2446	21	48	49.25	86	5	13.79
2447	21	48	50.16	86	5	9.48
2448	21	48	49.64	86	5 5	5.54
2449	21	48	49.51	86	5	5.00
2450	21	48	50.55	86	5	3.82
2451	21	48	51.73	86	5	2.52
2452	21	48	52.66	86	5	1.05
2453	21	48	54.17	86	4	58.38
2454	21	48	55.73	86	4	57.53
2455	21	48	57.84	86	4	56.62
2456	21.	48	59.36	86	4	53.44
2457	21	49	0.60	86	4	53.66
2458	. 21	49	1.43	86	4	52.52
2459	21	49	5.14	86	4	48.35
2460	21	49	8.02	86	4	47.71
2461	21	49	12.43	- 86	4	46.53
2462	21	49	14.86	86	4	46.19
2463	21	49	19.58	86		
2464	21	49	21.66		4	45.67
2465	21	49	25.54	86	4	45.72
2466	21	49		86	4	47.82
2467			30.34	86	4	49.42
	21	49	32.29	86	4	48.61
2468	21	49	34.03	86	4	48.63
2469	21	49#	37.23	86	4	52.17
2470	21	49	36.52	86	4	58.63
2471	. 21	49	38.06	86	5	0.01
2472	21	49	41.72	86	. 5	3.29
2473	21	49	43.04	86	5 5	6.12
2474	21	49	41.12	86	5 5	8.92
2475	21	49	39.35	86	5	14.38
2476	21	49	42.43	86	5 5 5 5 5 5	16.69
2477	21	49	42.27	86	5	18.80
2478	21	49	42.07	86	5	22.83
2479	21	49	41.95	86	5	25.18
2480	21	49	43.28	86	5	25.91
2481	21	49	46.54	86	5	28.01
2482	21	49	50.82	86	5	27.91
2483	21	49	52.62	86	5	25.62
2484	21	49	56.55	86	5	25.10
2485	21	49	58.84	86	5	24.63
2486	21	50	4.34	86	5	28.66
2487	21	50	4.89	86	5	22.51
2488	21	50	5.44	86	5	19.77
2489	21	50	7.75	86	5	18.19
		1	• • • •	100		. 0. 10

					100	
' (1)	(2)	(3)	(4)	(5)	(6)	(7)
						16.51
2490	21	50	8.54	86	5	
2491	21	50	8.64	86	5	13.72
2492	. 21	50	8.78	86	5	8.80
2493	21	50	8.96	86	5	4.42
2494	21	50	6.55	86	5	4.52
2495	21	50	6.98	86	5	1.48
2496	21	50	8.94	86	4	58.81
2497	21	50	8.33	86	4	57.82
2498	21	50	8.64	86	4	55.67
2499	21	50	9.10	86	4	56.48
			7.58	86	4	51.49
2500	21	50		***		
2501	21	50	6.96	86	4	52.49
2502	21	50	5.90	86	4	51.89
2503	21	50	8.60	86	4	45.25
2504	21	50	12.71	86	4	42.80
2505	21	50	15.94	86	4	39.73
2506	21	50	18.43	86	4	39.04
2507	21	50	23.45	86	4	41.11
2508	21	50	25.82	86	4	39.81
2509	21	50	28.37	86	4	40.49
			35.54	86	4	43.06
2510	21	50				
2511	21	50	37.23	86	4	43.29
2512	21	50	40.95	86	4	46.40
2513	21	50	42.15	86	4	49.11
2514	21	50	42.57	86	4	49.11
2515	21	50	44.37	86	4	51.11
2516	21	50	45.85	86	4	52.69
2517	21	50	44.76	86	4	57.60
2518	21	50	48.08	86	5	0.08
2519	21	50	49.87	86	5	4.98
	21	50	51.14	86	5	8.88
2520						
2521	21	50	51.94	86	5	9.19
2522	21	. # 50	50.33	. 86	5	11.51
2523	21	<b>50</b> a	47.91	86	5	14.07
2524	21	50	40.57	86	5	17.52
2525	21	50	36.21	86	5	18.89
2526	21	50	33.35	86	5	20.10
2527	21	50	30.70	86	5	26.63
2528	21	50	34.06	86	5	27.03
2529	21	50	37.57	86	5	30.11
2530	21	50	37.96	86	5	36,18
		50	35.79	86	5	43.90
2531	21					46.61
2532	21	50	36.11	86	5	
2533	21	50	34.23	86	5	49.91
2534	21	50	32.33	86	5	53.60
2535	21	50	33.92	86	5	55.25
2536	21	50	34.85	86	5	57.62
2537	21	50	39.15	86	5	53.24
2538	21	50	45.59	86	5	52.57
2539	21	50	52.53	86	5	51.38
2540	21	51	3.44	86	5	57.64
2541	21	51	10.19	86	5	57.16
2041	21	31	10.19	00	3	57.10

(1) (2) (3) (4) (5) (6) (7)  2542 21 51 16.88 86 5 5,70.66  2543 21 51 19.82 86 5 43.021  2544 21 51 29.55 86 5 43.21  2546 21 51 35.06 86 5 44.06  2547 21 51 35.75 86 5 5 41.02  2548 21 51 35.75 86 5 5 41.17  2549 21 51 37.35 86 6 5 5 41.25  2550 21 51 37.35 86 6 6 2.24  2551 21 51 39.96 86 6 6 2.24  2551 21 51 39.96 86 6 6 6.42  2552 21 51 49.78 86 6 6 12.75  2554 21 51 55.76 86 6 12.75  2555 21 52 3.94 86 6 15.15  2556 21 52 3.94 86 6 18.67  2557 21 52 5.89 86 6 18.67  2558 21 52 4.38 86 6 2.279  2559 21 52 4.38 86 6 3 2.279  2560 21 52 4.38 86 6 3 33.84  2560 21 52 4.38 86 6 3 33.84  2560 21 52 20.37 86 6 30.00  2560 21 52 23.11 86 6 30.00  2560 21 52 20.37 86 6 30.00  2560 21 52 20.37 86 6 30.00  2560 21 52 20.37 86 6 30.00  2560 21 52 20.37 86 6 30.00  2560 21 52 20.37 86 6 30.00  2560 21 52 20.37 86 6 30.00  2560 21 52 20.37 86 6 30.00  2560 21 52 20.37 86 6 30.00  2560 21 52 20.37 86 6 30.00  2560 21 52 20.37 86 6 30.00  2560 21 52 20.37 86 6 30.00  2560 21 52 20.37 86 6 30.04  2560 21 52 20.37 86 6 30.04  2560 21 52 20.37 86 6 30.04  2560 21 52 20.37 86 6 30.04  2560 21 52 34.37 86 6 30.04  2560 21 52 37.52 86 6 36.04  2560 21 52 37.52 86 6 36.04  2560 21 52 37.52 86 6 35.51  2560 21 52 34.37 86 6 36.04  2560 21 52 37.52 86 6 35.51  2577 21 52 52.69 86 6 35.51  2577 21 52 52.69 86 6 35.51  2577 21 52 52.69 86 6 35.51  2577 21 52 52.69 86 6 35.51  2577 21 52 52.69 86 6 55.72  2578 21 52 52.69 86 6 55.72  2579 21 52 52.69 86 6 55.72  2579 21 53 31.30 86 6 50.37  2570 21 52 52.69 86 6 50.37  2570 21 52 52.69 86 6 50.37  2570 21 52 52.69 86 6 50.37  2570 21 52 52.69 86 6 50.37  2570 21 52 52.69 86 6 50.37  2570 21 52 52.69 86 6 50.37  2570 21 52 52.69 86 6 50.37  2570 21 52 52.69 86 6 50.37  2570 21 52 52.69 86 6 50.37  2570 21 52 52.69 86 6 50.37  2570 21 52 52.69 86 6 50.37  2570 21 52 52.69 86 6 50.37  2570 21 52 52.69 86 6 50.37  2570 21 52 52.69 86 6 6 6.50  2570 21 53 31.30 86 6 6 6.50  2580 21 53 31.30 86 6 6 6.50  2580 21 53 31.30 86 6 6 6.50  2580 21 53 31.30 86 6 6 6.50  2580 21 53 31.30 86 6 6 6	2542 21 51 16.88 86 5 57 2543 21 51 19.82 86 5 43 2544 21 51 23.85 86 5 43 2545 21 51 29.55 86 5 44 2546 21 51 35.06 86 5 44 2547 21 51 35.75 86 5 5 49 2548 21 51 33.73 86 6 6 22 2548 21 51 37.35 86 6 6 22 2550 21 51 39.96 86 6 6 6.2 2551 21 51 39.96 86 6 6 6.2 2551 21 51 39.96 86 6 6 9.5 2552 21 51 49.78 86 6 15 2553 21 51 55.76 86 6 15 2554 21 51 55.76 86 6 12 2555 21 52 3.94 86 6 18. 2555 21 52 3.94 86 6 18. 2556 21 52 4.38 86 6 22 2557 21 52 2.3 9.4 2560 21 52 2.3 9.4 2560 21 52 2.3 9.4 2560 21 52 2.3 9.4 2560 21 52 2.3 9.4 2560 21 52 2.3 9.4 2560 21 52 3.94 2560 3.36 2561 21 52 3.94 2562 21 52 3.94 2563 21 52 3.94 2564 21 52 3.94 2565 3.36 2567 21 52 3.94 2568 3.6 2567 3.1 2575 3.1 2575 3.1 2575 3.1 2577 21 52 52 58.86 2577 21 52 52.69 2577 21 53 0.93 266 6 55.72 2577 21 53 0.93 266 6 55.72 2577 21 53 0.93 266 6 55.72 2577 21 53 0.93 266 6 54.17 2577 21 53 0.93 266 6 55.72 2577 21 53 0.93 266 6 55.72 2577 21 53 0.93 266 6 55.72 2577 21 53 0.93 266 6 55.72 2577 21 53 0.93 266 6 6 6 6.60 267.25 2577 21 53 0.93 266 6 6 6.60 267.25 2577 21 53 0.93 266 6 6 6.60 26.73 2757
2592 21 53 24.27 86 6 58.31	2578       21       53       3.14       86       6       55.74         2579       21       53       3.33       86       6       57.41         2580       21       53       5.18       86       6       54.10         2581       21       53       9.08       86       6       50.52         2582       21       53       8.71       86       6       49.80         2583       21       53       11.33       86       6       49.80         2584       21       53       23.67       86       6       49.90         2585       21       53       14.55       86       6       52.63         2586       21       53       12.55       86       6       58.59         2587       21       53       11.35       86       7       2.91         2588       21       53       14.09       86       7       6.31         2589       21       53       17.90       86       7       3.11         2590       21       53       19.37       86       7       0.97          2591       21       5
2593 21 53 24.87 86 6 54.15	2591 21 53 21.58 86 6 58.31 2592 21 53 24.27 86 6 54.15

			00			
(1)	(2)	(3) 53	(4)	(5) 86	(6) 6	(7)
2594	(2) 21		27.92		6	54.72
2595	21	53	30.94	86	6	55.90
2596	21	53	31.46	86	6	56.20
2597	21	53	30.75	86	6	58.20
2598	21	53	30.39	86	7 7	0.31
2599	21	53	29.88	86	7	2.52 3.56
2600	21	53	29.58	86	7	7.30
2601	21	53	31.26	86	7	11.82
2602	21	53	33.77	86	7	15.41
2603	21	53	35.24	86	7	19.45
2604	21	. 53	36.93	86 86	7	23.80
2605	21	53	38.38		7	27.11
2606	21	53	44.34	86	7	22.79
2607	21	53	46.04	86 86	7	21.50
2608	21	53	45.63	86	7	18.42
2609	21	53	47.65	86	7	14.61
2610	21	53	45.00 46.94	86		13.06
2611	21	53	46.9 <del>4</del> 47.05	86	7 7	11.60
2612	21	53	48.84	86	7	12.59
2613	21	53	50.09	86	7	11.69
2614	21	53 53	52.57	86	7	13.25
2615	21	53 53	52.37 58.17	86	, 7	11.30
2616	21	53	56.27	86	7	8.52
2617	21 21	53	56.82	86	7	5.60
2618	21	53 53	57.58	86	7.	4.12
2619	21	54	1.55	86	7	4.28
2620	21	54	4.47	86	7	3.81
2621 2622	21	54	8.65	86	7	6.13
2623	21	54	10.45	86	7	8.33
2624	21	54	11.39	86	7	11.43
2625	21	54 "	13.28	86	7	15.64
2626	21	54	9.94	86	7	16.26
2627	21	54	0.86	86	7	19.39
2628	21	54	0.68	86	7	21.32
2629	21	54	0.75	86	7	23.80
2630	21	54	4.50	86	7 7	26.22
2631	21	54	5.37	86		33.11
2632	21	54	7.58	86	7	35.43
2633	21	54	15.02	86	7	35.43
2634	21	54	19.59	86	7	39.02
2635	21	54	19.80	86	7	43.86
2636	21	54	23.46	86	7	48.65
2637	21	54	27.34	86	7	55.80
2638	21	54	28.33	86	7	57.13
2639	21	54	30.24	86	8	0.72
2640	21	54	27.33	86	8	3.30 14.37
2641	21	54	23.47	86	8	16.00
2642	21	54	25.07	86 86	8	11.42
2643	21	54	28.05	86 86	8	7.09
2644	21	54	31.55	86	8	5.21
2645	21	54	34.25	86	J	0,41

W045074.000001				59		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
2646	21	54	38.76	86	8	
2647	21	54	43.53	86	8	4.53
2648	21	54	45.70	86	8	5.42
2649	21	54	49.28	86	8	8.80
2650	21	<b>54</b> ·	45.30	86	8	11.21
2651	21	.54	42.35	86	8	14.41
2652	21	54	41.96	86	8	17.59
2653	21	54	40.27	86	8	18.61
2654	21	54	39.45	86	8	21.86
2655	21	54	42.66	86	8	26.99
2656	21	54	51.09	86		31.09
2657	21	54	53.09	86	8.	40.71
2658	21	54	56.06	86	8	46.76
2659	21	54	58.86	86	8	53.94
2660	21	54	58.69	86	9	0.19
2661	21	54	59.88	86	9	1.43
2662	21	54	50.29	86	. 9	4.10
2663	21	54	50.63	86	9	5.02
2664	21	54	51.32	86	9	7.16
2665	21	54	51.52	86	. 9	15.20
2666	21	54	50.46	86	9	15.57
2667	21	54	40.78	86	9	26.70
2668	21	54	41.94	86	9	24.60
2669	21	54	41.08	. 86	9	29.90
2670	. 21	54	40.53	86	9	34.42
2671	21	54	34.04	86	9	38.40
2672	21	54	36.46	86	9	41.82
2673	21	54	38.66	86	9	47.54
2674	21	54	38.47	86	9	55.38
2675	21	54	37.45		9	59.20
2676	21	54	35.99	86 86	10	0.52
2677	21	54	32.09	86	10	1.51
2678	21	54	31.32		10	3.19
2679	21	54	24.39	86	10	0.99
2680	21	54	23.18	86	9	59.91
2681	21	54	18.64	86	9	56.42
2682	21	54	16.77	86	9	54.61
2683	21	54	22.10	86	9	59.39
2684	21	54		86	10	3.60
2685	21	54	25.76	86	10	5.88
2686	21	54 .	32.12	86	10	10.37
2687	21	54	35.50	86	10	15.18
2688	21	54	36.10	86	10	16.97
2689	21	54	34.15	86	10	17.68
2690	21	5 <del>4</del>	32.91	86	10	18.10
2691	21		26.78	86	10	16.78
2692	21	54 54	24.08	86	10	19.03
2693	21	54 54	20.34	86	10	21.70
2694	21	54·	20.53	86	10	24.78
2695	21	54	21.61	86	10	25.83
2696	21	54	22.19	86	10	30.23
2697		54	24.58	86	10	28.52
2001	21	54	24.33	86	10	38.81

	(2)	(3)	(4)	(5)	(6)	(7)
(1)	(2) 21	54	24.58	86	10	· 40.10
2698		54	13.14	86	10	40.16
2699	21	54	10.66	86	10	43.93
2700	21	54	9.01	86	10	45.49
2701	21	54	6.45	86	10	43.27
2702	21	5 <del>4</del>	5.38	86	. 10	45.80
2703	21	54	4.03	86	10	52.21
2704	21		7.63	86	10	57.51
2705	21	54 54	11.07	86	11	0.51
2706	21	54	13.58	86	11	2.71
2707	21	54	11.35	86	11	7.28
2708	21	54	10.33	86	11	10.64
2709	21	54	3.37	86	11	12.59
2710	21	54	50.11	86	11	10.39
2711	21	53	49.09	86	11	10.42
2712	21	53		86	11	12.31
2713	21	53	44.47	86	11	9.62
2714	21	53	38.56	86	11	7.91
2715	21	53	33.20	86	11	9.37
2716	21	53	30.72	86	11	10.47
2717	21	53	27.78	86	11	12.42
2718	21	53	25.44	86	11	12.64
2719	21	53	26.43		11	16.08
2720	21	53	30.69	86	11	18.50
2721	21	53	31.63	86	11	19.74
2722	21	53	31.60	.86	11	24.11
2723	21	53	33.69	86	11	27.69
2724	21	53	33.86	86		32.78
2725	21	53	34.08	86	11	22.39
2726	21	53	53.56	86	11	26.61
2727	21	54	1.25	86	11 11	27.17
2728	21	54	8.09	86	11	26.33
2729	21	. 54	12.99	86	11	30.45
2730	21	54	18.55	86	11	29.89
2731	21	54	26.14	86	11	38.45
2732	21	54	35.05	86	11	42.23
2733	21	54	40.26	86	11	44.04
2734	21	54	46.48	86	11	45.79
2735	21	54	51.35	86	11	40.79
2736	21	54	54.29	86	11	42.11
2737	21	54	59.07	86	11	41.48
2738	21	55	7.57	86	11	37.48
2739	21	55	12.97	86	11	39.76
2740	21	55	16.60	86	. 11	34.98
2741	21	55	16.25	86	11	32.67
2742	21	55	19.09	86	11	26.71
2743	21	55	16.81	86	11	21.02
2744	21	55	11.85	86		20.52
2745	21	55	9.19	86	.11 41	17.21
2746	21	55	9.10	86	11	14.46
2747	21	55	8.91	86	11	12.30
2748	21	55	11.50	86	11	10.55
2749	21	55	12.07	86	11	10.00

			6	51		50	
(1)	(2)	(3)	(4)	(5)	(6)		(7)
2750	21	55	9.58	86	11		(7) 5.72
2751	21	55	9.97	86	11	.4	4.49
2752	21	55	6.76	86	11		3.68
2753	21	55	5.54	86	11		1.40
2754	21	55	8.35	86	10		58.34
2755	21	55	4.38	86	10		55.03
2756	21	55	4.94	86	10		54.12
2757	. 21	55	5.60	86	10		44.50
2758	21	55	5.88	86	10		41.41
2759	21	55	7.60	86	10		35.97
2760 2761	21	55 55	5.88	86	10		32.47
2762	21 21	55 55	5.38	86	10		30.57
2763	21	55 55	8.72 11.38	86	10		27.63
2764	21	55	17.31	86 86	10 10		31.29
2765	21	55	21.81	86	10		21.17 16.82
2766	- 21	55	20.53	86	10		13.86
2767	21	55	17.91	86	10		10.95
2768	21	55	19.78	86	10		7.08
2769	21	55	15.75	86	10		4.98
2770	21	55	15.28	86	10		0.33
2771	21	55	14.28	86	. 9		59.52
2772	21	55	10.66	86	9 -		52.52
2773	21	55	11.91	86	9		44.96
2774	21	. 55	11.69	86	9		38.49
2775	21	55	19.72	86	. 9		36.53
2776	21	55	24.94	86	9		34.68
2777 2778	21 21	55 55	27.62	86	9		33.37
2779	21	55 55	29.47 30.31	86 86	9		33.59
2780	21	55	30.56	86	9 9		27.31
2781	21	. # 55	33.56	86	9		26.03 25.90
2782	21	55	37.18	86	9		27.28
2783	21	55	38.43	86	9		27.03
2784	21	55	38.81	86	9		25.87
2785	21	55	35.99	. 86	9		22.25
2786	21	55	35.40	86	9		21.09
2787	21	55	37.68	86	9		20.59
2788	21	55	40.96	86	9 -	*	21.87
2789	21	55	44.37	86	9		20.44
2790	21	55	40.34	86	9		15.72
2791 2792	21	55	35.46	86	9		12.00
2792	21	55 55	38.49	86	9		10.57
2794	21 21	55 55	39.40	86	9		6.69
2795	21	55	40.81 42.24	86 86	9 .		4.19
2796	21	55	45.49	86	9		4.72 4.38
2797	21	55	48.87	-86	9		3.97
2798	21	55	51.18	86	9		4.07
2799	21	55	58.42	86	9		7.97
2800	21	56	1.07	86	9	673	3.58
2801	21	55	55.46	86	8		56.10
			70				

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			62			
(1) 2802 2803 2804 2805 2806 2807 2808 2809 2810 2811 2812 2813 2814 2815 2816 2817 2818 2819 2820 2821 2822 2823 2824 2825 2826 2827 2828 2829 2830 2831 2832 2833 2834 2835 2836 2837 2838 2839 2840 2841 2842 2843 2844 2845 2846 2847 2848 2849 2850 2851 2852 2853	(2) 21 21 21 21 21 21 21 21 21 21 21 21 21	(3) 55 56 56 56 56 56 56 56 56 56 56 56 56	(4) 57.89 2.08 9.17 13.14 15.42 18.26 18.76 17.32 15.45 11.39 12.77 13.47 17.52 22.58 24.27 25.07 29.19 28.93 31.23 32.59 35.05 34.46 36.78 39.15 47.16 52.48 58.29 58.12 58.84 59.51 1.44 7.25 10.69 14.45 18.74 20.22 21.65 21.57 24.33 25.05 23.72 18.54 20.84 18.85 15.98 23.45 30.36 30.69 31.14 27.44 29.91 26.92	(5) 86 86 86 86 86 86 86 86 86 86 86 86 86	(6) 8 8 8 8 8 9 9 9 9 9 9 9 9 9 9 9 9 9 9	(7) 53.38 51.89 51.70 50.95 53.85 58.23 2.66 5.88 9.29 11.32 13.71 19.56 18.81 19.52 16.80 13.40 12.63 14.99 14.53 17.88 20.34 23.48 22.52 22.63 23.12 22.52 25.86 25.63 22.22 17.96 9.05 9.21 6.33 58.53 59.38 3.71 8.49 17.68 23.74 24.52 25.79 30.79 38.80 45.54 53.92 54.23 57.51 59.11 5.45 9.94 14.32 18.01

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(1)	(2)	(3)	(4)	(5)	(6)	(7)
2854	21	57	22.27	86	10	23.63
2855	21	57	27.66	86	10	26.60
	21	57	35.24	86	10.	30.10
2856		57	40.61	86	10	32.91
2857	21				10	39.61
2858	21	57	40.03	86		42.53
2859	21	57	40.26	86	10	
2860	21	57	40.76	86	10	44.79
2861	21	57	38.77	86	10	49.11
2862	21	57	34.35 -	86	. 10	59.21
2863	21	57	39.57	86	11	4.57
2864	21	57	41.30	86	11	6.64
2865	21	57	42.17	86	11	12.08
2866	21	57	43.37	86	· · · 11	17.28
2867	21	57	40.34	86	11	21.39
2868	21	57	39.12	86	11	22.32
2869	21	57	37.27	86	11	22.22
	21	57	34.28	86	11	26.83
2870	21	57	29.06	86	11	29.40
2871			17.33	86	11	28.78
2872	21	57 57	11.65	86	11	27.30
2873	21	-57			11	32.18
2874	21	57	9.66	86		33.72
2875	21	57	8.16	86	11	38.61
2876	21	57	3.95	86	11	
2877	21	57	0.84	86	11	42.10
2878	21	56	59.72	86	11	44.61
2879	21	56	59.37	86	11	46.31
2880	21	56	57.62	86	11	49.21
2881	21	56	51.64	86	12	1.94
2882	21	56	47.26	86	12	3.03
2883	21	56	41.02	86	12	2.71
2884	21	56	38.36	86	12	8.87
2885	21	56	36.85	86	12	8.20
	21	· # 56	33.07	86	12	8.42
2886		56	31.78	86	12	6.66
2887	21		27.60	86	12	5.24
2888	21	56				9.49
2889	21	56	26.29	86	12 12	13.72
2890	21	56	25.29	86		16.90
2891	21	56	28.22	86	12	19.93
2892	21	56	32.65	86	12	
2893	21	56	35.93	86	12	20.53
2894	21	56	37.84	86	12	23.93
2895	21	56	40.05	86	12	28.51
2896	21	56	36.95	86	12	34.37
2897	21	56	32.20	. 86	12	34.32
2898	21	56	27.70	86	12	34.12
2899	21	56	24.35	86	12	37.60
2900	21	56	23.21	86	12	38.66
2900	21	56	24.45	86	12	42.50
		56	23.05	86	12	43.99
2902	21	56	12.47	86	12	44.39
2903	21		12.67	86	12	52.12
2904	21	56		86	12	54.50
2905	21	56	11.94	00	14	<del>01.00</del>

(1) (2) (3) (4) (5) (6) (7) (2) (2906 21 56 12.37 86 13 4.59 2907 21 56 14.01 86 13 11.23 2908 21 56 15.20 86 13 20.92 2909 21 56 16.89 86 13 20.92 2910 21 56 17.06 86 13 30.09 2911 21 56 13.16 86 13 30.09 2911 21 56 13.16 86 13 32.46 2913 21 56 6.85 86 13 32.46 2913 21 56 5.26 86 13 32.46 2913 21 56 5.26 86 13 36.86 2914 21 56 5.26 86 13 36.86 2914 21 56 6.45 86 13 36.86 2915 21 56 5.26 86 13 36.86 2916 21 56 5.26 86 13 36.86 2917 21 56 5.26 86 13 36.86 2917 21 56 5.26 86 13 53.84 20.917 21 56 5.26 86 13 36.86 2917 21 56 5.26 86 13 53.84 20.917 21 56 5.26 86 13 56.59 2918 21 55 59.59 86 13 56.59 2919 21 55 59.59 86 13 56.59 2919 21 55 59.59 86 13 56.59 2920 21 55 59.47 86 14 1.39 2921 21 56 5.60 14 6.53 2922 21 55 59.34 86 14 9.04 2923 21 55 56.71 86 14 13.86 2923 21 55 56.71 86 14 13.86 2923 21 55 56.71 86 14 13.86 2925 21 55 55.59 86 14 20.10 2927 21 55 55.59 86 14 20.10 2927 21 55 55.59 86 14 20.10 2927 21 55 55.59 86 14 20.10 2927 21 55 55.59 86 14 20.10 2927 21 55 55.59 86 14 20.10 2928 21 55 56.71 86 14 20.10 2927 21 55 55.59 86 14 20.10 2927 21 55 55.59 86 14 20.10 2927 21 55 55.59 86 14 20.10 2927 21 55 55.59 86 14 20.10 2927 21 55 55.59 86 14 20.10 2927 21 55 55.59 86 14 20.10 2927 21 55 55.59 86 14 20.10 2927 21 55 55.59 86 14 20.10 2927 21 55 55.59 86 14 20.10 2929 21 55 30.54 86 14 20.10 2929 21 55 30.54 86 14 20.10 2929 21 55 30.54 86 14 20.10 2929 21 55 30.54 86 14 20.90 2929 21 55 30.54 86 14 20.90 2929 21 55 30.54 86 14 20.90 2929 21 55 30.54 86 14 20.90 2929 21 55 30.54 86 14 20.90 2929 21 55 30.54 86 14 20.90 2929 21 55 30.54 86 14 20.90 2929 21 55 30.54 86 14 20.90 2929 21 55 30.54 86 14 20.90 2929 21 55 30.54 86 14 20.90 2929 21 55 30.54 86 14 20.90 2929 21 55 30.54 86 14 20.90 2929 21 55 30.54 86 14 30.90 2929 21 55 30.54 86 14 30.90 2929 21 55 30.54 86 14 30.90 2929 21 55 30.54 86 14 30.90 2929 21 55 30.54 86 15 30.54 86 15 30.77 80.90 2929 21 55 30.54 86 15 30.77 86 14 30.90 2929 21 55 30.54 86 15 30.77 86 14 30.90 2929 21 55 30.54 86 15 30.77 86 14 30.90 2929 21 55 30.54 86 15 30.77 86	•	147	(0)	(4)	(5)	(6)	(7)
2906	(1)	(2)	(3)	12 37	86		4.59
2907 21 56 15.20 86 13 16.97 2908 21 56 16.89 86 13 20.92 2910 21 56 17.06 86 13 30.09 2911 21 56 13.16 86 13 32.46 2912 21 56 11.22 86 13 32.46 2913 21 56 6.85 86 13 36.86 2914 21 56 6.85 86 13 42.57 2915 21 56 5.26 86 13 42.57 2916 21 56 5.06 86 13 53.88 2917 21 56 5.06 86 13 53.88 2917 21 56 5.06 86 13 53.88 2917 21 56 5.06 86 13 53.88 2918 21 55 59.59 86 13 56.59 2918 21 55 59.59 86 13 56.59 2919 21 55 59.47 86 14 6.53 2921 21 56 0.59 86 14 6.53 2921 21 55 59.34 86 14 13.86 2922 21 55 56.71 86 14 13.86 2923 21 55 56.71 86 14 17.77 2926 21 55 55.79 86 14 19.43 2926 21 55 55.79 86 14 20.10 2927 21 55 48.28 86 14 20.92 2928 21 55 55.79 86 14 20.10 2929 21 55 54.87 86 14 20.10 2929 21 55 54.87 86 14 20.10 2929 21 55 54.87 86 14 20.92 2929 21 55 55.79 86 14 20.10 2929 21 55 55.79 86 14 20.10 2929 21 55 55.79 86 14 20.10 2929 21 55 55.79 86 14 20.10 2929 21 55 55.79 86 14 20.10 2929 21 55 55.79 86 14 20.10 2929 21 55 55.79 86 14 20.10 2929 21 55 55.79 86 14 20.10 2929 21 55 56.79 86 14 20.10 2929 21 55 56.79 86 14 20.92 2929 21 55 56.87 86 14 20.92 2929 21 55 56.87 86 14 20.92 2929 21 55 56.87 86 14 20.92 2929 21 55 56.88 86 14 20.92 2930 21 55 33.76 86 14 24.97 2930 21 55 33.77 86 14 34.42 2931 21 55 33.77 86 14 34.42 2931 21 55 33.77 86 14 34.42 2934 21 55 33.77 86 15 14 39.22 2934 21 55 35.76 86 15 10.71 2948 21 55 36.88 86 15 14 29.92 2949 21 55 35.61 86 15 10.71 2948 21 55 36.88 86 15 10.71 2948 21 55 36.88 86 15 4.99 2949 21 55 36.88 86 15 15 10.71 2948 21 55 36.89 86 15 10.71 2948 21 55 36.89 86 15 10.71 2949 21 55 36.89 86 15 10.71 2948 21 55 36.89 86 15 10.71 2948 21 55 36.89 86 15 10.71 2949 21 55 36.89 86 15 10.71 2949 21 55 36.89 86 15 10.71 2949 21 55 36.89 86 15 10.71 2949 21 55 36.89 86 15 10.71 2949 21 55 36.89 86 15 10.71 2949 21 55 36.89 86 15 10.71 2949 21 55 36.89 86 15 10.71 2949 21 55 36.89 86 15 10.71 2949 21 55 36.89 86 15 10.71 2949 21 55 36.99 86 15 10.71 2949 21 55 36.99 86 16 16 16 16 16 16 16 16 16 16 16 16 16							11.23
2908							16.97
2919 21 56 17.06 86 13 32.20 2911 21 56 13.16 86 13 30.246 2912 21 56 13.22 86 13 32.46 2913 21 56 6.85 86 13 32.46 2914 21 56 5.26 86 13 42.57 2915 21 56 6.45 86 13 42.57 2916 21 56 5.06 86 13 53.88 2917 21 56 2.40 86 13 53.88 2917 21 56 2.40 86 13 54.90 2918 21 55 59.59 86 13 56.59 2918 21 55 59.59 86 13 59.47 2920 21 55 59.59 86 13 59.47 2920 21 55 59.47 86 14 13.86 2921 21 55 59.59 86 14 9.04 2922 21 55 56.71 86 14 13.86 2922 21 55 56.21 86 14 17.77 2925 21 55 55.57 86 14 20.10 2926 21 55 55.57 86 14 20.10 2927 21 55 54.87 86 14 20.10 2928 21 55 56.62 86 14 20.92 2929 21 55 43.88 86 14 24.40 2929 21 55 54.87 86 14 20.92 2929 21 55 39.56 86 14 24.99 2929 21 55 39.56 86 14 33.88 2929 21 55 56.71 86 14 33.84 2929 21 55 39.56 86 14 33.89 2929 21 55 39.56 86 14 33.89 2931 21 55 39.56 86 14 39.92 2931 21 55 39.56 86 14 39.93 2933 21 55 30.54 86 14 39.93 2933 21 55 30.54 86 14 39.92 2934 21 55 30.54 86 14 39.93 2939 21 55 30.54 86 14 39.92 2939 21 55 30.54 86 14 39.92 2931 21 55 30.54 86 14 39.92 2931 21 55 30.54 86 14 39.92 2931 21 55 30.54 86 14 39.92 2931 21 55 30.54 86 14 39.92 2931 21 55 30.54 86 14 39.92 2931 21 55 30.54 86 14 39.92 2931 21 55 30.54 86 14 39.92 2931 21 55 30.54 86 14 39.92 2931 21 55 30.54 86 14 39.92 2931 21 55 30.54 86 14 39.92 2931 21 55 30.54 86 14 39.92 2931 21 55 30.54 86 15 10.71 2942 21 55 30.54 86 15 10.71 2943 21 55 30.54 86 15 10.71 2944 21 55 30.54 86 15 10.71 2946 21 55 30.54 86 15 10.71 2947 2948 21 55 30.54 86 15 10.71 2948 21 55 30.54 86 15 10.71 2949 21 55 30.54 86 15 10.71 2949 21 55 30.54 86 15 10.71 2948 21 55 30.54 86 15 10.71 2948 21 55 30.54 86 15 10.71 2949 21 55 30.57 86 15 10.71 2949 21 55 30.57 86 15 10.71 2949 21 55 30.57 86 14 57.73 2950 21 55 50.48 86 15 50.48 86 15 50.88 2940 21 55 30.54 86 15 50.48 86 15 50.88 2940 21 55 30.54 86 15 50.48 86 15 50.88 2940 21 55 30.54 86 15 50.48 86 15 50.88 2940 21 55 30.54 86 15 50.48 86 15 50.88 2940 21 55 30.56 86 15 50.48 86 15 50.48 86 15 50.48 86 15 50.88 86 15 50.48 86 15 50.88 86 15 50.48 86 15 50.88 86 15 50.48 86 15							20.92
2910 21 56 13.16 86 13 32.46 2912 21 56 11.22 86 13 32.46 2913 21 56 6.85 86 13 47.82 2914 21 56 5.26 86 13 47.82 2915 21 56 6.45 86 13 47.82 2916 21 56 5.06 86 13 53.88 2917 21 56 2.40 86 13 54.90 2918 21 55 59.59 86 13 59.47 2919 21 55 55.58 86 13 59.47 2920 21 55 59.47 86 14 1.39 2920 21 55 59.47 86 14 1.39 2921 21 55 56.71 86 14 17.77 2922 21 55 56.71 86 14 17.77 2924 21 55 56.21 86 14 17.77 2924 21 55 55.57 86 14 20.10 2927 21 55 55.57 86 14 20.10 2928 21 55 54.87 86 14 20.92 2927 21 55 54.87 86 14 20.92 2928 21 55 54.87 86 14 22.93 2929 21 55 54.87 86 14 22.93 2930 21 55 54.83 86 14 22.93 2931 21 55 55.57 86 14 20.92 2927 21 55 55.57 86 14 20.92 2928 21 55 55.57 86 14 20.92 2929 21 55 55.57 86 14 20.92 2921 21 55 55.57 86 14 20.92 2922 21 55 55.57 86 14 20.92 2923 21 55 54.87 86 14 22.93 2930 21 55 35.76 86 14 22.93 2931 21 55 35.76 86 14 22.93 2932 21 55 32.45 86 14 22.93 2933 21 55 32.45 86 14 22.93 2934 21 55 32.45 86 14 22.93 2935 21 55 32.45 86 14 32.93 2936 21 55 32.45 86 14 32.93 2937 21 55 32.45 86 14 32.93 2939 21 55 32.45 86 14 32.93 2939 21 55 32.45 86 14 32.93 2930 21 55 32.45 86 14 32.93 2931 21 55 33.76 86 14 32.93 2932 21 55 33.76 86 14 22.93 2933 21 55 33.76 86 14 24.97 2934 21 55 33.76 86 14 24.97 2935 21 55 33.76 86 14 32.93 2934 21 55 33.76 86 14 32.93 2934 21 55 33.76 86 14 32.93 2934 21 55 33.76 86 14 32.93 2934 21 55 33.77 86 14 34.42 2935 21 55 33.77 86 14 33.29 2934 21 55 33.77 86 14 33.29 2934 21 55 33.77 86 14 33.92 2937 21 55 33.77 86 15 10.41 2948 21 55 36.58 86 15 10.41 2949 21 55 36.58 86 15 10.41 2949 21 55 36.48 86 15 15.77 2948 21 55 36.48 86 15 15.77 2949 21 55 36.48 86 15 57.24 2949 21 55 59.94 86 14 59.82 2949 21 55 59.94 86 14 59.82 2949 21 55 59.94 86 14 59.82 2949 21 55 59.94 86 14 59.82 2949 21 55 59.94 86 14 59.82 2949 21 55 59.94 86 14 59.82 2949 21 55 59.94 86 14 59.82 2949 21 55 59.94 86 14 59.94 2955 21 55 59.94 86 14 59.94 2956 21 55 59.94 86 14 59.94							25.20
2911 21 56 11.22 86 13 32.46 2913 21 56 6.85 86 13 42.57 2914 21 56 5.26 86 13 42.57 2914 21 56 5.26 86 13 42.57 2915 21 56 6.45 86 13 53.88 2916 21 56 5.06 86 13 53.88 2917 21 56 2.40 86 13 54.90 2918 21 55 59.59 86 13 56.59 2918 21 55 59.47 86 14 1.39 2920 21 55 59.47 86 14 1.39 2921 21 56 0.59 86 14 6.53 2922 21 55 59.34 86 14 9.04 2922 21 55 56.71 86 14 17.77 2924 21 55 56.21 86 14 17.77 2925 21 55 55.57 86 14 20.10 2927 21 55 55.57 86 14 20.10 2928 21 55 55.57 86 14 20.10 2929 21 55 54.87 86 14 20.92 2921 21 55 54.87 86 14 20.92 2922 21 55 55.57 86 14 20.10 2924 21 55 55.57 86 14 20.92 2927 21 55 55.57 86 14 20.92 2928 21 55 55.57 86 14 20.92 2929 21 55 33.56 86 14 23.38 2929 21 55 33.56 86 14 24.97 2931 21 55 39.56 86 14 24.97 2931 21 55 33.57 86 14 24.97 2932 21 55 33.27 86 14 24.97 2933 21 55 33.57 86 14 39.22 2934 21 55 33.57 86 14 39.22 2935 21 55 33.27 86 14 39.22 2936 21 55 33.27 86 14 39.22 2937 21 55 33.57 86 14 39.22 2938 21 55 33.57 86 14 39.22 2939 21 55 33.37 86 14 39.22 2934 21 55 33.57 86 14 39.22 2934 21 55 33.57 86 14 39.22 2934 21 55 33.57 86 14 39.22 2934 21 55 33.57 86 14 39.22 2935 21 55 33.37 86 14 39.22 2936 21 55 33.37 86 14 49.90 2937 21 55 33.37 86 14 49.90 2938 21 55 33.37 86 15 10.71 2942 21 55 36.58 86 15 10.71 2944 21 55 36.58 86 15 10.71 2947 21 55 36.58 86 15 10.41 2948 21 55 36.48 86 15 10.71 2949 21 55 36.48 86 15 10.71 2944 21 55 36.58 86 15 10.41 2947 21 55 39.48 86 15 10.41 2948 21 55 36.48 86 15 10.41 2949 21 55 39.48 86 15 10.41 2949 21 55 39.48 86 15 10.41 2947 21 55 36.68 86 15 10.41 2948 21 55 36.68 86 15 10.41 2949 21 55 39.48 86 15 10.41 2947 21 55 39.48 86 14 57.73 2948 21 55 50.40 86 14 57.73 2949 21 55 50.40 86 14 57.73 2949 21 55 50.40 86 14 57.73 2949 21 55 50.40 86 14 57.73 2949 21 55 50.40 86 14 57.73 2949 21 55 50.40 86 14 57.73 2949 21 55 50.40 86 14 57.73 2949 21 55 50.40 86 14 57.73 2949 21 55 50.40 86 14 57.73 2951 21 55 50.40 86 14 57.73 2952 21 55 50.40 86 14 57.73 2953 21 55 50.40 86 14 57.73 2955 21 55 50.40 86 14 57.88 14 57.98							30.09
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2922 21 55 56.71 86 14 13.86 2924 21 55 56.21 86 14 17.77 2925 21 55 55.79 86 14 20.10 2926 21 55 55.79 86 14 20.92 2927 21 55 55.487 86 14 20.92 2928 21 55 54.87 86 14 23.38 2928 21 55 51.66 86 14 23.38 2929 21 55 48.23 86 14 24.40 2930 21 55 43.88 86 14 24.49 2930 21 55 39.56 86 14 25.52 2931 21 55 39.56 86 14 28.93 2932 21 55 35.76 86 14 28.93 2933 21 55 35.76 86 14 28.93 2933 21 55 34.79 86 14 32.93 2934 21 55 32.45 86 14 39.22 2935 21 55 30.54 86 14 39.22 2936 21 55 30.54 86 14 43.64 2937 21 55, 31.31 86 14 43.64 2937 21 55, 31.31 86 14 49.90 2939 21 55 32.33 86 14 54.00 2939 21 55 36.58 86 15 10.71 2941 21 55 36.58 86 15 10.71 2942 21 55 35.61 86 15 10.71 2944 21 55 36.58 86 15 10.71 2944 21 55 36.58 86 15 10.71 2944 21 55 36.58 86 15 10.71 2945 21 55 39.48 86 15 11.65 2940 21 55 36.45 86 15 10.71 2944 21 55 36.58 86 15 10.71 2945 21 55 39.48 86 15 10.71 2946 21 55 39.48 86 15 10.71 2947 21 55 39.48 86 15 11.65 2948 21 55 5 39.48 86 15 10.41 2947 21 55 42.82 86 15 10.41 2948 21 55 5 42.82 86 15 10.41 2947 21 55 42.82 86 15 10.41 2950 21 55 50.40 86 14 57.24 2950 21 55 50.40 86 14 57.24 2950 21 55 50.40 86 14 57.24 2955 21 55 50.40 86 14 57.24 2955 21 55 50.40 86 14 57.83 2956 21 55 50.47 86 14 55.25							9.04
2924 21 55 56.21 86 14 17.77 2924 21 55 55.79 86 14 20.10 2926 21 55 55.79 86 14 20.92 2927 21 55 54.87 86 14 20.92 2928 21 55 51.66 86 14 23.38 2928 21 55 48.23 86 14 24.40 2930 21 55 48.23 86 14 24.97 2930 21 55 39.56 86 14 28.93 2931 21 55 39.56 86 14 28.93 2932 21 55 35.76 86 14 28.93 2933 21 55 34.79 86 14 32.93 2933 21 55 32.45 86 14 39.22 2935 21 55 30.54 86 14 39.22 2936 21 55 30.54 86 14 43.64 2937 21 55 31.31 86 14 45.13 2937 21 55 31.31 86 14 45.13 2938 21 55 31.31 86 14 49.90 2939 21 55 33.37 86 15 14.50 2939 21 55 36.58 86 15 4.99 2940 21 55 33.37 86 15 14.50 2940 21 55 36.58 86 15 10.71 2941 21 55 36.58 86 15 10.71 2942 21 55 36.45 86 15 10.71 2944 21 55 36.45 86 15 10.71 2944 21 55 36.45 86 15 10.71 2945 21 55 36.45 86 15 10.71 2946 21 55 36.45 86 15 10.71 2947 21 55 42.82 86 15 10.41 2947 21 55 42.82 86 15 10.41 2947 21 55 42.82 86 15 10.41 2947 21 55 42.82 86 15 10.41 2948 21 55 42.82 86 15 10.41 2950 21 55 50.40 86 14 57.24 2950 21 55 50.40 86 14 57.24 2955 21 55 50.40 86 14 57.24 2955 21 55 50.40 86 14 57.73 2955 21 55 50.40 86 14 57.73 2955 21 55 50.40 86 14 57.73 2955 21 56 0.74 86 14 52.31 2956 21 55 50.47 86 14 52.31 2956 21 55 50.47 86 14 52.31 2956 21 55 50.47 86 14 52.31 2956 21 55 50.47 86 14 52.31 2956 21 55 50.47 86 14 52.31							13.86
2924         21         55         55.79         86         14         19.43           2926         21         55         55.77         86         14         20.10           2927         21         55         55.57         86         14         20.92           2928         21         55         54.87         86         14         20.92           2929         21         55         48.23         86         14         24.40           2930         21         55         43.88         86         14         24.97           2930         21         55         39.56         86         14         24.97           2931         21         55         39.56         86         14         28.93           2932         21         55         35.76         86         14         28.93           2933         21         55         32.45         86         14         39.22           2934         21         55         32.45         86         14         43.64           2936         21         55         31.31         86         14         49.90           2938         <							17.77
2926         21         55         55.57         86         14         20.10           2927         21         55         55.57         86         14         20.92           2928         21         55         51.66         86         14         23.38           2929         21         55         48.23         86         14         24.40           2930         21         55         43.88         86         14         24.97           2930         21         55         39.56         86         14         24.97           2931         21         55         39.56         86         14         28.93           2932         21         55         35.76         86         14         28.93           2932         21         55         33.27         86         14         32.93           2934         21         55         32.45         86         14         39.22           2935         21         55         30.54         86         14         43.64           2936         21         55         31.36         86         14         49.90           2937         <							19.43
2926         21         55         54.87         86         14         20.92           2927         21         55         51.66         86         14         23.38           2928         21         55         48.23         86         14         24.40           2930         21         55         43.88         86         14         24.97           2931         21         55         39.56         86         14         28.93           2932         21         55         39.56         86         14         28.93           2932         21         55         34.79         86         14         32.93           2933         21         55         33.27         86         14         34.42           2935         21         55         30.54         86         14         43.64           2936         21         55         30.54         86         14         43.64           2937         21         55         31.31         86         14         49.90           2938         21         55         33.17         86         14         54.00           2940         <							20.10
2928         21         55         51.66         86         14         23.38           2929         21         55         48.23         86         14         24.40           2930         21         55         43.88         86         14         24.97           2931         21         55         39.56         86         14         28.93           2932         21         55         35.76         86         14         28.93           2933         21         55         35.76         86         14         32.93           2934         21         55         33.27         86         14         39.22           2935         21         55         30.54         86         14         43.64           2937         21         55         31.36         86         14         49.90           2938         21         55         31.31         86         14         49.90           2939         21         55         33.17         86         14         54.00           2940         21         55         33.17         86         15         10.71           2941         <							20.92
2929         21         55         48.23         86         14         24.40           2930         21         55         43.88         86         14         24.97           2931         21         55         39.56         86         14         28.93           2932         21         55         35.76         86         14         32.93           2933         21         55         34.79         86         14         39.22           2934         21         55         32.45         86         14         39.22           2935         21         55         30.54         86         14         43.64           2936         21         55         31.36         86         14         45.13           2937         21         55         31.31         86         14         49.90           2938         21         55         32.33         86         14         49.90           2939         21         55         33.17         86         14         54.00           2940         21         55         35.61         86         15         10.71           2941         <						14	23.38
2930         21         55         43.88         86         14         24.97           2931         21         55         39.56         86         14         28.93           2932         21         55         35.76         86         14         28.93           2933         21         55         34.79         86         14         32.93           2934         21         55         32.45         86         14         39.22           2935         21         55         32.45         86         14         43.64           2936         21         55         30.54         86         14         49.90           2937         21         55,         31.36         86         14         49.90           2938         21         55         32.33         86         14         49.90           2939         21         55         33.17         86         14         55.25           2940         21         55         33.17         86         14         55.25           2941         21         55         35.61         86         15         10.71           2942						14	24.40
2931         21         55         39.56         86         14         25.52           2932         21         55         35.76         86         14         32.93           2933         21         55         34.79         86         14         32.93           2934         21         55         33.27         86         14         34.42           2935         21         55         30.54         86         14         43.64           2936         21         55         30.54         86         14         43.64           2937         21         55,         31.36         86         14         49.90           2938         21         55         32.33         86         14         49.90           2939         21         55         32.33         86         14         55.25           2940         21         55         33.17         86         14         55.25           2940         21         55         35.61         86         15         10.71           2942         21         55         35.61         86         15         10.71           2943						14	24.97
2931         21         55         35.76         86         14         28.93           2933         21         55         34.79         86         14         32.93           2934         21         55         33.27         86         14         39.22           2935         21         55         32.45         86         14         39.22           2936         21         55         30.54         86         14         43.64           2937         21         55,         31.36         86         14         49.90           2938         21         55         32.33         86         14         49.90           2939         21         55         32.33         86         14         49.90           2939         21         55         32.33         86         14         54.00           2939         21         55         33.17         86         14         55.25           2940         21         55         36.58         86         15         10.71           2942         21         55         35.61         86         15         10.71           2943						14	
2932         21         55         34.79         86         14         32.93           2934         21         55         33.27         86         14         34.42           2935         21         55         32.45         86         14         39.22           2936         21         55         30.54         86         14         43.64           2937         21         55         31.36         86         14         49.90           2938         21         55         31.31         86         14         49.90           2939         21         55         32.33         86         14         54.00           2939         21         55         33.17         86         14         55.25           2940         21         55         36.58         86         15         4.49           2941         21         55         35.61         86         15         10.71           2942         21         55         35.76         86         15         11.65           2943         21         55         39.48         86         15         11.30           2946 <t< td=""><td></td><td></td><td></td><td></td><td></td><td>14</td><td></td></t<>						14	
2934         21         55         33.27         86         14         34.42           2935         21         55         32.45         86         14         39.22           2936         21         55         30.54         86         14         43.64           2937         21         55,         31.36         86         14         49.90           2938         21         55         31.31         86         14         49.90           2939         21         55         32.33         86         14         54.00           2939         21         55         33.17         86         14         55.25           2940         21         55         36.58         86         15         10.01           2941         21         55         35.61         86         15         10.71           2942         21         55         35.76         86         15         11.65           2943         21         55         39.48         86         15         11.30           2945         21         55         39.48         86         15         11.30           2946						14	
2935         21         55         32.45         86         14         39.22           2936         21         55         30.54         86         14         43.64           2937         21         55,         31.36         86         14         49.90           2938         21         55         31.31         86         14         49.90           2939         21         55         32.33         86         14         54.00           2939         21         55         32.33         86         14         54.00           2940         21         55         33.17         86         14         55.25           2940         21         55         36.58         86         15         4.49           2941         21         55         35.61         86         15         10.71           2942         21         55         35.76         86         15         11.65           2943         21         55         39.48         86         15         12.97           2944         21         55         42.82         86         15         11.30           2946         <						14	
2936         21         55         30.54         86         14         43.64           2937         21         55,         31.36         86         14         49.90           2938         21         55         31.31         86         14         49.90           2939         21         55         32.33         86         14         54.00           2939         21         55         33.17         86         14         55.25           2940         21         55         36.58         86         15         4.49           2941         21         55         36.58         86         15         10.71           2942         21         55         35.61         86         15         10.71           2943         21         55         35.76         86         15         11.65           2943         21         55         39.48         86         15         12.97           2944         21         55         39.48         86         15         11.30           2946         21         55         42.82         86         15         11.30           2947         <					86		
2937         21         55,         31.36         86         14         45.13           2938         21         55         31.31         86         14         49.90           2939         21         55         32.33         86         14         54.00           2940         21         55         33.17         86         14         55.25           2940         21         55         36.58         86         15         4.49           2941         21         55         36.58         86         15         10.71           2942         21         55         35.61         86         15         10.71           2942         21         55         35.76         86         15         11.65           2943         21         55         36.45         86         15         11.65           2944         21         55         39.48         86         15         14.88           2945         21         55         41.75         86         15         11.30           2946         21         55         42.82         86         15         8.77           2948 <t< td=""><td></td><td></td><td></td><td></td><td>86</td><td></td><td></td></t<>					86		
2938         21         55         31.31         86         14         49.90           2939         21         55         32.33         86         14         54.00           2940         21         55         33.17         86         14         55.25           2940         21         55         36.58         86         15         4.49           2941         21         55         36.58         86         15         10.71           2942         21         55         35.61         86         15         10.71           2942         21         55         35.76         86         15         11.65           2943         21         55         36.45         86         15         12.97           2944         21         55         39.48         86         15         12.97           2945         21         55         39.48         86         15         11.30           2946         21         55         41.75         86         15         10.41           2947         21         55         42.82         86         15         8.77           2948 <td< td=""><td></td><td></td><td></td><td></td><td>86</td><td></td><td></td></td<>					86		
2939         21         55         32.33         86         14         54.00           2940         21         55         33.17         86         14         55.25           2941         21         55         36.58         86         15         4.49           2942         21         55         35.61         86         15         10.71           2942         21         55         35.76         86         15         11.65           2943         21         55         35.76         86         15         12.97           2944         21         55         36.45         86         15         12.97           2944         21         55         39.48         86         15         14.88           2945         21         55         39.48         86         15         11.30           2946         21         55         41.75         86         15         11.30           2947         21         55         42.82         86         15         10.41           2947         21         55         42.89         86         14         59.82           2949 <t< td=""><td></td><td></td><td></td><td></td><td>86</td><td></td><td></td></t<>					86		
2940         21         55         33.17         86         14         55.25           2941         21         55         36.58         86         15         4.49           2942         21         55         35.61         86         15         10.71           2942         21         55         35.76         86         15         11.65           2943         21         55         36.45         86         15         12.97           2944         21         55         39.48         86         15         12.97           2945         21         55         39.48         86         15         14.88           2946         21         55         41.75         86         15         11.30           2947         21         55         42.82         86         15         10.41           2947         21         55         42.82         86         15         8.77           2948         21         55         42.89         86         14         59.82           2949         21         55         50.40         86         14         57.24           2951 <td< td=""><td></td><td></td><td></td><td></td><td>86</td><td></td><td></td></td<>					86		
2941     21     55     36.58     86     15     4.49       2942     21     55     35.61     86     15     10.71       2943     21     55     35.76     86     15     11.65       2944     21     55     36.45     86     15     12.97       2944     21     55     39.48     86     15     14.88       2945     21     55     39.48     86     15     11.30       2946     21     55     41.75     86     15     10.41       2947     21     55     42.82     86     15     10.41       2948     21     55     42.89     86     14     59.82       2949     21     55     42.89     86     14     59.82       2950     21     55     48.14     86     14     57.24       2951     21     55     50.40     86     14     57.43       2952     21     55     55.02     86     14     57.98       2953     21     55     57.03     86     14     56.61       2954     21     56     0.74     86     14     50.08       2955 </td <td></td> <td></td> <td></td> <td></td> <td></td> <td>C. Control of the Con</td> <td></td>						C. Control of the Con	
2942       21       55       35.61       86       15       10.71         2943       21       55       35.76       86       15       11.65         2944       21       55       36.45       86       15       12.97         2945       21       55       39.48       86       15       14.88         2946       21       55       41.75       86       15       11.30         2946       21       55       42.82       86       15       10.41         2947       21       55       42.82       86       15       8.77         2948       21       55       42.89       86       14       59.82         2949       21       55       42.89       86       14       57.24         2950       21       55       50.40       86       14       57.73         2951       21       55       55.02       86       14       57.43         2952       21       55       57.03       86       14       57.98         2953       21       56       0.74       86       14       52.31         2955       21				36.58	86		
2943       21       55       35.76       86       15       11.63         2944       21       55       36.45       86       15       12.97         2945       21       55       39.48       86       15       14.88         2946       21       55       41.75       86       15       11.30         2947       21       55       42.82       86       15       10.41         2947       21       55       42.82       86       15       8.77         2948       21       55       42.89       86       14       59.82         2949       21       55       48.14       86       14       57.24         2950       21       55       50.40       86       14       57.73         2951       21       55       55.02       86       14       57.43         2952       21       55       57.03       86       14       57.98         2953       21       56       0.74       86       14       56.61         2954       21       56       0.74       86       14       50.08         2956       21			55	35.61			
2944         21         55         36.45         86         15         12.97           2945         21         55         39.48         86         15         14.88           2946         21         55         41.75         86         15         11.30           2947         21         55         42.82         86         15         10.41           2948         21         55         44.88         86         15         8.77           2949         21         55         42.89         86         14         59.82           2949         21         55         48.14         86         14         57.24           2950         21         55         50.40         86         14         57.73           2951         21         55         55.02         86         14         57.98           2952         21         55         57.03         86         14         57.98           2953         21         56         0.74         86         14         56.61           2954         21         56         0.74         86         14         50.08           2955				35.76			
2945         21         55         39.48         86         15         11.30           2946         21         55         41.75         86         15         11.30           2947         21         55         42.82         86         15         10.41           2948         21         55         44.88         86         15         8.77           2949         21         55         42.89         86         14         59.82           2950         21         55         48.14         86         14         57.24           2950         21         55         50.40         86         14         57.73           2951         21         55         55.02         86         14         57.43           2952         21         55         57.03         86         14         57.98           2953         21         56         0.74         86         14         56.61           2954         21         56         1.61         86         14         50.08           2956         21         55         59.47         86         14         50.08           2956				36.45			
2946       21       55       41.75       86       15       11.35         2947       21       55       42.82       86       15       10.41         2948       21       55       44.88       86       15       8.77         2949       21       55       42.89       86       14       59.82         2950       21       55       48.14       86       14       57.24         2951       21       55       50.40       86       14       57.73         2951       21       55       55.02       86       14       57.43         2952       21       55       57.03       86       14       57.98         2953       21       56       0.74       86       14       56.61         2954       21       56       1.61       86       14       50.08         2955       21       55       59.47       86       14       50.08         2956       21       55       59.47       86       14       47.39			55				
2947         21         55         42.82         86         15         8.77           2948         21         55         44.88         86         15         8.77           2949         21         55         42.89         86         14         59.82           2950         21         55         48.14         86         14         57.24           2951         21         55         50.40         86         14         57.73           2951         21         55         55.02         86         14         57.98           2952         21         55         57.03         86         14         57.98           2953         21         56         0.74         86         14         56.61           2954         21         56         1.61         86         14         52.31           2955         21         56         59.47         86         14         50.08           2956         21         55         59.47         86         14         50.08           2956         21         55         59.47         86         14         47.39			55				
2948     21     55     44.88     86     15     5.7       2949     21     55     42.89     86     14     59.82       2950     21     55     48.14     86     14     57.24       2951     21     55     50.40     86     14     57.73       2952     21     55     55.02     86     14     57.98       2953     21     55     57.03     86     14     56.61       2954     21     56     0.74     86     14     56.61       2955     21     56     1.61     86     14     50.08       2956     21     55     59.47     86     14     50.08       2956     21     55     59.47     86     14     47.39			55				
2949     21     55     42.89     86     14     57.24       2950     21     55     48.14     86     14     57.24       2951     21     55     50.40     86     14     57.73       2952     21     55     55.02     86     14     57.43       2952     21     55     57.03     86     14     57.98       2953     21     56     0.74     86     14     56.61       2954     21     56     1.61     86     14     52.31       2955     21     55     59.47     86     14     50.08       2956     21     55     59.47     86     14     47.39			55				
2950     21     55     48.14     86     14     57.73       2951     21     55     50.40     86     14     57.73       2952     21     55     55.02     86     14     57.98       2953     21     55     57.03     86     14     56.61       2954     21     56     0.74     86     14     52.31       2955     21     56     1.61     86     14     50.08       2956     21     55     59.47     86     14     50.08       2956     21     55     59.47     86     14     47.39		21	55				
2951     21     55     50.40     86     14     57.43       2952     21     55     55.02     86     14     57.43       2953     21     55     57.03     86     14     57.98       2954     21     56     0.74     86     14     56.61       2955     21     56     1.61     86     14     52.31       2956     21     55     59.47     86     14     50.08       2956     21     55     59.47     86     14     47.39		21	55				
2952     21     55     55.02     86     14     57.98       2953     21     55     57.03     86     14     57.98       2954     21     56     0.74     86     14     56.61       2955     21     56     1.61     86     14     52.31       2956     21     55     59.47     86     14     50.08       2956     21     55     59.47     86     14     47.39		21					
2953     21     55     57.03     86     14     56.61       2954     21     56     0.74     86     14     56.61       2955     21     56     1.61     86     14     52.31       2956     21     55     59.47     86     14     50.08       2956     21     55     0.21     86     14     47.39		21					
2954     21     56     0.74     86     14     52.31       2955     21     56     1.61     86     14     52.31       2956     21     55     59.47     86     14     50.08       2956     21     55     0.21     86     14     47.39		21					
2955 21 56 1.61 86 14 50.08 2956 21 55 59.47 86 14 47.39							
2956 21 55 59.47 66 14 47.39							
2957 21 56 0.21 60 14							
	2957	21	56	0.21	00	1-4	

(1)	(2)		9	65		
2958 2959	(2)	56	(4) 2.35	(5) 86	(6) 14	(7)
2960	21 21	56	6.15	86	14	* 45.30
2961	21	56 50	3.72	86	14	42.62
2962	21	56 55	1.95	86	14	40.38 38.30
2963	21	56 56	58.67	86	14	35.71
2964	21	56	0.46	86	14	31.39
2965	21	56	2.35 4.54	86	14	26.86
2966	21	56	7.12	86	14	22.94
2967	21	56	9.98	86 86	14	18.44
2968 2969	21	56	12.59	86	14	12.79
2970	21 21	56	15.00	86	14 14	8.84
2971	21	56 50	17.98	86	13	5.09
2972	21	56 56	19.60	86	13	59.80 57.68
2973	21	56	17.56	86	13	55.00
2974	21	56	19.08	86	13	51.52
2975	21	56	20.25 19.55	86	13	48.76
2976	21	56	18.36	86 86	13	46.62
2977	21	56	17.14	86	13	45.45
2978 <b>2979</b>	21	56	16.54	86	13 13	44.61
2980	21 21	56	15.70	86	13	43.39
2981	21	56 56	15.47	86	13	43.49 41.18
2982	21	56 56	15.23	86	13	38.82
2983	21	56	16.29 17.84	86	13	38.00
2984	21	56	21.24	86	13	36.61
2985	21	56	22.33	86 86	13	33.03
2986	21	56	28.05	86	13	32.46
2987 2988	21	56	32.57	86	13 13	30.24
2989	21 21	56	37.27	86	13	28.48
2990	21	56 56 <sup>4</sup>	40.18	86	. 13	30.64 31.98
2991	21	56	42.76	86	13	33.77
2992	21	56	45.62	86	13	34.39
2993	21	56	45.95 45.37	86	13	33.80
2994	21	56	45.77	86 86	13	30.79
2995	21	56	46.22	86	13	26.07
2996 2997	21	56	48.11	86	13 13	24.13
2998	21 21	56	48.85	86	13	20.48
2999	21	56 56	51.59	86	13	20.10 20.20
3000	21	56	57.06	86	13	19.90
3000	24	56	59.53 59.55	86	13	21.51
3001	21	57	59.55 1.74	86	13	21.51
3002	21	57	2.79	86 86	13	22.98
3003	21	57	5.75	86	13	24.01
3004 3005	21	57	10.55	86	13 13	25.16
3005	21	57 57	12.48	86	13	28.48
3007	21 21	57 57	13.79	86	13	30.04 30.97
3008	21	57 57	14.77	86	13	34.28
			18.47	86	13	35.00

			66			(7)
(1) 3009 3010 3011 3012 3013 3014 3015 3016 3017 3018 3019 3020 3021 3022 3023 3024 3025 3026 3027 3028 3029 3030 3031 3032 3033 3034 3035 3036 3037 3038 3039 3040 3041 3042 3043 3044 3045 3040 3041 3042 3043 3044 3045 3046 3047 3048 3049 3050 3051 3052 3053 3056 3056 3056 3056 3056 3056 3056	21 21 3 21 4 21 5 21 6 21 7 21 8 21 9 21	58	(4) 19.24 22.76 24.09 26.74 31.14 34.43 36.22 37.92 45.17 41.65 39.95 40.28 42.16 45.24 44.63 42.91 43.57 47.84 44.52 43.39 40.82 35.15 34.25 33.92 34.44 36.19 38.73 39.27 41.04 41.63 43.28 46.31 49.16 51.32 54.74 54.64 57.34 3.79 5.56 8.64 14.79 17.41 18.82 21.08 24.16 23.86 21.95 18.54 11.8	86 86 86 86 86 986 3 86 0 86	(6) 13 13 13 13 13 13 13 13 13 13 13 13 13	52.79 47.96 47.50 46.34 42.64 38.92 35.68 34.34 31.85 28.28 24.24

			67			
(1)	(2)	(3)	(4)	(5)	(6)	(7)
	21	58	15.50	86	11	17.64
3061 <sub>2</sub> 3062	21	58	14.14	86	11	13.99
3063	21	58	12.91	86	11	10.21
3064	21	58	13.11	86	· 11	8.23
3065	21	58	10.80	86	11	6.77
3066	21	58	7.92	86	11	13.58
3067	21	58	6.74	86	11	11.52
3068	21	58	7.26	86	11	9.44
3069	21	58	5.28	86	11	6.92
3070	21	58	7.67	86	11	2.84
3071	21	58	6.95	86	11	0.09
3072	21	58	5.35	86	10	57.36
3073	21	58	5.15	86	. 10	55.51
3074	21	58	5.82	86	10	52.15
3075	21	58	6.74	86	10	48.75
3076	21	58	7.36	86	10	46.13
3077	21	58	8.44	86	10	41.87
3078	21	58	9.13	86	10	39.73
3079	21	58	10.29	86	10	35.00
3080	21	58	10.75	86	10	31.61
3081	21	58	9.72	86	10	30.89
3082	21	58	6.77	86	10	26.78
3083	21	58	6.84	86	10 10	22.80 19.17
3084	21	58 58	7.67 8.57	86 86	10	14.73
3085 3086	21 21	58	10.78	86	10	14.63
3087	21	58	16.64	86	10	14.29
3088	21	58	18.85	86	10	14.78
3089	21	58	20.52	86	10	12.70
3090	21	58	21.72	86	10	8.82
3091	21	58	20.75	86	10	4.30
3092	21	58 58	19.26	86	10	2.01
3093	21		18.23	86	9	59.03
3094	21	58	17.38	86	9	55.63
3095	21	58	16.07	86	9	52.32
3096	21	58	15.20	86	9	48.90
3097	21	58	13.68	86	9	44.33 42.68
3098	21	58	11.75	86	.9	41.06
3099	21	58	9.57 6.54	86 86	9 9	38.91
3100	21 21	58 58	2.96	86	9	36.31
3101 3102	21	58	3.84	86	9	30.40
3103	21	58	4.71	86	9 .	29.45
3104	21	58	8.75	86	9	27.11
3105	21	58	10.08	86	9	26.60
3106	21	58	11.93	86	9	24.90
3107	21	58	13.14	86	. 9	25.21
3108	21	58	14.35	86	9	26.65
3109	21	58	16.30	86	9	32.51
3110	21	58	17.89	. 86	9	34.31
3111	21	58	18.54	86	9	35.02
3112	21	58	20.08	86	9	36.21

20		

		(0)	(4)	(5)	<b>(6</b> )	(7)
(1)	(2)	(3)	22.06	86	9	35.80
3113	21	58	23.91	86	9.	35.67
3114	21	58	27.27	86	9	36.64
3115	21	58	30.49	86	9	38.47
3116	21	58	32.23	86	9	39.73
3117	21	58	32.98	86	9	41.32
3118	21	58	34.37	86	9 9	42.99
3119	21	58	38.35	86	9	44.25
3120	21	58 58	41.36	86	9	45.46
3121	21	58	48.99	86	9	48.18
3122	21	58	49.86	86	9	53.30
3123	21	58	50.84	86	9	53.91
3124	21	58	50.97	86	9	57.28
3125	21	58	51.48	86	9	59.72
3126	21 21	58	49.73	86	10	1.01 8.90
3127	21	58	45.65	86	10	10.23
3128	21	58	43.64	86	10	9.54
3129	21	58	41.28	86	10	10.28
3130	21	58	39.17	86	10	11.64
3131 3132	21.	58	36.94	86	10	13.70
	21	58	34.78	86	10	15.78
3133 3134	21	58	32.90	86	10 10	17.25
3135	21	58	36.60	86	10	17.97
3136	21	58	38.89	86	10	18.61
3137	21	58	40.48	86	10	20.46
3138	21	58	42.74	86	10	22.41
3139	21	58	43.85	86	10	24.11
3140	21	58	44.93	86 86	10	27.32
3141	21	58	44.39	86	10	31.61
3142	21	58	43.54	86	10	35.54
3143	21	58	43.13	86	.10	38.11
3144	21	· * 58	44.72 48.01	86	10	37.86
3145	21	58	49.14	86	10	39.60
3146	21	53	49.99	86	10	45.21
3147	21	58	47.50	86	10	48.60
3148	21	58	48.48	86	10	50.89
3149	21	58 58	49.27	86	10	53.17
3150	21	58	49.14	86	10	55.33
3151	21	58	49.45	86	10	59.13
3152	21	58	55.39	86	11	2.84
3153	21	59	0.12	86	11	5.79
3154	21 21	59	2.58	86	. 11	9.90 16.79
3155	21	59	5.69	86	11	20.72
3156	21	59	8.75	86	11	21.29
3157	21	59	10.27	86	- 11	21.90
3158	21	59	12.73	. 86	11	22.70
3159	21	59	16.87	86	11	22.29
3160 3161	21	59	19.44		11	17.97
3161 3162	21	59	28.56		11 11	15.09
3162	21		32.34		11 11	12.83
3164	21		33.86	86	.,	
0.0.						

				59		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
3165	_ 21	· 59	37.53	86	11	
3166	21	59	36.94	86	11	11.44 8.44
3167	21	59	38.77	86	11	2.53
3168	21	59	39.08	86	11	1.81
3169	21	59	42.18	86	10	59.88
3170	21	59	43.98	86	10	57.31
3171	21	59	43.93	86	10	46.11
3172	21	59	43.98	86	10	45.80
3173	21	59	48.94	86	10	43.69
3174	21	59	46.50	86	10	40.17
3175	21	59	45.96	86	10	36.16
3176	21	59	46.37	86	10	30.28
3177	21	59	46.66	86	10	29.53
3178	21	59	47.56	86	10	25.83
3179	21	59	49.15	86	10	21.28
3180	21	59	49.41	86	10	18.40
3181 3182	21	59	48.66	86	10	13.32
3183	21	59	49.68	86	10	7.61
3184	21	59	51.79	86	10	3.08
3185	21	59 50	53.66	86	9	58.84
3186	21 22	59	59.98	86	9	58.79
3187	22	0	1.50	86	9	58.61
3188	22	0	4.56	86	9	56.86
3189	22	0	10.73	86	9	53.01
3190	22	0	14.86	86	9	59.49
3191	22	0	17.69	86	9	56.71
3192	22	0	19.85	86	9	51.39 °
3193	22	0	25.48	86	9	46.41
3194	22	0 .	28.77	86	9	37.18
3195	22	0	33.06	86	9	33.89
3196	22	0 #	38.53	86	9	31.19
3197	22	0	37.25 42.15	86	9	30.63
3198	22	ő	42.15	86	9	28.21
3199	22	ő	42.57 45.57	86 86	9	28.31
3200	22	ŏ	48.68	86	. 9	27.03
3201	22	ŏ	50.53	86	9	26.93
3202	22	ő	52.31	86	9	25.51
3203	22	. 0	56.91	86 86	9	24.43
3204	22	Ō	59.86	86	9	22.89
3205	22	1.	3.48	86	9	23.89
3206	22	1	7.52	86	9	24.51
3207	22	1	9.63	86	9	24.61
3208	22	1	10.17	86	9	27.85
3209	22	1	11.09	86	9	30.50
3210	22	1	10.09	86	9 9	33.81
3211	22	1	12.04	86>	9	36.90
9212	22	.1	11.99	86	9	39.52
3213	22	1.	9.86	86	9	42.29
3214	22	1	8.03	86	9	43.94
3215	22	1	6.57	86	9	44.91 48.49
3216	22	1	7.75	86	9	54.53
					9	<del>04</del> .53

(1) 3217 3218 3219 3220 3221 3222 3223 3224 3225 3226 3227 3228 3229 3230 3231 3232 3233 3234 3235 3236 3237 3238 3239 3240 3241 3242 3243 3244 3245 3246 3247 3248 3249 3250 3251 3252 3253 3254 3255 3256 3257 3258 3259 3260 3261 3262 3263 3264 3265	(2) 22 22 22 22 22 22 22 22 22 22 22 22 2	(3) 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	(4) 4.95 0.63 1.04 2.64 59.27 58.91 57.47 54.93 53.82 52.49 49.25 41.44 40.38 42.26 41.33 41.56 42.44 47.27 48.37 49.68 49.61 49.48 49.27 50.56 53.69 56.62 58.29 59.42 57.37 59.73 1.40 1.51 1.76 1.84 6.26 5.33 4.56 0.66 53.69 50.17 36.81 36.76 35.14 39.92 44.85 50.20 53.72 59.48 1.89	(5) 86 86 86 86 86 86 86 86 86 86 86 86 86	(6) 10 9 10 10 10 10 10 10 10 10 10 10 10 10 10	(7) 0.10 55.96 1.72 9.61 9.61 11.33 17.24 18.84 22.23 27.60 29.12 29.01 32.40 32.20 33.10 41.45 41.37 43.15 46.23 47.49 50.37 51.99 51.94 55.30 57.54 0.65 3.45 8.05 9.59 14.47 20.90 24.60 29.28 30.23 32.87 35.08 35.47 33.54 36.19 37.68 43.23 47.60 45.70 46.49 49.42 53.82 57.13 56.57
			59.48 1.89 3.41 6.18	86 86 86 86		

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(1) 3269 3270 3271 3272 3273 3274 3275 3276 3277 3278 3279 3280 3281 3282 3283 3284 3285 3286 3287 3288 3289 3290 3291 3292 3293 3294 3295 3296 3297 3298 3299 3300 3301 3302 3303 3304 3305 3306 3307 3308 3309 3311 3312 3313 3314 3315 3316 3317 3318 3319 3320	(2) 22 22 22 22 22 22 22 22 22 22 22 22 2	(3) 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	(4) 6.36 3.05 3.15 5.80 6.57 5.28 1.97 1.81 3.25 8.86 9.47 9.88 9.37 7.96 7.34 9.27 9.50 14.84 16.90 18.72 20.88 23.84 23.94 26.36 30.31 32.27 38.07 40.57 42.55 45.19 48.20 52.05 54.57 57.68 57.09 56.68 57.09 56.68 57.09 56.68 57.09 56.68 57.09 56.68 57.09 56.68 57.09 56.68 57.09 56.68 57.09 56.68 57.09 56.68 57.09 56.68 57.09 56.68 57.09 56.68 57.09 56.68 56.27 56.17 59.20 2.49 4.77 7.65 11.84 17.21 18.27 19.47 22.61 24.69 29.29 29.26 27.08	(5) 86 86 86 86 86 86 86 86 86 86 86 86 86	(6) 12 12 12 12 12 12 12 12 12 12 13 13 13 13 13 13 13 13 13 13 13 13 13	(7) 5.61 10.39 13.66 17.77 21.49 26.68 29.02 35.24 37.17 42.13 45.73 45.52 49.71 53.18 57.34 0.04 4.10 7.11 5.80 2.64 58.91 53.77 55.11 53.41 52.61 51.33 50.69 50.10 51.69 53.64 55.75 57.91 0.91 2.61 4.23 8.21 12.09 17.28 20.52 21.86 23.25 21.86 23.25 21.86 23.25 23.61 23.73 23.32 26.05 27.74 28.69 31.03 33.47 39.28 54.88 57.53

	energia.		(A)	(5)	(6)	. (7)
(1)	(2)	(3)	(4)	(5)	13	59.28
3321	22	2	24.69	86	14	1.31
3322	22	2	20.14	86	14	2.72
3323	22	2	16.39	86		2.41
3324	22	2	17.37	86	14	6.55
3325	22	2	16.72	86	14	8.14
3326	22	2	16.00	86	14	9.53
3327	22	2	13.25	86	14	8.35
3328	22	2	8.55	86	14	7.16
3329	22	2 2 2 2 2 2 2 2	5.93	86	14	5.73
3330	22	2	5.52	86	14	6.34
3331	22	1	58.71	86	14	5.85
3332	22	· 1	56.22	86	14	7.81
3333	22	1	55.14	86	14 .	10.79
3334	22	1	53.98	86	14	14.18
3335	22	1	56.94	86	14	14.57
3336	22	1	58.40	86	14	16.52
3337	22	2	1.05	86	14	18.91
3338	22	2	5.16	86	14	19.65
3339	22	2 2 2 2	9.91	86	14	20.35
3340	22	2	13.23	86	14	23.84
3341	22	2	13.20	86	14	33.63
3342	22	2 2 2 2	11.89	86	14	38.64
3343	22	2	11.87	86	14	45.12
3344	22	. 2	8.29	86	14	45.45
3345	22	2	1.66	86	14 14	47.49
3346	22	2 2 2 2 2 2	0.95	86	14	50.75
3347	22	2	4.49	86	14	57.61
3348	22	2	8.89	86	15	4.68
3349	22	2	8.01	86	15	10.10
3350	22	2	6.78	86	15	12.98
3351	22	2	5.39	86	15	15.50
3352	22	<sub>, 1</sub> , 2	3.57	86	15	19.04
3353	22	# 2 2 2 2	3.77	86	15	30.14
3354	22	2	0.56	86 86	15	29.14
3355	22		3.18	86	15	31.02
3356	22	2	4.93	86 86	15	27.03
3357	22	2	5.49	86	15	25.24
3358	22	2	7.60	86	15	28.42
3359	22	2	9.66	86	15	31.09
3360	22	2	15.44	86	. 15	30.63
3361	22	2	22.15	86	15	27.50
3362	22	, 2	25.20	86	15	21.61
3363	22	2	23.12	86	15	19.07
3364	22	2	22.81	86	15	15.50
3365	22	2	15.23 13.69	86	15	11.33
3366	22	2		86	15	4.68
3367	22	2	9.48 11.17	86	14	56.86
3368	22	2	14.51	86	. 15	0.57
3369	22	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	18.32	86	15	3.57
3370	22	2	22.81	86	14	54.94
3371	22	2 2	23.61	86	14	54.83
3372	22	2	23.01			

			73			,
(1)	(2)	(3)	(4)	(5)	(6)	(7)
3373	-22	2	28.03	86	14	53.73
3374	22	2	28.83	86	. 14	54.48
3375	22		32.17	86	14	56.84
3376	22	2 2 2	35.54	86	14	58.64
3377	22	2	39.36	86	14	59.92
3378	22	2	43.84	86	15	3.11
3379	22	2 2	44.58	86	15	2.52
3380	22	2	50.88	86	15	7.74
3381	22	2	54.55	86	15	4.93
3382	22	2	55.53	86	15	3.67
3383	22	2	57.87	86	15	2.83
3384	. 22	3	0.15	86	15	0.28
3385	22	3	5.09	86	14	58.25
3386	22	3	9.07	86	14	58.92
3387	22	3	13.34	86	14	58.12
3388	22	3	15.75	86	14	59.51
3389	22	3	19.84	86	14	59.49
3390	22	3 .	22.33	86	14	57.35
3391	22	3	25.98	86	14	59.59
3392	22	3	29.76	86	. 14	59.87
3393	22	3	33.33	86	15	0.26
3394	22	3	39.34	86	15	0.59
3395	22	3	42.38	86	14	59.92
3396	22	3	46.95	86	14	59.49
3397	22	3	50.11	86	14	58.00
3398	22 .	3	53.40	86	14	59.36
3399	22	3	56.48	86	14	59.92
3400	22	4	3.42	86	14	58.00
3401	22	4	10.59	86	14	57.61
3402	22	4	11.49	86	14	58.90
3403	22	4	17.51	86	15	5.22
3404	22	4	20.23	86	15	10.20
3405	22	и 4	19.46	86	15	13.39
3406	22	4	18.12	86	15	17.24
3407	22	4	17.74	86	15	19.99
3408	22	4	19.54	86	15	22.02
3409	22	4	22.47	86	15	29.42
3410	22	4	20.64	86	15	32.97
3411	22	4	18.05	86	15	40.24
3412	22	4	18.66	86	15	45.25
3413	22	4	19.41	86	15	45.05
3414	22	4	20.26	86	15	52.24
3415	22	4	21.98	86	15	52.78
3416	22	4	23.78	86	15	54.15
3417	22	4	27.60	86	15	56.33
3418	22	4	28.07	86	15	57.49
3419	22	4	31.64	86	15	59.13
3419	22	4	34.03	86	16	0.06
3421	22	4	35.16	86	15	59.88
3422	22	4	36.11	86	16	3.22
3423	22	4	41.07	86	16	3.83
	22	4	44.21	86	16	5.40
3424		4	<del>-7-1</del> .∠ I	00	10	0.40

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1	4	7	
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5				74		
(1)	(2)	(3)	a (4)	(5)	A	
3425	22	4		(5)	(6)	(7)
3426	22	4	47.98	86	16	7.61
3427	22	4	49.73	86	16	9.62
3428	22		52.35	86	16	12.62
3429	22	4	54.25	86	16	15.30
3430	22	4	57.18	86	16	18.51
3431	22	4	59.50	86	16	21.46
3432		5	0.19	86	16	24.11
3433	22	4	59.65	86	16	27.96
3434	22	4	59.93	86	16	31.61
3435	22	4	59.19	86	16	
3436	22	4	54.69	86	16	34.62
3436	22	4	52.04	86	16	41.20
	22	4	57.16	86	16	43.90
3438	22	4	48.55	86	16	47.08
3439	22	4	43.95	86	16	49.83
3440	22	4	44.90	86	16	54.79
3441	22	4	42.64	86	16	54.74
3442	22	4	42.54	86	17	59.55
3443	22	. 4	43.72	86	17	5.51
3444	22	4	45.54	86	17	5.90
3445	22	4	46.11	86		11.11
3446	22	4	47.29	86	17	14.17
3447	22	4	47.32	86	17	15.61
3448	22	4	49.73	86	17	19.52
3449	22	4	55.10	86	17	24.32
3450	22	4	57.62	86	17	29.20
3451	22	5	2.73	86	17	31.57
3452	22	5	5.97	86	17	34.63
3453	22	5	15.20	86	17	33.14
3454	22	5	17.28	86	17	41.49
3455	22	5	21.85	86	17	40.90
3456	22	5	29.36	86	17	43.62
3457	22	5 "	26.53	86	17	49.20
3458	22	5 5	25.30	86	17	55.13
3459	22	5	25.09	86	17	55.60
3460	22	5	23.96	86	17	58.60
3461	22	5	23.09	86	18	6.90
3462	22	5 5	20.65	86	18	14.74
3463	22	5	18.28	86	18	20.70
3464	22	, 5	14.17	86	18	24.20
3465	22	. 5 5	9.75	86	18	26.84
3466	22	5	5.56	86	18	26.38
3467	22		2.43	86	18	23.04
3468	22	5 5	59.06	86	18	20.37
3469	22	4	56.80	86	18	18.13
3470	22	4	52.17	86	18 19	13.53
3471	22	4	50.78	86	18 10	15.18
3472	22	4	43.54	86	18	15.82
3473	22	4	41.84	86	18	11.14
3474	22	4	37.09	86	18	10.14
3475	22	4	37.86	86	18 19	5.77
3476	22	4	34.41	86	18 18	3.72
			189	00	10	2.64

(1) (2) (3) (4) (5) (6) (7) 3477 22 4 32.20 86 17 59.91 3476 22 4 31.46 86 17 58.86 3479 22 4 29.38 86 17 54.85 3480 22 4 26.73 86 17 51.05 3481 22 4 22.59 86 17 44.50 3481 22 4 18.40 86 17 44.80 3483 22 4 7.15 86 17 52.93 3484 22 4 8.23 86 17 44.70 3484 22 4 8.23 86 17 52.90 3485 22 4 19.79 86 17 52.90 3486 22 4 19.90 86 17 52.90 3486 22 4 19.80 86 17 52.90 3487 22 3 56.64 86 18 3.33 3487 22 3 56.64 86 18 3.33 3489 22 4 5.14 86 18 6.08 3490 22 4 5.14 86 18 6.41 3492 22 4 8.49 86 18 6.08 3490 22 4 14.14 86 18 6.41 3492 22 4 8.49 86 18 8.61 3493 322 4 19.79 86 18 8.65 3495 22 4 22.49 86 86 18 10.55 3496 22 4 24.96 86 18 10.55 3496 22 4 24.96 86 18 10.55 3496 22 4 24.96 86 18 10.55 3496 22 4 30.48 86 18 10.55 3496 22 4 30.48 86 18 10.55 3496 22 4 30.48 86 18 10.55 3496 22 4 30.48 86 18 10.55 3496 22 4 30.48 86 18 3.33 3497 22 4 38.63 86 18 10.55 3496 22 4 50.86 86 18 10.55 3496 22 4 50.86 86 18 10.55 3496 22 4 50.86 86 18 10.55 3496 22 4 50.86 86 18 10.55 3496 22 4 50.86 86 18 10.55 3496 22 5 5 2.53 86 18 30.20 3500 22 4 50.86 86 18 30.20 3500 22 4 50.86 86 18 30.20 3500 22 4 50.86 86 18 30.20 3500 22 5 5 7.85 86 18 42.47 3500 22 5 5 7.85 86 18 42.47 3500 22 5 5 7.85 86 18 42.47 3500 22 5 5 7.85 86 18 42.47 3500 22 5 5 7.85 86 18 42.47 3500 22 5 5 7.85 86 18 42.47 3510 22 5 5 18.92 86 18 42.67 3511 22 5 5 18.92 86 18 42.67 3511 22 5 5 18.92 86 18 42.67 3511 22 5 5 18.92 86 18 42.67 3511 22 5 5 18.92 86 18 42.67 3511 22 5 5 18.92 86 18 42.67 3511 22 5 5 18.92 86 18 42.67 3511 22 5 5 18.92 86 19 15.51 3511 22 5 5 18.92 86 19 15.51 3511 22 5 5 18.92 86 19 15.51 3511 22 5 5 18.92 86 19 15.51 3511 22 5 5 18.92 86 19 15.51 3511 22 5 5 18.92 86 19 15.51 3511 22 5 5 18.92 86 19 15.51 3511 22 5 5 18.92 86 19 15.51 3511 22 5 5 18.92 86 19 15.51 3511 22 5 5 18.92 86 19 15.51 3511 22 5 5 18.92 86 19 15.51 3511 22 5 5 18.92 86 19 15.51 3511 22 5 5 18.92 86 19 15.51 3511 32 2 5 5 18.92 86 19 15.51 3511 32 2 5 5 18.92 86 19 15.51 3511 32 2 5 5 18.92 86 19 15.51 3511 32 2 5 5 18.92 86 19 15.51 3511 32 2 5 5 18.92 86 19 15.51 351			·	75			1
3476         22         4         31.46         86         17         58.86           3479         22         4         29.98         86         17         54.85           3481         22         4         26.73         86         17         45.52           3481         22         4         22.59         86         17         44.52           3482         22         4         18.40         86         17         44.70           3483         22         4         8.23         86         17         44.29           3484         22         4         8.23         86         17         42.29           3486         22         4         1.96         86         17         59.90           3487         22         3         57.92         86         17         59.04           3489         22         4         2.11         86         18         3.33           3489         22         4         2.11         86         18         6.81           3490         22         4         14.14         86         18         7.78           3492         22         <	(1)	(2)	(3)		(5)		1000 00
3476 22 4 29.38 86 17 58.86 3480 22 4 26.73 86 17 45.52 3481 22 4 22.59 86 17 45.52 3481 22 4 22.59 86 17 44.80 3482 22 4 18.40 86 17 44.70 3484 22 4 8.23 86 17 44.29 3485 22 4 1.98 86 17 52.90 3486 22 4 1.98 86 17 52.90 3486 22 4 1.98 86 17 52.90 3487 22 3 57.92 86 17 59.04 3488 22 3 57.92 86 17 59.04 3488 22 4 2.11 86 18 6.88 333 3488 22 4 2.11 86 18 6.41 3490 22 4 5.14 86 18 6.41 3491 22 4 8.49 86 18 8.33 3490 22 4 14.14 86 18 6.41 3491 22 4 19.79 86 18 8.32 3494 22 4 24.96 86 18 8.32 3493 22 4 14.14 86 18 8.32 3494 22 4 24.96 86 18 8.32 3496 22 4 28.27 86 18 10.55 3496 22 4 38.63 86 18 18.03 3497 22 4 38.63 86 18 18.03 3497 22 4 38.63 86 18 18.03 3497 22 4 38.63 86 18 18.03 3497 22 4 51.66 86 18 18.03 3497 22 4 51.66 86 18 18.03 3500 22 4 47.39 86 18 23.43 3500 22 4 50.86 86 18 30.33 3501 22 4 50.86 86 18 30.33 3501 22 4 50.86 86 18 30.33 3501 22 5 5.86 86 18 42.47 3506 22 5 7.85 86 18 45.04 3507 22 5 18.90 86 18 42.47 3508 22 5 18.90 86 18 42.47 3508 22 5 18.90 86 18 42.67 3511 22 5 18.80 86 18 42.77 3511 22 5 18.80 86 18 42.77 3511 22 5 18.80 86 18 42.77 3511 22 5 18.92 86 18 40.18 3511 22 5 18.92 86 18 40.18 3511 22 5 18.92 86 18 40.18 3511 22 5 18.92 86 18 50.13 3511 22 5 18.92 86 18 50.13 3511 22 5 18.80 86 18 47.61 3511 22 5 18.80 86 18 47.61 3511 22 5 18.80 86 19 27.57 3522 22 5 19.93 86 19 27.57 3523 22 5 19.93 86 19 27.57 3524 22 5 19.93 86 19 27.57 3526 22 5 22.57 3526 22 5 22.57 3526 22 5 5 22.57 3526 22 5 5 22.57 3527 22 5 32.65 86 19 27.57	3477	22	4	32.20	86	17	
3479 22 4 29.38 86 17 54.85 3480 22 4 26.73 86 17 51.05 3481 22 4 22.59 86 17 44.52 3482 22 4 18.40 86 17 44.80 3483 22 4 7.15 86 17 44.70 3484 22 4 8.23 86 17 52.90 3485 22 4 1.86 86 17 52.90 3485 22 4 1.86 86 17 52.90 3486 22 4 1.86 86 17 53.93 3487 22 3 57.92 86 17 53.93 3487 22 3 56.64 86 18 3.33 3488 22 4 5.14 86 18 6.08 3490 22 4 5.14 86 18 6.41 3491 22 4 8.49 86 18 6.41 3491 22 4 8.49 86 18 9.01 3493 22 4 19.79 86 18 8.32 3494 22 4 24.96 86 18 8.32 3495 22 4 24.96 86 18 8.32 3495 22 4 30.48 86 18 8.65 3495 22 4 30.48 86 18 10.55 3496 22 4 30.48 86 18 10.55 3496 22 4 30.48 86 18 18.21 3498 22 4 30.48 86 18 18.23 3499 22 4 30.48 86 18 18.23 3499 22 4 30.48 86 18 18.23 3499 22 4 30.48 86 18 18.23 3498 22 4 30.48 86 18 18.23 3500 22 4 50.66 86 18 30.93 3500 22 4 50.66 86 18 30.93 3500 22 4 50.66 86 18 30.93 3500 22 4 50.66 86 18 30.93 3500 22 4 50.66 86 18 30.93 3500 22 5 5 7.80 86 18 42.47 3506 22 5 5 7.80 86 18 42.47 3506 22 5 5 7.80 86 18 42.24 3511 22 5 5 12.06 86 18 42.24 3511 22 5 12.06 86 18 42.24 3511 22 5 12.06 86 18 42.24 3511 22 5 12.06 86 18 42.26 3511 22 5 12.06 86 18 42.26 3511 22 5 12.06 86 18 42.26 3511 22 5 12.06 86 18 42.26 3511 22 5 12.06 86 18 42.26 3511 22 5 12.06 86 18 42.26 3511 22 5 12.06 86 18 42.26 3511 22 5 13.84 86 19 25.59 3527 22 5 5 5.56 86 19 25.57 3527 22 5 5 32.65 86 19 25.57 3527 22 5 5 32.65 86 19 25.57 3527 22 5 5 32.65 86 19 25.57 3527 22 5 5 32.65 86 19 25.57 3527 22 5 5 32.65 86 19 25.57 3527 22 5 5 32.65 86 19 25.57 3527 22 5 32.65 86 19 25.57 35				31.46	86	17	58.86
3480 22 4 26.73 86 17 45.52   3481 22 4 22.59 86 17 45.52   3483 22 4 7.15 86 17 44.80   3483 22 4 8.23 86 17 44.70   3484 22 4 8.23 86 17 52.90   3486 22 4 1.96 86 17 52.90   3486 22 4 1.96 86 17 52.90   3487 22 3 57.92 86 17 53.93   3487 22 3 56.64 86 18 3.33   3488 22 4 2.11 86 18 6.8   3490 22 4 5.14 86 18 6.8   3490 22 4 5.14 86 18 6.41   3491 22 4 8.49 86 18 7.78   3492 22 4 14.14 86 18 6.41   3493 22 4 19.79 86 18 8.32   3494 22 4 24.96 86 18 8.32   3494 22 4 24.96 86 18 8.32   3495 22 4 30.48 86 18 10.55   3496 22 4 30.48 86 18 10.55   3496 22 4 30.48 86 18 10.55   3497 22 4 38.63 86 18 10.55   3498 22 4 41.22 86 18 10.55   3499 22 4 51.66 86 18 32.30   3500 22 4 55.10 86 18 32.34   3501 22 4 55.10 86 18 32.34   3501 22 4 55.10 86 18 32.34   3500 22 4 55.10 86 18 32.34   3501 22 5 7.85 86 18 32.34   3501 22 5 7.80 86 18 32.34   3501 22 5 7.85 86 18 32.34   3501 22 5 7.85 86 18 32.34   3501 22 5 7.85 86 18 32.34   3501 22 5 7.85 86 18 37.00   3503 22 5 7.85 86 18 32.34   3504 22 5 7.85 86 18 32.34   3507 22 5 7.80 86 18 32.34   3508 22 5 7.85 86 18 42.47   3504 22 5 7.85 86 18 42.47   3505 22 5 7.80 86 18 42.47   3506 22 5 7.85 86 18 42.47   3507 22 5 7.80 86 18 42.47   3511 22 5 7.85 86 18 42.52   3512 22 5 7.85 86 18 50.13   3513 22 5 7.85 86 18 50.13   3514 22 5 7.85 86 18 50.13   3515 22 5 7.85 86 18 50.13   3516 22 5 7.85 86 18 50.13   3517 22 5 7.80 86 18 50.13   3518 22 5 7.85 86 18 50.13   3519 22 5 7.85 86 18 50.13   3510 22 5 7.85 86 18 50.13   3511 22 5 7.85 86 18 50.13   3512 22 5 7.85 86 19 15.51   3513 22 5 7.85 86 19 27.57   3522 22 5 7.39 86 19 27.57   3524 22 5 7.39 86 19 27.57   3525 22 5 7.39 86 19 27.57   3526 22 5 7.39 86 19 27.57   3527 22 5 7.39 86 19 27.57   3527 22 5 7.39 86 19 27.57   3527 22 5 7.39 86 19 27.57   3527 22 5 7.39 86 19 27.57   3527 22 5 7.39 86 19 27.57   3527 22 5 7.39 86 19 27.57   3527 22 5 7.39 86 19 27.57   3527 22 5 7.39 86 19 27.57   3527 22 5 7.39 86 19 27.57   3527 22 5 7.39 86 19 27.57   3527 22 5 7.39 86 19 27.57   3527 22 5 7.39 86 19 27.57   3527 22 5			4	29.38	86	17	
3481 22 4 18.40 86 17 44.80 3482 22 4 18.40 86 17 44.80 3484 22 4 8.23 86 17 44.70 3484 22 4 8.23 86 17 52.90 3485 22 4 1.96 86 17 53.93 3486 22 4 1.96 86 17 53.93 3487 22 3 57.92 86 17 59.04 3488 22 3 56.64 86 18 3.33 3489 22 4 2.11 86 18 6.08 3490 22 4 5.14 86 18 6.8 3491 22 4 8.49 86 18 7.41 3492 22 4 14.14 86 18 6.8 3491 22 4 19.79 86 18 3.32 3493 22 4 19.79 86 18 8.32 3494 22 4 28.27 86 18 10.55 3496 22 4 30.48 86 18 16.53 3496 22 4 30.48 86 18 16.55 3497 22 4 30.48 86 18 18.21 3498 22 4 30.48 86 18 18.21 3498 22 4 41.22 86 18 18.21 3498 22 4 56.44 86 18 18.21 3500 22 4 50.86 86 18 3.32 3500 22 4 50.86 86 18 3.32 3500 22 4 50.86 86 18 3.32 3501 22 4 50.86 86 18 3.32 3503 22 4 50.86 86 18 3.32 3504 22 5 5 7.80 86 18 3.7.20 3507 22 5 7.80 86 18 42.47 3504 22 5 11.06 86 18 42.47 3504 22 5 11.06 86 18 37.20 3507 22 5 7.80 86 18 42.47 3506 22 5 7.80 86 18 43.70 3507 22 5 7.80 86 18 42.47 3506 22 5 7.80 86 18 43.70 3507 22 5 7.80 86 18 43.70 3507 22 5 7.80 86 18 43.70 3511 22 5 11.20 86 18 43.70 3512 22 5 11.06 86 18 43.70 3513 22 5 11.06 86 18 43.70 3514 22 5 11.06 86 19 15.51 3516 22 5 11.06 86 19 27.57 3527 22 5 22.62 86 19 27.57 3527 22 5 22.62 86 19 27.57 3527 22 5 32.65 86 19 27.57 3527 22 5 32.65 86 19 27.57 3527 22 5 32.65 86 19 27.57					86	17	51.05
3482         22         4         18.40         86         17         44.80           3483         22         4         7.15         86         17         44.70           3485         22         4         8.23         86         17         52.90           3486         22         4         1.96         86         17         59.04           3488         22         3         56.64         86         18         3.33           3489         22         4         2.11         86         18         6.08           3490         22         4         5.14         86         18         6.41           3491         22         4         8.49         86         18         6.41           3492         22         4         14.14         86         18         8.32           3494         22         4         24.96         86         18         8.32           3494         22         4         28.27         86         18         8.05           3497         22         4         38.63         86         18         18.03           3499         22         4<				22.59	- 86	17	45.52
3483         22         4         7.15         86         17         44.79           3484         22         4         8.23         86         17         52.90           3486         22         4         1.96         86         17         52.90           3487         22         3         57.92         86         17         59.93           3488         22         3         57.92         86         17         59.93           3489         22         4         2.11         86         18         3.33           3490         22         4         5.14         86         18         6.08           3491         22         4         8.49         86         18         7.78           3492         22         4         19.79         86         18         8.32           3493         22         4         24.96         86         18         8.65           3494         22         4         30.48         86         18         10.55           3496         22         4         30.48         86         18         18.21           3497         22				18.40	86	17	44.80
3484         22         4         8.23         86         17         44.29           3485         22         4         2.21         86         17         52.90           3486         22         3         57.92         86         17         53.93           3487         22         3         56.64         86         18         3.33           3488         22         3         56.64         86         18         6.08           3490         22         4         5.14         86         18         6.08           3491         22         4         8.49         86         18         9.01           3493         22         4         14.14         86         18         9.01           3493         22         4         24.96         86         18         8.65           3494         22         4         24.96         86         18         10.55           3496         22         4         38.63         86         18         10.55           3496         22         4         38.63         86         18         10.55           3499         22 <td< td=""><td></td><td></td><td>4</td><td>7.15</td><td>86</td><td>17</td><td>44.70</td></td<>			4	7.15	86	17	44.70
3485         22         4         1.96         86         17         52.90           3486         22         4         1.96         86         17         53.93           3488         22         3         56.64         86         18         3.33           3489         22         4         2.11         86         18         6.08           3490         22         4         5.14         86         18         6.41           3491         22         4         8.49         86         18         7.78           3492         22         4         14.14         86         18         9.01           3493         22         4         19.79         86         18         8.65           3495         22         4         24.96         86         18         8.65           3495         22         4         22.79         86         18         10.55           3496         22         4         30.48         86         18         18.21           3498         22         4         41.22         86         18         18.21           3499         22         4			4	8.23	86	17	44.29
3486         22         4         1.96         86         17         53.93           3487         22         3         57.92         86         17         59.04           3488         22         3         56.64         86         18         3.33           3489         22         4         2.11         86         18         6.08           3490         22         4         5.14         86         18         6.41           3491         22         4         8.49         86         18         7.78           3492         22         4         19.79         86         18         9.01           3493         22         4         24.96         86         18         8.65           3494         22         4         28.27         86         18         10.55           3496         22         4         38.63         86         18         10.55           3498         22         4         34.22         86         18         19.08           3499         22         4         46.24         86         18         19.03           3499         22 <td< td=""><td></td><td></td><td></td><td>2.21</td><td>86</td><td>17</td><td>52.90</td></td<>				2.21	86	17	52.90
3487         22         3         57.92         86         17         59.04           3488         22         3         56.64         86         18         3.33           3489         22         4         5.14         86         18         6.41           3491         22         4         8.49         86         18         7.78           3492         22         4         14.14         86         18         9.01           3493         22         4         19.79         86         18         9.01           3493         22         4         24.96         86         18         8.32           3494         22         4         24.96         86         18         10.55           3495         22         4         30.48         86         18         18.03           3497         22         4         38.63         86         18         18.21           3498         22         4         41.22         86         18         19.08           3499         22         4         46.24         86         18         19.08           3501         22         <				1.96	86	17	53.93
3488         22         3         56.64         86         18         3.33           3489         22         4         2.11         86         18         6.08           3490         22         4         5.14         86         18         7.78           3492         22         4         14.14         86         18         9.01           3493         22         4         19.79         86         18         8.32           3494         22         4         24.96         86         18         8.65           3495         22         4         28.27         86         18         10.55           3496         22         4         30.48         86         18         18.03           3497         22         4         38.63         86         18         18.03           3498         22         4         41.22         86         18         18.03           3499         22         4         46.24         86         18         23.43           3500         22         4         47.39         86         18         23.43           3501         22         <				57.92	86	17	59.04
3489         22         4         2.11         86         18         6.08           3490         22         4         5.14         86         18         6.41           3491         22         4         8.49         86         18         9.01           3493         22         4         19.79         86         18         8.32           3494         22         4         24.96         86         18         8.65           3495         22         4         28.27         86         18         10.55           3496         22         4         30.48         86         18         18.03           3497         22         4         38.63         86         18         18.21           3498         22         4         41.22         86         18         19.08           3499         22         4         46.24         86         18         23.43           3500         22         4         47.39         86         18         26.43           3501         22         4         48.06         86         18         30.93           3503         22         <			3	56.64	86	18	3.33
3490         22         4         5.14         86         18         7.78           3491         22         4         8.49         86         18         7.78           3492         22         4         19.79         86         18         9.01           3493         22         4         19.79         86         18         9.65           3494         22         4         24.96         86         18         18.65           3495         22         4         28.27         86         18         18.03           3496         22         4         30.48         86         18         18.03           3497         22         4         38.63         86         18         19.08           3498         22         4         41.22         86         18         19.08           3499         22         4         46.24         86         18         23.43           35001         22         4         47.39         86         18         20.43           3502         22         4         50.86         86         18         37.20           3503         22				2.11	86	18	6.08
3491         22         4         8.49         86         18         7.78           3492         22         4         14.14         86         18         9.01           3493         22         4         19.79         86         18         8.32           3494         22         4         24.96         86         18         10.55           3496         22         4         30.48         86         18         10.55           3496         22         4         38.63         86         18         18.03           3497         22         4         38.63         86         18         19.08           3499         22         4         46.24         86         18         23.43           3500         22         4         47.39         86         18         30.93           3501         22         4         48.06         86         18         30.93           3501         22         4         50.86         86         18         30.93           3503         22         4         50.86         86         18         42.47           3504         22				5.14	86	18	6.41
3492         22         4         14.14         86         18         9.01           3493         22         4         19.79         86         18         8.32           3494         22         4         24.96         86         18         8.65           3495         22         4         30.48         86         18         10.55           3496         22         4         30.48         86         18         18.03           3497         22         4         38.63         86         18         19.08           3498         22         4         41.22         86         18         19.08           3499         22         4         46.24         86         18         23.43           3500         22         4         47.39         86         18         30.93           3501         22         4         48.06         86         18         37.20           3503         22         4         51.66         86         18         37.20           3504         22         4         55.10         86         18         42.47           3505         22			4	8.49	86	18	7.78
3493         22         4         19.79         86         18         8.32           3494         22         4         24.96         86         18         10.55           3495         22         4         28.27         86         18         10.55           3496         22         4         30.48         86         18         18.03           3497         22         4         38.63         86         18         19.08           3498         22         4         41.22         86         18         19.08           3499         22         4         46.24         86         18         23.43           3500         22         4         47.39         86         18         26.43           3501         22         4         48.06         86         18         37.20           3503         22         4         55.86         86         18         42.47           3504         22         4         55.10         86         18         42.47           3505         22         4         55.10         86         18         42.47           3506         22			4	14.14	86		
3494         22         4         24.96         86         18         8.65           3495         22         4         28.27         86         18         10.55           3496         22         4         30.48         86         18         18.03           3497         22         4         38.63         86         18         18.21           3498         22         4         41.22         86         18         19.08           3499         22         4         46.24         86         18         23.43           3500         22         4         47.39         86         18         20.43           3501         22         4         48.06         86         18         30.93           3502         22         4         50.86         86         18         37.20           3503         22         4         50.86         86         18         42.47           3504         22         4         55.10         86         18         42.47           3505         22         4         55.10         86         18         43.70           3507         22			4	19.79			
3495         22         4         28.27         86         18         10.55           3496         22         4         30.48         86         18         18.03           3497         22         4         38.63         86         18         19.08           3498         22         4         41.22         86         18         19.08           3499         22         4         46.24         86         18         23.43           3500         22         4         46.24         86         18         26.43           3501         22         4         48.06         86         18         30.93           3502         22         4         50.86         86         18         37.20           3503         22         4         51.66         86         18         42.47           3504         22         4         55.10         86         18         42.47           3505         22         4         59.16         86         18         43.70           3507         22         5         7.80         86         18         40.18           3508         22			4	24.96	86	18	
3496         22         4         30.48         86         18         18.03           3497         22         4         38.63         86         18         19.08           3498         22         4         41.22         86         18         19.08           3499         22         4         46.24         86         18         23.43           3500         22         4         47.39         86         18         26.43           3501         22         4         48.06         86         18         30.93           3502         22         4         50.86         86         18         37.20           3503         22         4         51.66         86         18         42.47           3504         22         4         55.10         86         18         42.74           3505         22         4         55.10         86         18         42.47           3506         22         5         2.53         86         18         43.70           3507         22         5         7.85         86         18         40.18           3508         22			4	28.27	86		
3497         22         4         38.63         86         18         18.21           3498         22         4         41.22         86         18         19.08           3499         22         4         46.24         86         18         23.43           3500         22         4         47.39         86         18         26.43           3501         22         4         48.06         86         18         30.93           3502         22         4         50.86         86         18         37.20           3503         22         4         51.66         86         18         42.47           3504         22         4         55.10         86         18         42.47           3505         22         4         59.16         86         18         44.47           3506         22         5         7.80         86         18         44.47           3507         22         5         7.80         86         18         40.18           3508         22         5         7.80         86         18         42.16           3510         22			4	30.48			
3498       22       4       41.22       86       18       19.08         3499       22       4       46.24       86       18       23.43         3500       22       4       47.39       86       18       26.43         3501       22       4       48.06       86       18       30.93         3502       22       4       50.86       86       18       37.20         3503       22       4       51.66       86       18       42.47         3504       22       4       55.10       86       18       45.04         3505       22       4       59.16       86       18       44.47         3506       22       5       2.53       86       18       40.18         3507       22       5       7.85       86       18       40.18         3508       22       5       7.85       86       18       40.18         3510       22       5       7.85       86       18       42.16         3511       22       5       14.22       86       18       47.61         3512       22       5 <td></td> <td></td> <td>4</td> <td>38.63</td> <td>86</td> <td></td> <td></td>			4	38.63	86		
3499       22       4       46.24       86       18       23.43         3500       22       4       47.39       86       18       26.43         3501       22       4       48.06       86       18       30.93         3502       22       4       50.86       86       18       37.20         3503       22       4       51.66       86       18       42.47         3504       22       4       55.10       86       18       42.47         3505       22       4       55.10       86       18       45.04         3506       22       5       2.53       86       18       42.47         3506       22       5       7.80       86       18       40.18         3508       22       5       7.85       86       18       42.32         3509       22       5       7.85       86       18       42.16         3510       22       5       14.22       86       18       41.52         3511       22       5       14.22       86       18       47.61         3513       22       5 <td></td> <td></td> <td>4</td> <td>41.22</td> <td>86</td> <td></td> <td></td>			4	41.22	86		
3500         22         4         47.39         86         18         26.43           3501         22         4         48.06         86         18         30.93           3502         22         4         50.86         86         18         37.20           3503         22         4         51.66         86         18         42.47           3504         22         4         55.10         86         18         42.47           3505         22         4         59.16         86         18         42.47           3506         22         5         2.53         86         18         43.70           3507         22         5         7.85         86         18         40.18           3508         22         5         7.85         86         18         42.32           3509         22         5         7.85         86         18         42.16           3510         22         5         12.06         86         18         42.16           3511         22         5         14.22         86         18         47.61           3513         22			- 4	46.24	86	18	
3501         22         4         48.06         86         18         30.93           3502         22         4         50.86         86         18         37.20           3503         22         4         51.66         86         18         42.47           3504         22         4         55.10         86         18         45.04           3505         22         4         59.16         86         18         44.70           3506         22         5         2.53         86         18         43.70           3507         22         5         7.80         86         18         40.18           3508         22         5         7.85         86         18         42.32           3509         22         5         7.85         86         18         42.16           3510         22         5         12.06         86         18         41.52           3511         22         5         14.22         86         18         47.61           3512         22         5         18.80         86         18         47.61           3513         22			4	47.39	86		
3502         22         4         50.86         86         18         37.20           3503         22         4         51.66         86         18         42.47           3504         22         4         55.10         86         18         45.44           3505         22         4         59.16         86         18         44.47           3506         22         5         2.53         86         18         43.70           3507         22         5         7.80         86         18         40.18           3508         22         5         7.85         86         18         42.32           3509         22         5         7.85         86         18         42.32           3509         22         5         9.42         86         18         42.16           3510         22         5         12.06         86         18         41.52           3511         22         5         14.22         86         18         47.61           3513         22         5         18.80         86         18         57.71           3516         22			4	48.06	86		
3503       22       4       51.66       86       18       42.47         3504       22       4       55.10       86       18       45.04         3505       22       4       59.16       86       18       44.47         3506       22       5       2.53       86       18       43.70         3507       22       5       7.80       86       18       40.18         3508       22       5       7.85       86       18       42.32         3509       22       5       9.42       86       18       42.16         3510       22       5       12.06       86       18       42.62         3511       22       5       14.22       86       18       47.61         3512       22       5       18.80       86       18       47.61         3513       22       5       19.54       86       18       50.13         3514       22       5       17.20       86       19       1.51         3516       22       5       16.82       86       19       1.51         3518       22       5			4	50.86	86	18	37.20
3504       22       4       55.10       86       18       45.04         3505       22       4       59.16       86       18       44.47         3506       22       5       2.53       86       18       43.70         3507       22       5       7.80       86       18       40.18         3508       22       5       7.85       86       18       42.32         3509       22       5       9.42       86       18       42.16         3510       22       5       12.06       86       18       41.52         3511       22       5       14.22       86       18       47.61         3512       22       5       18.80       86       18       47.61         3513       22       5       19.54       86       18       50.13         3514       22       5       19.54       86       18       57.71         3515       22       5       17.20       86       19       1.51         3516       22       5       16.82       86       19       15.11         3519       22       5			4	51.66	86	18	42.47
3505       22       4       59.16       86       18       44.47         3506       22       5       2.53       86       18       43.70         3507       22       5       7.80       86       18       40.18         3508       22       5       7.85       86       18       42.32         3509       22       5       9.42       86       18       42.16         3510       22       5       12.06       86       18       41.52         3511       22       5       14.22       86       18       47.61         3512       22       5       18.80       86       18       47.61         3513       22       5       19.54       86       18       50.13         3514       22       5       18.92       86       18       57.71         3515       22       5       17.20       86       19       1.51         3516       22       5       16.82       86       19       6.11         3517       22       5       13.84       86       19       15.11         3519       22       5			4	55.10	86		
3506       22       5       2.53       86       18       43.70         3507       22       5       7.80       86       18       40.18         3508       22       5       7.85       86       18       42.32         3509       22       5       9.42       86       18       42.16         3510       22       5       12.06       86       18       41.52         3511       22       5       14.22       86       18       42.62         3512       22       5       18.80       86       18       47.61         3513       22       5       19.54       86       18       50.13         3514       22       5       18.92       86       18       57.71         3515       22       5       17.20       86       19       1.51         3516       22       5       16.82       86       19       6.11         3517       22       5       13.84       86       19       9.48         3518       22       5       5.56       86       19       15.11         3519       22       5			4	59.16	86		
3508       22       5       7.85       86       18       42.32         3509       22       5       9.42       86       18       42.16         3510       22       5       12.06       86       18       41.52         3511       22       5       14.22       86       18       42.62         3512       22       5       18.80       86       18       47.61         3513       22       5       19.54       86       18       50.13         3514       22       5       18.92       86       18       57.71         3515       22       5       17.20       86       19       1.51         3516       22       5       16.82       86       19       6.11         3517       22       5       13.84       86       19       9.48         3518       22       5       9.52       86       19       15.11         3519       22       5       5.56       86       19       15.51         3520       22       5       7.39       86       19       25.90         3521       22       5			5	2.53	86		
3508       22       5       7.85       86       18       42.32         3509       22       5       9.42       86       18       42.16         3510       22       5       12.06       86       18       41.52         3511       22       5       14.22       86       18       42.62         3512       22       5       18.80       86       18       47.61         3513       22       5       19.54       86       18       50.13         3514       22       5       18.92       86       18       57.71         3515       22       5       17.20       86       19       1.51         3516       22       5       16.82       86       19       6.11         3517       22       5       13.84       86       19       9.48         3518       22       5       9.52       86       19       15.11         3519       22       5       5.56       86       19       15.51         3520       22       5       7.39       86       19       25.90         3521       22       5			5	7.80	86		
3510       22       5       12.06       86       18       41.52         3511       22       5       14.22       86       18       42.62         3512       22       5       18.80       86       18       47.61         3513       22       5       19.54       86       18       50.13         3514       22       5       18.92       86       18       57.71         3515       22       5       17.20       86       19       1.51         3516       22       5       16.82       86       19       6.11         3517       22       5       13.84       86       19       9.48         3518       22       5       9.52       86       19       15.11         3519       22       5       5.56       86       19       15.51         3519       22       5       7.39       86       19       25.90         3521       22       5       11.06       86       19       27.60         3522       22       5       19.93       86       19       26.13         3523       22       5			5	7.85			
3510       22       5       12.06       86       18       41.52         3511       22       5       14.22       86       18       42.62         3512       22       5       18.80       86       18       47.61         3513       22       5       19.54       86       18       50.13         3514       22       5       18.92       86       18       57.71         3515       22       5       17.20       86       19       1.51         3516       22       5       16.82       86       19       6.11         3517       22       5       13.84       86       19       9.48         3518       22       5       9.52       86       19       15.11         3519       22       5       5.56       86       19       18.55         3520       22       5       7.39       86       19       25.90         3521       22       5       11.06       86       19       27.60         3522       22       5       19.93       86       19       26.13         3523       22       5				9.42	86		
3511       22       5       14.22       86       18       42.62         3512       22       5       18.80       86       18       47.61         3513       22       5       19.54       86       18       50.13         3514       22       5       18.92       86       18       57.71         3515       22       5       17.20       86       19       1.51         3516       22       5       16.82       86       19       6.11         3517       22       5       13.84       86       19       9.48         3518       22       5       9.52       86       19       15.11         3519       22       5       5.56       86       19       18.55         3520       22       5       7.39       86       19       25.90         3521       22       5       11.06       86       19       27.60         3522       22       5       15.33       86       19       26.13         3523       22       5       19.93       86       19       27.70         3525       22       5				12.06	86		
3512       22       5       18.80       86       18       47.61         3513       22       5       19.54       86       18       50.13         3514       22       5       18.92       86       18       57.71         3515       22       5       17.20       86       19       1.51         3516       22       5       16.82       86       19       6.11         3517       22       5       13.84       86       19       9.48         3518       22       5       9.52       86       19       15.11         3519       22       5       5.56       86       19       15.51         3520       22       5       7.39       86       19       25.90         3521       22       5       11.06       86       19       27.60         3522       22       5       15.33       86       19       26.13         3523       22       5       19.93       86       19       27.70         3524       22       5       22.62       86       19       27.57         3526       22       5				14.22	86		
3513       22       5       19.54       86       18       50.13         3514       22       5       18.92       86       18       57.71         3515       22       5       17.20       86       19       1.51         3516       22       5       16.82       86       19       6.11         3517       22       5       13.84       86       19       9.48         3518       22       5       9.52       86       19       15.11         3519       22       5       5.56       86       19       18.55         3520       22       5       7.39       86       19       25.90         3521       22       5       11.06       86       19       27.60         3522       22       5       15.33       86       19       26.13         3523       22       5       19.93       86       19       27.70         3524       22       5       22.62       86       19       27.57         3526       22       5       24.42       86       19       27.57         3526       22       5		22	5	18.80	86		
3514       22       5       18.92       86       18       57.71         3515       22       5       17.20       86       19       1.51         3516       22       5       16.82       86       19       6.11         3517       22       5       13.84       86       19       9.48         3518       22       5       9.52       86       19       15.11         3519       22       5       5.56       86       19       18.55         3520       22       5       7.39       86       19       25.90         3521       22       5       11.06       86       19       27.60         3522       22       5       15.33       86       19       26.13         3523       22       5       19.93       86       19       26.28         3524       22       5       22.62       86       19       27.57         3525       22       5       24.42       86       19       27.57         3526       22       5       28.07       86       19       27.57         3527       22       5				19.54	86		
3515     22     5     17.20     86     19     1.51       3516     22     5     16.82     86     19     6.11       3517     22     5     13.84     86     19     9.48       3518     22     5     9.52     86     19     15.11       3519     22     5     5.56     86     19     18.55       3520     22     5     7.39     86     19     25.90       3521     22     5     11.06     86     19     27.60       3522     22     5     15.33     86     19     26.13       3523     22     5     19.93     86     19     26.28       3524     22     5     22.62     86     19     27.70       3525     22     5     24.42     86     19     27.57       3526     22     5     28.07     86     19     27.57       3527     22     5     32.65     86     19     28.08				18.92			
3516       22       5       16.82       86       19       6.11         3517       22       5       13.84       86       19       9.48         3518       22       5       9.52       86       19       15.11         3519       22       5       5.56       86       19       18.55         3520       22       5       7.39       86       19       25.90         3521       22       5       11.06       86       19       27.60         3522       22       5       15.33       86       19       26.13         3523       22       5       19.93       86       19       26.28         3524       22       5       22.62       86       19       27.70         3525       22       5       24.42       86       19       27.57         3526       22       5       28.07       86       19       27.57         3527       22       5       32.65       86       19       28.08			5	17.20			
3517       22       5       13.84       86       19       9.48         3518       22       5       9.52       86       19       15.11         3519       22       5       5.56       86       19       18.55         3520       22       5       7.39       86       19       25.90         3521       22       5       11.06       86       19       27.60         3522       22       5       15.33       86       19       26.13         3523       22       5       19.93       86       19       26.28         3524       22       5       22.62       86       19       27.70         3525       22       5       24.42       86       19       27.57         3526       22       5       28.07       86       19       27.57         3527       22       5       32.65       86       19       28.08			5	16.82			
3518     22     5     9.52     86     19     15.11       3519     22     5     5.56     86     19     18.55       3520     22     5     7.39     86     19     25.90       3521     22     5     11.06     86     19     27.60       3522     22     5     15.33     86     19     26.13       3523     22     5     19.93     86     19     26.28       3524     22     5     22.62     86     19     27.70       3525     22     5     24.42     86     19     27.57       3526     22     5     28.07     86     19     27.57       3527     22     5     32.65     86     19     28.08		22	5	13.84	86		
3519     22     5     5.56     86     19     18.55       3520     22     5     7.39     86     19     25.90       3521     22     5     11.06     86     19     27.60       3522     22     5     15.33     86     19     26.13       3523     22     5     19.93     86     19     26.28       3524     22     5     22.62     86     19     27.70       3525     22     5     24.42     86     19     27.57       3526     22     5     28.07     86     19     27.57       3527     22     5     32.65     86     19     28.08			5	9.52			
3520     22     5     7.39     86     19     25.90       3521     22     5     11.06     86     19     27.60       3522     22     5     15.33     86     19     26.13       3523     22     5     19.93     86     19     26.28       3524     22     5     22.62     86     19     27.70       3525     22     5     24.42     86     19     27.57       3526     22     5     28.07     86     19     27.57       3527     22     5     32.65     86     19     28.08			5	5.56	86		
3521     22     5     11.06     86     19     27.60       3522     22     5     15.33     86     19     26.13       3523     22     5     19.93     86     19     26.28       3524     22     5     22.62     86     19     27.70       3525     22     5     24.42     86     19     27.57       3526     22     5     28.07     86     19     27.57       3527     22     5     32.65     86     19     28.08				7.39	86		
3522     22     5     15.33     86     19     26.13       3523     22     5     19.93     86     19     26.28       3524     22     5     22.62     86     19     27.70       3525     22     5     24.42     86     19     27.57       3526     22     5     28.07     86     19     27.57       3527     22     5     32.65     86     19     28.08       3527     22     5     32.65     86     19     28.08		22	5	11.06	86		
3523     22     5     19.93     86     19     26.28       3524     22     5     22.62     86     19     27.70       3525     22     5     24.42     86     19     27.57       3526     22     5     28.07     86     19     27.57       3527     22     5     32.65     86     19     28.08       3527     22     5     32.65     86     19     28.08							
3524     22     5     22.62     86     19     27.70       3525     22     5     24.42     86     19     27.57       3526     22     5     28.07     86     19     27.57       3527     22     5     32.65     86     19     28.08       3527     22     5     32.65     86     19     28.08				19.93			
3525     22     5     24.42     86     19     27.57       3526     22     5     28.07     86     19     27.57       3527     22     5     32.65     86     19     28.08       3527     22     5     32.65     86     19     28.08				22.62			
3526     22     5     28.07     86     19     27.57       3527     22     5     32.65     86     19     28.08       3527     32.65     32.65     32.65     32.65     32.65			5				
3527 22 5 32.65 86 19 28.08			5				
20.47			5		•		
			5	33.85	86	19	28.47

(1)	(2)	(3)	(4)	(5)	(6)	(7)
3529	22	5	34.27	86		
3530	22	5	35.78	86	19 10	28.21
3531	22	5	36.94	86	19 10	* 32.04
3532	22	5 5	38.63		19	32.48
3533	22	5	40.18	86 86	19	35.43
3534	22	5	42.00		19	37.62
3535	22	5	43.77	86	19	41.29
3536	22	5		86	19	44.76
3537	22	5	40.87	86	19	45.02
3538	22	5	40.33	86	19	49.64
3539	22		39.53	86	19	53.63
3540		5	39.97	86	19	59.31
3541	22	5	35.86	86	20	0.28
	22	5	32.11	86	20	5.06
3542	22	5	35.65	86	20	7.38
3543	22	5	28.46	86	20	19.71
3544	22	5	21.73	86	. 20	24.62
3545	22	5	10.26	86	20	29.35
3546	22	5	4.61	86	20	37.73
3547	22	4	57.47	. 86	20	35.16
3548	22	4	56.08	86	20	39.65
3549	22	4	59.60	86	20	44.92
3550	22	5	6.67	86	20	51.60
3551	22	· 5	7.23	86	20	59.08
3552	22	5	15.69	86	20	48.52
3553	22	5	19.93	86	20	
3554	22	5	24.63	86	20	43.84
3555	22	5	31.62	86		38.57
3556	22	5	33.88	86	20	34.51
3557	22	5	36.50		20	30.25
3558	22	5	44.96	86 86	20	27.29
3559	22	5	48.45	86	20	27.52
3560	22	5	52.67	86	20	28.81
3561	22	5 <sub>%</sub>	58.50		20	30.50
3562	22	6	0.20	86	20	33.07
3563	22	6		86	20	32.66
3564	22	6	8.24	86	20	28.22
3565	22		12.35	86	20	24.49
3566	22	6	13.89	86	20	19.04
3567	22		17.85	- 86	20	16.70
3568		6	23.22	86	20	13.47
3569	22	6	25.35	86	20	14.88
	22	6	27.67	86	20	15.65
3570	22	6	30.70	86	20	16.01
3571	22	6	35.07	86	20	22.59
3572	22	6	38.92	86	20	22.13
3573	22	6	42.96	86	20	29.50
3574	22	6	43.96	86	20	31.07
3575	22	6	45.17	86	20	43.64
3576	22	6	46.94	86	20	46.08
3577	22	6	48.35	86	20	52.37
3578	22	6	48.17	86	20	55.89
3579	22	6	47.89	86	20	57.69
3580	22	6	46.50	86	21	0.06
	57					

			. 7	7		
(1)	(2)	(3)	(4)	(5)	(6)	(7)
3581	22	6	42.85	86	21	3.40
3582	22	6	38.72	86	21	3.68
3583	22	6	35.35	86	21	8.54
3584	22	6	30.80	86	21	11.80
3585	22	6	30.03	86	21	14.35
3586	22	6	23.17	86	21	17.12
3587	22	6	18.29	86	21	18.38
3588	22	6	13.56	86	21	17.04
3589	22	6	13.74	86	21	24.91 29.76
3590	22	6	10.27	86 86	21 21	32.44
3591	22	, 6	6.57	86 86	21	35.60
3592	22	6	6.54 8.21	86	21	37.53
3593	22	6 6	4.64	86	21	42.23
3594	22 22	, 6	4.82	86	21	43.90
3595 3596	22	6	2.51	86	21	49.83
3597	22	6	2.51	86	21	52.04
3598	22	6	2.79	86	21	54.43
3599	22	6	7.55	86	21	56.54
3600	22	6	8.11	86	22	1.37
3601	22	6	9.73	86	22	2.09
3602	22	. 6	11.99	86	22	5.77
3603	. 22	6	12.92	86	22	7.67
3604	22	6	12.43	. 86	22	8.70
3605	22	6	14.25	86	22	12.42
3606	22	6	14.48	86	22	16.12
3607	22	- 6	13.04	86	22	15.43 15.69
3608	22	6	12.40	86	22 22	18.39
3609	22	6	7.44	86 86	22	30.62
3610	22	6	3.59 1.15	86	22	38.53
3611	22	6 <sub>.</sub> 5	57.68	86	22	44.57
3612	22 22		52.02	86	22	46.50
3613 3614	22	я 5 5	43.44	86	22	43.88
3615	22	5	37.30	86	22	40.90
3616	22		34.81	86	22	37.02
3617	. 22	5 5	30.75	86	22	34.42
3618	22	5	26.27	86	22	30.72
3619	22	5	26.09	86	22	24.91
3620	22	5 5	21.78	86	22	22.34
3621	22	5	. 20.18	86	22	24.50
3622	22	- 5	18.98	86	22	26.12
3623	22	5	17.25	86	22	27.48
3624	22	5	13.84	86	22	28.74 27.35
3625	22	5	9.88	86	22	26.63
3626	22	5	8.11	86	22 22	27.69
3627	22	5	3.97	86	22 22	34.11
3628	22	. 4	59.88	86 86	22	35.60
3629	22	5	2.09 2.53	86	22	37.61
3630	22	5	0.86	86	22	41.23
3631	22	5	5.84	86	22	42.16
3632	22	5	J.0 <del>4</del>		~~	72.10

(1)	(2)	(3)	(4)	(5)	(6)	(7)
			10.93	86	22	39.61
3633	22	5	13.94	86	22	* 36.89
3634	. 22	5	19.62	86	22	39.43
3635	22	5		86	22	41.72
3636	22	5	22.16	86	22	39.38
3637	22	5	26.97	86	22	41.13
3638	22	. 5	27.33		22	43.54
3639	22	5	28.36	86	22	48.32
3640	22	5	31.80	86	22	50.51
3641	22	5	37.02	86	22	51.79
3642	22	5	40.10	86		58.83
3643	22	5	46.68	86	22	3.64
3644	22	5	55.08	86	23	
3645	22	6	0.14	86	23	4.67
3646	22	6	4.18	86	23	6.13
3647	22	6	8.52	86	23	10.50
3648	22	6	22.37	86	23	23.89
3649	22	6	23.12	86	23	26.74
3650	22	6	24.45	86	23	29.06
3651	22	. 6	27.23	86	23	32.86
3652	22	6	27.62	86	23	36.71
3653	22	6	28.00	86	23	41.90
3654	22	6	28.69	86	23	46.07
3655	22	6	29.34	86	23	50.64
3656	22	6	32.55	86	23	52.88
	22	6	33.63	86	23	57.22
3657		6	34.71	86	24	0.02
3658	22	6	34.61	, <b>86</b>	24	3.90
3659	22	6	36.56	86	24	7.32
3660	22		37.53	86	24	10.53
3661	22	6	36.89	86	24	12.49
3662	22	6	34.66	86	24	17.14
3663	22	6	33.35	86	24	18.22
3664	22	6		86	24	24.82
3665	22	, 6	30.78	86	24	27.06
3666	22	6	30.03	86	24	29.16
3667	22	6	28.44		24	31.58
3668	22	6	24.99	86	24	33.61
3669	22	6	24.94	86	24	36.87
3670	22	6	26.84	86	24	38.03
3671	22	6	29.52	86		40.34
3672	22	6	34.17	86	24	43.76
3673	22	6	37.15	86	24	46.54
3674	22	6	37.15	86	24	48.33
3675	22	6	41.62	86	24	
3676	22	6	44.11	86	24	50.39
3677	22	6	47.17	86	24	51.39
3678	22	6	49.07	86	24	54.76
3679	22	6	52.54	86	25	4.52
3680	22	6	55.75	86	25	9.38
3681	22	6	57.30	86	25	13.44
3682	22	6	58.76	86	16	25.22
3683	22	7	0.41	86	25	20.46
3684	22	7	0.92	86	25	23.16

			79			
(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1)	22	6	59.71	86	25	28.89
3685	22	7	0.20	86	25	. 31.40
3686 3687	22	7.	3.21	86	25	30.89
3688	22	7	7.76	86	25	33.90
3689	22	7	8.30	86	25	36.72
3690	22	7 7	10.43	86	25	45.05
3691	22	<b>7</b>	12.69	86	25	48.72
3692	22	7	12.77	86	25	50.47
3693	22	7	12.77	86	25	53.50
3694	22	7	12.43	86	25	56.36 59.21
3695	22	7	9.48	86	25 26	3.40
3696	22	7	5.80	86	26	6.07
3697	22	7	4.06	86 86	26	9.93
3698	22	7 7	2.77 1.90	86	26	11.73
3699	22	7	0.02	86	26	14.81
3700	22 22	6	57.94	86	26	18.10
3701	22	6	55.47	86	26	18.92
3702 3703	22	6	52.52	86	26	21.77
3704	22	6	48.48	86	26	28.04
3705	22	6	46.35	86	26	30.41
3706	22	6	41.60	86	26	35.86
3707	22	6	38.87	86	26	38.84
3708	22	6	37.18	86	26	42.87
3709	22	6	33.68	86	26	37.32
3710	22	- 6	27.64	86	26 26	34.52 26.58
3711	22	6	26.54	86 86	26 26	22.08
3712	22	6	17.34 13.25	86	26	20.41
3713	22	6	14.38	86	26	23.91
3714	22	6 6	9.93	86	26	30.12
3715	22 22	<sub>,</sub> 6	7.19	86	26	32.90
3716 3717	22	л <b>6</b>	1.58	86	26	26.81
3718	22	5	54.59	86	26	31.46
3719	22	5	43.36	86	26	35.37
3720	22	5	35.81	86	26	33.00
3721	22	- 5	30.15	86	26	25.52
3722	22	5 5	26.09	86	26	22.67
3723	22	5	23.09	86	26	17.71
3724	22	. 5 5	20.67	86	26	13.09
3725	22	5	19.05	86	26	9.64
3726	22	5	14.94	86	26 25	4.91 59.80
3727	22	5	4.94	86	25 25	58.26
3728	22	5	2.48	86 86	25	53.30
3729	22	4	57.67 55.59	86	25	52.68
3730	22	4	56.18	86	25	40.94
3731	22 22	4	47.91	86	25	34.80
3732	22	4	43.36	86	25	29.61
3733 3734	22	4	41.15	86	25	19.87
3735	22	4	45.05	86	25	14.55
3736	22	4	42.15	86	25	11.51
0,00						_^ *

(1)	(2)	(3)	(4)	(5)	(6)	(7)
3737	22	4	40.27	86	25	5.37
3738	22	4	43.46	86	25	* 2.08
3739	22	4	36.73	86	24	56.71
3740	22	4	30.87	86	24	52.47
3740 3741	22	4	24.37	86	24	45.10
	22	4	22.29	86	24	42.27
3742	22	4	17.33	86	24	40.70
3743		4	11.08	86	24	41.88
3744	22	4	9.18	. 86	24	32.79
3745	22	4	6.71	86	24	30.53
3746	22	4	3.86	86	24	28.03
3747	22		0.24	86	24	21.76
3748	22	4		86	24	18.50
3749	22	3	59.59		24	13.44
3750	22	3	58.13	86	24	11.61
3751	22	3 .	59.26	86		9.02
3752	22	4	3.29	86	24	1.10
3753	22	. 3	59.34	86	24	
3754	22	3	55.17	86	23	52.80
3755	22	3	47.70	86	23	44.29
3756	22	3 3	42.02	86	23	35.17
3757	22		37.21	86	23	33.66
3758	22	3 3 3	33.90	86	23	29.18
3759	22	3	31.27	86	23	20.09
3760	22		28.27	86	23	13.53
3761	22	3	27.70	86	22	57.34
3762	22	3	23.69	86	22	53.33
3763	22	3	25.98	86	22	45.11
3764	22	. 3	26.60	86	22	36.37
3765	22	3	29.86	86	22	25.12
3766	22	3 ,	23.11	86	22	22.29
3767	22	3	13.89	86	22	22.34
3768	22	3	12.17	86	22	20.80
3769	- 22	3 n	9.34	86	22	13.45
3770	22	3	6.10	86	22	7.05
3771	22	3	2.37	86	22	1.17
3772	22	2	58.60	86	22	1.61
3773	22	2	57.36	86	22	24.32
3774	22	2 2 2	57.39	86	22	27.23
3775	22	2	55.67	86	22	33.32
3776	22	2	54.15	86	22	38.10
3777	22	2 2 2 2	54.97	86	22	46.63
3778	22	2	55.56	86	22	57.71
3779	22	2	53.23	86	22	58.63
3780	22	2	48.73	86	22	56.99
3781	22	. 2	49.55	86	22	50.20
3782	22	2 2	46.57	86	22	49.51
3783	22	2	48.73	86	22	39.18
3784	22	2	48.27	86	22	35.89
3785	22	2	38.94	86	22	17.49
3786	22	2	37.16	86	22	12.32
3787	22	2	33.64	86	22	3.28
3788	22	2 2	31.79	. 86	21	56.80

		41	81			
		(0)	(4)	(5)	(6)	(7)
(1)	(2)	(3)		86	21	53.79
3789	22	2	29.17	86	21	48.68
3790	. 22	2 .	27.91 28.32	86	21	38.28
3791	22	. 2	30.43	86	21	39.30
3792	22	2		86	21	25.73
3793	22	2	44.67 43.18	86	21	15.91
3794	22	2	41.74	86	21	13.63
3795	22	2	39.63	<sup>6</sup> 86	21	7.72
3796	22	2	35.91	86	20	59.49
3797	22	2	29.97	86	20	48.16
3798	22	2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	30.43	86	20	40.01
3799	22	2	29.02	86	20	40.35
3800	22	2	27.63	86	20	35.72
3801	22	2	28.32	86	20	31.59
3802	22	2	29.89	86	20	27.34
3803	22	2	36.29	86	20	17.61
3804	22	2	31.97	86	20	13.60
3805	22	5	21.49	86	20	18.43
3806	22 22	2	20.25	86	20	16.68
3807	22	2	10.21	86	20	26.88
3808	22	2 2 2 2 2 2 2 2 2	6.79	86	20	27.04
3809	22	2	2.88	86	20	13.80
3810	22	2	2.60	86	20	10.18
3811	22	2	1.91	86	20	7.84
3812 3813	22	1	59.18	86	20	3.29
3814	22	1	56.54	86	19	56.04
3815	22	1	54.94	86	19	50.85
3816	22	1	47.41	86	19	47.46 46.07
3817	22	1	46.20	86	19	42.60
3818	22	1	41.81	86	19	36.62
3819	22	1	38.86	86	19	41.27
3820	22	<b>"1</b> .	28.91	86	19 <sup>-</sup> 19	50.01
3821	22	· ″1	26.06	86	19	58.72
3822	22	1	23.77	86	20	2.31
3823	22	1	28.06	86	20	9.64
3824	22	1	26.96	86	20	12.36
3825	22	1	24.26	86	20	17.81
3826	22	1	26.80	86 86	20	23.52
3827	22	1	26.26	86	20	33.20
3828	22	1	23.80	86	20	44.64
3829	22	1	28.22 18.76	86	20	47.78
3830	22	1	17.73	86	20	51.09
3831	22	: 1	21.12	86	20	49.06
3832	22	1	26.73	86	20	48.49
3833	22	1	30.79	86	20	56.41
3834	22	1	34.26	86	21	2.47
3835	22	1	40.27	86	21	12.14
3836	22	1	41.35	86	21	17.76
3837	22	1	49.08	86	21	24.37
3838	22 22	1	48.67	86	21	32.00
3839 3840	22	1	52.86	86	21	45.34
55,0						

(1)	(2)	(3)	(4)	(5)	(6)	(7)
3841	22	1	53.99	86	21	45.( )
3842	22	1	54.30	86	21	46.78
3843	22	1	54.30	86	21	50.48
3844	22	1	54.58	86	21	52.48
3845	22	1	55.48	86	21	53.54
3846	22	1	56.92	86	21	56.41
3847	22	1	56.10	86	21	59.34
3848	22	1	58.69	86	22	12.35
3849	22	2	0.65	86	22	12.35
3850	22	2 2	2.63	86	22	15.15
3851	22		3.35	86	22	26.43
3852	22	2	2.24	86	22	32.85
3853	22	2	0.06	86	22	35.42
3854	22	2	0.47	86	22	45.47
3855	22	2	4.58	86	22	50.46
3856	22	2	9.72	86	22	57.88
3857	22	2	23.08	86	23	6.01
3858	. 22	2	22.67	86	23	12.40
3859	22	2	23.82	86	23	15.10
3860	22	2	24.61	86	23	22.91
3861	22	2	28.29	86	23	24.51
3862	22	2 2	30.19	86	23	29.16
3863	22		29.21	86	23	30.24
3864	22	2	30.42	86	23	34.61
3865	22	2	34.04	86	23	41.44

By order of the Governor

H. S. CHAHAR

Principal Secretary to Government

Printed and published by the Director, Printing, Stationery and Publication, Orissa, Cuttack-10
Ex. Gaz.206—193+500

# ANNEXURE VII NOTIFICATION OF SIMILIPAL BIOSPHERE RESERVE

realities and the state of the

1clegram: PARYAVARAN.

दूरभाव

Telephone: टेलेक्स (द्विभाषीय)

Telex (bi-lingual): W-66185 DOE IN

Fax: 4360678

भारत सरकार

पर्यावरण एवं वन मंत्रालय GOVERNMENT OF INDIA MINISTRY OF ENVIRONMENT & FORESTS पर्यावरण भवन, सी० जी० औ० कॉमप्लेक्स

PARYAVARAN BHAWAN, C.G.O. COMPLEX

लोदी रोड, नई दिल्ली-110003 LODI ROAD (NEW DELHI-110003

ROAD NEW D

MILIPAL IN

1260 18 APR 2011

The Chief Secretary Government of Orissa Bhubaneswar.

No.16/2/85-MAB-CSC

Sub

ESTABLISHMENT OF BIOSPHERE RESERVE AT

ORISSA

Sir,

The Government of India has identified potential sites for designating as Biosphere Reserve for preserving the biological diversity with the following broad objectives:

- conservation of representative samples of ecosystems,
- provision of long-term conservation of genetic diversity in-situ,
- .. promotion of basic and applied research work and its monitoring; and
- . dissemination of experience for education and training.
- 2. One of these is Similipal forests in Orissa which represents the Mahamadian bio-geographic region. The matter has been considered in detail by the Government of India in consultation with the Government of Orissa and it is on the request of the Government of Orissa, it has been decided to designate Similipal area as a Biosphere Reserve. The Biosphere Reserve will be deemed to have come into being immediately after the issue of this Notification.
- 3. In accordance with the guidelines on the subject, the State Government is requested to prepare a Project Document for the setting up the Similipal Biosphere Reserve. Proposed team of experts for preparing the Project Document is given in Annexure-I.
- 4. The size of the buffer zone and transitional area is 1354.30 sq.km and 77.07 sq.kms respectively. The boundary and zonation of the tuffer zone in the Biosphere Reserves is given in Ammenua-II. The details of the area to be carmarked for manipulation activities such as forestry, Agriculture, Noo restoration, Agmoforestry etc., willbs worked cut by the Project authorities.

- 5. The following will be the important aspects of the Similipal Biosphere Reserve:
- a. The core and the buffer areas and manipulation activities which may be permitted in the buffer zone will be in conformity with the general guidelines for Biosphere Reserves and will be determined accordingly by the State Management Council. A detailed map will subsequently be submitted by the Government of Orissa.
- b. The core zone of the Biosphere Reserve will be kept absolutely undisturbed. The Biosphere Reserve, by itself will not affect the rights of the tribal and other people of the area.
- c. The constitution of the Biosphere Reserve by itself will not, in any way, change the status of legal ownership of the land and forests.
- d. There will be a Biosphere Reserve Management Council with the composition given in Annexure-III.
- e. The Government of India will provide financial assistance for approved items of expenditure included in the Action and Management Plan to be prepared by the Government of Orissa. This may broadly come under the following heads:
  - . Survey
- . Protection
- .. Conservation
- .. Eco-restoration
- .. Eco-development
- .. Education and Awareness
- f. There will be a Research Committee as per the composition shown in Annexure-IV.
- g. The subjects of research and the institutions for the purpose are to be identified by the State Government.
- h. The Government of Orissa will set up a local Committee for coordination of the activities of the various departments in the Biosphere Reserve area.
- i. The Director, Project Tiger, (i.e., Field Director) of Similipal Tiger Reserve, Orissa, will act as the Project Director for the Similipal Biosphere Reserve.

.: The funds will flow through the Chief Wildlife Warden of Drissa to get technical inputs in Project Development.

Yours faithfully,

Secretary to the Government of India.

Encl: As stated.

# Copy to:

- 1. The Secretary Planning Commission Yojana Bhawan New Delhi.
- 2. Chief (Science) Planning Commission Yojana Dhawan New Delhi.
- 3. Secretary Department of Forests Government of Orissa Bhubaneswar.
- 4. Secretary Department of Environment Government of Orissa Inubaneswar 4
- 5. Principal Chief Conservator of Forests Government of Orissa Ihubaneswar.
- 6V Chief Wildlife Warden Government of Orissa Bhubaneswar.

Secretary to the Government of India.

# PROPOSED TEAM OF EXPERTS FOR PREPARING THE PROJECT DOCUMENTS

- 1. Shri.C.S.Dani (Former PCCF, Orissa)
- 2. Subject Matter Specialist (I)
- 3. Subject Matter Specialist (II)
- 4. Shri.P.C.Ehanj Deo Chairman, Indian Society of Wildlife Research and Ex Maharaja of Mayurbhanj.
  - 5. Chief Conservator of Forests (WL) and Chief Wildlife Warden, Orissa.
  - 6. Field Director(Project Tiger) Similipal

## ZONATION - SIMILIPAL BIOSPHERE RESERVE

# GENERAL DESCRIPTION AND THE BOUNDARY:

Similipal Mussif is situated between 21 30'-22 08' N 86 05'-86 37' E. It covers the major ecosystem of North Indian tropical moist deciduous forest, moist peninsular valley forest and moist sal savannah, containing about 135 plant species. The endangered and threatened animal species include: Tiger, four-horned antelope, giant squirrel, panther, leopard, mouse deer and pangolin.

It has fifty nine villages in the buffer area, and two hundred villages in the fringe area. The popular of the buffer area is 8643 and fringe area is 65,791 respectively.

## ZONATION :

The size of the buffer zo dill be 1354.30 sq.km.and the size of the transitional area 77.07 sq.km. The zonation of the Biosphere Reserve, however is subject to changes, which will be decided by the project formulation team in concultation with the State Government and Director, Project Tiger programme.

ANNEXURE-III

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ANNEXURE-III

ANNEXURE-III

## MANAGEMENT COUNCIL - SIMILIPAL BIOSPIERE RESERVE

1. Chief Secretary Government of Orissa

Chairman

2. Addl.Inspector General of Forests M/o Environment and Forests

Member

 Addl.Chief Secretary, Government of Orissa

Member

 Joint Secretary & Financial Adviser M/o Environment and Forests

Member

 Officer in charge of Biosphere Reserves Programme,
 Myo Environment and Forests

Member

6. Secretary to the Govt. of Oriesa Forest Department

Henter

 Principal Chief Conservator of Forests
 Government of Orissa

Member

8. Chief Conservator of Forests (WL) and Chief Wildlife Warden Government of Orissa

Member

9. Representative of the Botanical Survey of India

Member

10. Representative of the Zoological Survey of India

Member

11. Director of Similipal Biosphere Reserve

.. Member Secretary

## COMPOSITION OF RESEARCH COMMITTEE ON SIMILIPAL BIOSPHERE RESERVE

1.	Chief Wildlife Warden		• '	
	Government of Orissa	• •	Chairman	

2. Director Zoological Survey of India .. Member

١,

- 3. Representative of Uthkal University .. Member
- 4. Director Botanical Survey of India
- 5. Representative of the M/o Environment and Forests Member
- 6. Director Wildlife Institute of India lehradun.
- 7. Field Director, Project Tiger Member Secretary .

10° (2) 40 94 169

GOVERNMENT OF ORISSA FOREST AND ENVIRONMENT DEPARTMENT

1/6/9**6** 

#### NOTIFICATION

DATED BRUBANESSER THE SOLL MAY, 1996.

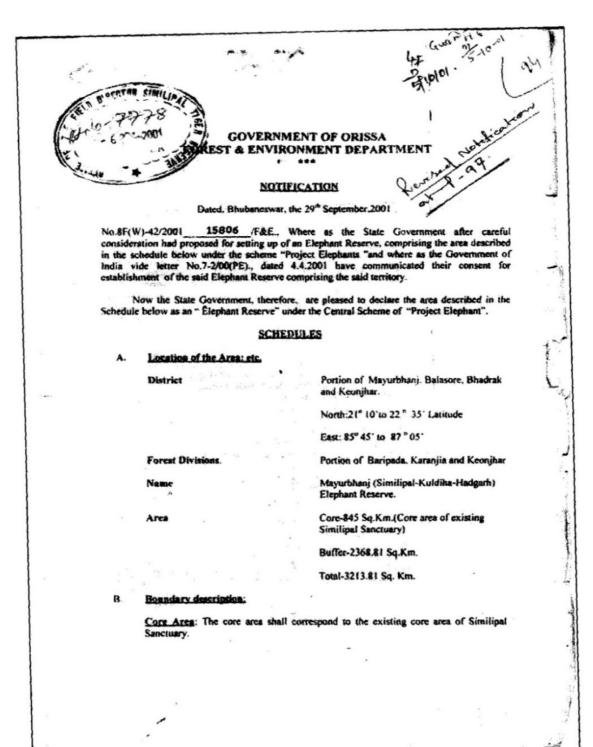
No.8F(T)-8/96. 11319 /F&B., Government of India, in the Ministry of Environment and Forests have designated Similipal Forest in Orism as a Biosphere Reserve. The Biosphere Reserve will be mapaged on the basis of a project document, and will have Core Zone, Buffer Zone and Transsitional Zone. Various manipulation activities, such as Forestry, Agriculture, Eco-restoration, Eco-development and Agroforestry etc. may be permitted in the buffer sone area, in conformity with the general guidelines for Bio-sphere Reserve, and will be determined accordingly by the State Management Council. Although the Core Zone will be kept absolutely undisturbed, the Bio-sphere Reserve by itself will not affect the rights of the tribal and other people of the area. The Constitution of the Bio-sphere Reserve by itself will not in any way change the status of legal ownership of the land and forests. The Field Director, Project Tiger, Similipal Tiger Reserve will act as the Project Director for the Similipal Ato-sphere Reserve.

There will be a Bio-sphere Reserve Management Council to oversee implementation of the Bio-sphere Project document. According-ly State Covernment have decided to constitute a Bio-sphere Reserve Management Council for Similipal with the following members.

1.	Chief Secretary, Government of Orissa.	-	Chairman
2.	Addl. Inspector General of Forests, Ministry of Environment and Forests.	-	Member
3.	Agricultural Production Commissioner.		Kember
4.	Joint Secretary and Financial Adviser, Ministry of Environment and Forests.	_	Hember
5.	Officer-in-charge of Biosphere Reserves Programme, Winistry of Environment and Porests.	-	Hember
6.	Secretary to the Government of Orissa, Forest Department.	· <del></del>	Hember
7.	Principal Chief Conservator of Forests. Government of Orissa.		Hember
8.	Principal Chief Conservator of Forests. and Chief Fild Life arden, Government of Orissa.	LJ_	Nember
9.	Representative of the Botanical	- ,	Hember

1284 -: 2 18. Representative of the Zoological Member Survey of India. 11 Field Director of Similipal Tiger Reserve, Bartpada (Project Director, Similipal
Biosphere Reserve). Member Secretary BY ORDER OF THE GOVERNOR R. M. SENAPATI PRINCIPAL SECRETARY TO GOVERNMENT. Memo No. 11320 /FeE., Dated Shubaneswar the 20th May, 1995. Copy to Persons Concerned for information and necessary action. SECHETAL TO GOVERNMENT. DEPUTY Nemo No. 11321 /Fill., Dated Shubaneswar the 2015. Nay, 1996. Gapy to Private Secretary: to Chief Minister, Orissa/ Private Secretary to Minister, Forest, Orissa/Private Secretary to Minister, Anvironment, Orissa/Private Secretary to Chief Secretary, Orissa/Private Secretary to Agricultural Production Commissioner, Ortaga for information. DEPUTY SECRETARY TO GOVERNMENT. Memo No. 11322/FEE., Dated Bhubaneswar the 20th May, 1996. Copy forwarded to the Secretary to Government of India, Ministry of Environment and Forests/Inspector General of Forests and Special Secretary to Government of India, Ministry of Environment and Forests, Parys varan Shawan, C.G.C. Complex, Lodi Road, New Delhi-18003 for favour of Information. Brahamere DEPUTY SECRETARY TO GOVERNMENT. Nemo No. 11323 / F&B., Dated Shubu neswar the 20 K Nay, 1996. Copy to Guard Pile (10 Copies). TISSULTIANT IL GOVERNUENT. Dilayak.

# ANNEXURE VIII NOTIFICATION OF MAYURBHANJ ELEPHANT RESERVE



#### Buffer Zone:

The outer boundary of the Mayurbhanj (Similipal-Kuldiha- Hadgarh) Elephant Range shall be starting from Taradiha Nalla at its Confluence with Baitarani River near Sarangi village. Then it proceeds along upstream of river Baitarani (enclosing within it the Santoshpur RF of Keonjhar Division) up to Dalki Suhi Village, i.e. the boundary of Thakumunda Range of Karanjia Division( which is also the District boundary between Mayurbhanj and Keonjhar), then follows the district boundary in a northerly direction up to West Deo River near Mandua village, and then proceeds upstream along West Deo River up to its crossing point with Karanjia-Thakurmunda road. Then the boundary moves along the road up to Karanjia, then up to Singada Chhak, touches NH-6, the along NH-6 up to the crossing of Nanjura nalla from there it proceeds in north-west direction along Nanjura nalla up to the confluence of Khairi nalla, then proceeds along the downstream of Khairi nalla up to Panposi village. Then the boundary runs upstream in north direction along Dubajora nalla up to state houndary of Bihar-Orissa. Then the boundary of the Elephant Reserve proceeds along the Bihar-Orissa state boundary along eastern and northern direction up to north of Manbir Reserved Forest near village Manbir. Then it moves in eastern direction and encircles Manbir RF and Budheirana RF up to Edelbeda village. Then the boundary of the Elephant Reserve runs in an easterly direction along the boundary of the Badampahar Range up to Kanhu River near Kaduani village and further runs upstream along the Kanhu River up to the confluence of Pokharia Nalla in the north of Pokharia village, and then runs upstream of Pokharia Nalla up to boundary of Badanipahar RF near Kasiabeda village. Then the boundary runs along the north of Badampahar RF in an easterly direction up to Badampahar Forest Range Head Quarter then it proceeds up to Badampahar Railway Station land moves in a northerly direction along the Badampahar-Tatanagar Railway Line up to crossing of Barhai nalla near Bahalda Road railway station. Then the boundary proceeds westward along the downstream of Barhai nalla up to Dharamdihi village and then moves in northwest direction along the ridges of Churia hill. Sadam hill and Jerai, RF, where it touches Bihar-Orissa State border. Then the boundary runs north eastward along the Bihari Orissa State border near Pandupani village up to the boundary of Baripada Division near Satabankara hilltop.

#### Baripada Division:

The boundary proceeds south and then eastward from Satabankara hill top along Bihar-Orissa State border up to Jamsola, and then along West Bengal-Orissa State border up to Senteliya. Then it proceeds southward along Gulfa Nalla up to Guhaldiha(near Bagra), then proceeds westward along Bagra-Baripada Road up to Munduri Bandha, then proceeds north-west along Munduri-Bankisol road up to Bankisol, then proceeds northward along Baripada-Deuli road up to Kuabuda chhak, then along Kuahuda-Chandua road up to Dardara village, then along Dardara-Kathasirsi road up to NH-5. From Kathsirsi it proceeds northward along NH-5 up to Kalabadia, then moves westwards to touch river Budhabalanga and then moves southward along Budhabalanga river up to the confluence of Sankiri nalla. Then it

proceeds upstream of Sankiri nalla and touches Similipal RF near Gendapokhari. Then it follows the boundary of Similipal RF in a southerly direction up to Nato RF, encircles boundary of Nato RF up to Purunapani village. Then it follows the road Purunapani-Sarat-Sarisua-Padmapokhari-Kaladahi up to Nilgiri. Then it proceeds southerly along the road Nilgiri-Santaragadia-Baulagadia-Bagudi, goes north and then touches the southern boundary of Debgiri RF up to Katikholia. Then it follows the boundary of Debgiri RF in South-west direction and continues along southern boundary of Kuldiha RF. Carsahi RF. Mahisadali PF. Gogua PF and Bandhalata PF to touch the boundary of Baula RF in Keonjhar Division.

#### Keonihar Division:

Then the boundary proceeds along the boundary of Baula RF, crosses the Salandi River near Hadgarh. Then it proceeds along the road from Hadgarh to Baidyanathpur and encircles Baula RF along south west, south and north-east boundary up to the juction of Mayurbhanj-Keonjhar District boundary near Mirigichua village. Then the boundary proceeds in a westernly direction along the district boundary of Mayurbhanj-Keonjhar district up to the crossing of Taradiha nalla near Sarangi village.

By order of the Governor,

Principal Secretary to Government

Memo No. 15807 /F&E., Dated, Bhubaneswar, the 29th September 2001

Copy forwarded to the Director, Printing Stationery and Publication.

Orissa, Cuttack with a request to publish the Notification in the next issue of Orissa

Gazette and will bear S.R.O. Number.

500 copies of the Gazette Notification may please be sent to this Department for reference and use.

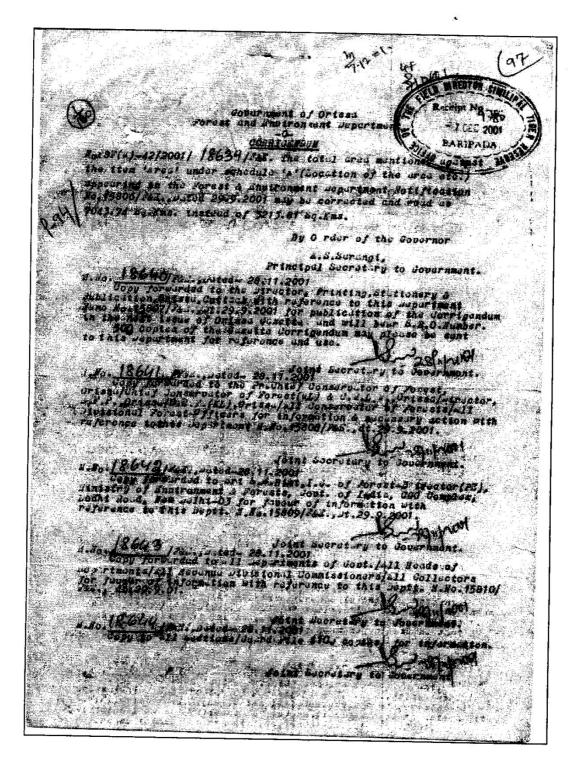
Joint Secretary to Government.

Memo No. 15808 /F&E. Dated, Bhubaneswar the 29th September, 2001

Copy forwarded to the Principal Chief Conservator of Forests, Orissa /
Chief Conservator of Forests (Wildlife), Orissa and Chief Wildlife Warden, Orissa /
Director, Social Forestry Project, Orissa /Chief Conservator of Forests(KL),
Orissa/All Conservator of Forests / All Divisional Forest Officers, for information and necessary action.

Joint Secretary to Government.

Memo No. 15809 /F&E., Dated, Bhubaneswar tine 29 September 1981 - Director Copy forwarded to Sri S.S.Bist, Inspector General of Forest- Director Copy forwarded to Sri S.S.Bist, Inspector General of Forest- Director Copy forwarded to Sri S.S.Bist, Inspector General of Forest- Director Copy forwarded to Sri S.S.Bist, Inspector General of Forest- Director Copy forwarded to Sri S.S.Bist, Inspector General of Forest- Director Copy forwarded to Sri S.S.Bist, Inspector General of Forest- Director Copy forwarded to Sri S.S.Bist, Inspector General of Forest- Director Copy forwarded to Sri S.S.Bist, Inspector General of Forest- Director Copy forwarded to Sri S.S.Bist, Inspector General of Forest- Director Copy forwarded to Sri S.S.Bist, Inspector General of Forest- Director Copy forwarded to Sri S.S.Bist, Inspector General of Forest- Director Copy forwarded to Sri S.S.Bist, Inspector General of Forest- Director Copy forwarded to Sri S.S.Bist, Inspector General of Forest- Director Copy forwarded to Sri S.S.Bist, Inspector General of Forest- Director Copy forwarded to Sri S.S.Bist, Inspector General Of India, C.G.O.Complex, Inspector Copy forwarded to Sri S.S.Bist, Inspector Copy forwarded to Sri S. (PE). Ministry of Environment & Forests, Government of India, C.G.O.Complex, Lodhi Road, New Delhi-03 for favour of information with reference to his letter No.7-2/00(PE) dt.4.4.01. Joint Secretary to Government Memo No. 15810 /F&E Dated Bhubaneswar the 29th September,2001 Copy forwarded to all Departments of Government/All Heads of Department/All Revenue Divisional Commissioners/ All the Collectors for favour of information. Joint Secretary to Government Memo No. 15811 /F&E., Dated, Bhubaneswar the 29th September,2001 Copy to all Sections /Guard File (30 copies) for information. Joint Secretary to Governmen OFFICE OF THE CONSERVATOR OF FORESTST & FIELD DIRECTOR SIMILIPAL TIGER RESERVE, BARIPADA Mama No 3250 8/8415/0101 Conservator of freeholat lie Range officers of L.T.R.,
Brannipada for their enformation of neterence.



### **ANNEXURE IX**

1 F. No. 3-1/2003-PT

# REVISED GUIDELINES FOR THE ONGOING CENTRALLY SPONSORED SCHEME OF PROJECT TIGER FEBRUARY, 2008

National Tiger Conservation Authority Ministry of Environment & Forests Government of India **Government of India**Ministry of Environment & Forests

**National Tiger Conservation Authority** 

REVISED GUIDELINES FOR THE ONGOING CENTRALLY SPONSORED SCHEME OF PROJECT TIGER

## (1) Introduction:

Project Tiger is an ongoing Centrally Sponsored Scheme of the Ministry of Environment and Forests. The revised guidelines incorporate the additional activities for implementing the urgent recommendations of the Tiger Task Force, constituted by the National Board for Wildlife, chaired by the Hon'ble Prime Minister. These, interalia, also include support for implementing the provisions of the Wild Life (Protection) Amendment Act, 2006, which has come into force with effect from 4.09.2006. The activities are as below:

- (i) Antipoaching initiatives
- (ii) Strengthening infrastructure within tiger reserves
- (iii) Habitat improvement and water development
- (iv) Addressing man-animal conflicts
- (v) Co-existence agenda in buffer / fringe areas with landscape approach
- (vi) Deciding inviolate spaces and relocation of villages from crucial tiger habitats within a timeframe by providing a better relocation package, apart from supporting States for settlement of rights of such people
- (vii) Rehabilitation of traditional hunting tribes living in and around tiger reserves
- (viii) Providing support to States for research and field equipments
- (ix) Supporting States for staff development and capacity building in tiger reserves.
- (x) Mainstreaming wildlife concerns in tiger bearing forests outside tiger reserves, and fostering corridor conservation in such areas through restorative strategy involving local people to arrest fragmentation of habitats.
- (xi) Providing safeguards / retrofitting measures in and around tiger reserves and tiger bearing forests for wildlife conservation.
- (xii) Strengthening the infrastructure of National Tiger Conservation Authority at the Centre.
- (xiii) Carrying out independent monitoring and the evaluation of tiger reserves.
- (xiv) Establishment and development of eight new tiger reserves.
- (xv) Provision of project allowance to all categories of staff working in tiger reserves.
- (xvi) Providing residential amenities to facilitate basic education to children of frontline Field staff posted in tiger reserves.
- (xvii) Providing assistance to States for fostering ecotourism to benefit local people.
- **1.1** "Project Tiger" was launched in April, 1973 with the objective "to ensure maintenance of a viable population of Tigers in India for scientific, economic, aesthetic, cultural and ecological values, and to preserve for all times, areas of biological importance as a national heritage for the benefit, education and enjoyment of the people".
- **1.2** The Project has been successfully implemented, and at present there are **28 Tiger Reserves** in **17 states**, covering an area of **37761 sq. km.** Apart from above 'in principle' approval for creation of eight new Tiger Reserves has been accorded. The selection of reserves was guided by the need to conserve unique ecosystem/habitat types across the geographic distribution of tigers in the country.

**1.3** Project Tiger is an ongoing Centrally Sponsored Scheme, which is continued, in the XIth five-year Plan. Conservation of endangered species and their habitat, strengthening and enhancing the Protected Area Network, control of poaching, monitoring, research and ensuring people's participation in Wildlife Conservation have been accorded high priority in the National Wildlife Action Plan and the Wildlife Conservation strategy, 2002.

# 2. Past funding pattern and major activities supported under the Scheme

During present plan period, 100% Central Assistance is being made available to States for expenditure on all non-recurring items; for recurring items, the Central Assistance is restricted to 50% of the expenditure, while the matching grant is provided by the Project States. The activities / field inputs under Project Tiger, interalia, include : (Non recurring) strengthening of protection, deployment of armed squads in tiger reserves, creating basic infrastructure for management, roads, wireless, civil works, habitat development, augmenting water resources, compensatory ameliorative measures for habitat restoration, ecodevelopment, village relocation, use of Information Technology in crime detection, establishment of a digitized database in Tiger Reserves having collaborative linkage with Project Tiger Directorate in the GIS domain, monitoring and evaluation of tiger reserves, monitoring of habitat status, carrying out All India Estimation of Tigers, Co-predators and Prey animals in the GIS domain with the state of art technology, continuous monitoring of tiger populations in various tiger range states (tiger reserves and other forest areas outside tiger reserves), fostering wildlife viewing for tourists in Tiger Reserves, providing compensation to villagers for human deaths/livestock depredation by carnivores in tiger reserves, staff welfare measures, providing 'Project Allowance' to all categories of staff working in Tiger Reserves, establishment of veterinary facility, and fostering research / research projects relating to tiger conservation, replacement and purchase of new vehicles for existing and new Tiger Reserves to ensure staff mobility. (Recurring) creation / deployment of local work force for patrolling/barriers, habitat improvement, providing salt licks, water facility, fire protection measures, maintenance of various items, publicity and extension and legal assistance.

# 3. Constitution of the National Tiger Conservation Authority (NTCA)

The Govt. of India had launched "Project Tiger" to promote conservation of the tiger, since the significance of its conservation has ramifications beyond State boundaries. Management of forests and wildlife is primarily the responsibility of concerned States. The field implementation of the project, protection and management in the designated reserves is done by the project States, who also provide the matching grant to recurring items of expenditure, deploy field staff/officers, and give their salaries. The Project Tiger Directorate of the Ministry of Environment and Forests was mandated with the task of providing technical guidance and funding support.

**3.1** The implementation of Project Tiger over the years has highlighted the need for a statutory authority with legal backing to ensure tiger conservation. On the basis of the recommendations of National Board for Wild Life chaired by the Hon'ble Prime Minister, a Task Force was set up to look into the problems of tiger conservation in the country. The recommendations of the said Task Force, interalia include strengthening of Project Tiger by giving it statutory and administrative powers, apart from creating the Wildlife Crime Control Bureau. It has also recommended that an annual report should be submitted to the Central Government for laying in Parliament, so that commitment to Project Tiger is reviewed from time to time, in addition to addressing the concerns of local people. Broadly the urgent recommendations of the said Task Force are as below:

• Reinvigorating the constitution of governance.

- Strengthening efforts towards protection of tiger, checking poaching, convicting wildlife criminals and breaking the international trade network in wildlife body parts and derivatives.
- Expanding the undisturbed areas for tiger by reducing human pressure.
- Repair the relationship with local people who share the tiger's habitat by fielding strategies for coexistence.
- Regenerate the forest habitats in the fringes of the tigers protective enclaves by investing in forest, water and grassland economies of the people.
- **3.2** The Tiger Reserves are faced with ecological disturbances and various other problems. Fragmentation of habitats occurs owing to overuse of forest habitats, apart from conflicting land uses leading to loss of habitat. There are also in some cases, significant village population with large number of cattle, which graze in the forests, leading to ecological degradation, apart from major sources of regular or intermittent disturbance, such as temples and commercial entities such as tea estates. This also leads to man-animal conflicts, resulting in tiger and prey mortality.
- **3.3** Several constraints affect field implementation of the project, viz. delayed release of Central Assistance given to the States for Field Units, staff vacancies, ageing of field staff, lack of capacity building initiatives, weak enforcement and monitoring of protection work etc. The events in the recent past have highlighted the fact that there is a need in the States for greater commitment and vigilance. The field administration managing the tiger reserves require capacity building and supervision.
- **3.4** There is also an urgent need to strengthen the system at the Central Government level (Project Tiger Directorate), which has the mandate to oversee and guide tiger conservation in the country. Involvement of Parliament is also required to ensure review and guidance. Likewise, involvement of Chief Ministers of States and strengthening the field administration, supervision of the project and building a participatory base by including interests of local people living in and around tiger reserves are extremely important.
- 3.5 Considering the urgency of the situation, Project Tiger has been converted into a statutory authority (NTCA) by providing enabling provisions in the Wild Life (Protection) Act, 1972 through an amendment, viz. Wild Life (Protection) Amendment Act, 2006. This forms one of the urgent recommendations of the Tiger Task Force appointed by the Prime Minister. The NTCA would address the ecological as well as administrative concerns for conserving tigers, by providing a statutory basis for protection of tiger reserves, apart from providing strengthened institutional mechanisms for the protection of ecologically sensitive areas and endangered species. The Authority would also ensure enforcing of guidelines for tiger conservation and monitoring compliance of the same, apart from placement of motivated and trained officers having good track record as Field Directors of tiger reserves. It would also facilitate capacity building of officers and staff posted in tiger reserves, apart from a time bound staff development plan.
- **3.6** The Wild Life (Protection) Amendment Act, 2006 has come into force with effect from the 4 of September, 2006, and the NTCA has also been constituted on the same date.
- **3.7** Despite three decades of Project Tiger and the efforts of the Centre and States, tiger continues to remain one of the most endangered large predators in the world. The causative factors are many, and to name a few, we may mention the important ones like loss of habitat due to agriculture expansion and development, revenge killings by people due to man-animal conflicts and above all, the demand for the body parts and derivatives of tiger in the illegal

international market. These factors contribute to the decimation of our in-situ population in the wild. Therefore, continuance of a focused, species-specific, multifaceted, ecosystem project like 'Project Tiger' becomes important and crucial at this juncture to address the threats faced by the tiger and its habitat.

- **3.8** The three key imperatives in tiger conservation which necessitate a 'project mode' are: a focused approach to prioritize actions, in the interest of tiger conservation (within and outside the tiger reserves), eliciting the support of local stakeholder communities and ensuring the necessary infrastructure for protection and management. Considering the fact that conservation of tiger has ecological national significance transcending State boundaries, the Government of India provides funding support and technical guidance to States through the ongoing Centrally Sponsored Scheme of Project Tiger and other schemes for wildlife conservation. Tigers are present in the forests of seventeen states in our country at present, which also include their protected areas / tiger reserves.
- **3.9** The distribution of tigers and their density vary in States due to several ecological and human reasons, viz. the forest cover, terrain, natural prey availability, presence of undisturbed habitat and the quality of managerial efforts taken towards protection. Since tigers are at the top of the ecological "food -chain", their conservation results in the overall conservation of all other species of plants and animals occupying the ecosystem. We can say that tigers are indicators of the well being of the ecosystem. A healthy tiger population indicates that the other ecological components in its habitat are equally robust, since tigers need large amount of prey and good habitat. The investments made in a project of this kind are more than justified.
- 4. Ongoing activities and additionalities to be supported under the revised Centrally Sponsored Scheme of Project Tiger:
- 4.1 Anti-poaching activities (ongoing) (non recurring for antipoaching squad/Tiger Protection Force deployment, and recurring for wages towards patrolling camp labourers/watchers)

The antipoaching operations in Tiger Reserves are site specific. However, the following activities, interalia, would form part of the protection strategy in Tiger Reserves:

- Deployment of antipoaching squads
- Elestablishing and maintenance of existing patrolling camps/chowkis and deployment of camp labourers for patrolling.
- Delorganising vehicular patrolling by constituting squads (Tiger Protection Force), comprising of field staff, labourers and police/SAF/ex-army personnel, with wireless handset and paraphernalia for apprehending offenders, apart from prescribing a patrolling calendar for the squad.
- 22 Establishing and maintenance of wireless network.
- 22 Organising surprise raids jointly with the local police in railway stations, local trains, bus-stops, buses, catchers and cafeteria.
- Ensuring special site-specific protection measures, during monsoon as 'Operation Monsoon' considering the terrain and accessibility of Protected Areas.
- 22 Deployment of ex-army personnel / home guards.

- Deployment of local work force for patrolling, surveillance of water holes, manning barriers.
- 22 Procurement of arms and ammunition.
- 22Procurement/maintenance of elephant squads.
- **?** Rewards to informers.
- 22 Legal support for defending court cases.
- 22Procurement of vehicles, boats.
- 22 Procurement field gear, night vision device.

# **4.2** Strengthening of infrastructure within Tiger Reserves (ongoing) (non recurring for new civil works and recurring for maintenance)

The following activities, interalia, would form part of reinforcing the infrastructure of Tiger Reserves (including support to new tiger reserves):

- ©©Civil Works (staff quarters, family hostels, office improvement, patrolling camp, house keeping buildings, museum, culverts).
- 22 Maintenance / creation / upgradation of road network.
- 22 Maintenance / creation of wireless tower.
- Maintenance / creation of fire watch tower.
- 22 Maintenance / creation of bridges, dams, anicuts.
- 22 Maintenance / creation of firelines / firebreaks.
- 22 Maintenance / creation of earthen ponds.
- 22 Procurement / maintenance of vehicles (Gypsy, Jeep, Truck, Tractor).
- 22 Habitat improvement works.
- 22 Procurement of hardware, software / GIS.
- 22 Procurement of compass, range finder, GPS, camera traps.
- 22 Procurement of satellite imageries for management planning.
- 22 Map digitization facility for management planning.

#### 4.3 Habitat improvement and water development (ongoing) (recurring)

**These, interalia, may include:** weed eradication, removal of gregarious plant growth from grasslands, grass improvement, water retention structures and the like. These initiatives would increase the forage and browse values of the habitat for wild animals.

4.4 Addressing man-animal conflict (ensuring uniform, timely compensation for human deaths due to wild animals, livestock depredation by carnivores, crop depredation\* by wild ungulates) (compensation for crop loss is a new component) (non recurring)

This would involve:

22 Payment of compensation for cattle lifting, death of human beings and crop depredation\* due to wild animals.

22 Creation of crop protection structures.

Procurement / deployment of traps, cages to catch problematic animals.

Procurement of tranquilizing equipments, rescue vehicles and drugs.

The above initiatives are extremely important to avoid as well as redress the "park-people" interface conflicts.

(\* would be supported as per prevailing norms of the State, in the delineated buffer area as explained in Section 38V of the Wild Life (Protection) Act, 1972, as amended in 2006.)

4.5 Co-existence agenda in buffer / fringe areas (landscape approach/sectoral integration/ecologically sustainable development programme/livelihood options/ecotourism) (new activity in case of tiger reserves where buffer has not been notified so far) (non recurring)

The fringe areas around Tiger Reserve have corridor value, and their ecological sustainability is important to prevent the area from becoming ecological sinks on account of over use of resources and unwise land use. This calls for delineation of buffer zone around a tiger reserve to incorporate such fringe areas so that it can fulfill the following objectives:

Providing ecologically viable livelihood options to local stakeholders for reducing their dependency on forests.

©Conserving the forest area through restorative inputs involving local people for providing habitat supplement to wild animals moving out of core areas.

A comparative assessment of the forest cover status of outer fringe areas of tiger reserves upto a radial distance of 10 kms has been done in collaboration with the Forest Survey of India. The States are required to delineate the fringe/buffer area around the core zones of tiger reserves, and submit a Tiger Conservation Plan as required under Section 38 V of the Wild Life (Protection) Amendment Act, 2006, to ensure wildlife conservation while addressing the livelihood issues relating to local people.

# 4.6 Rehabilitation package for traditional hunting tribes living around tiger reserves (new activity) (non recurring)

There is an urgent need to launch a rehabilitation and development programme for the denotified tribes and tribes involved in traditional hunting, living around tiger reserves and tiger corridors. The following denotified tribes / communities are involved in traditional hunting of wild animals: Behelias, Ambalgars, Badaks, Mongias, Bavariyas, Monglias, Pardhi, Boyas, Kaikads, Karwal Nat, Nirshikaris, Picharis, Valayaras, Yenadis, Chakma, Mizo, Bru, Solung and Nyishi. While this list is not exhaustive, around 5,000 such families

are required to be taken up under a welfare programme (forming part of NTCA initiatives) during the Plan period. The rehabilitation / welfare package should be evolved in a site specific, consultative manner with livelihood options, to include: wages for such people towards their deployment in foot patrolling for protecting wildlife, providing agricultural land with irrigation, basic health care, housing and related community welfare inputs and basic education facilities. The experience gained in the past for settling denotified tribes by the Salvation Army is required to be considered dispassionately while structuring the programme.

#### 4.7 Research and field equipments (ongoing) (non recurring)

The All India tiger estimation using the new methodology approved by the Tiger task Force has resulted in a permanent monitoring protocol for the field units. The format/protocol used for the Phase-I data collection in the new estimation process should be adopted for day-to-day field monitoring. Further, assistance would be provided for fostering field oriented research and to equip the staff with facilities like GPS, camera traps, night vision, range finder and related accessories including hardware and software. As decided in the 1 meeting of the National Tiger Conservation Authority, the tiger reserves are required to carry out the day to day monitoring of wild animals using the refined process in the GIS domain, which would enable "forecasting" vis-à-vis wildlife protection.

### 4.8 Staff development and capacity building (ongoing) (non recurring)

This would involve:

22 Capacity building / training.

22 Providing project allowance and special incentives.

Expecialized training in the use of GIS, antipoaching operations.

22 Specialized training in jurisprudence and wildlife forensics.

**22**Study tours for appraisal of good practices in other reserves.

**ID**Dissemination workshops.

**22** Specialized training in park interpretation.

22 Specialized training in management planning.

The above inputs are extremely important for enhancing the skill of field staff. Several instances of poaching occur for want of specialized training in crime detection and related skills.

# 4.9 Deciding inviolate spaces for wildlife and relocation of villagers from core or critical tiger habitats in Tiger Reserves within a timeframe and settlement of rights (settlement of rights is a new activity) (non recurring)

The Wild Life (Protection) Act, 1972, as well as the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, require that rights of people (Scheduled Tribes and other traditional forest dwellers) recognized in forest areas within core/critical tiger/wildlife habitats of tiger reserves/protected areas may be modified and

resettled for providing inviolate spaces to tiger/wild animals. This requires payment of compensation (rights settlement in addition to the relocation package offered under the CSS at present). Chapter IV of the Wild Life (Protection) Act, 1972 (Section 24) provides for acquisition of rights in or over the land declared by the State Government under Section 18 (for constituting a Sanctuary) or Section 35 (for constituting a National Park). Sub-section 2 of Section 24 of the Wild Life (Protection) Act, authorizes the Collector to acquire such land or rights. Therefore, payment of compensation for the immovable property of people forms part of modifying / settling their rights which is a statutory requirement.

The ongoing study and the analysis of the available research data on tiger ecology indicate that the minimum population of tigresses in breeding age, which are needed to maintain a viable population of 80-100 tigers (in and around core) require an inviolate space of 800 - 1000 sq km. Tiger being an "umbrella species", this will also ensure viable populations of other wild animals (co-predators, prey) and forest, thereby ensuring the ecological viability of the entire area / habitat. Thus, it becomes an ecological imperative to keep the core areas of tiger reserves inviolate for the survival of source populations of tiger and other wild animals. Based on the recommendations of the Professional Agency, a new package for village relocation/rehabilitation has been proposed, with the following options / norms, which adequately covers the "National Rehabilitation and Resettlement Policy, 2007", while taking into consideration the difficulties / imperatives involved in relocating people living in forest areas:

The proposed package has two options:

**Option I** – Payment of the entire package amount (Rs. 10 lakks per family) to the family in case the family opts so, without involving any rehabilitation / relocation process by the Forest Department.

**Option II** - Carrying out relocation / rehabilitation of village from protected area / tiger reserve by the Forest Department.

- (i) In case of option I, a monitoring process involving the District Magistrate of concerned District(s) would be ensured so that the villagers rehabilitate themselves with the package money provided to them. In this regard, a mechanism involving handholding, preferably by external agencies should also be ensured, while depositing a considerable portion of the amount in the name of the beneficiary in a nationalized bank for obtaining income through interest generated.
- (ii) In case of option II, the following package (per family) is proposed, at the rate of Rs. 10 lakhs per family:

(a)	Agriculture land procurement (2 hectare) and development	:	35% of the total package
(b)	Settlement of rights		30% of the total package
(c)	Homstead land and house construction		20% of the total package
(d)	Incentive		5% of the total package
(e)	Community facilities commuted by the family (access, road, irrigation, drinking water, sanitation, electricity, telecommunication, community centre, religious places of		10% of the total package

worship,	burial/	cremation
ground)		

(iii) The relocation process would be monitored / implemented by the following two Committees:

#### (State level Monitoring Committee)

- (a) Chief Secretary of the State Chairman
- (b) Secretaries of related departments Members
- (c) State Principal Chief Conservator Member
- Of Forests
- (d) Non-official members of respective Members

Tiger Conservation Foundation

(e) Chief Wildlife Warden - Member-Secretary

### (District level Implementing Committee for ensuring convergence of other sectors)

- (a) District Collector Chairman
- (b) CEO Member
- (c) Representative officials from: Members

PWD, Social Welfare, Tribal Department,

Health Department, Agriculture Department,

Education Department, Power and Irrigation

#### **Departments**

- (d) Deputy Director of the Tiger Reserve/PA Member Secretary
- (iv) The above cost norms are indicative in nature to facilitate flexibility for State/site specific situation, and may be modified to allow inter component as well as inter family adjustments by respective State Governments as per site specific requirements.
- (v) The relocated village would be taken up on a priority basis for eco development as well as local development through convergence of District level schemes.
- (vi) The labour oriented works involved in the relocation process would be preferably implemented through the villagers who are being relocated, so that they derive benefits out of the same apart from ensuring the field implementation to their satisfaction.
- (vii) In case resettlement has been done on a forest land, the new settlement will be eligible for access to forest resources for their bonafide use through the village level committee and Gram Sabhas.
- (viii) The District Administration would facilitate fair price shop, education, health center close to the relocated site.
- (ix) "Handholding" after relocation would be ensured through the forest department with ongoing ecodevelopmental inputs through central assistance and district administration involving convergence of schemes. In this effort help of competent independent agencies may be sought wherever available.
- (x) The relocated villagers would be given priority for livelihood options emanating from the protected area.
- (xi) In case the cost of relocation including settlement of rights per family exceeds Rs. 10 lakhs, the State Government has to meet the extra cost.

The relocation process would be an open ended one, since the progress of relocation process would depend on performance by States.

4.10 Mainstreaming wildlife concerns in tiger bearing forests and fostering corridor conservation through restorative strategy involving locals to arrest fragmentation of habitats (new activity) (non recurring)

The forests connecting Tiger Reserves or Protected Areas have tigers and other wild animals in most of the States. At present, there is no Scheme for addressing wildlife concerns in such areas, where restorative as well as protective inputs are required. The Wild Life (Protection) Amendment Act, 2006, provides for addressing such corridor areas. This, interalia, would involve:

Predressing man-animal conflict.

©Capturing problematic / aberrant wild animals.

22 Monitoring of wild animals.

**22** Antipoaching operations.

22 Habitat improvement measures.

The communities living in fringe areas of National Parks, Sanctuaries and Tiger Reserves suffer from frequent depredation of their crops on account of damage caused by wild herbivores like blue bull, black buck, wild pig and elephants. The situation becomes acute in certain pockets, since people depend on a single annual rain fed crop with low productivity. This is one of the major reasons for man-animal conflicts around our Tiger Reserves and Protected Areas, and is a serious bottleneck in enlisting the much needed local support for wildlife conservation.

Under Section 11 of Wild life (Protection) Act, the State Chief Wildlife Wardens and officers authorized on his behalf can permit killing of wild animals causing destruction to life and property, including standing crops. However, rural communities do not favor such killings due to religious sentiments attached to these animals. Trapping and translocation of such wild animals which gain a pest value is neither feasible nor cost effective. Therefore, the situation calls for adequately compensating the stakeholder communities around Tiger Reserves from this recurring loss. This would be supported as per prevailing norms of the State, in the delineated buffer area as explained in Section 38V of the Wild Life (Protection) Act, 1972, as amended in 2006.

# 4.11 Safeguards / Retrofitting measures in the interest of wildlife conservation (new activity) (non recurring)

Several Tiger Reserves are affected on account of heavily used infrastructure like roads, railway tracks and others. The high tension electric lines passing through many reserves cause mortality of wild animals due to electrocution by poachers. In the interest of wild animals several safeguards as well as retrofitting measures may be required, which would be supported on a site-specific basis.

4.12 Providing basic infrastructure/ Project Tiger Headquarter expenditure for consultancy, all India tiger estimation/continuous monitoring of tigers outside tiger reserves, strengthening of NTCA at the Center and establishing a monitoring lab in the Wildlife Institute of India. The following are envisaged (new activity) (non recurring):

©Creation of office space at Delhi for National Tiger Conservation Authority.

**22** Creation of GIS outstation laboratory at Wildlife Institute of India.

22 Carrying out All India Tiger Estimation, monitoring.

**22**Support to research work.

22 Contractual arrangement for special studies.

22 International / National Workshops.

22 Contractual arrangement for data entry, analysis.

#### 4.13 Independent monitoring and evaluation of tiger reserves (ongoing) (non recurring)

The independent monitoring of tiger reserves was carried out using as many as 45 parameters by a panel of experts, based on IUCN format. The monitoring reports were peer reviewed by the IUCN and placed before the Parliament. This process would be continued during the XIth Plan period after further refinement.

# 4.14 Establishment and development of eight new Tiger Reserves (new activity) (recurring and non recurring as indicated for various activities)

'Project Tiger' has a holistic ecosystem approach. Though the focus is on the flagship species 'tiger', the project strives to maintain the stability of ecosystem by fostering other trophic levels in the food chain. This is essential to ensure an ecologically viable population of tiger, which is at the 'apex' of the ecological food chain. The community pressures on forests are ever on the increase in developing countries, and India is no exception. As a sequel, the tiger habitat has become fragile and weak at several places, warranting a focused conservation approach. Our protected areas / Tiger Reserves are analogous to "islands" in an ocean of the other-use patterns. Empirical evidences from 'island biogeography' indicate that "isolated" reserves lose their species rapidly owing to 'ecological insularization'. Further, apart from fragmentation, the situation is aggravated by degraded forest cover owing to biotic pressure, dislocated prey - predator ratio, absence of effective measures to ensure the desired level of protection and lack of eco developmental initiatives for the fringe dwelling stake holders to reduce their dependency on forest resources. Since 'Project Tiger' would go a long way in redressing the above situation, the Steering Committee of Project Tiger in its meeting held on 23.1.2003 recommended inclusion of new Tiger Reserve areas so as to increase the total area of Project Tiger from existing 37761 sq. kms. to 50,000 sq. kms. during the X Plan period. Accordingly, proposals for new Tiger Reserves were received from some States, on which 'in principle' approval has been accorded. The details are as below:

(i) Anamalai -Parambikulam Wildlife Sanctuaries	Tamil Nadu & Kerala
(ii) Udanti and Sita Nadi Wildlife Sanctuaries	Chattisgarh
(iii) Satkosia Wildlife Sanctuary	Orissa
(iv) KazirangaNational Park	Assam
(v) Achanakmar Wildlife Sanctuary	Chattisgarh
(vi) Dandeli Wildlife Sanctuary and AnshiNational Park	Karnataka
(vii) SanjayNational Park and Sanjay Dubri Wildlife Sanctuary	Madhya Pradesh
(viii) Mudumalai Wildlife Sanctuary	Tamil Nadu

### ANNEXURE X GUIDELINES ISSUED BY NATIONAL TIGER CONSERVATION AUTHORITY

**F.No. PS(DIR) – PT** Dated: 9<sup>th</sup>April, 2003 To, Field Director

(All Tiger Reserves)

SUBJECT: Regulation of Tourist Visitation in Tiger Reserves

Sir,

As you are aware, there is considerable tourist influx (both inland and foreign) in many of our Protected Areas and Tiger Reserves, which necessitate regulation of such visitation in the interest of minimizing the biotic disturbance to wild animals and their habitat. It must be borne in mind, ecotourism should be fostered in the right perspective in these areas, so that there is no compromise or trade –off in wildlife interests, since our Tiger Reserves are ecotypical repositories of valuable gene pool. Hence, the following may be ensured in this regard:

- The tourist visitation should be regulated as per the **carrying capacity** of the area.
- In place of open gypsies and smaller vehicles, medium sized buses, with a closed body and sliding windows, may be used for park excursions. This will minimize the risk of close encounters with wild animals, apart from reducing the number of vehicles inside the park at any point in time .
- A minimum mandatory distance of at **least 500 meters** should be maintained between two vehicles plying on the same road.
- A minimum mandatory distance of **30 meters** should be maintained by tourist vehicles while spotting a tiger or any other wild animal.
- The route guides should be more professionally trained and penalty should be imposed on visitors in case they violate park rules.

Further, a model calculation of the Tourist Carrying Capacity is also appended for ready reference, which is fairly robust and can be computed in a site-specific manner by collecting some basic field data. It is requested, this computation may please be done for your Reserve and this Ministry may be apprised accordingly. Since a certain amount of risk is always involved in jungle excursions despite all precautions, a standardized 'Indemnity Bond' may also be prescribed indemnifying the park authorities from litigation / arbitration which may arise on account of accidents suffered by tourists during park round. All due formalities in this regard may be completed before the tourists are allowed entry into the Tiger Reserve. Under no circumstances tourist excursions should be allowed during the night. It goes without saying, apart from causing immense disturbance to wild animals, such ventures are extremely risky. It is also reiterated, no tourist facilities should be created in the 'core Zone' of a Tiger Reserve.

Yours Sincerely, Dr Rajesh Gopal ( IGF& DIRECTOR, PT)

Copy to: All Chief Wildlife Wardens

To, Chief Wildlife Wardens (All States) Sir.

As you are kindly aware, the guidelines for execution of Project Tiger has laid down mandatory provisions for State Governments to review, from time to time, the progress and implementation of the project with a view to evaluate its performance. In this regard, a directive was sent from this Ministry vide letter No. F.No. 1-6 / 2001-PT dated 10<sup>th</sup>September, 2001, for constituting a 'Monitoring and Evaluation Committee' at the level of State Governments, in consultation with identified Institutes / Centres of excellence in states. The action taken in this regard from your end has not been communicated to this Ministry so far. For close monitoring at the level of Government of India, the formats for monthly, half yearly and annual reports are appended for ready reference. It is requested that the information sought in these formats may be sent to this Ministry as below:-

- 1. Monthly Report by the 20th of the month following to which it relates.
- 2. Half Yearly Report within 2 months of the expiry of the half year to which it relates. With the Second Half Yearly Report an analytical report should also be submitted which should contain a comprehensive assessment of the project, highlighting the problems, current issues and achievement of physical and financial targets and bottlenecks.
- 3. Annual Report 1st week of June following the financial year being reported upon. It is requested that the Field Directors may please be directed for needful action and compliance in this regard.

Yours sincerely, (Dr. Rajesh Gopal) IGF & Director, Project Tiger

#### PROJECT TIGER MONTHLTY REPORT FOR THE MONTH OF .....

- 1. State
- 2. Tiger Reserve
- 3. Date of initiation
- 4. Plan Provision
- 5. Provision for the current year
- Sl. No. Item of works Financial Achievements Cumulative Remarks

Target for during the progress till

The year month the end of

(Rs.) (Rs.) month

- 6. Works
- 6.1 Capital
- 6.1.1 Buildings
- 6.1.2 Communication
- 6.1.2.1 Roads
- 6.1.2.2 Wireless
- 6.1.3 Equipment, Scientific and others including arms and ammunitions
- 6.1.4 Water development works
- 6.1.5 Cost of shifting villages
- 6.1.6 Cost of shifting cattle
- 6.1.7 Miscellaneous Tools
- 6.2 Works (Recurring)

6.2.1 Staff including special Protection staff 6.2.2 Habitat Manipulation 6.2.2.1 Details of works 6.2.2.2 Planning 6.2.2.3 Improvement of pasture land 6.2.3 Supplementary feeding 6.2.3.1 Artificial salt lick 6.2.4 Water facilities 6.2.4.1 Transportation of water 6.2.4.2 Running of pumping sets 6.2.4.3 Desilting of wells **6.2.4.4 Dugouts** 6.2.4.5 Water trough 6.2.5 Fire protection 6.2.5.1 Water Tower 6.2.5.2 Layout of fire lines 6.2.5.3 Fire fighting squads 6.2.6 Maintenance 6.2.6.1 Buildings 6.2.6.2 Livestock 6.2.6.3 Motor Vehicles 6.2.6.4 Fire lines 6.2.7 Compensation to cattle owners 6.2.8 Veterinary care 6.2.9 Research 6.2.10 Training 6.2.10.1 Officers 6.2.10.2 Field staff 6.2.11 Publicity and extension 6.2.12 Unforeseen and miscellaneous 7. Difficulty - bottlenecks, Additional remarks Field Director PROJECT TIGER HALF YEARLY REPORT REPORT ENDING SEPTEMBER 1. State 2. Tiger Reserve 3. Date of initiation 4. Plan Provision 5. Provision for the current year Sl. No. item of TARGETS Works -----Physical Financial Remarks Annual ½ Achievements Deficit Annual ½ Achievements Deficit State Yearly ending Sept. excess Yearly ending Sept. excess Sector 12345678910 6. Works 6.1 Capital 6.1.1 Buildings

1 2 3 4 5 6 7 8 9 10
1 2 3 4 3 0 7 8 9 10
6.1.2 Communication 6.1.2.1 Roads 6.1.2.2 Wireless 6.1.3 Equipment, scientific and others including arms and ammunitions 6.1.4 Water development works 6.1.5 Cost of shifting villages 6.1.6 Cost of shifting cattle 6.1.7 Miscellaneous – Tools
6.2 Works (Recurring)
6.2.1 Staff including special Protection staff
6.2.2 Habitat Manipulation
6.2.2.1 Details of works 6.2.2.2 Planning
Sl. No. Item of
Works
1 2 3 4 5 6 7 8 9 10
6.2.2.3 Improvement of pasture land 6.2.3 Supplementary feeding 6.2.4 Water facilities 6.2.4.1 Transportation of water 6.2.4.2 Running of pumping sets 6.2.4.3 Desilting of wells 6.2.4.4 Dugouts 6.2.4.5 Water trough 6.2.5 Fire protection 6.2.5.1 Water tower 6.2.5.2 Layout of fire lines 6.2.5.3 Fire fighting squads 6.2.6 Maintenance 6.2.6.1 Buildings Sl. No. Item of Works
6.2.6.2 Livestock
6.2.6.3 Motor Vehicles
6.2.6.4 Fire lines
6.2.14 Compensation to cattle owners
6.2.15 Veterinary care
6.2.16 Research
6.2.17 Training
6.2.10.1 Officers
6.2.10.2 Field Staff 6.2.18 Publicity and extension
6.2.18 Publicity and extension 6.2.19 Unforeseen and miscellaneous

- 7. Manpower employed
- 8. Bottlenecks if any or additional remarks
- 9. No. of cases of illicit grazing, hunting, forest cutting and others Detected Challenged Findings
- 10. No. of fires controlled Area burnt Loss
- 11. Loss of any wild animal Cause Action taken
- 12. A brief narrative about evaluation of the Field Director about progress of the Project. Field Director Date
- 13. Remarks of the Chief Conservator of Forests

C.C.F. Date

#### PROJECT TIGER HALF YEARLY REPORT-II ENDING MARCH

- 1. State
- 2. Tiger Reserve
- 3. Date of initiation
- 4. Plan Provision
- 5. Provision for the current year
- Sl. No. item of TARGETS

Works -----

Physical Financial Remarks

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½ Deficit Net to be Actual Cumulative Annual ½ Deficit Net to be Actual Cumulative Annual State Yearly of excess achieved achieve- for the year target yearly or excess achieved achieve- for the year target Sector

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- 6. Works
- 6.1 Capital
- 6.1.1 Buildings
- 6.1.2 Communication
- Sl. No. Item of

Works ------

12345678910

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- 6.1.2.1 Roads
- 6.1.2.2 Wireless
- 6.1.3 Equipment, scientific and others including arms and ammunitions
- 6.1.4 Water development works
- 6.1.5 Cost of shifting villages
- 6.1.6 Cost of shifting cattle
- 6.1.7 Miscellaneous Tools
- 6.2 Works (Recurring)
- 6.2.1 Staff including special Protection staff
- 6.2.2 Habitat Manipulation
- 6.2.2.1 Details of works
- 6.2.2.2 Planning

### 6.2.2.3 Improvement of pasture land Sl. No. Item of Works -----1 2 3 4 5 6 7 8 9 10 6.2.3 Supplementary feeding 6.2.3.1 Artificial salt lick 6.2.4 Water facilities 6.2.4.1 Transportation of water 6.2.4.2 Running of pumping sets 6.2.4.3 Desilting of wells **6.2.4.4 Dugouts** 6.2.4.5 Water trough 6.2.5 Fire protection 6.2.5.1 Water tower 6.2.12.1 Layout of fire lines 6.2.12.2 Fire fighting squads 6.2.13 Maintenance **6.2.13.1 Buildings** Sl. No. Item of Works -----1 2 3 4 5 6 7 8 9 10 6.2.13.2 Livestock 6.2.13.3 Motor Vehicles 6.2.13.4Fire lines 6.2.7 Compensation to cattle owners 6.2.8 Veterinary care 6.2.9 Research 6.2.10 Training **6.2.10.1 Officers** 6.2.10.2 Field Staff 6.2.11 Publicity and extension 6.2.12 Unforeseen and miscellaneous 7 Manpower employed 8 Bottlenecks if any or additional remarks 9 No. of cases of illicit grazing, hunting, forest cutting and others Detected - Challenged **Findings** 10 No. of fires controlled - Area burnt Loss 11 Loss of any wild animal - Cause Action taken 12 A brief narrative about evaluation of the Field Director about progress of the Project. Field Director Date 13 Remarks of the Chief Conservator of Forests C.C.F. Date PROJECT TIGER ...... TIGER RESERVE ANNUAL REPORT Introduction Brief narrative of the Tiger Reserve Background information Objective – Justification

Narrative summary of targets proposed

Narrative summary of targets achieved

Highlight of project achievements, performance in the State Sector. Protection from poachers Mention cases detected. All over the from wood poachers and their results project area from fire - Give narrative of fire accidents, loss and control measures applied both preventive and control.

from grazing of- Shifting of village domestic cattle Shifting of cattle from other human -- interference

Against diseases - Veterinary care provided

Accidents - Veterinary care provided

Construction Building Central Sector State

Sector

**Works Communication** 

Roads

Water

Facilities for animals - Water-Construction works State

Sector

and achievements

FoodCanopydevelopmentState

Sector

Artificial feeding

Salt Licks

Pasture Development

Shelter Canopy manipulation

Research

Progress of Research findings

Research Papers published Give brief summary

Brief of each scheme in the Appendix

New designs made

Training Narrative

Publicity and extension works Extensions, lectures, cinema shows

Men employed

Visitors - Scientists With brief of remarks remarks

V.I.P.s in the visitor's book

**Tourists** 

Evaluation By the Field Director

By the Chief Conservator of Forests

Appendix (1) Statement of 11 half yearly report

(2) Photographs maps

Census results.

Other material

List of animals killed or poached

No. F.1-6/2001-PT Government of India Ministry of Environment & Forests (PROJECT TIGER)

Annexe No. 5, Bikaner House Shahjahan Road, New Delhi-110011 Date the 11th September, 2001 To The All Field Directors of Tiger Reserves. Subject: Mortality Survey. Sir,

The mortality survey in a habitat is important to ascertain the age/sex specific natural mortality of wild animals. You are therefore requested to kindly issue suitable instruction to the field staff to collect all evidences of such mortality (mandibles/skulls) found on the forest floor every six months. A compiled information in this regard with categorization (Cervid/Bovid/Field/Canid) may be subsequently sent to this office.

Yours sincerely, DR. RAJESH GOPAL IGF & DIRECTOR (PROJECT TIGER)

Copy To: The Chief Wildlife Wardens of States having Tiger Reserves for information and necessary action.

DR. RAJESH GOPAL IGF & DIRECTOR (PROJECT TIGER)

No.1-18/2002 – PT Government of India Ministry of Environment & Forests (PROJECT TIGER)

Annexe No. 5, Bikaner House Shahjahan Road, New Delhi-110011 Date the 18th June, 2002 To The Chief Wildlife Warden, (All States)

### **Subject: Protection initiatives in Tiger Reserves/National Parks/Sanctuaries.**Sir

As you are perhaps aware, many gangs of poachers have been recently apprehended from Protected Areas like Nagarhole (Karnataka) and Nagarjunsagar Srisailam (Andhra Pradesh). These miscreants hail from States like Rajasthan, Haryana, M.P. and travel along with their kith and kin in small groups. They sneak inside Tiger Reserves/National Parks/Sanctuaries and other forest areas and carry on their activities. Basic interrogation has revealed their linkages with some notorious poachers. This calls for a dispassionate the view of protection initiatives in our Protected Areas for reinforcing the same with site-specific strategies based on past experience. While no generalised approach can be prescribed for the entire country, certain broad points are highlighted below, which may be of use in evolving or improving the protection strategy in-vogue:-

- (1) Review of the existing patrolling camps/chowkis in Protected Areas, so that each chowki/patrolling camp has, on an average, an area of 25-30 sq. km. under its jurisdiction to ensure the desired amount of legwork by beat guards and his camp followers posted in such patrolling camps/chowkis.
- (2) Prescribing a daily schedule of patrolling keeping in mind the vulnerability of the area from protection point of view.
- (3) Maintaining a monitoring/daily observation register in each patrolling camp/chowki in the local language preferably, in which the field personnel can record their daily observations based on patrolling.
- (4) Adopting a regula supervision schedule for field officers, alongwith minimum patrolling to be done by them jointly with patrolling camp/chowki staff.
- (5) Maintaining a system of "surprise checking" of chowkies/patrolling camps by senior officers.
- (6) Keeping a record of the local village level market days in the peripheral areas, and deploying information/staff in civil dress to keep track of any untoward incident/transaction relating to wildlife.
- (7) Organising vehicular patrolling by constituting squads comprising of field staff, labourers and police/SAF personnel (if necessary), with wireless handset and paraphernalia for apprehending offenders, apart from prescribing a patrolling calendar for the squad.
- (8) Maintaining a list of vehicles passing through manned barriers, and surprise checks by senior officers at such points during every month.
- (9) Evolving a monitoring system for collation of information regarding livestock depredation/human injury/loss of human life/large scale crop depredation by wild animals through wireless and prompt payment of compensation as per Citizens' Charter.

- (10) Wherever half eaten careasses of livestock on account of carnivore depredation are reported, such careasses should be incinerated in the presence of a gazetted officer to eliminate the possibility of poisoning for revenge killing by local people.
- (11) In areas where more than three incidents of livestock de-predation are reported within a fortnight, continuous monitoring based on field evidences should be done by deploying trackers.
- (12) Ensuring periodic monthly meetings with the neighboring district officials for exchanging wildlife crime dossiers to facilitate joint action.
- (13) Exchange of crime dossiers with local police to facilitate their updation, apart from organising monthly review meetings with the Superintendent of Police.
- (14) Periodic meetings with the District Judge to expedite the disposal of pending cases relating to wildlife offences.
- (15) Organising surprise raids jointly with the local police in railway stations, local trains, bus-stops, buses, catchers and cafeteria.
- (16) Ensuring special site-specific protection measures, during monsoon as 'Operation Monsoon' considering the terrain and accessibility of Protected Areas.
- (17) Organising inter-state meetings at least once in three months, specially to exchange wildlife crime data between border Parks/Tiger Reserves/Sanctuaries.
- (18) The area should be constantly monitored to ascertain the presence of gaags and wandering pastoral people., apart from keeping an inventory of their temporary settlements.
- (19) Wherever EDCs have been constituted, a village level crime register should be maintained at the EDC level to keep track of villagers involved in wildlife offences.
- (20) At the range level, dossiers of perpetual offenders should be maintained, which may help in tracing new crimes to old offenders.
- (21) Identifying pro-active local persons and imparting them the basics of wildlife crime detection so as to avail their services as and when required as informers.
- (22) Preparing a monthly crime map of each Protected Area on a 1:50,000 scale indicating the locations of each crime with date. It should also highlight the recorded cases of live stock depredation by carnivores during the period.
- (23) Patrolling camp/chowki staff should be instructed to collect field evidences like pugmarks, plaster cast of foot-prints on a regular basis, so that individual identities of carnivores like tiger can be fixed. This would serve as a continuous monitoring also.
- (24) Laying out impression pads near water points in villages to ascertain the presence of carnivores in the area.
- (25) Constituting a Defence Squads comprising of local, pro-active villagers at the EDC level, which can assist the PA staff in apprehending miscreants involved in wildlife poaching. It is requested, keeping the above in mind, suitable directives may be issued to the field formations under intimation to this Ministry.

Yours sincerely, (DR. RAJESH GOPAL)

IGF & DIRECTOR, PROJECT TIGER

Annexe No. 5, Bikaner House Shahjahan Road, New Delhi-110011 Date the 10th September, 2001 To The Chief Wildlife Warden, (All Tiger Range States)

**Subject:**MONITORING AND EVALUATION OF PROJECT TIGER INITIATIVES IN TIGER RESERVES – REG.

Sir,

As you are well aware, the Govt. of India (Project Tiger) provides allocation (100%) for the annual 'Monitoring and Evaluation' of initiatives executed under the Project. However, despite allocation, very few reports of monitoring and evaluation have been received from the field units, which is a matter of serious concern. It is therefore requested that this may be pursued in right earnestness and the task should be preferably entrusted to institutes like SFRI or other Centres of excellence in you State. Further, in constitution with such identified institutes, a 'Monitoring and Evaluation Committee' may also be constituted with representation from the Office of the Chief Wildlife Warden, field units and the office of the Regional Chief Conservator of Forests. An early action in this regard is desirable and the Govt. of India (Project Tiger) may be apprised of the same.

Yours sincerely, (DR. RAJESH GOPAL) IGF & DIRECTOR (PROJECT TIGER)

No.F.1-6/2001 – PT Government of India Ministry of Environment & Forests (PROJECT TIGER) \*\*\*\*\* Annexe No. 5, Bikaner House

Shahjahan Road, New Delhi-110011

Date the 10th September, 2001

To

The Chief Wildlife Warden,

(All Tiger Range States)

Subject: Monthly Report on mortality of tigers, co-predators and wild animals.

Reference: This office letter No. 1-6/2000-PT dated 23rd June, 2000.

Sir,

Further to the reference cited above, it is seen that monthly reports relating to the mortality of tigers, co-predators and other wild animals are not received regularly from the various field units, despite repeated reminders from this end. Consequently, considerable difficulty is experienced by this office in sending reply to Parliament Questions and assurances. You may please ensure necessary compliance in this regard so that the monthly report in the prescribed format reaches this office by the 15th of every month. A copy of the format is appended once again for the needful.

Yours sincerely,

(DR. RAJESH GOPAL)

IGF & DIRECTOR (PROJECT TIGER)

5 4

No.F.1-6/2001 - PT

Government of India

Ministry of Environment & Forests

(PROJECT TIGER)

Annexe No. 5, Bikaner House Shahjahan Road, New Delhi-110011 Date the 11th September, 2001 To

The All Field Directors of Tiger Reserves

Subject: Patrolling Strategy and AntiPoaching Initiatives.

Sir,

Effective 'Anti Poaching' measures and 'Patrolling Strategy' should be accorded topmost priority in a Tiger Reserve management. The need for a reliable, round the clock wireless system, strategically placed forest patrolling camps and an ever vigilant, motivated frontline staff requires no elaboration. However, in the recent past, in several tiger reserves, mortality of wild animals has not been timely detected by the field staff, which poorly reflects on the management and degree of protection. Since Govt. of India allocates considerable resources for antipoaching and patrolling under Project Tiger, this is a matter of serious concern. Therefore, the following initiatives should be ensured in the overall protection strategy of your Tiger Reserve.

Creation of Patrolling Camps at sensitive points with deployment of staff/labour as required. Listing of Staff/Camps with duty allocation and route chart. Appropriately equipping the patrolling team with fire arms and mobile wireless sets. Special instructions to squads/parties covering several aspects viz.:

- Suvreillance : hotels, tourist points, vehicles, bus stand
- Surveillance : traditional hunters etc.
- Coordination with local police
- Networking
- Issue of Special 'Preliminary Offence Report' books
- Preparation of daily schedule
- Local Country side market checking
- Surprise checking of barriers.
- Preparation of monthly wildlife "crime maps" (preferably in the GIS domain using GPS or on a 1:50,000 scale map)
- Monitoring Cattle kill, human kill, injury
- Monitoring water points near habitation
- Preparation of crime gang dossiers.
- Monitoring/updating at the level of Field Director/Dy. Director through wireless.
- Maintenance of 'village level' crime registers through village committees.
- Taking note of offences registered in local police station.
- Using tape recorder/camera to record evidences.
- Registration of fire arm license holders as per the directives of the Hon'ble Apex Court.

While situations in field units would vary necessitating site-specific strategy, the success of Wildlife Protection and crime risk management depends on good surveillance, timely reporting and networking, prompt situation analysis and immediate action. You are required to send the 'crime map' on a 1:50,000 scale along with (floppy/hard copy) details of wildlife crime registered, criminally prosecuted and convicted every 3 months to the PT monitoring cell of this office.

Yours sincerely, (DR. RAJESH GOPAL) IGF & DIRECTOR (PROJECT TIGER)

No.F.1-6/2001 – PT Government of India Ministry of Environment & Forests (PROJECT TIGER) Annexe No. 5, Bikaner House Shahjahan Road, New Delhi-110011 Date the 11th September, 2001

To
The All Field Directors,
All Tiger Reserves
Subject:- Disease surveillance and livestock immunization.

Sir,

As you are aware, wildlife disease may become one of the decimating factors causing high mortality among wild animals even in well established Protected Areas. Therefore, regular disease surveillance becomes important. Wild animals are prone to diseases which may be viral, bacterial, protozoan, mycotic, Helminth or ectoparasitic in nature. These diseases are mutually transferable between wild animals and livestock, and hence regula prophylactic immunization of nearby village cattle should be ensured by utilizing the services of local veterinary department. Further, seasonal pathological faecal matter analysis of major wild animal species (herbivores & carnivores, including departmental elephants) may be done, apart from blood tests with due permission as required under the Wildlife Protection Act, 1972.

Yours sincerely, (Dr. Rajesh Gopal) IGF & Director (Project Tiger) No.F.1-6/2001 – PT Government of India Ministry of Environment & Forests (PROJECT TIGER)

Annexe No. 5, Bikaner House Shahjahan Road, New Delhi-110011 Date the 11th September, 2001 To The All Field Directors of Tiger Reserves Subject: Physical Assault on Staff Sir.

Any incidence of physical assault on field staff leading to death and other serious happenings may please be communicated to the Project Tiger Directorate through fax/email/ telephone at the earliest (within 24 hours), followed by a detailed report after ground truthing. Needless to add, this is essential to highlight the factual position to all concerned, and in the absence of such spot reports undue credence is given to hearsay accounts and stray media coverages which may not reflect the true picture.

Yours sincerely,
(Dr. Rajesh Gopal)
IGF & Director (Project Tiger)
Copy to: The Chief Wildlife Warden,
(Dr. Rajesh Gopal)
IGF & Director (Project Tiger)
No. 7-1/96-PT
GOVERNMENT OF INDIA
MINISTRY OF ENVIRONMENT & FORESTS
PROJECT TIGER

#### To,

- 1. Principal Secretary Forests of all States having presence of tigers
- 2. CWLW, AllStates having tiger.
- 3. Field Director, All Tiger Reserves.
- 4. All members of Steering Committee Project Tiger.
- 5. All members of the Committee.

In continuation to the guidelines issued by this Ministry vide letter of even number dated 28-04-1997, there was a detailed discussion of Officials, Conservationist, Statisticians, Scientists and Non-Govt. organizations on the issue of Tiger Estimation in the country. There was an unanimous agreement that different methods should be used for different situations depending upon site specific factors, for example in Sunderbans and large areas of North-East, getting precise number of tigers by use of pug mark methodology is impossible. Similarly each methodology for estimation is not applicable to all tiger habitats in the country. After careful consideration the decision taken on 4 - 4 - 1997 also enclosed with the new guideline and it is requested that a sincere effort must be made to implement the guidelines for estimation of tiger and other prey species and compliance reported to this Ministry for each financial year latest by 30th June of the next financial year.

Yours faithfully, (P.K. Sen) Director, Project Tiger

# **GUIDELINS FOR ESTIMATING TIGERS DATED 22nd May 2001**

- 1. The term census was not appropriate and thus the term "estimations" is to be adopted for the purpose of determining the trends in the wildlife populations. Therefore the annual exercise will be termed as "All India Wildlife Estimation".
- 2. There is a diversity in areas across the country in the terms of available resources, skills and ecological conditions. Therefore different approaches are to be adopted for different areas for conducting tiger estimation.
- 3. Different goals were identified for practicing managers, researchers and conservationist depending upon above consideration. Accordingly the following approaches are to be adopted:
- (a) Spatial distribution maps (At a large scale) for all tiger population in the country are to be generated.
- (b) In major protected areas with tiger population, simple but reliable indices of tiger densities are to be developed.
- (c) In a few selected sites where sufficient resources and skilled manpower both from within and outside forest development is available, actual density study of tiger and prey species may be taken up and attempts be made to generate number of tiger population in the area for such specific sites only by more advanced technologies like camera trapping, digital photographs of pug marks, radiotelemetory or any other technology feasible.
- 4. It was decided no to attempt generation of tiger numbers where ecological factors and management / resource constraints, prevent the generation of invalid results.
- 5. A core group would be formed to oversee the results derived from tiger monitoring all over the country and assist the Ministry in arriving at a range of estimates for the purpose of informing the public and Parliament.
- 6. The consensus was reached that the guidelines issued by Project Tiger Division for monitoring of tiger and prey population on 04.04.1997, considering all the above aspects, will be followed. Therefore the proposed core group would ensure specific plan of action for proper implementation of the guidelines all over the country.
- 7. It was also agreed that the availability of maps of tiger habitats was a major constraint for management and research and special efforts to be made to be obtained them from FSI and other agencies.
- 8. All information collected from estimation should be readily available to managers, scientists and conservationist, in a central repository with Project Tiger Directorate.
- 9. Efforts will be made to put infrastructure in place in entire forest areas to carry out the tiger estimation as per plan elicited above expeditiously.

(P.K. Sen) Director, Project Tiger

#### **APPENDIX-**

No. 8(2) – 9 / 98-PT GOVERNMENT OF INDIA MINISTRY OF ENVIRONMENT & FORESTS PROJECT TIGER

Annexe No.-5, Bikaner House, Shahjahan Road, New Delhi-11 Dated the 29th January, 1998 To

(1) Forest Secretary,

Govt. of

(2) P.C.C.F.,

Govt. of

(3) Chief Wildlife Warden,

Govt. of

(4) Field Director,

SUBJECT: GUIDELINES FOR IMPLEMENTATION OF THE INDIA

**ECODEVELOPMENT** 

PROJECT IN SEVEN PILOT PROTECTED AREAS.

Sir.

The Externally Aided India Eco-development Project is being implemented in your State. With a view to implementing the project in its right guidelines, a copy of which is circulated herewith for your information and guidance.

Yours faithfully, (P.K. SEN) DIRECTOR, PROJECT TIGER

## MINISTRY OF ENVIRONMENT & FORESTS PROJECT TIGER

SUBJECT: GUIDELINES FOR IMPLEMENTATION OF THE INDIA ECODEVELOPMENT PROJECT IN SEVEN PILOT PROTECTED AREAS.

#### **Guidelines for implementation:**

#### **INTRODUCTION:**

The main phase of India Eco-development Project (IEP) approved by the Cabinet Committee of Economics Affairs has become operational. The project is defined as a Centrally Sponsored Scheme with a IDA loan and GEF grant component. The IEP received criticism on some issues mostly on account of lack of full information on the project. Nevertheless, some bottlenecks in the project need to be removed by framing well defined guidelines so that the project achieves its objectives. The project has four components for which the following guidelines are issued:-

#### **FIRST COMPONENT:**

#### **Improved P.A. Management:**

The objective of the biodiversity conservation within the protected areas has to be ensured. Top priority may be accorded to habitat improvement so that maximum biomass is regenerated and made available to the herbivores for reaching optimum carrying capacity. In many of the states where externally aided forestry projects are in vogue, priorities are given to widening of the forest roads, construction of buildings, bridges and culverts which do not merge with the environment. Therefore, it is suggested that:

- (a) No building should be constructed in isolation which is inconsonant with the surrounding.
- (b) No widening of forest roads should be taken up; and
- (c) Bridges and culvert, if at all necessary, should be constructed so as not to carry a load beyond eight tones.
- (d) The fire watch towers should be so designed so that it is possible to lock access when not manned. The wireless and anti-poaching structures be carefully designed to prevent unauthorized access.

#### SECOND AND THIRD COMPONENTS

#### \*\*\*-DEVELOPMENT AND ECO-DEVELOPMENT SUPPORT COMPONENT

Detailed discussions were held in the workshop organized by W.I.I., Dehradun on 25th and 26th of August, 1997. The selected Pas are seven pilot project sites whose success will decide India's future biodiversity conservation programme. Therefore, it is essential that only such activities are taken up which facilitate quantification of achievements. It was accepted in the workshop that two major issues are common not only in the seven selected sites covered by this project, rather they are prevalent in all the P.As. Therefore, it is expected that the P.A. Managers will priorities their activities so that our achievements through this project are visible to one and all. The identified common pressure points are: (a) grazing (b) fuelwood, fodder and small timber collection (c) low output from the existing resources of villagers and (d) no income generation during lean period for marginal and submarginal and landless villagers. Any other issue is site specific and therefore no common guideline can be issued on that. Though the staff appraisal report envisages implementation of eco-development work according to microplans which have to be formulated for each identified village but emphasis should be given to these issues while submitting the A.P.O. and executing eco-development activities. A few of the suggestions are noted below.

- (a) Fuel & small timber: Plantation of indigenous fast growing fuel, small timber and fodder in:
- (i) Community land
- (ii) Village waste land
- (iii) Private waste land
- (iv) Other revenue waste land
- **(b) Grazing:** (i) reduction in number of scrub cattle.
- (ii) substitute them by improved or cross breed cattle.
- (iii) Biogas plants.
- (iv) Veterinary Care Units.

While raising such plantations application of chemical fertilizers and insecticides may preferably by avoided.

#### (c) Augmentation of output: -

- (i) Adoption of soil and water conservation techniques
- (ii) Small irrigation facilities earthen check dams, stop dams, ponds etc.

#### (d) Income generation:

- (i) bee keeping
- (ii) poultry
- (iii) piggery
- (iv) Tassar
- (v) Sewing and knitting etc.

### (e) Any other:

Such items as insisted by villagers which may be area specific. The suggested percentage of investment under these components is:

- (a) 40%
- (b) -20%
- (c) 25%
- (d) 10%

(e) - 5%

Only labour oriented earthen works should be taken up to cut down the expenditure on cement and steel items.

A close proximity with the District Administration will avoid duplicity of work; rather District Administration should be closely associated with this project so that the P.A. authorities may take up the case of additional development work in selected village through D.R.D.A. funds.

#### FOURTH COMPONENT PROJECT MANAGEMENT COMPONENT

All the investments should flow out of the approved Plan for the protected area. It is proposed to write new management plans for each PA and, therefore, special training for such officers have been suggested in the consultancy. The guidelines for new management plan have already been circulated by W.I.I. In situ training schedule for category of staff below Forest Ranger should be finalized with W.I.I., as well as training of management plan officers should be taken up with W.I.I. immediately under intimation to the Director, Project Tiger. Similarly the research component too have to be management plan oriented and, therefore while revising the Management Plan, utmost attention must be given to the research component which has substantial share in this project.

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#### **APPENDIX-**

**PS-DIR(PT)-2003 MISCE** Dated: 29th May, 2003

To.

Chief Wildlife Wardens

(All States)

Subject: Habitat occupancy map of tigers.

Reference:

- a) This Ministry's letter No. 7-1/96-PT dated 27th November, 2001, and subsequent three reminders.
- b) This Ministry's letter No. 4(5)-1/2001 PT dated 12th June, 2002. Sir,

Please refer to the correspondence cited above, wherein a State level Forest Map on a 1:250,000 scale was requested, depicting boundary delineation of forest divisions / Protected Areas, with the spatial presence of tigers plotted as "dots", corresponding to the estimation data sent from your end. This information is still awaited, due to which "vetting" of the figures by the core committee is held up. It is requested, the same may be expedited without any further delay. In addition, the Addl. DG (Wildlife) has desired that the Field Directors and Protected Area Managers should maintain seasonal Habitats Occupancy Maps of tiger for the tiger populations, pertaining to their own field units. The methodology to be followed is simple and based on available field data. For guidance, a brief write-up is annexed. This information is vital for a country level appraisal of tiger presence and therefore suitable directives may be issued to all concerned for doing the needful. Further follow-up work will be indicated as soon as the analysis of Habitat Occupancy Maps is carried out.

Yours sincerely, (Dr. RAJESH GOPAL) IGF & DIRECTOR (PT)

Copy to:

1. Addl. DG (Wildlife), Ministry of Environment & Forests, New Delhi.

2. Principal Secretary / Forest Secretary of all respective States.

(Dr. RAJESH GOPAL)
IGF & DIRECTOR (PT)

#### **Preparing Seasonal Habitat Occupancy Maps (HOMs)**

The documentation of presence or absence of a species through evidences and sightings in forest compartments on a map is a quick, simple, user friendly way of making a beginning to understand response of the species to the ecological conditions prevalent in an administrative management unit. It helps the forest managers in fine tuning the knowledge base relating to his/her area and notice the impacts of management interventions in a very short time, within their tenures of service in the area. Tiger is an ecological indicator species. The tiger habitats may not be fully occupied by tiger populations all the time. What are the habitat occupancy dynamics of any particular species, or a group of animals species, in a Tiger Reserve or any other wildlife management unit is the basic knowledge that is needed to formulate management strategies and prescriptions. To start with understating of the Habitat Occupancy Dynamics of tigers we need the following material:-

- 1. A map of the total management unit, say a Tiger Reserve, showing compartments boundaries, major land based features including location of human habitations, roads, rivers and watercourses, etc. The scale of the map should be such that the entire management unit can be seen on a single sheet of quarter imperial drawing board size. An ammonia sheet map will be acceptable.
- 2. Tracings and plaster casts of 3 recent census exercise years, on which locations and date from where these were picked up.
- 3. Colour pens, each colour for a specific year. After reading the location and year in which any particular tracing or plaster cast was picked up, as indicated by the collector on it, place a dot, in colour coded for that particular year, in the compartment on the map where it was picked up. The objective of this action is only to indicate that a tiger (irrespective of its age or sex) had used that compartment during the census month in that particular year.

A single map showing the pattern of occupancy by tigers by colour dots during the three census years is the basic map to act as a bench mark for future work. Likewise single sheet will, in future, be needed for registering HOMs on seasonal basis. Each season will be given a separate colour code for the entire year. However, the perceived pinch-period for tigers prey base must be covered. This work, to cover occupancy by tigers

during the identified seasons, should be started w.e.f. 1st June, 2003 and taken up at 4 month intervals. For this purpose census exercise will not be needed. Reporting of presence of pugmarks, scats and other evidences, and sightings if any will suffice as data to be placed on Habitat Occupancy Map. If the management authority would like to proceed ahead, HOMs may also be prepared simultaneously for leopard, bear, gaur, and major tiger-prey species on separate sheets. An overview will be taken of the HOMs prepared as and when these are ready to decide about moving onto the next steps to be taken.

No.PS/Dir (PT)/2004-Misce. Dated the July 22, 2004

To

The Field Directors

(All Tiger Reserves)

# Subject: Preventive measures/surveillance for Trypanosomiasis in wild, free ranging conditions.

Sir.

As you are aware, Trypanosomiasis (commonly known as Surra), is an acute, sub-acute or chronic disease caused by a protozoa (Trypanosoma evansi). The disease is characterized by fever, progressive emaciation, anemia, neural symptoms and death. While in dogs and cats the disease is acute and fatal, it may become chronic in ruminants. The disease is reportedly an enzootic one occurring in domestic animals. However, several references are available relating to free ranging wild animals also, and the outbreak has been observed during the onset of mansoon synchronizing with the breeding activities of files. In our country, the transmission of this disease occurs due to blood sucking flies belonging to genera Tabanus and Stomoxys which seve as vectors. The wild animal may get infection by feeding on an infected carcass/prey animal or through the flies. The Tabanus fly lives along fresh water ponds or rivers, whereas Stomoxys breed on decomposing fecal or waste matter, especially from cattle shed. Since chances of infection of infection to in-situ population of wild animals exists, the following preventive measures are suggested:-

- 1. Population control of flies around cattle sheds by destroying their breeding area in peripheral villages of Tiger Reserves.
- 2. Control of disease in domestic animals in villages in and around Tiger Reserves.
- 3. Controlling the movement of nomadic and village cattle inside Tiger Reserves.
- 4. Surveillance of the disease and prophylactic treatment of sick and reservoir domestic animals at the periphery of Protected Areas/Tiger Reserves.
- 5. Periodical surveillance of diseases in wild and domestic animals at waterholes and grazing lands near peripheral villages.
- 6. Treatment of suspected animals particularly of threatened species.
- 7. Ensuring a regular monitoring system through wireless, involving the Ecodevelopment Committees.

Yours sincerely,

(DR. RAJESH GOPAL)

IGF & DIRECTOR, PROJECT TIGER

Copy to: 1. Principal Secretary/Secretary, Forest Department (All States having Tiger Reserves)

- 2. Principal Chief Conservator of Forests (All States)
- 3. Chief Wildlife Wardens (All States having Tiger Reserves)

69

No. 7-1/96-PT

**Government of India** 

**Ministry of Environment & Forests** 

(Project Tiger)

\*\*\*\*

Annex No. 5, Bikaner House,

Shahjahan Road, New Delhi- 110 011.

Telefax: 3384428

E-mail: dirpt-r@hub.nic.in

#### **Dated 27th Nov., 2001**

 $T_0$ 

Chief Wildlife Warden, (All Tiger Range States)

SUBJECT: All India Estimation of Tiger/ Leopard/ Wild Animals.

Sir,

The All India Census of Tiger/ Leopard/ major wild animals (free ranging, as well as captive) is due in the current year. As done during 1997, apart from tiger and leopard, other major wild animals are also to be estimated viz. rhino, gaur, wild buffalo, brow antlered deer, hog deer, cheetal, wild pig, crocodile, barasingha, neelgai, black buck, barking deer, hog deer, elephant and the like. This list is by no means exhaustive, and hence other important faunal species found within your jurisdiction may also be taken into account during the estimation. As you are aware, detailed guidelines for estimating carnivores have been issued from this Directorate in the past. A copy of these guidelines are once again appended for ready reference. Further, guidelines have also been issued subsequently in 1997 for estimating tigers, followed by additional directives for refinement in 2001. Estimation of tiger population, based on pug marks and related evidences, still remains the most cost effective and time tested methodology suited to our conditions, which if carried out due care in a systematic manner, can lead to authentic results. Therefore, as indicated in the guidelines, considerable emphasis may be given on the training aspects, and preferably three or four "spearhead teams" consisting of 3 frontline staff (1 Range Officer/ Dy. Range Officer, 1 Forester, 1 Forest Guard) may be given intensive practice so that they are in a position to collect the pug/ impressions and supporting evidences from the field in a reliable manner. Instructions may also be issued to all field units for "preserving" the pug marks of tiger/ leopard by protecting them with stones or sticks encircled all around, so that they are not obliterated by vehicular or pedestrian movement. Such "preserved impressions" may be telecasted/ photographed only by the spearhead team so that the basis in telecasting/ photographing gets reflected throughout consequently leading to its destination. As per the directives issued subsequently, if the area permits further movement, results of such refinement may also be supplemented along with the pug marks data. Estimation of other wild animals may also be done using one of the following

methods as per feasibility:-

- i) Direct block counting (to be done on 2 days with a correction factor)
- ii) Pellet/ dung density estimation
- iii) Waterhole counts
- iv) Transect counts(vehicular/ non-vehicular)

Considering the infrastructural limitations and terrain conditions for the various protected areas and forest areas, it is neither desirable not practical to advocate any single method of estimating the wild animals other than major carnivores like tiger/ leopard, therefore, necessary instructions/ field training may be imparted to the managerial staff in consultation with the Wildlife Institute of India or other resource persons readily available. Since livestock is also an important denizen of our right burdened forests, forming a sizeable component in the diet of major carnivores, the number of livestock depredated along with compensation disbursed by the field units during the year for such depredation may invariably indicated. Likewise, exgratia paid for loss of human life or injury may also be furnished field unit-wise. To ensure uniformity, transparency and desired standard in the entire exercise, it has been decided to constitute a "Supervisory Committee" at the State level consisting of the respective Chief Wildlife Warden, NGO/NGI of long standing association with wildlife, and a regional scientist. You are requested to kindly suggest a panel in this regard for the consideration of the Ministry. The time schedule for the estimation exercise is appended in

the Annexure-A. For taking into account the transient animals (especially tigers), it is imperative that the estimation exercise should be coordinated with the neighboring States by tallying the evidences collected in the vicinity. As desired fit, suitable instructions may kindly be issued for such coordination meetings, and a "Coordination Committee" comprising of local officers may also be constituted under intimation to this Ministry. It is once again reiterated that the estimated figures should be supplemented with the continuous monitoring data along with the outcome of other refinement carried out, if any. A meeting would be shortly convened in this regard and you are requested to furnish the select list of NGOs/NGIs/Scientists at an early date.

Yours sincerely, (Dr. Rajesh Gopal) IGF&Director(PT)

No.PS-DIR(PT)/2005-MISCE. Dated the February 28, 2005.

To

Field Directors

(All Tiger Reserves)

### Subject: Monitoring monthly frequency of pug-marks in the habitat

Sir.

During the recent deliberations in the All India meeting of field directors at Bandipur, the format for daily monitoring of wild animals and habitat parameters was circulated. It is reiterated, the field staff may be directed to record the day to day field monitoring data in the prescribed format to be maintained at nakas/patrolling camps/chowkis w.e.f. 15-3-2005, which would be checked by the officials of this Ministry during their supervisory field visits. This would be in addition to the traditional tracking record being maintained in the reserve. Further, the total number of tiger pug marks /scats /kills seen/collected in the reserve during the last seven days in a month should also be recorded and communicated to this ministry every month in the enclosed format every month. While counting pugmarks care should be taken to take note of only one pug mark from a track pertaining to a single animal. This would facilitate continuous monitoring of tiger population in the habitat, so that reasons for any change in the relative abundance of such evidence in the habitat can be looked into as a part of the continuous monitoring strategy. This may please be accorded top most priority.

Yours sincerely, Encl: As above. ( Dr. Rajesh Gopal ) IGF &Director, ProjectTiger

Copy to:

- (1) Principal Chief Conservator of Forests (All Tiger Reserve States)
- (2) The Chief Wildlife Wardens (All Tiger Reserve States)

#### DATA SHEET FOR TIGER MONITORING

Name of the recorder :	Date :	
Forest Division	Forest Circle	
Range	_	
Days Number of Tiger Sign	s collected/seen	
(Pugmark/Scat)		
1		

i de la companya de
Total Control
) Has any tigress with cubs been reported during the past 3 months?  Yes No
Seen by staff, b/ Pug Marks, c/ Reported by local persons, d) Seen by Officials  How many cubs approximate age of cubs  2) In case tigers are known to be present in the beat, but no sign was obtained during the ampling period then mention on what evidence was this conclusion made (pugmark, direct ighting, scat, other sign)  3) How many livestock predation events have been recorded in the past 3 monthsby igers?
No.PS-DIR(PT)/2005-MISCE. Dated February 28, 2005.
Principal Chief Conservator of Forests
All Tiger Reserve States)
Sir,
The All India estimation of tigers, co-predators and previanimals would be conducted from

The All India estimation of tigers, co-predators and prey animals would be conducted from November, 2005 to February, 2006. This Ministry would be deputing a panel of experts/supervisors for assisting and overseeing the estimation work in States. While detailed guidelines in this regard would be sent in the near future, you are requested to maintain a monthly monitoring data of tigers seen in the various forest divisions and protected areas outside the Tiger Reserves, in the prescribed format annexed with this letter w.e.f. 01-04-2005. The number of evidences pertaining to tiger presence (pug marks, scats, kills) should be recorded during the last seven days in a month by field staff. While counting pugmarks, care should be taken to take note of only one pug mark from a track pertaining to a single animal. The total number of pug marks/scats/kills pertaining to tiger in the area should be compiled range-wise for each division, and the collated circle level information has to be maintained month-wise in the office of the Chief Wildlife Warden. The field staff may be directed to maintain the range level records for supervisory checks by the expert team of this Ministry. This may please be accorded top most priority, as the information is crucial to ascertain the status of tiger presence in areas outside the Tiger Reserves. All Conservators, Divisional Forest Officers and Protected Area Managers may be directed accordingly under intimation to this Ministry.

> Yours sincerely, Encl: As above. (DR. RAJESH GOPAL) IGF & DIRECTOR, PROJECT TIGER

Copy to : 1. Forest Secretary (All Tiger Reserve States)
2. Chief Wildlife Warden (All Tiger Reserve States)

3. Field Director (All Tiger Reserve States)

(DR. RAJESH GOPAL) IGF & DIRECTOR, PROJECT TIGER



### NATIONAL TIGER CONSERVATION AUTHORITY

(STATUTORY BODY UNDER THE MINISTRY OF ENVIRONMENT & FORESTS, GOVT. OF INDIA)

Bikaner House, Annexe-V, Shahjahan Road, New Octhi-11001f Tele Fax: 011-23384428 Email: dirpt-r@nic.in

Dr. RAJESH GOPAL Addl. P.C.C.F. & Member Secretary

No. 1-16/93-PT (Part-I)

Dated the 12th August, 2010

of bolk Propert All

Chief Wildlife Warden(s),
All Tiger Range States.

 Directive of the Hon'ble Apex Court dated 25.11.2005 in LA. No.1220 (Interim Report of CEC in LA. No. 548) and LA. No. 994 in W.P.C. No. 202/1995.

2. Section 38V of the Wildlife (Protection) Act, 1972.

3. Forest (Conservation) Act, 1980 and the Rules / Guidelines issued therein.

Letter No. PS-MS(NTCA)/2009-Misc, dated 22.4.2009.

5. Guidelines of CSS-PT No. 3(1)/2001-PT dated February, 2008.

6. Guidelines for preparation of Tiger Conservation Plan, Technical Document: NTCA/01/07.

-Copy to Eco Towyam tile 19/18/10 Sir.

Reference is invited to the directive of the Hon'ble Apex Court, and the statutory provisions contained in the Acts alongwith advisory/guidelines cited

In this context, the following is stated:

The patrolling camps / chowkis / watch towers inside a tiger reserve (core as well as buffer) should not be used for accommodating tourists or facilitating tourism. As these structures have been constructed under Project Tiger, for the sole purpose of accommodating the frontline field staff (at places with wireless), it needs to be ensured that they are solely used for patrolling / antipoaching work.

Tourists should not be allowed to patrol the core / critical tiger habitat owing to the risk involved vis-à-vis the intensive legwork in a formidable terrain with wild animals. Further, exposing tourists to sensitive patrolling routes / paths / spatial presence of animals,

(iii)

Control of the contro

besides the patrolling strategy would make the habitat vulnerable by exposing such details which may be confidential for apprehending the offenders / poachers. Besides, there can be no method by which a poacher entering a wildlife habitat under the garb of a tourist canbe identified. Likewise, there is no mechanism available to ensure that sensitive information pertaining to wildlife protection is not advertently/inadvertently passed on to miscreants / poachers. The frontline staff would also be burdened with the task of acting as "caretakers" for the tourists, besides attending to their possible health related emergencies. Needless to point out, patrolling is effective and successful only if it is organized discretely. Patrolling is a technical / specialized task requiring considerable physical fitness and a knowledge of a terrain which by and large, is done at odd hours. While the tourists would not be in a position to undertake this task, there is also a risk of patrolling strategy and related details getting exposed to poachers.

Under no circumstances forest produce material should be used for (iii) making a temporary / permanent construction to facilitate tourists in

the core / critical tiger habitat.

It is reiterated that provisions under section 38V of the Wildlife (iv) (Protection) Act, 1972 should be implemented in letter and spirit for ensuring the inviolate status of the core / critical tiger habitat.

The guidelines / advisories issued from the Project Tiger/NTCA may (v) be strictly followed for organizing intelligence based patrolling in tiger reserves.

Yours sincerely,

APCCF & Member Secretary (NTOA)

#### Copy to:

1. APS to MEF.

2. PPS to Secretary (E&F).

3. PPS to DGF & SS, MoEF.

### Copy for information to:

1. PS to Chief Secretary(s) of all tiger States.

2. Additional Chief Secretary(s)/ Principal Secretary(s) of all tiger States.

3. PCCF(s) of all tiger States.

4. Field Director(s), All Tiger Reserves.

13 miles

No.4-29/86-FRY (PT)

No.4-29/86-FRY(PT) Government of India

Department of Environment, Forests and Wildlife (Wild Life II Sec.)

-0-0-

Annexe No.5, Bikaner House, Shahjahan Roac, New Delhi - 110011. Dated, the 17/2/37

To,

1412

The Forest Secretary,
Government of
Department of Forests,

Subject:- Regulating wildlife tourism in Tiger Reserves
- Guidelines regarding.

Sir,

I am directed to refer to the subject noted above and say that wildlife tourism has had a very intricate relationship with wildlife areas. Wildlife tourism has enabled the parks and sanctuaries to become "strong" entities in so far as the people visiting these have become committed to the cause of conservation and has also given to some extent an economic viability to the conservation efforts in the country. Tourism has, however, also been responsible for the degradation of a number of parks and sanctuaries by over and inappropriate usage directly or indirectly.

Project Tiger held on 19th May, 1981 under the chairpersonship of the then Prime Minister, a Sub-Committee was appointed to make recommendations to organise and regulate tourism in tiger reserves. The Sub-Committee's recommendations were placed before the Steering Committee in its 26th Meeting held on 25th August, 1986 and were accepted with certain modifications. On the basis of these, Government of India have formulated 'Guidelines for wildlife tourism in Tiger Reserves'. A copy of the Guidelines is enclosed for necessary action under intimation to this Department.

Yours faithfully,

(S.K. GOYAL)
DEPUTY DIRECTOR (PROJECT TIGER)
Tele.No.389645

(P.T.O.)

visitors

Tiger Reserve	Total	n	S. O.	( .
	1982-83	number of vi: 1983-84	itors during 1984-85	1985-86
Periyar	1,04,512	1,39,260	1,84,712	1900-01
Corbett	18,092	19,621	15,015	
Kanha	13,683	27,570		
Palamau	22,812	. 24,077	27,012	
Ranthambhor	1,200		22,924	26,602
Sariska		309	2,800	4,400
Bandipur	14,599	18,611	23,269	
BandThut	26,807	25,600	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	

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The number of visitors in Namdapha and Indravati are low due to their remoteness, but the number of visitors to the other reserves have also been increasing though their figures are not readily available.

- . As regards the second aspect, namely, the control of activities of the visitors, it is necessary to lay down guidelines for the formulation of regulations which would govern the activities and the extent of tourism and to prescribe the 'Dos' and Donts'. In this regard the following criteria may be observed.
- 1. It must be recognised that a national park or sanctuary, including a tiger reserve, is primarily for the conservation of nature and of the genetic and natural resources of India's national heritage. Any tourism activity that may be permissible would have to be only subservient to and in consonance with this principle.
- 2. Tourism must be effectively regulated in quantum in areas of usage in a given park/sanctuary and in the mode and method that it would be carried out in these given areas.
- 3. The officer in charge of the park/sanctuary should have the final say in the matter of regulation of tourism in his area and tourism should be in consonance with the

(Contd...3/...)

- directions laid down by him. The officer in charge of such areas will not be in charge of the tourist complex that may exist or come up around such areas, but he must be consulted before they are established or extended.
- 4. Scope and extent of tourism would be incorporated
  in the management plan of each national park or sanctuary
  and should be revised periodically. Under the Wild Life
  (Protection) Act, 1972, there is a provision for framing
  rules for the management of park/sanctuary and in this
  regard provisions should be made for punishment for any
  act of vandalism that might occur amongst tourists/visitors.
  - 5. A park interpretation centre adequately equipped with maps, guide books, audio-visual aids etc. should be set up at the edge of each reserve so as to provide nature education and park interpretation to the visitors.
  - that of tiger reserve) should be clearly demarcated and should be protected as a sanctum sanctorum. Any tourism now existing in such areas should be discontinued,
  - 7. One or more tourism zones for each national park and sanctuary should be established and clearly demarcated in the buffer zone or elsewhere outside the core area. Such tourism zones should be adequately rich in its wildlife features so that its main floristic and faunal features may be seen and experienced by the visitors.
  - 8. There will be a ceiling on the number of visitors allowed into the national park and wildlife sanctuary at any one time. There may also be a ceiling on the number of visitors in a given part of the area. This number is to be determined by the capacity of each national park/wildlife sanctuary to provide viewing capability and transport and guide facilities.

(Contd ...4/...)

# Guidelines for Wildlife Tourism in Tiger Reserves.

Wildlife tourism has had a very intricate relationship with wildlife areas the world over and India is no exception. Wildlife tourism has enabled the parks and sanctuaries to become "strong" entities in so far as the people who visit them have become "converted" to the cause of nature conservation in general and to the maintenance of the park in question in particular, and has also given to a certain extent an economic viability to the nature conservation efforts in a country. Tourism has, however, also been responsible for the degradation of a number of parks and sanctuaries, both by over and inappropriate usage directly or indirectly.

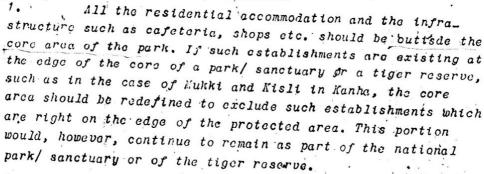
The adverse impact of tourism is broadly due to 2 factors. Firstly, the sheer quantum of visitors, the number of which has increased very dramatically in the last few years and secondly, the inappropriate and unregulated activities of the visitors themselves. . Both these matters have to be addressed, firstly by regulating the number of visitors that can be allowed at a given time and at a given place in a tiger reserve including the numbers which may be allowed to stay overnight on the premises of the reserve outside the core area, and the discpline and control which has to be excercised on the activities of the visitors during their visit and the facilities of proper guides etc. that has to be extended to them, both to provide them with a rewarding experience as well as to supervise their activities.

As regards the number of visitors in the tiger reserves during the last 4 years, the following table is indicative and shows the rise in the number of

(...2...)

# PROJECT TIGER

# GUIDELINES FOR CONTROLLING VILDLIFE FOURISM IN TIGER RESERVES



- 2. If such an establishment happens to be in the middle of the tiger reserve, we can not have a residential tourism zone carved out from the middle of such protected area. In such cases, they should be closed and if this is simply not possible, it be taken over by the Forest Department and the objective should be that these should be closed down in future and the residential facility should be set up outside the core area. One such case is the Corbett Tiger Reserve of U.P. where Dhikala Residential Complex is right in the centre of the national park. State Government has already decided to build up a residential complex at the edge of the national park. In all other similar cases, this should be followed.
- 3. No new residential accommodation would be allowed to be created within the core area of the Tiger Reserve, not even a forest rest house.
- 4. No new tourist residential accommodation either governmental, corporate or private would be allowed to come up within the buffer area of the Tiger Reserve.
- 5. In Tiger Reserves having core areas more than 300 Sq.km which is the prescribed minimum area as the Sanctum Sanctorum of a nature reserve, guided entry to the tourist would be permitted on the scheduled routes. The following restrictions will be imposed in such cases:
  - a) The zone and roads of the core area will be defined with the approval of the Government of India for permitting the movement of the tourists. In identifying the area where such movement of tourists

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\* ...

Contd. . . . (2)

would be allowed within the core area, it would be ensured that 300 sq.km. of the core area would remain free of such tourist visitation.

The number and the type of vehicle, their timings, period of visit will be specified and restricted.

No vehicle will be allowed to move in a Tiger Reserve without an approved guide. Large Buses would not be allowed to travel in these areas. Mini buses that would travel at a given time and on a given route, would be the most preferred vehicle. If they are to be owned and operated by the Tourist Department, they will run strictly according to the regulations laid down and will have an approved guide. Private Cars will only be allowed with the special permission of the Field Director at the prescribed fee. All vehicles including government vehicles other than those directly connected with the park administration will have to pay the fee applicable to the private cars and will also have to acquire the same permission.

Walking on foot will be permitted, only on a well defined nature Trails. Individuals will not be allowed to walk on foot nor groups larger than 20 members will be allowed on the walking train at a time. Visitors applying for permission to walk on foot will be required to give in writing that they will be solely responsible for any harm that may be caused due to the presence of wild animals in the area. However, armed guides will be provided to the groups parmitted to walk on the train. The permission will be given entirely at the discretion of the Field Director.

Cooking of meals or carrying eatables, transistors and arms inside the core area will be totally prohibited.

(inese guidelines are in supplement to the guidelines issued carlier vide Department of Environment, Forests and Fildlife letter No.4-29/86-FRY(PT)(Vol. II), dated 17/18 Feb.,87).

Name & Designa	tion	Name & Designation	Name & Designation
(With Stamp)		(With Stamp)	(With Stamp)
Dated:		Dated:	Dated:

# PART-B

# GUIDELINES FOR TOURISM IN AND AROUND TIGER RESERVES PREAMBLE.

Whereas, healthy natural ecosystems are critical to the ecological well-being of all living entities, and especially for the economic security of people. Tourism in the form of ecotourism has the potential to enhance public awareness, education, and wildlife conservation, while providing nature-compatible local livelihoods and greater incomes for a large number of people living around natural ecosystem which can help to contribute directly to the protection of wildlife or forest areas, while making the local community stakeholders and owners in the process.

Whereas, the Central Government considers it necessary to lay down a framework Guidelines on the selection, planning, development, implementation and monitoring of tourism in tiger reserves of the country with a view to recognise that tiger reserves and their landscapes are diverse, specific State Tourism and Ecotourism Strategies to be developed by the concerned State Governments and Tourism and Ecotourism Plans to be developed by the concerned Authorities.

These Guidelines are framed under section 38-O (c) of the Wild Life (Protection) Act, 1972, (WLPA), the provisions of the Scheduled Tribes and Other Forest Dwellers (Recognition of Forest Rights) Act, 2006, (FRA), Panchayat (Extension to Scheduled Areas) Act, 1996, (PESA) and Part IX of the Constitution of India, besides other laws in force. These Guidelines are in consonance with the Guidelines of the Centrally Sponsored Scheme of Project Tiger.

# 1. THE NEED FOR GUIDELINES.

- 1.1 The objective of these Guidelines is to move from wildlife tourism to ecotourism which is defined as 'responsible travel to natural areas that conserves the environment and improves the well-being of local people'. Given the conditions in India, it is proposed that ecotourism includes tourism that is community based and community driven. The aim should be to move towards a system of tourism around tiger reserves which is primarily community based tourism. Such tourism should be low-impact, educational and conserve the ecology and environment, while directly benefiting the economic wellbeing of local communities.
- 1.2 The primary objective of tiger reserves is to conserve tiger source populations that also act as an umbrella for biodiversity conservation. These areas provide a whole host of ecosystem services and opportunities for tourism.

Unplanned and unregulated tourism in such landscapes can destroy the very environment that attracts such tourism in the first place. Hence, there is a need to move towards a model of tourism that is responsible and compatible with these fragile landscapes.

- 1.3 Tourism, when practiced appropriately, is an important economic and educational activity. It has the scope to link to a wider constituency and build conservation support while raising awareness about the worth and fragility of such ecosystems in the public at large. It also promotes the non-consumptive use of wilderness areas, for the benefit of local communities living around and dependent on these fragile landscapes.
- 1.4 In the absence of proper planning and regulation, there has been a mushrooming of tourist facilities in recent years around tiger reserves which has led to the exploitation, degradation, disturbance and misuse of fragile ecosystems. It has also led to misuse of the term 'ecotourism', often to the detriment of the ecosystems and towards further alienation of local people and communities.
- 1.5 These Guidelines are applicable to areas in and around tiger reserves.

### 1.6 PRINCIPLES OF TOURISM IN AND AROUND TIGER RESERVES.

The persons who implement and participate in tourism activities shall, inter alia, practice the following principles, namely:—

- (a) adopt low-impact wildlife tourism which protects ecological integrity of forest and wildlife areas, secure wildlife values of the destination and its surrounding areas;
- (b) engage with Gram Sabhas as defined in the Scheduled Tribes and Other Forest Dwellers (Recognition of Forest Rights), Act 2006 (FRA) and Panchayat (Extension to Scheduled Areas) Act, 1996 (PESA) to facilitate decision making;
- (c) ensure free participation and prior informed consent of Gram Sabhas and all other stake holders;
- (d) develop mechanisms to generate revenues from wildlife tourism for the welfare and economic up-liftment of local communities;
- (e) highlight the biodiversity richness, their values and their ecological services to people;
- (f) highlight the heritage value of India's wilderness and tiger reserves;
- (g) build environmental, cultural awareness and respect;
- (h) facilitate the sustainability of tourism enterprises and activities;
- (i) provide livelihood opportunities to local communities;
- (j) promote sustainable use of indigenous materials for tourism activities;
- (k) promote processes for forest dwellers to control and maintain their resources, culture and rights so as to minimize negative impacts.

# 2. GUIDELINES FOR DEVELOPING STATE TOURISM STRATEGY FOR TIGER RESERVES.

- → 2.1 The following paragraphs provide the broad framework for each stakeholder.
  - 2.2 Synergy and collaboration amongst the Central Government, and relevant State Government Departments, forest dwellers, local communities and civil society institutions are vital for ensuring successful implementation of the Guidelines.

#### 2.1. State Governments.

- 2.1.1. The State-level Tourism and Ecotourism Strategy for Tiger Reserves shall be in tune with these guidelines. Ecologically sensitive land use policies related to tourism shall be specified by the State Government for the landscape surrounding tiger reserves. Adequate provisions shall be made to ensure that ecotourism does not get relegated to purely high-end, exclusive tourism, leaving out local communities. Relevant modifications in State rules and regulations should be carried out in order to ensure adherence to these standards by tourism developers and operators. All States-Governments shall notify the Statelevel Tourism and Ecotourism Strategy within one year from the date of notification of these Guidelines.
- 2.1.2. The State Governments shall endeavour to develop a State-level policy to favour ecotourism in place of wildlife tourism as a comprehensive plan to ensure that the primary objective of tiger conservation is not compromised and inter alia, include:
  - (i) maintaining integrity and connectivity of tiger reserves;
  - (ii) local community rights, participation and benefit-sharing;
  - (iii) sound environmental design and sustainable use of indigenous materials:
  - (iv) conservation education and training;
  - (v) adequate machinery for monitoring and evaluation of the impact of ecotourism activities on wildlife conservation and local communities:
  - (vi) capacity building of local communities in planning, providing and managing ecotourism facilities;
  - (vii) development of appropriate land use and water management planning and regulation for maintaining the ecological integrity of landscape in and around tiger reserves.
- 2.1.3. No new tourist infrastructure shall to be set up within the core or critical tiger habitat of tiger reserves, in violation of the provisions of the Wild Life (Protection) Act, 1972, and the directives of the Honourable Supreme Court.
- 2.1.4. The State Level Steering Committee under section 38U of the Wild Life (Protection) Act, 1972 shall review the implementation of the State-level Tourism and Ecotourism Strategy in Tiger Reserves.
- 2.1.5. The State Governments shall develop a system to ensure that gate receipts

from tiger reserves are utilised by their management for specific conservation purposes and shall not to go as revenue to the State Exchequer. This will ensure that resources generated from tourism can be earmarked for protection, conservation and local livelihood development, tackling human-wild animal conflict and welfare measures of field staff.

- 2.1.6. Since the tourism industry in and around tiger reserves is sustained primarily from the non-consumptive use of wildlife resources and the local communities are the ones that bear the brunt of conservation, the State Governments may charge a conservation fee from the tourism industry for ecodevelopment and local community upliftment works. The conservation fee shall be decided on the number of beds in a facility, the duration of operation of the facility (seasonal or year round) and on a luxury classification system such as home stay (fee for which will not be charged up to a 6 bed facility), to high end (which will have the maximum quantum of the fee). The suggested fee structure may range between Rs. 500 to Rs. 3000 per room per month. The rate of conservation fee and tourist facility strata shall be determined by the State Government, and the fund thus collected shall be earmarked to address local livelihood development, human-wildlife conflict management and conservation through ecodevelopment and not go to the State Exchequer as specified in 2.1.5 above.
- 2.1.7 The fund shall be administered by the Tiger Conservation Foundations with the Tourism Industry having a say in how and where this fund is to be utilized, and mechanisms for which need to be worked out at specific tiger reserves. The fund shall be used for all the villages located within or adjacent to the tiger reserves. Every State Government shall notify the rate of local conservation fee within a year from the date of notification of these Guidelines. The rate of fee shall be revised periodically taking into consideration the cost of operation. The rationale for a local conservation fee should be clearly explained to the public at large, through clear signages at local tourist facilities. The State Government shall put in place a transparent mechanism for utilisation of these funds involving the tiger reserve management through the Tiger Conservation Foundations and Gram Sabhas.
- 2.1.8. A Local Advisory Committee (hereinafter referred to as LAC) shall be constituted for each tiger reserve by the State Government. The LAC shall have the following functions, namely:
  - to review the tourism strategy with respect to the tiger reserve and make recommendations to the State Government;
  - (b) to ensure computation of reserve specific carrying capacity and its implementation through periodic reviews;
  - (c) to ensure site specific norms on buildings, and infrastructures in areas inside and close to tiger reserves, keeping in view the corridor value and ecological aesthetics;
  - (d) to advise local self Government and State Government on issues relating to development of tourism in and around tiger reserves;
  - (e) monitor regularly (at least half yearly) all tourist facilities in and around tiger reserves vis-à-vis environmental clearance, area of coverage, ownership, type of construction, number of employees, etc., for suggesting mitigation and retrofitting measures if needed;
  - (f) monitor regularly activities of tour operators to ensure that they do

- not cause disturbance to animals while taking visitors into the tiger reserves;
- (g) to encourage tourism industry to augment employment opportunities for members of local communities.

# 2.1.9. Local Advisory Committee shall consist of:

- (a) Divisional Commissioner or an officer of equivalent rank to be nominated by the State Government Chairperson;
- (b) Member/s of the State Legislature representing the area comprising of the concerned tiger reserve
- (c) District Collector/s
- (d) Tiger Reserve Field Director (Member Secretary)
- (e) Local Territorial Divisional Forests Officers
- (f) Honorary Wildlife Warden (if present)
- (g) Official of State Tourism Department
- (h) Official of the State Tribal Department
- (i) one Block Development Officer or Sub Divisional Magistrate to be nominated by the State Government
- (j) two Members of Local Panchayats to be nominated by the State Government
- (k) one Wildlife scientist to be nominated by the State Government
- (1) one Social scientist to be nominated by the State Government
- (m) one representative of the tourism sector to be nominated by the State Government
- (n) two local conservationists to be nominated by the State Government
  - (o) two representative from a local, registered Civil Society Institution to be nominated by the State Government
  - (p) Provided that the Gram Sabhas and in case of North Eastern States, the traditional village councils shall be recognized as equivalent to Panchayat Members, wherever such councils exist.
- 2.1.10 For tourism in a tiger reserve, the Tiger Conservation Foundation shall be the overseeing authority.
- 2.1.11 Terms of reference and tenure of the Local Advisory Committees shall be determined by the State Government.

# 2.2. Tiger Reserve Management in the context of tourism.

2.2.1 The Chief Wildlife Warden of the State shall ensure that each tiger reserve prepares a tourism plan, as part of the Tiger Conservation Plan vis-à-vis the technical Guidelines of the National Tiger Conservation Authority. The plan shall inter alia, include identification of corridor connectivity and important wildlife habitats and mechanisms to secure them. This site-specific tourism plan forming part of the Tiger Conservation Plan shall be approved as per the provisions of the Wild Life (Protection) Act, 1972. Prior to this approval, no new infrastructure for tourism (except for minor alterations in existing modest home stays) shall be allowed to be developed in and around tiger reserves.

- 2.2.2 The tourism plan shall, inter alia, include a monitoring mechanism, estimated carrying capacity (a suggested model mechanism to calculate carrying capacity, is provided in Annexure-I and Annexure-II, which may be modified on a site specific basis), tourism zones and demarcation of the area open to tourism on the basis of objective and scientific criteria.
- 2.2.3. The tourism plan should be consistent with the State Tourism and Ecotourism Strategy and shall also be approved by the LAC and the State Government.

### 2.2.4 The plan shall:

- (i) identify (using landscape ecological principles and tools) and monitor the ecologically sensitive areas surrounding tiger reserves, in order to ensure the ecological integrity of corridor and buffer areas, and prevent corridor encroachment;
- (ii) assess carrying capacity of the tiger reserve, at three levels: physical, real and effective and permissible carrying capacity of visitors and vehicles as well as residential facilities in and around the tiger reserve (in accordance with Annexure-I, Annexure-II). On the lines of the illustrative calculation provided for vehicular tourist visitation, carrying capacity needs to be computed on a site specific basis for tourist visitation involving elephant, boat and foot travel. Explore the possibility of technological tools (Global Positioning System, wireless, etc.) to manage traffic and spacing of tourist vehicles within tiger reserves;
- (iii) set a ceiling level on number of visitors allowed to enter a tiger reserve at any given time, based on the carrying capacity of the habitat:
- (iv) indicate the area open to tourism in the reserves to be designated as 'eco-tourism zone';
- (v) ensure visitor entry into tiger reserves through vehicles registered with the tiger reserve management, accompanied by authorised guide;
- (vi) develop a participatory community-based tourism strategy, in collaboration with local communities, to ensure long-term localcommunity benefit-sharing, and promotion of activities run by local communities.
- (vii) develop codes and standards for privately-operated tourist facilities located in the vicinity of core or critical tiger habitats, eco-sensitive zones or buffer areas, with a view to, inter alia, ensure benefit and income to local communities;
- (viii) develop monitoring mechanisms to assess impact of tourism activities on the wildlife and its habitat so as to minimize them;
- (ix) develop generic guidelines for environmentally acceptable and culturally appropriate practices, and for all new constructions;
- (x) set up lists of Do's and Don'ts for visitors;
- (xi) provide for subsidized visits of students while fostering educational extension activities.
- 2.2.5. In the case of human animal conflicts, compensation shall be paid within the period as per Citizen's Charter, apart from immediate payment of ex gratia.

- 2.2.6. All tourism activities shall take place only in delineated 'tourism zones' indicated in the tourism plan. The vacant posts in tiger reserves shall be filled up since the staff is also required to manage some tourism in addition to their regular duties.
- 2.2.7. Tigers in India occur across varied habitats that range from high elevation mountain subtropical forests, tropical wet evergreen forests, mangrove swamps, tropical moist or dry deciduous forests and alluvial floodplain grasslands. The densities of large ungulates, the main prey of tigers, vary from 2 to over 60 animals per km<sup>2</sup> among these different habitats. Breeding tigress's are territorial, and the size of their territories adjust to prey density so as to successfully raise cubs. Male tiger territories cover the territories of two to four breeding tigress territories. Due to variation in habitat specific prey density, breeding tigress territories range from 20 to 200 km<sup>2</sup> in India. For a demographically viable population it is essential to have a core area that harbours a minimum of 20 to 25 breeding tigresses. For long-term genetic viability the minimum effective population size is believed to be about 500 individuals. Due to the variability in breeding tigress territory size and thus breeding tiger density, the core area needed can be generalized to be between 800-1200 km<sup>2</sup>. This core and surrounding buffer can then sustain a population of about 75 to 100 individual tigers to attain demographic viability. However, genetic viability is possible only through corridor connectivity within the larger landscape where dispersing individual tigers ensure genetic mixing between different source populations (tiger reserves) in a metapopulation framework. Current tourism zones where only tourist visits are permitted and there are no consumptive uses, tiger density and recruitment does not seem to be impacted. For this reason permitting up to 20% of the core/ critical tiger habitat as a tourism zone should not have an adverse effect on the tiger biology needs, which is subject to adherence to all the prescriptions made in these Guidelines.
- 2.2.7.1. There is also a need for fostering the buffer and peripheral areas for carrying out the greater part of ecotourism to benefit local communities.
- 2.2.8. Conservation of the tiger, our National animal, is the paramount objective of tiger reserves and generating public support through regulated tourism is an invaluable tool for harnessing public and community support for tiger conservation. Regulated tourism results in enhanced awareness and is of educational value especially for the younger generation. Non-consumptive regulated, low-impact tourism, could be permitted within core or critical tiger habitat without in any way compromising the sprit of core/critical tiger habitat for tiger conservation. With this importance of tourism in tiger conservation in mind, it is recommended that a maximum of 20% of the core or critical tiger habitat usage (not exceeding the present usage) for regulated, low-impact tourist visitation may be permitted. In case the current usage exceeds 20% the Local Advisory Committee may decide on a timeframe for bringing down the usage to 20%. Such area may be demarcated as tourism zone and there should be strict adherence to site specific carrying capacity. Restoration of buffer forest areas shall be done through its unified control under the respective Field Directors of tiger reserves vis-à-vis the Guidelines of the Project Tiger and the National Tiger Conservation Authority. Further, no new tourism infrastructure shall be created in the core areas. Existing residential infrastructure inside core or critical tiger habitats shall be strictly regulated to adhere to low ecological impacts as decided

by the Local Advisory Committee on a site specific basis.

- 2.2.8.1. Any core area in a tiger reserve from which relocation has been carried out, shall not be used for tourism infrastructure.
- 2.2.9. Forest dwellers who have been relocated from core or critical tiger habitat to the Buffer shall be given priority in terms of livelihood generation activities related to community-based ecotourism in the tiger reserve. Tiger reserve management shall make a special effort in this regard, besides a periodic review to ensure its compliance.
- 2.2.10. Tourism infrastructure shall conform to environment-friendly, low-impact aesthetic architecture, including solar energy, waste recycling, rainwater harvesting, natural cross-ventilation, proper sewage disposal and merging with the surrounding habitat. Violations of these norms will be appropriately dealt with by the LAC. Any violation of the guidelines will be referred to the appropriate authorities under intimation to the NTCA, for taking action in accordance to the relevant provisions of the law.
- 2.2.11. The District Revenue and tiger reserve authorities shall ensure that all tourist facilities within a zone of influence (to be identified by the LAC) in the context of core/critical tiger habitats in tiger reserves must adhere to all environmental clearances, noise pollution norms, and are non-polluting, blending in with surroundings. Severe penalties must be imposed for non-compliance.
- 2.2.12. Permanent tourist facilities located inside core or critical tiger habitat, which are being used for wildlife tourism shall be phased out on a time frame decided by the LAC. Strict plans ensuring low impact adherence by these facilities shall be developed and approved by LAC for implementation. There shall be no privately run facilities such as catering, etc., inside the core or critical tiger habitat where night stay is permitted. Such existing facilities if any, are to be run by the Tiger Conservation Foundations.
- 2.2.13. All tourism facilities located within the zone of influence (as determined by the LAC) in the context of the tiger reserve shall adhere to pollution norms (noise, solid waste, air and water, etc.), under the respective laws or rules for the time being in force. Outdoor high intensity illumination shall not be utilized as it disturbs nocturnal wild animal activities.
- 2.2.14. There shall be a complete ban on burying, burning or otherwise disposing non-biodegradable or toxic waste in and around the tiger reserve. Proper plan for disposal for degradable waste shall be developed and strictly implemented.
- 2.2.15. Management of habitat to inflate animal abundance for tourism purposes shall not be practiced within the core or critical habitat. Visitors shall keep a minimum distance of more than 20 meter from all wildlife; cordoning, luring or feeding of any wildlife shall be prohibited. Minimum distance between vehicles while spotting wildlife shall be maintained at 50 meters. Vehicles shall not monopolize a wildlife sighting for more than 15 minutes.
- 2.2.16. To avoid the number of visitors and vehicles exceeding carrying capacity,

tiger reserve managers shall establish an advance booking system to control tourist and vehicle numbers. Rules of booking shall be transparent and, violators shall be penalized.

- 2.2.17. Tiger reserve authorities shall delineate an adequate and appropriate area for the visitor facility outside the protected area.
- 2.2.18. Tourism activities in a tiger reserves shall be under the overall guidance of the respective Tiger Conservation Foundations and the LACs.

### 2.3. Tourist facilities and Tour operators.

- 2.3.1. Tourism infrastructure must conform to environment-friendly, low-impact, low height aesthetic architecture; renewable including solar energy, waste recycling, water management, natural cross-ventilation, no use of asbestos, discharge of only treated sewage, no air pollution, minimal outdoor lighting, and merging with the surrounding landscape.
- 2.3.2. The use of battery operated vehicles shall be encouraged to minimize pollution wherever terrain permits.
- 2.3.3 A 'curriculum' shall be developed for training of guides and drivers in the art, craft and ethics of wildlife tourism, resulting in certification. All guides and drivers shall compulsorily go through a short course in interpretation and rules and regulations followed by an oral examination before being certified by the Tiger Conservation Foundation. Courses may be scheduled during the nontourist season. All certified guides and drivers shall wear appropriately designed uniforms with name tags and badges. This will instil a sense of pride, discipline and accountability. Prior to every tourist season, certified guides and drivers shall go through a refresher course or workshop. These shall also build up their capacity to identify birds and provide natural history information on other species, to slowly wean them away from a tiger-centric obsession. A periodic assessment of their performance shall be reviewed by the LAC before reissuing their licences.
- 2.3.4. All tourist facilities falling within the zone of influence of a tiger reserve shall be reviewed regularly by the Local Advisory Committee vis-à-vis environmental clearance, area of coverage, ownership, type of construction, number of employees, etc., for suggesting mitigation and retrofitting measures if needed.
- 2.3.5. All tourist facilities, old and new shall aim to generate at least 50% of their total energy and fuel requirements from alternate energy sources that may include solar and biogas.
- 2.3.6. The use of wood as fuel shall be prohibited, except for campfires for which wood must be procured from State Forest Department or the Forest Development Corporation depots.
- 2.3.7. In order to allow free passage to wildlife, developments shall be sensitive to the conservation of flora and fauna, and the corridor value of the area in and around tiger reserves.

- 2.3.8. Tourist facilities and tour operators shall not cause disturbance to animals while taking visitors on nature trails.
- 2.3.9. Any violation of the guidelines shall be referred to the appropriate authorities under intimation to the National Tiger Conservation Authority, for taking action in accordance to the relevant provisions of the law.

# 2.4. Temple and Pilgrimage Boards.

- 2.4.1. Pilgrim sites located inside tiger reserves shall be in accordance with the Forest (Conservation) Act, 1980, Wild Life (Protection) Act, 1972 and the Environment (Protection) Act, 1986 to prevent any further expansion. This shall be periodically reviewed by the LAC.
- 2.4.2. All transit camps and places of stay for such pilgrimage shall be restricted to nominated days in a year. The protected area managers shall work with the temple authorities to develop a system for controlling the number of pilgrims so as to maintain the ecological integrity of the area. This mechanism shall be developed within three years of the notification of these Guidelines.
- 2.4.3. All rules relating to tourism facilities including noise, building design, use of alternate energy and free passage to wildlife shall apply to such pilgrim facilities.
- 2.4.4 Temple boards shall negotiate terms of revenue sharing with local communities and channel a minimum of 10 percent of gross revenue collected into development of local communities through the Gram Sabha.
- 2.4.5 The tourist operators, drivers and temple controlling authorities shall be given an exposure on the value of forest ecosystem and their ecological services and alongwith the do's and don'ts during visits to forests and tiger reserves.
- 2.5 These Guidelines shall be applicable to the tiger reserves notified under section 38V of the Wild Life (Protection) Act, 1972. The State Government shall lay down Guidelines on similar lines for tourism in other protected areas.
- 2.6 Contravention of any provision of these guidelines or conditions laid therein by any person or organization shall be liable of an offence under subsection (2) of 38-O of the Wild Life (Protection) Act, 1972.

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NATIO (STATUTOR

# NATIONAL TIGER CONSERVATION AUTHORITY

(STATUTORY BODY UNDER THE MINISTRY OF ENVIRONMENT & FORESTS, GOVT. OF INDIA)

Dr. RAJESH GOPAL Member Secretary )6

Bikaner House, Annexe-V, Shahjahan Road, New Delhi-110011 Tele Fax: 011-23384428 Email: dirpt-r@nic.in

Dated the 28th April, 2009

To.

The Field Director(s)
(All Tiger Reserves)

No. PS-MS(NTCA)/2009-Misces

Sub: Plying of diesel vehicles / mini-trucks / canters inside core / critical tiger habitats.

Sir,

As you are aware, the core / critical tiger habitats of tiger reserves notified under section 38V of the Wildlife (Protection) Act, 1972, are required to be kept inviolate for tiger conservation. However, tourism infrastructure is present in many core areas, and visitors are permitted in such tourism zones, and guidelines have been issued from this end for phasing out the tourism activities from such areas to the outer buffer zones. Till the desired tranquility is achieved in the core / critical tiger habitat, every care should be taken to ensure that minimum noise pollution is caused in such areas due to plying of canters / mini-trucks and other diesel vehicles transporting tourists. In this context, it is suggested that every effort should be made for promoting CNG run vehicles and vehicles using Bio-fuel, while reducing the use of diesel / other polluting vehicles. It is pertinent to add that the Hon'ble Apex Court has also strongly recommended the use of CNG vehicle in our urban landscape to reduce pollution.

Yours sincerely,

(Dr. Rajdsh Gopal)
IGF & Member Secretary (NTCA)

Copy to:

The Chief Wildlife Warden, All Tiger Range States.

OFFICE OF THE CONSERVATOR OF FORESTS AND FIELD DIRECTOR, SIMILIPAL TIGER RESERVE, BARIPADA.

Memo No. /4F-33/09, Dated.
Copy forwarded to the Divisional Forest Officers, Baripada, kairangpur and Karanjiam Divisions for information and taking necessary action.

Conservator of Forests &
Field Director,
Similipal Tiger Reserve, Baripad.

Hembram/4.05.09.

### STANDARD OPERATING PROCEDURE-I BY NTCA

No. 15-37/2012-NTCA
Government of India
Ministry of Environment and Forests
National Tiger Conservation Authority

Annexe No. 5, Bikaner House. Shahjahan Road, New Delhi-110011 Telefax: 2338 9883 E-mail: jdntca@gmail.com

Dated the 30<sup>th</sup> January, 2013

To.

- 1. The PCCF/HOFF(s), Tiger Range States.
- 2. The Chief Wildlife Warden(s) Tiger Range States.

Sir.

As you are aware, advisories have been issued by the Project Tiger / National Tiger Conservation Authority, time and again, for dealing with emergency arising due to straying of tigers in human dominated landscapes. Based on inputs from field officers experts vis-à-vis the said advisories, a Standard Operating Procedure has been developed after fine tuning to meet the present challenges.

In this context, I am directed to forward herewith a copy of the said Standard Operating Procedure (SOP) for dealing with emergency arising due to straying of tigers in human dominated landscapes, duly approved by the competent authority, for implementation.

The SOP may please be translated in vernacular and widely circulated amongst the field staff for guidance.

Yours faithfully.

Encl: As above

(S.P. Yadav Deputy Inspector General (NTCA)

Copy for information to:

# STANDARD OPERATING PROCEDURE TO DEAL WITH **EMERGENCY ARISING DUE TO STRAYING OF TIGERS** IN HUMAN DOMINATED LANDSCAPES



# MINISTRY OF ENVIRONMENT AND FORESTS **GOVERNMENT OF INDIA** NATIONAL TIGER CONSERVATION AUTHORITY

# STANDARD OPERATING PROCEDURE TO DEAL WITH EMERGENCY ARISING DUE TO STRAYING OF TIGERS IN HUMAN DOMINATED LANDSCAPES

- 1. **Title:** Standard Operating Procedure to deal with emergency arising due to straying of tigers in human dominated landscapes
- 2. **Subject:** Dealing with emergency arising due to straying of tigers in human dominated landscapes
- 3. **Reference:** Advisories of National Tiger Conservation Authority /Project Tiger on the subject
- 4. **Purpose:** To ensure that straying tigers are handled in the most appropriate manner to avoid casualty / injury to human beings, tiger, cattle and property.
- 5. **Short summary:** This Standard Operating Procedure (SOP) provides the basic, minimum steps which are required to be taken at the field level (tiger reserve or elsewhere) for dealing with incidents of tiger straying in human dominated landscapes.
- 6. **Scope:** The SOP applies to all forest field formations including tiger reserves besides other areas where such incidents occur.
- Responsibilities: The Field Director would be responsible in the case of a tiger reserve / fringe areas. For a protected area (National Park / Wildlife Sanctuary), the concerned protected area manager would be responsible. In the case of other areas (revenue land/conservation reserve/community reserve/village/township) the Wildlife Warden, as per the Wildlife (Protection) Act, 1972, or Divisional Forest Officer/Deputy Conservator of Forests (under whose jurisdiction the area falls), would be responsible. The overall responsibility at the State level would rest with the Chief Wildlife Warden of the concerned State.

# 8. Suggested field actions to deal with strayed wild carnivores (tiger / leopard)

- (a) At the outset, constitute a Committee immediately for technical guidance and monitoring on day to day basis, as under:
  - i. A nominee of the Chief Wildlife Warden
  - ii. A nominee of the National Tiger Conservation Authority
  - iii. A veterinarian
  - iv. Local NGO representative
  - v. A representative of the local Panchayat
  - vi. Field Director/ Protected Area Manager/ DFO I/C -Chairman
- (b) Since it may not be always possible for experts from the Wildlife Institute of India to provide assistance, it is advised that some outside experts may be involved in the ongoing monitoring.
- (c) Establish identity of the tiger by comparing camera trap photographs with National Repository of Camera Trap Photographs of Tigers (NRCTPT) / Reserve level photo database and find out the source area of the animal.
- (d) Collect recent cattle / livestock depredation or human injury / fatal encounter data, if any, in the area. If it is an area historically prone to such incidences, detailed research work has to be carried out in order to assess the reasons for the frequent tiger emergencies in the area.
- (e) In case of confirmed livestock depredation / human injury / fatal encounters or frequent straying of tiger near human settlements, set traps (automatic closure) with appropriate luring while avoiding disturbance, to trap the animal.

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- (f) Set up camera traps near kill site to confirm / establish the ID of the animal.
- (g) Ensure unobtrusive guarding of the kill to allow feeding of the carcass (if not close to a human settlement) besides safeguarding from poisoning (for revenge killing).
- (h) Create 'pressure impression pads (PIPs)' in the area to ascertain the daily movement of the animal, while plotting the same on a map (4"=1 mile scale or 1:50,000 scale).
- (i) Proactively involve District Collector / DM and SSP / SP of the area to maintain law and order in the area, besides avoiding crowding by local mobs. Acquaint them with human-tiger conflict issues and guidelines of the NTCA to deal with the situation.
- (j) In all instances of wild carnivores like tiger / leopard straying into a human dominated landscape, the district authorities need to ensure law and order by imposing section 144 of the Cr.Pc. This is essential to avoid agitation / excited local people surrounding the animal spot which hampers capture operation, leading to serious injuries on people and staff. It is also necessary that police and local administration be involved at an early stage. Effective coordination with them is critical to control mobs which as has been seen in several instances, worsen the situation and lead to avoidable fatalities/ tragedies.
- (k) Take help of the district level officials to alert the villages in the vicinity of the area having the spatial presence of the tiger.
- (l) If successive trapping efforts fail, chemical immobilization of the wild carnivore should be done by an expert team having a veterinarian, as per the protocol at **Annexure-I**.

- (m) In case, the tranquilised tiger is found to be healthy in prime or young age without any incapacitation (loss of canine, injury, broken paw etc.), as confirmed / certified by the Committee as constituted at para (1), then it may be released after radio collaring in a suitable habitat with adequate prey base, away from the territory of a resident male tiger (if any) or human settlements, under intimation to the National Tiger Conservation Authority. (Under no circumstances an injured / incapacitated tiger should be released back, and the same needs to be sent to a recognized zoo).
- (n) Under no circumstances, a tiger should be eliminated by invoking the Wildlife (Protection) Act, 1972, if it is not habituated for causing human death. The guidelines for dealing with 'man-eaters' are annexed for compliance / guidance in this regard (Annexure-II).
- (o) In case of a healthy tiger/encumbered tigress occupying a sugar cane field or similar habitat, attempt should be made first to attract it to nearby forest area, while avoiding disturbance. If such operations fail, the animal should be captured through immobilization for release in low density area of a nearby tiger reserve/protected area after radio collaring.
- (p) An authorized spokesperson of the Forest Department, should periodically update the media (if required) to prevent dissemination of distorted information relating to the operation / incidents. Sensalization or distorted information can lead to further damage.
- (q) In case monitoring using camera traps (Phase-IV) is ongoing in the area, the minimum tiger numbers based on individual tiger captures, should not be given undue publicity without due cross checking with the National Tiger Conservation Authority.

- (r) The Chief Wildlife Warden has to take the final decision on whether a tiger has to be released back in the wild or transferred to a zoo.
- (s) It is important to have properly designed suitable cages and transport mechanism which cause least stress to the captured carnivore.
- 9. **Preventive / Proactive Measures** to be followed in tiger straying incidents / areas prone are at **Annexure-III.**
- 10. Guidelines for prioritizing areas for tiger monitoring are at **Annexure-IV.**

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# Annexure 1

# PROTOCOL ON IMMOBILIZATION AND RESTRAINT OF TIGERS

# PROTOCOL ON IMMOBILIZATION AND RESTRAINT OF TIGERS

# **General Consideration**

**Behavior:** Tigers in conflict or those strayed into human habitation differ considerably in behavior as compared to those in native/ natural habitats. The animals may be stressed, shy, elusive, secretive and even unpredictable thereby posing challenge in capture. These animals may even pose safety threats for human involved in capture as well as to general public. **Utmost care needs to be taken to ensure safety of humans when attempts for capture are made**.

Capture options: Tigers, can be captured employing physical and chemical restraint methods or combination of both. The physiological and emotional status of the animal; length of the procedure; the environmental conditions; terrain/ escape cover; equipment availability; drug appropriateness and availability and most importantly the safety of the operator/team needs to be considered prior to making a choice of procedure. Both the procedures have their benefits and limitations however the present guidelines would focus primarily on the chemical restraint procedures.

# Chemical Restraint

Chemical immobilization has become an important tool in wildlife management over the last few decades. Advancement and development in this field has resulted in use of newer and safer drugs for immobilization. and efficient and reliable systems of drug delivery. Chemical Immobilization involves use of drugs to restrict animal's movement by inducing a state of insensibility and preventing deliberate and coherent mobility. The technique is well suited for tigers in conflict as it allows capture of select individual, enables selection of time of capture and causes minimal stress to the animal. Chemical restraint drugs alter certain CNS functions without compromising the vital functions and produce a state of anaesthesia which immobilizes the animal to the extent that provides considerable safety both for human and animal.

# Immobilization Equipment

Due to difficulty of directly approaching and handling wild animals, it is necessary to have safe and effective methods by which drugs can be administered. Projected darts have proved to be effective and safe option

for delivering drugs to wild animals. The dart is projected through an equipment and discharges the medicaments intramuscularly upon impact. The darts are available in different sizes, however are specific to the type of equipment used to propel them. Different power projection systems have been used for projecting the darts however for tigers; the system that employs compressed gas/CO<sub>2</sub> to propel the dark should be selected. Light weight plastic darts of 3-5 ml. capacity should be used for remote injection using air powered/CO2 tele-injection projector. Needle length is critical factor while darting tigers. The outside diameter of the needle should be 1.5- 2.0 mm and length of 38- 40 mm.

# Immobilization Drugs

Though there are varieties of drugs that have been used for capturing tigers, a combination of alpha-2 adrenergic agonists (sedatives) and dissociatives have proved to be effective for immobilizing tigers.

Alpha-2 adrenergic agonists/ Sedatives: These drugs are CNS depressants with good sedative, muscle relaxant, and analgesic properties. These drugs need to be used with caution in animals as they produce initial hypertension followed by severe hypotension, bradycardia, hyperglycemia and glucosuria, disrupts thermoregulation and may lead to regurgitation/ vomiting in carnivores. These drugs however have the advantage of being non-controlled, inexpensive and reversible. The drugs have been extensively used in felids in combination with dissociatives. A mixture of *Xylazine* and *Ketamine* in a proportion of 1.25 :1 known as Hellabrunn mixture has been effectively used in tigers and other carnivores.

Another new Alpha-2 agonists Medetomidine in combination with ketamine has proved to be effective and specific sedative in large carnivores as it induces rapid drug induction and has specific antidote for reversal.

These Alpha-2 adrenergic agonists can be negated by antidote.

Examples: Xylazine, Detomidine, Medetomidine.

Antidotes include Yahimbine hydrochloride, Atipamezole hydrochloride, Tolazoline hydrochloride.

### Dissociatives

These include the psychotomimetic drugs that are cyclohexamine derivatives. The drugs act by separating the conscious mind from sensory and motor or control mechanism in the brain (dissociative) producing, rapid analgesia and a trance-like state (psychosis) which may be as a

result of over stimulation of the CNS. The animal appears unaware of human presence. They have the advantage of being rapidly absorbed following IM, IV administration, have good safety margin and cause little depression of the respiratory and circulatory system. Pronounced muscle rigidity, hyperthermia, hyper salivation, convulsion and rough recovery are common side effects. These effects can be considerably reduced by combining these drugs with a tranquilizer or sedatives. Their effect cannot be reversed and the animal has to be monitored for long till complete recovery takes place. These drugs lack specific antidote.

Examples: Phencyclidine, Ketamine hydrochloride, Tiletamine Hydrochloride

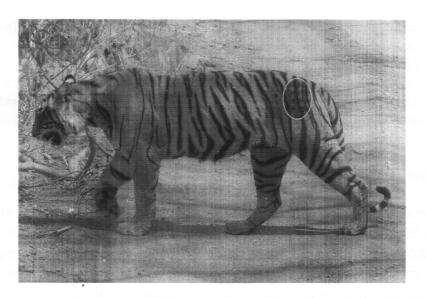
The choice of drug for immobilization may include the Hellabrunn mixture (HBM) (Xylazine –Ketamine mixture in ratio of 1.25:1) in appropriate doses. The dosage can be decided on the spot, taking into consideration the animal's health and condition, level of excitement, physiological status, sex, time of the day, and ambient temperature besides other habitat parameters. Medetomidine in combination with ketamine has proved to be effective for capturing tigers in conflict as it provides short and rapid induction thereby ensuring minimal movement of animal following darting.

# Recommended drug/ dosages for immobilization of adult tiger

Sr. No.	Drug(s) for immobilization	Male	Female	Rreversal drugs (antidote)
1.	Hellabrunn mixture (HBM) [Xylazine (XYL)	<b>3.0 ml</b> (375 mg XYL & 300mg KET) <b>to3.5</b>	<b>2.5 ml</b> (312.5 mg XYL & 250 mg KET)	Yohimbine hydrochloride (0.125
~^.^	and Ketamine (KET)] mixture in a ratio of 1.25:1	ml -(437.5 mg XYL & 350 mg KET)	to 3.0 ml (375 mg XYL & 300mg KET)	mgkg-1 body weight)
2	Medetomidine (MED) and Ketamine (KET)	mgkg-1 body weight KI	<b>∃</b>	- 25-35 mg of - Atipamezole hydrochloride

# Approach to the Target Animal

A four wheel field vehicle or trained captive elephants may be used to approach the animal taking due care of human safety and an overriding degree of patience. In a terrain where the vehicle cannot be used possibility of darting the animal from a *machan* (raised platforms) may also be considered. Tigers in conflict provide limited opportunities for darting and therefore require adequate experience by personnel in effective darting as well as knowledge of anatomical peculiarities. Hindquarters should be preferred for tele injection however depending on the opportunities; other suitable areas can also be explored.



Preferred darting site in a large carnivore

# **Induction Phase**

The time interval between injection (darting) and the point when the animal is rendered immobile is induction period. The total time for the completion of induction may vary from 10-15 minutes. A close observation should be kept by the team for any movement of the animal however the team should ensure minimal disturbance during induction.

# Handling and Care of the Immobilized Animal

The animal should be approached quietly and following steps should be followed:

- Removal of dart
- Blindfolding to protect the cornea from direct sunlight, dust and injury.
- Ensuring proper animal positioning (sternal or lateral recumbancy) to maintain patent airways and ensure normal breathing and circulation.
- Assessing the status of animal, the degree of muscle relaxation and the rate and depth of respiration. Assessment of anesthesia should be done using following methods:

- Monitor tissue perfusion: Anesthetic drugs frequently depress the contractile force of the heart and vasodilatation results in decreased tissue perfusion. Evaluation of tissue perfusion should be done by observation, auscultation, palpation and capillary refill time.
- Monitor gas exchange: Respiratory rates are highly variable during anesthesia.
- Quality of respiration should be evaluated by observing animal's chest movement.
- Monitor level of CNS depression by assessing the muscle tone-jaw tone and eye reflexes.
- Monitor vital signs such as respiration, heart rate and body temperature.
- Examine animal for any wound or injuries (including status of canines and claws).
- Estimate animal body weight and if possible take bodily measurements.

# Shifting of the Animal to Stretcher

The animal should be shifted to a stretcher and placed in lateral or sternal recumbancy. Animal should then be shifted to a transport container.

# **Reversal of Anesthesia**

Specific Alfa-2 antagonists (Yohimbine HCI, Atipamezole HCI) should be used to reverse the anesthesia.

# **Supplemental Information**

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- a. Preparedness: All equipment for crating the animal, radio collars and accessories, emergency medicaments, biological sampling accessories, transport containers and any other essentials should be in place before the animal is darted.
- b. Data recording: A complete immobilization record, particularly including each drug given, amount given, time of administration and physiological parameters should be maintained during the procedure. These details should be recorded in the datasheet in the format provided. It would be appropriate to ensure human safety considerations to meet any eventuality at all the time.
- c. Assessing depth of anaesthesia: It should take about 15 minutes for the drug induction to happen. Prior to approaching the animal, the depth of anaesthesia should be assessed by either tapping on the tail or ears with the help of long pole and if the animal does not react, it should be approached. The depth of anaesthesia should be optimum if the jaws can be opened and the

tongue exteriorized with little or no resistance. Other indicators would include responses to stimulation of body, feet, cornea, ears and tongue. The physiological parameters should be assessed and should include assessment of temperature, respiration, pulse and color of mucous membrane including condition of pharynx, gingiva and teeth. In case of emergency (depressed respiration or cardiac arrhythmias or depression) the animal should be revived. Emergency drug including cardiac and respiratory stimulants should be kept handy at all times. The physiological parameters should be assessed and should include assessment of temperature, respiration, pulse and color of mucous membrane including condition of pharynx, gingiva and teeth.

- d. Managing emergencies: Emergency drugs and equipment would be available during the entire operation. Adequate supplies of emergency drugs should be ensured at all times.
- e. Composition of team: Capturing large felids poses a challenge and therefore requires a skilled team comprising wildlife managers, biologists, trained veterinarians and most preferably an individual specializing in animal anaesthesia.

# Data Sheet for Recording and Monitoring Immobilized Animal

Area Details				
Date				
Location	SPS Lat	Lon	g	
Collar Frequency				
Purpose of capture				
Ambient temperature	Day (d	cloudy, bright)		
Animal Details				
Species	Physic	cal condition		
Emotional state before drugging	Sex	, year		
Approximate age	Weigh	nt (kg)		
Breeding status				
Body Measurements			~	
Nose tip to Tip of tail	Nose	tip to base of tail		
Nose tip to base of skull (Occipital)		ngth		
Height (Shoulder blade to heel)	 Hind I	imb length		
Left fore limb or Hind limb paw dimension L	ength	Width		
Neck girth	Lengt	n of Canines		
in the second se	. 140			
Immobilization Details		*** 1 10 11		
Name of Immobilizing Drug(s)	Time of Injection	Drug dose given	Route	Site
1. , i				
2.		1		
3.	**			
4.				

200	g, walking, standing, excited)					
Inducti Animal	on time when animal goes dow Monitoring	n/ approached		••••		
Time	Signs shown following immobilization	Sha	Respiration Shallow/ deep/ irregular & rate		Temperature (°F)	
		-	22	-		
					_	
			0	<u></u>		
Drug reversal Name of reversal Drug(s)		Time of	Drug do	Drug dose &		Site
1.		Injection	volume	volume given		
n					1	1
۷.		2 2 2 2				
2. Time wh	nen animal shows first sign of re					
Γime wh	nen animal shows first sign of re about recovery event till animal	covery				
Time wh	about recovery event till animal	coveryregains conscio	usness /show	s signs	of recove	
Time who be tails a	about recovery event till animal	coveryregains conscio	usness /show	s signs	of recove	
Time who details a second and the se	er comments  mental drugs	coveryregains conscio	usness /show	s signs	of recove	
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Time who Details a Community of the Comm	er comments  mental drugs of other supportive	regains conscio	usness /show	s signs	of recove	 

Biological sampling

Preservative used	Examination required	Handed over to	Remarks

# GUIDELINES FOR DECLARATION OF BIG CATS AS 'MAN-EATERS'

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- ➤ Both tiger as well as leopard are known to cause habituated loss of human life (man-eaters). Such confirmed 'man-eaters' should be eliminated as per the statutory provisions provided in section 11 of the Wildlife (Protection) Act, 1972.
- ➤ Tiger as well as leopard are categorized under Schedule I of the Wildlife (Protection) Act, 1972, with highest statutory protection against hunting under section 9 (1) of the said Act. Hence, such species can be killed if they become dangerous to human life or are so disabled / diseased beyond recovery.
- ➤ Under section 11 (1) (a) of the Wildlife (Protection) Act, 1972, the Chief Wildlife Warden of a State alone has the authority to permit hunting of such animals becoming dangerous to human life or disabled or diseased beyond recovery. However, as per the statutory requirement, the Chief Wildlife Warden of the State has to state in writing the reasons for permitting elimination before hunting.
- There are several reasons for a big wild cat like tiger or a leopard to get habituated as a 'man-eater', viz. disability due to old age, incapacitation due to serious injury or loss / breakage of its canines etc. However, there may be several exceptions, and hence specific reasons have to be ascertained on a case to case basis.
- ➤ The tiger bearing forests and areas nearby prone to livestock depredation, besides having human settlements alongwith their rights and concessions in such areas, are generally prone to 'maneaters'. Besides, loss of habitat connectivity in close proximity to a tiger source area owing to various land uses also foster straying of tiger near human settlements, eventually ending up as a 'man-eater'.

# Suggested steps on loss of human life due to tiger / leopard

- > Constitute a team for technical guidance and monitoring on day to day basis, as below:
  - A nominee of the Chief Wildlife Warden
  - A nominee of the National Tiger Conservation Authority
  - A veterinarian
  - Local NGO representative
  - A representative of the local Panchayat
  - Field Director/Protected Area Manager/DFO I/C Chairman
- > Set up camera traps near kill sites, besides creating pug impression pads to monitor the day to day spatial movement of the wild carnivore.
- > Inform the district officials (Collector / DM / SP) for duly alerting the local people to refrain temporally from the area where human death(s) has / have been reported, besides ensuring tranquility in the area from mobs / crowds of local people.
- > Obtain / establish the ID of the aberrant animal causing loss of human life, through the committee constituted for the purpose, through camera trappings or direct sightings or pug impressions if camera trappings could not be done, besides collecting pieces of hair / scats of the carnivore (if available) for DNA profiling.
- A differentiation should be made between 'human kill' due to chance encounters and 'habituated man-eaters'. As most of our forests outside protected areas are right burdened, the probability of chance encounters is very high. Further, tigers often use agriculture / sugar cane field and similar cover along river courses while feeding on livestock or blue bull, which may also cause lethal encounters with human beings. Such animals should not be declared as 'man-eaters'. However, confirmed habituated tiger / leopard which 'stalk' human beings and feed on the dead body are likely to be 'man-eaters'.
- > The declaration of an aberrant tiger / leopard as a man-eater requires considerable examination based on field evidences. At

times, the human beings killed due to chance of encounters may also be eaten by the animal (especially an encumbered tigress in low prey base area). However, such happenings are not sufficient for classifying a tiger / leopard as a 'man-eater', which can best be established only after confirming the habituation of the aberrant animal for deliberate stalking of human beings, while avoiding its natural prey.

- ➤ Under no circumstances, mere an animal resorting to cattle depredation should be declared as a 'man-eater', despite the fact it may venture close to human settlements. To avoid untoward incidents in such situations, the efforts to trap the animal (chemical immobilization / use of traps) should alone be resorted to.
- > Set up trap cages (automatic closure) in areas most frequented by the carnivore (with appropriate luring) for trapping.
- ➤ In case successive trapping operation fails set up an expert team for chemical immobilization of the aberrant animal as per the annexed protocol.
- ➤ The option of capturing the aberrant animal either through traps or chemical immobilization should be invariably resorted to as the first option. The wild carnivore thus captured, should be sent to a nearest recognized zoo and NOT released in the wild.
- ➤ Elimination of a tiger / leopard as a 'man-eater' should be the last option, after exhausting the option of capturing the animal live as detailed in the SOP.
- ➤ The Chief Wildlife Warden of the State after the above due diligence should record in writing the reasons for declaring the tiger / leopard as a 'man-eater'.
- After 'declaring' the man-eater, its elimination should be done by a Departmental personnel having the desired proficiency, while providing the fire arm with the appropriate bore size (not below .375 magnum). In case, such expertise is not available within the Department, an expert may be co-opted from the other State Governments or outside with due authorization.
- No award / reward should be announced for destruction of 'maneaters'.

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# DETAILED INSTRUCTIONS FOR THE PROCEDURE TO BE FOLLOWED IN TIGER STRAYING INCIDENTS / AREAS PRONE FOR SUCH INCIDENTS : PREVENTIVE / PROACTIVE MEASURES

- (a) Identify the crisis spots / districts in the State.
- (b) Conduct science based research and analysis to arrive at reasons for frequent straying of tigers in such areas.
- (c) Prepare a google map indicating forest patches, territory of the tigers, nearby habitation and corridors.
- (d) Form monitoring teams consisting of locals with wireless communication on 24X7 basis besides rapid response team.
- (e) Establish an early warning system.
- (f) Issue alert to all nearby villages to take utmost caution.
- (g) Monitor the cattle kill and immediately pay ex-gratia / compensation in the case of eventuality.
- (h) Use electronic surveillance to monitor the movement of the tigers during the night.
- (i) Water holes, cattle kill, transmission lines should be regularly monitored.
- (j) Put in place Rapid Response Team (RRT) for capturing the animal to avoid lethal encounter. The RRT to be equipped with the following:-
  - (i) A field van/mini-truck with built in rails for accommodating a trap cage, with space for equipments, attendants and staff.
  - (ii) A tranquilization kit with drugs for chemical immobilization.
  - (iii) Taser gun for instant immobilization of the animal.
  - (iv) 2 mobile phones for continued communication with the authorities.
  - (v) 4 wireless handsets.
  - (vi) 2 GPS sets.
  - (vii) 1 long ranging night vision for seeing objects in the dark.

- (viii) A digital camera.
- (ix) 4 trap cages (2 for tiger and 2 for leopard).
- (x) 1 mini-tractor for transporting the cage in rugged terrain.
- (xi) 2 search lights.
- (xii) 2 radio collars with receiver and antenna.
- (xiii) 2 portable tents.
- (xiv) Portable hides which can be set up fast, to be used for persons with tranquilizers
- (xv) 2 folding chairs with table.
- (xvi) Hand held audio system.
- (xvii)Rope and net.
- (xviii) First aid kits
- (k) The rapid rescue team is required to ensure unobtrusive close monitoring of the animal with least disturbance, for tracking its movement.
- (l) In addition, at places which are not waterlogged, camera traps should be set up (fixed to a post or a tree) for establishing the identity of the animal.
- (m) The rapid rescue team also requires due capacity building and 'hands on' field training involving the Wildlife Institute of India and other relevant outside experts, if needed.

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# PRIORITISING AREAS FOR TIGER MONITORING

The tiger source areas and its surrounding forests have the maximum tigers, besides some protected areas and forest patches. The districts/forest divisions having spatial occupancy of tiger as indicated in the maps need ongoing monitoring on a daily basis. In this context, the following actions are indicated:

- (a) Monitoring the tiger source areas using camera traps to generate photo ID for creating a photo database (Phase-IV monitoring)
- (b) Implementing Phase-IV monitoring in areas having tiger occupancy as indicated in the map
- (c) Periodic comparison / review of camera trap tiger photos to fix ID of tigers reported in several areas near a source site
- (d) Complementing the camera trap monitoring with simple foot patrolling in the peripheral areas, while maintaining day-to-day record as per Phase-IV monitoring protocol
  - (e) Monitoring livestock depredation by tiger and ready payment of compensation
  - (f) Keeping track of sudden change in land use in areas having tiger presence
  - (g) Avoiding blockage of traditional tiger / wildlife corridors in areas outside the tiger reserves falling in various forest divisions
  - (h) Monitoring sudden change in cover values in tiger areas (change in cropping pattern etc.)
  - (i) Monitoring tiger movement along river courses
  - (j) Keeping track of insecticides sale outlets and their use in tiger bearing areas (to avoid poisoning of water)
  - (k) Networking through local workforce for gathering information relating to wandering gangs traditionally involved in poaching of wild animals

(l) Keeping track of local market days

(m) Fostering creation / maintenance of wildlife monitoring register at the Gram Sabha level in areas outside tiger reserves, with incentives for informing tiger presence

(n) Creation / maintenance of 'wildlife / tiger offence register at the Gram Sabha level with reward system for assisting in

crime detection

(o) Deploying special monitoring teams around highways. open wells, railway tracks, electrical transmission lines, village ponds, natural water holes, irrigation canals

(p) Insulating high tension electrical transmission poles in tiger bearing areas, besides covering open wells and

irrigation canals

(q) Keeping track of encumbered tigresses in tiger bearing areas for monitoring the dispersing young ones

(r) Periodic checking of samples from water points/perennial water sources for lethal contamination

(s) Alerting local people in right burdened, tiger bearing areas

to prevent lethal encounters

- (t) Periodic disease monitoring of village cattle in the tiger bearing areas to avoid disease transmission to natural prey base for tiger
- (u) Monitoring natural salt licks to prevent poisoning / poaching in tiger bearing areas

(v) Keeping track of local ironsmiths engaged in preparation of

'gin traps', snares etc.

- (w) Creation of wildlife crime dossier and exchange of such information with field units in tiger bearing areas under intimation to the NTCA
- (x) Fortnightly monitoring of tiger mortality and progress of tiger offence cases ongoing in the courts of law by the Chief Wildlife Warden
- (y) Monthly monitoring of tiger mortality and progress of tiger offence cases ongoing in the courts of law by the PCCF/HOFF

(z) Use sniffer dogs for detection of body parts, escape routes and other leads

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# STANDARD OPERATING PROCEDURE-II BY NTCA

# STANDARD OPERATING PROCEDURE FOR DEALING WITH TIGER DEATH



MINISTRY OF ENVIRONMENT AND FORESTS **GOVERNMENT OF INDIA** NATIONAL TIGER CONSERVATION AUTHORITY

#### STANDARD OPERATING PROCEDURE FOR DEALING WITH TIGER DEATH

1. Title: Standard Operating Procedure for dealing with tiger death

2. Subject: Tiger death/seizure of body parts

3. Reference: Advisories of NTCA/Project Tiger on the subject

- 4. **Purpose:** To ensure that the causative factors for tiger death are ascertained and taken to logical conclusion in the interest of tiger conservation.
- 5. Short summary: This Standard Operating Procedure (SOP) provides the basic, minimum steps which are required to be taken at the field level (tiger reserve or elsewhere) for dealing with incidents of tiger mortality where the carcass is available or the body parts have been seized.
- 6. Scope: The SOP applies to all forest field formations including tiger reserves besides other areas where the incident has occurred.
- 7. Responsibilities: The Field Director would be responsible in the case of a tiger reserve. For a protected area (National Park / Wildlife Sanctuary), the concerned protected area manager would be responsible. In the case of other areas (revenue land/conservation reserve/community reserve/village/township) the Wildlife Warden, as per the Wildlife (Protection) Act, 1972, or Divisional Forest Officer/ Deputy Conservator of Forests (under whose jurisdiction the area falls), would be responsible. The overall responsibility at the State level would rest with the Chief Wildlife Warden of the concerned State.
- 8. Detailed instructions for the procedure to be followed in tiger death / seizure of body part / incident reported but no body part / carcass available but for corroborative field evidences
- (i) At Scene of crime (SoC) / incident (responsibility: Range Officer, Assistant Director / Assistant Conservator of Forests, Deputy Director / Divisional Forest Officer)
  - > Reach the spot at the earliest, while informing the Field Director/Conservator/Chief Conservator of Forests having jurisdiction
  - > Call for Investigation Team to the spot immediately. It should be mandatory for the Investigation Team to visit the SoC with Investigation Kit.
  - > Cordon off the area with the help of rope/tape so that evidences are not disturbed
  - > Take photographs of undisturbed site/video record from different angles for comparison with camera trap recordings (if done in the area). Photographs and video should have both close ups and from distance shots. Tapes may be placed to show distances of various physical objects found at SoC. Circumstantial observation at SoC should be minutely recorded.
  - Do not manipulate evidences
  - Divide the whole area into grids/circles for investigation and collection of evidences
  - > Note down all finer details, date, time, GPS location, weather etc. Each step and action in the investigation process should be properly documented. It is highly recommended that

- Investigating Officers (IOs) should adopt the practice of writing daily case diaries as prescribed under Section 172 CrPC and submit it to next supervisory officer on daily basis.
- Requisite seizure/arrest memo should be prepared on the spot.
- Wherever possible, two independent witnesses should be associated in search, seizures and arrests.
- Survey the entire area. In case of suspected infighting of animals, look for trails of other injured animals also.
- At least an area of about 500 meters encircling the Scene of Crime (SoC) may be searched thoroughly for evidence. In many cases it is seen that the animal moves some distance after it is hit by the bullet or it consumed poison. It is also common that the poachers remove the carcass to a nearby place for the sake of convenience in de skinning the animal.
- Rivers, lakes or other water bodies near by the SoC may also be inspected for collection of evidence as the poachers wash their body or the tools/weapons used in de-skinning the animal in the nearby rivers or water bodies. In some cases it is also noticed that the poachers enter the Tiger Reserve walking along the river banks.
- Record foot prints of animals/human/tyre marks of vehicles if any by using plaster of Paris.
- Search & collect all possible evidences carefully in original conditions, while preserving (if needed)
- Search for evidences at ground level, eye level and above eye level (eg. hideout/machan/bullet marks on trees/freshly cut branches/traces of kindled fire on the floor/burnt matchsticks etc.). Samples to be collected from the spot may include: blood, body-fluids, tissues, hair/fur/teeth/bone pieces etc., gun powder, cloth fibre, paint chips, soil, cartridge case, bullets, foot prints, tyre marks, gutka wrapper, match sticks, food items, water sample from waterhole etc.
- > Tools recovered from the spot should be appropriately secured for finger prints, stains etc.
- At times clothes worn by the accused are to be seized for analysis of blood stains, fluids etc. Nail cuttings may be taken if skinning is suspected.
- ➤ Use transparent polythene bags for collecting these samples. The different articles should not be put in one bag. Each article needs to be put in one bag, separately.
- Specimen seal to be sent to the expert, Court and the third copy to be put in official file for records.
- Properly label and seal the samples collected. Assign each sample with exhibit number and brief description. Search the leads/trails/routes of escape/exit. Use sniffer dogs for leads (if available).
- Record external evidence from carcass: wounds, bullet injury/marks, symptoms of poisoning etc., apart from body measurement (if possible). Injuries on the carcass should be properly measured and described / explained.
- > Go for Post Mortem (PM) if team available or otherwise keep the carcass in deep fridge. The PM has to be conducted during the day light.
- While doing PM collect sample of visceral content and tissue. Send visceral sample for forensic analysis to a reputed laboratory; send the tissue sample to the Wildlife Institute of India (WII) or a recognized institute within the country having domain expertise for DNA profiling and histo-pathological tests.
- ➤ Finalize the PM report, and send the same to the Chief Wildlife Warden (CWLW) under intimation to the National Tiger Conservation Authority (NTCA). In case the PM report is under process, send a preliminary report to the Authority indicated immediately
- Dispose of the body as per rules in the presence of the competent authority In case of seizures of body parts, the same may be required as evidence for prosecution in the courts of law and

- hence in such situations do not dispose the same till the orders of the concerned court for disposal of the same are received.
- > Issue a departmental preliminary offence report (POR)/FIR etc.
- Prepare a seizure memo and arrest memo with signature of accused (if present), witnesses etc. alongwith a site map, and a species identification certificate issued by a forest officer, not below the rank of an Assistant Conservator of Forests who would certify that he has identified the species on the basis of his training and experience in identifying the species in the field

#### (ii) If suspect(s) is arrested:

- Collect name, address, biometric details, photographs, height, weight etc. of suspect(s). During the search/ arrest/ interrogation, special care should be taken to seize/ get details of telephone nos. especially mobile phones, diaries including numbers scribbled on a piece of paper etc. These are crucial in tracing linkages. Persons arrested must be informed of the full particulars of the offence committed and the grounds for arrest. (Sec. 50 Cr. P.C. & Art 22 (1) Constitution of India)
- > Prepare an arrest memo with ground/basis for arrest, citing reasons/basis for arrest
- Record statements of suspects(s) and/or witness(s) alongwith signatures under Section 50(8) of WPA. Ideally the statement should be recorded by ACF and above authorized by the State Govt. in this behalf (which is the requirement of WPA)
- > The nominated person by the accused needs to be informed about the arrest and place where the accused has been lodged as per Section 50A of Cr. P.C and Supreme Court's order in Joginder Singh's case intimate
- Get conducted medical examination of arrested suspect(s) and produce before the Magistrate having jurisdiction within 24 hrs. or where forward and backward linkages are to be discovered move an application for remand. Always contact your Public Prosecutor in the local Court before hand in case you are trying to move such application so that the staff succeeds in getting the remand.
- In the case of a female offender, the medical examination has to be conducted only by a female registered medical practitioner.
- > Take proper care of health and safety of accused during which he is in your remand. If the accused falls ill in depts, custody, he must be given medical aid or treatment admitted for in a hospital
- Based on interrogations and leads, thoroughly investigate the matter, establish backward and forward links, arrest other links involved based on statement given by the accused and information given by accused.
- > The arrested person has a right to consult and be defended by a legal practitioner of his choice (Article 22 (1) of the Constitution of India).
- > If the arrested person is poor, he can get free Legal Assistance from the Legal Services Authority (Art 39 A Constitution of India).
- Arrest should not be made on mere suspicion (145 Cr. P.C).
- > The arrested person is entitled for compensation for groundless arrest / illegal detention.
- > Though the statement given by the accused under Psycho analysis test has little evidentiary value but in case of hardened criminals who don't cooperate in investigation, such tests may be recommended.
- > Prepare a final report, Complaint as per Section 55 of WPA and file in the court of law

- Submit a final report with conclusion regarding cause of death to the Chief Wildlife Warden under intimation to the National Tiger Conservation Authority through the Field Director/Wildlife Warden/Conservator/Chief Conservator of Forests having jurisdiction
- A format of 'Arrest cum Personal Search Memo' is at Annexure 1.

## (iii) Actions required at the Office of Field Director/Wildlife Warden/Conservator/Chief Conservator of Forests having jurisdiction/Control Room

- ➤ Send a preliminary intimation to NTCA, Chief Wildlife Warden and Regional Deputy Director (RDD) of WCCB about the incident (SMS/ e-mail/telephonic call/fax etc.) immediately
- Constitute a Post Mortem team as per the NTCA protocol
- > Send an investigation team/issue office order appointing the Investigating Officer (IO)
- > Analyze the past and present intelligence reports for possible leads, cell phone records of history sheeters/suspects, check with neighbouring districts/divisions/States
- > Deploy vehicular checking on barriers, inform local Police and issue red alert for checking vehicles at all exit points
- > Check the photographs of carcass and compare with the National Repository of Camera Trap Photographs of Tigers (NRCTPT) in NTCA or the Phase-IV camera trap monitoring database or other research database to establish the identity/source area
- > Issue an official version of the incident through the Chief Wildlife Warden
- > Send the biometric details of suspect(s) to the NTCA for alerting other Field Directors/States/Wildlife Crime Control Bureau, and for establishing possible linkage with other crimes elsewhere
- > Closely monitor/supervise the investigation, liaise with Police Department, Tiger Cell of the State (if available), Wildlife Crime Control Bureau and other investigation agencies
- > Prepare a 'Final Report' and submit to the Chief Wildlife Warden under intimation to the NTCA. Since all tiger deaths are treated as 'Poaching Cases' by the NTCA unless proven otherwise, justification for categorizing a tiger death as 'Natural' should be provided alongwith evidences
- > All cases of poaching / seizure should be dealt in the courts of law having jurisdiction
- > Monitor the case ongoing in the court of law till its final disposal by the Court
- After the Court's order, analyze the case for corrective actions (if needed) for further appeal
- > If the decision of the Court is satisfactory, close the case and report to the Chief Wildlife Warden under intimation to the NTCA

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#### IMPORTANT POINTS FOR PREPARING A COMPLAINT

- ➤ Check the complaint/ whether relevant sections of the Wildlife (Protection) Act, 1972 and other Acts have been invoked viz. Section 2, 9, 50 etc. of Wildlife (Protection) Act
- Statements under Section 50 (8) of the Wildlife (Protection) Act, 1972 of witnesses and confession statements of suspect(s), (besides relevant sections of other laws)
- > Site plan of the crime scene. The map of the compartment can also be useful in this regard.
- > Status of site of the said offence protected area/tiger reserve/forest division/other area, alongwith a copy of Government notification (in case of tiger reserve/protected area/reserved forest/protected forest)
- Post Mortem report
- Expert identification report, from institutions like Wildlife Institute of India, Dehradun or Zoological Survey of India or reputed institution having domain expertise, regarding only portions/pieces/tissues, if seized
- > Copy of the specimen seal affixed on the materials sealed
- > CD of photographs/video recording done during investigation
- > Copy of ownership papers of house/seized vehicle, identity proofs/cards etc.
- > Copy of relevant section of the Wildlife (Protection) Act, 1972, and/or any other Act
- > Annexure containing list of documents and witnesses
- Forensic report of visceral contents, ballistic report (if applicable)
- ➤ A format of Complaint is at Annexure 2.
- A list of documents to be attached with the Complaint and guidelines for filing complaint u/s 55 of the Wildlife (Protection) Act 1972 are at Annexure 3.

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#### NOTE ON ACTIONS NEEDED FOR ANTIPOACHING/TIGER PROTECTION

- In-depth thorough investigation on EACH CASE with a final report (should not be left unresolved/ open ended)
- Investigation must examine forward/ backward linkages, trans border ramifications, cracking poacher-carrier-trader-consumer nexus/network
- 3) Close monitoring with the help of information technology/informer network on suspects/history sheeters
- 4) Examine Post Mortem (PM) and viscera reports
- 5) Intensive patrolling besides other antipoaching operations should be done in sensitive areas
- 6) Ensure multi-disciplinary approach and cooperation in case of investigation and intelligence sharing. Wildlife authorities should enter into MoU with IB/LIU for intelligence sharing, MoU with Paramilitary forces like BSF, CRPF, Assam Rifles, SSB etc. for joint patrolling in sensitive border areas, through the State Government and NTCA
- 7) Review of each case of mortality regularly at the highest appropriate level
- 8) Ensure review and coordination meeting with Judicial, Police and Revenue Officials on monthly basis
- 9) Each Tiger Reserve must have a highly trained team of officers/ Rangers for investigations of tiger related crime with all modern & scientific tools of forensic science. The State Forest Department, through the National Tiger Conservation Authority should organize training of such selected elite 'Investigating Teams', if required
- 10) After complete investigation, proper prosecution of cases in the appropriate courts of law should be ensured through regular monitoring of pending cases at the highest authority at the appropriate level
- 11) Prepare State/Reserve level of database/history sheet/dossier of each convicted criminals and suspects, while apprising the NTCA periodically. Personal Profiles (PPs) of all accused should be prepared. In case of habitual offenders History Sheets (HSs) may be prepared for surveillance. Copies of PPs and HSs may be sent to NTCA/WCCB as well for circulation and surveillance. A format of Personal Profile is at Annexure 4
- 12) A separate note on the modus operandi adopted by the criminals in each tiger poaching case may be recorded and circulated to NTCA/WCCB etc., which could be used in crime prevention strategy and also in the sensitization/ training courses for enforcement agencies.
- 13) Ensure that each Tiger Reserve has a Security Plan in place as per the guidelines issued by the NTCA
- 14) Ensure appropriate resources to deal with poaching threats and investigation
- 15) Since tiger is a highly endangered species falling in Schedule-I of the Wildlife (Protection) Act, 1972, weekly monitoring of tiger offence cases ongoing in courts of law should be done for expediting the same by the Field Director/Wildlife Warden/Conservator/Chief Conservator of Forests having jurisdiction
- 16) The Chief Wildlife Warden of the State should also review the progress of each tiger case ongoing in various courts of law every fortnight. The Principal Chief Conservator of Forests (HOFF) of the State should also review the same on a monthly basis, while apprising the NTCA

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# ARREST CUM PERSONAL SEARCH MEMO

(U/S 50 (3) of the Wild Life Protection Act, 1972)

1	Name of Office	
2	Case number, date and Sections of law	
3	Name, parentage and age of the accused arrested	
4	Present and permanent address of the arrested accused	t a Tarywald Canada
5	Identification marks of the arrested accused	
6	Reasons for arrest and whether without warrant or with warrant	
7	Place, date and time of arrest	
8	Documents/articles which found on the person of the accused	
.9	Name and address of the independent witness who was present at the time of arrest	
10	Name and designation of the officer who effected the arrest	
11	Name of the relative/friend as declared by the arrestee who has been informed of his arrest	
12	Name of the local Police Station where the arrested person is to be kept in custody or other venue of custody of the accused	
13	Any other particulars including injuries on the person of the arrestee if any	
14	Signature of the arrested accused	
	Signatures of independent witnesses.	

16	Name, designation and signature of the officer who effected the arrest	
	",	

COMPLAINT IN A WILDLIFE OFFENCE
(U/s 55 of Wildlife (Protection) Act 1972 r/w Sec 200 Cr.P.C)

1	Name of the Office	
2	Offence Report number and date	
3	Place, date and time of offence	
4	Sections of law	
5	Details of property seized	
6	Whose custody the seized properties are lying, if submitted in the court · Property Index number	
7	Live specimens if any seized and subsequently rehabilitated in its natural habitat as per the court order	
8	Details of perishable or hazardous materials seized and subsequently destroyed as per the court order	
9	Details of fire arms, if any, seized and handed over to the Police for investigation and the Police FIR number	
10	Whether samples were sent for examination to Wildlife Institute of India, Zoological Survey of India, Botanical Survey of India or any other scientific experts for opinion? If so, details of the opinion received	
11	Name, designation and office address of the officer who filed	

	the Offence Report	
12	Name, designation and office address of the officer filing the complaint	
13	Name and address of the accused against whom the complaint is filed	
(i)	Accused in custody	
(ii)	Accused on bail	
(iii)	Accused not arrested/absconding	
(iv)	Accused who are habitual/ repeated offenders, details of previous cases	
13	Name and address of the witnesses and facts to be proved by the evidence of each witness	l .
14	List of documents, if any, submitted along with the complaint	
15	Nature of offences and facts of the	case/allegation made against each accused

Name & designation of the complainant with office seal

To The Chief Judicial Magistrate/JMFC (Address)

## DOCUMENTS TO BE ATTACHED WITH THE COMPLAINT

- Forwarding/Covering letter addressed to the concerned magistrate praying for taking complaints u/s 55 of WL(P)Act,1972, r/w Section 200 of Indian Criminal Code 1973.
- 2. Sequential order of incidence preferably in chronological order along with the violation of relevant sections and section 51 under which sentence of the accused is prayed upon.
- 3. POR/FIR if any along with the information sent to the court
- 4. List of accused.
- 5. List of witness.
- 6. Site memo
- 7. Arrest memo
- 8. Medical report
- 9. Intimation to relatives
- 10. Seizure Memo
- 11. Statement of accused
- 12. Statement of Witness (u/s 50(8) of WLPA
- 13. Gazette Notification of R.F/NP/Sanctuary
- 14. PM Report/Expert Opinion
- 15. Wildlife Census Report (if any)
- 16. Appointment letter of I.O.
- 17. Posting order of staff.
- 18. Log book of vehicle (if used)

19. Any other relevant document having bearing on the incidence.

## Guidelines for filing complaint u/s 55 of Wildlife (Protection) Act 1972:

The officer filing the complaint should ensure that he is authorized to file the complaint as envisaged under section 55 of Wildlife (Protection) Act 1972.

If the accused is in judicial custody, the complaint is to be filed within 60 days from the date of arrest of the accused. In case of more than one accused, the 60 days period starts from the date of arrest of the first accused.

The complaint should preferably be typed, or neatly written without any over writings, alterations etc.

Full details of all the accused and the role played by them individually, offences committed by each of them with relevant sections of the Act are to be narrated in the complaint. Present status of the accused like on bail, in judicial custody, absconding etc is also to be mentioned in the complaint. In the case of accused in judicial custody, name of the jail in which they are lodged is to be mentioned. In case of absconding accused, efforts taken by the Investigating Officer to apprehend them including action under Section 82 & 83 CrPC, are also to be narrated in the complaint.

The complaint should be specific and without any ambiguity. Facts not supported by evidence should not be mentioned in the complaint. Similarly, accused against which sufficient evidence is not there should not be named in the complaint. Facts and circumstances connected to the case should be narrated in simple language, sequentially. List of witnesses, documents and material objects should be submitted along with the complaint. The authorized officer who files the complaint should sign all the pages of the complaint and annexures if any.

Statements of all the witnesses, including the official witnesses, recorded u/s 50(8) of Wildlife (Protection) Act as per the list of witnesses, confessional statements of the accused and statements recorded by the Magistrate u/s 164 Cr.PC if any should be filed along with the complaint.

All documents in original or certified copy, as per the list of documents enclosed, should be submitted along with the complaint. A comprehensive list of documents which are to be compulsorily submitted along with the complaint is given below.

671

# PERSONAL PROFILE

1. Name, aliases and Father's name:				
2. Address:				PHOTO with date
3. Personal Description:				
Date of Birth / age:	Hair:			
Place of Birth:	Eyes:			
Height:	Sex:			
Weight:	Complexion:			
Build :	Language:			
Citizenship:				
Scars/ Identification Marks:				
Remarks:				
4. Important personal information:				
a. Telephone/ mobile No(s). :				
b. E – Mail Address:				ě
c. Passport No. :				
d. Bank Account No(s).:				
e. Aadhar Card No.:				
f. Voter Id Card No.:				
g. Ration Card No.:				
h. Finger print records:				
5. Current/ previous occupation(s) a	nd list of properti	es owned:		
6. Associates / relatives/ family me	mbers and their o	ccupation:		

- 7. Crime history and brief facts of the wildlife case(s) against him:
- 8. Crime Modus Operandi:
- 9. Areas of his current activities/ places of usual movements:
- 10. Previous Acquittals / Convictions:
- 11. If declared absconder, details:
- 12. Any other remarks:

(SOP prepared with inputs from WCCB, Mr Saurabh Sharma, Legal Expert, Field Officers of Tiger Reserves)

# STANDARD OPERATING PROCEDURE-III BY NTCA

# STANDARD OPERATING PROCEDURE FOR DISPOSING TIGER/ LEOPARD CARCASS/BODY PARTS



# MINISTRY OF ENVIRONMENT AND FORESTS GOVERNMENT OF INDIA NATIONAL TIGER CONSERVATION AUTHORITY

# STANDARD OPERATING PROCEDURE FOR DISPOSING THE TIGER/ LEOPARD CARCASS/BODY PARTS

- 1. Title: Standard Operating Procedure for disposing the tiger/ leopard carcass boarparts.
- 2. Subject: Tiger death/seizure of body parts
- 3. Reference: Advisories of the Ministry of Environment & Forests/ Project Tiger/ NTCA on the subject (Advisory No: 1-60/89-WL I dated 04-11-1994 from the Addl. IGF (wildlife) Ministry of Environment and Forests)
- 4. **Purpose:** To ensure that the carcass/ body parts of tiger/ leopard are disposed of in a transparent manner to prevent any pilferage for illegal market.
- 5. Short summary: This Standard Operating Procedure (SOP) provides the basic, minimum steps which are required to be taken at the field level (tiger reserve or elsewhere) for disposing of tiger/leopard carcass/ body parts where carcass is available or the body parts have been seized.
- 6. Scope: The SOP applies to all forest field formations including tiger reserves besides other areas where the incident has occurred.
- 7. Responsibilities: The Field Director would be responsible in the case of a tiger reserve. For a protected area (National Park / Wildlife Sanctuary), the concerned protected area manager would be responsible. In the case of other areas (revenue land/conservation reserve/community reserve/village/township) the Wildlife Warden, as per the Wildlife (Protection) Act, 1972, or Divisional Forest Officer/ Deputy Conservator of Forests (under whose jurisdiction the area falls), would be responsible. The overall responsibility at the State level would rest with the Chief Wildlife Warden of the concerned State.
- 8. Detailed instructions for the procedure to be followed for disposing of the tiger/leopard carcass/ body part(s) where body part(s) / carcass is available
  - (i) At Scene of crime (SoC) / incident: when carcass or parts available:
  - Follow the SOP issued by the NTCA on dealing with the tiger mortality/ seizure of body parts.
  - Dispose of the carcass by incineration in the presence of the Field Director or an officer not below the rank of the Conservator of Forests besides the Post Mortem (PM) Team having representation from the civil society institution
  - > While incinerating the carcass, the sequence must be photographed and video recorded.
  - > Before leaving the site, ensure that the whole carcass including bones are fully burnt.
  - After ensuring the complete incineration of the carcass, prepare a 'Panchnama (Memo) on disposal of the carcass, duly signed by the PM Team and officer incharge, and send a final report (Annexure-I) to the CWLW under intimation to the NTCA with supporting photographs/documents.

# (ii) In case of seizure of body parts (Skin - dry or fresh/ bones/meat or other body parts):

> Follow the SOP issued by the NTCA on dealing with the tiger mortality/ seizure of body parts.

n case of seizures of body parts, the same may be required as evidence for prosecution in the courts of law and hence in such situations do not dispose the same till the orders of the concerned court for such disposal are obtained.

Once orders have been obtained by the competent authority, dispose of the body part (s) by incineration in the presence of the Field Director or an officer not below the rank of the Conservator of Forests besides the Team (same as prescribed for the Post Mortem) having representation from a civil society institution

While incinerating the body parts, the sequence must be photographed and video recorded.

> Before leaving the site, ensure that the whole/ all body parts are fully burnt.

After ensuring the complete incineration of the body part (s), prepare a 'Panchnama' (Memo) on disposal of the body part (s), duly signed by the said Team and officer incharge, and send a final report (Annexure-I) to the CWLW under intimation to the NTCA with supporting photographs/ documents.

# (iii) In cases of seized stock of wildlife trophies obtained during seizure/ confiscation:

- ➤ All seized stock of wildlife trophies, where no case is pending in a Court of law, should be destroyed through incineration in the presence of the Field Director or an officer not below the rank of the Conservator of Forests besides a team (same as prescribed for the post mortem) having representation from a civil society institution.
- ➤ While incinerating the body parts, the sequence must be photographed and video recorded.

> Before leaving the site, ensure that the whole/ all body parts are fully burnt.

After ensuring the complete incineration of the body part (s), prepare a 'Panchnama' (Memo) on disposal of the body part (s), duly signed by the said Team and officer incharge, and send a final report (Annexure-I) to the CWLW under intimation to the NTCA with supporting photographs/ documents.

➤ The provisions of the Wildlife (Protection) Act, 1972 must be followed before destroying such stock.

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# **FINAL REPORT**

To be submitted for disposal of each case of tiger/ leopard carcass/ body part (s)/ trophy

1	Name of Office	
2	Locational details of the mortality:	
	description, GPS, Compartment	
	/Block/Range /Sub-Division/ Forest	a a
	Division/ Tiger Reserve or place/ time	
3	Date of Mortality/ carcass report	
4	In case of seizure of body parts details	
	indicating the status of carcass or	
	seized material	
5	Details of the person (staff/ Others)	
	who reported the incident first:	
	name/address/ contact details/	
	telephone numbers/e-mail	And the second s
6	For carcass: Date, time and Place of	*
	Post Mortem (PM)	10.20000-AL-00240-500-5
7	Details of PM Team	9
	(names/designation/ address/ contact)	*
8	Details of the missing body parts, if	
	any	
9	Cause of death as ascertained after the	
11	PM	
11	Colour photographs of the carcass/	
,	body part (s)- (close ups, indicating	
	injury, if any); details of comparison	
12	with camera trap photo data base  Cause of death: Natural/ Poaching	
13	In case of poaching/ seizure of body	
13	parts:	*
	i. further action taken/ proposed:	
	ii. attach colour photographs of	
	the seized body part/s	
	iii. attach certification regarding	
	species identity (for bone	
	pieces/ meat/ other body parts	
	which are not physically	

	identifiable)  iv. action taken with respect to offenders/ suspects (if arrested)  v. status of Case/ complaint: number, date of filing the complaint, Sections of law, name of Court where filed	
14	Panchnama/memo of disposal of carcass/ body part (s)	Enclosed/ not-enclosed
15	Remarks if any	
16	Signature of the Officer In-charge with name, designation, date and stamp	

(SOP prepared with inputs from Field Officers of Tiger Reserves)

#### **ANNEXURE XI**

#### **COMMITTEES**

#### A. Tiger Conservation Authority

- 1. The Minister of State in charge of the Ministry of Environment and Forests Chairperson
- 2. The Minister of State in the Ministry of Environment and Forests- Vice-Chairperson
- 3. Three Members of Parliament of whom two shall be elected by the House of the People and one by the Council of States
- 4. Eight experts or professionals having prescribed qualifications and experience in conservation of wildlife and welfare of people living in tiger reserve out of which at least two shall be from the field of tribal development
- 5. Secretary, Ministry of Environment and Forests
- 6. Director General of Forests and Special Secretary, Ministry of Environment and Forests.
- 7. Director, Wildlife Preservation, Ministry of Environment & Forests
- 8. Six Chief Wildlife Wardens from the tiger reserve States in rotation for three years
- 9. An Officer not below the rank of Joint Secretary and Legislative Consel from the Ministry of Law and justice
- 10. Secretary, Ministry of Tribal Affairs
- 11. Secretary, Ministry of social justice and Empowerment.
- 12. Chairperson, National Commission of the Scheduled Tribes
- 13. Chairperson, National Commission for the Scheduled Castes
- 14. Secretary, Ministry of Panchayati Raj
- 15. Inspector-General of Forests or an officer of the equivalent rank having at least ten years experience in a tiger reserve or wildlife management, who shall be the Member-Secretary, to be notified by the Central Government, in the Official Gazzette.

#### **B. State Level Steering Committee**

Copy of Govt notification given overleaf.







# GOVERNMENT OF ORISSA FOREST & ENVIRONMENT DEPARTMENT.

NOTIFICATION

Dated, Bhubaneswar the 8-1-15

No 8-(T)-3/2007(Pt). 565 /F&E Under the provisions of section 38-U of the Wildlife (Protection) Amendment Act, 2006 a State Level Steering Committee for conservation of tiger is constituted as follows for Co-ordination and monitoring of all activities related to protection of Tigers, co-predators and their previousless.

Chief Minister, Orissa -	Chairperson
Minister in charge, Forest & Environemnt -	Vice-Chairperson.
Sri Subarna Naik, M.L.A., Keonjhar -	Member .
Sri Jhina Hikaka, MLA, Laxmipur	Member
Secretary to Govt., Forest & Env. Deptt.	Member
Secretary to Govt., ST & SC Dev. Deptt	Member
Secretary to Govt., Panchayati Raj Dept	Member .
LFfeic Director, Similipal Tiger Reserve, Baripeta-	Member
Field Director, Satkosia Tiger Reserve, Angui -	Member
DFO (Wildlife) in -charge,	
Sunabeda (Proposed) Tiger Reserve	Jamber
Director, SC-&ST Research & Training Institute-	'dember
Dr. S. N. Patra, Member,	
Expert Committee for Sabiosia Tigar Reserve-	Momber
Sri S.K. Mishra, Member	
Expert Committee for Similipal Tiger Reserve -	Member
√Sri Guruva Soren, Organizer,	
Scolety for Research & May Of Tribal Culture	
At. Raikadjinaran, Via. Tekatour, Bangada -	Member
Chief Wildlife Warden, Or \$39	Member
En au talentia e per	Campagage



By Order of Governor

B.P. Singh, Special Secy to Government.

Secretary.

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Copy forwarded to the Head State Portal Group, I.T. Centre with a

Joint Secretary to Government

#### C. Similipal Tiger Conservation Foundation

#### Governing Body of the Foundation:-

i)	Minister in-charge of Wildlife in the Govt. of Orissa.	President
ii)	Principal Secretary, Forest & Environment, Orissa	Vice-President
iii)	Principal Chief Conservator of Forests, Orissa	Member
iv)	Field Director, Similipal Tiger Reserve, Baripada	Member
v)	Deputy Director, Similipal Tiger Resreve, Baripada	Member
vi)	Two prominent Scientists or qualified Experts in the field to be nominated by Government.	Members
vii)	M.L.A., Jashipur.	Member
viii)	Chairman, Zilla Parishada, Mayurbhanj	Member
ix)	Two members of the executive committee of the Foundation (other	Members
	than the Field Director/ Deputy Director).	
x)	Principal Chief Conservator of Forests(WL) and Chief Wildlife Warden, Orissa	Member-Secretary

#### The Executive Committee:-

1.	Field Director, Similipal Tiger Reserve	Chairperson
2.	Two representatives of Eco-development Committees working in the Similipal Tiger Reserve	Members
	to be nominated in the Governing Body.	Members
3.	two members of front line staff of the Similipal Tiger	Members
	Reserve	
4.	Deputy Director, Similipal Tiger Reserve	Member- Secretary

# **Rehabilitation and Periphery Development Advisory Committee (RPDAC)** of Similipal Tiger Reserve for relocation of villages

- 1. Hon'ble Member of Parliament, Loksabha, Mayurbhanj
- 2. Hon'ble Member of Parliament, Rajyasabha, Mayurbhanj
- 3. All Hon'ble MLAs of Mayurbhanj District (Karajia/ Jashipur/Bahalda/ Rairangpur/Bangriposi/Kuliana/Baripada/Baisinga/Khunta/Udala
- 4. President, Zilla Parishad, Mayurbhanj
- 5. Conservator of Forests & Field Director, STR, Baripada
- 6. Chairperson, Panchayat Samiti, Jashipur
- 7. Secretary, Lamp(NGO), At/Po-Bangriposi, Mayurbhanj
- 8. Chairman, Nawana Eco-Dev(NGO) Committee, At/Po- Nawana, Po- Astakunar, Via- Jashipur, Mayurbhanj
- 9. President, Ashra SHG, At- Sharapat, Po- Gurguria, Via- Jashipur, Mayurbhanj
- 10. Ganpati Woment SHG, At- Jamda Rangamatia, Po- Begunia, Mayurbhanj
- 11. Ganga Ho, At-Jenabil, Po-Gurguria, Via-Jashipur, Mayurbhanj
- 12. Rajendra Murmu, S/O Motilal Murmu, At-Kabatghai, PO- Gurguria, Via- Jashipur, Mayurbhanj
- 13. Project Director, DRDA, Mayurbhanj
- 14. Sub-Collector, Panchpir, Karanjia
- 15. Land Acquisition Officer, Mayurbhanj.

#### ANNEXURE XII

#### SIMILIPAL TIGER CONSERVATION FOUNDATION

The Rules and Regulations of Foundation has been approved as follows.

#### **RULES AND REGULATIONS**

(Bye- Laws)

#### 1. Introduction:

- i. The Name of the Foundation: Similipal Tiger Conservation Foundation
- ii. The Registered Office of the Foundation : Office of the Field Director Similipal Tiger Reserve, Baripada, Dist- Mayurbhanj.

#### 2. Area of Operation / Jurisdiction:

The area of operation shall be Similipal Tiger Reserve and its adjoining landscape with possible corridor value for dispersal of wild animals from Tiger Reserve.

#### 3. Definitions -

In these Rules unless the context otherwise requires:

- i. "Act" means the Wildlife (Protection) Act, 1972 (53 of 1972);
- ii. "Executive Committee" means Executive Committee of the Foundation;
- iii. "Foundation" means the Similipal Tiger Conservation Foundation (STCF) established under section 38X of the Act;
- iv. "Governing Body" means Governing Body of the Foundation;
- v. "Government" or "State Government" means Government of Orissa;
- vi. "Implementing agency" means a tiger reserve notified under section 38V of the Act or a tiger reserve already notified by the Government of Orissa under Project Tiger Scheme;
- vii. "Operations Manual" means the administrative code of the Foundation approved by the Government of Orissa;
- viii. "Rules of the Foundation" means the approved trust of deed and Operations Manual of the Foundation;
- ix. "Staff" means any employee of the Foundation appointed by appropriate authority and shall include consultants, professionals engaged on contract, staff on deputation, daily wages worker, etc.;
- x. "Tiger Conservation Authority" means the National Tiger Conservation Authority constituted under section 38L of the Act;
- xi. "TigerReserveState" means a state having tiger reserve;
- xii. All other words which have not been specifically defined in this Rule shall have the same meanings as have been assigned to them in the Act.

#### 4. Constitution of the Foundation:

Similipal Tiger Conservation Foundation shall be an autonomous body to facilitate and support the management, for conservation of tiger and bio-diversity for the tiger reserve at Similipal and to take initiative in eco-development by involvement of people in such development process.

- i. Members of the Governing Body mentioned in clauses (vii) and (viii) shall, upon ceasing to be a Member of Legislative Assembly or, the Chairman, Zilla Parishad, as the case may be, cases to be a member of the Governing Body.
- ii. The tenure of nominated member shall be for a period of three years from the date of nomination.

# 5. Governing Body of the Foundation-

i. The Governing Body of the Similipal Foundation shall consist of the following members, namely:-

i)	Minister in-charge of Wildlife in the Govt. of Orissa.	President
ii)	Principal Secretary, Forest & Environment, Orissa	Vice-President
iii)	Principal Chief Conservator of Forests, Orissa	Member
iv)	Field Director, Similipal Tiger Reserve, Baripada	Member
v)	Deputy Director, Similipal Tiger Reserve, Baripada	Member
vi)	Two prominent Scientists or qualified Experts in the field to be nominated by Government.	Members
vii)	M.L.A., Jashipur.	Member
viii)	Chairman, Zilla Parishad, Mayurbhanj	Member
ix)	Two members of the executive committee of the Foundation (other than the Field Director/ Deputy Director).	Members
x)	Principal Chief Conservator of Forests (WL) and Chief Wildlife Warden, Orissa	Member- Secretary

- ii. Members of the Governing Body mentioned in clauses (vii) and (viii) shall, upon ceasing to be a Member of Legislative Assembly or, the Chairman, Zilla Parishad, as the case may be, cases to be a member of the Governing Body.
- iii. The tenure of nominated member shall be for a period of three years from the date of nomination.

#### 6. Power and functions of the General Body-

# i. The Governing Body shall exercise the following powers and perform the following functions, namely:-

i. make overall policy of the Foundation in consonance with the provisions of the Act;

- ii. consider and approve the balance sheet and audited accounts of the Foundation;
- iii. consider and approve the Annual Report of the Foundation;
- iv. approve the work plan, fund flow, Annual Budget of the Foundation;
- v. make amendment in the deed of trust, which may be necessary, subject to the approval of the Government;
- vi. approve the "Operations Manual" of the Foundation.
- vii. co-ordinate between different departments and other institutions and with non-

Governmental organisations to achieve the objectives of the Foundation;

- viii.frame rules and regulations under the provisions of the deed of trust for managing the affairs of the Foundation;
- ix. take all policy decisions regarding fund raising, investment and budget of the Foundation;
- x. suspend, terminate or effect any other procedures on any Project or activity undertaken by the Foundation:
- xi. supervise the works of the Executive Committee; and
- xii. perform such other functions as may be necessary to achieve the objectives of the Foundation.

# ii. Annual General Body Meeting:

The Foundation shall hold a General Body meeting of all the members of the Governing Body as per details furnished below;

- a) it shall be held at least once in a year preferably in the month of April;
- b) each year in the General Body Meeting the audited accounts of the previous year and the budget for the current year shall be presented, discussed and approved.
- c) every meeting shall be called in writing by and under the signature of the Member-Secretary of the Governing Body through a prior notice of 15 days, containing a summary' of the business to be transacted in such meeting.
- d) any inadvertent omission to give notice to, or the non-receipt of notice of any meeting by, any member shall not invalidate the proceedings of the meeting;
- e) if the President is not present in the meetings of the Governing Body, the Vice-President shall preside over the meeting;
- f) one third of the members of the Governing Body present shall form a quorum of the Governing Body provided that no quorum shall be necessary in respect of any adjourned meeting;
- g) all disputes in a meeting of the Governing Body shall be determined by the division of vote;
- h) the member who is unable to attend the Governing Body meeting may send his views on the agenda in writing and such expression of opinion shall be taken to be his vote on the matter concerned; and
- i) the minutes of the proceedings of the meeting shall be recorded and such minutes after

having been approved and signed by the

Member-Secretary, shall be the conclusive proof of the business transacted in the meeting.

#### 7. The Executive Committee :-

- i. The Foundation shall have an Executive Committee to look after its day-to-day management.
- ii. The affairs of the Foundation shall be administrated subject to the rules of the Foundation by the Executive Committee
- iii. The Executive Committee shall consist of -
- a) Field Director, Similipal Tiger Reserve-Chairperson
- b) Two representatives of Eco-development Committees working in the Similipal Tiger Reserve to be nominated in the Governing Body-**Members**
- c) Two members of front line staff of the Similipal Tiger Reserve-Members
- d) The Collector & District Magistrate, Mayurbhani or his representative-Member
- e)The Superintendent of Police, Mayurbhanj or his representative-Member
- f)Representative of two NGOs selected by Governing Body-Members
- g)Deputy Director, Similipal Tiger Reserve-Member- Secretary

(the Deputy Director or, as the case may be ,the Assistant Director of the tiger reserve shall function as the Secretary of the Executive Committee).

- iv. The tenure of the nominated member shall be for a period of two years from the date of nomination.
- v. A member of the Executive Committee, other than nominated members, shall cease to be a member as such, if he ceases to hold that office or post by virtue of which, he became the member of the committee.

#### ii. Powers and functions of the Executive Committee:

The Executive Committee shall have the following powers and perform the following functions, namely;

- (a) manage the affairs and funds of the Foundation in accordance with the rules and regulations of the Foundation;
- (b) make endeavor to achieve the objectives of the Foundation and discharge all its functions;
- (c) exercise administrative and financial powers including power to engage any person of one description and make appointment thereon in accordance with the rules and regulations of the Foundation;
- (d) enter into arrangement with other public or private organizations or individuals for furtherance of its objectives and in accordance with the rules and regulations of the Foundation:
- (e) accept endowments, grant-in-aid, donations or gifts to the Foundation not inconsistent with the rules and regulations of the Foundation and interest of the Government;
- (f) take over or acquire in the Foundation by purchase, gift or otherwise from Government or other public bodies or private individuals or organizations, any movable and immovable property in the state or elsewhere in conformity with the rules and regulations of the

Foundation; and

(g) perform such others functions as are assigned to it by the Governing Body.

# iii. Proceedings of Executive Committee Meeting:-

- a) Every meeting of the Executive Committee shall be presided over by the Chairperson. Provided that in the absence of the Chairperson, the executive committee shall elect a Chairman to preside over the meeting.
- b) One half of the total members of the Executive Committee present in the meeting shall constitute the quorum, provided that no quorum shall be necessary in respect of any adjourned meeting.
- c) Not less than seven days notice of every meeting of the Executive Committee shall be given to each member of the said Committee, provided that the Chairperson may call an emergency meeting if the situation so warrants.
- d) Any inadvertent omission to give notice to or the non-receipt of notice of any meeting by any member shall not invalidate the proceedings of the meetings.
- e) The Executive Committee shall meet as and when necessary but at least once in every month
- f) All disputed issues in the Executive Committee meetings shall be determined by vote among members.
- g) Any member who is unable to attend the Executive Committee meeting may send his views on the agenda in writing and such expressio of opinion shall be taken to be his vote on the matter concerned.
- h) The Executive Committee may refer any issue for the advice or recommendation to a Sub-Committee constituted by it for the purpose and the Executive Committee shall have the right to override the recommendation or advice given by the Sub-Committee, and in doing so, it shall record reasons thereof.
- i) The Minutes of the proceedings of the executive committee meetings shall be recorded and such minutes after due approval shall be issued by the Secretary.

#### 8. Office and Authorities of the Executive Committee:-

- a) The Field Director, Similipal Tiger Reserve shall be the Executive Director of the Foundation and he or she shall carry out all administrative and
- day-to- day function of the Foundation on behalf of the Executive Committee and he shall be the custodian of all records, assets and belongings of the Foundation.
- b) The Executive Director shall have the following powers in conformity with the rules of the Foundation; namely:-
- a) to accept contributions on behalf of the Foundation either in cash or in kind from a person or institutions.
- b) to purchase, acquire, take on lease any movable and immovable property for the purpose of the achieving the objectives of the Foundation.
- c) to have control and authority on the general administration of the Foundation.
- d) to open and operate accounts with banks.
- e) to prosecute, sue and defend all actions as per law for and on behalf of the Foundation.

- c) The Executive Director shall have powers to convene seminars, workshops etc., and to oversee publications of research materials and books of the Foundation.
- d) The Executive Director shall initiate appropriate actions for the preparation and submission of project proposals on different programmes to be undertaken by the Foundation, to various agencies for support.
- e) The Executive Director shall have powers to interact with National and International Agencies for furthering the objectives of the Foundation.

## 9. Property, Assets and Liabilities.

- a) The income and property of the Foundation, howsoever derived, shall be applied solely towards the promotions of the objectives thereof as set-forth above.
- b) No portion of the income and property of the Foundation shall be paid or transferred directly or indirectly, by way of dividend, bonus or otherwise, howsoever, by way of profit, to the persons who at any point of time have been members of the Foundation or to any of them or to any person claiming through them. Provided that nothing herein contained shall prevent the payment of remuneration to any member or any persons in return of any service rendered to the Foundation or for any administrative expenses as stipulated in the Operations Manual.

#### 10. Powers of the Government:-

The State Government may time to time review the functioning of the Foundation and issue such directions, as it may consider necessary in respect of the affairs of the Foundations. All such directions shall be binding upon the Foundation.

## 11. Funds of the Foundation -

#### i. Source of Fund:

The following shall be the various sources of funds for running the affairs of the Foundation in conformity with the rules of the Foundation, namely:-

- a) the income generated from levying tourist entry fees and other charges for the services generated out of the Tiger Reserve;
- b) contribution from other sources in terms of specific projects from national as well as international agencies as permitted by law; and contributions received for internal Agencies may be accounted for under a separate Head in Accounts, mentioning the purpose for which they are received.
- c) grant-in-aids, donation or assistance of any kind from any individual or organisations including foreign Governments and other external agencies as permitted by law;
- d) Income received from any other activities as permitted by law and in conformity with the rules of the Foundation; and
- e) Interest, dividend earned on the funds of the Foundation.

#### ii. Management of Funds:

The fund of the Foundation shall be managed as per the provisions of the 'Operation Manual-Part-I' annexed with this Rules duly approved by the Governing Body.

## iii. Delegation of Financial and Administrative Powers:

For day to day management of the affairs of the Foundation, 'Operation Manual-II' annexed

with this Rules duly approved by the Governing Body shall provide the guidance of delegation of financial and administrative powers.

#### 12. Accounts & Audit:

- i. The foundation shall maintain proper accounts and prepare annual accounts comprising the receipts and payment. Statement of liabilities etc.
- ii. Opening of bank account shall be in accordance with Rule 5 of the O.G.F.R. Vol-I and withdrawal shall be made by cheques signed by Field Director, Similipal Tiger Reserve, who is the Chairperson of the Executive Committee of the Foundation.
- iii. The interest generated so, shall be utilized for development and protection of Similipal after approval of the Executive Committee.
- iv. All the transactions i.e. petty as well as major transactions shall be made by Field Director or the person authorised by him and must be brought to account without delay.
- v. The Foundation shall maintain the Balance Sheet including all assets and liabilities of permanent and intermittent nature, and all movable and immovable properties including consumable. Purchase of stores, tools and plants shall be guided by high standards of financial propriety and should be regulated in strict conformity with the store Rules given in Appendix-6 of OGFR volume-II.
- vi. The Foundation is non-commercial in nature.
- a) The accounts of the Foundation shall be audited annually by the qualified Chartered Accountant, empanelled by the Comptroller & Auditor- General of India, and approved by the Governing Body.
- b) The audited accounts shall be discussed and approved by the Governing Body in its annual meeting held for the purpose; and
- c) The accounts of the Foundation shall be subjected to the general provisions and directive of the Comptroller and Auditor-general of India.
- d) The accounts shall be opened to Audit by internal Auditors of Forest and Environment department and A.G., Orissa. The accounts of the Foundation shall also be subject to Audit annually by the Principal Accountant General (Civil Audit), Orissa and the accounts as certified by him shall be forwarded to the Govt. of India and State Govt. which shall cause a copy of the same to be laid before the State Legislature after the same has been perused by the Governing Body.
- vii. The budget provision of the Foundation shall be made through Annual Plan of Operation and expenditure shall be made as per approved Plan.
- viii. More than one subsidiary Cash Books shall be provided for daily transaction and these will be incorporated in main Cash Book / Central Cash Book of Executive Director, who is the Chairperson of the Executive Committee. The Cash balance of Executive Director is primarily the detailed record of transaction written up day by day. The Cash balance shall be closed and balanced monthly.
- ix. A stock register of receipt books with machine numbering shall be maintained with clear indication of receipt books already exhausted and receipt books in use. Receipts shall be issued in support of receipt of money invariably and the transactions shall be exhibited in the Cash Book on the same day.
- x. The monthly progress report, quarterly progress report and annual progress report

regarding the physical and financial targets and achievements of the Foundation shall be submitted to the Principal Chief Conservator of Forests (Wildlife) and Chief Wildlife Warden, Orissa / Forest & Environment Department as well as to National Tiger Conservation Authority.

- xi. No remuneration shall be paid to any office bearers of the Foundation. However, incentive/honorarium can be given if so decided by Executive Committee.
- xii. No travel expenses shall be payable to the staff for journey inside and outside the state when it is not related to Foundation work. The staff of the Foundation shall be governed by the T.A. Rules of State Government.
- xiii. Purchase should be made in most economical manner in accordance with the definite requirement and strict adherence to the provisions of the OGFR for such purchases till the Foundation frames its own Rules for such transactions.
- xiv. The Field Director, who is the Chairperson of the Executive Committee shall be responsible for watching the progress of expenditure and for keeping the expenditure within the grant.
- xv. The Field Director, who is the Chairperson of the Executive Committee, shall take every precaution to get maximum work for the amount spent and to see that the Foundation money is not being wasted.
- xvi. Monthly expenditure statement in respect of expenditure incurred out of Grants-in-aid received from Government of India / Government of Orissa may be submitted to A.G. (A & E), Orissa.
- xvii. All the financial aspects / provisions shall be in conformity with the rules / provisions envisaged in Orissa Treasury Code, OGFR and Delegation of Financial Power Rules.

#### 13. Dissolution of the Foundation:

The Foundation is irrevocable, however, in the event of any circumstance in which it is decided to terminate or dissolve the Foundation after the satisfaction of all its debts and liabilities, any assets and property, whatsoever be the same, shall not be paid to or distributed among members of the Foundation but shall be dealt with in such manner as the State Government may determine in that behalf.

#### 14. Miscellaneous:-

- a) As and when there is any change in the nomenclature of Ministries, Departments, or institution and designation mentioned, such changes shall automatically stand incorporated in the Rules of the Foundation.
- b) Every staff of the Foundation may be sued or prosecuted by the Foundation for any loss or damage caused to the Foundation or its property for anything done by him/her, detrimental to the interests of the Foundation.

#### **ANNEXURE XIII**

#### PROPOSED RESTRUCTURING OF CORE- BUFFER AREA OF SIMILIPAL TIGER RESERVE

In exercise of the powers conferred by Section 38V of the Chapter IVB of the Wildlife (Protection) Act, 1972 and with pursuance to the Notification Dated Bhubaneswar, The 31st December 2007 No.8F(T)-9/2007/20801/F&E the total area of Similipal Tiger Reserve over 2750 Sq. Kms , core area has been notified over 1194.75 Sq. Kms, whereas rest 1555.25 Sq Kms has been declared as buffer area. The entire 1194.75 sq.kms core area should now be under the Territorial jurisdiction of Dy. Director, Similipal Tiger Reserve for smooth wildlife management as per the guidelines outlined in the Project Tiger Memorandum Dt.04.01.2974, item No.20, as against 896.29 Sq. Kms. of area presently under his administrative control. Therefore, it is imperative that the notified core area is delineated in the field and area of 386.09 to be handed over to the control of Dy. Director, STR from the three buffer Divisions i.e. Baripada, Karanjia and Rairangpur Divisions as per Table I along with staff and infrastructures. Similarly the area of 87.63 Sq.Kms from STR Division under the control of Dy. Director, STR to be transferred to the three Buffer Divisions as per Table II. By this, the re-structuring of all the four Divisions i.e. Similipal Core Division, and three buffer divisions -Baripada, Karanjia and Rairangpur will be effective. The beats in a whole transferred from buffer divisions will be merged with core division and will be the part of the concerned range. A part of the beats in compartments transferred from the Baripada, Karanjia and Rairangpur divisions will be merged with the adjoining beats of the STR division as per Table I. Similarly the beats in a whole transferred from core division will be merged with buffer divisions and becomes part of the concerned buffer range and a part of the beat in compartments transferred from STR core Division to the Baripada, Karanjia and Rairangpur divisions will be merged with adjoining beats of the three divisions as shown in the Table II.

After the re-structuring, the core and buffer area of Similipal Tiger Reserve of the four divisions will be modified as shown in Table III. Similarly the total geographical area of the four divisions will be modified as per the Table IV(A & B). The details of the area of the Division in Table-IV-A, The details of the area of the Ranges of these divisions in table-IV-B.

Table-I: CORE AREA OF BUFFER DIVISIONS TRANSFERRED TO THE CONTROL OF DEPUTY DIRECTOR, SIMILIPAL TIGER RESERVE.

Name of the Division	Name of Range	Section existing	Name of Beat	Compt . No.	Area in Sq.Km	Area merged with beat / new beat Name in STR Division	Remained Area of buffer beat merged /renamed and now known as
Baripada	Bangriposi	Kusumtota	Jaldiha*	BLE-5P	9.39	Chakidi-I	Rangamatia
	Udala	Dengam	Baniabasa*	SJ-16P	5.75	Baniabasa- C	Dengam
			Baniabasa	SJ-17P	10.43	Baniabasa- C	Dengam
		Taldiha	Phulbadia	ED-3	7.78	Hatisal-I	Phulbadia
			Taldiha	ED- 11P	5.51	Tiktali	Taldiha
	Kaptipada	Podadiha	Anantapur	TK-5P	8.92	Anantapur- C	Anantapur(T)
			Podadiha	TK-8P	2.93	Anantapur- C	Podadiha
			Podadiha	TK-7P	5.17	Anantapur- C	Podadiha
			Dangadiha-I*	SL-18P	4.02	Dangadiha-I	Dangadiha(T)
			Dangadiha-II	SL-13	12.95	Dangadiha- II	Dangadiha(T)
			Dangadiha-II	SL-6P	3.98	Dangadiha-I	Dangadiha(T)
			Dangadiha-II	SL-8	9.32	Dangadiha- II	Dangadiha(T)
			Dangadiha-II	SL-9	6.55	Dangadiha- II	Dangadiha(T)
			Dangadiha-I	SL-11P	5.72	Anantapur- C	Dangadiha(T)
			Dangadiha-I	SL-10	15.26	Dangadiha-I	Dangadiha(T)
		Total	8 Nos		111.68		
Karanjia	Thakurmund	Kesidiha	Purunapani	SL-5	9.84	Matughara	Purunapani
	a		Mandaljhari	SL-2	4.85	Matughara	Purunapani
			Mandaljhari	SL-1	8.55	Bengapani	Mandaljhari
	Kendumundi	Badabalipo	Badabaliposi*	TL-9P	4.68	Baghara	Badabiliposhi
		si	Khaparkhai	TL-7	7.54	Khaparakha i	Badabaliposhi
			Badmuhuldiha *	TL-5P	7.39	Pokharibadi	Badamahuldih a
		Kendumun di	Kendumundi*	TL-4P	5.35	Kendumun di(C)	Edelbeda(T)
			Kendumundi*	TL-3P	4.20	Kendumun di(C )	Edelbeda(T)
			Edalbeda	WD-19	9.70	Edelbeda (C	Edelbeda(T)

		G.Total	32 nos of Beats		386.09		
		Total	8 Nos		72.91		
			Barehipani*	BH-7P	4.99	Barehipani	Matighati
			Barehipani*	BH-6P	7.37	Barehipani	Matighati
		Barehipani	Barehipani	BH-5P	4.81	Barehipani( C)	-
			Jamuani	BH-4	7.05	Jamuani (C )	Jamuani (T)
		Jamuani	Tulasibani*	BH-3P	7.06	Jamuani(C)	Tulasibani
			Sansialinai*	KD-9P	10.13	Tamalaban dha	Sansialinai
			Tamalbandha	KD-10	10.89	Tamalaban dha	-
	IVIdilud	IVIdIIUd	Tamalbandha	KD-7P	6.47	Tamalaban dha	Allapani
	Manda	Manda	Allapani*	10P KD-7P	6.79	Chahala	Allapani
			Charabandha*	8P BLW-	0.15	KairaKacha Bhatuni	Charabandha
Rairangpu r	Bisoi	Talabandha	Talabandha*  Talabandha*	BLW- 7P BLW-	1.48 5.72	KairaKacha	Talabandha Charabandha
		Total	16 nos		199.05		
			Kaliani*	KH-2P	12.09	Utaras( C)	Kaliani
			Utras	KH-8	11.96	Utaras( C)	Utaras(T)
		Kaliani	Utras	KH-7	10.92	Utaras( C)	Utaras(T)
			Gudgudia*	KH- 10P	7.95	Gurguria (C)	Gurguria (T)
			Barigaon	KH-9	11.71	(C) Gurguria(C)	Gurguria (T)
			Barigaon*	KH-15	9.17	(C) Barigaon	Gurguria (T)
Karanjia	Gudgudia	Gudgudia	Barigaon*	KH-16	9.00	Barigaon	Gurguria (T)
Karanjia	Dudhiani	a Ranipat	Kiajhari	WD-3	9.41	Kiajhari( C)	Kiajhari(T)
	Dudhiani	Barakamud	Barakamuda*	WD-5P	5.11	Kiajhari( C)	Barakamuda
			Dudhiani*  Dudhiani*	WD-9 WD-7P	7.35 6.08	Budhigaon (C ) Kiajhari( C)	Dudhiani Dudhiani
			Budhigaon	WD-16	8.48	Budhigaon (C)	Budhigaon(T)
			Budhigaon*	WD-8P	2.04	Budhigaon (C)	Budhigaon(T)
	Dudhiani	Dudhiani	Budhigaon	WD-14	6.66	Budhigaon (C)	Budhigaon(T)
			Bisipur*	TL-2P	6.35	Bisipur( C)	Bisipur (T)
		Baghalata	Bisipur*	17P TL-1P	3.30	Bisipur( C)	Bisipur(T)
			Edalbeda	WD-	9.82	Edelbeda(C	Edelbeda (T)

 Table-II: AREA FROM SIMILIPAL TIGER RESERVE CORE DIVISION TRANSFERRED TO THE BUFFER DIVISIONS.

Nawana (S)   Duduruchampa   Rajabasa   BLE-21(P)   3.01	Name of the Division	Name of the Range	Name of Section	Name of the Beat	Compartme nt No.	Area in Sq. Kms.	Area transfer red to Division	New area merged with the Beat/creation of new beat in Buffer Divn	Old beat / renamed beat of Core
Nawana (S)   Duduruchampa   Duduruchampa   BLE-23(P)   0.38   Nawana (S)   Duduruchampa   Rajabasa   BLE-21(P)   3.01   Nawana (S)   Duduruchampa   Rajabasa   BLE-22(P)   1.12   Pithabata   Chandanchatu   SJ-2   8.04   Pithabata   Pithabata   Chandanchatu   SJ-2   8.04   Pithabata   Pithabata   Chandanchatu   SJ-3   8.37   Pithabata   Chandanchatu   C	Tiger	Nawana (N)	Nigirdha	Nigirdha	BLE-19P	0.83		Nigirdha (T)	Nigirdha
Nawana (S)   Duduruchampa   Rajabasa   BLE-21(P)   3.01   Nawana (S)   Duduruchampa   Rajabasa   BLE-22(P)   1.12		Nawana (N)	Baunsakhal	Chakidi-I	BLE-4(P)	2.31		Rangamatia	Chakidi-I
Nawana (S)   Duduruchampa   Rajabasa   BLE-22(P)   1.12   Pithabata   Pitahabata		Nawana (S)	Duduruchampa		BLE-23(P)	0.38		Dudruchampa (T)	Duduruchamp a
Pithabata (WL) Nawana (S) Badmakabadi Gopinathpur P-14(P) 0.34 Pithabata Pitahabata Pitahabata Pithabata-II P-9 10.37 (WL) Pithabata Pithabata Digdiga SJ-I(P) 4.40 (WL) Pithabata Pithabata Digdiga SJ-I(P) 4.40 (WL) Pithabata Pitahabata Digdiga P-13 8.45 (WL) Pithabata Pitahabata Chandanchatu SJ-2 8.04 (WL) Pithabata Pitahabata Chandanchatu SJ-2 8.04 (WL) Pithabata Pitahabata Chandanchatu SJ-3 8.37 (WL)  Total S3.69 National Park National Park National Park National Chahala Kabatghai Khejuri KH-19(P) 1.01 Park  Total Total 1.95  Chahala Chahala Barehipani		Nawana (S)	Duduruchampa	Rajabasa	BLE-21(P)	3.01		Dudruchampa (T)	Rajabasa
Pithabata (WL)		Nawana (S)	Duduruchampa	Rajabasa	BLE-22(P)	1.12	ision	Dudruchampa (T)	,
Pithabata (WL)		(WL)	Pitahabata	Pitahabata-I			da Div		Pithabata(C)
Pithabata (WL)		Nawana (S)	Badmakabadi		P-14(P)	0.34	эра	Dudruchampa (T)	Gopinathpur
Chandanchaturill   Chandanchat			Pitahabata	Pithabata-II	P-9	10.37	Bari	Pithabata-II	-
Similipal Tiger Reserve   Pithabata (WL)   Pithabata (W			Pitahabata	Digdiga	SJ-I(P)	4.40		Digidiga	-
Reserve (WL) ri			Pitahabata	Digdiga	P-13	8.45		Digidiga	-
Chahala   Barehipani   Barehipani   Barehipani   Barehipani   Barehipani   Chahala   Bakua-II   Nawana(S)   Bakua   Bakua-II   Total   Total   Sa.69	_		Pitahabata		SJ-2	8.04		Chandanchaturill	ChandanChat uri-I
National Park National Park National Park  National Park  Total  Chahala Chahala Karkachia BLW-12(P) 1.07 Chahala Chahala Barehipani BLW-15 Chahala Barehipani Bakua Bakua-II BLW-18(P) 0.5 Nawana(S) Bakua Garh-Similipal BLW-17(P) 2.62  Total  Khejuri (T)			Pitahabata		SJ-3	8.37		Chandanchaturill	ChandanChat uri-l
Park National Park  National Park  Total  Chahala Chahala Chahala Chahala Barehipani Chahala Barehipani				Total		53.69			
Chahala Chahala Karkachia BLW-12(P) 1.07 Chahala Chahala Bhatunia BLW-13(P) 2.37 Chahala Barehipani Barehipani BLW-14(P) 0.11 Chahala Barehipani Barehipani BH-11 11.82  Chahala Barehipani Barehipani BLW-15 13.14 Nawana(S) Bakua Bakua-II BLW-18(P) 0.5 Nawana(S) Bakua Garh-Similipal BLW-17(P) 2.62  Total Charabandh Charabandh Bhatunia Barehipani(T) Barehipani(C)			Kabatghai	Kabatghai-I	KH-17(P)	0.94	sion	Khejuri (T)	Kabatghai-I
Chahala Chahala Karkachia BLW-12(P) 1.07 Chahala Chahala Bhatunia BLW-13(P) 2.37 Chahala Barehipani Barehipani BLW-14(P) 0.11 Chahala Barehipani Barehipani BH-11 11.82  Chahala Barehipani Barehipani BLW-15 13.14 Nawana(S) Bakua Bakua-II BLW-18(P) 0.5 Nawana(S) Bakua Garh-Similipal BLW-17(P) 2.62  Total Charabandh Charabandh Bhatunia Barehipani(T) Barehipani(C)			Kabatghai	Khejuri	KH-19(P)	1.01	a Divis	Khejuri (T)	Khejuri
Chahala Chahala Bhatunia BLW-13(P) 2.37 Chahala Barehipani Barehipani BLW-14(P) 0.11 Chahala Barehipani Barehipani BH-11 11.82  Chahala Barehipani Barehipani BLW-15 13.14 Nawana(S) Bakua Bakua-II BLW-18(P) 0.5 Nawana(S) Bakua Garh-Similipal BLW-17(P) 2.62  Total Charabandh Bhatunia Barehipani(C) Barehipani(T)				Total		1.95	Karanji		
Chahala Barehipani Barehipani BLW-14(P) 0.11 Chahala Barehipani Barehipani BH-11 11.82  Chahala Barehipani BLW-15 13.14 Nawana(S) Bakua Bakua-II BLW-18(P) 0.5 Nawana(S) Bakua Garh-Similipal BLW-17(P) 2.62  Total Barehipani(T) Barehipani(Garehipani)  Matighati - Garh Similipal Bakua-II Garh Similipal Nigirdha(T)		Chahala	Chahala	Karkachia	BLW-12(P)	1.07		Charabandh	Karkachia
Chahala Barehipani Barehipani BH-11 11.82  Chahala Barehipani Matighati BLW- 15 13.14  Nawana(S) Bakua Bakua-II BLW-18(P) 0.5  Nawana(S) Bakua Garh-Similipal BLW-17(P) 2.62  Total Total BH-11 11.82  Barehipani(T) Barehipani (1)  Matighati -  Garh Similipal Bakua-II  Garh Similipal Nigirdha(T)									
Nawana(S) Bakua Garh-Similipal BLW-17(P) 2.62 Total 31.99 Garh Similipal Nigirdha(T)			Barehipani		BLW-14(P)	0.11	↓ .	Barehipani(T)	Barehipani(C)
Nawana(S) Bakua Garh-Similipal BLW-17(P) 2.62 Total 31.99 Garh Similipal Nigirdha(T)		Chahala	·	·			angpur ision	, , ,	Barehipani (C )
Nawana(S) Bakua Garh-Similipal BLW-17(P) 2.62 Total 31.99 Garh Similipal Nigirdha(T)			·				aira Div		
Total 31.99			+				æ		
		Nawana(S)	Bakua		BLW-17(P)			Garh Similipal	Nigirdha(T)
[ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [ [				G.Total		87.63			

Table III: New area of the STR Core Division, Baripada, Karanjia, and Rairangpur in Similipal Tiger Reserve after Restructuring.

Name of the	Total Core	Total Buffer	Other	Total	Area trai	nsferred	Total Core	Total
Division	Area	area	rev.forests /	Area of	Area	Area	Area	Buffer
	before	of the	village	the	excluded in	included in	after Re-	Area of
	Re-	Division	forests in	Division	Sq. Kms	Sq Kms	stucture	the
	structure	before	Sq.kms	in STR in			in Sq.Kms	Division
	in Sq.Kms	Restructure		Sq.kms.				after
				before				Restructur
				Restruct				ing in
				ure				sq.Kms.
STR Core	808.66	87.63	NIL	896.29	87.63	386.09	1194.75	NIL
Division								
Baripada	113.68	321.15	80.40	515.23	113.68	53.69	NIL	455.24
Karanjia	199.5	311.61	198.12	709.23	199.5	1.95	NIL	511.68
Rairangpur	72.91	271.52	199.70	544.13	72.91	31.99	NIL	503.21
Village/Reve				85.12			-	85.12
nue areas								
Total				2750.0			1194.75	1555.25
				(Tiger			(Core)	(Buffer)
				reserve)				

#### **APPENDIX XIV LIST OF MAMMALS**

1.	Badger, Honey or Ratel (Oriya: Gada Bhalu) (Mellivora capensis)
2.	Bear, Sloth (Oriya: Bhalu) (Melursus ursinus)
3.	Bison, Indian or Gaur (Oriya: Gayala) (Bos gaurus)
4.	Boar, Wild (Oriya: Barha) (Sus scorfa cristatus)
5.	Cat, Fishing (Oriya: Machharankana Biradi) (Prionailurus viverrinus)
6.	Cat, Jungle (Oriya: Bana Bhua, Katas) (Felis chaus)
7.	Cat, Leopard (Oriya: Chitta Biradi) (Felis bengalensis)
8.	Cat, Rusty-spotted (Oriya: Chhota Biradi) ( <i>Prionailurus rubiginosus</i> ) (1 <sup>st</sup> Recorded in 2014)
9.	Civet, Small Indian (Oriya: Salia Patani) (Vivarricula indica)
10.	Civet, Large Indian (Oriya: Salia Patani)(Vivera Zibetha)
11.	Civet, Common palm Civet (Oriya: Salia patani)(paradoxurus hermaphodiths)
12.	Civet, white banded palm civet(Hemigalus derbyanus)
13.	Deer, Barking or Muntjac (Oriya: Kutura) (Muntiacus muntjak)
14.	Deer, Mouse or Indian Chevrotan (Oriya: Gurandi) ( <i>Traqulus = Moschiola meminna</i> )
15.	Deer, Sambar (Oriya: Sambar) (Rusa unicolor)
16.	Deer, Spotted or Chital (Oriya: Harina, Mruga) (Axis axis)
17.	Elephant, Indian (Oriya: Hati) ( <i>Elephas maximus</i> )
18.	Fox, Indian (Oriya: Koki Siali) (Vulpes bengalensis)
19.	Fox, Indian Flying (Oriya: Badudi) (Pteropus giganteus)
20.	Fulvous fruit bat (Rousettus lesnaultii)
21.	Greater short-nosed fruit bat (Cynopterus sphinx)

22.	Lesser short-nosed fruit bat (Cynopterus brachyotis
23.	Fulvous horse shoe bat (Rhinolophus rouxii)
24.	Blyth's horse shoe bat (Rhinolophus lepidus)
25.	Indian leaf-nosed bat ( <i>Hipposideros lankadiva</i> )
26.	Indian Pygmy Pipistrelle ( <i>Pipistrellus mimus</i> )
27.	Coromandel Pipistrelle (Pipistrellus coromandra)
28.	Greater Asiatic Yellow house bat (Scotoecus pallidus)
29.	Lesser Asiatic Yellow house bat (Scotophilus kuhlii)
30.	White bellied tube-nosed bat ( <i>Murina huttoni</i> ) (1 <sup>st</sup> Recorded in 2013)
31.	Hare, Rufous tailed (Oriya: Thekua) (Lepus nigricollis ruficaudatus)
32.	Hyaena, Stripped (Oriya: Hundala, Heta Bagha) ( <i>Hyaena hyaena</i> )
33.	Jackal (Oriya: Bilua, Siala) (Canis aureus)
34.	Langur, Common (Oriya: Hanu Mankada) (Semnopithecus)
35.	Leopard (Oriya: Kalara-patria Bagha, Pendra) (Panthera pardus)
36.	Mole-Rat, Indian (Oriya: no specific name) (Bandicuta bengalensis)
37.	Mongoose, Common (Oriya: Bada Neula) (Herpestes edwardsi)
38.	Mongoose, Ruddy (Oriya: Kala Langudia Neula) (Herpestes smithi)
39.	Mongoose, Small Indian (Oriya: Sana Neula, Nali-muhan Neula) (Herpestes auropunctatus)
40.	Mongoose, Stripe necked mongoose (Oriya: Neula) (Herpestes vittcollis) (1st Recorded in
	2012)
41.	Mouse, Indian Field (Oriya: Musa) (Mus booduga)
42.	Otter, Smooth-coated (Oriya: Machhakhia Pani Odha) (Lutra perspicillata)
43.	Otter, Asian Small-clawed (Oriya: Kankadakhia Pani Odha ( <i>Aonyx cinereus</i> ) (1 <sup>st</sup> Recorded in
	2012)
44.	Pangolin, Indian (Oriya: Bajrokapta) (Manis crassicaudata)
45.	Pipistrelle, Indian (Oriya: Chemini) ( <i>Pitistrellus coromandra</i> )
46.	Procupine, Indian (Oriya: Jhinka) ( <i>Hystrix Indica</i> )
47.	Rhesus Macaque (or Pati Mankada) ( <i>Macaque mullata</i> )
48.	Shrew, Tree (Oriya: Bana chuchundra) ( <i>Anathana ellioti</i> )
49.	Shrew, Pigmy (Oriya: Baman Chuchundra) (Sorex minutus) (1st Recorded in 2013)
50.	Squirrel, Common Giant Flying (Oriya: Olei Budi) ( <i>Pteaurista petaurista</i> )
51.	Squirrel, Giant Indian (Oriya: Belera Musa) ( <i>Ratufa indica</i> )
52.	Squirrel, Three stripped palm (Oriya: Gunduchi musa) (Funambulus palmarum)
53.	Tiger or Royal Bengal Tiger (Oriya: Mahabala Bagha) (Panthera tigris)
54.	Wolf (Oriya: Gadhia) (Canis lupus)
55.	Antelope, Four-horned or Chowsingha (Oriya: Chausingha) (Tetracerus quadricornis) (Not
	sighted for the last several years)
56.	Dog, Wild or Dhole (Oriya: Balia Kukura) ( <i>Cuon alpinus</i> ) (Not sighted for the last several
	years )
	, ,

#### **ANNEXURE XV LIST OF BIRDS**

Sl. no	Common Name	Scientific Name
	PODICIPEDIDAE	
1.	Great Crested Grebe	Podiceps cristatus
2.	Little Grebe	Tachybaptus ruficollis
3.	Red necked Grebe	Podiceps grisegena
]	PHALACROCORACIDAE	
4.	Little Cormorant	Phalacrocorax niger
5.	Indian Cormorant	Phalacrocorax fuscicollis
6.	Great Cormorant	Phalacrocorax carbo
]	PHASIANIDAE	
7.	Grey Francolin	Francolinus pondicerianus
8.	Black Francolin	Francolinus francolinus
9.	Common Peafowl	Pavo cristatus
10.	Painted Spurfowl	Galloperdix lunulata
11.	Red Spurfowl	Galloperdix spadicea
12.	Red Junglefowl	Gallus gallus
13.	Jungle Bush Quail	Perdicula asiatica
14.	Rain Quail	Coturnix coromandelica
15.	Blue-breasted Quail	Coturnix chinensis
16.	Painted Bush Quail	Crythro rsinyricha
]	DENDROCYGNIDAE	
17.	Lesser Whistling Duck	Dendrocygna javanica
1	ANATIDAE	
18.	Cotton Pygmy-goose	Nettapus coromandelianus
19.	Common Teal	Anas crecca
20.	Garganey	Anas querquedula
21.	Spot-billed Duck	Anas poecilorhyncha
22.	Gadwall	Anas strepera
23.	Eurasian Wigeon	Anas penelope
24.	Northern Pintail	Anas acuta
25.	Common Pochard	Aythya ferina
26.	Ferruginous Pochard	Aythya nyroca
27.	Tufted Duck	Aythya fuligula
28.	Red crested Pochard	Netta rufina
29.	Comb Duck	Sarkidiornis melanotos
30.	Rudy Shelduck	Tadorna ferruginea
31.	Baer's Pochard	Aythya baeri
	ΓURNICIDAE	
32.	Barred Buttonquail	Turnix suscitator
33.	Small buttonquail	Turnix sylvaticus
34.	Yellow legged buttonquail	Turnix tanki

Į	PICIDAE	
35.	Eurasian Wryneck	Jynx torquilla
36.	Speckled Piculet	Picumnus innominatus
37.	Brown-capped Pygmy Woodpecker	Dencdrocopos nanus
38.	Fulvous-breasted Woodpecker	Dendrocopus macei
39.	Yellow-crowned Woodpecker	Dendrocopos mahrattensis
40.	Rufous Woodpecker	Celeus brachyurus
41.	Lesser Yellownape	Picus chlorolophus
42.	Greater Yellownape	Picus flavinucha
43.	Streak-throated Woodpecker	Picus xanthopygaeus
44.	Grey-headed Woodpecker	Picus canus
45.	Black-rumped Flameback	Dinopium benghalense
46.	Greater Flameback	Chrysocolaptes lucidus
47.	Heart Spotted Woodpecker	Hemicircus canente
1	MEGALAIMIDAE	
48.	Coppersmith Barbet	Megalaima haemacephala
49.	Brown-headed Barbet	Megalaima zeylanica
50.	Lineated Barbet	Megalaima lineata
51.	Blue-throated Barbet	Megalaima asiatica
	BUCEROTIDAE	
52.	Indian Grey Hornbill	Ocyceros birostris
53.	Oriental Pied Hornbill	Anthracoceros albirostris
54.	Malabar Pied Hornbill	Anthracoceros coronatus
	JPUPIDAE	Third deceros coronalias
55.	Common Hoopoe	Unung anons
	FROGONIDAE	Upupa epops
56.		Harnactas fasciatus
	CORACIIDAE	Harpactes fasciatus
<del>57.</del>		
	Indian Roller	Coracias benghalensis
	ALCEDINIDAE	A1 11 ·
<u>58.</u>	Common Kingfisher	Alcedo atthis
<u>59.</u>	White-throated Kingfisher	Halcyon smyrnensis
60.	Stork-billed Kingfisher	Halcyon capensis
61.	Pied Kingfisher	Ceryle rudis
	MEROPIDAE	
62.	Green Bee-eater	Merops orientalis
63.	Blue-tailed Bee-eater	Merops philippinus
64.	Blue-bearded Bee-eater	Nyctyornis athertoni
65.	Chestnut-headed Bee-eater	Merops leschenaulti
(	CUCULIDAE	
66.	Asian Koel	Eudynamys scolopacea
67.	Pied Cuckoo	Clamator jacobinus
68.	Chestnut-winged Cuckoo	Clamator coromandus

69.	Common Hawk Cuckoo	Hierococcyx varius
70.	Large Hawk Cuckoo	Hierococcyx sparverioides
71.	Indian Cuckoo	Cuculus micropterus
72.	Oriental Cuckoo	Cuculus saturatus
73.	Lesser Cuckoo	Cuculus poliocephalus
74.	Grey-bellied Cuckoo	Cacomantis passerinus
75.	Banded Bay Cuckoo	Cacomantis sonneratii
76.	Drongo Cuckoo	Surniculus lugubris
77.	Sirkeer Malkoha	Phaenicophaeus leshcenaultii
78.	Blue-faced Malkoha	Phaenicophaeus viridirostris
79.	Green billed Malkoha	Phaenicophaeus tristis
	CENTROPIDAE	-
80.	Greater Coucal	Centropus sinensis
81.	Lesser Coucal	Centropus bengalnesis
P	SITTACIDAE	_
82.	Rose-ringed Parakeet	Psittacula krameri
83.	Alexandrine Parakeet	Psittacula eupatria
84.	Plum-headed Parakeet	Psittacula cyanocephala
85.	Vernal Hanging Parrot	Loriculus vernalis
A	APODIDAE	
86.	Asian Palm Swift	Cypsiurus balasiensis
87.	Alpine Swift	Apus melba
88.	White-rumped Needletail	Zoonavena sylvatica
89.	House little Swift	Apus affinis
F	IEMIPROCNIDAE	
90.	Crested Tree Swift	Hemiprocne coronata
Τ	YTONIDAE	
91.	Barn Owl	Tyto alba
92.	Grass Owl	Tyto capensis
S	TRIGIDAE	
93.	Collared Scops Owl	Otus bakkamoena
94.	Oriental Scops Owl	Otus sunia
95.	Spotted Owlet	Athene brama
96.	Jungle Owlet	Glaucidium radiatum
97.	Brown Hawk Owl	Ninox scutulata
98.	Short-eared Owl	Asio flammeus
99.	Indian Eagle Owl	Bubo bubo
100.		Bubo nipalensis
101.		Ketupa zeylonenis
102.	Brown Wood Owl	Strix leptogrammica
103.	Mottled Wood Owl	Strix ocellata
	CAPRIMULGIDAE	
104.	Grey Nightjar	Caprimulgus indicus
105.	Indian Nightjar	Caprimulgus asiaticus

105	T =				
	Savanna Nightjar	Caprimulgus affinis			
	Large-tailed Nightjar	Caprimulgus macrurus			
	COLUMBIDAE				
	Rock Pigeon	Columba livia			
109.	Pale-capped Pigeon	Columba punicea			
	Green Imperial Pigeon	Ducula aenea			
	Mountain Imperial Pigeon	Ducula badia			
112.	Oriental Turtle Dove	Streptopelia orientalis			
113.	Laughing Dove	Streptopelia senegalensis			
	Spotted Dove	Streptopelia chinensis			
115.	Red Collared Dove	Streptopelia tranquebarica			
116.	Eurasian Collared Dove	Streptopelia decaocto			
117.	Emerald Dove	Chalcophaps indica			
118.	Yellow-footed Green pigeon	Treron phoenicoptera			
119.	Orange-breasted Green Pigeon	Treron bicincta			
120.	Pompadour Green Pigeon	Treron pompadora			
	PTEROCLIDIDAE				
121.	Chestnut-bellied Sandgrouse	Pterocles exustus			
	RALLIDAE				
122.	Purple Swamphen	Porphyrio porphyrio			
	Water Cock	Gallicrex cinerea			
124.	Common Moorhen	Gallinula chloropus			
125.	White-breasted Waterhen	Amaurornis phoenicurus			
126.	Brown Crake	Amaurornis akool			
127.	Ruddy-breasted Crake	Porzana fusca			
128.	-	Gallirallus striatus			
129.	Common Coot	Fulica atra			
R	COSTRATULIDAE				
	Greater Painted-Snipe	Rostratula bengalensis			
	COLOPACIDAE				
131.	Common Snipe	Gallinago gallinago			
132.	-	Tringa totanus			
133.	Common Greenshank	Tringa nebularia			
134.		Tringa ochropus			
135.		Tringa hypoleucos			
136.		Tringa glareola			
137.		Calidris minuta			
138.		Calidris temminckii			
	BURHINIDAE				
139.	T	Burhinus oedicnemus			
	RECURVIROSTRIDAE				
140.	Black-winged Stilt	Himantopus himantopus			
	ACANIDAE				
141.	Bronze-winged Jacana	Metopidius indicus			
<u> </u>	<u> </u>	*			

142.	Pheasant-tailed Jacana	Hydrophasianus chirurgus
G	LAREOLIDAE	
143.	Small Pratincole	Glareola lactea
C	HARADRIIDAE	
144.	Little Ringed Plover	Charadrius dubius
	Red-wattled Lapwing	Vanellus indicus
	Yellow-wattled Lapwing	Vanellus malabaricus
147.	Kentish plover	Charadrius alexandrinus
	Gray-headed Lapwing	Vanellus cinerens
	ARIDAE	
149.	Brown-headed Gull	Larus brunnicephalus
150.	Gull-billed Tern	Gelochelidon nilotica
151.	River Tern	Sterna aurantica
152.	Black bellied Tern	Sterna acuticauda
153.	Whiskered Tern	Chlidonias hybrida
A	CCIPITRIDAE	
154.	Jerdon's Baza	Aviceda jerdoni
155.	Black Baza	Aviceda leuphotes
156.	Osprey	Pandion haliaetus
157.	Black-shouldered Kite	Elanus caeruleus
158.	Black Kite	Milvus migrans
159.	Brahminy Kite	Haliastur indus
160.	Cinereous Vulture	Aegypius monachus
161.		Sarcogyps calvus
162.	Egyptian vulture	Neophron percnopterus
163.	Short-toed Snake Eagle	Circaetus gallicus
164.	1 0	Spilornis cheela
	Black Eagle	Ictinaetus malayensis
166.	Eurasian Marsh Harrier	Circus aeruginosus
167.	Pallid Harrier	Circus macrourus
168.	Pied Harrier	Circus melanoleucos
169.	Shikra	Accipiter badius
170.	Besra	Accipiter virgatus
171.	Eurasian Sparrowhawk	Accipiter nisus
172.	Crested Goshawk	Accipiter trivirgatus
173.	Oriental Honey Buzzard	Pernis ptilorhyncus
174.	White-eyed Buzzard	Butastur teesa
175.	Common Buzzard	Buteo buteo
176.	Greater Spotted Eagle	Aquila clanga
177.	Steppe Eagle	Aquila nipalensis
178.	Bonelli's Eagle	Hieraaetus fasciatus
179.	Booted Eagle	Hieraaetus pennatus
180.	Rufous-bellied Eagle	Hieraaetus kienerii
181.	Changeable Hawk Eagle	Spizaetus cirrhatus

183. Lesser spotted eagle 184. Grey headed fish eagle FALCONIDAE  185. Collared Falconet 186. Common Kestrel 187. Lesser Kestrel 188. Peregrine Falcon 189. Laggar Falcon 189. Laggar Falcon 189. Laggar Falcon 189. Laggar Falcon 190. Eurasian Hobby ANHINGIDAE 191. Darter ARDEIDAE 192. Little Heron 193. Pond Heron 194. Purple Heron 195. Grey Heron 196. Cattle Egret 197. Little Egret 198. Intermediate Egret 199. Great Egret 200. Black crowned Night Heron 201. Black Bittern 202. Yellow Bittern 203. Cinnamon Bittern 204. Asian Openbill 205. Woolly-necked Stork 206. Painted stork 207. Rosy Minivet 208. Rosy Minivet 209. Rosy Minivet 200. Periorocotus cinnamomeus 201. Campel Minivet 202. Scarlet Minivet 203. Carlet Minivet 204. Rosy Minivet 206. Periorocotus cinnamomeus 207. Scarlet Minivet 208. Periorocotus cinnamomeus 209. Rosy Minivet 200. Periorocotus cinnamomeus 201. Conracted Minivet 202. Scarlet Minivet 203. Carlet Minivet 204. Rosy Minivet 205. Rosy Minivet 206. Periorocotus croseus 207. Carcina novaehollandia 208. Large Woodshrike 209. Scarlet Minivet 200. Periorocotus cinnamomeus 201. Coracina novaehollandia 202. Small Minivet 203. Carcina novaehollandia 204. Large Woodshrike 205. Coracina novaehollandia	182.	Pallas fish eagle	Haliaeetus leucoryphus
184. Grey headed fish eagle FALCONIDAE  185. Collared Falconet 186. Common Kestrel 187. Lesser Kestrel 188. Peregrine Falcon 188. Peregrine Falcon 189. Laggar Falcon 189. Laggar Falcon 190. Eurasian Hobby ANHINGIDAE 191. Darter ARDEIDAE 192. Little Heron 193. Pond Heron 194. Purple Heron 195. Grey Heron 196. Cattle Egret 197. Little Egret 198. Intermediate Egret 199. Great Egret 199. Great Egret 199. Great Egret 190. Black crowned Night Heron 191. Daytor flavicollis 192. Vellow Bittern 202. Yellow Bittern 203. Cinnamon Bittern 204. Asian Openbill 205. Woolly-necked Stork 206. Painted stork 207. Black his 208. Black-headed White Ibis 209. Rosy Minivet 209. Rosy Minivet 200. Scarlet Minivet 201. Pericrocotus roseus 201. Campon Woodshrike 202. Small Minivet 203. Campon Woodshrike 204. Large Woodshrike 205. Scarlet Minivet 206. Pericrocotus roseus 207. Common Woodshrike 208. Black Large Ucokooshrike 209. Rosy conductors 201. Black Bittern 201. Scarlet Minivet 202. Pericrocotus roseus 203. Cinquan on Woodshrike 204. Coracina melasochistos		)	
FALCONIDAE  185. Collared Falconet  186. Common Kestrel  187. Lesser Kestrel  188. Peregrine Falcon  189. Laggar Falcon  189. Falco subbuteo  ANHINGIDAE  191. Darter  ARDEIDAE  192. Little Heron  193. Pond Heron  194. Purple Heron  195. Grey Heron  196. Cattle Egret  197. Little Egret  198. Intermediate Egret  199. Great Egret  200. Black crowned Night Heron  201. Black Bittern  202. Yellow Bittern  203. Cinnamon Bittern  CICONIDAE  204. Asian Openbill  205. Woolly-necked Stork  206. Painted stork  THRESKIORNITHIDAE  207. Black Ibis  208. Black-headed White Ibis  CAMPEPHAGIDAE  209. Rosy Minivet  201. Searle Minivet  Pericrocotus roseus  201. Common Woodshrike  202. Seman Minivet  Pericrocotus cinnamomeus  CICONIDAE  208. Black headed Cuckoo-shrike  Coracina melanoptera  209. Black common Woodshrike  Coracina melanoptera  201. Black Black headed Cuckoo-shrike  Coracina melanoptera  201. Black black-headed Cuckoo-shrike  Coracina melanoptera  202. Coracina melanoptera  203. Black-hisos			
186. Common Kestrel  187. Lesser Kestrel  188. Peregrine Falcon  189. Laggar Falcon  189. Laggar Falcon  189. Laggar Falcon  189. Falco pregrinus  189. Laggar Falcon  190. Eurasian Hobby  ANHINGIDAE  191. Darter  ARDEIDAE  192. Little Heron  193. Pond Heron  194. Purple Heron  195. Grey Heron  196. Cattle Egret  197. Little Egret  198. Intermediate Egret  199. Great Egret  199. Great Egret  200. Black crowned Night Heron  201. Black Bittern  202. Yellow Bittern  203. Cinnamon Bittern  CICONIDAE  204. Asian Openbill  205. Woolly-necked Stork  206. Painted stork  207. Black libis  208. Black-headed White Ibis  CAMPEPHAGIDAE  209. Rosy Minivet  200. Scarlet Minivet  201. Common Woodshrike  202. Small Minivet  203. Common Woodshrike  204. Large Woodshrike  205. Coracina melaschistos		_	7 1 0 7
186. Common Kestrel  187. Lesser Kestrel  188. Peregrine Falcon  189. Laggar Falcon  189. Laggar Falcon  189. Laggar Falcon  189. Falco pregrinus  189. Laggar Falcon  190. Eurasian Hobby  ANHINGIDAE  191. Darter  ARDEIDAE  192. Little Heron  193. Pond Heron  194. Purple Heron  195. Grey Heron  196. Cattle Egret  197. Little Egret  198. Intermediate Egret  199. Great Egret  199. Great Egret  200. Black crowned Night Heron  201. Black Bittern  202. Yellow Bittern  203. Cinnamon Bittern  CICONIDAE  204. Asian Openbill  205. Woolly-necked Stork  206. Painted stork  207. Black libis  208. Black-headed White Ibis  CAMPEPHAGIDAE  209. Rosy Minivet  200. Scarlet Minivet  201. Common Woodshrike  202. Small Minivet  203. Common Woodshrike  204. Large Woodshrike  205. Coracina melaschistos	185.	Collared Falconet	Microhierax caerulescens
188. Peregrine Falcon  189. Laggar Falcon  190. Eurasian Hobby  ANHINGIDAE  191. Darter  ARDEIDAE  192. Little Heron  193. Pond Heron  194. Purple Heron  195. Grey Heron  196. Cattle Egret  197. Little Egret  198. Intermediate Egret  199. Great Egret  199. Great Egret  199. Great Egret  190. Black rowned Night Heron  201. Black Bittern  202. Yellow Bittern  203. Cinnamon Bittern  204. Asian Openbill  205. Woolly-necked Stork  206. Painted stork  THRESKIORNITHIDAE  207. Black Ibis  208. Rosy Minivet  209. Rosy Minivet  201. Small Minivet  201. Small Minivet  202. Pericrocotus ethologus  203. Camerodius albus  Pericrocotus roseus  204. Pericrocotus ethologus  205. Camerodius albus  Pericrocotus roseus  Pericrocotus roseus  206. Painted stork  THRESKIORNITHIDAE  207. Black Ibis  208. Black-headed White Ibis  CAMPEPHAGIDAE  209. Rosy Minivet  209. Rosy Minivet  201. Large Cuckoo-shrike  201. Large Cuckoo-shrike  202. Tephrodornis gularis  203. Croacina melanoptera  204. Large Woodshrike  205. Coracina melanoptera  206. Peinted occupants  207. Black Ibis  208. Black-headed Cuckoo-shrike  209. Rosy Minivet  209. Rosy Minivet  200. Croacina melanoptera  201. Coracina melanoptera  202. Small Minivet  203. Cinamon Woodshrike  204. Coracina melanoptera  205. Coracina melanoptera	186.	Common Kestrel	
189. Laggar Falcon  Falco jugger  190. Eurasian Hobby  ANHINGIDAE  191. Darter  ARDEIDAE  192. Little Heron  Butorides striatus  193. Pond Heron  Ardea grayii  194. Purple Heron  Ardea cinerea  196. Cattle Egret  Bubulcus ibis  197. Little Egret  Egretta garzetta  198. Intermediate Egret  Mesophoyx intermedia  200. Black crowned Night Heron  Dupetor flavicollis  201. Jellow Bittern  CICONIDAE  202. Yellow Bittern  CICONIDAE  204. Asian Openbill  Anastomus oscitans  CICONIDAE  205. Woolly-necked Stork  Ciconia episcopus  THRESKIORNITHIDAE  207. Black Ibis  Pseudibis papillosa  Threskiornis melanocepha  CAMPEPHAGIDAE  209. Rosy Minivet  Pericrocotus roseus  210. Scarlet Minivet  Pericrocotus ethologus  211. Long-tailed Minivet  Pericrocotus ethologus  212. Small Minivet  Pericrocotus cinnamomeu  Coracina nevaehollandia  214. Large Woodshrike  Tephrodornis gularis  215. Common Woodshrike  Tephrodornis pondicerian  216. Black-winged Cuckooshrike  Coracina melanoptera  Coracina melanoptera	187.	Lesser Kestrel	Falco naumanni
189. Laggar Falcon  Falco jugger  190. Eurasian Hobby  ANHINGIDAE  191. Darter  ARDEIDAE  192. Little Heron  Butorides striatus  193. Pond Heron  Ardea grayii  194. Purple Heron  Ardea cinerea  196. Cattle Egret  Bubulcus ibis  197. Little Egret  Egretta garzetta  198. Intermediate Egret  Mesophoyx intermedia  200. Black crowned Night Heron  Dupetor flavicollis  201. Jellow Bittern  CICONIDAE  202. Yellow Bittern  CICONIDAE  204. Asian Openbill  Anastomus oscitans  CICONIDAE  205. Woolly-necked Stork  Ciconia episcopus  THRESKIORNITHIDAE  207. Black Ibis  Pseudibis papillosa  Threskiornis melanocepha  CAMPEPHAGIDAE  209. Rosy Minivet  Pericrocotus roseus  210. Scarlet Minivet  Pericrocotus ethologus  211. Long-tailed Minivet  Pericrocotus ethologus  212. Small Minivet  Pericrocotus cinnamomeu  Coracina nevaehollandia  214. Large Woodshrike  Tephrodornis gularis  215. Common Woodshrike  Tephrodornis pondicerian  216. Black-winged Cuckooshrike  Coracina melanoptera  Coracina melanoptera	188.	Peregrine Falcon	Falco peregrinus
190. Eurasian Hobby ANHINGIDAE  191. Darter ARDEIDAE  192. Little Heron Butorides striatus  193. Pond Heron Ardea purpurea  195. Grey Heron Ardea cinerea  196. Cattle Egret Bubulcus ibis  197. Little Egret Egretta garzetta  198. Intermediate Egret Ascrowned Night Heron Andea Camerodius albus  200. Black crowned Night Heron Andea Camerodius albus  201. Black Bittern Dupetor flavicollis  202. Yellow Bittern Lixobrychus sinensis  203. Cinnamon Bittern CICONIDAE  204. Asian Openbill Anastomus oscitans  205. Woolly-necked Stork Ciconia episcopus  206. Painted stork THRESKIORNITHIDAE  Black headed White Ibis  CAMPEPHAGIDAE  209. Rosy Minivet Pericrocotus roseus  211. Long-tailed Minivet Pericrocotus roseus  212. Small Minivet Pericrocotus einnamomeus  Croacina melanoptera  213. Large Cuckoo-shrike Tephrodornis gularis  Tephrodornis pondicerian  214. Large Woodshrike Tephrodornis pondicerian  215. Common Woodshrike Tephrodornis pondicerian  Coracina melanoptera  Coracina melanoptera  Coracina melanoptera  Coracina melanoptera  Coracina melanoptera  Coracina melaschistos			
ANHINGIDAE  191. Darter  ARDEIDAE  192. Little Heron  Butorides striatus  193. Pond Heron  Ardea purpurea  195. Grey Heron  Ardea cinerea  196. Cattle Egret  Bubulcus ibis  197. Little Egret  Bubulcus ibis  198. Intermediate Egret  Mesophoyx intermedia  199. Great Egret  Camerodius albus  200. Black crowned Night Heron  Nycticorax nycticorax  201. Black Bittern  Dupetor flavicollis  202. Yellow Bittern  Lxobrychus sinensis  203. Cinnamon Bittern  CICONIDAE  204. Asian Openbill  Anastomus oscitans  CICONIDAE  205. Woolly-necked Stork  Ciconia episcopus  206. Painted stork  THRESKIORNITHIDAE  207. Black Ibis  Pseudibis papillosa  Threskionnis melanocepha  CAMPEPHAGIDAE  209. Rosy Minivet  Pericrocotus roseus  210. Scarlet Minivet  Pericrocotus roseus  211. Long-tailed Minivet  Pericrocotus cinnamomeu  212. Small Minivet  Pericrocotus cinnamomeu  Pericrocotus cinnamomeu  Coracina novaehollandia  214. Large Woodshrike  Tephrodornis pondicerian  215. Common Woodshrike  Tephrodornis pondicerian  Coracina melanoptera  Coracina melanoptera  Coracina melanoptera			
ARDEIDAE  192. Little Heron  193. Pond Heron  Ardeola grayii  194. Purple Heron  Ardea cinerea  195. Grey Heron  Ardea cinerea  196. Cattle Egret  Bubulcus ibis  197. Little Egret  Egretta garzetta  198. Intermediate Egret  Mesophoyx intermedia  199. Great Egret  Casmerodius albus  200. Black crowned Night Heron  Nycticorax nycticorax  201. Black Bittern  Dupetor flavicollis  202. Yellow Bittern  Lixobrychus sinensis  203. Cinnamon Bittern  CICONIDAE  204. Asian Openbill  Anastomus oscitans  CICONIDAE  205. Woolly-necked Stork  Ciconia episcopus  206. Painted stork  THRESKIORNITHIDAE  207. Black Ibis  Pseudibis papillosa  208. Black-headed White Ibis  CAMPEPHAGIDAE  209. Rosy Minivet  Pericrocotus roseus  210. Scarlet Minivet  Pericrocotus ethologus  211. Long-tailed Minivet  Pericrocotus ethologus  212. Small Minivet  Pericrocotus cinnamomeu  213. Large Cuckoo-shrike  Coracina novaehollandia  214. Large Woodshrike  Tephrodornis pondicerian  215. Common Woodshrike  Tephrodornis pondicerian  Coracina melanoptera  Coracina melanoptera	A	NHINGIDAE	
192. Little Heron Butorides striatus  193. Pond Heron Ardeola grayii  194. Purple Heron Ardea cinerea  195. Grey Heron Ardea cinerea  196. Cattle Egret Bubulcus ibis  197. Little Egret Egretta garzetta  198. Intermediate Egret Mesophoyx intermedia  199. Great Egret Casmerodius albus  200. Black crowned Night Heron Nycticorax nycticorax  201. Black Bittern Dupetor flavicollis  202. Yellow Bittern Ixobrychus sinensis  203. Cinnamon Bittern Ixobrychus cinnamomeus  CICONIDAE  204. Asian Openbill Anastomus oscitans  205. Woolly-necked Stork Ciconia episcopus  206. Painted stork Mycteria leucocephala  THRESKIORNITHIDAE  207. Black Ibis Pseudibis papillosa  208. Black-headed White Ibis Threskiornis melanocepha  CAMPEPHAGIDAE  209. Rosy Minivet Pericrocotus roseus  210. Scarlet Minivet Pericrocotus roseus  211. Long-tailed Minivet Pericrocotus ethologus  212. Small Minivet Pericrocotus cinnamomeu  213. Large Cuckoo-shrike Coracina novaehollandia.  214. Large Woodshrike Tephrodornis gularis  215. Common Woodshrike Coracina melanoptera  216. Black-winged Cuckooshrike Coracina melanoptera  217. Black-winged Cuckooshrike Coracina melanoptera	191.	Darter	Anhinga melanogaster
193. Pond Heron Ardeola grayii 194. Purple Heron Ardea purpurea 195. Grey Heron Ardea cinerea 196. Cattle Egret Bubulcus ibis 197. Little Egret Egretta garzetta 198. Intermediate Egret Mesophoyx intermedia 199. Great Egret Casmerodius albus 200. Black crowned Night Heron Nycticorax nycticorax 201. Black Bittern Dupetor flavicollis 202. Yellow Bittern Ixobrychus sinensis 203. Cinnamon Bittern Ixobrychus cinnamomeus CICONIDAE 204. Asian Openbill Anastomus oscitans 205. Woolly-necked Stork Ciconia episcopus 206. Painted stork Mycteria leucocephala THRESKIORNITHIDAE 207. Black Ibis Pseudibis papillosa 208. Black-headed White Ibis Threskiornis melanocepha CAMPEPHAGIDAE 209. Rosy Minivet Pericrocotus roseus 210. Scarlet Minivet Pericrocotus ethologus 211. Long-tailed Minivet Pericrocotus ethologus 212. Small Minivet Pericrocotus cinnamomeu 213. Large Cuckoo-shrike Coracina novaehollandia 214. Large Woodshrike Tephrodornis gularis 215. Common Woodshrike Tephrodornis pondicerian 216. Black-winged Cuckooshrike Coracina melanoptera 217. Black-winged Cuckooshrike Coracina melanoptera	A	RDEIDAE	
194. Purple Heron  195. Grey Heron  196. Cattle Egret  197. Little Egret  198. Intermediate Egret  199. Great Egret  200. Black crowned Night Heron  201. Black Bittern  202. Yellow Bittern  203. Cinnamon Bittern  204. Asian Openbill  205. Woolly-necked Stork  206. Painted stork  THRESKIORNITHIDAE  207. Black Ibis  208. Black-headed White Ibis  CAMPEPHAGIDAE  209. Rosy Minivet  209. Rosy Minivet  210. Scarlet Minivet  211. Long-tailed Minivet  212. Small Minivet  213. Large Cuckoo-shrike  214. Large Woodshrike  215. Common Woodshrike  216. Black-headed Cuckooshrike  Coracina melanoptera  217. Black-winged Cuckooshrike  Coracina melanoptera  Coracina melanoptera  Coracina melanoptera  Coracina melanoptera  Coracina melanoptera	192.	Little Heron	Butorides striatus
194. Purple Heron Ardea purpurea 195. Grey Heron Ardea cinerea 196. Cattle Egret Bubulcus ibis 197. Little Egret Egretta garzetta 198. Intermediate Egret Mesophoyx intermedia 199. Great Egret Casmerodius albus 200. Black crowned Night Heron Nycticorax nycticorax 201. Black Bittern Dupetor flavicollis 202. Yellow Bittern Ixobrychus sinensis 203. Cinnamon Bittern Ixobrychus cinnamomeus CICONIDAE 204. Asian Openbill Anastomus oscitans 205. Woolly-necked Stork Ciconia episcopus 206. Painted stork Mycteria leucocephala THRESKIORNITHIDAE 207. Black Ibis Pseudibis papillosa 208. Black-headed White Ibis Threskiornis melanocepha CAMPEPHAGIDAE 209. Rosy Minivet Pericrocotus roseus 210. Scarlet Minivet Pericrocotus ethologus 211. Long-tailed Minivet Pericrocotus ethologus 212. Small Minivet Pericrocotus cinnamomeu 213. Large Cuckoo-shrike Coracina novaehollandia 214. Large Woodshrike Tephrodornis gularis 215. Common Woodshrike Tephrodornis pondicerian 216. Black-winged Cuckooshrike Coracina melanoptera 217. Black-winged Cuckooshrike Coracina melanoptera	193.	Pond Heron	Ardeola grayii
195. Grey Heron 196. Cattle Egret 197. Little Egret 198. Intermediate Egret 199. Great Egret 200. Black crowned Night Heron 201. Black Bittern 202. Yellow Bittern 203. Cinnamon Bittern 204. Asian Openbill 205. Woolly-necked Stork 206. Painted stork 207. Black Ibis 208. Black-headed White Ibis 209. Rosy Minivet 209. Rosy Minivet 209. Rosy Minivet 209. Rosy Minivet 210. Scarlet Minivet 211. Long-tailed Minivet 212. Small Minivet 213. Large Cuckoo-shrike 216. Black-headed Cuckoo-shrike 217. Black-headed Cuckoo-shrike 217. Black-headed Cuckoo-shrike 218. Black-headed Cuckoo-shrike 219. Coracina melanoptera 210. Coracina melanoptera 210. Coracina melanoptera 211. Long-tailed Cuckoo-shrike 212. Coracina melanoptera 213. Large Cuckoo-shrike 214. Black-headed Cuckoo-shrike 215. Common Woodshrike 216. Black-headed Cuckoo-shrike 217. Black-winged Cuckooshrike 218. Coracina melanoptera 219. Coracina melanoptera 210. Coracina melanoptera 210. Coracina melanoptera 211. Coracina melanoptera 212. Black-winged Cuckooshrike 213. Coracina melanoptera 214. Coracina melanoptera 215. Coracina melanoptera	194.	Purple Heron	
197. Little Egret			
198. Intermediate Egret	196.	Cattle Egret	Bubulcus ibis
198. Intermediate Egret	197.	Little Egret	Egretta garzetta
200. Black crowned Night Heron  201. Black Bittern  202. Yellow Bittern  203. Cinnamon Bittern  CICONIDAE  204. Asian Openbill  205. Woolly-necked Stork  206. Painted stork  THRESKIORNITHIDAE  207. Black Ibis  208. Black-headed White Ibis  CAMPEPHAGIDAE  209. Rosy Minivet  210. Scarlet Minivet  211. Long-tailed Minivet  212. Small Minivet  213. Large Cuckoo-shrike  216. Black headed Cuckoo-shrike  217. Black-winged Cuckooshrike  208. Black-winged Cuckooshrike  209. Rosy Monivet  210. Coracina melanoteria  211. Coracina melanoteria  212. Coracina melanoteria  213. Coracina melanoteria  214. Coracina melanoteria  215. Common Woodshrike  216. Black-winged Cuckooshrike  Coracina melanoptera  217. Black-winged Cuckooshrike  Coracina melanoptera  Coracina melanoptera	198.	Intermediate Egret	Mesophoyx intermedia
201. Black Bittern  202. Yellow Bittern  203. Cinnamon Bittern  CICONIDAE  204. Asian Openbill  205. Woolly-necked Stork  206. Painted stork  THRESKIORNITHIDAE  207. Black Ibis  CAMPEPHAGIDAE  209. Rosy Minivet  210. Scarlet Minivet  211. Long-tailed Minivet  212. Small Minivet  213. Large Cuckoo-shrike  214. Large Woodshrike  216. Black-headed Cuckoo-shrike  217. Black-winged Cuckooshrike  Coracina melanoptera	199.	Great Egret	Casmerodius albus
201. Black Bittern  202. Yellow Bittern  203. Cinnamon Bittern  CICONIDAE  204. Asian Openbill  205. Woolly-necked Stork  206. Painted stork  THRESKIORNITHIDAE  207. Black Ibis  CAMPEPHAGIDAE  209. Rosy Minivet  210. Scarlet Minivet  211. Long-tailed Minivet  212. Small Minivet  213. Large Cuckoo-shrike  214. Large Woodshrike  216. Black-headed Cuckoo-shrike  217. Black-winged Cuckooshrike  Dupetor flavicollis  Ixobrychus sinensis  Ixobrychus sinensis  Ixobrychus cinnamomeus  Ixobrychus cinnamomeus  Ixobrychus cinnamomeus  Ciconia episcopus  Mycteria leucocephala  Mycteria leucocephala  Threskiornis melanocepha  Pericrocotus roseus  Pericrocotus roseus  Pericrocotus roseus  Pericrocotus ethologus  Pericrocotus cinnamomeu  Pericrocotus cinnamomeu  Coracina novaehollandia  Tephrodornis gularis  Tephrodornis pondicerian  Coracina melanoptera  Coracina melanoptera	200.	Black crowned Night Heron	Nycticorax nycticorax
CICONIDAE  204. Asian Openbill  205. Woolly-necked Stork  206. Painted stork  THRESKIORNITHIDAE  207. Black Ibis  208. Black-headed White Ibis  CAMPEPHAGIDAE  209. Rosy Minivet  210. Scarlet Minivet  211. Long-tailed Minivet  212. Small Minivet  213. Large Cuckoo-shrike  214. Large Woodshrike  215. Common Woodshrike  216. Black-headed Cuckooshrike  Ciconia episcopus  Mycteria leucocephala  Mycteria leucocephala  Threskiornis melanocepha  Pericrocotus roseus  Pericrocotus roseus  Pericrocotus roseus  Pericrocotus ethologus  Pericrocotus cinnamomen  Coracina novaehollandiaa  214. Large Woodshrike  Tephrodornis gularis  Tephrodornis pondicerian  216. Black-winged Cuckooshrike  Coracina melanoptera  217. Black-winged Cuckooshrike  Coracina melaschistos			
CICONIDAE  204. Asian Openbill  205. Woolly-necked Stork  206. Painted stork  THRESKIORNITHIDAE  207. Black Ibis  208. Black-headed White Ibis  CAMPEPHAGIDAE  209. Rosy Minivet  210. Scarlet Minivet  211. Long-tailed Minivet  212. Small Minivet  213. Large Cuckoo-shrike  214. Large Woodshrike  215. Common Woodshrike  216. Black headed Cuckoo-shrike  217. Black-winged Cuckooshrike  Coracina melaschistos	202.	Yellow Bittern	Ixobrychus sinensis
204. Asian Openbill  205. Woolly-necked Stork  206. Painted stork  THRESKIORNITHIDAE  207. Black Ibis  208. Black-headed White Ibis  CAMPEPHAGIDAE  209. Rosy Minivet  210. Scarlet Minivet  211. Long-tailed Minivet  212. Small Minivet  213. Large Cuckoo-shrike  214. Large Woodshrike  215. Common Woodshrike  216. Black headed Cuckoo-shrike  207. Black Iteration and provided and pro	203.	Cinnamon Bittern	Ixobrychus cinnamomeus
205. Woolly-necked Stork  206. Painted stork  THRESKIORNITHIDAE  207. Black Ibis  208. Black-headed White Ibis  CAMPEPHAGIDAE  209. Rosy Minivet  210. Scarlet Minivet  211. Long-tailed Minivet  212. Small Minivet  213. Large Cuckoo-shrike  214. Large Woodshrike  215. Common Woodshrike  216. Black-headed Stork  Mycteria episcopus  Mycteria leucocephala  Pseudibis papillosa  Presicrocotus melanocephala  Pericrocotus roseus  Pericrocotus roseus  Pericrocotus ethologus  Pericrocotus cinnamoment  Coracina novaehollandiaa  Tephrodornis gularis  Tephrodornis pondicerian  216. Black-winged Cuckooshrike  Coracina melanoptera  Coracina melanoptera	C	CICONIDAE	
206. Painted stork  THRESKIORNITHIDAE  207. Black Ibis  Pseudibis papillosa  208. Black-headed White Ibis  CAMPEPHAGIDAE  209. Rosy Minivet  Pericrocotus roseus  210. Scarlet Minivet  Pericrocotus roseus  211. Long-tailed Minivet  Pericrocotus ethologus  212. Small Minivet  Pericrocotus cinnamomeu  213. Large Cuckoo-shrike  Coracina novaehollandiae  214. Large Woodshrike  Tephrodornis gularis  215. Common Woodshrike  Tephrodornis pondicerian  216. Black-winged Cuckooshrike  Coracina melanoptera  217. Black-winged Cuckooshrike	204.	Asian Openbill	Anastomus oscitans
THRESKIORNITHIDAE  207. Black Ibis  208. Black-headed White Ibis  CAMPEPHAGIDAE  209. Rosy Minivet  210. Scarlet Minivet  211. Long-tailed Minivet  212. Small Minivet  213. Large Cuckoo-shrike  214. Large Woodshrike  215. Common Woodshrike  216. Black headed Cuckoo-shrike  217. Black-winged Cuckooshrike  218. Pseudibis papillosa  Pricrocotus melanocepho  Pericrocotus roseus  Pericrocotus roseus  Pericrocotus ethologus  Pericrocotus cinnamomeu  Coracina novaehollandia  Tephrodornis gularis  Tephrodornis pondicerian  Coracina melanoptera  Coracina melanoptera	205.	Woolly-necked Stork	Ciconia episcopus
207. Black Ibis  208. Black-headed White Ibis  CAMPEPHAGIDAE  209. Rosy Minivet  210. Scarlet Minivet  211. Long-tailed Minivet  212. Small Minivet  213. Large Cuckoo-shrike  214. Large Woodshrike  215. Common Woodshrike  216. Black headed Cuckoo-shrike  217. Black-winged Cuckooshrike  218. Threskiornis melanocepho  Threskiornis melanocepho  Tepicrocotus roseus  Pericrocotus roseus  Pericrocotus ethologus  Pericrocotus cinnamomeu  Coracina novaehollandia  Tephrodornis gularis  Tephrodornis pondicerian  Coracina melanoptera  Coracina melanoptera  Coracina melaschistos	206.	Painted stork	Mycteria leucocephala
208. Black-headed White Ibis  CAMPEPHAGIDAE  209. Rosy Minivet  Pericrocotus roseus  210. Scarlet Minivet  Pericrocotus roseus  211. Long-tailed Minivet  Pericrocotus ethologus  212. Small Minivet  Pericrocotus cinnamomeu  213. Large Cuckoo-shrike  Coracina novaehollandia  214. Large Woodshrike  Tephrodornis gularis  215. Common Woodshrike  Tephrodornis pondicerian  216. Black headed Cuckoo-shrike  Coracina melanoptera  217. Black-winged Cuckooshrike  Coracina melaschistos	Т	HRESKIORNITHIDAE	
CAMPEPHAGIDAE  209. Rosy Minivet  Pericrocotus roseus  210. Scarlet Minivet  Pericrocotus roseus  211. Long-tailed Minivet  Pericrocotus ethologus  212. Small Minivet  Pericrocotus cinnamomeu  213. Large Cuckoo-shrike  Coracina novaehollandia  214. Large Woodshrike  Tephrodornis gularis  215. Common Woodshrike  Tephrodornis pondicerian  216. Black headed Cuckoo-shrike  Coracina melanoptera  217. Black-winged Cuckooshrike  Coracina melaschistos	207.	Black Ibis	Pseudibis papillosa
209. Rosy Minivet  210. Scarlet Minivet  211. Long-tailed Minivet  212. Small Minivet  213. Large Cuckoo-shrike  214. Large Woodshrike  215. Common Woodshrike  216. Black headed Cuckoo-shrike  217. Black-winged Cuckooshrike  Pericrocotus roseus  Pericrocotus ethologus  Pericrocotus cinnamomeu  Coracina novaehollandia  Tephrodornis gularis  Tephrodornis pondicerian  Coracina melanoptera  Coracina melanoptera	208.	Black-headed White Ibis	Threskiornis melanocephalus
210. Scarlet Minivet  211. Long-tailed Minivet  212. Small Minivet  213. Large Cuckoo-shrike  214. Large Woodshrike  215. Common Woodshrike  216. Black headed Cuckoo-shrike  217. Black-winged Cuckooshrike  Pericrocotus ethologus  Pericrocotus ethologus  Pericrocotus ethologus  Coracina novaehollandia  Coracina novaehollandia  Tephrodornis gularis  Tephrodornis pondicerian  Coracina melanoptera  Coracina melaschistos	C	AMPEPHAGIDAE	
211. Long-tailed Minivet  212. Small Minivet  213. Large Cuckoo-shrike  214. Large Woodshrike  215. Common Woodshrike  216. Black headed Cuckoo-shrike  217. Black-winged Cuckooshrike  Pericrocotus ethologus  Pericrocotus ethologus  Coracina movaehollandia  Tephrodornis gularis  Tephrodornis pondicerian  Coracina melanoptera  Coracina melaschistos	209.	Rosy Minivet	Pericrocotus roseus
211.Long-tailed MinivetPericrocotus ethologus212.Small MinivetPericrocotus cinnamomen213.Large Cuckoo-shrikeCoracina novaehollandia214.Large WoodshrikeTephrodornis gularis215.Common WoodshrikeTephrodornis pondicerian216.Black headed Cuckoo-shrikeCoracina melanoptera217.Black-winged CuckooshrikeCoracina melaschistos	210.		Pericrocotus roseus
212. Small Minivet  213. Large Cuckoo-shrike  214. Large Woodshrike  215. Common Woodshrike  216. Black headed Cuckoo-shrike  217. Black-winged Cuckooshrike  Coracina melaschistos  Pericrocotus cinnamomeu Coracina novaehollandia Tephrodornis gularis  Tephrodornis pondicerian Coracina melanoptera Coracina melaschistos	211.	Long-tailed Minivet	
213.Large Cuckoo-shrikeCoracina novaehollandia214.Large WoodshrikeTephrodornis gularis215.Common WoodshrikeTephrodornis pondicerian216.Black headed Cuckoo-shrikeCoracina melanoptera217.Black-winged CuckooshrikeCoracina melaschistos			Pericrocotus cinnamomeus
214.Large WoodshrikeTephrodornis gularis215.Common WoodshrikeTephrodornis pondicerian216.Black headed Cuckoo-shrikeCoracina melanoptera217.Black-winged CuckooshrikeCoracina melaschistos		Large Cuckoo-shrike	Coracina novaehollandiae
215.Common WoodshrikeTephrodornis pondicerian216.Black headed Cuckoo-shrikeCoracina melanoptera217.Black-winged CuckooshrikeCoracina melaschistos	214.		Tephrodornis gularis
216. Black headed Cuckoo-shrike Coracina melanoptera 217. Black-winged Cuckooshrike Coracina melaschistos			Tephrodornis pondicerianus
217. Black-winged Cuckooshrike Coracina melaschistos		Black headed Cuckoo-shrike	*
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I I		, v	

I.	ANIDAE	
	Long-tailed Shrike	Lanius schach
	Grey-backed Shrike	Lanius tephronotus
	Bay-backed Shrike	Lanius vittatus
	Brown Shrike	Lanius cristatus
C	CORVIDAE	
	Rufous Tree Pie	Dendrocitta vagabunda
224.	House Crow	Corvus splendens
	Large-billed Crow	Corvus macrorhyncos
226.	Grey tree pie	Dendrocitta formosae
D	DICRURIDAE	·
227.	Black Drongo	Dicrurus macrocercus
	White-bellied Drongo	Dicrurus caerulescens
	Bronzed Drongo	Dicrurus aeneus
	Ashy Drongo	Dicrurus leucophaeus
	Spangled Drongo	Dicrurus hottentottus
	Greater Racket Tailed Drongo	Dicrurus paradiseus
	DRIOLIDAE	
	Indian Golden Oriole	Oriolus oriolus
	Black-hooded Oriole	Oriolus xanthornus
	Black-naped Oriole	Oriolus chinensis
	ARTAMIDAE	
	Ashy Wood Swallow	Artamus fuscus
	RENIDAE	127 centrus yuseus
	Common Iora	Aegithina tiphia
	Blue-winged Leafbird	Chloropsis cochinchinensis
	Golden-fronted Leafbird	Chloropsis aurifrons
240.	Asian Fairy Bluebird	Irene puella
	TTTIDAE	1
241.	Indian Pitta	Pitta brachyura
N	MUSCICAPIDAE	
242.	Asian Paradise-flycatcher	Terpsiphone paradisi
243.	Black-naped Monarch	Hypothymis azurea
244.	White-browed Fantail	Rhipidura aureola
245.		Rhipidura albicollis
246.	Oriental Magpie Robin	Copsychus saularis
247.	White-rumped Shama	Copsychus malabaricus
248.	Indian Robin	Saxicoloides fulicata
249.	Bluethroat	Luscinia svecica
250.	Black Redstart	Phoenicurus ochruros
251.	Common Stonechat	Saxicola torquata
252.	White-tailed Stonechat	Saxicola leucura
253.	Diad Duahahat	C 1
	Pied Bushchat	Saxicola caprata

255.	Blue-capped Rock Thrush	Monticola cinclorhynchus	
256.		Myophonus horsfieldii	
257.	Pied Thrush	Zoothera wardii	
258.	Tickell's Thrush	Turdus unicolor	
259.	Orange headed thrush	Zoothera citrina	
260.	=	Zoothera dauma	
261.	Black-breasted Thrush	Turdus dissimilis	
262.	Dark-throated Thrush	Turdus ruficollis	
263.	Eurasian Blackbird	Turdud merula	
264.	Red-throated flycatcher	Ficedula parva	
265.		Cyornis tickelliae	
266.	Asian Brown Flycatcher	Muscicapa dauurica	
267.	Brown-breasted Flycatcher	Muscicapa muttui	
268.	Ultramarine Flycatcher	Ficedula superciliaris	
269.	Little Pied Flycatcher	Ficedula westermanni	
270.	Verditer Flycatcher	Eumyias thalassina	
271.	Pale-chinned Flycatcher	Cyornis poliogenys	
272.	Blue-throated flycatcher	Cyornis rubeculoides	
273.	Grey-headed Canary Flycatcher	Culicicapa ceylonensis	
P	ARIDAE		
274.	Great Tit	Parus major	
275.	Black-lored Tit	Parus xanthogenys	
S	ITTIDAE		
276.	Velvet-fronted Nuthatch	Sitta frontalis	
	Chestnut-bellied Nuthatch	Sitta castanea	
	TURNIDAE		
	Hill Myna	Gracula relegiosa	
	Asian Pied Starling	Sturnus contra	
280.	Common Myna	Acridotheres tristis	
281.	Jungle Myna	Acridotheres fuscus	
282.	Brahminy Starling	Sturnus pagodarum	
283.	Ü	Sturnus malabaricus	
284.	, e	Sturnus roseus	
285.	<u> </u>	Acridotheres ginginianus	
P	YCNONOTIDAE		
286.	Black-crested Bulbul	Pycnonotus melanicterus	
287.		Pycnonotus jocosus	
288.		Pycnonotus cafer	
289.		Pycnonotus luteolus	
	ISTICOLIDAE		
290.	Zitting Cisticola	Cisticola juncidis	
291.	Grey-breasted Prinia	Prinia hodgsonii	
292.	Ashy Prinia	Prinia socialis	
293.	Plain Prinia	Prinia inornata	

294.	Jungle Prinia	Prinia sylvatica			
	ZOSTEROPIDAE				
295.	Oriental White-eye	Zosterops palpebrosa			
	YLVIDAE				
296.	Pale-footed Bush Warbler	Cettia pallidipes			
297.	Spotted Bush Warbler	Bradypterus thoracicus			
	Clamorous Reed Warbler	Acrocephalus stentoreus			
299.	Thick-billed Warbler	Acrocephalus aedon			
300.	Blyth's Reed Warbler	Acrocephalus dumetorum			
	Paddyfield Warbler	Acrocephalus Agricola			
302.	Bristled Grassbird	Chaetornis striatus			
303.	Common Tailor Bird	Orthotomus sutorius			
304.	Orphean Warbler	Sylvia hortensis			
305.	Lesser Whitethroat	Sylvia curruca			
306.	Common Chiffchaff	Phylloscopus collybita			
307.	Greenish Leaf Warbler	Phylloscopus trochiloides			
308.	Hume's Warbler	Phylloscopus humei			
309.	Tickell's Leaf Warbler	Phylloscopus affinis			
310.	Eastern Crowned Warbler	Phylloscopus coronatus			
311.	Golden-spectacled Warbler	Phylloscopus burkii			
312.	Puff-throated Babbler	Pellorneum ruficeps			
313.	Brown-cheeked Fulvetta	Alcippe poioicephala			
314.	Jungle Babbler	Turdoides striatus			
315.	Rufous-capped Babbler	Stachyris ruficeps			
316.	Striped Tit Babbler	Macronous gularis			
317.	Common Babbler	Turdoides caudatus			
318.	Indian Scimitar Babbler	Pomatorhinus horsfieldii			
319.	Tawny-bellied Babbler	Dumetia hyperythra			
320.	Yellow-eyed Babbler	Chrysomma sinense			
A	ALAUDIDAE				
321.	Rufous-winged Bushlark	Mirafra assamica			
322.	Oriental Skylark	Alauda gulgula			
323.	1	Eremopterix grisea			
324.	Rufous-tailed Lark	Ammomanes phoenicurus			
325.	Indian Bushlark	Mirafra erythroptera			
326.	Jerdon's Bushlark	Mirafra affinis			
N	IECTARINIIDAE				
327.	Purple-rumped Sunbird	Nectarinia zeylonica			
328.	1	Nectarinia asiatica			
329.		Aethopyga siparaja			
330.	1	Arachnothera longirostra			
Γ	DICAEIDAE				
331.	1	Dicaeum agile			
332.	Pale-billed Flowerpecker	Dicaeum erythrorhynchos			

N	MOTACILLIDAE			
333.	White Wagtail	Motacilla alba		
334.	Yellow Wagtail	Motacilla flava		
	Citrine Wagtail	Motacilla citreola		
336.	Grey Wagtail	Motacilla cinerea		
337.	White-browed Wagtail	Motacilla maderaspatensis		
338.	Forest Wagtail	Dendronanthus indicus		
339.	Paddyfield Pipit	Anthus rufulus		
340.	Olive-backed Pipit	Anthus hodgsonii		
	Tree Pipit	Anthus trivialis		
342.	Blyth's Pipit	Anthus godlewskii		
P	ASSERIDAE			
343.	House Sparrow	Passer domesticus		
344.	Chestnut-shouldered Petronia	Petronia xanthocollis		
345.	Baya Weaver	Ploceus philippinus		
346.	Black-breasted Weaver	Ploceus benghalensis		
347.	Streaked Weaver	Ploceus manyar		
Н	IIRUNDINIDAE			
348.	Dusky Crag Martin	Hirundo concolor		
349.	Northern House Martin	Delichon urbica		
350.	Barn Swallow	Hirundo rustica		
351.	Wire-tailed Swallow	Hirundo smithii		
352.	Red-rumped Swallow	Hirundo daurica		
353.	Streak-throated Swallow	Hirundo fluvicola		
Е	STRILDIDAE			
354.	Black-headed Munia	Lonchura malacca		
355.	Scaly-breasted Munia	Lonchura punctulata		
356.	White-rumped Munia	Lonchura striata		
357.	Black-throated Munia	Lonchura kelartii		
358.	Red Avadavat	Amandava amandava		
359.	Indian Silverbill or White throated	Lonchura malabarica		
	Munia			
F	RINGILLIDAE			
360.	Common Rosefinch	Carpodacus erythrinus		
E	EMBERIZIDAE			
361.	Crested Bunting	Melophus lathami		

## ANNEXURE XVI

### LIST OF AMPHIBIANS

## **CLASS: AMPHIBIA**

1.	Marbled Toad (Oriya-Katha Benga) (Duttaphrynus stomaticus)
2.	Common Asian Toad (Oriya-Luni benga, Sinduria benga) (Duttaphrynus
	melanostictus)
3.	Indian SkipperFrog (Oriya-Pani benga) (Euphlyctiscyanophlyctis)
4.	Dutta's Cricket Frog (Oriya-Pani benga) (Fejervarya orissaensis)
5.	Syhadra Cricket Frog (Oriya-Pani benga) (Fejervarya syhadrensis)
6.	Jerdon's Bull Frog (Oriya-Cheli benga) (Hoplobatrachus Crassus)
7.	Indian Bull Frog (Oriya-Brahmani benga) (Hoplobatrachus tigerinus)
8.	Short-Headed Burrowing Frog (Oriya-Mati Pota Benga) (Sphaerotheca
	breviceps)
9.	Dobson's Burrowing Frog (Oriya-Matipota matia benga) (Sphaerotheca
	dobsonii)
10	Indian Burrowing Frog (Oriya-Chota matipota benga) (Sphaerotheca
	rolandae)
11	Painted Ballon Frog (Oriya-Sinduria phutka benga) (Kaloula taprobanica)
12	Ornate Narrow-Mouthed Frog (Oriya-Chuin benga) (Microhyla Ornata)
13	Variegated Ramanella (Oriya-Suneli benga) (Ramanella variegate)
14	Grey Ballon Frog (Oriya-Kolathia benga) (Uperodon globulosus)
15	Marbled Ballon Frog (Oriya-Chitra benga) (Uperodon systoma)
16	Fungoid Frog (Oriya-Nali benga) (Hylarana malabarica)
17	Pigmy Tree Frog (Oriya-Chuin buda benga) (Chiromantis sp)
18	Similipal Bush Frog (Oriya-Similipal buda benga) (Philautus similipalensis)
19	Common Indian Tree Frog (Oriya-katha benga, Akhi dian benga)
	(Polypedates maculates)
20.	Dubois's Tree Frog (Oriya-Akhi dian benga) (Polypedates teraiensis)
21	Ferguson's Toad (Oriya- Luni Benga) (Duttaphrynus scaber)

### ANNEXURE XVII LIST OF REPTILES

1.	John's Sand Boa (Oriya-Domundia Sapa) (Eryx johnii)	
2.	Common Sand Boa (Oriya-Boda sapa) (Gongylophis conicus)	
3.	India Rock Python (Oriya-Ajagara sapa) (Python molurus)	
4.	Common Vine Snake (Oriya-Laudankia sapa) (Ahaetulla nasutus)	
5.	Buff striped keelback (Oriya-Mati birala, Mati biradi) (Amphiesma stolata)	
6.	Banded Racer (Argyrogena fasciolata)	
7.	Olive keelback water snake (Oriya-Sabuja dhanda) (Atretium schistosum)	
8.	Forsten's Cat Snake (Oriya-Katakatia naga) (Boiga forsteni)	
9.	Common Indian Cat Snake (Oriya-Pahadia chitti sapa) (Boiga trigonata)	
10.	Ornate Flying Snake (Oriya-Udanta sapa) (Chrysopelea ornate)	
11.	Common Indian Trinket Snake (Oriya-Donger chiti/pahadia chiti)	
	(Coelognathus helena helena)	
12.	Common-Headed Trinket Snake (Oriya-pahadia chiti) (Coelognathus radiata)	
13.	Common Indian Bronze-Back (Oriya-Kanala, Kauchia) (Dendrelaphis tristis)	
14.	Smooth water Snake (Oriya-Jal ganthia) (Enhydris enhydris)	
15.	Common Wolf Snake (Oriya-Kaudia chiti sapa) (Lycodon aulicus)	
16.	Twin-spotted wolf Snake (Lycodon jara)	
17.	Barred wolf Snake (Oriya-Kaudia chiti) (Lycodon striatus)	
18.	Indian Green keelback (Oriya-Sabuja dhanda) (Macropisthodon plumbicolor)	
19.	Common kukuri Snake (Oriya-Matia hara sapa) (Oligodon arnensis)	
20.	Mock Viper (Psammodynastes pulverulentus)	
21.	Common Indian Rat Snake (Oriya-Dhamana sapa) (Ptyas mucosus)	
22.	Cantor's Black-headed Snake (Oriya-Dhulia naga) (Sibynophis Sagittarius)	
23.	Checkered keelback water snake (Pani Dhanda, Dhanda sapa) (Xenochrophis	
	piscator)	
24.	Comon Indian krait (Oriya-Chiti sapa) (Bungarus caeruleus)	
25.	Banded Krait (Oriya-Rana sapa) (Bungarus fasciatus)	
26.	Monocellate Cobra (Oriya-Tampa sapa) (Naja kaouthia)	
27.	Binocellate Cobra (Oriya-Naga sapa, Gokhara sapa) (Naja naja)	
28.	King Cobra (Oriya-Ahiraja) (Ophiophagus hannah)	
29.	Common Blind Snake (Oriya-Do mundia sapa) (Ramphotyphlops braminus)	
30.	Beaked worm snake (Oriya-Teli Sapa) (Grypotyphlops acutus)	
31.	Russell's viper (Oriya-Chandan Boda) (Daboia russellii)	
32.	Saw-scaled viper (Oriya-Dhulia boda sapa) (Echis carinatus)	
33.	Bamboo pit Viper (Oriya-Fatka sapa, Gendamundia Boila) (Trimeresurus	
	gramineus)	
34.	Indian Garden Lizard (Oriya-Endua, Teneko, Kerkanta) (Calotes versicolor)	
35.	Fan-Throated Lizard (Oriya-Mati endua) (Sitana ponticeriana)	
36.	Indian Chamaeleon (Oriya-Bahurupa, Bahurupi, Pohola endua) (Chamaeleo	

	zeylanicus)
37.	East Indian Leopard (Oriya-Kalakuta, Kalakuta sapa) (Eublepharis
	hardwickii)
38.	Clouded Ground Gecko (Oriya-Kalakuta) (Geckoella nebulosa)
39.	Spotted Indian House Gecko (Oriya-Jhitipiti) (Hemidactylus brookii)
40.	Indian House Gecko (Oriya-Jhitipiti)(Hemidactylus flaviviridis)
41.	Smooth house gecko (Oriya-Jhitipiti) (Hemidactylus frenatus)
42.	Bark Gecko (Oriya-Jhitipiti) (Hemidactylus leschenaultia)
43.	East Indian Forest Gecko (Hemidactylus sp)
44.	Snake-eyed Lacerta (Ophisops jerdonii)
45.	White-Spotted Supple Skink (Oriya-Champei sapa) (Riopa albopunctata)
46.	Common Snake Skink (Oriya-Nali lanzia champei sapa) (Lygosoma
	punctatus)
47.	Beddome's Grass Skink (Champeineula) (Eutropis beddomii)
48.	Common Indian Skink (Champeinula) (Eutropis carinata)
49.	Eastern Bronze Skink (Champeinula) (Eutropis macularia)
50.	Limbless Skink (Sepsophis punctatus)
51.	Common Indian Monitor (Oriya-matia godhi) (Varanus bengalensis)
52.	Yellow Monitor Lizard (Oriya-Sorisia godhi) (Varanus flavescens)
53.	Mugger Crocodile (Oriya-Kumbhira, Magara) (Crocodylus palustris)
54.	Indian Roofed Turtle (Oriya-Nali beka Katha Kaincha) (Batagur tecta)
55.	Peninsular Tent Turtle (Oriya-Katha Kainca) (Batagur tentoria)
56.	Tricarinate Hill Turtle (Oriya-Tinigaria pahadi Kaincha) (Melanochelys
	tricarinata)
57.	Eastern Black Turtle (Oriya-kala kaincha/Pahadi kaincha) (Melanochelys
	trijuga indopeninsularis)
58.	Elongated Tortoise (Oriya-Haladia katha Kaincha) (Indotestudo elongate)
59.	Indian Flapshell Turtle (Oriya-Pani Kainchha/Pankua kainchha) (Lissemys
	punctata punctata)
60.	Indian Rock Lizard(Oriya-Endua, Tenko)(Psammophilus blanfordanus)

## ANNEXURE XVIII LIST OF FISHES

## **CLASS: PISCES**

Sl.No.	Local name in Oriya	Scientific name	Family
1.	Flai	Notopteus notopterus	Notopteridae
2.	Chitala	Chitala Chitala	Notopteridae
3.	Pathari	Amblypharyngodon	Cyprinidae
		mola	
4.	Jhalli	Barilius vagra	Cyprinidae
5.	Jaradi	Danio rerio	Cyprinidae
6.	Bhakur	Catla Catla	Cyprinidae
7.	Dumala	Cirrhinus fulungee	Cyprinidae
8.	Mira	Cirrhinus mrigala	Cyprinidae
9.	Kalabatuli	Crossocheilus latius	Cyprinidae
10.	Mirkha	Cyprinus carpio	Cyprinidae
11.	Kulia	Devario aequipinnatus	Cyprinidae
12.	Jahi	Esomus danricus	Cyprinidae
13.	Patharachatta	Garra gotyla	Cyprinidae
14.	Gentu	Garra mullya	Cyprinidae
15.	Pohala	Labeo bata	Cyprinidae
16.	Kalabanisi	Labeo calbasu	Cyprinidae
17.	Rohi	Labeo rohita	Cyprinidae
18.	Jodda	Laubuca sp	Cyprinidae
19.	Chilanti	Osteobrama vigorsii	Cyprinidae
20.	Kerandi	Puntius amphibius	Cyprinidae
21.	Pita Kerandi	Puntius conchonius	Cyprinidae
22.	Sema	Puntius Sarana	Cyprinidae
23.	Patia Kerandi	Puntius sophore	Cyprinidae
24.	Kujikerandi	Puntius ticto	Cyprinidae
25.	Kerandi	Puntius Sp 1	Cyprinidae
26.	Kerandi	Puntius Sp.2	Cyprinidae
27.	Jilo	Rasbora daniconius	Cyprinidae
28.	Mino	Rasbora sp	Cyprinidae
29.	Baunsapatri	Salmophasia bacaila	Cyprinidae
30.	Mahaseer	Tor putitora	Cyprinidae
31.	Mahaseer	Tor Tor	Cyprinidae
32.	Patharachatta	Acanthocobitis botia	Nemacheilidae
33.	Patharachatta	Schistura Sp.1	Nemacheilidae
34.	Patharachatta	Schistura sp-2	Nemacheilidae
35.	Jimani	Lepidocephalichthys	Cobitidae

		guntea	
36.	Balijimani	Lepidocephalichthys	Cobitidae
		thermalis	
37.	Jimani	Lepidocephalichthys sp	Cobitidae
38.	Hara Sp	Erethistidae	
39.	Singla	Sperata Aor	Bagridae
40.	Singhi	Sperata seenghala	Bagridae
41.	Kujikantia	Mystus bleekeri	Bagridae
42.	Baikantia	Mystus cavasius	Bagridae
43.	Kantia	Mystus gulio	Bagridae
44.	Kantia	Mystus vittatus	Bagridae
45.	Baisilia	Ompok bimaculatus	Siluridae
46.	Balia	Wallago attu	Siluridae
47.	Puttuli	Alia coila	Schilbeidae
48.	Batbacha	Eutropiichthys vacha	Schilbeidae
49.	Jhilikantia	Amblyceps mangois	Ambiycipitidae
50.	Magur	Clarias sp	Claridae
51.	Singi	Heteropneustes fossilis	Heteropneustidae
52.	Gania	Strongylura strongylura	Belonidae
53.	Gangeitodi	Xenentodon cancila	Belonidae
54.	Cuchia	Monopterus cuchia	Synbranchidae
55.	Todi	Macrognathus aculeatus	Mastacembelidae
56.	Gomitodi	Mastacembelus pancalus	Mastacemblidae
57.	Kalileep	Badis badis	Badidae
58.	Tilapia	Oreochromis	Cichlidae
		mossambicus	
59.	Kau	Anabas cobojius	Anabantidae
60.	Rajakau	Anabas testudineus	Anabantidae
61.	Raja kau	Trichogaster fasciata	Belontiidae
62.	Raja kau	Trichogaster lalius	Belontiidae
63.	Sahala	Channa marulius	Channidae
64.	Gadisa	Channa punctata	Channidae
65.	Seola	Channa striata	Channidae
66.	Channa sp	Channidae	

#### **ANNEXURE XIX**

### LIST OF INVERTEBRATES

Invertebrate groups	No. of taxa	Remarks
	reported	
Phylum Mollusca		No specific group studies by ZSI/
Class. Gastropoda	9	others on malacofauna in SBR. First
Fam. Achatinidae,		time ever report of 9 spp.
Ariophantidae, Pilidae,		
Viviparidae, Lymnaeidae		
Phylum Arthropoda.		
Class. Diplopoda (Millipedes)	1	Single spp. of Juliformia millipedes
Class. Chilopoda (Centipedes)	2	and Sclopendromorpha centipedes
Class. Crustacea		occupies the great range of habitat in
Ord. Decapoda (Crabs)	1	the reserve. Only 1 spp. of
Class. Arachnida		Potamonidae crabs reported from
Ord. Scorpionida (Scorpions)		SBR first time forever.
Fam. Ischnuridae	2	Two spp. of ischnuridae scorpion
Ord. Araneae (Spiders)		reported first time.
Fam. Araneidae and	13	13 spp. of spiders are recorded from
Clubionidae.		the protected area, under 3 families.
Class. Insecta		42 spp. of Grasshopper/Crickets
Ord. Orthoptera	42	belong to 4 families and 18 genera
(Grasshopper/Crickets)	_	are reported from the reserve.
Fam. Terigidae, Gryllidae,		10 spp. of Dragon flies under 3
Acrididae, Pyrogomophidae	10	families are recorded from Similipal.
Ord. Odonata (Dragon flies)	10	42 spp. of butterflies under 5 families
Fam. Libellulidae,		26 genera, are recorded from the
Calopterygidae, Aeshnidae	42	reserve, of which 12 spp. are new
Ord. Lepidoptera (Butterflies)		record to Similipal.
Fam. Papilionidae,		record to Simmpan
Nymphalidae, Pieridae,		6 spp. of diptera fauna under 5
Lycaenidae and Hespriidae.		families and 6 genera are reported
Ord. Diptera (True flies)	6	from the reserve.
Fam. Tabanidae, Syrphidae,		Previous ZSI study records 22 spp.
Sepsidae.		beetles, from the reserve under 5
Ord. Coleoptera (Beetles).	24	families and 12 genera, 2 spp. are
Fam. Scrabaeidae,	2-7	now added to the faunal list.
Coenagionidae, Agridae,		6 spp. of Isoptera belongs to single
Chrysomelidae, Cerambycidae		family and 3 genera are reported
Ord. Isoptera (Termites/ants)	6	from the protected area.
Ord. Hemiptera (Bugs)	4	from the protected area.
Ord.Hymnoptera (Bees)	4	
Ord.Homoptera (Aphids/leaf hoppers)	3	Further detailed surveys of different
Ora. Pomopiera (Apinus/rear noppers)	<i>,</i>	habitats, in the reserve may reveal
		large number of unexplored
Total	169	invertebrate fauna.
10tal	109	mverteorate rauna.

# ANNEXURE XX

## LIST OF PLANTS

Sl. No.	Local Name	Scientific Name	Family
PTERIE	OOPHYTA		
1.		Huperzia hamiltonii	Huperziaceae
2.		Hupperzia squarrosa	Huperziaceae
3.		Palhinhaea cernua	Lycopodiaceae
4.	Mrityusanjivani	Selaginella bryopteris	Selaginellaceae
5.		Selaginella chrysorrhizos	Selaginellaceae
6.		Selaginella Cillaris	Selaginellaceae
7.		Selaginella indica	Selaginellaceae
8.		Selaginella repanda	Selaginellaceae
9.		Equisetum ramosissimum	Equisetaceae
10.		Botrychium daucifolium	Botrychiaceae
11.		Angiopteris evecta	Angiopteridaceae
12.		Angiopteris helferiana	Angiopteridaceae
13.		Dicranopteris linearis	Dicranopteridaceae
14.		Colysis digitata	Polypodiaceae
15.		Colysis pedunculata	Polypodiaceae
16.		Lepisorus contortus	Polypodiaceae
17.		Lepisorus nudus	Polypodiaceae
18.		Leptochilus decurrens	Polypodiaceae
19.		Microsorium membarnaceum	Polypodiaceae
20.		Microsorium punctatum	Polypodiaceae
21.		Paraleptochilus decurrens	Polypodiaceae
22.		Pyrrosia adnascens	Polypodiaceae
23.		Pyrrosia beddomeana	Polypodiaceae
24.		Pyrrosia lanceolata	Polypodiaceae
25.		Pyrrosia mollis	Polypodiaceae
26.		Pyrrosia nuda	Polypodiaceae
27.		Pyrrosia stigmosa	Polypodiaceae
28.	Gaud-panki	Drynaria quercifolia	Drynariaceae
29.	Mahajal	Lygodium flexuosum	Lygodiaceae
30.		Lygodium microphyllum	Lygodiaceae
31.		Cheilanthes anceps	Cheilanthaceae
32.		Cheilanthes tenuifolia	Cheilanthaceae
33.		Coniogramme fraxinea	Pteridaceae
34.		Parahemiotis cordifolia	Pteridaceae
35.		Pteris arisanensis	Pteridaceae
36.		Pteris biauriata sub sps.	Pteridaceae
		biauriata	
37.		Pteris biauriata sub sps.	Pteridaceae
20		fornicata	
38.		Pteris cretica	Pteridaceae
39.		Pteris ensiformis	Pteridaceae
40.		Pteris longipes	Pteridaceae
41.		Pteris pellucida	Pteridaceae

42.	Pteris quadriaurita	Pteridaceae
43.	Pteris vittata	Pteridaceae
44.	Adiantum cappillus-veneris	Adiantaceae
45.	Adiantum incisum	Adiantaceae
46.	Adiantum philippense	Adiantaceae
47.	Adiantum proliferum	Adiantaceae
48.	Coniogramme fraxinea	Hemionitidaceae
49.	Hemionitis arifolia	Hemionitidaceae
50.	Antrophyum henryi	Antrophyaceae
51.	Antrophyum reticulatum	Antrophyaceae
52.	Ceratopteris thalictroedes	Parkeriaceae
53.	Marsilea minuta	Marsileaceae
54.	Gonocormus prolifer	Hymenophyllaceae
55.	Mecodium exsertum	Hymenophyllaceae
56.	Alsophila spinulosa	Cyatheaceae
57.	Alsophila gigantea	Cyatheaceae
58.	Microlepia speluncae	Dennstaedtiaceae
59.	Microlepia spetancae  Microlepia strigosa	Dennstaedtiaceae
60.	Pteridium revolutum	Dennstaedtiaceae
61.	Pteridium aquilinum	Pteridiaceae
62.	Sphenomeris chinensis	Lindsaeaceae
63.	Ampelopteris prolifera	Thelypteridaceae
64.	Amphineuron opulentum	Thelypteridaceae
65.	Amphineuron terminans	Thelypteridaceae
66.	Christella dentata	Thelypteridaceae
67.	Christella parasitica	Thelypteridaceae
68.	Cyclosorus parasiticus	Thelypteridaceae
69.	Pronephrium nudatum	Thelypteridaceae
70.	Pseudocyclosorus falcilobus	Thelypteridaceae
71.	Sphaerostephanos unitus	Thelypteridaceae
72.	Thelypteris falciloba	Thelypteridaceae
73.	Thelypteris nudatum	• •
74.	Thelypteris tenera	Thelypteridaceae Thelypteridaceae
75.	71	<u> </u>
76.	Thelypteris terminans Trigonospora ciliata	Thelypteridaceae Thelypteridaceae
77.	Asplenium indicum	Aspleniaceae
78.	Asplenium thatcum Asplenium laciniatum	Aspleniaceae
78. 79.	Asplenium tacintatum  Asplenium nidus	Aspleniaceae
80.		1
	Asplenium perakense	Aspleniaceae
81. 82.	Asplenium simonsianum Asplenium unilaterale	Aspleniaceae
		Aspleniaceae
83.	Anisocampium cumingianum	Athyriaceae
84. 85.	Athyrium cunningianum	Athyriaceae
	Athyrium falcatum	Athyriaceae
86.	Diplazium dilatatum	Athyriaceae
87.	Diplazium esculentum	Athyriaceae
88.	Diplazium polypodiodes	Anthyriaceae
89.	Diplazium spectabile	Anthyriaceae

90.		Diplazium subsinuatum	Anthyriaceae
91.		Arachniodes aristata	Dryopteridaceae
92.		Dryopteris cochleata	Dryopteridaceae
93.		Dryopteris sparsa	Dryopteridaceae
94.		Blechnum orientale	Blechnaceae
95.		Salvinia cucullata	Salviniaceae
<b>GYMN</b>	<u>OSPERMS</u>		
96.		Gnetum ula	Gnetaceae
97.	Orguna/Odasamari	Cycas circinalis	Cycadaceae
98.		Cryptomeria japonica	Coniferae
99.		Pinus insularis	Coniferae
ANGIO	SPERMS		
100.		Clematis gouriana	Ranunculaceae
101.		Clematis roylei	Ranunculaceae
102.		Clematis smilacifolia	Ranunculaceae
103.		Clematis wightiana	Ranunculaceae
104.		Naravelia zeylanica	Ranunculaceae
105.		Ranunculus pensylvannicus	Ranunculaceae
106.		Thalictrum foliolosum	Ranunculaceae
107.	Rai	Dillenia aurea	Dilleniaceae
108.	Oou	Dillenia indica	Dilleniaceae
109.	Rai	Dillenia pentagyna	Dilleniaceae
110.	Champa	Michelia champaca	Magnoliaceae
111.		Alphonsea lutea	Annonaceae
112.		Alphonsea ventricosa	Annonaceae
113.	Badhiala	Annona reticulata	Annonaceae
114.	Ata	Annona squamosa	Annonaceae
115.		Artabotrys hexapetalus	Annonaceae
116.		Desmos chinensis	Annonaceae
117.		Miliusa tomentosa	Annonaceae
118.	Gandha palasa	Miliusa velutina	Annonaceae
119.	Champati	Polyalthia cerasoides	Annonaceae
120.	Спатран	Polyalthia simiarum	Annonaceae
121.		Polyalthia suberosa	Annonaceae
122.		Uvaria hamiltonii	Annonaceae
123.	Okanbindi	Cissampelos pareira	Menispermaceae
124.		Cocculus hirsutus	Menispermaceae
125.		Stephania japonica	Menispermaceae
126.		Tinospora cordifolia	Menispermaceae
127.		Tinospora sinensis	Menispermaceae
128.	Padma	Nymphaea pubescens	Nymphaeaceae
129.	Laphar phula	Argemore mexicana	Papaveraceae
130.	Sorisa Sorisa	Brassica juncea	Brassicaceae
131.	Mula	Raphanus sativus	Brassicaceae
131.	Asadua	Capparis zeylanica	Capparaceae
133.	Anasorisa	Cleome viscose	Capparaceae
134.	1 Masorisa	Hybanthus enneaspermus	Violaceae
134.		Viola betonicifolia	Violaceae
133.		v wia veronicijona	VIOIACEAE

136.		Bixa orellana	Bixaceae
137.	Khakada	Casearia elliptica	Flacourtiaceae
138.	Kokra	Casearia graveolens	Flacourtiaceae
139.		Casearia rubescens	Flacourtiaceae
140.	Baincha	Flacourtia indica	Flacourtiaceae
141.	Baincha	Flacourtia jangomas	Flacourtiaceae
142.	Kakhara/Kakhada	Homalium nepaulense	Flacourtiaceae
143.	Trumiui ui Trumiuuu	Homalium tomentosum	Flacourtiaceae
144.	Kapasia/Pithaalu	Cochlospermum religiosum	Cochlospermaceae
145.	Kapasia/Timaara	Pittosporum wightii	Pittosporaceae
146.		Polygala arvensis	Polygalaceae
147.		Polygala crotalarioides	Polygalaceae
148.		Polygala elongata	Polygalaceae
149.		Polygala erioptera	Polygalaceae
150.			
		Polygala furcata	Polygalaceae
151.		Polygala longifolia	Polygalaceae
152.		Salomonia cantoniensis	Plygalaceae
153.		Salmonia ciliate	Polygalaceae
154.		Drymaria cordata	Caryophyllaceae
155.		Polycarpaea corymbosa	Caryophyllaceae
156.		Polycarpon prostratum	Caryophyllaceae
157.		Portulaca oleracea	Portulacaceae
158.		Hypericum gaitii	Hypericaceae
159.		Hypericum japonicum	Hypericaceae
160.	Sankada	Garcinia cowa	Clusiaceae
161.	Satyambo, Chinyar	Garcinia xanthochymus	Clusiaceae
162.	Nageswar	Mesua ferrea	Clusiaceae
163.	Chaa	Camellia sinensis	Theaceae
164.	Sal	Shorea robusta	Dipterocarpaceae
165.	Simli	Bombax ceiba	Malvaceae
166.		Abelmoschus crinitus	Malvaceae
167.		Abelmoschus manihot	Malvaceae
168.		Abelmoschus moschatus	Malvaceae
169.		Abutilon indicum subsp.	Malvaceae
		indicum	
170.		Abutilon persicum	Malvaceae
171.		Gossypium barbadense	Malvaceae
172.	Piri-Prirka	Hibiscus aculeatus	Malvaceae
173.		Hibiscus lobatus	Malvaceae
174.		Hibiscus platanifolius	Malvaceae
175.	Kapasia	Kydia calycina	Malvaceae
176.	Bajarmuli	Sida acuta	Malvaceae
177.		Sida cordata	Malvaceae
178.		Sida mysorensis	Malvaceae
179.		Sida rhombifolia	Malvaceae
180.	Bankapsi	Thespesia lampas	Malvaceae
181.	-	Urena lobata L. ssp lobata	Malvaceae
182.		Urena lobata L. ssp sinuta	Malvaceae

183.	Samarkhoi	Byttneria herbacea	Sterculiaceae
184.	Kodalo	Firmiana colorata	Sterculiaceae
185.	Rodulo	Guazuma ulmifolia	Sterculiaceae
186.	Mudimudika	Helicteres isora	Sterculiaceae
187.	Telpuri	Melochia corchorifolia	Sterculiaceae
188.	Kanaka champa	Pterospermum acerifolium	Sterculiaceae
189.	Muchukunda	Pterospermum xylocarpum	Sterculiaceae
190.	Witchiakunda	Sterculia urens	Sterculiaceae
190.		Sterculia villosa	Sterculiaceae
191.			Sterculiaceae
		Waltheria indica	
193.	D - 11 - 11 - 11 - 11 - 11 - 11 - 11 -	Sloanea sterculiacea	Elaeocarpaceae
194.	Bananalita	Corchorus aestuans	Tiliaceae
195.	Panasia	Elaeocarpus tectorius	Tiliaceae
196.		Elaeocarpus wallichii	Tiliaceae
197.		Grewia abutifolia	Tiliaceae
198.		Grewia disperma	Tiliaceae
199.	Mirgi chara	Grewia elastic	Tiliaceae
200.	Sonaranga	Grewia hirsute	Tiliaceae
201.	Burso	Grewis sapida	Tiliaceae
202.	Dhaman	Grewia tiliifolia	Tiliaceae
203.		Triumfetta annua	Tiliaceae
204.		Triumfetta pentandra	Tiliaceae
205.		Triumfetta pilosa	Tiliaceae
206.		Triumffetta rhomboidea	Tiliaceae
207.	Tisi	Linum usitatissimum	Linaceae
208.		Reinwardtia indica	Linaceae
209.		Aspidopterys tomentosa	Malpighiaceae
210.	Banomali	Hiptage benghalensis	Malpighiaceae
211.		Biophytum reinwardtii	Oxalidaceae
212.		Oxalis corniculata	Oxalidaceae
213.		Oxalis dehradunensis	Oxalidaceae
214.		Acronychia pedunculata	Rutaceae
215.	Bela	Aegle marmelos	Rutaceae
216.		Atalantia monophylla	Rutaceae
217.	Bheru	Chloroxylon swietiana	Rutaceae
218.	Kamala	Citrus aurantium	Rutaceae
219.	Janglilembu	Citrus medica	Rutaceae
220.	Agnijala	Clausena excavata	Rutaceae
221.	Chauli	Glycosmis pentaphylla	Rutaceae
222.	CHUUH	Micromelum minutum	Rutaceae
223.	Bursingo	Murraya koenigii	Rutaceae
224.	Ban mallika	Murraya koenigii Murraya paniculata	Rutaceae
225.	Baintha	Naringi crenulata	Rutaceae
226.	Damuia	Toddalia asiatica	Rutaceae
	Morei		
227.		Zanthoxylum rhetsa	Rutaceae
228.	Pata champa	Ochna obtusata DC var. obtusata	Ochnaceae
229.	Bhuin champa	Ochna obtusata DC var.pumila	Ochnaceae

230.	Salia	Boswellia serrata	Burseraceae
231.	Moi	Garuga pinnata	Burseraceae
232.	Rimuli	Protium serratum	Burseraceae
233.	Nimba	Azadirachta indica	Meliaceae
234.	Pittamari	Cipadessa baccifera	Meliaceae
235.	Mahanimbo	Melia dubia	Meliaceae
236.	Rohini	Soymida febrifuga	Meliaceae
237.	Tun	Toona ciliate var. cilliata	Meliaceae
238.	Raiphala	Trichilia connaroides	Meliaceae
239.	Mundica	Walsura trifoliate	Meliaceae
240.		Natsiatum herpeticum	Icacinaceae
241.	Bhadai	Olax scandens	Olacaceae
242.	Bodelia	Opilia amentacea	Opliaceae
243.	Mokha	Cassine glauca	Celastraceae
244.	Pengu	Celastrus paniculatus	Celastraceae
245.		Euonymus glaber	Celastraceae
246.		Maytenus baliadiana	Celastraceae
247.		Siphonodon celaastrineus	Siphonodontaceae
248.		Gouania leptostachya	Rhamnaceae
249.		Helinus lanceolatus	Rhamnaceae
250.		Rhamnus napalensis	Rhamnaceae
251.	Rainjhai	Ventilago denticulate	Rhamnaceae
252.	Pitchule	Ventilago maderaspatana	Rhamnaceae
253.	Chunkoli	Ziziphus funiculosa	Rhamnaceae
254.		Ziziphus glabrata	Rhamnaceae
255.	Borokoli	Ziziphus mauritiana	Rhamnaceae
256.	Kanakoli	Ziziphus oenoplia	Rhamnaceae
257.	Chunkoli/Tinkoli	Ziziphus rugosa	Rhamnaceae
258.	Gonti/ Goto	Ziziphus xylopyrus	Rhamnaceae
259.		Ampelocissus divaricata	Vitaceae
260.	Paninoha	Ampelocissus latifolia	Vitaceae
261.		Ampelocissus tomentosa	Vitaceae
262.		Cayratia auriculata	Vitaceae
263.		Cayratia pedata	Vitaceae
264.		Cissus adnata	Vitaceae
265.		Cissus assamica	Vitaceae
266.		Cissus quadrangular	Vitaceae
267.	Tekual, Panibel	Cissus repanda	Vitaceae
268.	Diboria	Cissus repens	Vitaceae
269.		Leea aequata	Vitaceae
270.		Leea asiatica	Vitaceae
271.		Leea guineensis	Vitaceae
272.	Kalad chana	Leea indica	Vitaceae
273.	Jibni	Leea macrophylla	Vitaceae
274.		Tetrastigma lanceolarium	Vitaceae
275.	Lahunga	Lepisanthes rubiginosa	Sapindaceae
276.	Lichu	Litchi chinensis	Sapindaceae
277.	Kusuma	Schleichera oleosa	Sapindaceae

278.		Turpinia nepalensis	Staphyleaceae
279.		Meliosma pinnata	Sabiaceae
280.		Meliosma simplicifolia	Sabiaceae
281.	Kaju	Anacardium occidentale	Anacardiaceae
282.	Chara	Buchanania lanzan	Anacardiaceae
283.	Moi	Lannea coromandelica	Anacardiaceae
284.	Amba	Mangifera indica	Anacardiaceae
285.	Alliba	<u> </u>	Anacardiaceae
286.		Nothopegia heyneana Rhus chinensis	
	D11!-		Anacardiaceae
287.	Bhalia	Semecarpus anacardium	Anacardiaceae
288.	Ambada	Spondias pinnata	Anacardiaceae
289.	Sajana	Moringa oleifera	Moringaceae
290.		Bauhinia acuminata	Caesalpiniaceae
291.		Bauhinia malabarica	Caesalpiniaceae
292.	Barada	Bauhinia purpurea	Caesalpiniaceae
293.	Amta	Bauhinia semla	Caesalpiniaceae
294.	Siali	Bauhinia vahlii	Caesalpiniaceae
295.	Kanchan	Bauhinia variegata	Caesalpiniaceae
296.		Caesalpinia cucullata	Caesalpiniaceae
297.		Caeselpinia pulcherrima	Caesalpiniaceae
298.	Sunari	Cassia fistula	Caesalpiniaceae
299.		Cassia hirsute	Caesalpiniaceae
300.		Cassia lechenaultiana	Caesalpiniaceae
301.	Kala chakunda	Cassia occidentalis	Caesalpiniaceae
302.		Cassia sophera	Caesalpiniaceae
303.	Chakunda	Cassia tora	Caesalpiniaceae
304.	Krushnachuda	Delonix regia	Caesalpiniaceae
305.	Ashok	Saraca asoca	Caesalpiniaceae
306.	Tentuli	Tamarindus indica	Caesalpiniaceae
307.		Acacia auriculoformis	Mimosaceae
308.		Acacia farnesiana	Mimosaceae
309.	Ghar-khair	Acacia lenticularis	Mimosaceae
310.	Kantasiris	Acacia leucophloea	Mimosaceae
311.	Babul	Acacia nilotica	Mimosaceae
312.	Dantari	Acacia pennata	Mimosaceae
313.	Dantari	Acacia torta	Mimosaceae
314.	Kala sirisa	Albizia chinensis	Mimosaceae
315.	Sirisa	Albizia lebbeck	Mimosaceae
316.		Albizia odoratissima	Mimosaceae
317.	Satpuri	Albizia procera	Mimosaceae
318.	Gilo /Giredi	Entada rheedii	Mimosaceae
319.	Kirkichi	Mimosa himalayana	Mimosaceae
320.	Lajkuli	Mimosa pudica	Mimosaceae
321.	Kongda, Bankhira	Xylia xylocarpa	Mimosaceae
322.	Kaicho, Runjo	Abrus precatorious	Fabaceae
323.	Lajuari	Aeschynomene indica	Fabaceae
324.	,	Alysicarpus vaginalis	Fabaceae
	Kuldiha	Atylosia scaraboides	Fabaceae

326.		Atylosia volubilis	Fabaceae
327.	Palasa	Butea monosperma	Fabaceae
328.		Butea parviflora	Fabaceae
329.	Noipalasa	Butea superba	Fabaceae
330.	•	Canavalia gladiata	Fabaceae
331.	Aparajita	Clitoria ternatea	Fabaceae
332.	1 3	Crotalaria acicularis	Fabaceae
333.		Crotalaria albida	Fabaceae
334.		Crotalaria bilata	Fabaceae
335.		Crotalaria calycina	Fabaceae
336.		Crotalaria Montana	Fabaceae
337.		Crotalaria mysorensis	Fabaceae
338.	Junjunka	Crotalaria pallida	Fabaceae
339.	J	Crotalaria prostrata	Fabaceae
340.		Crotalaria retusa	Fabaceae
341.	Jhunka	Crotalaria spectabilis	Fabaceae
342.		Dalbergia lanceolaria	Fabaceae
343.	Pahadisisu	Dalbergia latifolia	Fabaceae
344.	Sujuni	Dalbergia paniculata	Fabaceae
345.		Dalbergia pinnata	Fabaceae
346.		Dalbergia volubilis	Fabaceae
347.		Desmodium benthamii	Fabaceae
348.		Desmodium dichotomum	Fabaceae
349.		Desodium gangeticum	Fabaceae
350.		Desmodium heterocarpon	Fabaceae
351.		Desmodium laxiflorum	Fabaceae
352.		Desmodium microphyllum	Fabaceae
353.		Desmodium motorium	Fabaceae
354.	Bandhano	Desmodium oojeinense	Fabaceae
355.	Birkapi	Desmodium pulchellum	Fabaceae
356.		Desmodium triangulare	Fabaceae
357.		Desmodium triflorum	Fabaceae
358.	Salparni	Desmodium triquetrum	Fabaceae
359.		Desmodium triquetrum L. ssp.	Fabaceae
		Pseudotriquetrum	
360.		Desmodium velutinum	Fabaceae
361.		Dumasia villosa	Fabaceae
362.		Dunbaria rotundifolia	Fabaceae
363.	Paldhua	Erythrina suberosa	Fabaceae
364.		Flemingia bracteata	Fabaceae
365.	Rani kathi	Flemingia chappar	Fabaceae
366.		Flemingia macrophylla	Fabaceae
367.		Flemingia nana	Fabaceae
368.		Flemingia paniculata	Fabaceae
369.		Flemingia prostrata	Fabaceae
370.		Flemingia stricta	Fabaceae
371.		Flemingia strobilifera	Fabaceae
372.		Galactia longifolia	Fabaceae

373.		Indigofera atropurpurea	Fabaceae
374.	Giliri	Indigofera cassioides	Fabaceae
375.		Indigofera glabra	Fabaceae
376.		Indigofera linifolia	Fabaceae
377.		Indigofera prostrata	Fabaceae
378.		Indigofera spicata	Fabaceae
379.	Simba	Lablab purpureus	Fabaceae
380.	Guadhuni/Guadhubni	Millettia exensa	Fabaceae
381.		Millettia racemosa	Fabaceae
382.	Bado baidonko	Mucuna nigricans	Fabaceae
383.	Baidanka	Mucuna pruriens	Fabaceae
384.	Karanja	Pongamia pinnata	Fabaceae
385.	,	Pseudarthria viscida	Fabaceae
386.	Piasal/ Bija	Pterocarpus marsupium	Fabaceae
387.	Bhuinkakharu	Pueraria tuberose	Fabaceae
388.		Sesbania bispinosa	Fabaceae
389.	Jhilliphula	Shuteria involucrate	Fabaceae
390.		Smithia conferta	Fabaceae
391.		Smithia sensitive	Fabaceae
392.		Sophora bakeri	Fabaceae
393.	Gileri	Tephrosia purpurea	Fabaceae
394.		Termanus labialis	Fabaceae
395.		Termanus mollis	Fabaceae
396.	Krushna parni	Uraria alopecuroides	Fabaceae
397.	•	Uraria lagopodioides	Fabaceae
398.	Salparni	Uraria rufescens	Fabaceae
399.	•	Vigna adenantha	Fabaceae
400.	Biri	Vigna mungo	Fabaceae
401.		Vigna pilosa	Fabaceae
402.	Banamongo	Vigna radiate	Fabaceae
403.	J	Vigna umbellate	Fabaceae
404.	Jhudanga	Vigna unguiculata	Fabaceae
405.		Zornia gibbosa	Fabaceae
406.		Duchesnea indica	Rosaceae
407.		Prunus ceylanica	Rosaceae
408.		Rubus ellipticus	Rosaceae
409.	Hemsagar	Kalanchoe pinnata	Crassulaceae
410.		Drosera burmannii	Droseraceae
411.		Drosera indica	Droseraceae
412.		Carallia brachiata	Rhizophoraceae
413.	Dhaura	Anogeissus latifolia	Combretaceae
414.	Kokundia	Calycopteris floribunda	Combretaceae
415.		Combretum nanum	Combretaceae
416.	Atundi	Combretum roxburghii	Combretaceae
417.	Asan	Terminalia tomentosa	Combretaceae
418.	Arjuna	Terminalia arjuna	Combretaceae
419.	Bahada	Terminalia bellirica	Combretaceae
420.	Harida	Terminalia chebula	Combretaceae

421.		Eucaluptus citriodora	Myrtaceae
422.		Eucaluptus tereticornis	Myrtaceae
423.	Pijuli	Psidium guajava	Myrtaceae
424.	Poijamu	Syzygium cerasoides	Myrtaceae
425.	Jamu	Syzygium cumini	Myrtaceae
426.	Bhalu jamu	Syzygium fruticosum	Myrtaceae
427.	3	Syzygium heyneanum	Myrtaceae
428.	Golab jamu	Syzygium jambos	Myrtaceae
429.		Syzygium roxburghianum	Myrtaceae
430.	Hinjal	Barringtonia acutangula	Barringtoniaceae
431.	Kumbhi	Careya arborea	Barringtoniaceae
432.	Koroli	Melastoma malabathricum	Melastomataceae
433.	Niresho	Memecylon umbellatum	Melastomataceae
434.		Osbeckia chinensis	Melastomataceae
435.		Osbeckia muralis	Melastomataceae
436.		Obsackia stellata var. rostrata	Melastomataceae
437.		Sonerila tenera	Melastomataceae
438.		Ammannia baccifera	Lythraceae
439.		Ammannia multiflora	Lythraceae
440.	Sidha	Lagerstoemia parviflora	Lythraceae
441.	Patoli	Lagerstroemia reginae	Lythraceae
442.	Manjuati	Lawsonia inermis	Lythraceae
443.		Rotala densiflora	Lythraceae
444.		Rotala indica	Lythraceae
445.		Rotola rotundifolia	Lythraceae
446.	Dhatuki	Woodfodia fruiticosa	Lythraceae
447.	Dalimba	Punnica granatum	Punicaceae
448.		Ludwigia hyssopifolia	Onagraceae
449.		Ludwigia octovalvis	Onagraceae
450.		Ludwigia perennis	Onagraceae
451.		Ludwigia prostrate	Onagraceae
452.	Panisingada	Trapa natans	Trapaceae
453.		Turnera ulmifolia	Turneraceae
454.	Papaya	Carica papaya	Caricaceae
455.	Banakundri	Coccinia grandis	Cucurbitaceae
456.		Cucumis melo	Cucurbitaceae
457.		Cucumis sativus	Cucurbitaceae
458.	Kakharu	Cucurbita maxima	Cucurbitaceae
459.	Shivalingi	Diplocyclos palmatus	Cucurbitaceae
460.		Gymnopetalum	Cucurbitaceae
		cochinchinensis	
461.		Gynostemma pedata	Cucurbitaceae
462.	Lau	Lagenaria siceraria	Cucurbitaceae
463.	Janhi	Luffa acutangula	Cucurbitaceae
464.	Janhi	Luffa aegyptiaca	Cucurbitaceae
465.	Janhi	Luffa cylindrica var. Minor	Cucurbitaceae
466.	Kalara	Momordica charantia	Cucurbitaceae
467.	Kankud	Mimordica dioica	Cucurbitaceae

468.	Paharikakharu	Mukia maderaspatana	Cucurbitaceae
469.	Lata baigana	Sechium edule	Cucurbitaceae
470.	Bankunduri	Solena amplexicaulis	Cucurbitaceae
471.	Mahakala	Trichosanthes tricuspidata	Cucurbitaceae
472.	Tranakara	Begonia picta	Begoniaceae
473.	Nagapheni	Opuntia vulgaris	Cactaceae
474.	Pita saga	Glinus oppositifolius	Molluginaceae
475.	Tita saga	Mollugo pentaphylla	Molluginaceae
476.	Puruni saga	Trianthema portulacastrum	Aizoaceae
477.	1 urum saga	Bupleurum ramosissimum	Apiaceae
477.	Thalkudi	Centella asiatica	Apiaceae
479.	Dhania	Coriandrum sativum	Apiaceae
480.	Janglidhania		-
	Jangnunama	Erynginum foetidum	Apiaceae
481.		Hydrocotyle sibthorpioides	Apiaceae
482.	D = ==1-1 C = ==1	Oenanthe javanica	Apiaceae
483.	Banshi Gopal	Peucedanum nagpurense	Apiaceae
484.		Pimpinella bracteata	Apiaceae
485.		Pimpinella heyneana	Apiaceae
486.		Aralia Montana	Aralaceae
487.	Jari	Schlefflera venulosa	Araliaceae
488.		Trevesia palmate	Araliaceae
489.	Ankula	Alangium salviifolium	Alangiaceae
490.	Kadamba	Anthocephalus chinensis	Rubiaceae
491.		Argostemma verticillatum	Rubiaceae
492.	Phiriki	Benkara malabarica	Rubiaceae
493.	Kumar chikni/ Jordaru	Canthium dicoccum (Gaertn.)	Rubiaceae
		var. umbellatum	
494.		Canthium glabrum	Rubiaceae
495.		Canthium parviflorum	Rubiaceae
496.	Kalei kanta	Catunaregam spinosa	Rubiaceae
497.		Chassalia curviflora	Rubiaceae
498.		Coffea benghalensis	Rubiaceae
499.		Dentella repens	Rubiaceae
500.		Fagerlindia fasciculate	Rubiaceae
501.	Bhurudu	Gardenia gummifera	Rubiaceae
502.	Dambaru	Gardenia latifolia	Rubiaceae
503.		Gardenia resinifera	Rubiaceae
504.	Kuruma, Kaima	Haldinia cordifolia	Rubiaceae
505.		Hedyotis affinis	Rubiaceae
506.		Hedyotis auricularia	Rubiaceae
507.	Gharpodia	Hedyotis corymbosa	Rubiaceae
508.		Hedyotis diffusa	Rubiaceae
509.		Hedyotis gracilis	Rubiaceae
510.		Hedyotis ovatifolia	Rubiaceae
511.		Hedyotis pinifolia	Rubiaceae
512.		Hedyotis verticillata	Rubiaceae
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513.		Hedyotis vestita	Rubiaceae

515.	Banodadri	Hyptianthera stricta	Rubiaceae
516.	Lohajharia	Ixora pavetta	Rubiaceae
517.	3	Ixora undulate	Rubiaceae
518.		Knoxia sumatrensis	Rubiaceae
519.		Meyna spinosa	Rubiaceae
520.		Mitracarpus villosus	Rubiaceae
521.	Gudikoima	Mitragyna parvifolia	Rubiaceae
522.	Pindra	Morinda citrifolia	Rubiaceae
523.	Achu	Morinda pubescens	Rubiaceae
524.		Morinda umbellate	Rubiaceae
525.		Mussaenda incana	Rubiaceae
526.		Neanotis montholoni	Rubiaceae
527.		Neanotis tubulosa	Rubiaceae
528.		Neanotis wightiana	Rubiaceae
529.		Ophiorrhiza fasciculata	Rubiaceae
530.		Ophiorrhiza rugosa	Rubiaceae
531.	Prasaruni	Paederiafoetida	Rubiaceae
532.	Kukuchalia	Pavetta crassicaulis	Rubiaceae
533.		Pavetta tomentosa	Rubiaceae
534.		Psychotria adenophylla	Rubiaceae
535.		Psychotria denticulate	Rubiaceae
536.		Psychotria monticola	Rubiaceae
537.		Richardia scabra	Rubiaceae
538.	Rangachireita	Rubia cordifolia	Rubiaceae
539.		Spermacoce articularis	Rubiaceae
540.		Spermacoce hispida	Rubiaceae
541.		Spermacoce pusilla	Rubiaceae
542.		Spermacoce ramanii	Rubiaceae
543.		Spermadictyon suaveolens	Rubiaceae
544.	Telkur	Tamilnadia uliginosa	Rubiaceae
545.	Jajanka	Tarenna asiatica	Rubiaceae
546.		Uncaria sessilifructus	Rubiaceae
547.	Tilai	Wendlandia tinctoria	Rubiaceae
548.	Gokhura	Acanthospermum hispidum	Asteraceae
549.		Adenostomma lavenia	Asteraceae
550.		Ageratum conyzoides	Asteraceae
551.		Anaphilis adnata	Asteraceae
552.		Artemisia japonica	Asteraceae
553.	Magha latenga	Bidens biternata	Asteraceae
554.		Bidens pilosa	Asteraceae
555.		Blainvillea acmella	Asteraceae
556.		Blumea aromatic	Asteraceae
557.		Blumea clarkei	Asteraceae
558.		Blumea fistulosa	Asteraceae
559.		Blumea hieraciifolia	Asteraceae
560.		Blumea lacera	Asteraceae
561.		Blumea laciniata	Asteraceae
562.		Blumea lanceolaria	Asteraceae

563.		Blumea membranacea var. jacquemontii	Asteraceae
564.		Blumea mollis	Asteraceae
565.		Blumea oxyodonta	Asteraceae
566.	Moharenti	Blumeopsis flava	Asteraceae
567.	Jamjuria	Caesulia axillaris	Asteraceae
568.	Nakchika	Centipeda minima	Asteraceae
569.	Phulgandhuri	Chromolaena odorata	Asteraceae
570.	1 Hargananari	Chrysanthellum americanum	Asteraceae
571.		Conyza Canadensis	Asteraceae
572.		Conyza japonica	Asteraceae
573.		Conyza stricta	Asteraceae
574.		Cyathocline purpurea	Asteraceae
575.		Dicrocephalla integrifolia	Asteraceae
576.	Kasarda	Eclipta prostrate	Asteraceae
577.	Tatmuli, Mayurchulia	Elephantopus scaber	Asteraceae
578.	Sarkara	Emilia sonchifolia	Asteraceae
579.	Sarkara	Emilia soncnijotta Emilia zeylanica	Asteraceae
580.	Hidimichi	Emitia zeytanica Enydra fluctuans	
	HIGHINICH	, ,	Asteraceae
581.		Gnaphalium luteo-album	Asteraceae
582.		Gnaphalium pensylvanicum	Asteraceae
583.	Delinieni	Gnaphalium polycaulon	Asteraceae
584.	Painjari	Grangea maderaspatana	Asteraceae
585.	G + 11 11	Gynura aurantiaca	Asteraceae
586.	Gota khadaka	Laggera alata	Asteraceae
587.		Laggera crispata	Asteraceae
588.		Launaea acaulis	Asteraceae
589.		Mikania micrantha	Asteraceae
590.		Sigesbeckia orientalis	Asteraceae
591.		Solidago Canadensis	Asteraceae
592.		Sonchus asper	Asteraceae
593.		Sonchus wightianus var. glaber	Asteraceae
594.	Bhuikadam, Halamundi	Sphaeranthus indicus	Asteraceae
595.		Synedrella nodiflora	Asteraceae
596.	Vaishalyakarni	Tridex procumbens	Asteraceae
597.		Vernonia anthelmintica	Asteraceae
598.		Vernonia aspera	Asteraceae
599.		Vernonia cineria	Asteraceae
600.		Vernonia divergens	Asteraceae
601.		Vernonia squarrosa	Asteraceae
602.		Vicoa cernua	Asteraceae
603.	Bana sebati	Vicoa indica	Asteraceae
604.		Wedelia urticifolia	Asteraceae
605.	Parbatjeera	Wedelia wallichii	Asteraceae
606.	Gokhru	Xanthium indicum	Asteraceae
607.		Youngia japonica	Asteraceae
608.		Campanula benthamii	Campanulaceae

609.		Lobelia alsinoides	Lobeliaceae
610.		Lobelia heyneana	Lobeliaceae
611.		Anagallis arvensis	Primulaceae
612.		Anagallis pumila	Primulaceae
613.		Primula umbellata	Primulaceae
614.		Ardisia depressa	Myrsinaceae
615.	Tinkoli	Ardisia solanacea	Myrsinaceae
616.		Embelia ribens	Myrsinaceae
617.	Baibirango	Embelia tsjeriam-cottam	Myrsinaceae
618.	Mahulo	Madhuca indica	Sapotaceae
619.	Jayasthamadhuro	Xantolis tomentosa	Sapotaceae
620.	•	Diospyros ferrea	Ebenaceae
621.	Makarkendu	Diospyros malabarica	Ebenaceae
622.	Kendu	Diospyros melanoxylon	Ebenaceae
623.	Halda/ Jallai	Diospyros Montana	Ebenaceae
624.	Kalicha	Diospyrous sylvatica	Ebenaceae
625.		Styrax serullatum	Styraceae
626.	Bhaunri	Symplocos cochichinensis	Symplococaceae
627.	Lodha	Symplocos recemosa	Symplococaceae
628.	Masur danta	Chionanthus intermedius	Oleaceae
629.	Pochandia	Chionathus mala-elengi	Oleaceae
630.	Bana malli	Jasminum arborescens	Oleaceae
631.		Jasminum flexile	Oleaceae
632.		Jasminum sambac	Oleaceae
633.	Ban malli	Jasminum scandens	Oleaceae
634.		Ligustrum gamblei	Oleaceae
635.	Gangasiuli	Nyctanthes arbor-tristis	Oleaceae
636.	Eksira	Schrebera swietenioides	Oleaceae
637.	Gandhomalati	Aganosma caryophyllata	Apocynaceae
638.	Chhatiana	Alstonia scholaris	Apocynaceae
639.		Alstonia venenata	Apocynaceae
640.		Catharanthus pusillus	Apocynaceae
641.	Sadabihari	Catharanthus roseus	Apocynaceae
642.	Korua/ Khurchi/ Indrajalo	Holarrhena pubescens	Apocynaceae
643.	Dudhilata/ Swanlata	Ichnocarpus frutescens	Apocynaceae
644.	Kaner	Nerium oleander	Apocynaceae
645.	Kathachampa	Plumeria rubra	Apocynaceae
646.	Patal garud	Rauvolfia serpentina	Apocynaceae
647.	Tagar	Tabernaemontana divaricata	Apocynaceae
648.	Kaniar	Thevetia peruviana	Apocynaceae
649.	Banakaneari	Vallaris solanacea	Apocynaceae
650.	Pahadia kuduchi	Wrightia arborea	Apocynaceae
651.		Wrightia tinctoria	Apocynaceae
652.	Dudhi	Cryptolepis buchananii	Peripiocaceae
653.	Dudhi/Antamula/ Sugandhi	Hemidesmus indicus	Peripiocaceae
654.	Arakha	Calotropis gigantea	Asclepiadaceae

655.		Caralluma umbellata	Asclepiadaceae
656.		Ceropegia hirsuta	Asclepiadaceae
657.		Cynanchum callialatum	Asclepiadaceae
658.		Dischidia nummularia	Asclepiadaceae
659.		Gymnema sylvestre	Asclepiadaceae
660.		Heterostemma tanjorense	Asclepiadaceae
661.		Holostemma annulare	Asclepiadaceae
662.		Hoya alexicaca	Asclepiadaceae
663.		Hoya parasitica	Asclepiadaceae
664.		Pentatropis capensis	Asclepiadaceae
665.	Utrali/ Uturudi	Pergularia daemia	Asclepiadaceae
666.	Ottan/ Oturuui	Toxocarpus kleinii	Asclepiadaceae
667.		Wattakaaka volubilis	Asclepiadaceae
668.	Kochila		-
		Strychnos nux-vomica	Strychnaceae
669.	Kakato/Koyar	Strychonos potatorum	Strychnaceae
670.		Buddleja asiatica	Buddlejaceae
671.		Mitreola petiolata	Spigeliaceae
672.		Mitrasacme indica	Spigeliaceae
673.		Mitrasacme pygmaea	Spigeliaceae
674.		Canscora decurrens	Gentianaceae
675.		Cansocora decussata	Gentianaceae
676.		Canscora diffusa	Gentianaceae
677.		Centaurium centaurioides	Gentianaceae
678.		Exacum bicolor	Gentianaceae
679.		Exacum tenue	Gentianaceae
680.		Hoppea dichotoma	Gentianaceae
681.		Swertia angustifolia	Gentianaceae
682.		Nymphoides hydrophylla	Menyanthaceae
683.	Languliya	Hydrolea zeylanica	Hydrophyllaceae
684.	Ghanti	Cordia macleodii	Ehretiaceae
685.		Cordia wallichii	Ehretiaceae
686.		Ehretia acuminata	Ehretiaceae
687.	Mosania	Ehretia laevis	Ehretiaceae
688.	TVIOSUITU	Coldenia procumbens	Boraginaceae
689.		Cynoglossum zeylanicum	Boraginaceae
690.		Heliotropium indicum	Boraginaceae
691.		Heliotropium strigosum	Boraginaceae
692.		Trichodesma zeylanicum	Boraginaceae
693.		Argyreia bella	Convolvulaceae
694.	Inda	Argyreia daltonii	Convolvulaceae
695.	Jada	Erycibe paniculata	Convolvulaceae
696.	Bichhamalia	Evolvulus alsinoides	Convolvulaceae
697.		Evolvulus nummularius	Convolvulaceae
698.	T7 1	Hewittia sublobata	Convolvulaceae
699.	Kalam	Ipomea aquatic	Convolvulaceae
700.		Ipomea barlerioides	Convolvulaceae
701.		Ipomea cairica	Convolvulaceae
702.		Ipomea carnea	Convolvulaceae

703.		Ipomea eriocarpa	Convolvulaceae
704.		Ipomea nil	Convolvulaceae
705.		Ipomea pes-tigridis	Convolvulaceae
706.		Ipomea quamoclit	Convolvulaceae
707.		Ipomea sinensis	Convolvulaceae
708.		Ipomea turbinata	Convolvulaceae
709.		Merremia emarginata	Convolvulaceae
710.		Merremia hirta	Convolvulaceae
711.		Merremia umbellata	Convolvulaceae
712.		Merremia vitifolia	Convolvulaceae
713.	Nirmuli	Cuscuta reflexa	Cuscutaceae
714.	Lanka	Capsicum annum	Solanaceae
715.	Dutura	Datura metel	Solanaceae
716.	Bilati	Lycopersicon esculentum	Solanaceae
717.	Tipai	Physalis minima	Solanaceae
718.	r ··	Solanum erianthum	Solanaceae
719.		Solanum giganteum	Solanaceae
720.	Baigana	Solanum melongena var.	Solanaceae
	<i>8</i>	melongena	
721.	Bhejibaigan	Solanum melongena var.	Solanaceae
	, ,	insanum	
722.	Nunununia	Solanum nigram	Solanaceae
723.	Kantua	Solanum torvum	Solanaceae
724.	Bhejibaigan	Solanum vairum	Solanaceae
725.		Solanum violaceum	Solanaceae
726.		Solanum virginianum	Solanaceae
727.		Adenosma microcephalum	Scrophulariaceae
728.		Baccopa monnieri	Scrophulariaceae
729.		Buchnera hispida	Scrophulariaceae
730.		Centranthera indica	Scrophulariaceae
731.		Centranthera tranquebarica	Scrophulariaceae
732.		Limnophila aquatica	Scrophulariaceae
733.		Limnophila aromatica	Scrophulariaceae
734.		Limnophila connata	Scrophulariaceae
735.		Limnophila heterophylla	Scrophulariaceae
736.		Limnophila indica	Scrophulariaceae
737.		Limnophila rugosa	Scrophulariaceae
738.		Lindenbergia muraria	Scrophulariaceae
739.		Lindernia anagallis	Scrophulariaceae
740.		Lindernia antipoda	Scrophulariaceae
741.		Lindernia caespitosa	Scrophulariaceae
742.		Lindernia ciliata	Scrophulariaceae
743.		Lindernia crustacea	Scrophulariaceae
744.		Lindernia hookeri	Scrophulariaceae
745.		Lindernia nummularifolia	Scrophulariaceae
746.		Lindernia viscosa	Scrophulariaceae
747.		Mecardonia procumbens	Scrophulariaceae
748.	Khelopapada	Scoparia dulcis	Scrophulariaceae

749.		Striga angustifolia	Scrophulariaceae
750.		Striga asiatica	Scrophulariaceae
751.		Torenia cordifolia	Scrophulariaceae
752.		Torenia violacea	Scrophulariaceae
753.		Aeginetia indica	Orobanchaceae
754.		Utricularia aurea	Lentibulariaceae
755.		Utricularia bifida	Lentibulariaceae
756.		Utricularia caerulea	Lentibulariaceae
757.		Utricularia scandens	Lentibulariaceae
757.			Gesneriaceae
759.		Aeschynanthus parasiticus Chirita hamosa	Gesneriaceae
760.	District District	Rhinchoglossum obliquum	Gesneriaceae
761.	Phimpinia/ Phanphana	Oroxylum indicum	Bignoniaceae
762.		Radermachera xylocarpa	Bignoniaceae
763.	D 11/D 11	Spathodea campanulata	Bignoniaceae
764.	Parudi/Patuli	Stereospermum chelonoides	Bignoniaceae
765.	Rasi	Sesamum orientale	Pedaliaceae
766.	Baghanakhi	Martynia annua	Martyniaceae
767.		Andrographis elongate	Acanthaceae
768.		Andrographis ovate	Acanthaceae
769.		Andrographis paniculata	Acanthaceae
770.		Barleria cristata	Acanthaceae
771.		Barleria strigosa	Acanthaceae
772.		Barleria gibsonii	Acanthaceae
773.	Daskeranta	Barleria prionitis	Acanthaceae
774.		Barleria lupulina	Acanthaceae
775.		Blepharis maderaspatensis	Acanthaceae
776.		Dicliptera bupleuroides	Acanthaceae
777.		Dicliptera verticillata	Acanthaceae
778.		Dipteracanthus beddomei	Acanthaceae
779.		Dipteracanthus suffruticosus	Acanthaceae
780.		Ecbolium viride	Acanthaceae
781.		Eranthemum capsense	Acanthaceae
782.		Eranthemum nervosum	Acanthaceae
783.		Eranthemum purpurascens	Acanthaceae
784.		Hemiadelphis polysperma	Acanthaceae
785.		Hemigraphis latebrosa	Acanthaceae
786.	Koilekha	Hygrophila auriculata	Acanthaceae
787.		Hygrophila salicifolia	Acanthaceae
788.		Indoneesiella echioides	Acanthaceae
789.		Justicia adhatoda	Acanthaceae
790.		Justicia betonica	Acanthaceae
790. 791.		Justicia diffusa	Acanthaceae
791.		Justicia gendarussa	Acanthaceae
		Justicia japonica	
793.		v 2	Acanthaceae
794.		Justicia nilgherrensis	Acanthaceae
795.		Justicia quiqueangularis	Acanthaceae
796.		Lepidagathis fasciculata	Acanthaceae

797.		Lepidagathis incurva	Acanthaceae
798.		Lepidagathis purpuricaulis	Acanthaceae
798.		Nelsonia canescens	Acanthaceae
800.			Acanthaceae
800.		Peristrophe speciosa	_
		Petalidium barlerioides	Acanthaceae
802.		Phaulopsis imbricata	Acanthaceae
803.		Rhinacanthus nasutus	Acanthaceae
804.		Ruellia tuberosa	Acanthaceae
805.		Rungia pectinata	Acanthaceae
806.		Rungia repens	Acanthaceae
807.		Staurogyne glutinosa	Acanthaceae
808.	Pianya	Strobilanthes auriculatus	Acanthaceae
809.		Strobilanthes heyneanus	Acanthaceae
810.		Strobilanthes lupulinus	Acanthaceae
811.		Strobilanthes scaber	Acanthaceae
812.	Chakrakedar	Thunbergia frangrans	Acanthaceae
813.		Callicarpa longifolia	Verbenaceae
814.		Callicarpa macrophylla	Verbenaceae
815.		Callicarpa tomentosa	Verbenaceae
816.		Clerodendrum indicum	Verbenaceae
817.	Samarkand/ Tirkatia	Clerodendrum serratum	Verbenaceae
818.	Kunti	Clerodendrum viscosum	Verbenaceae
819.	Gambhari	Gmelina arborea	Verbenaceae
820.	Putus	Lantana camara var. aculeate	Verbenaceae
821.	Naguari	Lippia javanica	Verbenaceae
822.	Gosingi	Phyla nodiflora	Verbenaceae
823.		Premna calycina	Verbenaceae
824.		Premna coriacea	Verbenaceae
825.	Gandhanu	Premna latifolia	Verbenaceae
826.	Gitia	Pygmaeopremna herbacea	Verbenaceae
827.		Stachytarpheta jamaicensis	Verbenaceae
828.	Poiyan	Symphorema polyandrum	Verbenaceae
829.	Sagwan	Tectona grandis	Verbenaceae
830.	Muria	Vitex glabrata	Verbenaceae
831.	1110110	Vitex leucoxylon	Verbenaceae
832.	Begunia, Nirgundi	Vitex negundo	Verbenaceae
833.	Chadaigudi/ simkata	Vitex peduncularis	Verbenaceae
834.	Chadaigudi/ Sillikata	Acrocephalus hispidus	Lamiaceae
835.		1 1	Lamiaceae
		Ajuga macrosperma Anisochilus carnosus	Lamiaceae
836.			
837.		Anisomeles indica	Lamiaceae
838.		Colebrookea oppositifolia	Lamiaceae
839.		Eusteralis stellata	Lamiaceae
840.	D (1)	Gomphostemma parviflorum	Lamiaceae
841.	Banatulsi	Hyptis suaveolens	Lamiaceae
842.		Leonotis nepetifolia	Lamiaceae
843.		Leucas aspera	Lamiaceae
844.	Gaisa	Leucas indica	Lamiaceae

0.47		scaberula	
847.		Micromeria capitellata	Lamiaceae
848.		Micromeria biflora	Lamiaceae
849.		Mosla dianthera	Lamiaceae
850.	Bantulsi	Ocimum americanum	Lamiaceae
851.		Ocimum basilicum	Lamiaceae
852.	Tulsi	Ocimum tennuiflorum	Lamiaceae
853.		Orthosiphon aristatus	Lamiaceae
854.		Orthosiphon pallidus	Lamiaceae
855.	Chandua	Orthosiphon rubicundus	Lamiaceae
856.		Orthosiphon thymiflorus	Lamiaceae
857.		Platystoma africanus	Lamiaceae
858.		Plectanthus japonicus	Lamiaceae
859.		Plectanthus mollis	Lamiaceae
860.		Plectanthus ternifolius	Lamiaceae
861.		Plectanthus wightii	Lamiaceae
862.		Pogostemon auricularius	Lamiaceae
863.		Pogostemon benghalensis	Lamiaceae
864.		Teucrium viscidum	Lamiaceae
865.	Kharkharia/ Parni	Boerhavia diffusa	Nyctaginaceae
866.		Bougainvillea glabra	Nyctaginaceae
867.		Bougainvillea spectabilis	Nyctaginaceae
868.	Apamaranga	Achyranthes aspera	Amaranthaceae
869.		Acaranthes bidentata	Amaranthaceae
870.		Aerva lantana	Amaranthaceae
871.		Aerva sanguinolenta	Amaranthaceae
872.		Allmania nodiflora	Amaranthaceae
873.		Alternanthera sessilis	Amaranthaceae
874.	Khada saga	Amaranthus caudatus	Amaranthaceae
875.	Kanta khada	Amaranthus spinosus	Amaranthaceae
876.	Nautia	Amaranthus tricolor	Amaranthaceae
877.		Amaranthus viridis	Amaranthaceae
878.		Celosia argentea	Amaranthaceae
879.		Cyathula prostrata	Amaranthaceae
880.		Gomphhrena celosioides	Amaranthaceae
881.		Pupalia lappacea	Amaranthaceae
882.		Chenopodium album	Chenopodiaceae
883.		Polygonum barbatum	Polygonaceae
884.		Polygonum barbatum L.	Polygonaceae
		Var. stagninum	
885.		Polygonum chinense	Polygonaceae
886.		Polygonum glabrum	Polygonaceae
887.		Polygonum hydropiper L.	Polygonaceae
		Ssp. Microcarpum var.	
		triquetrum	
888.		Polygonum pendunculare	Polygonaceae

889.		Polygonum plebeium	Polygonaceae
890.		Polygonum strigosum	Polygonaceae
891.		Polypleurum wallichii	Podostemaceae
892.	Iswar-mula	Aristolochia indica	Aristolochiaceae
893.	15Wai iliala	Peperomia dindigulensis	Piperaceae
894.		Peperomia tetraphylla	Piperaceae
895.	Chaikatha	Piper triocum	Piperaceae
896.	Charkatha	Actinodaphne anguistifolia	Lauraceae
897.			
	T - 411-111	Cassytha filliformis	Lauraceae
898.	Ledha chhali	Litsea glutinosa	Lauraceae
899.	Paja	Litsea monopetala	Lauraceae
900.		Neocinnamomum caudatum	Lauraceae
901.		Persea villosa	Lauraceae
902.		Phoebe lanceolata	Lauraceae
903.		Phoebe wightii	Lauraceae
904.		Grevillea robusta	Proteaceae
905.		Elaeagnus kologa	Elaeagnaceae
906.		Dendrophthoe falcata	Loranthaceae
907.		Macrosolen cochinchinensis	Loranthaceae
908.	Malanga	Scurrula parasitica	Loranthaceae
909.	Malanga	Viscum articulatum	Loranthaceae
910.	Malanga	Viscum monoicum	Loranthaceae
911.	Malanga	Viscum orientale	Loranthaceae
912.		Osyris wightiana	Santalaceae
913.	Chandan	Santalum album	Santalaceae
914.		Acalypha indica	Euphorbiaceae
915.		Alchornea mollis	Euphorbiaceae
916.	Nunnunia	Antidesma acidum	Euphorbiaceae
917.		Antidesma acuminatum	Euphorbiaceae
918.		Antidesma bunius	Euphorbiaceae
919.	Amtua/Nuniari	Antidesma ghaesembilla	Euphorbiaceae
920.	Tabo	Aporosa octandra	Euphorbiaceae
921.	Rajkoli	Baccaurea ramiflora	Euphorbiaceae
922.	Tugitori	Baliospremum montanum	Euphorbiaceae
923.		Biscofia javanica	Euphorbiaceae
924.	Jajana	Breynia vitis-idaea	Euphorbiaceae
925.	- ujuiiu	Bridelia pubescens	Euphorbiaceae
926.	Kasi	Bridelia retusa	Euphorbiaceae
927.	Nota kasi	Bridelia stipularis	Euphorbiaceae
928.	Karada	Cleistanthus collinus	Euphorbiaceae
929.	ranaua	Cleistanthus patulus	Euphorbiaceae
930.		Croton bonplandianus	Euphorbiaceae
930.	Furudi	1	±
	Masud/Putudi	Croton raybyrabii	Euphorbiaceae
932.	iviasuu/Putuul	Croton roxburghii	Euphorbiaceae
933.		Cnesmosa javanica	Euphorbiaceae
934.	A1-	Dimorphocalyx glabellus	Euphorbiaceae
935.	Anla	Embica officinalis	Euphorbiaceae
936.	Dudhi	Euphorbia hirta	Euphorbiaceae

937.	Seju	Euphorbia nivulia	Euphorbiaceae
938.	V	Euphorbia prostrata	Euphorbiaceae
939.		Euphorbia thymifolia	Euphorbiaceae
940.		Glochidion lanceolarium	Euphorbiaceae
941.		Glochidion velutinum	Euphorbiaceae
942.		Glochidion zeylanicum	Euphorbiaceae
943.	Pani jhorabi/Jamla	Homonoia riparia	Euphorbiaceae
944.	Banpri jada	Jatropha curcas	Euphorbiaceae
945.	Dunpii juuu	Jatropha gossypifolia	Euphorbiaceae
946.	Jandaki	Kirganelia reticulata	Euphorbiaceae
947.	Kukuda-hadi	Lasiococca comberi	Euphorbiaceae
948.	Kukuua-naui	Macaranga denticulate	Euphorbiaceae
949.			
	Sinduri	Macaranga peltata	Euphorbiaceae
950.	Sinduri	Mallotus philippensis	Euphorbiaceae
951.		Pachystylidium hirsutum	Euphorbiaceae
952.		Phyllanthus amarus	Euphorbiaceae
953.		Phyllanthus debilis	Euphorbiaceae
954.	Bhui-amla/Bari-amla	Phyllanthus fraternus	Euphorbiaceae
955.	Jhar	Phyllanthus lawii	Euphorbiaceae
956.		Phyllanthus urinaria	Euphorbiaceae
957.		Phyllanthus virgatus	Euphorbiaceae
958.	Jada	Ricinus communis	Euphorbiaceae
959.		Sapium insigne	Euphorbiaceae
960.		Sauropus quadrangularis	Euphorbiaceae
961.		Sebastiania chamaelea	Euphorbiaceae
962.		Securinega virosa	Euphorbiaceae
963.		Suregada multiflora	Euphorbiaceae
964.		Tragia involucrata	Euphorbiaceae
965.	Panigambhari	Trewia nudiflora	Euphorbiaceae
966.		Triadica cochinchinensis	Euphorbiaceae
967.		Celtis tetrandra	Ulmaceae
968.	Charla/Turuda	Holoptelea intergrifolia	Ulmaceae
969.	Kharkas	Trema orientalis	Ulmaceae
970.	Jautha/Jeota	Artocarpus lacucha	Moraceae
971.	Panasa	Artocarpus heterophullus	Moraceae
972.	1 dilasa	Cudrania cochinchinensis	Moraceae
973.	Bara	Ficus benghalensis	Moraceae
974.	Duru	Ficus benjamina var. comosa	Moraceae
974.		Ficus fruticosa	Moraceae
975. 976.		ů	Moraceae
970. 977.		Ficus heterophylla	
		Ficus hispida	Moraceae
978.		Ficus lanceolata	Moraceae
979.		Ficus microcarpa	Moraceae
980.	D	Ficus nervosa	Moraceae
981.	Dimiri	Ficus racemosa	Moraceae
982.	Pipalo/Aswastha	Ficus religiosa	Moraceae
983.		Ficus scandens	Moraceae
984.	Potkuli	Ficus semicordata	Moraceae

985.	Kharsara	Ficus tinctoria subsp. gibbosa	Moraceae
986.		Ficus virens	Moraceae
987.	Tutkoli	Morus australis	Moraceae
988.		Morus macroura	Moraceae
989.	Sara	Streblus asper	Moraceae
990.	Phutkuli	Streblus taxoides	Moraceae
991.		Boerhmeria macrophylla	Urticaceae
992.		Elatostemma cuneatum	Urticaceae
993.		Laportea interrupta	Urticaceae
994.		Maoutia puya	Urticaceae
995.		Oreocnide frutescens	Urticaceae
996.		Pilea microphylla	Urticaceae
997.		Pilea scripta	Urticaceae
998.		Pouzolzia auriculata	Urticaceae
999.		Pouzolzia pentandra	Urticaceae
1000.		Populus cilata	Salicaceae
1001.	Panibegunia	Salix tetrasperma	Salicaceae
1002.		Ceratophyllum demersum	Ceratophyliaceae
1003.		Blyxa auberti	Hydrocharitaceae
1004.		Ottelia alismoides	Hydrocharitaceae
1005.		Vallisneria natans	Hydrocharitaceae
1006.		Burmannia coelestis	Burmanniaceae
1007.		Acampe carinata	Orchidaceae
1008.	Rasna	Acampe ochracea	Orchidaceae
1009.		Acampe praemorsa	Orchidaceae
1010.		Acampe rigida	Orchidaceae
1011.		Acanthephippium sylhetens	Orchidaceae
1012.		Aerides maculosum	Orchidaceae
1013.		Aerides multiflorum	Orchidaceae
1014.		Aerides odoratum	Orchidaceae
1015.		Bulbophyllum cariniflorum	Orchidaceae
1016.		Bulbophyllum crassipes	Orchidaceae
1017.		Bulbophyllum macraei	Orchidaceae
1018.		Bulbophyllum panigrahianum	Orchidaceae
1019.		Bulbophyllum polyrhizum	Orchidaceae
1020.		Bulbophyllum triste	Orchidaceae
1021.		Bulbophyllum umbellatum	Orchidaceae
1022.		Chiloschista parishii	Orchidaceae
1023.		Cleisostoma appendiculatum	Orchidaceae
1024.		Cymbidium aloifolium	Orchidaceae
1025.		Cymbidium bicolor	Orchidaceae
1026.		Dendrobium aphyllum	Orchidaceae
1027.		Dendrobium bicameratum	Orchidaceae
1028.		Dendrobium cathcartii	Orchidaceae
1029.		Dendrobium crepidatum	Orchidaceae
1030.		Dendrobium fimbriatum	Orchidaceae
1031.		Dendrobium formosum	Orchidaceae
1032.		Dendrobium herbaceum	Orchidaceae

1033.		Dendrobium macrostachyum	Orchidaceae
1034.		Dendrobium moschatum	Orchidaceae
1035.		Dendrobium nobile	Orchidaceae
1036.		Dendrobium peguanum	Orchidaceae
1037.		Dendrobium regium	Orchidaceae
1038.		Dendrobium transparens	Orchidaceae
1039.		Diploprora championi	Orchidaceae
1040.		Eria bambusifolia	Orchidaceae
1041.		Eria meghasaniensis	Orchidaceae
1042.		Eulophia explanata	Orchidaceae
1043.		Eulophia nuda	Orchidaceae
1044.		Eulophia spectabilis	Orchidaceae
1045.		Flickingeria macraei	Orchidaceae
1046.		Flickingeria nodosa	Orchidaceae
1047.		Gastrochilus inconspicuous	Orchidaceae
1048.		Geodorum densiflorum	Orchidaceae
1049.		Goodyera fumata	Orchidaceae
1050.		Goodyera hispida	Orchidaceae
1051.		Goodyrea procera	Orchidaceae
1052.		Goodyera thailandica	Orchidaceae
1053.	Dev Sunda	Habenaria commelinifolia	Orchidaceae
1054.	Dev Sunau	Habenaria crassifolia	Orchidaceae
1055.		Habenaria foliosa	Orchidaceae
1056.		Habenaria furcifera	Orchidaceae
1050.		Habenaria plantaginea	Orchidaceae
1057.		Habenaria reniformis	Orchidaceae
1050.		Habenaria stenopetala	Orchidaceae
1060.		Kingidium decumbens	Orchidaceae
1061.		Kingidium deliciosum	Orchidaceae
1061.		Liparis bituberculata	Orchidaceae
1062.		Liparis oliuberculaid Liparis elliptica	Orchidaceae
1064.		1 1	Orchidaceae
1064.		Liparis nervosa Liparis resupinata	Orchidaceae
1065.			Orchidaceae
		Liparis viridiflora	
1067. 1068.		Lusia brachystychis	Orchidaceae Orchidaceae
1068.		Luisia trichorhiza	Orchidaceae
		Luisia zeylanica Malaxis latifolia	
1070.		v	Orchidaceae
1071.		Malaxis purpurea Malaxis rheedii	Orchidaceae
1072.			Orchidaceae
1073.		Micropera pallida	Orchidaceae
1074.		Nervilia aragoana	Orchidaceae
1075.		Nervilia crociformis	Orchidaceae
1076.		Nervilia discolor	Orchidaceae
1077.		Nervilia infundibulifolia	Orchidaceae
1078.		Nervilia prainiana	Orchidaceae
1079.		Oberonia denticulata	Orchidaceae
1080.		Oberonia ensiformis	Orchidaceae

1081.		Oberonia iridifolia	Orchidaceae
1081.		Oberonia iriaijona Oberonia falconeri	Orchidaceae
1082.		Oberonia gammiei	Orchidaceae
1083.		Oberonia gammei Oberonia proudlockii	Orchidaceae
		*	
1085.		Odisha cleistantha	Orchidaceae
1086.		Pecteilis gigantea	Orchidaceae
1087.		Pelatantheria insectifera	Orchidaceae
1088.		Peristylus constrictus	Orchidaceae
1089.		Peristylus goodyeroides	Orchidaceae
1090.		Peristylus lawii	Orchidaceae
1091.		Peristylus parishii	Orchidaceae
1092.		Pholidota pallida	Orchidaceae
1093.		Rhynchostylis retusa	Orchidaceae
1094.		Seidenfia versicolor	Orchidaceae
1095.		Smitinandia micrantha	Orchidaceae
1096.		Spiranthes sinensis	Orchidaceae
1097.		Staurochilus ramosus	Orchidaceae
1098.		Tainia hookeriana	Orchidaceae
1099.		Thunia bracteata	Orchidaceae
1100.		Tropidia angulosa	Orchidaceae
1101.		Tropidia curculigoides	Orchidaceae
1102.	Malanga/ Amdahaka/	Vanda tessellata	Orchidaceae
	Ransa		
1103.	Rasna/Malang	Vanda testacea	Orchidaceae
1104.		Zeuxine gracilis	Orchidaceae
1105.	Ban Kadali	Musa paradisiaca	Musaceae
1106.		Amomum maximum	Zingiberaceae
1107.		Catimbium malaccense	Zingiberaceae
1108.		Costus speciosus	Zingiberaceae
1109.	Ban haldi/Amada	Curcuma amada	Zingiberaceae
1110.	Palua	Curcuma angustifolia	Zingiberaceae
1111.	Ban haldi/Palua	Curcuma aromatica	Zingiberaceae
1111.	Dali lialul/1 alua	Curcuma zedoaria	
			Zingiberaceae
1113.		Curcumorpha longiflora	Zingiberaceae
1114.		Globba marantina L. G.	Zingiberaceae
1115		bulbifera Roxb.	7ingihamaaaa
1115.		Globba racemosa	Zingiberaceae
1116.		Hedychium coccineum	Zingiberaceae
1117.		Hedychium coronarium	Zingiberaceae
1118.		Kaempferia rotunda	Zingiberaceae
1119.		Zingiber capitanum	Zingiberaceae
1120.		Zingiber purpureum	Zingiberaceae
1121.		Zingiber rubens	Zingiberaceae
1122.		Canna coccinea	Cannaceae
1123.		Ananas comosus	Bromeliaceae
1124.		Crinum amoenum	Amaryllidaceae
		Crititin amocnant	7 Hillar y Hilladecae
1125.	Kondai	Crinum defixum	Amaryllidaceae

1127.	Sisal	Agave sisalana	Agavaceae
1128.	Talmuli/ Kua kanda	Curculigo orchioides	Hypoxidaceae
1129.		Curculigo trichocarpa	Hypoxidaceae
1130.		Tacca leontopetaloides	Taccaceae
1131.		Dioscorea alata	Dioscoreaceae
1132.		Dioscorea belophylla	Dioscoreaceae
1133.		Dioscorea bulbifera	Dioscoreaceae
1134.	Kanta alu	Dioscorea glabra	Dioscoreaceae
1135.	Suta alu	Dioscorea hamiltonii	Dioscoreaceae
1136.	Bainya	Dioscorea hispida	Dioscoreaceae
1137.	Pani alu	Dioscorea oppositifolia	Dioscoreaceae
1138.	Karabha alu	Dioscorea pentaphylla	Dioscoreaceae
1139.	Kosa alu/ Saiga alu	Dioscorea puber	Dioscoreaceae
1140.		Dioscorea tomentosa	Dioscoreaceae
1141.	Tunga alu	Dioscorea wallichii	Dioscoreaceae
1142.	Satawari/ Gaisiro/	Asparagus racemosus	Liliaceae
	Gaichero		
1143.	Jhinka	Chlorophytum arundinaceum	Liliaceae
1144.		Chlorophytum tuberosum	Liliaceae
1145.		Disporum cantoniensis	Liliaceae
1146.		Dracaena ternifolia	Liliaceae
1147.		Drimia indica	Liliaceae
1148.		Gloriosa superba	Liliaceae
1149.		Iphigenia indica	Liliaceae
1150.	Ramdantani/Mutri Mothuri	Smilax perfoliata	Smilaceae
1151.	Ramdantani/Mutri Mothuri	Smilax zeylanica	Smilaceae
1152.		Monochoria vaginalis	Pontederiaceae
1153.		Aneilema ovalifolium	Commelinaceae
1154.		Commelina appendiculata	Commelinaceae
1155.		Commelina benghalensis	Commelinaceae
1156.		Commelina diffusa	Commelinaceae
1157.		Commelina erecta	Commelinaceae
1158.		Commelina paludosa	Commelinaceae
1159.		Commelina suffruticosa	Commelinaceae
1160.		Cyanotis arachnoides	Commelinaceae
1161.		Cyanotis cristata	Commelinaceae
1162.		Cyanotis fasciculata	Commelinaceae
1163.		Cyanotis tuberosa	Commelinaceae
1164.		Floscopa scandens	Commelinaceae
1165.		Mudrannia edulis	Commelinaceae
1166.		Mudrannia japonica	Commelinaceae
1167.		Mudrannia nudiflora	Commelinaceae
1168.		Mudrannia spirata	Commelinaceae
1169.		Mudrannia vaginata	Commelinaceae
1170.		Tonningia axillaries	Commelinaceae
1171.		Juncos prismatocarpus	Juncaceae

1172.	Gauri-bet	Calamus latifolius	Arecaceae
1173.		Calamus viminalis var	Arecaceae
11701		fasciculatus	
1174.		Caryota urens	Arecaceae
1175.	Khejuri	Phoenix acaulis	Arecaceae
1176.		Alocasia fornicata	Araceae
1177.		Alocasia macrorrhizos	Araceae
1178.		Amorphophalus paeoniifolius	Araceae
		var campanulatus	
1179.		Arisaema tortuosum	Araceae
1180.		Colocasia esculenta	Araceae
1181.		Lasia spinosa	Araceae
1182.		Plesmonium margaritiferum	Araceae
1183.		Pothos scandens	Araceae
1184.		Raphidophora glauca	Araceae
1185.		Remusatia vivipara	Araceae
1186.		Rhapidophora decursiva	Araceae
1187.		Scindapsus officinalis	Araceae
1188.		Theriophonum minutum	Araceae
1189.		Tenagocharis latifolia	Butomaceae
1190.		Aponogeton natans	Aponogetonaceae
1191.		Eriocaulon melaleucum	Erioleucaceae
1192.		Eriocaulon quinquangulare	Erioleucaceae
1193.		Eriocaulon ritchieanum	Erioleucaceae
1194.		Eriocaulon sollyanum	Erioleucaceae
1195.		Eriocaulon truncatum	Erioleucaceae
1196.		Eriocaulon xeranthum	Erioleucaceae
1197.		Carex baccans	Cyperaceae
1198.		Carex filicina	Cyperaceae
1199.		Carex phacota	Cyperaceae
1200.		Carex stramentitia	Cyperaceae
1201.		Cyperus brevifolius	Cyperaceae
1202.		Cyperus compactus	Cyperaceae
1203.		Cyperus cuspidatus	Cyperaceae
1204.		Cyperus cyperoides	Cyperaceae
1205.		Cyperus distans	Cyperaceae
1206.		Cyperus flavidus	Cyperaceae
1207.		Cyperus haspan	Cyperaceae
1208.		Cyperus iria	Cyperaceae
1209.		Cyperus malccensia	Cyperaceae
1210.		Cyperus niveus	Cyperaceae
1211.		Cyperus nutans	Cyperaceae
1212.		Cyperus pilosus	Cyperaceae
1213.		Cyperus procerus	Cyperaceae
1214.		Cyperus pubisquama	Cyperaceae
1215.		Cyperus pumilus	Cyperaceae
1216.		Cyperus rotundus	Cyperaceae
1217.		Cyperus sanguinolentus	Cyperaceae

1218.	Cyperus sesquiflorus	Cyperaceae
1219.	Cyperus tenuispica	Cyperaceae
1220.	Eleocharis congesta	Cyperaceae
1221.	Eleocharis retroflexa	Cyperaceae
1222.	Fimbristylis aestivalis	Cyperaceae
1223.	Fimbristylis bisumbellata	Cyperaceae
1224.	Fimbristylis dichotoma	Cyperaceae
1225.	Fimbristylis littoralis Gaud.	Cyperaceae
1223.	Var. littoralis	Сурстиссис
1226.	Fimbristylis miliacea	Cyperaceae
1227.	Fimbristylis swchoenoides	Cyperaceae
1228.	Fuirena ciliaris	Cyperaceae
1229.	Indocourtoisia cyperoides	Cyperaceae
1230.	Lipocarpha chinensis	Cyperaceae
1231.	Lipocarpha enthensis  Lipocarpha sphacelata	Cyperaceae
1232.	Scirpus articulatus	Cyperaceae
1233.	Scirpus grossus	Cyperaceae
1234.	Scirpus juncoides	Cyperaceae
1235.	Scirpus mucronatus	Cyperaceae
1236.	Scirpus squarrosus	Cyperaceae
1237.		
1238.	Scleria lithosperma Scleria terrestris	Cyperaceae
1239.	Scieria terrestris  Scleria tessellata	Cyperaceae
1240.		Cyperaceae
	Alloteropsis semialata	Poaceae
1241.	Andropogon ascinodes	Poaceae
1242.	Apluda mutica	Poaceae
1243.	Apocopis courtallumensis	Poaceae
1244.	Apocopis paleacea	Poaceae
1245.	Arthraxon lanceolatus	Poaceae
1246.	Arthraxon lancifolius	Poaceae
1247.	Arthraxon quartinianus	Poaceae
1248.	Arundinella setosa	Poaceae
1249.	Arundo donax	Poaceae
1250.	Bambusa nutans	Poaceae
1251.	Bambusa tulda	Poaceae
1252.	Bothriochloa bladhii	Poaceae
1253.	Bothriochloa parviflora	Poaceae
1254.	Bothriochloa pertusa	Poaceae
1255.	Brachiaria distachya	Poaceae
1256.	Brachiaria ramose	Poaceae
1257.	Capillipedium assimile	Poaceae
1258.	Centosteca latifolia	Poaceae
1259.	Chionachne koenigii	Poaceae
1260.	Chrysopogon aciculatus	Poaceae
1261.	Chrysopogon verticillatus	Poaceae
1262.	Coelachne simpliciuscula	Poaceae
1263.	Coix aqquatica	Poaceae
1264.	Coix gigantia	Poaceae

1265.		Coix lacryma	Poaceae
1266.		Cymbopogon caecius	Poaceae
1267.	Dhanantri	Cymbopogon fexuosus	Poaceae
1268.	Dhanantri	Cymbopogon martinii	Poaceae
1269.	Duba	Cynodon dactylon	Poaceae
1270.		Crytococcum oxyphyllum	Poaceae
1271.		Crytococcum patens	Poaceae
1272.		Dacyloctenium aegyptium	Poaceae
1273.	Saliabanso	Dendrocalamus strictus	Poaceae
1274.		Desmostachya bipinnata	Poaceae
1275.		Dicanthium caricosum	Poaceae
1276.		Digitaria abludens	Poaceae
1277.		Digitaria bicornis	Poaceae
1278.		Digitaria ciliaris	Poaceae
1279.		Digitaria longifloga	Poaceae
1280.		Digitaria stricta	Poaceae
1281.		Echinochloa colona	Poaceae
1282.		Eleusine indica	Poaceae
1283.		Eragrostiella nardoides	Poaceae
1284.		Eragrostis atrovirens	Poaceae
1285.		Eragrostis coarctata	Poaceae
1286.		Eragrostis gangetica	Poaceae
1287.		Eragrostis tenella	Poaceae
1288.		Eragrostis unioloides	Poaceae
1289.	Banga-serum	Eulalia trispicata	Poaceae
1290.	Baguli/Bubai/Sabai	Eulaliopsis binata	Poaceae
1291.		Garnotia tenella	Poaceae
1292.		Hackelochloa granularis	Poaceae
1293.	Sukla	Heteropogon contortus	Poaceae
1294.		Hygroryza aristata	Poaceae
1295.		Ichnanthus vicinus	Poaceae
1296.	Chhana ghas	Imperata cylindrica	Poaceae
1297.		Isachne albens	Poaceae
1298.		Isachne globosa	Poaceae
1299.		Isachne miliacea	Poaceae
1300.		Ischaemum hirtum	Poaceae
1301.		Ischaemum idicum	Poaceae
1302.		Ischaemum rugosum	Poaceae
1303.		Iseilema laxum	Poaceae
1304.		Leersia hexandra	Poaceae
1305.		Leptochloa chinensis	Poaceae
1306.		Microstegium ciliatum	Poaceae
1307.		Mnesithea laevis	Poaceae
1308.		Oplismenus burmannii	Poaceae
1309.		Oplismenus compositus	Poaceae
1310.		Oryza meyeriana	Poaceae
1311.		Oryza rufipogon	Poaceae
1312.	Dhana	Oryza sativa	Poaceae

1313.		Oryza officinalis	Poaceae
1314.		Panicum brevifolium	Poaceae
1315.		Panicum notatum	Poaceae
1316.	Gundlu/Gundla	Panicum sumatrense	Poaceae
1317.	Odificial Odificia	Panicum trypheron	Poaceae
1318.		Paspalidium flavidum	Poaceae
1319.	Kodo	Paspalum scrobiculatum	Poaceae
1320.	11000	Pennisetum pedicelatum	Poaceae
1321.		Pennisetum polystachyon	Poaceae
1322.		Pennisetum purpureum	Poaceae
1323.		Perotis indica	Poaceae
1324.		Phragmitis karka	Poaceae
1325.		Pogonatherum paniceum	Poaceae
1326.		Pogonatherum rufo-barbatum	Poaceae
1327.		Pseudopogonatherum	Poaceae
		contortum	
1328.		Pseudosorghum fasciculare	Poaceae
1329.		Rottboellia cochinchinensis	Poaceae
1330.		Saccharum fallax	Poaceae
1331.		Saccharum narenga	Poaceae
1332.		Saccharum spontaneum	Poaceae
1333.		Sacciolepis indica	Poaceae
1334.		Sacciolepis interrupta	Poaceae
1335.		Schizachyrium brevifolium	Poaceae
1336.		Sehima nervosa	Poaceae
1337.		Setaria intermedia	Poaceae
1338.		Setaria palmifolia	Poaceae
1339.		Setaria pumila	Poaceae
1340.		Sorghum bicolor	Poaceae
1341.		Sorghum nitidum	Poaceae
1342.		Sporobolus indicus (L.)	Poaceae
		R. Br. Var. diander	
1343.		Sporobolus indicus (L.)	Poaceae
		R.Br. var. purpureosuffusus	
1344.		Sporobolus wallichii	Poaceae
1345.		Themeda arundinacea	Poaceae
1346.		Themeda caudata	Poaceae
1347.		Themeda laxa	Poaceae
1348.		Themeda quadrivalvis	Poaceae
1349.		Themeda triandra	Poaceae
1350.		Themeda villosa	Poaceae
1351.		Thysanolaena maxima	Poaceae
1352.	Maka	Zea mays	Poaceae

#### ANNEXURE XXI

#### LIST OF ORCHIDS

(As per Saxena and Brahman, 1989)

Acampe carinata (Griff.)Panigr., Taxon 34:688-689, 1985.

A. papillosa (Lindl.) Lindl., Fol. Orch. Acampe 2, 1853. nom. Illeg; Mishra 1985:168.

Occurrence: Jamuani, Jenabil, Kabatghai, Mahubhandar, Manbhanga ghat;

Pithabata, Talabandha, Upper Barakamuda; very common in the semi-

evergreen forest, in shade; flowering during Dec.-Feb.

Acampe ochracea (lindl.)Hochr., Bull. N. Y. Bot. Gard. 6:270, 1910.

Occurrence: Bada makabadi, Banjikusum ghat, Chahala, Gurguria, Jenabil,

Kabatghai, Meghasini, Upper Barakamuda; very common in the semi-

evergreen forest, in shade; flowering during Dec.:Feb.

Acampe praemorsa (Roxb.)Blatt.& McCann, J. Bombay nat. Hist. Soc. 35:495, 1932.

Occurrence: Baniabasa, Deokund, Kabatghai, Lulung, Manbhanga ghat, Sitakunda;

occasional, in open forests, in the periphery; flowers during May-June.

Acampe rigida (Buch.-Ham.Ex J.E. Sm.) Hunt, Kew Bull. 24:98, 1970.

Occurrence: Baniapada, Champaghat, Dhanagoji, Jenabil; scarce, in semi-ever-

green to evergreen forests, in shade; flowers during Sept.

\*Acanthephippium bicolorLindl., Bot. Reg.:t.1730, 1835.

Occurrence: Badamakabadi; scarce, in semi-evergreen forest, on stream bank, under

shade, in association with A.sylhetense; flowers in May.

Acanthephippium sylhetense Lindl. Gen. & SP. Orch.: 177, 1830.

Occurrence: Balidahar, Baniapada, Bhanjabasa, Dhudruchampa, Garandia nala,

Hatisala, Jenabila, Mandadahar, Meghasini block, Tangaria, tarinibila; scarce, in semi-ever green to evergreen forests, on stream banks under

heavily shaded situations; flowers in May-June.

Aerides multiflora Roxb., Corom. P1.271, 1820.

Occurrence: Baniabasa, Banjikusum ghat, Debakund, Dhudruchampa, Garh

Similipal, Gurguria, Jamuani, Jenabil, Kabatghai, Kendumundi, Lulung, Mahubhandar, Meghasini, Talabandh, Upper Barakamuda; common, in moist deciduous to semi-evergreen forests; flowers in

June.

Aerides odorata Lour., F1.Cochinch. 2:525,1790.

Occurrence: Badamakabadi, Baniabasa, Banjikusum ghat, Chahala, Deokund, Garh

Similipal, Gurguria, Jamuani, Jenabil, Joranda fall, Kabatghai, Lulung, Manabhanga ghat, Uski; common, in the moist deciduous forests;

flowers in June.

**Bulbophyllum cariniflorum** Rchb.f, in Walp.Ann.6:253,1861.

Occurrence: Jenabil, Matughar, Meghasini-Bhanjabasa, Nekdanacha-

Balidahar, Upper Barakamuda; occasional, in semi-evergreen and

evergreen forests, under shade; flowers during Aug.-Sep.

Bulbophyllum crassipes Hook.f.F1. Brit. Ind.5:760,1890.

Occurrence: Bhanjabasa, Deokund, Joranda fall, Kendumundi, Munidhar-Lulung,

Sanjo valley, Sitakund; occasional, in the moist deciduous forests by

stream side, epiphytic or lithophytic; flowers in Oct.

Bulbophyllum macraei (Lindl.)Rchb.f., in Walp.Ann. 6:263,1861.

Occurrence: Bhudaka, Hatisala, Matughar, Pataghara, Upper Barakamuda scarce, in

ever-green forests, by stream side, under shade; flowering during July-

Aug.

**Bulbophyllum panigrahinum** S. Misra in Nord. J.Bot. 6(1): 25-29, 1986.

Occurrence: Bhuduka, near Baniapada, very rare in evergreen forest, in moist

valley, lithophytic by stream side; flowers in June; flowers waxy-

white, maroon-speckled; fruiting Jan.

Bulbophyllum polyrhizum Lindl., Gen & Sp.Orch.:53,1830.

Occurrence: Meghasini hill, nearing the peak; scarce, in semi-evergreen forest, in

partly open condition; flowers in Mar.

Bulbophyllum triste Rchb.f., in Walp. Ann.6:1861.

Occurrence: Meghsani hill, Nekadanecha-Balidahar; scarce, in semi-evergreen

forests, in partly open situations; flowers in Feb.-Mar.

Bulbophyllum umbellatumLindl., Wall,Cat, 1984,1829 non.nud., Gen. & Sp.

Orch.:56,1830.

Occurrence: Upper Barakamuda, Baladi nala; occasional, in evergreen forest, by

stream side, under shade; flowers in Apr.

\*Calanthe triplicata (Willem) Ames, Philipp. J. Sc. Bot. 2:326, 1907.

Occurrence: Bandiriabasa on Deo river; on edge of the stream, rare, in semi-

evergreen forest, under shade.

Chiloschista parishii Seidenf.in Opera Bot.95:176-178, 1988. Chiloschista lunifera auct. non (Rchb.f.) J. J. Sm.; Misra 1985:170.

Occurrence: Bakua, Baniabasa, Bhanjabasa, Debasthali, Dhangoji, Garandia,

Jenabil, Kabatghai, Meghasini, Tarinibila, Upper Barakamuda; occasional, in semi-evergreen to evergreen forests, epiphytic usually on slender branches, at low heights, under shade; flowers during Apr.-

June.

**Cleisostoma appendiculatum** (Lindl.)Benth.& Hook. f. Scidenef., Dansk. Bot.Ark. 29(2-4): 58.1975.

Occurrence: Andharajodi, Gurguria, Kabatghai, Manabhanga ghat, Tangaria,

Tarukdora; occasional, in semi-evergreen to moist deciduous forests, usually by stream side, epiphytic or lithophytic at low heights, under

shade; flowers in Sept.

Cymbidium aloifolium (L.) Sw., Kg1.Sv.Vet.Akad.nya Handl.6:73,1799.

Occurrence: Badamakabadi, Baniabasa, Bhanjabasa, Champaghat, debakunda,

Ghagra, Gudgudiam, Jenabil, Joranda, fall, Kendumundi, Lulung, Manabhanga ghat, Upper Barakamuda, Meghasini, Uski; frequent, in moist deciduous to semi-evergreen forests, in open situations; flowers

during April.-June.

Cymbidium bicolorLindl., Gen. & Sp. Orch.:164,1833.

Occurrence: Badamakabadi, Baniapada, Jenabil, Joranda fall (bed), Kairakacha,

Meghasini, Pathuria, Upper Barakamuda; occasional, in semievergreen forests, under shade, preferring moist conditions; flowers in

Mar.

**Dendrobium aphyllum** (Roxb.)Fisch., in Gamble,F1.Madr.Pres.8:141,1928.

Occurrence: Badamakabadi, Baniabasa, Banjikusum ghat, Bhanjabasa, Chahala,

Deokund, Gurguria, Jenabil, Joranda fall (top and bottom), Kabatghai, Lulung, Upper Barakamuda, Uski; common, in moist deciduous to semi-evergreen forests, in partly open situations; flowers during Mar.-

Apr.

**Dendrobium bicameratum** Lindl. Bot. Reg. 25:85, misc.52,1839.

Occurrence: Badamakabadi, Bhanjabasa, Jenabil-Dhudruchampa, Matughar,

Meghasini, Upper Barakamuda; occasional, in semi-evergreen forests;

flowers during July-Aug.

**Dendrobium cathcartii Hook.f.**, F1. Br. Ind. 5:727,1890.

Occurrence: Badamakabadi, Baniapada, Bhanjabasa, Dhanagoji, Meghasini,

Nekadanecha, Sarua, tarinibila, Upper Barakamuda; occasional in semi-evergreen to evergreen forests, in well shaded situations; flowers

during Apr.-June.

Dendrobium cathcartii J. Hook., Fl. Br. India 5:727, 1890.

Occurrence: Badamakabadi, Baniapada, Bhanjabasa, Dhanagoji, Meghasini,

Nekadanacha, Sarua, Tarinibilla, Upper Barakamuda; occasional, in semi-evergreen to evergreen forests, in well shaded situations; flowers

during April – June.

**Dendrobium crepidatum** Lindl.&Paxt., Paxton F1.Gard. 1:63, Fig.45, 1850.

Occurrence: Badamakabadi, Baniapada, Bhanjabasa, Dhanagoji, Dhudruchampa,

Garh Similipal, Jenabil, Kabataghai, Khejuri, Meghasini, Sarua, Tarinibila, Upper Barakamuda; occasional, in moist deciduous to semi-

evergreen forests, in partly shaded situation; flowers in Apr.

**Dendobium formosum** Roxb.exLindl., in Wallich, Pl. As.rar. 1:24, T.29, 1830.

Occurrence: Badamakabadi, Barehipani, Dha ghat, Dhanagoji, Ghagara, Gurguria,

Jenabil, Kabatghai, Patbil, Talabandh-Chahala, Tangaria, Tinadiha, Upper Barakamuda; frequent, in moist deciduous or semi-evergreen

forests, in open situation; flowers during May-June.

**Dendobium herbaceum** Lindl., Bot. Reg. Misc.69,1840.

Occurrence: Bhanjabasa, Chahala, Dhanagoji, Jenabil, Kabatghai, Meghasini,

Tangaria, Upper Barakamuda; frequent, in moist deciduous to semi-

evergreen forests; flowers during Feb.-Apr.

**Dendrobium macrostachyum** Lindl.Gen.& Sp. Orch, 78, 1830.

Occurrence: Bakua, Barehipani, Kendumundi, Uski; scarce, in moist deciduous

forests, in open situations; flowers in Apr.

Dendrobium moschatum (Buch.-Ham.)Sw. Schrader Neue Joourn. 1:94, 1806

Occurrence: Badamakabadi, Baniapada, Bhanjabasa, Chahala, Champaghat,

Deokund, Ghagra, Jenabil, Joranda fall (bed), Kabatghai, Manbhangaghat, Meghasini, Sanjo valley, Sitakund, Tinadiha, Upper Barakamuda, frequent in semi-evergreen forests, in shade, flowers

May-June.

Dendrobium nobileLindl. Gen & Sp. Orch.: 34, 1830.

Occurrence: Badamakabadi, Bhanjabasa, Chahala, Jenabil, Kabatghai, Meghasini,

Tinadiha, Upper Barakamuda, frequent in semi-evergreen forests, in

shade, flowers May-June.

Dendrobium peguanum Lindl., J. Linn. Soc. 3:19, 1859.

Occurrence: Jamuani; scarce in moist deciduous forest, in open situation. Flowers in Dec-Jan.

Dendrobium transparens Lindl. Gen. & Sp. Orch.: 79,1830.

Occurrence: Bhanjabasa, Chahala, Gurguria, Hatisala, Jamuna, Jenabil, Kabatghai,

Meghasini, Patbil, Sanjo valley, U. Barhakamunda, Uski; frequent, in moist deciduous to semi-evergreen forests, in partly open situations;

flowers during Apr.-June.

Diploprora championi (Lindl.) Hook.f., F1.Brit.India,6:26,1890.

Occurrence: Baniapada, Bhanjabasa, Garandia nala, Meghasini nala, Sanabaladi

nala (near Pataghar), Tangaria and Tarinibila; scarce; in evergreen forests, by stream side in completely shaded situations, hanging from a

slender branches at low heights; flowers June, fruit; in Oct.-Apr.

Eria bambusifoliaLindl., J. Linn. Soc. 3:61,1859.

Occurrence: Baniapada, Bhanjabasa, Jenabil, Matughar, Meghasini, Pathuria,

Tarinibila, Upper Barakamuda; frequent, in semi-evergreen to evergreen forest, in shade, under moist conditions; flowers during

Dec.-Jan.

Eria meghasaniensis (Sarat Misra) Sarat Misra, J. Orchid Soc. India 3(1,2):69, 1990.

Occurrence: Meghasini hill, Khairiburu hill; rare, in tropical evergreen forests,

epiphytes, at low heights, in moist and partly open situations, flowers

in Sept.

Eulophia explanata Lindl., Gen. & Sp. Orch.: 180, 1833.

Occurrence: Bamanghaty, Balidar (near); occasional, in moist deciduous forests, on

foot hills or forest floors with loamy soil, flowers during May.

Eulophia graminea Lindl., (Wall. Num. List no. 7372 nom. Nud.)Gen. Sp. Orch. Pl.:182,

1833.

Occurrence: Gurguria; scarce, on bank of Khairi nala, in moist deciduous forest, in

open situation.

Eulophia nuda Lindl. Gen. Sp. Orch. P1:180, 1833

Occurrence: Bamanghaty, Barehipani, Chahala, Debasthali, Gurguria, Jenabil,

Meghasini, Sanjo valley, Upper Barakamuda; common in forest floors

or hills, even with stoney soil; flowers during May-June.

Flickingeria macraei (Lindl) Seid. Dansk Bot. Ark. 34 (1): 39, 1980.

Occurrence: Baniapada, Bhanjabasa, Hatisala, Jenabil, Meghasini, Tarinibila, Upper

Barhakamuda; frequent, in semi-evergreen to evergreen forest, in

shade, under moist conditions; flowers during Dec.-Jan.

Gastrochilus inconspicuum (Hook.f.) Kuntze, Rev. Gen. 2:661, 1891.

Occurrence: Barehipani, Bhanjabasa-Meghasini, Gurguria, Hatisala, Jamuani,

Jenabil, Kabatghai, Talbandha, Upper Barakamuda; common, in moist deciduous to semi-evergreen forest, in partly open situation; flowers

during June-Oct.

Geodorum densiflorum (Lamk.) Schltr. Fed. Rep.Beih. 4:259, 1919.

Occurrence: Bakua, Bamanghaty, Bhanjabasa-Meghasini, Chahala, Gurguria,

Kabatghai, Lulung, Meghasini, Patbil, Sanjo valley, Upper Barakamuda-Meghasini; very common throughout, under forest floor;

flowers during June-July.

Goodyera fumata Thw., Enum. Pl. Zeyl. 314,1864.

Occurrence: Pataghara, by the side of Baladinala; rare, in dense evergreen forest,

inshade; flowers in Feb.

Goodyera hispida Lindl., J. Linn. Soc.1:183,1857.

Occurrence: Tarinibila nala, Upper Barakamuda, by the side of Baladinala; scarce,

in dense evergreen forest, under shade; flowers in Aug.

Goodyera procera (Ker-Gawl.)Hook., Exot.FL.1.3:T.39,1823.

Occurrence: Badamakabadi, Gurguria, Jenabil, Upper Barakamuda; occasional, in

semi-evergreen to evergreen forests, by stream side, under shade,

flowers during March.

Goodyera thailandica Seid., Bot. Tidskr. 65:109,1969; Misra 1988a:21-23.

Occurrence: Baniapada, Bhanjabasa, Hatisala (Sendakida nala), Tarinibila and

Upper Barakamuda (Pataghar and Mandadahar); scarce, in dense evergreen forest, near streams, under heavy shade; flowers during

Feb.-Mar.

Habenaria commelinifolia (Roxb.) wall. Ex Lindl., Gen. & Sp. Orch.:325, 1835.

Occurrence: Barehipani, Debasthali, Gurguria, Joranda, Lulung, Nawana, Patbil;

common on forest floors, in open, in moist deciduous forests; flowers

during Aug.-Oct.

Habenaria crassifolia A. Rich.in Ann. Sci.nat.Ser.2.15:72t3c.1841.

Occurrence: Gurguria, Lulung, Sargada; occasional, inmoist deciduous forest floor,

fruiting Sept.

Habenaria furciferaLindl., Gen. & Sp. Orch.: 319, 1835.

Occurrence: Dhangoji, Gurguria (on way to Bakua); occasional, in moist deciduous

forests, under cover, flowers in Aug.

Habenaria gibsoni var. foetida Blatt.&McCann, J. Bombay nat.Hist. Soc. 36:16, 1932.

Occurrence: Chahala, Gurguria-Bakua, Kusumi; occasional, in moist deciduous

forests, under cover, fruiting Oct.

Habenaria plantaginea Lindl., Gen & Sp. Orch.:323, 1835.

Occurrence: Baniabasa, Barehipani, Chahala, Champagada, Gurguria, Kusumi,

Lulung; common around Chahala, occasional elsewhere, in moist

deciduous forests, under cover, flowers during Sept.-Oct.

Habenaria reniformis (D. Don.)Hook.f., FL.Brit.Ind.6:152,1890.

Occurrence: Gurguria, Joranda, Patabil, Tinadiha; common, in open grassy land;

flowers in Aug.

Habenaria stenopetalaLindl., Gen. & Sp. Orch.:319,1835.

Occurrence: Baniapada, Jenabil-Tarinibilla; rare, in evergreen forest, under dense

shade, in moist condition, with light soil; flowers Sep.-Oct.

**Kingidium deliciosum** (Rchb.f.) Sweet, Am.Orch.Soc.Bull.39:1095,1970.

Occurrence: Ghagra, Joranda fall (bed), Nekdanach, Tarinibila; scarce, in semi-

evergreen forests, in shade; flowers during May-Sept.

**Liparis elliptica** Wight, Ic.Pl.Ind.Or.5(1): 17,Pl.1735,1851.

Occurrence: Upper Barakamuda, Mandadahara, Meghasini nala, Tarinibila; rare, in

evergreen forests, under heavy shade, in moist condition; flowers in

Nov.-Dec.

Liparis nervosa (Thunb.)Lindl. Gen. & Sp. Orch.:26,1830.

Occurrence: Balidar, Baniapada, Bhanjabasa, Dhudruchampa, Garandia, Hatisala,

Jenabila, Kabataghai, Tarinibila and Upper Barhakamuda; scarce; in semi-evergreen to evergreen forests, under cover, on edge of perinnial

streams, with humus rich soil; flowers in June.

**Liparis paradoxa** (Lindl.) H.G.Rchb in Walp.Ann.6:218,1861.

Occurrence: Jenabil, Maghasani, Tinadiha-U.Barhakamuda; in semi-evergreen

forests, under cover; flowers June-July.

Liparis viridiflora (B1.)Lindl., Gen. & Sp. Orch.:31,p.p.1830.

Occurrence: Meghasini, Nekdanacha, Pathuria; occasional, in semi-evergreen to

evergreen forests, under moist conditions; flowers during Nov.-Dec.

Luisia brchystachys (Lindl.)B1., Rumphia 4:50, 1848.

Occurrence: Badampahar, on the periphery; scarce, in moist deciduous open forest;

flowers in Apr.

Luisia trichorhiza (W. Hook.)B1., Mus. Bot. Lugd.Bat.1:63,1849.

Occurrence: Bada makabadi, Barehipani fall, Chahala, Debasthali, Gurguria,

Jamuani, Joranda fall, Kabatghai, Kairakacha, Kendumundi, Sanjo valley, Upper Barakamuda; very common, in open, moist deciduous

forests, flowers during Feb.-Apr.

Luisia zeylanicaLindl., Fol. Orch. Luisia 3, 1853.

Occurrence: Barehipani-Uski, Barehipani-Nawana, Khadakai-Nigirdha; occasional,

in open moist deciduous forests; flowers in Apr.-May.

Malaxis ophrydis (Koen) Ormerod in Seidenf., Descrip. Epidend.: 18, 1995.

Occurrence: Meghasini-Bhanjabasa, Tarinibilla, Udiabasa; scarce, in semi-

evergreen forest, under shade, flowers in June.

Malaxis purpurea (Lindl.)Kze., Rev. Gen. 2:673, 1891.

Occurrence: Bhanjabasa, on way to Ghagra, rare, in partly shaded situations of

semi-evergreen forest, near water courses, with loamy soil; flowers in

June-July.

Malaxis rheedii Sw., Kgl., Vet.Akad.nya Handl.21:235,1800.

Occurrence: Bhanjabasa-Meghasini, Bhudaka, Hatisala, Meghasini, Upper

Barakamuda; occasional, terrestrial, epiphytic or lithophytic, in semievergreen to evergreen forests, under moist conditions; flowers in July.

Micropera pallida (Roxb.)Lindl., Bot.Reg.18:sub T.1522,1832.

Occurrence: Andharajodi, Baniabasa, Joranda fall (bed), Manbhanga ghat,

Tangaria; occasional, in semi-evergreen forests, by stream side, in

shade; flowers in June.

Nervilia aragoana Gaud. In Freycss., Voy. Bot.422, T.35, 1829.

Occurrence: Barigam Deokund, Kusumi, Lulung; occasional, in moist deciduous

forests, under cover; flowers in May.

Nervilia infundibulifolia Blatt.& McCann, J. Bombay nat. Hist. Soc. 35:725, T.3,1932.

Occurrence: Andharajodi, Bakua, Gurguria; scarce, in moist deciduous forests,

under cover, flowers in June.

Nervilia plicata (Andr.)Schltr., Engl. Bot.Jahrb.45:403,1911.

Occurrence: Lulung; fairly abundant, in moist deciduous forests, under cover.

Nervilia crociformis (Zoll.&Mor.) Seid., Dansk Bot. Ark. 32(2):151, fig. 92, 1978.

Occurrence: Bakua, Barehipani, Barigam, Chahala, Champagada, Garandia,

Gurguria, Jenabil, Kusumi, Meghasini, Patbil, Upper Barakamuda; frequent, in semi-evergreen forests, under cover, in moist conditions.

**Oberonia denticulata** Wight var. iridigolia (Roxb.) Sarat Misra, *J. Orchid Soc.Ind*.3(1,2), 1990.

Occurrence: Akhapalana; scarce, in open moist deciduous forests; flowers in Nov.

Oberonia ensiformis (J.E.Sm) Lindl., Fol. Orch. Ober. No.21, 1859.

Occurrence: Badamakabadi, Baniapada, Bhanjabasa, Chahala, Champagada-

Khadakai, Dhudruchampa, Garh Similipal, gudgudia, Jenabil, Kabatghai, Meghasini, Sanjo valley, Upper Barakamuda, Uski; frequent, in moist decicuous to semi-evergreen forests; flowers during

Oct.-Nov.

Oberonia falconeriHook.f., Fl.Br. Ind.5: 678, 1890.

Occurrence: Barehipani, Deokund, Garh Similipal, Gurguria, Joranda fall (bed),

Kabatghai, Lulung, Kachudahan, Saragada, Upper Barakamuda, Uski; frequent, preferring moist deciduous open forets; fowers during Sept.-

Oct.

Oberonia gammiei King & Pantl. J. Soc. Beng. 66, 2:578, 1897.

Occurrence: Badamakabadi, Baniapada, Bhanjabasa, Chakunda nala, Garandia,

Jenabil, Khairiburu, Matughar, Meghasini, Pakaladiha nala, Tarinibilla, Upper Barakamuda, Udiabasa; frequent, in semi-evergreen to evergreen forests, in moist conditions, under shade; flowers in Aug.

Oberonia proudlockii king & Pantl. J.As. Soc. Beng. 66, 2:580, 1897.

Occurrence: Jenabil (on way to Dhudruchampa), Meghasini; occassional; in semi-

evergreen forest on the hills in open situations; flowers Feb.

Oberonia pyrulifera (lindl.), Fol. Orch. Oberonia No.15, 1859.

Occurrence: Bandhanala, Naranga, Udiabasa, UpperBarakamuda; scarce in semi-

evergreen to evergreen forests, in shaded situations; flowers during

Oct-Nov.

Pecteilis gigantea (J.E.Sm.) Rafin.Fl.Tell.2:38, 1837.

Occurrence: Patbil, Tinadiha; open grass land; flowers Aug.

Pelatantheria insectifera (H.G. Rchb.)Ridl., J. Linn.Soc.32:373, 1896.

Occurrence: Andharjodi, Joranda fall (stream bed, lithophytic), Lulung,

Mahubhandar, Sanjo valley; common, in moist deciduous forests, in

partly open conditions; flowers during Sept.-Oct.

Peristylus constrictus (Lindl.), Gen & Sp. Orch.:300, 1835.

Occurrence: Bakua-Jenabil, Lulung, Meghasini, Patbil; occasional, in open patches

of semi-evergreen forests; flowers in Aug.

Peristylus goodyeroides (D.Don.)Lindl., Gen & Sp. Orch.:299, 1835.

Occurrence: Kachudahan (fide Panigrahi), Khadkhai, Lulung, occasional, in moist

deciduous forest, in shrubs; flowers in Sept.

Peristylus lawii Wight, Icones 5:12, t.1695, 1851.

Occurrence: Lulung, occasional, in moist deciduous forest, as under growth, with

clayeeloamy soil; fruits in late July.

Peristylus parishii Rchb.f., Trans. Linn. Soc. 30:139, 1874.

Occurrence: Balidahar, occasional, in semi-evergreen forest, in partly open

situations, with loamy soil; flowers in June.

Peristylus plantagineus (Lindl.)Lindl., Gen Sp. Orch. P1.:300, 1835.

Occurrence: Lulung; occasional, in mixed deciduous forest; flowers during early

Sept.

Pholidota imbricata W.J.Hook., Exot.Fl.2: T. 138,1825.

Occurrence: Badamakabadi, Baniapada, Bhanjabasa, Chahala, champaghat,

Deokund, Jenabil, Kabatghai, Meghasini, Sitakunda, Tarinibila, Upper

Barakamuda; common, in semi-evergreen forest, in shade; flowers dueing Aug.-Sept.

Rhynchostylis retusa (L.)B1., Bijdr.: 286, Fig 49, 1825.

Occurrence: Bhanjabasa, Chahala, Deokund, Gurguria, Lulung, Manabhanga ghat,

Meghasini, Sanjo valley, Upper Barakamuda, Uski; very common,

throughout, in open situations; flowering May-June.

Smitinandia micrantha (Lindl.)Holtt., Gard, Bull. Sing.25:106, 1969.

Occurrence: Baniabasa, Banjikusum, Bhanjabasa, Deokund, dhudruchampa,

Gurguria, Hatisala-Jenabil, Joranda fall (bed), Kairakacha, Kendumundi, Mahubhandar, Meghasini, Tinadiha, U. Brhakamuda;

common throughout, in shade, flowers during Apr.-May.

**Sprinthes sinensis** (Pers.) Armes, Orch.2:53. 1908.

Occurrence: Jenabil, scarce, on edge of stream, lithophytic on moss covered rock,

flowers in Feb. Also in Gurguria (fide Panigrahi).

Staurochilus ramosus (Indl.)Seid. Op. Bot. 95:95, Fig.53, 1988.

Occurrence: Deokund, Kairakacha, Lulung, Sanjo valley; in semi-evergreen forest,

by stream side, under shade; flowers in May.

Tainia hookeriana King & Pantl., J. As. Soc. Beng.64, 2:336, 1895.

Occurrence: Jenabil; rare, in semi-evergreen forest, on stream bank; flowers during

Jan.- Mar.

Thunia bracteata (Roxb.), Fed.Rep. Eeih. 4:205,1919. (excl. syn. Thunia alba).

Occurrence: Bakua, Bhanjabasa, Chahala, Dhangoji, Jenabil, Meghasini, Tarinibila;

occasional, in semi-evergreen forests; flowers in Aug.

Tropidia angulosa (Lindl.).Bl., Coll. Orch. Arch. Ind. 122, 1858.

Occurrence: Badamakabadi, Balidar, Baniapada, Garandia, Meghasini, Tangaria,

Tarinibila, Upper Barakamuda; occasional, in evergreen forests,under

shade.

**Tropidia pedunculata** Bl., Coll. Orch. Archip.India: 122, t. 40, 1859.

Occurrence: Andharjodi, Badamakabadi, Bhanjabasa, Chahala, Gurguria, Jenabil,

Hatisal, Kabatghai, Matughar, Nekedanacha, Balidar, Tangiria, Upper

Barakamuda, occasional in semi-evergreen forest, under shade.

Vanda tessellata (Roxb.) Hook.exG.Don.in Lond., Hort. Brit. 372, 1830.

Occurrence: Bhaniabasa, Deokund, Joranda fall, Kendumundi, Lulung,

Manabhanga ghat; very common in the dry to moist deciduous forests, in open, in the periphery only; flowers during Mar.-May and Sept.-

Nov.

Vanda testacea (Lindl.) Rchb.f.Gard. Chron.166, 1877.

Occurrence: Badamakabadi, Chahala, Garh Similipal, Gurguria, Jenabil-

Dhudruchampa, Joranda fall, Kendumundi, Lulung, Manbhanga ghat,

Uski; common in mixed forests, in open; flowers during Apr.

Zeuxine affinis (Lindl.)Benth.ex Hook.f.Fl. Brit. India 8:108, 1890.

Occurrence: Bhanjabasa, Garandia, Hatisala, Matughar, scarce, in evergreen forests,

on stream banks, with light soil, under heavy shade; flowers in Feb.

Zeuxine nervosa (Wall. ex. Lindl.)Benth.ex Clerke, J. Linn. Soc.25:73, 1889.

Occurrence: Badamakabadi; scarce in semi-evergreen forest, on edge of a stream,

with light soil, under shade; flowered in cultivation at Baripada in

Feb.-Mar.

# ANNEXURE XXII

# LIST OF ETHNOBOTANICAL SPECIES

Sl. No.	Local name	Botanical name	Parts used	Purpose
1.	Kundan jaman	Acacia torta	Pods	Wounds/sore of
2	D	A	I C	goat
2.	Rasna	Acampe ochracea	Leaf	Headache
3.	Apamaranga	Achyranthes aspera	Twigs	Tooth brush, wounds of animals
4.	Ainso	Alangium salvifolium	Root	Stomachache
5.	Chhatiana	Alstonia scholaris	Latex	Spermatorrhoea
6.	Bhuineem	Andrographis paniculata	Twings	Malaria and stomach trouble
7.	Dhaura	Anogeissus latifolia	Bark	Diarrhoea
8.	Gaisira	Asparagus racemosus	Root	Night pollution/ Gonorrhoea
9.	Rajkoli	Baccaurea ramiflora	Fruits	Food
10.	Kundadi	Bauhinia purpurea	Seeds, leafs, flowers	Food and fatigue
11.	Chara	Buchanania lanzan	Bark	Mouth sores
			Leaf & flower	Laxative
12.	Jordaru	Canthium dicoccum	Bark	Stomach-ache and worm
13.	Jhinka	Chlorophytum arundinaceum	Root	Food in fever
14.	Sonna rasi	Chrysanthellum americanus	Entire plant	Gastric trouble
15.	Hadasara	Cissus quadrangularis	Stem	Prevents conception
16.	Samarkand	Cherodendrum serratum	Root	Diarrhoea
17.	Kapasia/Pithalu	Cochlospermum religiosum	Root	Urination
	_		Bark	Food
18.	Furudi	Croton caudatus	Leaf	Fever
19.	Masund	Croton roxburghii	Root & bark	Boils
20.	Duba	Cynodon dactylon	Leaf	Nose bleeding
21.	Malang	Dendropthoe falcata	Leaf	Wound
22.	Bandhan	Desmodium oojeinense	Bark	Rheumatism
23.	Tutamuli	Elephantopus scaber	Root	Headache
24.	Katako	Entada rheedii	Bark	Boats
25.	Jodakoli	Erycibe paniculata	Bark	Fever
26.	Lowa	Ficus racemosa	Latex	Mumps
27.	Bhaincho	Flacourtia ramontchi	Fruit	Urination
28.	Pitari	Glochidion lanceolarium	Seeds	Nausea
29.	Jagli Badam	Gnetum ula	Seeds	Food
30.	Koim	Haldinia cordifolia	Leaf	Cuts and boils
31.	Antomulo	Helicteres isora	Fruit	Defective limbs
32.	Dahanimari	Homalium nepalense	Bark	Stomach-ache

33.		Hoya pendula	Leaf	Skin diseases
34.	Gileri	Indigofera cassioides	Flowers	Food
			Root	Pneumonia
35.	Bina	Ipomoea turbinate	Seed	Detergent
36.	Banprijada	Jatropha curcas	Seed	Oil
37.	Mahola	Madhuca logifolia	Corolla	Piles and fistula
38.	Niresho	Memecylon umbellatum	Fruits	Indigestion
39.	Gaudhuni	Millettia extensa	Root	Skin diseases
				Tick
40.	Boidonko	Mucuna nigricans	Seeds	Ulcers of genital
				organs
41.	Pahari kakharu	Mukia maderaspatana	Leaf	Vegetable
42.	Gangasiuli	Nyctanthes arbortristis	Leaf	Fever
			Shoot-tips	Malaria
43.	Banatulasi	Ocimum americanum	Plants	Ticks of chicken
44.	Phimphinia	Oroxylum indicum	Seed	Mumps/
4.5	G .:		<b>D</b> .	Stomach-ache
45.	Suti	Oxalis corniculata	Root	Cold
46.	Utrali	Pergularia daemia	Flowers	Whooping
47	D 1 1	D 1	D (	cough
47.	Pehardang	Peucedanum nagpurense	Root	Gonorrhoea
48.	Chanyeekantho	Piper trioicum	Stem	Eye, Asthma,
				Cold, Tonsillitis & Throat
				infection
49.	Rimuli	Protium serratum	Fruit	Food
49.	Killiuli	1 Tottum serratum	Bark & root	Cracking of lips
			Dark & 100t	and mouth
				ulcers
50.	Bija	Pterocarpus marsupium	Bark	Mouth ulcers
51.	Mucchkando	Pterospermum xylocarpum	Bark	Veneral diseses
				& general
				debility
52.	Ranga chireta	Rubia cordifolia	Root	Intoxication
53.	Kusum	Schleichera oleosa	Seed	Cuts and white
				patches
54.	Jhilliphulo	Shuteria involucrata	Leaf & flowers	Vegetable
55.	Kantua	Solanum torvum	Fruit	Cough
56.	Amra	Spondias pinnata	Fruit	Blood dysentery
57.	Jhato	Stachytarpheta jamicensis	Root	Wounds
58.	Parudi	Stereospermum chelonoides	Bark	Scorpion bite
59.	Painya	Strobilanthes auriculatus	Flowers	Apiculture
60.	Jamun	Syzygium cumini	Fruit	Food & cleaning
				of bowels and
				expelling of
				hairs
61.	Kankata	Vanda tessellata	Leaf	Ear-ache &
	3.5.1		7 0	lactogogue
62.	Malang	Vanda testacea	Leaf	Cuts

63.	Katkom	Viscum orientale	Fruit	Giddiness &
				stiff neck
64.	Chadheigudi	Vitex peduncularis	Bark	Tea
65.	Icha	Woodfordia fruiticosa	Flowers	Excess bleeding during menstruation
66.	Tinkoli	Ziziphus rugosa	Root	Dislocation of joints
67.	Gonti	Ziziphus xylopyrus	Leaf	Snake bite

#### **ANNEXURE XXIII**

## THREATENED, ENDANGERED, ENDEMIC AND RARE PLANT SPECIES

#### **Endemic**

## Bulbophyllum panigrahianum S. Mishra (Orchidaceae )

Habit and occurrence: An epiphyte; Bhuduca, in moist valley.

Distribution: Orissa.

Probable cause: Restricted distribution

#### Eria meghasaniensis S. Mishra (Orchidaceae)

Habit and occurrence: An epiphyte; Bhuduca, in moist valley.

Distribution: Orissa.

Probable cause: Restricted distribution

## > Endangered

### Gnetum ula Brongn. (Gnetaceae)

Habit and occurrence: Climber; Devigarh, along stream course Distribution: Eastern Himalaya, Malay islands.

Probable cause: Habitat destruction

## Goodyera fumata Thw. (Orchidaceae)

Habit and occurrence: Ground orchid; Pataghara,in shady habitat.

Distribution: Sikkim, Arunachal pradesh, Srilanka.

Probable cause: Forest fire

#### Goodyera hispida Lindl.(Orchidaceae)

Habit and occurrence: Ground orchid; Tarinibila, stream side

Distribution: Sikkim, Himalaya, Thailand

Probable cause: Forest fire

#### Goodyera thailandica Seidenf. (Orchidaceae)

Habit and occurrence: Ground orchid; Bhanjabasa, Hatisala, along stream edge.

Distribution: Orissa (Koira, Sundargarh), Thailand

Probable cause: Forest fire.

#### Liparis elliptica Wight.(Orchidaceae)

Habit and occurrence: An epiphyte; Meghasani, in semi evergreen forests.

Distribution: Tamilnadu, Sri Lanka, Thailand

Probable cause: Habitat loss.

## Rauvolfia serpentina (Linn) Benth.ex Kurz(Apocynaceae)

Habit and occurrence: Undershrub; Kalipahar, foothill.

Distribution: Deccan peninsula, sub-Himalayan ranges.

Probable cause: Over-exploitation for drugs.

## Rhaphidophora glauca Schott.(Araceae)

Habit and occurrence: Climber, Chitrabania, hill slopes.

Distribution: Tropical and sub-tropical Himalayan range,

Western peninisula.

Probable cause: Habitat loss.

## Tanacetum cineraarifolium (Trev.)Sch. –Bip. (Asteraceae)

Habit and occurrence: Perennial herb; Tangi pahar, rock crevices.

Distribution: Western Himalaya, Tibet.

Probable cause: Jhum cultivation.

#### > Vulnerable

## Garcinia cowa Roxb. (Clusiaceae)

Habit and occurrence: Tree, Meghasani hill, along stream course. Distribution: Assam, Eastern peninsula, East Bengal.

Probable cause: Over exploitation.

#### Gloriosa superba Linn. (Liliaceae)

Habit and occurrence: Scrambling shrub; Chitrabania, foothill.

Distribution: Tropical India and tropical Asia. Probable cause: Over exploitation for drugs.

#### Mesua nagassarium (Burm. f.) Kostermans (Clusiaceae)

Habit and occurrence: Trees, Debkund, along stream course.

Distribution: Western peninsula.

Probable cause: Over exploitation for drugs.

### Pectilis gigantean (Sm.) Rafin. (Orchidaceae)

Habit and occurrence: Ground orchid; Debasthali, in open grass land.

Distribution: Maharashtra
Probable cause: Over exploitation.

#### Pterospermum acerifolium (Linn.)Willd. (Sterculiaceae)

Habit and occurrence: Tree,Meghasani, ravines near foot hill.

Distribution: Northwest Himalayas, Western peninsula.

Probable cause: Over exploitation for drugs.

#### Radermachera xylocarpa (Roxb.) K. Schum (Bignoniaceae)

Habit and occurrence: Tree; Namopahar, hill slope.

Distribution: Deccan peninsula.

Probable cause: Over exploitation for drugs.

#### Rubia cordifolia Linn. (Rubiaceae)

Habit and occurrence: Scrambling herb; Barehipani, in gorges.

Distribution: Hilly districts of India, North westHimalaya.

Probable cause: Over exploitation for drugs.

#### Trevesia palmata Vis. (Araliaceae)

Habit and occurrence: Prickly tree; Shirsha fall, in moist gorges.

Distribution: Nepal to Sikkim.

Probable cause: Habitat destruction and over exploitation.

#### Rare

#### Acanthephippium bicolor Lindl. (Orchidaceae)

Habit and occurrence: Ground orchid, Bada Makabadi, stream edges.

Distribution: Tamilnadu, Kerala, Sri Lanka.

Probable cause: Jhum cultivation.

Ajuga macrosperma Wall. (Lamiaceae)

Habit and occurrence: Herbs; Lulung, shady moist forest floor.

Distribution: Tropical and temperate Himalaya, Chitagong, Khasia.

Probable cause: Habitat destruction.

Alphonsea ventricosa Hook.F. & Thoms. (Annonaceae)

Habit and occurrence: Tree, Barehipani, Meghasani, damp ravines.

Distribution: Assam, Chitagong, Andamans

Probable cause: Habitat destruction.

Anaphalis adnata DC (Asteraceae)

Habit and occurrence: cottony herbs; Meghasani hill, rock-crevices. Distribution: Temperate Himalaya, Khasia hill, Simla.

Probable cause: Jhum cultivation.

Bambusa nutans Wall. (Poaceae)

Habit and occurrence: Trees; Bhanjabasa, on trap rocks.
Distribution: Lower Himalaya, Sikkim, East Bengal.

Probable cause: Habitat destruction.

Bulbophyllum macraei (Lindl.) Rchb. F. (Orchidaceae)

Habit and occurrence: Epiphyte; Tarinibila, stream bank.
Distribution: Lower Himalaya, Sikkim, East Bengal.

Probable cause: Habitat destruction.

Cynoglossum glochidiatum Wall. Ex. Benth. (Boraginaceae)

Habit and occurrence: Herbs, Meghasani, hill top.

Distribution: Khasia hills, Assam. Probable cause: High –altitude plant.

Diploprora chompionii (Lindl.) J. Hook.

Habit and occurrence: Epiphyte; Baniapada, stream edge.

Distribution: Arunachal pradesh, Sikkim, Meghalaya,

Karnataka, Sri Lanka.

Probable cause: Habitat loss.

Hypericum gaitii Haines (Hypericaceae)

Habit and occurrence: Shrub, Meghasani, along stream course.

Distribution: Bihar and Orissa. Probable cause: Forest fire.

Justicia nilgherrensis Wall. Ex. T. And. (Acanthaceae)

Habit and occurrence: Procumbent herb; Meghasani, among grasses.

Distribution: Westernghats, Karnataka, Nilgiris.

Probable cause: High-altitude plant.

Malaxis purpurea (Lindl.) Kze (Orchidaceae)

Habit and occurrence: Ground orchid, Bhanjabasa, moist loamy forest floor.

Distribution: Uttar Pradesh, Orissa, Thailand.

Probable cause: Forest fire.

## Meliosma simplicifolia Walp. (Sabiaceae)

Habit and occurrence: Tree; Ramjori, along narrow gorges and deep ravines. Distribution: Tropical Himalaya, Khasia mountains, Western

peninsula.

Probable cause: Habitat destruction.

#### Neocinnamomum caudatum (Nees) Mer. (Lauraceae)

Habit and occurrence: Shrub; Ramjori pahar, hill slopes.

Distribution: Central & Eastern Himalaya, Sikkim, Nepal, Burma.

Probable cause: Over-exploitation.

#### Oberonia pyrulifera Lindl. (Orchidaceae)

Habit and occurrence: Epiphyte; Naranga, shaded habitats.

Distribution: Eastern Himalaya, Thailand.

Probable cause: Habitat loss.

## Peperomia heyneana Miq. (Piperaceae)

Habit and occurrence: Succulent herb; Meghasani, hill top.

Distribution: Subtropical Himalaya, Khasia hills, Assam.

Probable cause: Jhum cultivation and forest fire.

#### Peristylus parishii Rchb. F. (Orchidaceae)

Habit and occurrence: Ground orchids; Jenabil, moist forest floor.

Distribution: Eastern Himalayas, Thailand.

Probable cause: Forest fire.

## Phoebe wightii Meissn. (Lauraceae)

Habit and occurrence: Shrub; Deb kund, streamside. Distribution: Central Himalaya, Nilgiri.

Probable cause: Habitat destruction.

## Pittosporum nepaulense (DC.) Rehd.& Wilson (Pittosporaceae)

Habit and occurrence: Small tree; Bakua, hill slope.

Distribution: Sub-tropical Himalaya, Khasi hills, Western peninsula.

Probable cause: Habitat destruction.

#### Podostemon wallichii R. Br. (Podostemaceae)

Habit and occurrence: Herb; Meghasani, hill top.

Distribution: Khasia hills, Ava.

Probable cause: Jhum cultivation and forest fire.

## Psychotria adenophylla Wall. (Rubiaceae)

Habit and occurrence: Shrub; Similipal, shady moist locality. Distribution: Assam, Sikkim, Chitagong, Burma.

Probable cause: Habitat destruction.

#### Rhus semialata Murray. (Anacardiaceae)

Habit and occurrence: Tree; Kusumbani and Duduruchampa, high hill slope.

Distribution: Temperate Himalaya, Khasia hills

Habitat destruction. Probable cause:

Rubus niveus Sm. (Rosaceae)

Habit and occurrence: Straggling shrub; Meghasani, hill top.

Distribution: Temperate Himalaya. Probable cause: High-altitude plant.

Salomonia cantoniensis Lour (Polygalaceae)

Habit and occurrence: Herbs; Kiajhari, damp places.

Distribution: Assam, Khasia hills, Eastern peninsula.

Forest-fire and jhum cultivation. Probable cause:

Sonerilla tenera Royle (Melastomaceae)

Habit and occurrence: Herb; Rajmori, depressions on hill top.

Distribution: Western Himalaya. Probable cause: High-altitude plant. Tainia hookeriana King & Prantl (Orchidaceae)

Habit and occurrence: Ground orchid; Jenabil, stream bank, Sikkim, West Bengal, Thailand. Distribution:

Probable cause: Forest fire.

Toxocarpus kleinii Wt. & Arn (Asclepiadaceae)

Habit and occurrence: Twining shrub; Bhanjabasa, hill slope.

Distribution: Deccan peninsula, Sri Lanka.

Probable cause: Forest fire.

Trichosporum grandiflorum D. Don (Gesneriaceae)

Habit and occurrence: Undershrub; Similipal, high hill slope.

Distribution: Assam, Khasia hills.

Probable cause: Forest fire.

Uvaria hamiltonii Hook.f.& Thoms. (Annonaceae)

Habit and occurrence: Liane; Meghasani, moist valley near stream.

Distribution: Eastern Himalaya, Bihar. Probable cause: Habitat destruction.

Walsura trifolia A. Juss. (Meliaceae)

Habit and occurrence: Trees; Debigarh, rocky ravines.

Distribution: Eastern Himalaya. Probable cause: Habitat destruction.

> Insufficiently Known

Aspidopteris hutchinsonii Haines (Malpighiaceae)

Climber, Similipal, high hill slopes. Habit and occurrence:

Distribution: Orissa. Probable cause: Forest fire.

Cynachnum tunicatum (Retz.) Alston (Asclepiadaceae)

Twining herbs; Tangi pahad, along gorges. Habit and occurrence:

Distribution: Deccan peninsula. Probable cause: Jhum cultivation.

## Dichrocephala integrifolia (Linn. f. ) Kuntze (Asteraceae)

Habit and occurrence: Herbs; Debkund, along depressions on hill top.

Distribution: Eastern and western Himalaya.

Probable cause: Habitat destruction.

## Machilus villosa Hook. f. (Lauraceae)

Habit and occurrence: Tree; Kali pahad, foot hill near stream.

Distribution: SikkimHimalaya, Chitagong.

Probable cause: Habitat destruction.

## Polyalthia simiarum Benth.& Hook. f. (Annonaceae)

Habit and occurrence: Tree; Similipal, moist valley.

Distribution: Assam, Silhet, Burma Probable cause: Habitat destruction

# ANNEXURE XXIV RESEARCH CONDUCTED IN 2010-11 to 2013-14

Sl	Activity Year Conducted by		Conducted by	Report
No	·		·	Submitted or
				Not
1	Study On Ecological density and	2010-11	North Orissa	Submitted
	distribution of Ungulates in STR		University,	
2	Diviginity Assessment and	2010-11	Baripada Institute of mineral	Einal nament
2	Diversity Assessment and documentation of Pteridophytes	2010-11	& material	Final report submitted.
	of SBR		Technology (CSIR)	subilitied.
			BBSR.	
3	Strategies to Improve	2010-11	RPRC,	Not Submitted
	availability of Meadows In		Bhubaneswar	
	Similipal.			
4	Modeling On Economic	2010-11	RPRC,	Not submitted
	Valuation and Eco-System services in SBR.		Bhubaneswar	
5	Documentation of the tradition	2010-11	RPRC,	Not Submitted
	of Forest Conservation as known	2010 11	Bhubaneswar	1 tot Subilitied
	in Folklore and traditional			
	literature.			
6	A study On Prey-base & their	2011-12	North Odisha	Submitted
	influence on Tiger distribution		University,	
	pattern in STR	2011-12	Baripada	0
7	Camera Trap survey of Cryptic and nocturnal fauna of STR like	2011-12	North Odisha University,	Ongoing
	Civet, Leopard Cat, and Rattle.		Baripada	
8	Assessment of Floral Diversity,	2011-12	North Orissa	Submitted
	Richness and Vegetational		University	
	zonation of SBR with special		, and the second	
	reference to endemic, rare and			
	threatened taxa.	2011 12	E' 11D'	D.
9	Impact of Domestic Dog on wild	2011-12	Field Director,	Report
	herbivore population in multiple use area of STR.		similipal Tiger Reserve.	submitted
10	Conservation of <i>Eria</i>	2012-13	RPRC,	On going
	meghasinensis in Similipal Tiger	2012 10	Bhubaneswar	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~
	Reserve & Similipal Biosphere			
	Reserve			
11	Prey distribution and its density	2012-13	Field Director,	Submitted
	in Similipal Tiger Reserve.		Similipal Tiger	
12	Food nottons of the service	2012 12	Reserve	Cysla : 44 - 1
12	Food pattern of tigers in Similipal through scat analysis.	2012-13	Field Director, Similipal Tiger	Submitted
	ommipai unough scat alialysis.		Reserve	
13	Photographic database of fauna	2012-13	FD cum RCCF,	Submitted

	of Similipal		Baripada	
14	Data on MFP products collected	2012-13	FD cum RCCF,	Submitted
	in 10 villages adjoining core of		Baripada	
	STR			
15	Photographic documentation of	2012-13	FD STR	Books
	birds of Similipal.			published
16	Photo album of individual tigers	2012-13	FD STR	Completed
	of Similipal			
17	Status and species composition	2013-14	Field Director,	Submitted
	of Meadows in Similipal Tiger		Similipal Tiger	
	Reserve		Reserve.	
18	Status and extent of Human-	2013-14	Field Director,	Submitted
	Sloth Bear Conflict in and		Similipal Tiger	
	around Similipal Sanctuary-		Reserve.	
19	Monitoring of river system,	2013-14	North Odisha	Submitted
	meadows and saltlicks of		University,	
	Similipal Tiger Reserve a remote		Baripada	
	sensing and GIS approach			
20	Survey on roosting sites of Bats	2013-14	Field Director,	Submitted
	in and around Similipal		Similipal Tiger	
	Biosphere Reserve		Reserve.	
21	Reintroduction of orchid	2013-14	Field Director,	Ongoing
	Dendrobium regium and		Similipal Tiger	
	conservation of Rare,		Reserve.	
	Endangered and Threatened			
	species in Similipal Tiger			
	Reserve			
22	Propagation of rare orchid	2013-14	Field Director,	Ongoing
	Tainia hookeriana through		Similipal Tiger	
	manual pollination		Reserve.	

#### ANNEXURE XXV WATER BODIES

# a. Rivers & Streams

12. Khadkei
12. Kilaukei
13. Bhandan
14. Khairi
14. Kliani
15. West Deo
16. Telnadi
10. Telliadi
17. Simanadi
18. Gobarjhara
19. Kantiali
20. Salandi

#### **ANNEXURE XXVI**

#### List of WATER HARVESTING STRUCTURES

#### **CORE AREA**

Sl.	Name of	Name of Beat	Name of Site	Type of	Remarks
No.	Range			Structure	
1.	Pithabata	Bhajam-I	Bhajam	Masonry Anicut	In good condition
2.	Nawana North	a) Joranda	Joranda watch tower in ring road	Masonry Anicut	In good condition
		b) Nigirda	Pansia	Earthen Dam	In good condition
		c)Pandabandha	Pandabandha	Masonry anicut	In good condition
		d) Kusumbani	Kusumbani	Masonry anicut	In good condition
3.	Nawana South	a) Bakua	Athardeuli	Earthrn dam	In good condition
		b) Chherabil	Chherabil	Masonry	In good condition
4.	Chahala	a) Chahala	Chahala	Masonry Anicut	Needs renovation
		b) Kairakacha	Kairakacha	Earthen Dam	Needs renovation
		c) Brundaban	Brundaban	Masonry Anicut	In good condition
		d) Karkachia	Karkachia	Masonry Anicut	In good condition
5.	Upper	a) Meghasini	Meghasini	Earthen Tank	Needs renovation
	Barhakamuda	b) Debasthali	Debasthali	Masonry Tank	Needs renovation
		c) Tinadiha	Dhuduram	Masonary	Needs renovation
		d) Matughar	Matughar	Masonry	Needs renovation
		e) Balidal	Balidar	Masonry	In good condition
6.	Jenabil	a) Jenabil	Jenabil	Masonry	In good condition
		b) Kulipal	Kulipal	Masonry	Needs renovation
7.	National Park	a) Mahabirsal	Mahabirsal	Masonry	In good condition

#### **BUFFER AREA**

**Baripada Division** 

SL No.	Name of	Name of	Forest		GPS rea	ading of V	VHS
	Range	Beat/Location	Block/Year of				
			construction				
					Degre	Minute	Seconds
					e	S	
Baripada	Bangripo	1.Shyamsundepur-	Similipal R.F.,	N-	22-	32-	31.3
	si	10no	BLE compt No				
			1 and BLE-	E	86	6.00-	33.5
			10(P), 11				
			Compt				
		2. Jaldhia-8 nos.	. No.3 and 5	N-	22	02	43.2
			(part)				

			E-	86	29	05.6
	3. Dhabanisole-2	Compt. No. 2	N-	22	06	34.2
	nos.		E-	86	35	04.5
Udala	Matihudi-10nos	ED-4,7,8	N	21	35	57.7
	(Endn)		-			
			E-	86	32	19.0
	Balma-5nos	ED-12(P),13,14	N-	21	40	24.8
			E-	86	28	25.8
	Baniabasa-5nos	SJ-16,17,18	N-	21	41	54.9
			Е	86	31	19.2
Dukura	Khandabuda-6nos	SJ-4	N	21	50	1.9
			E-	86	35	34.2
	Bahalda- 5nosSapanchua-4nos	SJ-6 SJ-5	N	21	46	55.1
	(CAMPA)		E-	86	32	58.5
Kaptipad	Antapur-6nos	TK-7, 8, 9, 10,	N	21	33	1.03
a	Podadiha-4nos	11 TK- 6,7,8,9,10(P), 11,	Е	86	25	1.49
	Podadiha-10nos	SL-15,16,17	N	21	33	' 1.49
	(CAMPA)		Е	86	31	1.02
	Nalakhanja-8nos	TK-10(P), 11,	N	21	32	1.29
	Sarat -10nos	SL-18(P) Notto RF	Е	86	22	0.77
Pithabata	Champagarh-4nos	P-5	N	21	57	44.0
			Е	86	37	15.9
	Balidiha-11nos	P-3,P-4	N	21	56	24.0
			Е	86	34	54.3
	Haldibani-5nos	BLE-12	N	22	01	16.0
	Pithabata-5nos (C.Y)	P-5	Е	86	36	47.1

## Karanjia Division

Sl. No	Name of the Range	Name of Location	Forest Block	GPS Reading			
1	4	6	7	Degree		Minute	Second
						S	S
	Thakurmunda	Talpada	Talpada RF	N	21	32	50.9
				Е	86	08	05.2

	-do-	Khejuri RF	N	21	31	36.3
			Е	86	08	05.2
	Bharandia	Bharandia RF	N	21	30	03.6
			Е	86	04	45.5
Dudhiani	Tangabila – Surubali		N	21	53	50.6
			Е	86	01	16.8
	Masinabila		N	21	53	18.2
			Е	86	02	56.7
	Dudhiani – Pahadpur		N	21	48	0.2
			Е	86	10	41.9
	Hatibari – Khalpada		N	21	48	41.8
	•		Е	86	05	34.3
	Shyamchan drapur		N	21	46	40.3
			Е	86	07	20.7
	Ranipat		N	21	50	56.0
			Е	86	04	04.4
	Baragadia		N	21	51	23.7
			Е	86	05	51.8
	Khadiadar		N	21	50	22.9
			Е	86	05	32.9
	Antasahi		N	21	50	28.7
			Е	86	04	48.6
	Kiajhari – Kaleitumba		N	21	51	43.7
			Е	86	01	29.9
	Purunapani  - Chanchbani		N	21	47	52.5
			Е	86	01	29.9

Sl. No.	Name of the Range	Name of Beat	Forest Block	GPS Reading			
1	4	6	7		D	M	S
	Dudhiani	Purunapani – Banakanda		N	21	47	25.4
				Е	86	01	21.8
	Gurguria	Khejuri	Comptt.No. KH-13	N	21	48	27.0
				Е	86	17	20.9
		-do-	Similipal RF	N	21	48	47.7
				Е	86	18	22.5
		Barigaon	-do-	N	21	49	27.4
				Е	86	14	58.4
		-do-	-do-	N	21	49	13.6
				Е	86	15	9.4
	Karanjia	Sunaposi	Paudia RF	N	21	47	00.5
				Е	86	05	00.2
		-do-	-do-	N	21	47	27.3
				Е	86	04	53.8
		-do-	-do-	N	21	46	06.0
				Е	86	05	53.5
		-do-	Hatisalbeda RF	N	21	44	41.5
				Е	86	04	34.0
		-do-		N	21	43	59.0
				Е	86	04	46.0
		Kadadiha	Padheidhara RF	N	21	43	10.7
				Е	86	04	02.9
		-do-	-do-	N	21	43	11.2
				Е	86	03	52.3
		Sunaposi	Kuliposi RF	N	21	45	17.7
				Е	86	03	12.3
		Tikasil	Singda RF	N	21	44	46.44
				Е	86	01	52.42
		-do-	Tikasil RF	N	21	42	33.97
				Е	86	02	18.45

Sl. No.	Name of the Range	Name of Beat/ Location	Forest Block	GPS Reading			
1	4	6	7		D	M	S
6	Kendumundi	endumundi Badabaliposi – Asankudar		N	21	36	11.34
				Е	86	12	46.26
		Khaparkhai - Khaparkhai		N	21	37	44.76
				Е	86	10	47.34
		Khaparkhai – Dangapani		N	21	37	4.57
				Е	86	09	26.5
		Badabaliposi – Asankudar		N	21	36	7.63
				E	86	12	10.1
		Kendujiani – Chheratangar		N	21	38	1.44
				Е	86	07	7.40
		Kendumundi- Kendumundi		N	21	41	29.4
				Е	86	06	8.27
		Baliposi- Baliposi		N	21	42	36.0
				Е	86	05	6.36
		Baghalata- Thakurjharan		N	21	44	14.9
				E	86	05	7.36
		Bisipur-Bisipur		N	21	43	4.91
				Е	86	06	3.94
		Baghalata – Baghalata		N	21	44	0.16
				Е	86	05	0.42
		Kendujiani – Kaliajiani		N	21	36	0.42
				Е	86	08	02.9
	Satkosia	Bhaliadal	Satkosia RF Comptt.No.20	N	21	24	25.2
				Е	86	12	50.5

# **Rairangpur Division**

Sl. No.	Name of the Range	Name of Location	Name of Forest Block/Year of Construction		GPS Reading		
1	4	6	7		D	M	S
1	Bisoi	Rugudihi	Similipal R.F./2006-07	N	21	05	56.01
			K.1./2000-07	E	86	20	39.50
2	Bisoi	Arjunbilla	Similipal R.F./2006-07	N	22	05	59.02
				E	86	17	12.3
3	Bisoi	Badbalichua	Similipal R.F./2006-07	N	22	06	16.4
				E	86	21	19.8
4	Bisoi	Kadamdiha	Similipal R.F./2006-07	N	22	07	17.33
				E	86	20	57.09
5	Bisoi	Hatigodia	Similipal R.F./2006-07	N	22	05	45.04
				E	86	24	44
6	Bisoi	Raikadkacha	Similipal R.F./2007-08	N	22	04	54.02
				E	86	17	18.9
7	Bisoi	Matiali Sahi	Similipal R.F./2007-08	N	22	05	44.09
				E	86	19	53.4
8	Bisoi	Rangamatia	Similipal R.F./2007-08	N	22	05	4.5
				E	86	20	54.01
9	Bisoi	Dhona	Similipal R.F./2008-09	N	22	08	42.8
				E	86	24	08.5
10	Bisoi	Bautia Pond	Similipal R.F./2008-09	N	22	04	30.01
				Е	86	18	03.8
11	Bisoi	Kashipani	Similipal R.F./2008-09	N	22	04	30.01
				E	86	18	03.8
12	Manada	Bankati village	Similipal R.F./2007-08	N	21	55	19
				Е	86	18	18.7

13	Manada	JamuaniVillage	Similipal R.F./2007-08	N	22	01	32.1
				Е	86	11	04.1
14	Manada	Chandripahadi	Similipal R.F./2007-08	N	21	57	34.2
				Е	86	09	22.4
15	Manada	BankatiVillage	Similipal R.F./2008-09	N	22	01	23.2
				Е	86	10	46.1
16	Manada	TingirianiVillage	Similipal R.F./2008-09	N	21	56	28.9
				Е	86	12	18

#### ANNEXURE XXVII

#### **GRASSLANDS AND MEADOWS**

## List of grasslands in Core Area

Name of the Range	Compartment No.	Area (Ha)
UBK	WD-22	4.10
	WD-27	13.88
	WD-28	13.33
	WD-29	21.39
	WD-30	2.32
	WD-31	26.62
	WD-32	14.07
National Park	KH-24	4.65
Jenabil	ED-9	11.55
Total		111.91

# List of meadows in Core area

SL	Range	Beat	Location	Area in Ha.	Species of Grass	Habitat of Wild animal
1	Pithabata WL range	Digidiga	Gudipokhari	0.40	Dhanantri (Cymbopogan fexuosus),Kodo (Paspalum scrobiculatum)	Elephants, Barking deer,Wild pig, Rabbit.Peacock
2	-Do-	-Do-	Chandripadi a	0.60	-Do-	-Do-
3	-Do-	Pithabata	Kuleipidi	0.40	-do-	-do-

4	-Do-	Namtidarh -I	Bhajam	3.0	Chiru(Dentella repens),Dhanantri	Elephants,Sambar, Wildpigs.
5	Pithabata Wl range	Namtidarh -II	Mayurnacha	0.8	Dhanantri(Cymbopog an fexuosus), Chiru,(Dentella repens).	-do-
6	-Do-	Bhajam	Pundibadi	0.8	Chiru(Dentella repens)	-do-
7	-do-	Bhajam	Sambaracha ra	0.4	-do-	-do-
8	-do-	Badamaka badi	Near jhaun Plantation	5.0	-do-	-do-
9	Jenabil	Hatisal-II	Sambargada	4.2	Dhanantri(Cymbopog an fexuosus), Chiru,(Dentella repens).	Gaurs, Elephants, Barking deer, wild pigs,rabbits.
10	Jenabil	-do-	Janagadaa	0.6	-do-	-do-
11	-do-	-do-	Baunsdiha	2.6	Dhanantri(Cymbopog an fexuosus), Chiru,(Dentella repens). Mutha(Cyperus rotundus),	-do-
12	-do-	-do-	Jampani	4.4	Dhanantri,Chiru, Duba (Cynodon dactylon)	-do-
13	Jenabil	Hatisal-I	Son pokhari	0.4	-do-	-do-
14	Jenabil	Gurandia	Gangasahi	1.0	Elephant grass (Pennisetum purpurium),Duba ( cynodon dactylon,chiru	-do-
15	-Do-	-Do-	Kultapur	1.6	-Do-	-do-
16	-Do-	-do-	Gayalgada	0.8	-do-	-do-
17	-Do-	Gurandia	Gurandia	0.6	-do-	-do-
18	-Do-	Jenabil	Khadiasahi	2.0	-do-	-do-
19	-Do-	Jenabil	Jenabil	7.2	-do-	-do-
20	-Do-	-Do-	Pakala diha	0.8	-do-	-do-
21	-Do-	-do-	Sirka Sahi	1.4	Elephant grass (Pennisetum purpurium), Mutha, chiru	
22	-Do-	-do-	Hagal sahi	2.5	-do-	-do-
23	-Do-	-do-	Hudi Sahi	0.8	-do-	-do-
24	-Do-	Jamunagar h	Barpautia	0.8	-do-	-do-
25	-Do-	-do-	Raigada	1.0	-do-	-do-
26	-Do-	-do-	Edalkacha	1.2	Dhanantri(Cymbopog an fexuosus),	

					Chiru,(Dentella repens).,Mutha(Cyper us rotundus),	
27	-Do-	Hatisal	Son Pokhari	0.4	-do-	-do-
28	-Do-	Gurandia	Chatamburu	0.4	-do-	-do-
29	-Do-	-do-	Gurandia	1.0	-do-	-do-
30	-Do-	Tiktali	Tiktali	2.5	-do-	-do-
31	-Do-	Tiktali	Ashok Nala	0.8	-do-	-do-
32	-Do-	Sarua	Gaurakanth a	1.2	Dhantari, Juna (Sorghum nitidum)	-do-
33	-Do-	-Do-	Udakanala	0.8	-do-	-do-
34	-Do-	-Do-	Asoka Nala	1.2	-Do-	-do-
35	-Do-	-Do-	Kanthibasa	1.6	-Do-	-do-
36	National	Nuagaon	Near section	8.0	Dhanantri,	Sambar,Barking
	Park		office		Kasatandi(Saccharum spotaneum), Chiru	deer,spotted deer,Elephant, mouse deer, rabbit
37	-Do-	Mahabirsa 1-I	Chandrapos hi	0.5	-do-	-do-
38	-Do-	Mahabirsa 1-II	Nimiadanda -I	0.01	-do-	-do-
39	-Do-	-do-	Nimiadanda -II	0.3	-do-	-do-
40	-Do-	-do-	Meralgoda-I	0.05	-do-	-do-
41	-Do-	-do-	Meralgoda- II	0.15	-do-	-do-
42	-Do-	-do-	Meralgoda- III	0.05	-do-	-do-
43	-Do-	Bakua-I	Pitalusila	0.4	Mutha,Chiru	Spotted deer,Barking deer

# <u>List of Grassland/meadows in buffer area of the Similipal Tiger Reserve:</u> Baripada Division

	Name of the Range	Name of Section	Name of Beat	Forest Block		GPS Reading		
						Degree	Minutes	Seconds
Meadows	Pithabata	-	Sanchandri (Baldiha)	Similipal	N	21	58	40.1
		Baldiha		RF (P-5)				
					Е	86	35	44.1
			Badchandri(Khasadiha)	-Do-	N-	21	57	42.7
					Е	86	34	55.8

**Karaniia Division:** 

<u>xar anjia r</u>	1 1 151011.							
	Name of	Name of	Name of	Forest		GPS	Read	ing
	the Range	Section	Beat	Block				
Meado	Thakurmun	Keshdiha	Mandaljha	Compt.No.	N	21	35	15.7
ws/	da		ri	SL-4				
Grassla								
nd								

				Е	86	15	32.8
	-do-	-do-	-do-	N	21	34	21.3
				Е	86	14	08.6

Item Name	Name of the Range	Name of Section	Name of Beat	Forest Block	•	GPS Reading		ling
2	4	5	6	7		D	M	S
Meadows/ Grassland	Karanjia	Kadadiha	Sunaposi	Paudia	N	21	47	00.5
					Е	86	05	00.2
	Kendumundi	Baghalata	Bisipur	Bisipur RF- II	N	21	42	36.9
					Е	86	07	51.5
	Satkosia	Noda	Salchua	Satkosia RF Comptt.No.2	N	21	18	07.5
					Е	86	08	41.4
		-do-	-do-	-do-	N	21	18	54.3
					Е	86	08	41.4

Rairangpur Division Grassland/Meadow

NIL

#### **ANNEXURE XXVIII**

# LIST OF SWAMPS (DALDALI) IN CORE AREA

Range	Beat	Compartment	Name of the Daldali
Upper Barakamuda	Debasthali	WD-21	Sarudala
	Patbil	WD-24	Baladaghara
	Kandadhanu	WD-17	Ankurbasa
	UBK	WD-28	Sanbaladi
			Badbaladi
	Tarinibilla	WD-29	Tarinibilla
National Park	Nuagaon	KH-24	Nuagaon-I
			Nuagaon-II
			Patuagoda
	Ranasa	KH-22	Ranasa
			Ganapati
	Mahavirsal-I	WD-18	Nimia
	Mahavirsal-II	WD-19	Sarudala
	Kabatghai	KH-18	Doligoda
Jenabil	Jamunagarh	KH-27	Jamuna
	Hatighar-I	KH-25	Kulutapur
	Hatisal-I	ED-2	Dalkikacha
	Tiktali	ED-10	Baniapada
Pithabata	Namti	P-7	Bhajamkhal
	Pithabata	P-9	Dalkikacha
Chahala	Chahala	KD-11	Daldali (2)
	Kairakacha	BLW-11	Kairakacha
	Karkachia	BLW-12	Janhagoda
	Barehipani	BH-11	Saru
			Ranga
Nawana South	Dhudurchampa	BLE-23	Dhudurchampa
		BLE-22	Rajabhadi
	Dhundubasa	SJ-9	Dhundubasa
	Jodapal	SJ-14	Jodapal
	Badamakabadi	P-18	Bhadragoda
	Bakua-II	BLW-17	Dhuliapada
			Cherabil
Nawana North	Pandabandha	BLE-18	Pandabandha

#### ANNEXURE XXIX LIST OF SALT LICKS IN CORE AREA

Range	Compartment	Name of the place	Remarks
Upper	WD- 24	1. Jal chhinda	Natural
Barakamuda		2. Ankura basa	Natural
		3. Nimia chhaka	Natural
		4. Balada ghara	Natural
		5. Kulachua	Natural
	WD – 26	6. Dalla pahad	Natural
		7. Namapahad-	Natural
		Tangumara	
		8. Chatia chua	Natural
	Sl – 11	9. Mathasila	Natural
		10.Gukiamba	Natural
	WD-21	11.Devasthali	Artificial
	WD-28	12.Barakamuda	Artificial
Chahala	KD-11	13.Dhadabasa	Natural
	KD-11	14.Chahala	Artificial
	KD-11	15.Brundaban	Artificial
	BLW -11	16.Mankadaghati	Natural
	BLW – 12	17.Pindarposha	Natural
	BH – 11	18.Rangapahad	Natural
Pithabata	P – 11	19.Kalikendu	Natural
	P – 15	20.Jamjhari	Natural
	SJ – 3	21.Chitiajharan	Natural
Pithabata	P – 3	22.Janadunguri	Natural
	P-2	23.Pundibaidi	Natural
	BLE – 8	24.Bhalasighati	Natural
		25.Dhudurbasa	Natural
		26.Kalasiduba	Natural
		27. Altandi	Natural
	BLE – 9	28.Murmuranighati	Natural
Nawana(N)	BLE – 17	29.Khupipahad	Natural
	BLE – 14	30.Jajachatini	Natural
	P-6	31.Edelkacha	Natural
		32.Ashadola	Natural
	BLE – 8	33.Palatiki	Natural
	BLE-16	34.Joranda	Artificial
Jenabil	KH-26	35.Jenabil	Artificial

#### **ANNEXURE XXX**

#### LIST OF ANTI-POACHING CAMPS IN SIMILIPAL TIGER RESERVE

SI N	lo Division	Range	Name	Name of the Camp		
1	STR	Pithabata	1	Namiti		
			2	Pithabata		
			3	Bhajam		
			4	Baunsakhal		
			5	Kachudahan		
			6	Badmakabadi		
			7	Andharitota		
			8	Chandanchaturi		
			9	Digdiga		
2		Nawana(N)	10	Nawana		
			11	Joranda		
			12	Bhandadar		
			13	Nigirdha		
			14	Khadkei		
			15	Pandabandha		
			16	Kusumbani		
			17	Baunsakhal		
			18	Chakidi		
3		Nawana(S)	19	Dhuduruchampa		
			20	Jodapal		
			21	Lengdakocha		
			22	Balikhal		
			23	Bakua		
			24	Dhundubasa		
			25	Chherabil		
			26	Gopinathpur		
1		Jenabil	27	Jenabil		
			28	Gurandia		

		29	Kulipal
		30	Hatisal
		31	Tiktali
		32	Sarua
		33	Sarabasa
		34	Baniabasa
		35	Jamuna
5	UBK	36	UBK
		37	Patbil
		38	Devasthali
		39	Bahaghar
		40	Kandadhanu
		41	Nekdanacha
		42	Balidar
		43	Bhanjabasa
		44	Gunduria
		45	Meghasani
		46	Tarinibila
		47	Dhuduram
6	Chahala	48	Chahala
		49	Kairakacha
		50	Karkachia
		51	Bhatunia
		52	Barehipani
		53	Matighati
		54	Brundaban Gate
7	National Park	55	Range office, Jashipur
		56	Kabatghai
		57	Khejuri
		58	Ransa
		59	Nuagaon
		60	Mahabirsal
		61	Kalikaprasad
			<b>T</b>

			62 Bakua
			63 Ramtirtha
8	Baripada	Pithabata	64. Champagarh
			65. Baldiha
			66. Tarajodii
			67. Khasadiha
			68. Haldibani
9		Dukura	69. Khandabura
			70. Bahalda
10		Bangriposi	71. Jaldiha
			72. Shyamsundarpur
11		Udala	73. Balma
			74. Devkund
			75. Baniabasa
			76. Nuagaon
12		Kaptipada	77. Dangadiha
			78. Podadiha
13	Karanjia	Gurguria	79. Gurguria
			80. Khejuri
14		Kendumundi	81. Edalbeda
15		Thakurmunda	82. Mandaljhari
			83. Dangadiha
16		Dudhiani	84. Rangamatia
			85. Pahadpur
			86. Kiajhari
17	Rairangpu	<b>r</b> Bisoi	87. Ghatkuanri
			88. Talbandha
			89. Kasipani
			90. Bangriposi
18	1	Manada	91. Uski
			92. Barehipani
			93 Haldia
			94 Jamuani

#### ANNEXURE XXXI LIST OF BUILDINGS IN PA

Sl. No.	Name of	Building	Location	Remark
1.	Range National	1. Khairi FRH	Jashipur	
1.	Park	2. Office of DD (Tourism &	-	
	T WITH	Research)	Jushipur	
		3. Office of the RO, National	Jashipur	
		Park	F	
		4. Residence of ACF, National	Jashipur	
		Park	7.1.	
		5. Residence of RO, National	Jashipur	
		Park 6. Driver Ouarter	Inchimum	
			Jashipur Jashipur	
		<ul><li>7. Forester Quarter</li><li>8. Forest Guard Quarter – 2 nos</li></ul>	Jashipur	
		9. Guide Quarter – 1 no.	Jashipur	
		10. Bunglow Chowkidar Qtr. – 1		
		no.	Jasinpui	
		11. Office Peoon Qtr. – 1 no	Jashipur	
		12. Booking counter& Green shop	_	
		-1no		
		13. Family hostel 1 no.	Jashipur	
		14. Research Office	Ramtirtha	
		15. Research laboratory	Ramtirtha	
		16. Residence of Research Officer	Ramtirtha	
		<ol> <li>Residence of Asst. Research Officer</li> </ol>	Ramtirtha	
		18. Residence of Foreste Guard –	Ramtirtha	
		2 no	Kamuna	
		19. Residence of Mugger	Ramtirtha	
		Watcher- 3nos		
		20. Dormitory – 3 nos	Ramtirtha	
		21. Tribal hut – 2 nos	Ramtirtha	
		22. Interpretation centre – 1 no	Ramtirtha	
		23. Congregation Hall – 1 no	Ramtirtha	
		24. Restaurant – 1 no	Ramtirtha	
		25. Forester, Kabatghai Qtr - 1	Gurguria	
		26. Forest Guard Qtr – 1 no.	Kabatghai	
		27. Forest Guard Qtr – 1 no.	Ransa Khejuri	
		28. Forest Guard Qtr – 1 no		
		29. Forest Guard Qtr – 1 no	Bakua	
		30. Anti-poaching Camp – 1 no.	Mahavirsal	
		31. Forester Qtr. – 1 no.	Nuagaon	
	Chahal-	32. Forester - Check gate	Kalikaprasad	
2.	Chahala	33. FRH	Chahala	
		34. Sal villa	Chahala	

		25 Dance Office	Chahala	
		35. Range Office	Chahala	
		36. Staff Barrack	Chahala	
		37. Forester Qtr – 1 no	Chahala	
		38. Store Room – 1 no	Chahala	
		39. Eucalyptus villa – 1 no	Chahala	Damaged in naxalite attack
		40. Chittal villa – 1 no	Chahala	-Do-
		41. Forest Guard Check Gate	Brundaban	
		42. Anti-poaching camp	Karkachia	
		43. Anti-poaching camp	Bhatunia	
		44. Forester Qtr – 1 no.	Barehipani	
		45. Forest Guard Qtr. – 1 no	Barehipani	
		46. Forest Guard Qtr. – 1 no	Kairakacha	
		47. WatchTower	Barehipani	
		48. Bunglow Chowkidar Qtr- 1	Barehipani	
		no.	1	
		49. Forest Guard Qtr. – 1 no	Matighati	
3.	Upper	50. Camp office of Field Director	UBK	
	Barakamud	51. Range Office	UBK	
	a	52. Staff barrack	UBK	
		53. Forest Guard Qtr. – 1 no	UBK	
		(Tinadiha)		
		54. Watch tower	Devasthali	
		55. Forester Qtr – 1 no.	Patbil	
		56. Forest Guard Qtr – 1 no.	Bahaghar	
		57. Forest Guard Qtr. – 1 no	Kandadhenu	
		58. Forest Guard Qtr. – 1 no	Silda	
		59. Forest Guard Qtr. – 1 no	Nekedanacha	
		60. Anti-poaching camp	Balidar	
		61. FRH (Camp office of ACF)	Bhanjabasa	
		62. Forester Qtr – 1 no	Bhanjabasa	
		63. Anti-poaching camp	Gunduria	
		64. Anti-poaching camp	Tarinibilla	
		65. Anti-poaching camp	Dhuduram	
		66. VHF room	Meghasini	
		67. Forest Guard Qtr. – 1 no	Meghasini	
4.	Jenabil	68. FRH (Wooden log house)	Jenabil	Damaged in
		69. Camp office of Deputy		naxalite attack
		Director		
		70. Range Office	Jenabil	
		71. Forest Guard Qtr. – 2 nos	Jenabil	
		72. Forester Qtr – 1 no	Jenabil	
		73. Barrack	Hatighar	
		74. Forest Guard Qtr. – 1 no	Hatisal	
		75. Watch tower	Sarabasa	
		76. Anti-poaching camp	Gurandia	
		77. Forest Guard Qtr. – 1 no	Kulipal	
		78. Forest Guard Qtr. – 1 no	Baniabasa	
	<u> </u>	, s. Toron Suma VII. I no	- aiiiaouou	1

		79.	Anti-poaching	Tiktali	
		80.	Forest Guard Qtr. – 1 no	Sarua	
5.	Nawana(S)	81.	Range Office	Dhudruchamp	
			8	a	
		82.	Forester Qtr – 1 no.	Dhudruchamp	
			- 323332	a	
		83.	Forest Guard Qtr. – 1 no	Dhudruchamp	
				a	
		84.	Forest Guard Qtr. – 1 no	Lengdakocha	
		85.	Anti-poaching camp	Chherabil	
		86.	Forest Guard Qtr	Jodapal	
6.	Nawana(N)	87.	FRH	Nawana	Being used as
	, ,				police camp
		88.	Pine villa (damaged)	Nawana	
		89.	Range office	Nawana	
		90.	Dormitory	Nawana	
		91.	FRH	Joranda	Damaged in
					naxalite attack
		92.	Forest Guard Qtr. – 1 no	Joranda	
		93.	Forester Qtr – 1 no.	Nigirdha	
		94.	Anti-poaching camp	Kusumbani	
		95.	Anti-poaching camp	Pandabandha	
		96.	Anti-poaching camp	Khadkei	
		97.	Forest Guard Qtr. – 1 no	Baunskhal	
7.	Pithabata	98.	Office of the Field Director	Baripada	
		99.	Residence of Field Director	Baripada	
		100.	Residence of Dy. Director	Baripada	
		101.	Residence of ACF	Baripada	
		102.	Office staff Qtr – 4 nos	Baripada	
		103.	Family Hostel-1 no	Baripada	
		104.	Office Chowkidar Qtr – 1 no	Baripada	
		105.	Staff barrack	Baripada	
		106.	Booking counter	Pithabata	
		107.	Range Office	Pithabata	
		108.	Forester Qtr – 1no	Pithabata	
		109.	Forest Guard Qtr. – 1 no	Pithabata	
		110.	Forester Qtr- 1no.	Bhajam	
		111.	Forest Guard Qtr. – 1 no	Badmakabadi	
		112.	Forester Qtr – 1 no.	Kachudahan	
		113.	Forest Guard Qtr. – 1 no	Kachudahan	
		114.	Anti-poaching camp	Bhundadar	
		115.	Forest Guard Qtr. – 1 no	Chandanchatu	
				ry	
		116.	Forest Guard Qtr. – 1 no	Palasibeda	
		117.	Forest Guard Qtr. – 1 no	Namati	

#### **ANNEXURE XXXII**

#### LIST OF CHECK POSTS

Sl. No.	Location of barriers	Type	Name of Range
	(check gates)		
1	Pithabata	Manned	Pithabata
2	Bhajam	Manned	Pithabata
3	Namati	Unmanned	Pithabata
4	Nawana	Unmanned	Nawana(N)
5	Nigirdha	Manned	Nawana(N)
6	Kalikaprasad	Manned	National Park
7	Kabatghai	Unmanned	National Park
8	Khejuri	Unmanned	National Park
9	Chahala (No entry)	Unmanned	Chahala
10	Brundaban	Manned	Chahala
11	Kulipal	Unmanned	Jenabil
12	Lengakacha	Unmanned	Nawana South
13	Kaliani	Manned	Gurguria
14	Tulasibani	Manned	Manada
15	Baniabasa	Manned	Udala
16	Manabhanga	Unmanned	Kaptipada
17	Dangadiha	Unmanned	Thakurmunda
18	Kendumundi	Unmanned	Kendumundi
19	Talabandha	Unmanned	Bisoi

#### **ANNEXURE XXXIII** WATCH TOWERS IN CORE AREA OF SIMILIPAL TR

Sl.	Name of Range	Location	Remarks
No.			
1.	Nawana (N)	Joranda	Watch tower
2.	Jenabil	Sarabasa	Watch tower cum anti-poaching
			camp
		Gurandia	Watch tower cum anti-poaching
			camp
		Tiktali	Watch tower cum anti-poaching
			camp
		Jenabil	Watch tower
3.	Upper Barakamuda	Upper Barakamuda	Hide-out
		Devasthali	Watch tower cum anti-poaching
			camp
4.	Chahala	Brundaban	Watch tower
		Chahala	Hide-out
5.	National Park	Mahavirsal	Watch tower cum anti-poaching
			camp

#### ANNEXURE XXXIV

#### LIST OF ROADS

#### **CORE AREA**

Name of Forest Road	Length	Length in Km	
	Pucca	Morrum	in Km
Brundaban-Chahala	-	03.00	03.00
Brundaban-Bareipani chhak (Beat house)	-	12.00	12.00
Bareipani (Beat house)-Champaghati	-	08.00	08.00
Bareipani (Beat house)- Fall view	-	03.00	03.00
Chahala Ring road	-	14.00	14.00
Chahala-Kairakacha	-	03.00	03.00
Karkachia chhak-Karkachia	-	09.00	09.00
Karkachia-Bhatunia	-	12.00	12.00
Bhatunia-Kusumbani	-	08.00	08.00
Kusumbani-PandabandhaRange boundary	-	06.00	06.00
Khadkei-Baunsakhal	-	12.00	12.00
Haldia chhak-Haldia	-	06.00	06.00
Champaghati-Nawana	-	03.00	03.00
Nawana-Bhajam Hill top	-	20.00	20.00
Gitilpidi-Joranda	-	06.00	06.00
Joranda Ring road	-	08.00	08.00
Ponasia-Range boundary ( on Ponasia-Kusumbani	-	05.00	05.00
Road)			
Pondabandha Ring road	-	02.00	02.00
Ponasia-Bhundadar Road	-	05.00	05.00
Bhundadar-Khadkei ghat	-	04.00	04.00
Nigirdha-Dhudruchampa-Jodapal Chhak	-	20.00	20.00
Gopinathpur-Balikhal	-	08.00	08.00
Balikhal-Domuhani	-	04.00	04.00
Badamakabadi Chhak-Bodamakabadi	-	06.00	06.00
Dhudruchampa-dhundubasa	-	07.00	07.00
Jodapal Chhak-Jodapal	-	06.00	06.00
Nawana-Bakua-Bhodraguda	-	14.00	14.00
Bakua-Dhudruchampa Link Road	-	08.00	08.00
Bakua-Lembuguda	-	06.00	06.00
Panasia-Pansia game tank	-	01.00	01.00
Jodapal Chhak-Shrikanta Sethi Chhak Jenabil	-	10.00	10.00
Jodapal-Sarabasa-Dhangaji	-	04.00	04.00
Sunpokhari-Jenabil Chhak (near Hatighar)	-	10.00	10.00
Jenabil-Tarinibilla-UBK	-	19.00	19.00
Nuagaon-Devasthali-UBK		20.00	20.00

Total	-	597.00	597.00
Badamakabadi-Sabarbasa	-	05.00	05.00
Bhajam- Baunskhal	-	08.00	08.00
Bhajam Core line-Bhajam Hill top	-	06.00	06.00
Laxmiposhi-Digdiga-Besarpani	-	13.00	13.00
Satnalia-Belghati	-	07.00	07.00
Kachudahan-Charichak	-	07.00	07.00
Kachudahan-Domuhani	-	02.00	02.00
Kachudahan-Badomakabadi	-	12.00	12.00
Lulung(Gate) –Kachudahan	-	10.00	10.00
Munidar-Champaghati	-	17.00	17.00
Bakua-Khejuri	-	06.00	06.00
Bhadraguda-Jenabil (Hatighar chhak)	-	15.00	15.00
Mohavir-Kalkam	-	03.00	03.00
Sarudola-Mohavir-Nimia	-	08.00	08.00
Nuagaon-Ganapati-Sarudola	-	07.00	07.00
Ranasa-Matiaghati-Sarudola	-	08.00	08.00
Jenabil (Bathudi sahi Chhak)-Jamuna-Nuagaon	-	07.00	07.00
Jenabil Chhak (near Hatighar)-Mahantahana- Ransa	-	08.00	08.00
Kabatghai-Nuagaon	-	15.00	15.00
Gurguria-Kabataghai	-	12.00	12.00
Solamundi-Sarudala	-	06.00	06.00
Kandadhanu-Silda	-	08.00	08.00
Gourakantha-Tiktali-Khairiburu	-	08.00	08.00
Sandhakilla-Hatisal link Road	-	05.00	05.00
Sarua-Hatisal-Sunpokhari	-	15.00	15.00
Gunduria-Sarua	-	08.00	08.00
Nekdanacha-Dhobighat	-	07.00	07.00
Bhanjabasa-Meghasini	-	06.00	06.00
Bhanjabasa-Gunduria	-	11.00	11.00
Core line			
Bhanjabasa-Rajabhadi-Chungudia-Champachua		06.00	06.00
UBK-Bhanjabasa	-	16.00	16.00
UBK-Meghasini	_	10.00	10.00
UBK-Jamuna via Jamunadonda		09.00	09.00
Ginahaja-Baghora Core line	1-	06.00	06.00
Patbil-Ginahaja-Kandadhanu Core line	T _	08.00	08.00

#### **BUFFER AREA**

Name of	Name of Forest Road	Length in	Length in Km	
Division		Pucca	Morrum	
Baripada	Munidar – Lulung	-	3.00	3.00
	Baniabasa – Sonpokhari	-	19.00	19.00
	Total	-	22.00	22.00
Karanjia	Dudhiani-Kandadhanu	-	15.00	15.00
	Kalikaprasad-Gurguria	-	15.00	15.00
	Barigaon – Khejuri	-	8.00	8.00
	Lanjighosra – Uski	e v		5.00
	Kandadhanu towards Kendumundi			8.00
	Total	-	51.00	51.00
Rairangpur	Uski-Bareipani	-	15.00	15.00
	Sasraghati-Talbandha-Chahala Core line	-	31.00	31.00
	Tulasibani-Brundaban	-	20.00	20.00
	Total	-	66.00	66.00
_	Grand Total	-	139.00	139.00

#### ANNEXURE XXXV LIST OF VEHICLES

#### 1. Core area

#### List of four wheeler vehicles

Sl. No.	Registration No. of vehicle/ Make model & Type of vehicle	Date of purchase	Present condition of vehicle	Remarks
01.	OR11-3672 Mini Truck	26.6.1993	Off road	Condemnation proposal already submitted to PCCF(WL), Orissa
02.	OR11-8421 Mahindra & Mahindra Jeep	3.6.1996	Running	-
03.	OR02K-7545 Gypsy Maruti (Petrol)	16.4.1999	Off road	-
04.	OR11A-5145 Commander Jeep	13.4.1999	Running	-
05.	OR11A5136 Tractor	17.4.1999	Running	-
06.	OR11B-9235 Bolero Mahindra & Mahindra	27.9.2002	Running	-
07.	OR11C-0352 Van-TATA 407	9.12.2002	Running	-
08.	OR11D-2489 Bolero Camper Mahindra & Mahindra	5.11.2004	Running	-
09.	OR11D-2490 Bolero Camper Mahindra & Mahindra	5.11.2004	Running	-
10.	OR11C-7690 Marshal Royal Deluxe	30.1.2004	Running	-
11.	OR11F-0889 Mini Bus	31.3.2006	Running	
12.	OR11F-2234 Commander Jeep	31.3.2006	Running	
13.	OR11F-5869 Mahindra Bolero Camper	17.01.2007	Running	
14.	OR11F-5354 Ambassador Car	27.03.2007	Running	
15.	OR02AU-1583 Mahindra Scorpio SUV	08.09.2008	Running	
16.	OR11H-1802 Bolero Camper Mahindra & Mahindra	23.02.2010	Running	
17.	OR11H-1803 Bolero Camper Mahindra & Mahindra	23.02.2010	Running	
18.	OR11K-9659 Bolero Camper Mahindra & Mahindra	15.03.2012	Running	
19.	OR11K-9660 Bolero Camper Mahindra & Mahindra	15.03.2012	Running	

## List of two wheeler vehicles

Sl. No	Registration No. of vehicle/ Make model & Type of vehicle	Date of purchase	Present condition of vehicle	Remarks
	OR11B-8165 Bullet Motor Cycle	27.2.2002	Running	-
	OR11B-8108 Bullet Motor Cycle	27.2.2002	Running	-
	KL11S-8016 Bullet Motor Cycle	13.2.2004	Running	-
	KL11S-8022 Bullet Motor Cycle	13.2.2004	Running	-
	KL11S-8024 Bullet Motor Cycle	13.2.2004	Running	-
	KL11S-8081 Bullet Motor Cycle	13.2.2004	Running	-
	OSM-2370 Rajdoot MC (Escort)	1989	Running	-
	OR11A2472 Rajdoot MC (Escort)	8.3.1999	Running	-
	OR11A-4767 Rajdoot MC (Escort)	8.3.1999	Running	-
	OR11A-4768 Rajdoot MC (Escort)	8.3.1999	Running	-
	OR11D-2550 Yamaha CruxR	30.6.2004	Running	-
	OR11D-2491 Yamaha CruxR	-do-	-do-	-
	OR11D-2492 Yamaha CruxR	-do-	-do-	-
	OR11D-2493 Yamaha CruxR	-do-	-do-	-
	OR11D-2498 Yamaha CruxR	-do-	-do-	-
	OR11D-2561 Yamaha CruxR	-do-	-do-	-
	OR02AJ-5669 Yahaha Fazer	22.4.2006	-do-	-
	OR02AJ-5682 Yahaha Fazer	22.4.2006	-do-	-

#### 2. Buffer area

No.	Sl	Name of	Name of	Details of Govt. / rented vehicle
1   3   4   7   1   1   1   1   1   1   1   1   1	No.	the	Range	
Baripada   Bangriposi   1.Bolero Camper full hard top body- OR-11K-7815   2. Yamaha Faizer-Motorcycle NoOR-02-AJ5748.   3. New Bajaj Pulsar- Motorcycle No. OR-11K-3121   Udala   4. Rented vehicle No.OR-11D-0511   5. Rented Mahindra max No.OR-11B-9388   6. Govt. Yamaha Faizer-Motorcycle NoOR-02AJ-5562.   Raptipada   8. Bolero Camper full body- OD-11L-1185.   9. Yamaha Faizer-Motorcycle NoOR-02AJ-5685.   10. New Bajaj Pulsar- Motorcycle No. OR-11K-3126   11. Bolero Camper-OD-11K-7817   Pithabata   12. Rented vehicle No.OR-11A-0281   13. Tata Sumo-OR-02AJ-8412   0 office, Baripada   15. Jeep-OR-11A-8855   16. Tata 407- OR-11B-8524   15. Jeep-OR-11B-8554   15. Jeep-OR-11B-8554   16. Tata 407- OR-11B-8524   18. Bolero Camper-OR-11L-1384,   2. Yamha MC-OR-02L-5572,   3. Rajdoot MC-ORM-7918,   4. Bajaj Pulsar-OD-02BZ-0803,   7. Hired Savari- OR-02AJ-5549,   6. Bajaj Pulsar-OD-02BZ-0803,   7. Hired Savari- OR-02AJ-5569   Kendumundi   13. Yamaha MC- OR-02AJ-5569   Kendumundi   13. Yamaha — Ino.   Satkosia   14. Bolero Camper-Ino,   15. Bajaj Pulsar-OR-11K-5913   2. Yamaha-OR-02Aj-5697   3. GWD Mahindra Jeep OR 11-0567   4. Mahidra Camper OR-11J-7205   10. PR-11B-11-11-11-11-11-11-11-11-11-11-11-11		Division		
2. Yamaha Faizer-Motorcycle No. OR-02-AJ5748.   3. New Bajaj Pulsar- Motorcycle No. OR-11K-3121     Udala	1	3	4	7
3.New Bajaj Pulsar- Motorcycle No. OR-11K-3121	1	Baripada	Bangriposi	1.Bolero Camper full hard top body- OR-11K-7815
Udala				2.Yamaha Faizer-Motorcycle NoOR-02-AJ5748.
S.Rented Mahindra max No.OR-11B-9388				3.New Bajaj Pulsar- Motorcycle No. OR-11K-3121
Bukura			Udala	4.Rented vehicle No.OR-11D-0511
Dukura				5.Rented Mahindra max No.OR-11B-9388
Kaptipada   8.Bolero Camper full body- OD-11L-1185.   9.Yamaha Faizer-Motorcycle NoOR-02-AJ-5685.   10.New Bajaj Pulsar- Motorcycle No. OR-11K-3126   11.Bolero Camper-OD-11K-7817   Pithabata   12.Rented vehicle No.OR-11A-0281   Division   13.Tata Sumo-OR-02AJ-8412   office,   14.Commander-OR-11A-2455   Baripada   15.Jeep-OR-11-8855   16.Tata 407- OR-11B-8524   2   Karanjia   Thakurmunda   1.Bolero Camper-OR-11L-1384,   2.Yamha MC-OR-02L-5572,   3.Rajdoot MC-ORM-7918,   4. Bajaj Pulsar-OD-2BZ-0811   Dudhiani   5.Yamha MC-OR-02AJ-5549,   (Tato)   6.Bajaj Pulsar-OD-02BZ-0803,   7.Hired Savari-1no.   Gurguria   8.Hired Savari-OR-02AJ-5569   Kendumundi   13 Yamaha - 1no.   Satkosia   14.Bolero Camper-1no,   15 Bajaj Pulser-1no.   3   Rairangpur   Bisoi   1.Bajaj Pulsar-OR-11K-5913   2.Yamaha-OR-02Aj-5697   3.GWD Mahindra Jeep OR 11-0567   4.Mahidra Camper OR-11J-7205				6.Govt. Yamaha Faizer No.OR-02AJ-5750
9.Yamaha Faizer-Motorcycle NoOR-02-AJ-5685.			Dukura	7.Yamaha Faizer-Motorcycle NoOR-02AJ-5562.
10.New Bajaj Pulsar- Motorcycle No. OR-11K-3126     11.Bolero Camper-OD-11K-7817     Pithabata   12.Rented vehicle No.OR-11A-0281     Division   13.Tata Sumo-OR-02AJ-8412     office,   14.Commander-OR-11A-2455     Baripada   15.Jeep-OR-11-8855     16.Tata 407- OR-11B-8524     Karanjia   Thakurmunda   1.Bolero Camper-OR-11L-1384,     2.Yamha MC-OR-02L-5572,     3.Rajdoot MC-ORM-7918,     4. Bajaj Pulsar-OD-2BZ-0811     Dudhiani   5.Yamha MC-OR-02AJ-5549,     (Tato)   6.Bajaj Pulsar-OD-02BZ-0803,     7.Hired Savari-1no.     Gurguria   8.Hired Savari- OR-02AD-5278     9.Jeep-OR-11-8250,     10.Yamaha MC- OR-02AJ-5569     Kendumundi   13 Yamaha - 1no.     Satkosia   14.Bolero Camper-1no,     15 Bajaj Pulsar-OR-11K-5913     2.Yamaha-OR-02Aj-5697     3.GWD Mahindra Jeep OR 11-0567     4.Mahidra Camper OR-11J-7205			Kaptipada	8.Bolero Camper full body- OD-11L-1185.
11.Bolero Camper-OD-11K-7817				9.Yamaha Faizer-Motorcycle NoOR-02-AJ-5685.
Pithabata   12.Rented vehicle No.OR-11A-0281     Division   13.Tata Sumo-OR-02AJ-8412     office,   14.Commander-OR-11A-2455     Baripada   15.Jeep-OR-11-8855     16.Tata 407- OR-11B-8524     2   Karanjia   Thakurmunda   1.Bolero Camper-OR-11L-1384,     2.Yamha MC-OR-02L-5572,   3.Rajdoot MC-ORM-7918,     4. Bajaj Pulsar-OD-2BZ-0811     Dudhiani   5.Yamha MC-OR-02AJ-5549,     (Tato)   6.Bajaj Pulsar-OD-02BZ-0803,   7.Hired Savari-1no.     Gurguria   8.Hired Savari-OR-02AD-5278     9.Jeep-OR-11-8250,   10.Yamaha MC- OR-02AJ-5569     Kendumundi   13 Yamaha - 1no.     Satkosia   14.Bolero Camper-1no,   15 Bajaj Pulsar-OR-11K-5913     2.Yamaha-OR-02Aj-5697   3.GWD Mahindra Jeep OR 11-0567     4.Mahidra Camper OR-11J-7205				10.New Bajaj Pulsar- Motorcycle No. OR-11K-3126
Division office,   14.Commander-OR-02AJ-8412   14.Commander-OR-11A-2455   15.Jeep-OR-11-8855   16.Tata 407- OR-11B-8524   2   Karanjia   Thakurmunda   1.Bolero Camper-OR-11L-1384,   2.Yamha MC-OR-02L-5572,   3.Rajdoot MC-ORM-7918,   4. Bajaj Pulsar-OD-2BZ-0811   Dudhiani   5.Yamha MC-OR-02AJ-5549,   (Tato)   6.Bajaj Pulsar-OD-02BZ-0803,   7.Hired Savari-1no.   Gurguria   8.Hired Savari- OR-02AD-5278   9.Jeep-OR-11-8250,   10.Yamaha MC- OR-02AJ-5569   Kendumundi   13 Yamaha - 1no.   Satkosia   14.Bolero Camper-1no,   15 Bajaj Pulser-1no.   15 Bajaj Pulser-1no.   3 Rairangpur   Bisoi   1.Bajaj Pulsar-OR-11K-5913   2.Yamaha-OR-02Aj-5697   3.GWD Mahindra Jeep OR 11-0567   4.Mahidra Camper OR-11J-7205				11.Bolero Camper-OD-11K-7817
Office, Baripada   14.Commander-OR-11A-2455   15.Jeep-OR-11-8855   16.Tata 407- OR-11B-8524   2   Karanjia   Thakurmunda   1.Bolero Camper-OR-11L-1384,			Pithabata	12.Rented vehicle No.OR-11A-0281
Baripada   15.Jeep-OR-11-8855   16.Tata 407- OR-11B-8524			Division	13.Tata Sumo-OR-02AJ-8412
16.Tata 407- OR-11B-8524   1.Bolero Camper-OR-11L-1384,   2.Yamha MC-OR-02L-5572,   3.Rajdoot MC-ORM-7918,   4.Bajaj Pulsar-OD-2BZ-0811   Dudhiani   5.Yamha MC-OR-02AJ-5549,   (Tato)   6.Bajaj Pulsar-OD-02BZ-0803,   7.Hired Savari-1no.   Gurguria   8.Hired Savari- OR-02AD-5278   9.Jeep-OR-11-8250,   10.Yamaha MC- OR-02AJ-5569   Kendumundi   13 Yamaha — 1no.   Satkosia   14.Bolero Camper-1no,   15 Bajaj Pulsar-OR-11K-5913   2.Yamaha-OR-02Aj-5697   3.GWD Mahindra Jeep OR 11-0567   4.Mahidra Camper OR-11J-7205			office,	14.Commander-OR-11A-2455
Thakurmunda			Baripada	15.Jeep-OR-11-8855
2.Yamha MC-OR-02L-5572,   3.Rajdoot MC-ORM-7918,   4. Bajaj Pulsar-OD-2BZ-0811   Dudhiani   5.Yamha MC-OR-02AJ-5549,   (Tato)   6.Bajaj Pulsar-OD-02BZ-0803,   7.Hired Savari-1no.   Gurguria   8.Hired Savari- OR-02AD-5278   9.Jeep-OR-11-8250,   10.Yamaha MC- OR-02AJ-5569   Kendumundi   13 Yamaha - 1no.   Satkosia   14.Bolero Camper-1no,   15 Bajaj Pulser-1no.   3 Rairangpur   Bisoi   1.Bajaj Pulsar-OR-11K-5913   2.Yamaha-OR-02Aj-5697   3.GWD Mahindra Jeep OR 11-0567   4.Mahidra Camper OR-11J-7205				16.Tata 407- OR-11B-8524
3.Rajdoot MC-ORM-7918, 4. Bajaj Pulsar-OD-2BZ-0811  Dudhiani 5.Yamha MC-OR-02AJ-5549, (Tato) 6.Bajaj Pulsar-OD-02BZ-0803, 7.Hired Savari-1no.  Gurguria 8.Hired Savari- OR-02AD-5278 9.Jeep-OR-11-8250, 10.Yamaha MC- OR-02AJ-5569  Kendumundi 13 Yamaha – 1no.  Satkosia 14.Bolero Camper-1no, 15 Bajaj Pulser-1no.  3 Rairangpur Bisoi 1.Bajaj Pulsar-OR-11K-5913 2.Yamaha-OR-02Aj-5697 3.GWD Mahindra Jeep OR 11-0567 4.Mahidra Camper OR-11J-7205	2	Karanjia	Thakurmunda	1.Bolero Camper-OR-11L-1384,
4. Bajaj Pulsar-OD-2BZ-0811     Dudhiani				2.Yamha MC-OR-02L-5572,
Dudhiani 5.Yamha MC-OR-02AJ-5549, (Tato) 6.Bajaj Pulsar-OD-02BZ-0803, 7.Hired Savari-1no.  Gurguria 8.Hired Savari- OR-02AD-5278 9.Jeep-OR-11-8250, 10.Yamaha MC- OR-02AJ-5569  Kendumundi 13 Yamaha – 1no.  Satkosia 14.Bolero Camper-1no, 15 Bajaj Pulser-1no.  3 Rairangpur Bisoi 1.Bajaj Pulsar-OR-11K-5913 2.Yamaha-OR-02Aj-5697 3.GWD Mahindra Jeep OR 11-0567 4.Mahidra Camper OR-11J-7205				3.Rajdoot MC-ORM-7918,
(Tato) 6.Bajaj Pulsar-OD-02BZ-0803, 7.Hired Savari-1no.  Gurguria 8.Hired Savari- OR-02AD-5278 9.Jeep-OR-11-8250, 10.Yamaha MC- OR-02AJ-5569  Kendumundi 13 Yamaha – 1no. Satkosia 14.Bolero Camper-1no, 15 Bajaj Pulser-1no.  Rairangpur Bisoi 1.Bajaj Pulsar-OR-11K-5913 2.Yamaha-OR-02Aj-5697 3.GWD Mahindra Jeep OR 11-0567 4.Mahidra Camper OR-11J-7205				4. Bajaj Pulsar-OD-2BZ-0811
7.Hired Savari-1no.  Gurguria  8.Hired Savari- OR-02AD-5278  9.Jeep-OR-11-8250, 10.Yamaha MC- OR-02AJ-5569  Kendumundi  13 Yamaha – 1no.  Satkosia  14.Bolero Camper-1no, 15 Bajaj Pulser-1no.  3 Rairangpur  Bisoi  1.Bajaj Pulsar-OR-11K-5913  2.Yamaha-OR-02Aj-5697  3.GWD Mahindra Jeep OR 11-0567  4.Mahidra Camper OR-11J-7205			Dudhiani	5.Yamha MC-OR-02AJ-5549,
Gurguria   8.Hired Savari- OR-02AD-5278   9.Jeep-OR-11-8250,   10.Yamaha MC- OR-02AJ-5569   Kendumundi   13 Yamaha - 1no.   Satkosia   14.Bolero Camper-1no,   15 Bajaj Pulser-1no.     15 Bajaj Pulsar-OR-11K-5913     2.Yamaha-OR-02Aj-5697     3.GWD Mahindra Jeep OR 11-0567     4.Mahidra Camper OR-11J-7205			(Tato)	6.Bajaj Pulsar-OD-02BZ-0803,
9.Jeep-OR-11-8250, 10.Yamaha MC- OR-02AJ-5569  Kendumundi 13 Yamaha – 1no.  Satkosia 14.Bolero Camper-1no, 15 Bajaj Pulser-1no.  3 Rairangpur Bisoi 1.Bajaj Pulsar-OR-11K-5913 2.Yamaha-OR-02Aj-5697 3.GWD Mahindra Jeep OR 11-0567 4.Mahidra Camper OR-11J-7205				7.Hired Savari-1no.
10.Yamaha MC- OR-02AJ-5569   Kendumundi			Gurguria	8.Hired Savari- OR-02AD-5278
Kendumundi				9.Jeep-OR-11-8250,
Satkosia       14.Bolero Camper-1no,         15 Bajaj Pulser-1no.         3       Rairangpur         Bisoi       1.Bajaj Pulsar-OR-11K-5913         2.Yamaha-OR-02Aj-5697         3.GWD Mahindra Jeep OR 11-0567         4.Mahidra Camper OR-11J-7205				10.Yamaha MC- OR-02AJ-5569
15 Bajaj Pulser-1no.  Rairangpur Bisoi 1.Bajaj Pulsar-OR-11K-5913  2.Yamaha-OR-o2Aj-5697  3.GWD Mahindra Jeep OR 11-0567  4.Mahidra Camper OR-11J-7205			Kendumundi	13 Yamaha – 1no.
3 Rairangpur Bisoi 1.Bajaj Pulsar-OR-11K-5913 2.Yamaha-OR-o2Aj-5697 3.GWD Mahindra Jeep OR 11-0567 4.Mahidra Camper OR-11J-7205			Satkosia	14.Bolero Camper-1no,
2. Yamaha-OR-o2Aj-5697 3. GWD Mahindra Jeep OR 11-0567 4. Mahidra Camper OR-11J-7205				15 Bajaj Pulser-1no.
3.GWD Mahindra Jeep OR 11-0567 4.Mahidra Camper OR-11J-7205	3	Rairangpur	Bisoi	1.Bajaj Pulsar-OR-11K-5913
4.Mahidra Camper OR-11J-7205				2.Yamaha-OR-o2Aj-5697
				3.GWD Mahindra Jeep OR 11-0567
Manada 5 Variata MC ODOO A' 5744				4.Mahidra Camper OR-11J-7205
Ivianada   5. Yamana MC ORUZ-Aj-3644			Manada	5.Yamaha MC OR02-Aj-5644
6.Bajaj Pulsar MC OR -11K- 5914				6.Bajaj Pulsar MC OR -11K- 5914
7.Bolero Camper-OR11 J- 7206				7.Bolero Camper-OR11 J- 7206

#### **ANNEXURE XXXVI** LIST OF V.H.F. STATIONS OF SIMILIPAL TIGER RESERVE

#### Core area

Sl.	Name of	Name of place	Name of the	Frequency	Status
No.	Range/Division		Station		
1.	Pithabata	Baripada	Lion	70.6 MHz	Static
2.		Pithabata	Python	-do-	Static
3.		Bhajam	Balia	-do-	Static
4.		Digdiga	Dingo	-do-	Static
5.		Baunskhala	Barasingha	-do-	Static
6.		Chandanchaturi	Cobra	-do-	Static
7.		Kachudahan	Kachudahan	-do-	Static
8.		Namtidar	Namti	-do-	Static
9.		Bhundadar		-do-	Static
10.	1 Chahala	Chahala	Chital	-do-	Static
11.		Barehipani	Bulbul	-do-	Static
12.		Brundaban	Brundaban	-do-	Static
13.		Bhatunia		-do-	Static
14.		Karkachia	Karkachia	-do-	Static
15.		Barehipani		-do-	Static
16.		Kairakacha	Kairakacha	-do-	Static
17.	2 Nawana(N)	Nawana	Neelam	-do-	Static
18.		Joranda	Jaguar	-do-	Static
19.		Nigirdha		-do-	Static
20.		Kusumbani	Kusum	-do-	Static
21.		Pandabandha		-do-	Static
22.		Khadkei	Khadkei	-do-	Static
23.	Nawana(S)	Badmakabadi	Buffalo	-do-	Static
24.		Dhudruchampa	Dove	-do-	Static
25.		Bakua		-do-	Static
26.		Lengdakacha		-do-	Static
27.		Jodapal		-do-	Static
28.		Dhundbasa		-do-	Static
29.		Balikhal		-do-	Static
30.		Chherabil		-do-	Static
31.	Upper	UBK	Barha	-do-	Static
32.	Barakamuda	Meghasini	Maina	-do-	Static
33.		Bhanjabasa	Baja	-do-	Static
34.		Patabil	Panther	-do-	Static
35.		Devasthali	Deer	-do-	Static

36.		Kandadhenu	Krait	-do-	Static
37.		Bahaghar	Bear	-do-	Static
38.		Tarinibilla		-do-	Static
39.		Nekdanacha		-do-	Static
40.		Balidar	Belra	-do-	Static
41.		Gunduria		-do-	Static
42.		Dhudram		-do-	Static
43.		Silda		-do-	Static
44.	Jenabil	Sarua	Stag	-do-	Static
45.		Jenabil	Jackle	-do-	Static
46.		Kulipal		-do-	Static
47.		Baniabasa	Bison	-do-	Static
48.		Tiktali		-do-	Static
49.		Hatishal		-do-	Static
50.		Sarabasa		-do-	Static
51.		Gurandia		-do-	Static
52.		Jamunagarh	Jamuna	-do-	Static
53.	3 National Park	Jashipur	Sambar	-do-	Static
54.		Nuagaon	Nilagai	-do-	Static
55.		Ramatirtha	Mugger	-do-	Static
56.		Kalikaprasad	Karakel	-do-	Static
57.		Mahavirshal		-do-	Static
58.		Kabatghai		-do-	Static
59.		Ransa		-do-	Static

#### **Buffer area**

Sl.	Name of	Name of place	Name of the	Frequency	Status
No.	Range/Division		Station		
1.	STR Sets to	Udala	Ashok	-do-	Static
	Divisions of 70.6				
	MHz				
2.		Tulasibani	TLI	-do-	Static
3.		Karanjia	Karanjia	-do-	Static
4.	Rairangpur	Barehipani		159.9	Static
	Division	_			
5.		Tulasibani		-do-	Static
6.		Jamuani		-do-	Static
7.		Ghatkuanri		-do-	Static
8.		Uski		-do-	Static
9.		ManadaRange		-do-	Static
		Office			
10.		BangiriposiCNG		-do-	Static

11.		BisoiRange	-do-	Static
		Office		
12.	Karanjia Division	Kaliani	-do-	Static
13.		Gurguria	-do-	Static
14.		Thakurmunda	-do-	Static
15.		Kendumundi	-do-	Static
16.		Satkosia	-do-	Static
17.		Godbhaga	-do-	Static
18.	Baripada Division	Dukura	-do-	Static
19.		Bahalda	-do-	Static
20.		Udala	-do-	Static
21.		Baniabasa	-do-	Static
22.		Taldiha	-do-	Static
23.		Matihudi	-do-	Static
24.		Nuagaon	-do-	Static
25.		Pithabata	-do-	Static
26.		Podadiha	-do-	Static
27.		Kaptipada	-do-	Static
28.		Nalakhanja	-do-	Static
29.		Sarat	-do-	Static
30.		Balma	-do-	Static
31.		Haladibani	-do-	Static
32.		Baldiha	-do-	Static
33.		Bangriposi	-do-	Static
34.		Syamsundarpur	-do-	Static
35.		Joldiha	-do-	Static
36.		Dhobanisole	-do-	Static
37.		Bangiriposi	-do-	Static

#### **ANNEXURE XXXVII**

#### FOREST REST HOUSES/LODGES UNDER SIMILIPAL TIGER ESERVE FOR **TOURISTS SINCE 2010-11**

Sl. No.	Name	Km from	No. of Suites	Total Beds	Total Extra	Rent (Rs.)		Rate for extra person/day	
		Jashipu r			persons allowed	Indian	Forei gner	Indian	Forei gner
1.	Dormitory-I Ramatirtha	-	1	10	5	500	800	20	40
2.	Dormitory-II Ramatirtha	-	1	10	5	500	800	20	40
3.	Dormitory-III Ramatirtha	-	1	10	5	500	800	20	40
4.	TribalHut cottage Ramatirtha	-	3	2/Suite	1/suite	300/ Suite	600/ Suite	20	40
5.	Debasthali cottage Ramatirtha	-	4	2/suite	1/suite	400/su ite	600/s uite	20	40
6.	Gurguria (Cottage-I)	25	2	4	4	300/ Suite	400/ Suite	20	40
7.	Gurguria (Cottage-II)	25	2	4	4	300/ Suite	400/ Suite	20	40
8.	Gurguria Pine Villa	25	2	10	2	300/su ite	400/s uite	20	40
9.	Jamuani (FRH)	25	2	2	2	200	400	20	40
10.	Jamuani (Tribal hut)	25	2	2	2	200	400	20	40

The FRH at Gurguria and Nawana are under occupation of Police for their camp after naxalite attack in Similipal in 2009.

#### ANNEXURE XXXVIII

## TIGER AND LEOPARD CENSUS, 2004

## Tiger census 2004 Tiger-2004(Male)

Sl. No.	Animal No.	Beat/Range	Pug L x B x S	Movement Area
1	TM-1	Nawana(N)	11.3 x 10.0 x 114	Panasia, Jhandapahad,
				Khupipahad
2	TM-2	Nawana(N)	11.0 x 10.7 x 116	Kusumbani chhaka, Khadkei,
				Baunsakhal
3	TM-3	National park	13.2 x 12.3 x 146	Mahantahana, Ransa,
				Nuagaon, Matighati
4	TM-4	National Park	11.9 x 9.6 x 110	Sarudala chhaka, Ganapati.
5	TM-5	Jenabil	11.5 x 11.0 x 121	Sunpokhari, Kulipal
6	TM-6	Chahala	12.4 x 11.3 x 129	Solabadi, Daldali F.P.,
				Jodadiha, Brundaban
7	TM-7	Karanjia Division	12.8 x 11.5 x	Rangamatia, kandadhenu
8	TM-8	UBK	11.2 x 10.7	Patbil, Bachhurichara
9	TM-9	UBK	12.4 x 11.2 x 118	UBK, Tinadiha.
10	TM-10	UBK	11.7 x 10.4 x 132	UBK, Patbil
11	TM-11	UBK	11.1 x 10.5 x 132	Tinadiha, Bachhurichara
12	TM-12	UBK	11 x 11 x 130	Devasthali
13	TM-13	UBK	11.3 x 10.5 x 120	Golkund
14	TM-14	UBK	12.0 x 11.4 x 140	Sarudala, Solamundi
15	TM-15	UBK	11.3 x 10.3 x 121	Golkund
16	TM-16	UBK	12.0 x 11.6 x 125	Jamunadanda

17	TM-17	UBK	11.2 x 11.0 x 132	Sarudala
18	TM-18	UBK	12.0 x 11.2 x 124	Devasthali, Golkund
19	TM-19	UBK	12.2 x 10.8 x 128	Silda, Champaguda
20	TM-20	UBK	13.6 x 12.5 x 152	Dalapahar, Ginahaja
21	TM-21	UBK	10.9 x 10.2 x 109	Bahaghar, Patbil
22	TM-22	UBK	13.1 x 12.1 x 109	Gunduria, Tiktali
23	TM-23	UBK	10.8 x 9.5 x 105	Kandhadhenu, Ginahaja
24	TM-24	UBK	12.7 x 10.9 x 105	Kandadhenu, Ginahaja
25	TM-25	UBK	13.1 x 13.1 x 130	UBK, Khadichua
26	TM-26	UBK	13.2 x 13.1 x	Tinadiha, UBK
27	TM-27	UBK	11.4 x 10.5 x 120	UBK, Matughar
28	TM-28	Jenabil	13.7 x 14.1 x	Jamuna-Jenabil Road

# Tiger-2004(Female)

Sl.	Animal	Beat/Range	Pug L x B x S	Movement Area
No.	No.			
1	TF-1	Pithabata	11.3 x 10.1 x 130	Munibasa, Bhajam, Khadiabasa
2	TF-2	Nawana(S)	12.7 x 10.6 x	Kaniabasa, Dhudruchampa
3	TF-3	Nawana(S)	12.9 x 11.8 x 130	Jodapal, Gilirighati,
				Dhundubasa
4	TF-4	Nawana(S)	12.2 x 10.9 x 124	Bakua, Garh Similipal,
				Belapanidanda, Kadalibadi
5	TF-5	National Park	12.9 x 11.6 x 140	Nuagaon, Jamuna
6	TF-6	National Park	14.6 x 13.1 x 84	Nuagaon, Matighati, Doliguda,
				Pokharidanda
7	TF-7	National Park	12.5 x 10.6 x 126	Mahabirshal, Nimia
8	TF-8	National Park	13.5 x 11.6 x	Makaladanda, Kabatghai
9	TF-9	Jenabil	12.1 x 10.9 x 120	Jenabil, Mahantahana,
				Hatighar, Ransa
10	TF-10	Jenabil	13.4 x 11.8 x 126	Hatighar, Mahantahana,
				Basudev pahad
11	TF-11	Jenabil	13.9 x 11.8 x 137	Hatisal, Sendhakila
12	TF-12	Jenabil	14.4 x 12.5 x 101	Gurandia, Bhadraguda
13	TF-13	UBK	12.2 x 11.0 x 130	Dhuduram
14	TF-14	UBK	12.8 x 10.2 x 130	Patbil, Bachhurichara
15	TF-15	UBK	13.2 x 9.7 x 140	Dhobighat, Nekedanacha

16	TF-16	UBK	13.8 x 11.7 x 128	Tinadiha, Ginahaja
17	TF-17	UBK	13.2 x 10.7 x 133	Sarudala, Ankurabasa
18	TF-18	UBK	12.5 x 9.7 x 112	Dhuduram, Patbil
19	TF-19	UBK	12.0 x 10.2	Bahaghar, Tinadiha
20	TF-20	UBK	11.2 x 9.9 x 118	Debasthali, Patbil
21	TF-21	UBK	12.7 x 10.4 x 119	Chakasil, Tinadiha,
				Kandadhenu
22	TF-22	UBK	12.2 x 10.2 x 122	Ginahaja, Kandadhenus
23	TF-23	UBK	12.3 x 10.3 x 137	Jamuna, UBK
24	TF-24	UBK	11.9 x 10.0 x 135	Tarinibilla, UBK
25	TF-25	UBK	12.2 x 10.4 x 122	Bhanjabasa, Nekedanacha
26	TF-26	UBK	13.0 x 10.6 x 131	UBK, Meghasini
27	TF-27	UBK	10.8 x 10.1	Debasthali, Golkund
28	TF-28	UBK	10.8 x 10.0 x 110	Solamundi, Sarudala
29	TF-29	UBK	11.8 x 10.8 x 107	Maruadibandha, Barpalchatori,
				Tiktali
30	TF-30	UBK	11.4 x 10.6 x 114	Tangiria, Gunduria
31	TF-31	UBK	12.4 x 12.1	Tiktali Foot Path
32	TF-32	UBK	11.5 x 10.3 x 118	UBK, Tinadiha, Patbil
33	TF-33	UBK	12.1 x 11.5 x 121	Chingudia, Kumbhaghai
34	TF-34	UBK	11.6 x 10.2 x 110	Nekedanacha, Bhanjabasa
35	TF-35	UBK	12 x 9.5 x 120	Kuladanda, Bengapani
36	TF-36	UBK	12 x 11.8 x 120	UBK, Tarinibilla
37	TF-37	UBK	12 x 11.8	Khadichua, UBK
38	TF-38	UBK	11.4 x 10 x 90	UBK, Matughar
39	TF-39	UBK	10.8 x 9.7 x 128	UBK, Matughar
40	TF-40	RRPR Div	10.9x9.8x76	Talbandha
41	TF-41	Karanjia	11.5x9.3x126	Kusumi, Domniguda
		Division		
42	TF-42	Balasore(WL)	13.2 x 11.0	Chitpal Kendunalia-
		Divn.		Jharanaghati, Pindahudi

# Tiger-2004(Cub)

Sl. No.	Animal No.	Beat/Range	Pug L x B x S	Movement Area
1	TC-1	Nawana(S)	9.2 x 8.9 x 90	Balikhal, Domuhani, Gopinathpur
2	TC-2	Nawana(S)	8.1 x 7.9 x 82	Bakua, Cheruanal, Rajabhadi
3	TC-3	Nawana(N)	9.7 x 8.6 x 104	Kusumbani, Pandabandha
4	TC-4	Nawana(N)	8.0 x 7.6 x 82	Ring Road, Balidar, Panasia
5	TC-5	National Park	9.5 x 9.4 x 50	Doliguda, Pokridanda, Ganapati, Solamundi
6	TC-6	National Park	10.4 x 9.6 x 140	Nuagaon, Jamuna
7	TC-7	Jenabil	9.1 x 8.0 x 93	Tiktali, Sahebehati
8	TC-8	Jenabil	9.1 x 8.4 x 86	Jodapal, Sarabasa
9	TC-9	Jenabil	8.1 x 7.0 x 83	Tangipahad, Hatisal
10	TC-10	Chahala	10.1 x 8.3 x 85	Machine nala
11	TC-11	RRPR Div	9.7 x 7.9 x 89	Mankadaghati, Kamaraghati

12	TC-12	RRPR Div.	8.7 x 8.2 x 85	Gairabhandan, Barulodam
13	TC-13	Baripada	9.3 x 9.0 x 91	Kanyabasa, Patelbasa
		Division		
14	TC-14	Baripada	104 x 8.9 x 105	Patelbasa, Kanyabasa
		Division		
15	TC-15	UBK	11.4 x 10.1 x 134	Nuagaon, Sarudala
16	TC-16	UBK	11.1 x 8.9 x 110	Daldali, Solamundi
17	TC-17	UBK	9.3 x 9.2 x 128	Bahaghar, Ranibhol
18	TC-18	UBK	8.8 x 8.4 x 86	Bhanjabasa, Nekadanacha
19	TC-19	UBK	8.9 x 7.9 x 85	Bhanjabasa, Champachua
20	TC-20	UBK	9.6 x 8.5 x 130	Bhanjabasa, Nekedanacha
21	TC-21	UBK	8.3 x 8.6 x 91	Meghasini, UBK
22	TC-22	UBK	9.1 x 8.2 x 89	Baragoda hill, Tarinibilla
23	TC-23	UBK	10 x 9.8	Dhuduram
24	TC-24	UBK	9.5 x 9.2 x 95	UBK, Tinadiha
25	TC-25	UBK	10.5 x 10.5 x 90	UBK, Matughar
26	TC-26	UBK	10.5 x 9.9 x 124	Debasthali
27	TC-27	UBK	10.0 x 7.2 x 90	Kandadhenu, Bengapani
28	TC-28	UBK	10.6 x 9.6 x 96	Bengapani
29	TC-29	Jenabil	9.4 x 9.0 x 96	Dhudruchampa, Jenabil
30	TC-30	Chahala	8.9 x 8.3	Haldia, Chahala, Jalbandh
31	TC-31	Chahala	9.8 x 9.0 x 89	Talabandha Chhak,
				Daldali(TF-21)
32	TC-32	Jenabil	9.0 x 8.4 x 88	Hatapada, Hatighara(TF-10)

Leopard-2004(Male)

Sl.	Animal	Beat/Range	Pug L x B x S	Movement Area
No.	No.	_		
1	LM-1	Pithabata	8.1 x 7.6 x 86	Mankadaghati, Bhalughar
2	LM-2	Pithabata	9.0 x 8.1 x 92	Champabarehi, Satnalia F.P.
3	LM-3	Pithabata	7.4 x 6.6 x 64	Bhajam, Lulung
4	LM-4	Nawna(N)	9.0 x 8.0 x 48	Kusumbani, Pandabandha,
				Bhatunia
5	LM-5	Nawana(N)	8.5 x 8.0 x 98	Joranda, Kusumbani
6	LM-6	Jenabil	7.7 x 7.0 x 90	Sarua, Gaurakantha
7	LM-7	Jenabil	7.9 x 7.0 x 90	Jenabil, Jampani, Sendhakila
8	LM-8	Jenabil	7.7 x 7.6 x 94	Sunpokhari, Kulipal, Hatisal,
				Jogidiha
9	LM-9	Chahala	9.2 x 8.6 x 107	Talbandha, Haladia, Chhaka
10	LM-10	Chahala	6.9 x 6.5 x 68	Chahala, Mankadaghati,
				Talbandha
11	LM-11	Chahala	8.7 x 8.4 x 95	Kairakacha, Karkachia,
				Brundaban
12	LM-12	Chahala	8.7 x 8.2 x 94	Daldali, Solabadi
13	LM-13	RRPR Divn.	7.6 x 6.7 x 80	Talabandha, Pandabandha
14	LM-14	RRPR Divn.	7.5 x 6.8 x 94	Talabandha, Kusumatota
15	LM-15	RRPR Divn.	8.4 x 8.1 x 91	Bandirabasa, Kolha
16	LM-16	RRPR Divn.	7.7 x 7.2 x 64	Rajupal, Dhuliapada

17         LM-17         Karanjia Division         7.4 x 6.2 x 80         Silda, Pokharidanda           18         LM-18         Karanjia Division         9.0 x 8.8 x 94         Kuanribil, Athharadeuli           19         LM-19         Karanjia Division         8.2 x 8.2 x 77         Domniguda, Khejuri           20         LM-20         Karanjia Division         7.5 x 6.5 x 90         Champaghati, Domniguda           21         LM-21         Baripada Division         7.3 x 6.2 x 106         Balhada, Dhudruchampa           22         LM-22         Baripada Division         7.5 x 7.3 x 88         Ghagra, Kenduchua           23         LM-23         Baripada Division         7.0 x 7.0 x         Chakidi, Badudijharan           24         LM-24         Baripada Division         7.0 x 7.0 x         Chakidi, Badudijharan           25         LM-25         UBK         6.8 x 7.0 x 85         Sarua, Gunduria           26         LM-26         UBK         8 x 7.3 x 97         Sarudala, Ankurbasa           27         LM-27         UBK         8.5 x 8.0 x 87         Champachua, Bhanjabasa, Balidar           28         LM-29         UBK         7.3 x 6.6 x 110         Bhanjabasa, Nekedakacha F.P.           30         LM-31         UBK         7.					
18         LM-18         Karanjia Division         9.0 x 8.8 x 94         Kuanribil, Athharadeuli           19         LM-19         Karanjia Division         8.2 x 8.2 x 77         Domniguda, Khejuri           20         LM-20         Karanjia Division         7.5 x 6.5 x 90         Champaghati, Domniguda Division           21         LM-21         Baripada Division         7.3 x 6.2 x 106         Balhada, Dhudruchampa Division           22         LM-22         Baripada Division         7.7 x 7.9 x 83         -do-           23         LM-23         Baripada Division         7.0 x 7.0 x         Chakidi, Badudijharan Division           24         LM-24         Baripada Division         7.0 x 7.0 x         Chakidi, Badudijharan Division           25         LM-25         UBK         6.8 x 7.0 x 85         Sarua, Gunduria           26         LM-26         UBK         8 x 7.3 x 97         Sarudala, Ankurbasa           27         LM-27         UBK         8.5 x 8.0 x 87         Champachua, Bhanjabasa, Balidar           28         LM-29         UBK         7.3 x 6.6 x 110         Bhanjabasa, Nekedakacha F.P.           30         LM-31         UBK         7.1 x 6.3 x 76         Nekedanacha           31         LM-32         UBK         7	17	LM-17	•	7.4 x 6.2 x 80	Silda, Pokharidanda
Division	10	IM 10		0.0 0.0 0.4	TZ '1'1 A.11 1 1'
19         LM-19         Karanjia Division         8.2 x 8.2 x 77         Domniguda, Khejuri           20         LM-20         Karanjia Division         7.5 x 6.5 x 90         Champaghati, Domniguda Division           21         LM-21         Baripada Division         7.3 x 6.2 x 106         Balhada, Dhudruchampa           22         LM-22         Baripada Division         7.5 x 7.3 x 88         Ghagra, Kenduchua           23         LM-23         Baripada Division         7.0 x 7.0 x         Chakidi, Badudijharan           24         LM-24         Baripada Division         7.0 x 7.0 x         Chakidi, Badudijharan           25         LM-25         UBK         6.8 x 7.0 x 85         Sarua, Gunduria           26         LM-26         UBK         8.5 x 8.0 x 87         Sarudala, Ankurbasa           27         LM-27         UBK         8.5 x 8.0 x 87         Sarudala, Ankurbasa           28         LM-29         UBK         7.3 x 6.6 x 110         Bhanjabasa, Balidar           29         LM-30         UBK         7.1 x 6.3 x 76         Nekedanacha           31         LM-31         UBK         7.1 x 6.3 x 76         Nekedanacha           31         LM-32         UBK         7.0 x 6.6 x 108         Bhanjabasa, Nekedakacha <td>18</td> <td>LM-18</td> <td>· ·</td> <td>9.0 x 8.8 x 94</td> <td>Kuanribii, Athnaradeuli</td>	18	LM-18	· ·	9.0 x 8.8 x 94	Kuanribii, Athnaradeuli
Division	10	T.M. 10	+	0.2 0.2 77	D : 1 III : :
20         LM-20         Karanjia Division         7.5 x 6.5 x 90         Champaghati, Domniguda           21         LM-21         Baripada Division         7.3 x 6.2 x 106         Balhada, Dhudruchampa           22         LM-22         Baripada Division         7.5 x 7.3 x 88         Ghagra, Kenduchua           23         LM-23         Baripada Division         7.0 x 7.0 x         Chakidi, Badudijharan           24         LM-24         Baripada Division         7.0 x 7.0 x         Chakidi, Badudijharan           25         LM-25         UBK         6.8 x 7.0 x 85         Sarua, Gunduria           26         LM-26         UBK         8 x 7.3 x 97         Sarudala, Ankurbasa           27         LM-27         UBK         8.5 x 8.0 x 87         Champachua, Bhanjabasa, Balidar           28         LM-29         UBK         7.3 x 6.6 x 110         Bhanjabasa, Nekedakacha F.P.           30         LM-31         UBK         7.1 x 6.3 x 76         Nekedanacha           31         LM-32         UBK         7.0 x 6.6 x 108         Bhanjabasa, Nekedakacha           32         LM-34         UBK         7.0 x 6.8 x 110         Mituani, Ghaighat           33         LM-36         UBK         7.2 x 6.7 x 92         Pokharibadi	19	LM-19	•	8.2 X 8.2 X //	Domniguda, Knejuri
Division   21	20	1 1 4 20	+	7.5 (5 00	
21         LM-21         Baripada Division         7.3 x 6.2 x 106         Balhada, Dhudruchampa           22         LM-22         Baripada Division         7.5 x 7.3 x 88         Ghagra, Kenduchua           23         LM-23         Baripada Division         7.7 x 7.9 x 83         -do-           24         LM-24         Baripada Division         7.0 x 7.0 x         Chakidi, Badudijharan           25         LM-25         UBK         6.8 x 7.0 x 85         Sarua, Gunduria           26         LM-26         UBK         8 x 7.3 x 97         Sarudala, Ankurbasa           27         LM-27         UBK         8.5 x 8.0 x 87         Champachua, Bhanjabasa, Balidar           28         LM-29         UBK         7.3 x 6.6 x 110         Bhanjabasa           29         LM-30         UBK         8.4 x 7.3 x 82         Bhanjabasa, Nekedakacha F.P.           30         LM-31         UBK         7.1 x 6.3 x 76         Nekedanacha           31         LM-32         UBK         7.0 x 6.6 x 108         Bhanjabasa, Nekedakacha           32         LM-34         UBK         7.2 x 6.7 x 92         Pokharibadi           33         LM-36         UBK         7.2 x 6.7 x 92         Pokharibadi           34 <t< td=""><td>20</td><td>LM-20</td><td>•</td><td>7.5 x 6.5 x 90</td><td>Champagnati, Domniguda</td></t<>	20	LM-20	•	7.5 x 6.5 x 90	Champagnati, Domniguda
Division   22	21	T N / O1		7.2 (2 10(	
22         LM-22         Baripada Division         7.5 x 7.3 x 88         Ghagra, Kenduchua           23         LM-23         Baripada Division         7.7 x 7.9 x 83         -do-           24         LM-24         Baripada Division         7.0 x 7.0 x         Chakidi, Badudijharan           25         LM-25         UBK         6.8 x 7.0 x 85         Sarua, Gunduria           26         LM-26         UBK         8 x 7.3 x 97         Sarudala, Ankurbasa           27         LM-27         UBK         8.5 x 8.0 x 87         Champachua, Bhanjabasa, Balidar           28         LM-29         UBK         7.3 x 6.6 x 110         Bhanjabasa, Nekedakacha F.P.           30         LM-30         UBK         7.1 x 6.3 x 76         Nekedanacha           31         LM-31         UBK         7.0 x 6.6 x 108         Bhanjabasa, Nekedakacha           32         LM-34         UBK         7.0 x 6.8 x 110         Mituani, Ghaighat           33         LM-36         UBK         7.2 x 6.7 x 92         Pokharibadi           34         LM-37         UBK         8.6 x 8.6 x         Tiktali           35         LM-38         UBK         8.8 x 8.5 x 102         Meghasini           36         LM-39	21	LMI-21	*	7.3 X 6.2 X 106	Bainada, Dhudruchampa
Division   23	22	1 1 4 22		75 72 00	
23         LM-23         Baripada Division         7.7 x 7.9 x 83         -do-           24         LM-24         Baripada Division         7.0 x 7.0 x         Chakidi, Badudijharan           25         LM-25         UBK         6.8 x 7.0 x 85         Sarua, Gunduria           26         LM-26         UBK         8 x 7.3 x 97         Sarudala, Ankurbasa           27         LM-27         UBK         8.5 x 8.0 x 87         Champachua, Bhanjabasa, Balidar           28         LM-29         UBK         7.3 x 6.6 x 110         Bhanjabasa, Nekedakacha F.P.           30         LM-30         UBK         8.4 x 7.3 x 82         Bhanjabasa, Nekedakacha F.P.           30         LM-31         UBK         7.1 x 6.3 x 76         Nekedanacha           31         LM-32         UBK         7.0 x 6.6 x 108         Bhanjabasa, Nekedakacha           32         LM-34         UBK         7.0 x 6.6 x 108         Bhanjabasa, Nekedakacha           33         LM-36         UBK         7.2 x 6.7 x 92         Pokharibadi           34         LM-37         UBK         8.6 x 8.6 x         Tiktali           35         LM-38         UBK         8.8 x 8.5 x 102         Meghasini           36         LM-39         <	22	LM-22	*	7.5 x 7.3 x 88	Ghagra, Kenduchua
Division   24	22	1 1 4 22	+	77 70 02	1
24         LM-24         Baripada Division         7.0 x 7.0 x         Chakidi, Badudijharan           25         LM-25         UBK         6.8 x 7.0 x 85         Sarua, Gunduria           26         LM-26         UBK         8 x 7.3 x 97         Sarudala, Ankurbasa           27         LM-27         UBK         8.5 x 8.0 x 87         Champachua, Bhanjabasa, Balidar           28         LM-29         UBK         7.3 x 6.6 x 110         Bhanjabasa, Nekedakacha F.P.           30         LM-31         UBK         7.1 x 6.3 x 76         Nekedanacha           31         LM-32         UBK         7.0 x 6.6 x 108         Bhanjabasa, Nekedakacha           32         LM-34         UBK         7.0 x 6.8 x 110         Mituani, Ghaighat           33         LM-36         UBK         7.2 x 6.7 x 92         Pokharibadi           34         LM-37         UBK         8.6 x 8.6 x         Tiktali           35         LM-38         UBK         8.8 x 8.5 x 102         Meghasini           36         LM-39         UBK         9.0 x 8.4 x         Khairiburu           37         LM-40         UBK         7.0 x 6.0 x 81         Nekedabacha           38         LM-42         UBK         8.0 x 7.4x	23	LM-23	*	1.1 x 1.9 x 83	-do-
Division   25	2.4	T N C O 4		7.0 7.0	CL 1:1: D 1 1:1
25         LM-25         UBK         6.8 x 7.0 x 85         Sarua, Gunduria           26         LM-26         UBK         8 x 7.3 x 97         Sarudala, Ankurbasa           27         LM-27         UBK         8.5 x 8.0 x 87         Champachua, Bhanjabasa, Balidar           28         LM-29         UBK         7.3 x 6.6 x 110         Bhanjabasa           29         LM-30         UBK         8.4 x 7.3 x 82         Bhanjabasa, Nekedakacha F.P.           30         LM-31         UBK         7.1 x 6.3 x 76         Nekedanacha           31         LM-32         UBK         7.0 x 6.6 x 108         Bhanjabasa, Nekedakacha           32         LM-34         UBK         7.0 x 6.6 x 108         Bhanjabasa, Nekedakacha           32         LM-34         UBK         7.0 x 6.8 x 110         Mituani, Ghaighat           33         LM-36         UBK         7.2 x 6.7 x 92         Pokharibadi           34         LM-37         UBK         8.6 x 8.6 x         Tiktali           35         LM-38         UBK         8.8 x 8.5 x 102         Meghasini           36         LM-39         UBK         9.0 x 8.4 x         Khairiburu           37         LM-40         UBK         8.0 x 7.4x 82	24	LM-24	*	/.0 x /.0 x	Chakidi, Badudijharan
26         LM-26         UBK         8 x 7.3 x 97         Sarudala, Ankurbasa           27         LM-27         UBK         8.5 x 8.0 x 87         Champachua, Bhanjabasa, Balidar           28         LM-29         UBK         7.3 x 6.6 x 110         Bhanjabasa           29         LM-30         UBK         8.4 x 7.3 x 82         Bhanjabasa, Nekedakacha F.P.           30         LM-31         UBK         7.1 x 6.3 x 76         Nekedanacha           31         LM-32         UBK         7.0 x 6.6 x 108         Bhanjabasa, Nekedakacha           32         LM-34         UBK         7.0 x 6.8 x 110         Mituani, Ghaighat           33         LM-34         UBK         7.2 x 6.7 x 92         Pokharibadi           34         LM-37         UBK         8.6 x 8.6 x         Tiktali           35         LM-38         UBK         8.8 x 8.5 x 102         Meghasini           36         LM-39         UBK         9.0 x 8.4 x         Khairiburu           37         LM-40         UBK         7.0 x 6.0 x 81         Nekedabacha           38         LM-42         UBK         8.5 x 7.0 x 7.2         Bhanjabasa           40         LM-44         UBK         7.4 x 7.0x75         Putuli	25	T N 4 O 7	+	60 70 05	
27         LM-27         UBK         8.5 x 8.0 x 87         Champachua, Balidar           28         LM-29         UBK         7.3 x 6.6 x 110         Bhanjabasa           29         LM-30         UBK         8.4 x 7.3 x 82         Bhanjabasa, Nekedakacha F.P.           30         LM-31         UBK         7.1 x 6.3 x 76         Nekedanacha           31         LM-32         UBK         7.0 x 6.6 x 108         Bhanjabasa, Nekedakacha           32         LM-34         UBK         7.0 x 6.8 x 110         Mituani, Ghaighat           33         LM-36         UBK         7.2 x 6.7 x 92         Pokharibadi           34         LM-37         UBK         8.6 x 8.6 x         Tiktali           35         LM-38         UBK         8.8 x 8.5 x 102         Meghasini           36         LM-39         UBK         9.0 x 8.4 x         Khairiburu           37         LM-40         UBK         7.0 x 6.0 x 81         Nekedabacha           38         LM-42         UBK         8.0 x 7.4x 82         Bhanjabasa           40         LM-43         UBK         8.5 x 7.0 x 7.2         Bhanjabasa           40         LM-44         UBK         7.4 x 7.0x75         Putulidiha Kadalibadi			+		,
28         LM-29         UBK         7.3 x 6.6 x 110         Bhanjabasa           29         LM-30         UBK         8.4 x 7.3 x 82         Bhanjabasa, Nekedakacha F.P.           30         LM-31         UBK         7.1 x 6.3 x 76         Nekedanacha           31         LM-32         UBK         7.0 x 6.6 x 108         Bhanjabasa, Nekedakacha           32         LM-34         UBK         7.0 x 6.8 x 110         Mituani, Ghaighat           33         LM-36         UBK         7.2 x 6.7 x 92         Pokharibadi           34         LM-37         UBK         8.6 x 8.6 x         Tiktali           35         LM-38         UBK         8.8 x 8.5 x 102         Meghasini           36         LM-39         UBK         9.0 x 8.4 x         Khairiburu           37         LM-40         UBK         7.0 x 6.0 x 81         Nekedabacha           38         LM-42         UBK         8.0 x 7.4x 82         Bhanjabasa           40         LM-44         UBK         8.5 x 7.0 x 7.2         Bhanjabasa           40         LM-44         UBK         7.4 x 7.0x75         Putulidiha Kadalibadi           41         LM-45         UBK         6.6 x 5.8 x 86         Gunduria			+		
28         LM-29         UBK         7.3 x 6.6 x 110         Bhanjabasa           29         LM-30         UBK         8.4 x 7.3 x 82         Bhanjabasa, Nekedakacha F.P.           30         LM-31         UBK         7.1 x 6.3 x 76         Nekedanacha           31         LM-32         UBK         7.0 x 6.6 x 108         Bhanjabasa, Nekedakacha           32         LM-34         UBK         7.0 x 6.8 x 110         Mituani, Ghaighat           33         LM-36         UBK         7.2 x 6.7 x 92         Pokharibadi           34         LM-37         UBK         8.6 x 8.6 x         Tiktali           35         LM-38         UBK         8.8 x 8.5 x 102         Meghasini           36         LM-39         UBK         9.0 x 8.4 x         Khairiburu           37         LM-40         UBK         7.0 x 6.0 x 81         Nekedabacha           38         LM-42         UBK         8.0 x 7.4x 82         Bhanjabasa         Nekadakacha           39         LM-43         UBK         8.5 x 7.0 x 7.2         Bhanjabasa           40         LM-44         UBK         7.4 x 7.0x75         Putulidiha Kadalibadi           41         LM-45         UBK         6.6 x 5.8 x 86	27	LM-27	UBK	8.5 x 8.0 x 87	1
29         LM-30         UBK         8.4 x 7.3 x 82         Bhanjabasa, Nekedakacha F.P.           30         LM-31         UBK         7.1 x 6.3 x 76         Nekedanacha           31         LM-32         UBK         7.0 x 6.6 x 108         Bhanjabasa, Nekedakacha           32         LM-34         UBK         7.0 x 6.8 x 110         Mituani, Ghaighat           33         LM-36         UBK         7.2 x 6.7 x 92         Pokharibadi           34         LM-37         UBK         8.6 x 8.6 x         Tiktali           35         LM-38         UBK         8.8 x 8.5 x 102         Meghasini           36         LM-39         UBK         9.0 x 8.4 x         Khairiburu           37         LM-40         UBK         7.0 x 6.0 x 81         Nekedabacha           38         LM-42         UBK         8.0 x 7.4x 82         Bhanjabasa Nekadakacha           39         LM-43         UBK         8.5 x 7.0 x 7.2         Bhanjabasa           40         LM-44         UBK         7.4 x 7.0x75         Putulidiha Kadalibadi           41         LM-45         UBK         6.6 x 5.8 x 86         Gunduria           42         LM-46         UBK         7.4 x 6.5 x 78         Tarinibilla <td>20</td> <td>I M 20</td> <td>LIDIZ</td> <td>7.2 ( ( 110</td> <td></td>	20	I M 20	LIDIZ	7.2 ( ( 110	
30         LM-31         UBK         7.1 x 6.3 x 76         Nekedanacha           31         LM-32         UBK         7.0 x 6.6 x 108         Bhanjabasa, Nekedakacha           32         LM-34         UBK         7.0 x 6.8 x 110         Mituani, Ghaighat           33         LM-36         UBK         7.2 x 6.7 x 92         Pokharibadi           34         LM-37         UBK         8.6 x 8.6 x         Tiktali           35         LM-38         UBK         8.8 x 8.5 x 102         Meghasini           36         LM-39         UBK         9.0 x 8.4 x         Khairiburu           37         LM-40         UBK         7.0 x 6.0 x 81         Nekedabacha           38         LM-42         UBK         8.0 x 7.4x 82         Bhanjabasa Nekadakacha           39         LM-43         UBK         8.5 x 7.0 x 7.2         Bhanjabasa           40         LM-44         UBK         7.4 x 7.0x75         Putulidiha Kadalibadi           41         LM-45         UBK         6.6 x 5.8 x 86         Gunduria           42         LM-46         UBK         7.4 x 6.5 x 78         Tarinibilla           43         LM-47         UBK         8.8 x 7.9 x 96         Mandadar. Kiabasa					3
31         LM-32         UBK         7.0 x 6.6 x 108         Bhanjabasa, Nekedakacha           32         LM-34         UBK         7.0 x 6.8 x 110         Mituani, Ghaighat           33         LM-36         UBK         7.2 x 6.7 x 92         Pokharibadi           34         LM-37         UBK         8.6 x 8.6 x         Tiktali           35         LM-38         UBK         8.8 x 8.5 x 102         Meghasini           36         LM-39         UBK         9.0 x 8.4 x         Khairiburu           37         LM-40         UBK         7.0 x 6.0 x 81         Nekedabacha           38         LM-42         UBK         8.0 x 7.4x 82         Bhanjabasa Nekadakacha           39         LM-43         UBK         8.5 x 7.0 x 7.2         Bhanjabasa           40         LM-44         UBK         7.4 x 7.0x75         Putulidiha Kadalibadi           41         LM-45         UBK         6.6 x 5.8 x 86         Gunduria           42         LM-46         UBK         7.4 x 6.5 x 78         Tarinibilla           43         LM-47         UBK         8.8 x 7.9 x 96         Mandadar. Kiabasa           44         LM-48         UBK         7.5 x 6.6 x 81         Kalianala. Telinalla					5
32         LM-34         UBK         7.0 x 6.8 x 110         Mituani, Ghaighat           33         LM-36         UBK         7.2 x 6.7 x 92         Pokharibadi           34         LM-37         UBK         8.6 x 8.6 x         Tiktali           35         LM-38         UBK         8.8 x 8.5 x 102         Meghasini           36         LM-39         UBK         9.0 x 8.4 x         Khairiburu           37         LM-40         UBK         7.0 x 6.0 x 81         Nekedabacha           38         LM-42         UBK         8.0 x 7.4x 82         Bhanjabasa Nekadakacha           39         LM-43         UBK         8.5 x 7.0 x 7.2         Bhanjabasa           40         LM-44         UBK         7.4 x 7.0x75         Putulidiha Kadalibadi           41         LM-45         UBK         6.6 x 5.8 x 86         Gunduria           42         LM-46         UBK         7.4 x 6.5 x 78         Tarinibilla           43         LM-47         UBK         8.8 x 7.9 x 96         Mandadar. Kiabasa           44         LM-48         UBK         7.5 x 6.6 x 81         Kalianala. Telinalla					
33         LM-36         UBK         7.2 x 6.7 x 92         Pokharibadi           34         LM-37         UBK         8.6 x 8.6 x         Tiktali           35         LM-38         UBK         8.8 x 8.5 x 102         Meghasini           36         LM-39         UBK         9.0 x 8.4 x         Khairiburu           37         LM-40         UBK         7.0 x 6.0 x 81         Nekedabacha           38         LM-42         UBK         8.0 x 7.4x 82         Bhanjabasa Nekadakacha           39         LM-43         UBK         8.5 x 7.0 x 7.2         Bhanjabasa           40         LM-44         UBK         7.4 x 7.0x75         Putulidiha Kadalibadi           41         LM-45         UBK         6.6 x 5.8 x 86         Gunduria           42         LM-46         UBK         7.4 x 6.5 x 78         Tarinibilla           43         LM-47         UBK         8.8 x 7.9 x 96         Mandadar. Kiabasa           44         LM-48         UBK         7.5 x 7.4 x 97         UBK-Mandadar           45         LM-49         Balasore         7.5 x 6.6 x 81         Kalianala. Telinalla					· ·
34         LM-37         UBK         8.6 x 8.6 x         Tiktali           35         LM-38         UBK         8.8 x 8.5 x 102         Meghasini           36         LM-39         UBK         9.0 x 8.4 x         Khairiburu           37         LM-40         UBK         7.0 x 6.0 x 81         Nekedabacha           38         LM-42         UBK         8.0 x 7.4x 82         Bhanjabasa Nekadakacha           39         LM-43         UBK         8.5 x 7.0 x 7.2         Bhanjabasa           40         LM-44         UBK         7.4 x 7.0x75         Putulidiha Kadalibadi           41         LM-45         UBK         6.6 x 5.8 x 86         Gunduria           42         LM-46         UBK         7.4 x 6.5 x 78         Tarinibilla           43         LM-47         UBK         8.8 x 7.9 x 96         Mandadar. Kiabasa           44         LM-48         UBK         7.5 x 7.4 x 97         UBK-Mandadar           45         LM-49         Balasore         7.5 x 6.6 x 81         Kalianala. Telinalla					Š
35         LM-38         UBK         8.8 x 8.5 x 102         Meghasini           36         LM-39         UBK         9.0 x 8.4 x         Khairiburu           37         LM-40         UBK         7.0 x 6.0 x 81         Nekedabacha           38         LM-42         UBK         8.0 x 7.4x 82         Bhanjabasa Nekadakacha           39         LM-43         UBK         8.5 x 7.0 x 7.2         Bhanjabasa           40         LM-44         UBK         7.4 x 7.0x75         Putulidiha Kadalibadi           41         LM-45         UBK         6.6 x 5.8 x 86         Gunduria           42         LM-46         UBK         7.4 x 6.5 x 78         Tarinibilla           43         LM-47         UBK         8.8 x 7.9 x 96         Mandadar. Kiabasa           44         LM-48         UBK         7.5 x 7.4 x 97         UBK-Mandadar           45         LM-49         Balasore         7.5 x 6.6 x 81         Kalianala. Telinalla					
36         LM-39         UBK         9.0 x 8.4 x         Khairiburu           37         LM-40         UBK         7.0 x 6.0 x 81         Nekedabacha           38         LM-42         UBK         8.0 x 7.4x 82         Bhanjabasa Nekadakacha           39         LM-43         UBK         8.5 x 7.0 x 7.2         Bhanjabasa           40         LM-44         UBK         7.4 x 7.0x75         Putulidiha Kadalibadi           41         LM-45         UBK         6.6 x 5.8 x 86         Gunduria           42         LM-46         UBK         7.4 x 6.5 x 78         Tarinibilla           43         LM-47         UBK         8.8 x 7.9 x 96         Mandadar. Kiabasa           44         LM-48         UBK         7.5 x 7.4 x 97         UBK-Mandadar           45         LM-49         Balasore         7.5 x 6.6 x 81         Kalianala. Telinalla					
37         LM-40         UBK         7.0 x 6.0 x 81         Nekedabacha           38         LM-42         UBK         8.0 x 7.4x 82         Bhanjabasa Nekadakacha           39         LM-43         UBK         8.5 x 7.0 x 7.2         Bhanjabasa           40         LM-44         UBK         7.4 x 7.0x75         Putulidiha Kadalibadi           41         LM-45         UBK         6.6 x 5.8 x 86         Gunduria           42         LM-46         UBK         7.4 x 6.5 x 78         Tarinibilla           43         LM-47         UBK         8.8 x 7.9 x 96         Mandadar. Kiabasa           44         LM-48         UBK         7.5 x 7.4 x 97         UBK-Mandadar           45         LM-49         Balasore         7.5 x 6.6 x 81         Kalianala. Telinalla					
38         LM-42         UBK         8.0 x 7.4x 82         Bhanjabasa Nekadakacha           39         LM-43         UBK         8.5 x 7.0 x 7.2         Bhanjabasa           40         LM-44         UBK         7.4 x 7.0x75         Putulidiha Kadalibadi           41         LM-45         UBK         6.6 x 5.8 x 86         Gunduria           42         LM-46         UBK         7.4 x 6.5 x 78         Tarinibilla           43         LM-47         UBK         8.8 x 7.9 x 96         Mandadar. Kiabasa           44         LM-48         UBK         7.5 x 7.4 x 97         UBK-Mandadar           45         LM-49         Balasore         7.5 x 6.6 x 81         Kalianala. Telinalla					
39         LM-43         UBK         8.5 x 7.0 x 7.2         Bhanjabasa           40         LM-44         UBK         7.4 x 7.0x75         Putulidiha Kadalibadi           41         LM-45         UBK         6.6 x 5.8 x 86         Gunduria           42         LM-46         UBK         7.4 x 6.5 x 78         Tarinibilla           43         LM-47         UBK         8.8 x 7.9 x 96         Mandadar. Kiabasa           44         LM-48         UBK         7.5 x 7.4 x 97         UBK-Mandadar           45         LM-49         Balasore         7.5 x 6.6 x 81         Kalianala. Telinalla					
40         LM-44         UBK         7.4 x 7.0x75         Putulidiha Kadalibadi           41         LM-45         UBK         6.6 x 5.8 x 86         Gunduria           42         LM-46         UBK         7.4 x 6.5 x 78         Tarinibilla           43         LM-47         UBK         8.8 x 7.9 x 96         Mandadar. Kiabasa           44         LM-48         UBK         7.5 x 7.4 x 97         UBK-Mandadar           45         LM-49         Balasore         7.5 x 6.6 x 81         Kalianala. Telinalla					ž
41       LM-45       UBK       6.6 x 5.8 x 86       Gunduria         42       LM-46       UBK       7.4 x 6.5 x 78       Tarinibilla         43       LM-47       UBK       8.8 x 7.9 x 96       Mandadar. Kiabasa         44       LM-48       UBK       7.5 x 7.4 x 97       UBK-Mandadar         45       LM-49       Balasore       7.5 x 6.6 x 81       Kalianala. Telinalla	39	LM-43	UBK	8.5 x 7.0 x 7.2	
42       LM-46       UBK       7.4 x 6.5 x 78       Tarinibilla         43       LM-47       UBK       8.8 x 7.9 x 96       Mandadar. Kiabasa         44       LM-48       UBK       7.5 x 7.4 x 97       UBK-Mandadar         45       LM-49       Balasore       7.5 x 6.6 x 81       Kalianala. Telinalla		<b>+</b>	UBK	7.4 x 7.0x75	Putulidiha Kadalibadi
43         LM-47         UBK         8.8 x 7.9 x 96         Mandadar. Kiabasa           44         LM-48         UBK         7.5 x 7.4 x 97         UBK-Mandadar           45         LM-49         Balasore         7.5 x 6.6 x 81         Kalianala. Telinalla	41	LM-45	UBK	6.6 x 5.8 x 86	
44         LM-48         UBK         7.5 x 7.4 x 97         UBK-Mandadar           45         LM-49         Balasore         7.5 x 6.6 x 81         Kalianala. Telinalla	42	LM-46	UBK	7.4 x 6.5 x 78	Tarinibilla
45 LM-49 Balasore 7.5 x 6.6 x 81 Kalianala. Telinalla	43	LM-47	UBK	8.8 x 7.9 x 96	Mandadar. Kiabasa
	44	LM-48	UBK	$7.5 \times 7.4 \times 97$	UBK-Mandadar
(WL)Divn.	45	LM-49	Balasore	$7.5 \times 6.6 \times 81$	Kalianala. Telinalla
			(WL)Divn.		

Leopard-2004(Female)

Sl. No.	Animal No.	Beat/Range	Pug L x B x S	Movement Area
1	LF-1	Pithabata	7.1 x 5.8 x 68	Muraripahada, Jamrikhal,Sabarabasa, Badamakabadi, Kukudakhumpi
2	LF-2	Pithabata	7.6 x 6.6 x 90	Baunsakhal, Bhajami, Hatibi
3	LF-3	Pithabata	9.2x 7.3 x 97	Hatitop,Baunsakhal,Bhajam,Ka chudahan

4	LF-4	Pithabata	6.8 x 6.4 x 76	Kachudahan, Badamakabadi
5	LF-5	Pithabata	8.0 x 6.2 x 61	Munibasa,Rakhyasamara.
6	LF-6	Pithabata	6.9 x 5.8 x 70	Rakhyasamara. Bhajam.
7	LF-7	Nawana (S)	9.5 x 8.0 x 119	Kaniabasa, Dhudruchampa,
8	LF-8	Nawana (S)	7.3 x 6.5 x 75	Badamakabadi, Lengedakacha.
9	LF-9	Nawana (N)	8.4 x 7.0 x 90	Pandabandha, Khupipahad.
10	LF-10	Nawana (N)	8.3 x 6.3 x 97	Bhajam, Khadkei.
11	LF-11	Nawana (N)	8.5 x 7.0 x 108	Khadkei, Nigirdha
12	LF-12	Nawana (N)	8.2 x 6.9 x 84	Kusumbani, Joronda.
13	LF-13	Nawana (N)	8.2 x 7.2 x 108	Badudijharan,Kusumbani
14	LF-14	National Park	8.3 x 5.5 x 87	Cheruanali, Chherabil
15	LF-15	National Park	8.3 x 7.2	Pokhridanda, Doliguda.
16	LF-16	National Park	9.2 x 8.0	Nageswar, Kacha, Edelkacha
17	LF-17	National Park	8.4 x 8.2 x 87	Kalkam, Nimiachhaka, Nimiada
				nda
18	LF-18	National Park	7.0x 6.4 x 69	Sarudala, Ganapati
19	LF-19	Jenabil	8.2 x 7.2 x 88	Khejuri
20	LF-20	Jenabil	7.8 x 6.6 x 86	Sendhakila,Hatisal,Jogidiha
21	LF-21	Chahala	6.6 x 6.1 x 46	Gomiabhanda ,Bhatunia
22	LF-22	Chahala	8.0 x 7.0 x 45	Fall View, Matighati
23	LF-23	Chahala	8.2 x 6.9 x 98	Kusumtota,Bhatunia
24	LF-24	Chahala	8.7 x 8.1 x 99	Karkachia,Bhatunia,
			(Front)	
25	LF-25	Chahala	9.0 x 7.3 x 96	Haldia, NoEntry
26	LF-26	Chahala	8.1 x 7.8 x 92	Karkachia, Talbandha
			(Front)	
27	LF-27	Chahala	7.7 x 7.0 x 74	Brundaban, Chahala
28	LF-28	Chahala	8.4 x 7.7 x 92	Brundaban, Jaunribasa
29	LF-29	RRPR Div	7.6 x 5.7 x 92	-do-
30	LF-30	RRPR Div	7.7 x 7.7 x 86	Haladia, Bandirabasa
31	LF-31	KaranjiaDivn	8.4 x 7.3 x 110	Rasliguda, Tamkhila,
				Kalikaprasad,
32	LF-32	KaranjiaDivn	9.5 x 7.8	Kendupachanala
33	LF-33	Karanjia	8.1 x 6.1 x 110	Ramjodi, Kiajhari,
		Divn.		Sarudala, Devastali
34	LF-34	Baripada	7.9 x 7.3 x 94	Champachua, Kenduchua
		Divn.		
35	LF-35	Baripada	7.3 x 6.2 x 94	Balma, Deokund
		Divn.		
36	LF-36	Baripada	8.2 x 7.2 x 77	Dangadiha, Dhobighatt
2-	17.07	Divn.		
37	LF-37	Baripada	8.0 x 8.6 x 94	Champachua , Bangikusum
20	1.00	Divn.	0.1.70.05	
38	LF-38	Baripada	8.1 x 7.3 x 96	Champachua Balidar
		Divn.		

## Division wiseCensus Figures of Royal Bengal Tiger from 1998 to 2004 in Similipal Tiger Reserve, (Based on Pugmark impression census method)

#### **Buffer and Core Area:**

Year	Division	Male	Female	Cub	Total
1998	Karanjia (	0	0	0	0
	Baripada	0	0	0	0
	STR(Core)	26	48	24	98
	<b>Grand Total</b>	26	48	24	98
1999	Karanjia (	0	0	0	0
	Baripada (	0	0	0	0
	STR(Core)	28	44	26	98
	<b>Grand Total</b>	28	44	26	98
2000	Karanjia (	0	0	0	0
	Baripada (	1	1	0	2
	STR(Core)	29	39	29	97
	<b>Grand Total</b>	30	40	29	99
2002	Karanjia (	1	1 Kuanribil –	0	2
	Buffer)	Gurguria/Andharjodi	Gurguria		
	Baripada (	2	0	0	2
	Buffer)	(Balidara of Kaptipada)			
		(Maniabasa of Udala),			
	STR(Core)	29	43	27	99
	<b>Grand Total</b>	30	43	27	101
2004	Karanjia (	1	1 (Kusumi,	0	2
	Buffer)	(Rangamatia, Kandadhe	Domini guda)		
	Baripada (	0	0	2	2
	Buffer)			(Kaniabasa,	
	·			Patelbasa)	
	Rairangpur	0	1	2 Mankada	3
	(Buffer)		(Talabandha)	ghati and	
				Dairabhanda	
	STR(Core)	27	39	28	94
	<b>Grand Total</b>	28	41	32	101

#### Census Figures of Leopards in Similipal Tiger Reserve from 1998 to 2004, (Based on **Pugmark impression census method)**

Year	Division	Male	Female	Unknown	Cub	Total
1998	Karanjia (Buffer)	2	7	0	1	10
	Baripada ( Buffer)	7	9	1	5	22
	STR(Core)	39	49	0	26	114
	Grand Total	48	65	1	32	146
1999	Karanjia (Buffer)	0	0	0	0	0
	Baripada ( Buffer)	0	0	0	0	0
	STR(Core)	32	59	0	24	115
	<b>Grand Total</b>	32	59	0	24	115
2000	Karanjia ( Buffer)	2	2	0	0	4

	Baripada (Buffer)	10	11	0	1	22
	STR(Core)	27	65	0	17	119
	<b>Grand Total</b>	39	78	0	18	145
2002	Karanjia (Buffer)	1	27         65         0         17           39         78         0         18           1         1         0         0           8         7         0         5           44         62         0         20           53         70         0         25           4         3         0         1           4         9         0         0	2		
	Baripada ( Buffer)	8	7	0	5	20
	STR(Core)	44	62	0	20	126
	<b>Grand Total</b>	53	70	0	25	148
2004	Karanjia (Buffer)	4	3	0	1	8
	Baripada ( Buffer)	4	9	0	0	13
	Rairangpur (Buffer)	4	2	0	0	6
	STR(Core)	32	50	0	18	100
	Grand Total	44	64	0	19	127

#### ANNEXURE XXXIX

## 2001 POPULATION CENSUS OF SANCTUARY VILLAGES

Sl.	Name of Village	Name of Block	Name of GP	Pop	Population		
No.				SC		Other s	Total
1	ASANBANI	JASHIPUR	BAREHIPANI	19	240	0	259
2	BAD-KASIRA	JASHIPUR	GURGUDIA	0	222	8	230
3	BAD-USKI	JASHIPUR	BAREHIPANI	0	232	9	241
4	BARIGAON	JASHIPUR	GURGUDIA	0	150	32	182
5	BHRADRACHUA	JASHIPUR	GURGUDIA	0	90	0	90
6	BILAPAKA	JASHIPUR	GURGUDIA	4	257	6	267
7	CHANDIKHAMAN	JASHIPUR	GURGUDIA	0	156	2	158
8	GUDGUDIA	JASHIPUR	GUDGUDIA	9	374	143	526
9	KHEDIADUNGURI	JASHIPUR	GURGUDIA	0	110	0	110
10	KHEJURIA	JASHIPUR	GURGUDIA	0	366	52	418
11	KOLHA	JASHIPUR	BAREHIPANI	0	220	7	227
12	KUNDABIL	JASHIPUR	GURGUDIA	0	342	30	372
	KUANRIBIL	JASHIPUR	GURGUDIA	0	344	2	346
	KUMARI(KUMBHARI						
14	)	JASHIPUR	GURGUDIA	1	254	38	293
	KUSUMI	JASHIPUR	GURGUDIA	10	112	109	231
	NENJAGHOSRA						
16	(Netraghosra)	JASHIPUR	GURGUDIA	0	84	1	85
	NUNIAGUDA	JASHIPUR	BAREHIPANI	0	182	0	182
	RAUTOLA	JASHIPUR	BAREHIPANI	0	246	13	259
	SANKASIRA	JASHIPUR	GURGUDIA	0	184	0	184
	SAN-USKI	JASHIPUR	BAREHIPANI	0	233	0	233
	SAHARPAT	JASHIPUR	GURGUDIA	1	236	61	298
	ASTAKUMAR	JASHIPUR	ASTAKUMAR	0	351	94	445
	BALARAMPUR	JASHIPUR	ASTAKUMAR	0	318	6	324
	BANDRIBASA	JASHIPUR	BAREHIPANI	0	240	0	240
25	BARHEIPANI	JASHIPUR	BAREHIPANI	0	445	28	473
	BARSIA	JASHIPUR	BAREHIPANI	0	399	4	403
27	BUDHABALANGA	JASHIPUR	ASTAKUMAR	0	249	0	249
28	CHAKUNDAKOCHA	JASHIPUR	BAREHIPANI	0	29	0	29
29	GARH-SIMILIPAL	JASHIPUR	ASTAKUMAR	0	333	84	417
30	GOPINATHPUR	JASHIPUR	ASTAKUMAR	0	217	0	217
31	HALADIA	JASHIPUR	BAREHIPANI	0	132	0	132
32	JADADIHI	JASHIPUR	BAREHIPANI	0	126	0	126
33	KIAJHARI	JASHIPUR	EKTALI	0	154	31	185
34	KUKURBHUKA	JASHIPUR	ASTAKUMAR	0	300	0	300
35	KOLAJHARI	JASHIPUR	BAREHIPANI	0	78	0	78
36	LEMBUJHARAN	JASHIPUR	ASTAKUMAR	0	123	0	123
37	MAKABADI	JASHIPUR	ASTAKUMAR	0	228	13	241
38	NAWANA	JASHIPUR	ASTAKUMAR	0	292	13	305

39	NIKHIRDA	JASHIPUR	ASTAKUMAR	0	58	2	60
40	PHULBARI	JASHIPUR	BAREHIPANI	0	80	0	80
41	RAJPAL	JASHIPUR	PODAGARH	0	148	0	148
42	SARUDA	JASHIPUR	ASTAKUANR	0	139	0	139
			BRAHMAN				
43	CHARBANDHA	BANGIRIPOSI	GAON	0	449	0	449
			BRAHMAN				
44	DANTIAKOCHA	BANGIRIPOSI	GAON	0	89	0	89
45	ALAPANI	BANGIRIPOSI	SARISPAL	0	113	0	113
46	AMDAPANI	BANGIRIPOSI	SARISPAL	0	170	12	182
47	BARIBEDA	BANGIRIPOSI	SARISPAL	0	162	0	162
48	BASILAKACHA	BANGIRIPOSI	SARISPAL	0	57	0	57
49	BHODUAKOCHA	BANGIRIPOSI	SARISPAL	0	23	0	23
50	CHAKIDI	BANGIRIPOSI	SARISPAL	0	155	0	155
	(CHAKIDIHIPANIPAL						
	)						
51	JAMTALIA	BANGIRIPOSI	SARISPAL	0	107	0	107
52	JERKANI	BANGIRIPOSI	SARISPAL	0	88	0	88
	KHADIGHATI	BANGIRIPOSI	SARISPAL	0	78	0	78
	KUKURBHUKA	BANGIRIPOSI	SARISPAL	0	147	0	147
55	KUSUMTOTA	BANGIRIPOSI	SARISPAL	0	65	0	65
56	PHULJHARI	BANGIRIPOSI	SARISPAL	0	138	0	138
57	PURUNAPANI	BANGIRIPOSI	SARISPAL	28	213	1	242
		THAKURMUND					
58	CHAULAJHARI	A	SALACHUA	0	307	38	345
	DUARSONI	THAKURMUNDA	SALACHUA				
	KHANDABARAI(						
	Hamlet of Duarsoni)	THAKURMUNDA	SALACHUA	0	528	3	531
	GAHIGANDA(						
	Hamlet of Baldiha)	THAKURMUNDA		15			
	BALDIHA	THAKURMUNDA		8	593	48	799
	TARANA	BISOI	KHADAMBEDA	0	84	0	84
	HATICHHAD	BISOI	KHADAMBEDA	0	275	27	302
65	DUARSUNI	BISOI	KHADAMBEDA	0	226	0	226
				23	1314		1428
	Total			0	0	917	7

Human Population comparative statement in the 38 villages of the Northern buffer area of the Similipal Tiger Reserve from the year 1971 to 2001.

Sl No	Village			Total population	Total population	
		1971	1981	1991	2001	
1	Bad-kasira	135	150	178	230	
2	Bad-uski	114	170	213	241	
3	Barigaon	130	154	129	182	
4	Bilapagha	177	180	216	267	

5	Gudgudia	274	354	453	526
6	Khejuri	269	245	296	418
7	Kohla	136	155	180	227
8	Kuanribil	216	304	297	346
9	Kumari(kumbhari)	192	267	263	293
10	Kusumi	159	188	210	231
11	Nenjaghosra	61	61	88	85
12	Nuniaguda	83	105	141	182
13	Routola	149	194	226	259
14	Sankasira	139	142	169	184
15	San-uski	157	194	162	233
16	Saharpat	189	225	238	298
17	Astakumar	270	275	341	445
18	Balarampur	208	255	298	324
19	Bandribasa	143	163	507	240
20	Barheipani	286	355	414	473
21	Barsia	237	240	329	403
22	Burhabalanga	150	175	199	249
23	Garh-similipal	255	297	345	417
24	Gopinathpur	74	123	159	217
25	Jadadihi	61	78	90	126
26	Kiajhari	128	129	158	185
27	Kukurbhuka	172	173	233	300
28	Kuljhari	40	80	59	78
29	Lembujharan	50	82	112	123
30	Makabadi	150	146	176	241
31	Nawana	185	263	288	305
32	Nikhirda	23	35	34	60
33	Phulbari	74	68	68	80
34	Rajupal	115	118	111	148
35	Saruda	94	92	136	139
36	Alapani	76	89	147	113
37	Chakidi	96	84	111	155
	(chakidihipanipal)				
38	Kukurbhuka	85	122	120	147
	Total	5552	6408	7894	9170

## ANNEXURE XL LIVESTOCK POPULATION OF SANCTUARY VILLAGES, 2003

SL NO	NAME OF VILLAGE	<u>CATTLE</u>	<b>GOAT</b>	<b>BUFFALO</b>	<b>SHEEP</b>	TOTAL GRAZING LIVESTOCKS
1	ASANBANI	135	81	0	0	216
2	BAD-KASIRA	132	214	17	5	368
3	BAD-USKI	207	217	0	0	424
4	BARIGAON	109	106	0	0	215
5	BHARRACHUA	55	92	0	12	159
6	BILAPAGHA	173	131	14	7	325
7	CHANDIKHAM AN	110	105	0	0	215
8	GUDGUDIA	195	227	28	20	470
9	KHARIADUNG URI	79	68	0	0	147
10	KHEJURI	196	209	0	29	434
11	KOHLA	176	184	0	53	413
12	KONDABIL	266	225	5	27	523
13	KUANRIBIL	316	261	0	0	577
14	KUMARI(KUM BHARI)	138	139	0	0	277
15	KUSUMI	189	145	0	0	334
16	NENJAGHOSR A	73	63	0	30	166
17	NUNIAGUDA	52	60	2	13	127
18	ROUTOLA	271	214	0	0	485
19	SANKASIRA	110	124	0	0	234
20	SAN-USKI	166	169	20	18	373
21	SAHARPAT	322	282	0	0	604
22	ASTAKUMAR	288	235	17	19	559
23	BALARAMPUR	192	177	2	0	371
24	BANDRIBASA	182	156	0	0	338
25	BARHEIPANI	353	297	16	0	666
26	BARSIA	264	295	0	0	559
27	BURHABALAN GA	140	111	2	0	253
28	CHAKUNDAKO CHA	63	54	0	0	117
29	GARH- SIMILIPAL	340	213	0	46	599
30	GOPINATHPUR	114	106	0	0	220
31	HALADIA	137	142	4	12	295
32	JADADIHI	107	104	0	32	243
33	KIAJHARI	38	77	17	27	159

34	KUKURBHUKA	205	152	10	0	367
35	KULJHARI	93	95	4	0	192
36	LEMBUJHARA	134	122	0	0	256
	N					
37	MAKABADI	178	140	0	0	318
38	NAWANA	215	211	2	0	428
39	NIKHIRDA	73	63	0	0	136
40	PHULBARI	115	116	0	0	231
41	RAJUPAL	122	107	0	0	229
42	SARUDA	94	105	0	0	199
43	CHARBANDHA	269	371	12	22	674
44	DANTIAKOCH	66	29	3	0	98
	A					

## ANNEXURE XLI

## LANDUSE

SI N	Village	Area (in Ha)	No. of house				fferent type 2 decimal p	
0			hold	Forest	Irrigate d by source	Un- irrigate d	Culturab le waste (includin g goucher & greves)	Area not availabl e for cultivati on
1	2	3	5	6	7	8	9	10
	<u>Buffer</u>							
1	Asanbani	167.11	25	22.84	T(22.27	52.04	2.93	67.03
2	Bad-kasira	97.77	40	14.16	-	46.85	30.03	6.73
3	Bad-uski	135.3	37	12.83	-	97.86	16.38	8.23
4	Barigaon	136.08	29	34.99	-	71.8	19.74	9.48
5	Bharrachua	35.98	13	3.26	-	26.3	3.55	2.87
6	Bilapagha	84.71	46	10.15	-	51.71	20.55	2.3
7	Chandikhaman	58.26	25	8.13	-	41.78	5.82	2.53
8	Gudgudia	159.52	94	41.05	-	71.29	33.33	13.85
9	Khariadunguri	142.05	19	72.36	-	14.92	46.2	8.57
10	Khejuri	171.43	68	34.23	-	85.89	34.65	16.66
11	Kohla	160.84	34	48.79	-	81.23	24.09	6.73
12	Kondabil	182.9	61	41.56	-	79.54	50.14	11.66
13	Kuanribil	265.66	62	27.63	-	126.18	19.68	92.17
14	Kumari(kumb hari)	168.84	59	59.24	-	80.48	14.63	14.49
15	Kusumi	129.95	52	56.9	-	55.46	62.91	11.58
16	Nenjaghosra	112.55	20	8.28	-	68.59	19.14	16.54
17	Nuniaguda	111.32	24	14.61	-	63.79	26.67	6.25
18	Routola	154.49	45	31.84	-	73.76	40.08	8.81
19	Sankasira	102.11	31	33.04	-	28.17	30.62	10.28
20	San-uski	82.05	32	5.34	-	61.9	9.61	5.2
21	Saharpat	148.01	53	18.19	-	69.14	10.35	50.33
22	Astakumar	432.9	79	175.11	-	169.1	28.58	60.11
23	Balarampur	357.75	61	132.54	-	92.77	33.66	98.78
24	Bandribasa	301.83	103	140	-	210.35	33.28	58.2
25	Barheipani	283.69	98	67.04	-	174.82	29.88	11.95
26	Barsia	360.52	68	163.15	-	116.47	65.72	15.18
27	Burhabalanga	318.53	39	133.51	-	33.85	36.8	114.37
28	Chakundakoch	25.83	5	10.28	_	9.01	4.51	2.03
	a							
29	Garh-similipal	405.14	70	136.12	-	77.23	95.48	96.31
30	Gopinathpur	476.4	25	228.55	-	47.8	134.16	65.89

31	Haladia	0	1	2	-	0	0	0
32	Jadadihi	65.65	20	1.6	-	47.08	5.45	11.52
33	Kiajhari	63.25	44	16.56	-	40.76	3.09	2.84
34	Kukurbhuka	874.3	39	96.94	-	38.18	164.85	574.33
35	Kuljhari	71.51	11	19.91	-	39.56	9.12	2.92
36	Lembujharan	153.68	24	84.27	-	42.18	6.59	20.64
37	Makabadi	267.03	33	25.19	-	78.31	93.08	70.45
38	Nawana	539.74	51	231.59	-	98.98	62.57	146.6
39	Nikhirda	304.46	8	230.19	-	37.46	22.23	14.58
40	Phulbari	50.27	14	47.5	-	45.75	0.45	4.07
41	Rajupal	130.2	24	34.78	-	65.59	18.66	11.17
42	Saruda	177.31	23	56.64	-	28.14	53.83	38.7
43	Charbandha	118.17	69	2	-	36	12	8.68
44	Dantiakocha	43	11	30	-	32	16	8.42
45	Alapani	72.03	23	12	1	40	16	1.02
46	Amdapani	79.9	17	15	-	26	10	9.71
47	Barubeda	69.02	35	6	-	20	20	10
48	Basilakacha	17.52	8	2	ı	20	20	30.03
49	Bhoduakocha	56	4	6	ı	20	20.8	10
50	Chakidi	56.74	23	2	-	36	12	6.74
	(chakidihipani							
	pal)							
51	Jamtolia	80.74	14	14	-	48.74	14	4
52	Jerkani	60.71	13	15	-	26	10	9.71
53	Khadighati	29.95	16	9	-	14	5.95	1
54	Kukurbhuka	77.87	26	6	-	43	26	2.87
55	Kusumtota	86.42	9	30	-	32	16	8.42
56	Phuljhari	75.86	23	29	-	14	28	4.86
57	Purunapani	57.68	44	2	-	35	12	8.68
58	Balidiha	116.82	100	6	-	61	8	41.82
59	Gahiganda(							
	Hamlet of							
	Baldiha)							
60	Chauljhari	43.0	48	-	1	15	6.5	21.50
61	Duarsoni	1057.9	73	159	-	110	360	428.90
62	Khandabarai (							
	Hamlet of							
	Duarsoni)Kara							
	njia							
63	Duarsuni,	47.15	44	2	-	21	14	10.15
	Rairangpur							
64	Tarana	110.4	11	-	-	-	1.0	109.4
65	Hatichhad	294.61	44	-	-	22	35	237.61
		11118.41	2364	2979.89	22.27	3513.81	2086.34	2766.45

#### **ANNEXURE XLII**

## LIST OF RANGE, SECTION, BEAT AND COMPARTMENTS OF STR CORE **DIVISION**

Sl	Name of the	Name of the	Name of the	Compar	Area in	Total
No	Range	Section	Beat	tment	Ha	area in
				No		На
1	Upper	1. UBK	1. UBK	WD-26	1060.06	1060.06
	Barakamuda		2. Tarinibilla	WD-29	915.80	915.80
			3. Matughar	WD-31	1155.89	1155.89
			4. Meghasani	WD-32	1127.40	1127.40
						4259.15
		2. Bhanjabasa	5. Gunduria	TK-1	932.38	932.38
			6. Bhanjabasa	TK-5P	260.40	
				TK-4	924.61	
				TK-7P	330.20	1515.21
						2447.59
		3. Nekdanacha	7. Balidar	TK-3	1065.24	
		1 (chamacha		SL-11P	450.00	1515.24
			8. Dhobighat	TK-2	713.79	
				SL-6P	850.00	1563.79
						3079.03
		4. Patbil	9. Tinadiha	WD-27	1247.48	1247.48
			10. Bengapani	WD-30	927.13	927.13
			11. Patbil	WD-24	754.94	754.94
			12. Devasthali-I	WD-21	1090.56	1090.56
			13. Devasthali-	WD-22	761.86	
			П	WD-25	836.09	1597.95
						5618.06
		5. Kandadhenu	14. Kandadhenu	WD-17P	180.48	
		Tunduliend		WD-20	1019.64	1200.12

			15. Pokharibadi	WD-23	1011.20	1011.20
			16. Bahaghara	WD-26	1130.49	1130.49
						3341.81
2	Jenabil	6. Jenabil	17. Jenabil	KH-26	1208.47	1208.47
			18. Jamunagarh	KH-27	1277.62	1277.62
			19. Sunpokhari- I	SJ-13	993.87	993.87
			20. Sunpokhari-	SJ-15	853.64	
			II	SJ-17P	91.20	944.84
						4424.80
		7. Hatisal	21. Hatisal-I	ED-1	1114.45	
				ED-2	554.25	1668.70
			22. Hatisal-II	ED-5	673.38	
				ED-9	928.75	1602.70
		8. Tiktali	23. Sarua	ED-6	1042.71	
				ED-7P	209.60	1252.31
			24. Tiktali	ED-10	1072.24	
				ED-11P	450.40	1522.64
						2774.95
		9. Gurandia	25. Gurandia-I	KH-21	1088.41	1088.41
			26. Gurandia-II	KH-20	896.76	896.76
			27. Hatighar-I	KH-23	1122.04	1122.04
			28. Hatighar-II	KH-25	1094.65	1094.65
						4201.86
3	National Park	10 Kabatghai	29. Kabatghai-I	KH-17	1032.44	1032.44
			30. Kabatghai- II	KH-18	1616.12	1616.12
			31. Khejuri	KH-19	872.96	872.96
			32. Bakua-I	KH-14	1103.36	1103.36
						4624.88
		11. Nuagaon	33. Nuagaon	KH-24	1175.80	1175.80
			34. Ranasa	KH-22	1660.41	1660.41
			35. Mahavirsal-	WD-15	1055.23	1055.23
			36. Mahavirsal- II	WD-18	1114.36	1114.36
						5005.80
4	Chahala	12. Chahala	37. Chahala	KB-11	1116.00	1116.00
			38. Kairakacha	BLW-11	1059.00	1059.00
			39. Karkachia	BLW-12	961.00	961.00

			40. Bhatunia	BLW-13	1053.50	1053.50
						4189.50
		13.	41. Bareipani	BH-11	1114.00	
		Barehipani	_	BLW-14	791.50	1905.50
			42. Matighati	BLW-15	1296.00	1296.00
						3201.50
5	Nawana	14. Joranda	43. Joranda	BLE-16	778.54	
	North			BLE-17	694.10	1472.64
			44. Kusumbani	BLE-13	1033.39	1033.39
						2506.03
		15. Nigirdha	45. Nigirdha	BLE-19	912.44	912.44
			46.	BLE-18	892.88	892.88
			Pandabandha			
			47. Khadkei	BLE-14	996.09	
				BLE-15	749.27	1745.36
			48. Bhundadar	P-6	1190.34	1190.34
						4741.02
		16. Baunskhal	49. Baunskhal-	BLE-7	1140.97	1140.97
			II			
			50. Chakidi-I	BLE-4	749.27	749.27
			51. Chakidi-II	BLE-6	883.17	883.17
						2773.41
6	Nawana	17.	52.	BLE-23	682.71	682.71
	South	Dhudurchamp	Dhudurchampa			
		a	53. Rajabasa	BLE-21	1003.08	
				BLE-22	782.94	1786.02
			54. Dhundubasa	SJ-9P	410.60	
				SJ-8	713.01	1123.61
						3592.34
		18. Jodapal	55. Jodapal-I	SJ-7	914.25	914.25
			56 Jodapal-II	SJ-14	966.82	966.82
			57.	BLW-19	1037.56	
			Chhatadanda	BLE-24	600.60	1638.16
						3519.23
		19. Bakua	58. Bakua-II	BLW-18	1113.60	1113.60
			59. Garh-	BLW-17	999.16	
			Similipal	BLW-	100.00	1099.16
				16P		
						2212.76
		20.	60. Balikhal	P-10	1231.00	1231.00
		Badamakabad	61. Gopinathpur	P-14	1212.61	1212.61
		i	62.	P-17	864.00	

			Badamakabadi			
				P-18	838.10	1702.10
7	Pithabata	21. Pithabata 63. Pithabata		P-8	999.46	999.46
			64. Pithabata-II	P-9	1075.60	1075.60
			65. Digdiga	SJ-1	562.79	
				P-13	791.49	1354.28
			66.	SJ-2	725.18	
			Chandanchaturi	SJ-3	776.72	1501.90
						4931.24
		22. Bhajam	67. Bhajam	P-1	816.61	816.61
			68. Namtidar-I	P-2	938.34	938.34
			69. Namtidar-II	P-7	1051.52	1051.52
			70. Baunskhal-I	BLE-8	790.71	
				BLE-9	773.36	1564.07
						4370.54
		23.	71. Kachudahan	P-11	1462.28	1462.28
		Kachudahan	72.	P-15	824.38	824.38
			Andharitota-I			
			73.	P-16	1083.37	1083.37
			Andharitota-II			
			74.	P-19	1176.35	1176.35
			Badamakabadi-			
			I			
			75. Palasibeda	P-12	1050.56	1050.56
						5596.94

#### ANNEXURE XLIII

## ALLOTMENT OF AREA OF SANCTUARY TO ANTI-POACHING CAMPS

S. N	Division	Range		Name of the Camp.	Compartments allotted
1	STR	Pithabata	1.	Namiti	P-2 & 7
			2.	Pithabata	P-8 & 9
			3.	Bhajam	P-1
			4.	Baunsakhal	BLE-8 & 9
			5.	Kachudahan	P-11
			6.	Badmakabadi	P-12 & 19
			7.	Andharitota	P-15 & 16
			8.	Chandanchaturi	SJ-2 & 3
			9.	Digdiga	SJ-1 & P-13
2		Nawana(N)	10.	Nawana	BLE-17
			11.	Joranda	BLE-16
			12.	Bhandadar	P-6
			13.	Nigirdha	BLE-19
			14.	Khadkei	BLE-14 & 15
			15.	Pandabandha	BLE-18
			16.	Kusumbani	BLE-13
			17.	Baunsakhal	BLE-7
			18.	Chakidi	BLE-4 & 6
3		Nawana(S)	19.	Dhuduruchampa	BLE-21, 22 & 23
			20.	t o trup til	SJ-7 & 14
			21.	Zengaaneena	P-14, 17 & 18
			22.		P-10
			23.	Buitau	BLW-18, 19 & 24
			24.	Dhundubasa	SJ-8 & 9(P)
			25.	Chherabil	BLW-16(P) & 17
4		Jenabil	26.		KH-26
			27.		KH-20 & 21
			28.	1	ED-9
			29.		ED-1,2 & 5
			30.		ED-10, 11(P)
			31.	Sarua	ED-6 & 7(P)
			32.	Sarabasa	SJ-13,15 & 17(P)
	=		33.		KH-27
5		UBK	34.		WD-28
			35.		WD-24
			36.		WD-21, 22 & 25
			37.	Bahaghar	WD-26

	1	1		T	
			38.	Kandadhanu	WD-17(P), 20 & 23
				Nekdanacha	TK-2 & SL-6(P)
				Balidar	TK-3 & SL-11(P)
			41.	Bhanjabasa	TK-4, 5(P) & 7(P)
			42.	Gunduria	TK-1
			43.	Meghasini	WD-31 & 32
			44.	Tarinibila	WD-28 & 29
			45.	Dhuduram	WD-27
6		Chahala	46.	Chahala	KD-11
			47.	Kairakacha	BLW-11
			48.	Karkachia	BLW-12
			49.	Bhatunia	BLW-13
			50.	Bareheipani	BH-11 & BLW-14
			51.	Matighati	BLW-15
			52.	Brundaban Gate	Nil
7		National Park	53.	Kabatghai	KH-17 &18
			54.	Khejuri	KH-19
			55.	Bakua-I	KH-14
			56.	Ransa	KH-22
			57.	Nuagaon	KH-24
			58.	Mahabirsal	WD-15 & 18
			59.	Kalikaprasad	Nil
8	Baripada	Pithabata	60.	Champagarh	P-3,4 &BLE-11(P)
			61.	Baldiha	P-5
			62.	Haldibani	BLE-12
9		Dukura	63.	Khandabura	SJ-4 & 5
			64.	Bahalda	SJ-6
			65.	Nigirdha	BLE-20
10	]	Bangriposi	66.	Jaldiha	BLE-3,10,11(P)
			67.	Shyamsundarpur	BLE-1,2,5
11		Udala	68.	Balma	ED-7(P),11(P), 12, 13 & 14
			69.	Matihudi	Sj-18, ED-3,4& 8
			70.	Baniabasa	SJ-9(P),10,11,12,16, &17(P)
12		Kaptipada	71.	Nalakhanja	SL-6(P),8,9,10, 11(P), 13,15,16,17& 18
			72.	Podadiha	TK- 5(P),6,7(P),8,9,10 & 11
13	Karanjia	Gurguria	73.	Gurguria	
			74.	Khejuri	
14	1	Kendumundi	75.	Edalbeda	WD-17& 19
15	1	Thakurmunda	76.	Mandaljhari	SL-1,2,3,4,5 & 7
	<u> </u>	1	<u> </u>	<u>,                                     </u>	, , , ,

			77.	Dangadiha	SL-12 & 14
16		Dudhiani	78.	Rangamatia	WD-5,6,11 & 12
			79.	Pahadpur	WD-7,8,9, & 13
			80.	Kiajhari	WD-1,2, & 4
17	Rairangpur	Bisoi	81.	Ghatkuanri	BLW-5& 6
			82.	Talbandha	BLW-7,8,9 & 10
			83.	Kasipani	BLW-1&KD-1,2,3,4,5
			84.	Kanchinda	BLW- 3 & 4
18		Manada	85.	Uski	BH- 9,10 & 15
			86.	Barehipani	BH-5,6,7,16,17& 18
			87.	Manada	BH-1,2& 3
			88.	Haldia	KD-6,7,8,9 & 10
			89.	Jamuani	BH-4,8,12,13 & 14

#### **ANNEXURE XLIV** CADRE STRENGTH &VACANCY POSITION OF ESTABLISHMENT OF FIELD **DIRECTOR**

Post Name	FD, STR –cum-			
		RCCF		
	SnSt	MIP	Vac	
RCCF & FD	1	1	0	
Baripada				
D.D. STR	5	2	0	
ACF		2 2 1	3	
Office Supdt.	1	1	0	
Forest Ranger	13	11	2	
Dy. Ranger(Ch)	4	0	4	
Forester	41	27	14	
Forest Guard	108	81	27	
Head Clerk	1	1	0	
Jr. Actt.	1	0	1	
Sr. Clerk (Circle)	6	3	3	
Sr. Clerk (Divn)	3	3	0	
Jr. Clerk (Circle)	7	3	4	
Jr. Clerk (Divn)	6	2	4	
Sr. Steno	1	0	1	
F.E.O	1	0	1	
Tractor Driver	1	1	0	
Driver(LV)	5	4	1	
Guide	5 2 2 3	2	0	
Office Choukidar	2	2 2	0	
Bng. Choukidar	3	2	1	
Cook cum bearer	1	0	1	
Mugger watcher	1	0	1	
OP/Or.P	7	6	1	
Wireless tech.	1	1	0	
Total	224	155	69	

#### ANNEXURE XLV SENSITIVE SITES OF POACHING AND TIMBER SMUGGLING IN CORE AREA

Range	Name of the sites
Upper Barakamuda	Upper Barakamuda
	Tinadiha
	Devasthali
	Bachhurichara
	Gayalkacha
	Baladaghar
	Tarinibilla
	Munibasa
	Dhobighat
	Matughar
Jenabil	Hatisal
	Gurandia
	Sarabasa
	Tiktali
	Sarua
	Sunpokhari
National Park	Mahavirsal
	Ransa
	Ganapati
	Kalkam
Nawana South	Chhatadanda
	Chherabil
	Langdakacha
	Balikhal
	Jadapal
	Duhunbasa
Nawana North	Kusumbani
	Pandabandha
	Daudidar
	Badudijharan
	Baunskhal
	Khadkei
Pithabata	Bhajam
	Kachudahan
	Badamakabadi
	Bulunda
	Bhundadar
	Sikaribasa
Chahala	Chahala
	Karkachia
	Kairakacha
	Haladia
	Barehipani
	Bhatunia

#### ANNEXURE XLVI

## ILLEGAL ENTRY POINTS TO SIMILIPAL TIGER RESERVE

Name of the Division	Name of the Range	Name of the route to be inspected
1	2	3
Karanjia	Thakurmunda	1.Bali[posi-Jodam-Dala-Bengapani 2.Mandaljhari-Tasarbasa-Nekedanocha-Matughar 3.Kirrkichipal-Dongadiha-Sanghagra-Dhubighat- Ghaighat
	Kenumundi	1.Bisipur-Jatiani-Jalchinda-Kandadhanu 2.Ranibhol-Gamuchhajharan-Silda-Pokharibadi- 3.Edelbeda-Panaskudur-Pakharibadi-Makarmundi 4.Ghudabindha-Asankudur-Mahisanjali- Chmpaguda-Bahaghar
	Dudhiani	1.Barakamauda-Khalpada-Budhigaon- Nimiamahabirsal 2.Dudhiani-Kiajhari-Jalada-Ramjodi 3.Dudhiani-Palasibeda-Jalchin da-Jatiani 4.Budhigaon-Chaturipani-Panianla-Kalkam- Ganapati
	Gudgudia	1.Kasira-Khejuri-Athardeuli-Bakua 2.Gurguria-Barigaon-Kobatghai 3.Gurguria-Bilapogha-Phulbadia 4.Kaliani-Olkudar-Chandraposi-Kumudabadi
Rairangpur	Manada	1.Asana-Saridanda-Haldia 2.Alhapani-Haldia 3.Sansialinai-Gagra-Riung road Chahala 4.Rajupal-Brundaaban-Zodadiha-Murumghati 5.Kolha-Bandriabasa-Jajachati-Lembuguda
	Bisoi	1.Ghastkuanri-Talabandha-Charabondha- Kairakocha-Sanidanda-Kutingjharan 2.Bankidihi-Daladali
Baripada	Bangriposi	1.Jaldiha-Chapdihi-Ghudagandha-Baunskhal 2.Chakidi-Baunskhal-Kusumbani-Pansia
	Pithabota	1.Lalpani-Kalipahad-Palasibeda-Satnalia-Bhajam 2.Baldiha-Chadripahar-Ghudagandha-Bhajam
	Dukura Udala	1.Sapanchua-Sunpokhari-Murari-Badmokabadi-Belpanidanda-Rajabasa 2.Bahalda-Gurusadar-Murari-Andhari- Kukudakhumpi 3.Chandanchaturi-Champagarh-Kachudahan 4.Digdiga-Baleda-Tikarpani-Sunpokhari- Kachudahan 1.Balma-Mallichua-Maruadibandha-Tiktali

	1	
		2.Deokund-Jogeidhia-Adhamukha&Ambaghati-
		Sarua
		3.Tarupdara-Bhasapal-Balidar-Jodapal
	Kaptipada	1.Sarat-Katuria-Bhejidiha-Bhanjhikusum-Ghagara-
	Карпраца	Nekedanacha-Meghasini
		2.Manabhanga-Kalianichaturi-Seltingghati-
		Kukudakhumpi-Balidar-Ghaighat
		3.Nachhipur-Badghati-Kumbhaghai-Guniamba
		4.Junapal-Talsorei-Mahulhudi-Gunduria & Zoka-
		Kadalibadi-Ujiapinda
		5.Balinal-Barhapal-Chaturi-Gunduria
		6.Barjupal-Manikpur-Mallichua-Bijilichati-
		Gunduria
Similipal Tiger	Jenabil	1.Jenabil-Adhamukhi-Ratokacha-
Reserve		Oldsikaricamp, Jogeidihanala
		2.Hatisal-Jogeidiha-WaterFall DeokundFP
		3.Tktali-Ashokanala-Khairiburu-Kiabasa-Bounsdiha
		4.Sarua-Ambaghati-Patharghar-Sahebchati-
		Gourkanta-Mankdiabasa-Bounsdiha
		5.Sarabasa-Balidar-Chatadanda
		6.Hatighar-Sarupani-Basudeve
		7.Gurandia-Basudev,Gayalgada-Kobatghai-
		Deokund-Phulbadia FP
	Nawana(S)	1.Chherabil-Bakua-Chhatadanda-Bhadarguda-
		2.Dhudurchampa-Bhadarguda-Kandhiajharan-
		Chatadanda – Kukudakhumpi
		3.Jodapal-Balidar-Bandhuakanala- Chhatadanda
		4.Dhundubasa-Rajabhadi-Belpanidanda
		5.Lengdakocha-Gopinathpur-FP-BadmokabadiFP 6.Balikhal-Champabarehi-KukudakhumpiFP.
	Nawana(N)	1.Joronda-Pandabandha-Doudidar-Pansia
	inawana(in)	2.Nigrida-Bhandadarah-Kusumbani
		3.Khadakhei-Sasanjharan-Kalasiduba-Baunskhal
		4.Bhandadarah-Jhimirkhal-Champabarehi
	Chahala	1.Daladali-Brundaban-Rajupal
		2.Kairakocha-Brundabhol-Bhatunia
		3.Barehipani-Matighati-Karakachia-Kairakocha
		4.Barehipanifallview-Bhatunia-Chilidarah
		-Gunduria
	National Park	1.Kobatghai-Kalkam-Panianla-Ganapati
	Jashipur	2.Ranasa-KabatghaiFP
	Jasinpai	3.Nuagan-Jamuna-Mohantahana FP
		4.Mohabirsal-Nemia-Kandadhanu
		5.Khejuri-Bakua-Khejuri FP-Gurandia-Bharadachua
		FP
	Linnan	1 Vandadhany Anlayshaga Daladahar Camidali
	Upper	1.Kandadhanu-Ankurbasa-Baladghar-Sarudala
	Barakamara	2.Bahaghar-Dala-Bengapani-Dudhuram-

Pithabota(WL	Bachhurichora 3.Silda-Kulchua-Ginahaja-Makarmundi-Nama 4.Debsthali-Sarudala-Ganapati-Golkund 5.Patbil-Bamandiha-Jamunadanda-Dhuduram-Chaksil 6.UBK-Baladi-Khaditua-Jamunadanda 7.Tarainibila-Kiabasa-Nuhabita-Taranibila-Boushdiha-Baragadia 8.Matughar-Meghasini down peak 9.Nekedanacha-Matughar—Mandaljhari-return in Dhubighat FP 10.Balidar-Guniamba-Kukudakhumpi-Ptharghar. 11.Bhanjabasa-Zoka-Kadalibadi-Ujiapinda-Putulidiha 12.Gunduria-Tiktali-Khairiburu-Kadalabadi 1.Stakunda-Kalipahar-Satnalia-Rakashamara. 2.Namati-Munibasa-Jhimirkhal-Satnalia 3.Digdiga-Chhetiajharan-Jambhirakhal-Kachudahan 4.Chandanchaturi-Gurusudar-Andharitota-Kukudakhumpi 5.Kachudahan-Campabarehi-Matihudi-Balikhal 6.Badmokabadi-Sabarbasa-Andhari-Murari-Gurusudar 7.Bhajam-Baunskhal-Ghadagandha-Jhimirkhal-Bhandadarah
	Bhandadarah

## ANNEXURE XLVII

## SENSITIVE VILLAGES IN AND AROUND SIMILIPAL

Name of the	Name of	Sensitive villages			
Division	the Range				
1	2	3			
Karanjia	Thakurmun da	Keshdiha, Dangadiha, Kirkichipal, Mandaljhari, Chiruapada,Ghodabindha,Mituani,Hatiguda, Asanbani & Mulapal			
	Kenumundi	Adelbeda, Milupaudia, Khapakhai, Ranibhol, Balibhole, Bisipur, Asankudar, Mahuldiha, Rugudisahi			
	Dudhiani	Hatibari,Budhigaon,Khalpada,Kiajhari,Dudhiani, Ranipat,LowerUBK,Ramjodi, Ramchandrapur,Kiajhari,Rangamatia,Pahadapur,Kadal ibadi,Anantasahi.			
	Gudgudia	Sanksira, Gudgudia, Barigaon, Kasira, Bharadachua, Khejuri, Kandibil, Phulbadia, Bilapogha, A thardeuli, Bakua, Kaliani, Olkudar, Chandraposi, Kaleitu mba, Kapand, Kusumi.			
Rairangpur	Manada	Sansialinai, Alhapani, Asana, Rajupal, Kolha, Uski, Brundeiposi, Lembuguda, Jamuani, Jatipani, Asanbani, Chakundakacha.			
	Bisoi	Bhatchhatra, Bankidhi, Talbandha, Ghatkuari, Charabndha, Chadripal			
Baripada	Bangriposi	Chakidi,Rajabasa,Jaldiha,Chapadihi,Badgaon,Gendap okhari,Bhuasuni, Chapadihi, Kanchinda,Masinabila, Samsundarpur			
	Pithabota	Lulung,Laxmiposi,Tarajodi,Jhinei, Baldiha,Nuagan,Gudipokahri,Sansole,Kakarpani,Dudh iasole,Ambadali, Nuagan.			
	Dukura	Besarpani,Dabak,Nuagan, Subarnamanjari,Sapanchua,Mathubasa,Champagarh,K handaduba,Beldunguri,Madhupur Bahalda, Govei.			
	Udala	Dengam,Mahulhudi.,Ambikadeipur, Biprachandrapur,Patsanipur,Phulbadia, Adipur,Sriramchandrapur,Gudamara,Taldiha,Kundaba i,Balabhadrapur,Sasakuila,Nuagan.			
	Kaptipada	Manikpur,Nalakhaman,Khandachira,Baidakhuti,Talsor ei,Barjupal, Patharkhani, Itagar,Chirtabani,Kulidihi,Junapal, Nachhipur,Manbhanga,Debla,Pagaldiha,Bhaluhunkra, Tentulibani,Sarat,Katuria,Barabanka, Gajapathar, Purunapani, Noto.			

Similipal Tiger	Jenabil	Jamuna,Baniabsa-Bhasapal
Reserve	Nawana(S)	Gopinathpur,Budhabalanga,Benipur,Saruda,Bakua,Le
		mbuguda,Asthakumar.
	Nawana(N)	Gitilpir, Mokabadi, Astakumar, Nawana, Kukurbuka.
	Chahala	Barehipani, Asanbani, Jhatipani, Kuljhari,
		Chakundakocha., Gajapathar, Purunapani, Noto.
	National ark	Kobatghai-Barigaon, Kashira,
	Jashipur	Bharadachua,Khejuri,Bakua,Jamuna,
	Upper	-
	Barakamara	
	Pithabata(W	Lulung, Tarajudi, Sitakund, Lalpani, Govindapur, Laxmip
	L)	osi,Dulda,Digdiga,Besarpani,Chandanchaturi,Gudipok
		hari,Kakarpani.

#### **ANNEXURE XLVIII**

# SENSITIVE ROUTES AND VILLAGES IN BUFFER AREA AND PROTECTION STRATEGY

#### Sensitive routes in Baripada Division

Name of Range	Name of Section	Name of Beat	Poaching /Timber smuggling sensitive village with GPS reading	The sensitive and smuggling routes.	Surveill ance patrolli ng days made during the last 6 month in ( i.e. from March to August-2012)
1	2	3	4	5	6
Pithabata	Baldiha	Khasadiha	Lulung Jhinei	Lulung-Balidar-Tarajodi- Jhinei, Baldiha-Kuchiamora- Jagannathpur-Ambadubi- Baripada	35 days
		Baldiha	Ambadali Dungrudihi	Dungurdihi to Bulunda	20 days
	Pithabata	Pithabata	Lulung	Siktakund to Rangamatia	48 days
	Haladiba ni	Kantasole	Kundalbani	1. Kundalbani-Raian-Bhuasuni-Jagannathpur-Gendapokhari-Patia Simuli-Kuliana-West Bengal. 2. Kantasole-Ramharipur-Gendapokhari-Pokharia-Kamrpal-Patiasimuli-Kuliana-West Bengal	25 days 18 days
Bangripos i	Kusum- bandh	Shyam- sunderpur	Chakidi Sarisopal N-22 <sup>0</sup> 00' 20.6" E-86 <sup>0</sup> 24'30.0"	<ul> <li>5. Bhatunia, Chakidi from Chakidi to Baripada, Nedam</li> <li>N-22<sup>0</sup> 03' 25.6" E-86<sup>0</sup></li> <li>27'19.4"</li> <li>6. Domuhari Sarispal Batjharan, Belchakroad.</li> <li>N-22<sup>0</sup> 03' 18.5" E-86<sup>0</sup> 24'</li> <li>30.1"</li> </ul>	6 times 8 times
		Rangamati a	Nedam, Polasbani, Gadrasahi, Budhikhamari		15 times

	1	1	T		1
			road.		
			N-22 <sup>0</sup> 04' 23.30" E-86 <sup>0</sup> 27'31.6"		
			N-22 <sup>0</sup> 04' 27.0"		
			E-86 <sup>0</sup> 28'25.5"		
		Jaldiha	Jaldiha,Hatigadia		16
		Jaidilla	N-22 <sup>0</sup> 02' 43.2"		times
			E-86 <sup>0</sup> 29'04.6"		times
			N-22 <sup>0</sup> 01' 36.9"		
			E-86 <sup>0</sup> 28'32.6"		
	Badgaon	Badgaon	Chapadihi,		18
			Badgaon,		times
			Bhuasuni,		
			Areasahi		
			N-22 <sup>0</sup> 00' 08.4"		
			E-86 <sup>0</sup> 30'09.9"		
			N-22 <sup>0</sup> 01' 24.0"		
			E-86 <sup>0</sup> 30'49.1"		
			N-22 <sup>0</sup> 03' 07.7"		
			E-86 <sup>0</sup> 33'18.3"		
	G.	D : 1 1	D 1		1.77
	Sirsa	Rajaloka	Budamara		17
			N-22 <sup>0</sup> 07' 16.46"		times
		Sirsa	E-86 <sup>0</sup> 38'08.1"  Ratila		12
		Sirsa	N-22 <sup>0</sup> 15' 38.7"		times
			E-86 <sup>0</sup> 37'35.4"		umes
		Joka	Sankhabhanga		10
		JOKA	N-22 <sup>0</sup> 14' 54.7"		times
			E-86 <sup>0</sup> 27'35.0"		times
Dukura	Digdiga	Kerko	Jadunathpur	Jadunathpur	10 days
			N 21 <sup>0</sup> 50'53.3"	N 21 <sup>0</sup> 50'53.3" E 086 <sup>0</sup> 37'20.9	
			E 086 <sup>0</sup> 37'20.9"	Kerko Road	
				N 21 <sup>0</sup> 50'26.1" E 086 <sup>0</sup> 40'58.7"	
	Digdiga	Kerko	Hatimada	Jadunathpur	10 days
			N 21 <sup>0</sup> 50'53.8"	N 21 <sup>0</sup> 50'53.3" E 086 <sup>0</sup> 37'20.9	
			E 086 <sup>0</sup> 39'04.5"	Kerko Road	
				N 21 <sup>0</sup> 50'26.1" E 086 <sup>0</sup> 40'58.7"	
	Digdiga	Kerko	Talanda	Jadunathpur	12 days
			N 21 <sup>0</sup> 51'12.3"	N 21 <sup>0</sup> 50'53.3" E 086 <sup>0</sup> 37'20.9	
	Dia 11	IZ1-	E 086 <sup>0</sup> 39'04.5"	Kerko Road N 21 <sup>0</sup> 50'26.1" E 086 <sup>0</sup> 40'58.7"	15 1
	Digdiga	Kerko	Kerko N 21 <sup>0</sup> 50'26.1"		15 days
			E 086 <sup>0</sup> 40'58.7"	Jadunathpur N 21 <sup>0</sup> 50'53.3" E 086 <sup>0</sup> 37'20.9	
			E 000 40 38./	Kerko Road	
				N 21 <sup>0</sup> 50'26.1" E 086 <sup>0</sup> 40'58.7"	
	Badasahi	Badasahi	Pratappur	Pratappur-	12 days
	Dadasam	Dadasani	N 21 <sup>0</sup> 47' 41.3"	N 21 <sup>0</sup> 47' 41.3" E 086 <sup>0</sup> 43'20.1"	12 days
			E 086 <sup>0</sup> 43'20.1"	Badasahi-Ratanpur road	
				N 21 <sup>0</sup> 36'34.8" E 086 <sup>0</sup> 48'08.3"	
	1	I		1.21202110 2000 10 00.5	1

Badasahi	Badasahi	Badasahi	Pratappur-	18 days
		N 21 <sup>0</sup> 43'11.3"	N 21 <sup>0</sup> 47' 41.3" E 086 <sup>0</sup> 43'20.1"	
		E 086 <sup>0</sup> 44'57.4"	Badasahi-Ratanpur road	
			N 21 <sup>0</sup> 36'34.8" E 086 <sup>0</sup> 48'08.3"	
Badasahi	Badasahi	Badaligaon	Pratappur-	20 days
		N 21 <sup>0</sup> 40'29.9"	N 21 <sup>6</sup> 47' 41.3" E 086 <sup>0</sup> 43'20.1"	
		E 086 <sup>0</sup> 47'23.9"	Badasahi-Ratanpur road N 21 <sup>0</sup> 36'34.8" E 086 <sup>0</sup> 48'08.3"	
Badasahi	Ratanpur	Ratanpur	Pratappur-	20 days
Tadki	ratumpar	N 21 <sup>0</sup> 36'34.8"	N 21 <sup>0</sup> 47' 41.3" E 086 <sup>0</sup> 43'20.1"	20 days
		E 086 <sup>0</sup> 48'08.3"	Badasahi-Ratanpur road	
			N 21 <sup>0</sup> 36'34.8" E 086 <sup>0</sup> 48'08.3"	
	Bahalda	Bahalda	Bahalda-	14 days
		N 21 <sup>0</sup> 47'19.6"	N 21 <sup>0</sup> 47'19.6" E 086 <sup>0</sup> 31'54.8"	
		E 086 <sup>0</sup> 31'54.8"	Titia Road	
T 11:	D 1 11	D 1 1	N 21 <sup>0</sup> 44'46.1" E 086 <sup>0</sup> 38'33.2"	15 1
Tadki	Bahalda	Badapathara N 21 <sup>0</sup> 45'42.1"	Bahalda- N 21 <sup>0</sup> 47'19.6" E 086 <sup>0</sup> 31'54.8"	15 days
Tadki		E 086 <sup>0</sup> 35'28.3"		
		E 080 33 28.3	Badapathara N 21 <sup>0</sup> 45'42.1" E 086 <sup>0</sup> 35'28.3"	
	Dukura	Titia	Bahalda-	18 days
	Dukura	N 21 <sup>0</sup> 44'46.1"	N 21 <sup>0</sup> 47'19.6" E 086 <sup>0</sup> 31'54.8"	16 days
		E 086 <sup>0</sup> 38'33.2"	Titia Road	
		12 000 30 33.2	N 21 <sup>0</sup> 44'46.1" E 086 <sup>0</sup> 38'33.2"	
Nigirdha	Nigirdha	Badmakabadi	Badmakabadi-	12 days
- 1.28-2 31-23	- 1-8-1-11	N 21 <sup>0</sup> 49'28.5"	N 21 <sup>0</sup> 49'28.5" E 086 <sup>0</sup> 29'21.1"	
		E 086 <sup>0</sup> 29'21.1"	Bahalda-Titia Road	
			N 21 <sup>0</sup> 44'46.1" E 086 <sup>0</sup> 38'33.2"	
Tadki	Bahalda	Kusumghati	Kusumghati	12 days
		N 21 <sup>0</sup> 45'11.7"	N 21 <sup>0</sup> 45'11.7" E 086 <sup>0</sup> 33'58.3"	
		E 086 <sup>0</sup> 33'58.3"	Titia	
			N 21 <sup>0</sup> 44'46.1" E 086 <sup>0</sup> 38'33.2"	
Digdiga	Digdiga	Sansole	Jadunathpur	14 days
		N 21 <sup>0</sup> 55'21.4"	N 21 <sup>0</sup> 50'53.3" E 086 <sup>0</sup> 37'20.9	
		E 086 <sup>0</sup> 37'36.6"	Sansole	
D: 1:	D: 1:	D: 1:	N 21 <sup>0</sup> 55'21.4" E 086 <sup>0</sup> 37'36.6"	17.1
Digdiga	Digdiga	Digdiga N 21 <sup>0</sup> 54'16.4"	Digdiga N 21 <sup>0</sup> 54'16.4" E 086 <sup>0</sup> 36'32.8"	17 days
		E 086 <sup>0</sup> 36'32.8"	N 21 34 10.4 E 080 30 32.8 Poda Astia	
		2 000 30 32.0	N 21 <sup>0</sup> 55'17.9" E 086 <sup>0</sup> 42'30.1"	
Digdiga	Digdiga	Saratchandrapur	Saratchandrapur	11 days
		N 21 <sup>0</sup> 53'15.0"	N 21 <sup>0</sup> 53'15.0" E 086 <sup>0</sup> 53'15.0"	
		E 086 <sup>0</sup> 53'15.0"	Poda Astia	
		1	N 21 <sup>0</sup> 55'17.9" E 086 <sup>0</sup> 42'30.1"	
Digdiga	Digdiga	Kendua	Kendua	16 days
		N 21 <sup>0</sup> 53'21.7"	N 21 <sup>0</sup> 53'21.7" E 086 <sup>0</sup> 38'40.4"	
		E 086 <sup>0</sup> 38'40.4"	Poda Astia	
			N 21 <sup>0</sup> 55'17.9" E 086 <sup>0</sup> 42'30.1"	1

	Digdiga	Digdiga	Poda Astia	Sitakund	15 days
			N 21 <sup>0</sup> 55'17.9"	N 21 <sup>0</sup> 55'57.8" E 086 <sup>0</sup> 34'28.2"	
			E 086 <sup>0</sup> 42'30.1"	Poda Astia N 21 <sup>0</sup> 55'17.9" E 086 <sup>0</sup> 42'30.1"	
	Digdiga	Digdiga	Sitakund	Sitakund	21 days
	Diguigu	Diguiga	N 21 <sup>0</sup> 55'57.8"	N 21 <sup>0</sup> 55'57.8" E 086 <sup>0</sup> 34'28.2"	21 days
			E 086 <sup>0</sup> 34'28.2"	Poda Astia	
				N 21 <sup>0</sup> 55'17.9" E 086 <sup>0</sup> 42'30.1"	
	Digdiga	Digdiga	Lulung road	Lulung road Pithabata	17 days
			Pithabata	N 21 <sup>0</sup> 56'24.8" E 086 <sup>0</sup> 34'50.7"	
			N 21 <sup>0</sup> 56'24.8"	Poda Astia	
	Diadiae	Diadiae	E 086 <sup>0</sup> 34'50.7"	N 21 <sup>0</sup> 55'17.9" E 086 <sup>0</sup> 42'30.1"	12 days
	Digdiga	Digdiga	Laxmiposi N 21 <sup>0</sup> 57'01.9"	Laxmiposi N 21 <sup>0</sup> 57'01.9" E 086 <sup>0</sup> 36'03.7"	12 days
			E 086 <sup>0</sup> 36'03.7"	Poda Astia	
			L 000 30 03.7	N 21 <sup>0</sup> 55'17.9" E 086 <sup>0</sup> 42'30.1"	
	Digdiga	Digdiga	Godipokhri	Godipokhri	10 days
			N 21 <sup>5</sup> 55'55.8"	N 21 <sup>6</sup> 55'55.8" E 086 <sup>0</sup> 36'39.2"	
			E 086 <sup>0</sup> 36'39.2"	Poda Astia	
				N 21 <sup>0</sup> 55'17.9" E 086 <sup>0</sup> 42'30.1"	
	Tadki	Chandanch		Agnikuanri – Mahalibasa	15 days
	TD 11:	aturi		N 21 <sup>0</sup> 50'18.0" E 086 <sup>0</sup> 35'29.4"	10.1
	Tadki	Chandanch		Champagarh- Chandanchaturi N 21 <sup>0</sup> 50'17.1" E 086 <sup>0</sup> 35'33.3"	18 days
Udala	Dengam	aturi Baniabasa	Baniabasa,	1. Bhospal to Ranibhole to	About
Odara	Dengam	Damadasa	Dengam,	Belaghati	90 days
			Andiatikira,	2. Baniabasa to Kaniabasa	patrolli
			Mamudiha,	3. Baniabasa to Dundubasa	ng
			Baunsanala,	4. Baniabasa to Khunta	underta
			Simigadia,	5. Baniabasa to Nalhua	ken by
			Mahuldihi,	6. Baniabasa to Gadigaon	four
			Betajharan		wheeler
					& two
					wheeler
					s during
					daring day/
					night
					by the
					staffs
	Dengam	Nuagaon	Nuagaon,	1.Nuagaon to Khunta to	About
			Mayurnachha,	Sanakaranjia	100
			Sankaranjia,	2.Nuagaon to Kusumughati	days
			Dabak, Sunghati,	3. Nuagaon to Bholagadia	patrolli
			Nachhipur, Bholagadia,	4.Nuagaon to bahalda 5.Nuagaon to Simigadia	ng made
			Dungurudihi	6.Nuagaon to Nachhipur	by the
			Dunguludilli	0.11uagaon to 11acimipui	staff.
	7D 1 111	D 1	D 1 I I'I	1 D 1 ( M 1	
•	Taldiha	Balma	Balma, Jamudiha,	1.Balma to Manikpur	90 days

			Dangametic	2 Palma to Dangadahi	na
			Rangamatia,	3.Balma to Dangadahi	ng.
			Manikpur,	4.Balma to Maruadibandh	
			Angarpada,	5.Balma to Rusibasa	
			Budhamara,	6.Manikpur to Matuadibandh	
			Taldiha,		
			Balabhadrapur,		
			Nuagaon		
	Taldiha	Fulbadia	Kasikundal,	Fulbadia to Sidam chandrapur	90 days
			Baniadara,	Kulipal to Sarabasa	patrolli
			Hatikote,	Kulipal to Dunguridihi	ng
			Ambikadeipur,	Kulipal to Realdaha	
			Garudabasa,	Kasikundal to Udala	
			Sarabasa,	Balma to Udala	
			Fulbadia,	Manikpur to Udala	
			Patsanipur,		
			Jugunikhunta,		
			Tentala		
	Kuamara	Kuamara	Sainkula,	Khunta to Sainkula & Remuna	90 days
			Angargadia,	Titia to Khunta to Sainkula	patrolli
			Bagabasa,	Kanheibandha to Sainkula	ng
			Raipada,		
			Hudiasahi,		
			Sirathali		
	Udala	Udala	Gadigaon,	Gadigaon to Pathurikati	90 days
			Dhanapana,	Gadigaon to Udala	patrolli
			Dhanghera,	Baliadihi to Pathurikati	ng
			Kanheibandha,	Jaranata to Dhanapana	8
Kaptipada			Kanheibandha, Baliadihi, Kanpur	Jaranata to Dhanapana	
1 1	Podadiha	Podadiha	· · · · · · · · · · · · · · · · · · ·	Jaranata to Dhanapana N-21-33-53.8 E-86-26-38.4	
	Podadiha	Podadiha	Baliadihi, Kanpur	-	90 days
	Podadiha	Podadiha	Baliadihi, Kanpur	-	90 days patrolli
	Podadiha Podadiha	Podadiha Podadiha	Baliadihi, Kanpur	-	90 days
			Baliadihi, Kanpur Podadiha	N-21-33-53.8 E-86-26-38.4	90 days patrolli ng
	Podadiha	Podadiha	Baliadihi, Kanpur Podadiha Antapur	N-21-33-53.8 E-86-26-38.4 N-21-37-14.0 E-86-28-14.1	90 days patrolli ng
	Podadiha	Podadiha Badkhama	Baliadihi, Kanpur Podadiha Antapur	N-21-33-53.8 E-86-26-38.4 N-21-37-14.0 E-86-28-14.1	90 days patrolli ng
	Podadiha Podadiha	Podadiha Badkhama n	Baliadihi, Kanpur Podadiha Antapur Badkhaman	N-21-33-53.8 E-86-26-38.4 N-21-37-14.0 E-86-28-14.1 N-21-35-34.7 E-86-27-51.2	90 days patrolli ng Do

#### Sensitive routes in Karanjia Division

Name of Range	Name of Section	Name of Beat	Poaching /Timber smuggling sensitive village.	The sensitive and smuggling routes.	Surveillance patrolling days made during the last 6 month in (i.e. from March to August-2012)
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Gurguria	Gurguria	Gurguria	Gurguria	Gurguria- Hotta	Alternate
					days
					patrolling
Gurguria	Gurguria	Gurguria	Kusumi	Machghat Comopt10	Alternate
				l and a grant of the part of t	days
					patrolling
Gurguria	Gurguria	Gurguria	Saharpat	-do-	-do-
Gurguria	Gurguria	Bilapagha	Bilapagha	Kolha ridge to KH -	Alternate
		1 6	1 0	Compt. – 3 Kankada	days
				Koccha	patrolling
Gurguria	Gurguria	Bilapagha	Bilapagha	Kolha ridge –	-do-
		2 mp ugm	2 mp ugm	chadripabadi –	
				Dholabani	
Gurguria	Gurguria	Barigaon	Barigaon	Barigaon- Tankagara	-do-
Guiguiia	Gurguria	Buriguon	Burguon	Chaturi – Ramjodi	40
Gurguria	Gurguria	Barigaon	Barigaon	Khaliamati – Ramjodi	-do-
Gurguria	Khejuri	Khejuri	Khejuri	Khejuri – Bhardachua –	-do-
	3.5	. J	J	Kobat Ghai to Ramjodi	
Gurguria	Khejuri	Kuanribil	Kuanribil	Kuanribil – Kandabil –	-do-
			110,00111011	Sankasira – Ramjodi	
Gurguria	Kaliani	Utras	Uttras	Tamaksila – Uttras –	-do-
Guiguila	Tariani	Cirus	Ctitus	Kaliani – Podagorh –	40
				Banbasa – Kaptira	
Gurguria	Kaliani	Utras	Uttras	Olkudar – Kaliani –	-do-
Guiguila	Kuituiii	Cirus	Cttrus	Padagorh – Tilabadi –	uo
				Bakla	
Gurguria	Kaliani	Ektali	Kanthikana	Kanthikana –	-do-
Guigaria	Tariani	Ziktuii	Tantinkana	Kamadabadi – Ektali –	40
				Bakla	
Gurguria	Kaliani	Kaliani	Kaliani	Kaliani –Dhalabani –	-do-
Guiguiia		Tadium	Tallall	Buranga – Kaptira	40
Gurguria	Kaliani	Kaliani	Kadagharion	Kadagharuan – Mayur	-do-
			U	– Badsole – Jashipur-	
				Kaptira	
Gurguria	Kaliani	Kaliani	Dhalabani	Chadripahad –	-do-
				Dhalabani – Kaliani –	
				Podaghorh – Bantasa-	
				Kaptira	
Gurguria	Kaliani	Ektali	Kaptira	Dhalabani – Badsole –	-do-
			•	Kaptira	
Gurguria	Kaliani	Ektali	Kaptira	Olkudar – Padagorh –	-do-
			1	Banabasa – Kaptira	
Gurguria	Kaliani	Ektali	Matiagarh	Olkudar – Tilabadi –	-do-
				Asanbani – Matiagorh	
Gurguria	Kaliani	Ektali	Bakala	Olkudar – Tilabadi-	-do-
6				Asanbani – Ektali	
Gurguria	Jashipur	Jashipur –	Jashipur	Dhalabani – Badsole –	-do-
	-F	Beat – I	r	Jashipur	
Karanjia	Kadadiha	Sunaposi	Rudang	Nearby way from the	-do-
- I I I I I I I I I I I I I I I I I I I	1100001110	Danapooi		1 . carej waj nom die	<u> </u>

				village concerned	
Karanjia	Kadadiha	Sunaposi	Milu	-do-	-do-
Karanjia	Kadadiha	Sunaposi	Kadadiha	-do-	-do-
Karanjia	Karanjia	Karanjia –I	Karadia	-do-	-do-
Karanjia	Karanjia	-do-	Rasamtala	-do-	-do-
Karanjia	Singda	Ghosda	Chadeibhol	-do-	-do-
Karanjia	Raruan	Raruan	Bhanjabeda	-do-	-do-
Kendu mundi	Kendu mundi	Edelbeda	Edelbeda – Burusahi	Edelbeda – Asanbani	-do-
Kendu mundi	Baghlata	Bisipur	Bisipur – Baliposi	Bisipur – Baliposi	-do-
Satkosia	Noda	Balidiha	Kundai	Kundei – Biridiha	-do-
Satkosia	Mohuldiha	Bhaliadal	Bhaliadal – Satbedi	Bhaliadal – Satbedi	-do-
Dudhiani	Barakamuda	Barakamuda	Barakamuda	Miluchaka	-do-
Dudhiani	Barakamuda	Barakamuda	Khalpada	S.Ra.chpur	-do-
Dudhiani	Barakamuda	Barakamuda	Ranibhol	Khalpada	-do-
Dudhiani	Barakamuda	Barakamuda		Jolda	-do-
Dudhiani	Barakamuda	Barakamuda		Ranibhol	-do-
Dudhiani	Dudhiani	Dudhiani	Dudhiani	Dudhiani – Anlakata	-do-
Dudhiani	Dudhiani	Dudhiani	Ramjodi	Ramjodi	-do-
Dudhiani	Dudhiani	Dudhiani	Budhigaon	Budhigaon	-do-
Dudhiani	Ranipat	Ranipat	Pahadpur	Pahadpur	-do-
Dudhiani	Ranipat	Ranipat	Malaharpada	Kaleitumba – jumridiha	-do-
Dudhiani	Ranipat	Ranipat	Ranipat	Baragadia – Kiajhori	-do-
Dudhiani	Ranipat	Ranipat	Kiajhari	Matakancha – Kiajhari	-do-
Dudhiani	Tato	Tato	Batpalasa	Batpalasa – Nakuda	-do-
Dudhiani	Tato	Tato	Salarapada	Batpalasa – Rasamtala	-do-
Dudhiani	Tangabila	Tangabila	Sunariposi – Batesahi	Sunariposi – Bakla Batesahi – Bakla	-do-

## **Sensitive routes in Rairangpur Division**

Name of Range	Name of Section	Name of Beat	Poaching /Timber smuggling sensitive village	The sensitive and smuggling routes.	Surveillance patrolling days made during the last 6 month in (i.e. from March to August-2012)
Manada	Manada	Alhapani	Alhapani	Alhapani- Pandabandha route.	Alternate days patrolling
	Manada	Tamalbandha	Tamalbandha	Baghiatangar – Sijupahad-Haldia Route	Alternate days patrolling
	Manada	Tamalbandha	-do-	Sansialinai –Ghagra	-do-

				footpath	
	Jamuani	Jamuani	Rajupal	Rajupal-Kolhakocha footpath	Alternate days patrolling
Bisoi	Talabandha	Charabandha	Charabandha	Charabandha- Karkachhia- Bandriposi	-do-
				Charabandha-Bhatunia	-do-
				Charabandha- Karkachhia-Chahala	-do-
				Charabandha- Kusumtota-Bhatunia	-do-
				Charabandha- Kusumtota.	-do-
	Talabandha	Talabandha	Talabandha	Talabandha- Kairakachha- Bhalughar-	-do-
				Pududihi- Bandabandha- Chahala Ring Road	-do-

#### ANNEXURE XLIX

## LIST OF FIRE PRONE FRINGE VILLAGES

Name of the Range	Name of the fringe villages
Chahala	1. Bandiriabasa
	2. Barsia
	3. Asanbani
	4. Bad-uski
	5. Kolha
	6. Nuniagoda
	7. Routola
	8. San-Uski
	9. Barehipani
	10. Chakundakacha
	11. Haladia
	12. Jajadiha
	13. Kulijhari
	14. Phulbaria
	15. Rajupal
	16. Charabandha
	17. Dantiakocha
	18. Allapani
	19. Amdapani
	20. Barubeda
	21. Basilakacha
	22. Baduakacha
	23. Chakidi
	24. Jamtolia
	25. Jarkani
	26. Khadighati
	27. Kukurbhuka
	28. Kusumtota
	29. Phuljhari
	30. Purunapani
Nawana North	1. Balarampur
	2. Kukurbhuka
	3. Nawana
	4. Nigirdha
Nawana South	1. Budhabalanga
	2. Garh-Similipal
	3. Gopinathpur
	4. Lembujharan

	5. Makabadi
	6. Saruda
	7. Bakua
	8. Astakuanr
Pithabata WL	1. Pithabata
	2. Lulung
	3. Lalpani
	4. Gobindpur
	5. Kakarpani
	6. Laxmiposi
	7. Kuchudaghati
Jenabil	1. Jamunagarh
National Park	1. Badkasira
	2. Barigaon
	3. Bharadachua
	4. Bilapagha
	5. Chandikhaman
	6. Gurguria
	7. Kabatghai
	8. Khadiadunguri
	9. Khejuri
	10. Kundabai
	11. Kuanribil
	12. Kumara
	13. Kusumi
	14. Lenjighosara
	15. Sankasira
	16. Saharpat
	17. Kiajhari

#### ANNEXURE L

## LIST OF FIRE LINES IN CORE AREA

Range	Name of fire line	Length in Km
Pithabata	Lalpani to Digdiga via Dalkikacha	10
	Sitakund to Kalipahad	08
	Bhajam to Namti via Saminala	11
	Bhajam chhak to Bhandadhar via Edelkacha	12
	Baunskhal chhak to Baunskhal	10
	Namti to Badamakabadi	20
	Badamakabadi to Sabarbasa	08
	Badamakabadi to Bahalda	12
	Kachudahan to Bhandadhar	10
	Sub-total	101
Nawana South	Jharanaghati to Bhadragada	06
	Bakua to Dhudurchampa	15
	Bakua to Lembugada	07
	Lembugada to Kadochapal	04
	Dhudurchampa to Lengdakacha to	10
	Gopinathpur	07
	Dhudurchampa to Dhundubasa	07
	Dhudurchampa to Haradhiri	12
	Jadapal chhak to Jadapal	07
	Sanmakabadi to Balikhal to Domuhani	10
	Other footpaths	10
	<b>Sub-total</b>	88
Nawana North	Kusumbani to Bhatunia	30
	Kusumbani to Chhakidi footpath	
	Kusumbani to Pandabandha	
	Nigirdha to Panasia	30
	Nigirdha to Bhandadhar	
	Nigirdha to Kukurbhuka hilltop	20
	Khadkei to Bhajam Khadkei to Talakpadia	30
	Khadkei to Sasanjharan	
	Khadkei to Bhandadhar	
	Bhandadhar to Tirilakhal	30
	Bhandadhar to Lababuru	_
	Bhandadhar to Hedelkacha	
	Bhandadhar to Hapunagar	
	Joranda to Pundihasa	30
	Joranda to Gitilpidi	
	Joranda to Ganeigura ring road	

	Pandabandha to Jhandiburu	30
	Pandabandha to Pansia	
	Pansia to kukurbhuka footpath	
	Pansia to Sasanjharan	
	Sub-total Sub-total	180
Upper Barakamuda	Mandadar to Kiabasa	10
	Baladi to Khadichua	06
	Balidar to Dhobighat	06
	Dhobighat to Bahaghar	14
	Meghasani to Putulidiha	05
	Tangria to Tikitali via Solpada	06
	Chakasila to Sikaribasa	08
	Dhuduram to Sikaribasa	04
	Luhabita to Meghasani	05
	Khadichua chhak to Badabaladi	08
	Mandachaturi to guniamba bhola	05
	Mathasila to Mandachaturi	04
	Kukurmachia to Bhalukanthi	05
1	Bhanjabasa to Ujiapindi – Putulidiha	10
	Khairapura to Putulidiha	10
	Bahaghar to Dala	08
	Kulachua to Pokharibadi	06
	Ankurabasa to Kandadhenu	06
	Matughar to Bengapani	08
	Gayalgada to Matughar	08
	Mandadar to Meghasani	07
	Meghasani to Khairiburu	04
	Chakasila to Bachhurichara	05
	Dhuduram to Jamum	10
	Bengapani to Dala	09
	Mandachaturi to Balidar	04
	Nekdanacha to Kukurmachhia (Old road)	08
	Gunduria to Mahulhudi	08
	Khairburu to Kadalibadi	06
	Zoka to Putulidiha	08
	Sub-total	211
Jenabil	Dalmati to Khejuri	08
J.IIIIOII	Jenabil to Chhatadanda	13
	Jenabil to Jampani	12
	Dhalamati – Jenabil to Mohantahana	14
	Kulipal towards Jenabil	05
	Jenabil to Beguniakacha	04
	Sarabassa to Balidar	04
	Dalamati to Salmundi	07

	Gourkantha to Sarua	13
	Marwadibasa to Tangiria	10
	Tiktali towards Kiabasa Dandi	10
	Tangiria to Kiabasa	06
	Sub-total Sub-total	106
Chahala	No entry chhak to Asanbani	07
	Brundaban to Janagada saltlick	04
	Dalkikacha to Panasakacha	07
	Badua Akala to brundaban	06
	Murgabadi saltlick to natural saltlick	03
	Kairakacha dam to telijhari footpath	04
	Kairakacha beat to Khadiabasa footpath	04
	Tambughati to Pindarposi footpath	07
	Chandanpahad to begunaladam footpath	05
	Labaladam to Durduri footpath	04
	Bhatunia beat to Gomiabhandar footpath	04
	Mardalam to Bhatunia Beat footpath	04
	Bhatunia daldali to Sukrijobe footpath	02
	Fall view FRH to machinenala	06
	Barehipani to Ranikapat footpath	03
	Bakrasahi to karkachia footpath	05
	Jarasahi to Bandirabasa coreline	07
	Barehipani to Bingburu company road	04
	Lokeburu to Kalehihunda	05
	Matighati to Rangapahad core line	06
	Champaghati to Basaghutu	06
	Champaghati to Balidarha	07
	Matighati to fall view road	05
	Sub-total	115
National Park	Kabataghai to Matiaghat	08
	Bakua to Khejuri	12
	Matiaghat to Nuagaon	07
	Matiaghat to Mahabirsal	12
	Mahabirsal to Nimiadanda	06
	Mahabirsal to Kalkam	04
	Naligoda to Bhatrandha	05
	Ghandakaran to Baladighat	05
	Ghutughutu to Ganapati	10
	Matiaghat to Ambabagan	05
	Shikaribasa to Gambhiranala	07
	Nuagaon to Mohantahana- Garumbara	05
	Mohantahana to Dhal	05
	- ·· ·· ·· ·· ·· ·· ·· <del>·</del> · <del>·</del> · <del>· ·</del> · · · ·	1

<b>Sub-total</b>	109
Bhardachua to Khejuri	03
Rangamatia to Baghiadarh	05
Ranidarh to chandposi gada	04

#### **ANNEXURE LI**

# CASES BOOKED IN LAST FIVE YEARS

# Cases booked under Odisha Forest Act, 1972

Year	Division	No	o. of ca	ses	Timber seized in cum	Ve	Vehicles seized		Perso ns arres ted
		OR	UD	Total		Motoriz ed	Non- motorized	Total	
2007-	STR	0	0	0	0	0	0	0	0
08	Baripada	1226	577	1803	104.4595	17	423	440	66
	Karanjia	1020	225	1245	267.797	08	174	182	79
	Rairangpur	530	145	675	22.232	07	41	48	134
2008-	STR	0	0	0	0	0	0	0	0
09	Baripada	577	376	953	72.23	07	301	308	54
	Karanjia	515	118	633	50.48	05	47	52	51
	Rairangpur	277	76	353	28.69	03	12	15	58
2009-	STR	0	0	0	0	0	0	0	0
10	Baripada	1131	515	1646	100.7971	13	474	487	95
	Karanjia	978	409	1387	285.204	13	126	139	23
	Rairangpur	696	132	828	20.365	28	38	66	24
2010-	STR	0	0	0	0	0	0	0	0
11	Baripada	318	141	459	12.8632	04	85	89	14
	Karanjia	448	138	586	88.048	20	47	67	18
	Rairangpur	119	18	137	12.1934	0	02	02	28
2011-	STR	0	0	0	0	0	0	0	0
12	Baripada	941	741	1682	93.2051	27	0	27	122
	Karanjia	1240	329	1569	203.768	04	0	04	54
	Rairangpur	641	78	720	9.016	03	00	03	16
2012-	STR	0	0	0	0	0	0	0	0
13	Baripada	636	501	1137	6.65	02	423	20	01
	Karanjia	489	271	760					
	Rairangpur	520	50	570					

# **Cases booked under Wildlife Protection Act**

Year	Division	No.	of cas	es	Timbe	Vehicles seized			Persons
		О	U	Tota	r seizes	Motorize	Non-	Tota	arreste
		R	D	l	in cum	d	motorize	l	d
							d		
2007	STR	22	73	95	2.78	0	0	0	16
-08	Baripada	08	09	17	0	0	0	0	09
	Karanjia	02	03	05	0	0	0	0	02
	Rairangpu	01	03	04	0	0	0	0	01
	r								
2008	STR	02	27	29	1.91	0	09	09	02
-09	Baripada	06	05	11	0	0	0	0	08
	Karanjia	0	03	03	0	0	0	0	08
	Rairangpu	01	03	04	0	0	0	0	01
	r								
2009	STR	0	72	72	23.28	0	08	08	00
-10	Baripada	19	06	25	0	0	0	0	22
	Karanjia	0	05	05	0	0	0	0	0
	Rairangpu	0	01	01	0	0	0	0	0
	r								
2010	STR	05	51	56	16.354	0	0	0	05
-11					5				
	Baripada	05	04	09	0	0	0	0	07
	Karanjia	02	02	04	0	0	0	0	02
	Rairangpu	01	02	03	0	0	0	0	02
	r								
2011	STR	05	49	54	2.08	01	11	12	09
-12	Baripada	01	02	03	0	0	0	0	34
	Karanjia	04	02	06	0	0	0	0	08
	Rairangpu	01	00	01	0	0	0	0	07
	r								
2012	STR	11	57	68	00	0	0	0	26
-13	Baripada	00	01	01	0	0	0	0	6
	Karanjia	01	00	01	0	0	0	0	01
	Rairangpu	02	00	02	0	0	0	0	08
	r								

### ANNEXURE LII

# POACHING CASES IN LAST THREE YEARS

Year	Name of Division	Name of the animal	No. of animal killed
2009-10	STR	Elephant	1
	Baripada	Sambar	3
		Mouse deer	2
		Barking deer	4
		Spotted deer	1
	Karanjia	Nil	-
	Rairangpur	Langur	1
2010-11	STR	Elephant (F)	4
		Elephant (M)	2
		Elephant (Calf)	1
		Juvenile Elephant	1
		Elephant (Unknown)	2
		Barking deer(F)	1
		Sambar(F)	3
		RBT(F)	1
	Baripada	Sambar	1
		Wild cat	2
	Karanjia	Elephant (Unknown sex)	2
		Sambar	1
		Wild Boar	1
	Rairangpur	Elephant (F)	1
		Elephant (calf)	1
2011-12	STR	Elephant(M)	1
		Juvenile Elephant	1
		Sambar (M)	1
		Sambar(F)	1
	Baripada	Elephant (newly born baby male)	1
		Spotted deer (M) 2yrs.	1
	Karanjia	Elephant (F)	2
		Elephant (Calf)	1
		Elephant (F)	1
		Elephant (5-7yrs)	1
		Elephant (3yrs)	1
Total			48

# ANNEXURE LIII TOURIST INFLOW

Year	Period	Indian	Foreigner	Total	Tourism closed season
1980-81	Apr./March	5,979	39	6,018	None
1981-82	Apr./March	4,632	36	4,668	None
1982-83	Apr./March	5,601	46	5,647	None
1983-84	Apr./March	7,270	34	7,304	None
1984-85	Apr./March	5,078	23	5,101	None
1985-86	Apr./March	8,414	35	8,449	None
1986-87	Apr./March	8,458	44	8,500	None
1987-88	Apr./March	11,248	54	11,302	None
1988-89	Apr./March	14,994	51	15,045	16 June – 15 Oct
1989-90	Apr./March	15,176	81	15,257	16 June – 15 Oct
1990-91	Apr./March	14,002	88	14,090	16 June – 15 Oct
1991-92	Apr./March	12,579	87	12,656	16 June – 15 Oct
1992-93	Apr./June	19,260	72	19,332	16 June – 15 Oct
1993-94	Nov./June	17,493	132	17,6255	16 June – 31 Oct
1994-95	Nov./June	16,908	148	17,056	16 June – 31 Oct
1995-96	Nov./June	20,236	134	20,370	16 June – 31 Oct
1996-97	Nov./June	21,133	140	21,273	16 June – 31 Oct
1997-98	Nov./June	24,413	161	24,574	16 June – 31 Oct
1998-99	Nov./June	19,377	163	19,530	16 June – 31 Oct
1999-00	Nov./June	13,403	84	13,487	16 June – 31 Oct
2000-01	Nov./June	22,142	129	22,271	16 June – 31 Oct
2001-02	Nov./June	22,508	146	22,654	16 June – 31 Oct
2002-03	Nov./June	21651	172	21,823	16 June – 31 Oct
2003-04	Nov./June	17125	192	17,317	16 June – 31 Oct
2004-05	Nov./June	19,677	171	19,848	16 June – 31 Oct
2005-06	Nov./June	14,064	189	14,253	16 June – 31 Oct
2006-07	Nov./June	13,256	240	13,496	16 June – 31 Oct
2007-08	Apr-Mar	15,105	164	15,269	16 June – 31 Oct
2008-09	Apr-Mar	20,561	182	20,743	16 June – 31 Oct
2009-10	Apr-Mar	Nil	Nil	Nil	Closed due to Maoist Attack.
2010-11	22.12.2010-	5693	44	5737	16 June – 31 Oct
2010-11		3073		3737	10 June – 31 Oct
2011 12	31.03.2011	14007	0.5	14.452	16 1 21 0 :
2011-12	14.11.2011-	14,367	85	14,452	16 June – 31 Oct
	15.06.2012				
2012-13	09.11.2012-	24,452	43	24,495	1 <sup>st</sup> July -31 <sup>st</sup> Oct
	30.06.2013				
2013-14	11.11.2013-	23,900	29	23,929	1 <sup>st</sup> July – 31 <sup>st</sup> Oct
	30.06.2014				

# ANNEXURE LIV

# REVENUE FROM TOURISM

year	Revenue collected
1992-93	95,926
1993-94	92,994
1994-95	2,28,200
1995-96	3,57,494
1996-97	6,25,778
1997-98	9,00,873
1998-99	8,42,743
1999-00	6,12,629
2000-01	9,40,893
2001-02	8,46,049
2002-03	9,44,109
2003-04	9,55,900
2004-05	12,15,739
2005-06	11,21,271
2006-07	22,61,646
2007-08	25,50,259
2008-09	26,98,952
2009-10	1,64,469
2010-11	6,84,020
2011-12	13,36,450
2012-13	20,38,052
2013-14	28,37,250

#### ANNEXURE LV

# COUPE WORKING IN LAST THREE YEARS

### Coupe working in last 3 years

Sl. No.	Name of the coupe & felling series	Area of coupes	Trees marked	Trees felled	Trees not	Reason for not
					felled	felling
1	2	3	4	5	6	7
2009	- 10					The
1	Kendumundi / Tikarpada FS	262.80	02	02		OFDC Ltd
2	Thakurmunda / Taramara FS	325.00	08	08		are not
3	Satkosia / Satkosia FS	594.80	50		50	willing to
4	Notto XIV3(P)	380.0	221	221	-	work out
2010	- 11					the
1	Kendumundi / Tikarpoda FS	260.00	06	06		Satkosia
2	Thakurmunda / Taramara FS	324.60	19	19		coupes of
3	Satkosia / Satkosia FS	718.00	135		135	Satkosia
4	Karanjia/ Podheidhara	106.00	01	01		Range
5	Notto XV(P)	380.0	350	350	-	during the
2011	<b>- 12</b>					year 09-10
1	Kendumundi / Tikarpoda FS	266.40	15	15		and 10-11,
2	Thakurmunda / Taramara FS	240.00	02	02		as these
	(Now under the contract of					coupes are
	SatkosiaRange)					not
3	Satkosia / Satkosia FS	673.60	23	23		profitable
4	Karanjia / Podheidhara	106.00	02	02		to them.
5	Notto XVI(P)	422.15	277	-	-	

Sl. No.	Name of the coupe & felling series	Area of coupes	Trees marked	Trees felled	Trees not felled	Reason for not felling
1	2	3	4	5	6	7
2012-13						
1	Thakurmunda / Taramara FS	314.00	13			The coupes are not delivered to OFDC
2	Satkosia / Satkosia FS	702.80	26			Ltd.
3	Kendumundi / Tikarpada FS	234.00	13			There are no dead and wind fallen trees available in Coupe No.XVII of Podheidhara FS of Karanjia Range and Gurguria FS of Gurguria Range.

#### ANNEXURE LVI MAN – ELEPHANT CONFLICT

**Man-Elephant Interface in Baripada Division.** 

Year	Man	Human	House Damage	Crop Damaged	Death Of
	Killed By	Injured By	By Elephant	By Elephant	Elephant
	Elephant	Elephant		Area in Acres	-
2005-06	03	01	22	50.9	03
2006-07	00	00	07	0.9	03
2007-08	02	00	145	52.36	03
2008-09	00	01	197	485.79	03(by
					electrocution)
2009-10	02	00	50	190.75	00
2010-11	03	01	72	939.48	00
2011-12	03	00	64	478.01	02
2012-13	02	01	38	471.09	02

Man- Elephant Interface in Rairangpur Division.

Year	Man	Human	House Damage	Crop Damaged	Death Of
	Killed By	Injured By	By Elephant	By Elephant	Elephant
	Elephant	Elephant		Area in Acres	
2005-06	02	01	-	47.34	01
2006-07		-	-	24.17	00
2007-08	01			11.14	
2008-09				27.335	
2009-10				85.85	01
2010-11	01	00		94.06	02
2011-12	00	00	Nil	65.00	Nil
2012-13	01	00	Nil	99.85	03

# Man- Elephant Interface in Karanjia Division.

Year	Huma	No of	No Of	Crop	No Of Elepha	nt Death
	n	Human	House	Damaged	Causality	Natural
	Kille	Injured	damaged By	By Elephant	Causanty	Ivaturar
	d by	By	Elephant	Area in		
	Eleph	Elephant		Acres		
	ant					
2005-06	-	-	-	239.77	1	3
2006-07	01	05	22	496.0	1	1
2007-08	01	01	71	27.032	1	2
2008-09	01	01		93.27	1	1
2009-10	02	02	61	432.51	03	01
2010-11	0	0	89	464.66	03	-
2011-12	01	0	65	38.52	03	-
2012-13	03	02	84	375.555	0	0

# ANNEXURE LVII

# AREA DISTRIBUTION FOR TRADITIONAL USE ZONE

Sl No	Name of the village / villages	Compartment Name	Area in km <sup>2</sup>
1	Nigirdha	BLE-20	7.56
2	Makabadi		
3	Kukurbhuka		
4	Gopinathpur		
5	Nawana	BLW-16(P)	6.19
6	Balarampur		
7	Astakumar		
8	Garhsimilipal	BLE-21(P)	1.60
9	Saruda	BLE-21(P)	1.40
10	Budhabalanga	BLE-22(P),23(P),BLW-7(P), 8(P)	2.66
11	Bandirabasa	Part of BH-17 Part of BH-18	7.50
12	Phulbari	7	
13	Jadadiha	7	
14	Lembujharan	Part of BH-18	1.50
15	Barehipani	BLW-14(P), 15(P), BH-11(P)	3.00
16	Barsia		
17	Haldia		
18	Chakundakacha	BH-6(P)	1.40
19	Kuljhari		
20	Asanbani	Part of BH-9	2.50
21	Nuniaguda	BH-10	6.00
22	Sanuski		
23	Baduski		
24	Routola		
25	Kolha	Part of BH-15	1.50
26	Bilapagha	Part of KH-3	1.00
27	Khejuri	KH-17(P), 19(P)	1.93
28	Kuanribil	Part of KH-12	1.50
29	Nenjigosara	Part of KH-3	3.00
30	Gurguria	7	
31	Chandikhaman	KH-11	6.00
32	Kumari	7	
33	Saharpat	7	
34	Khadiadunguri	7	
35	Kundibil	KH-13(P)	5.00
36	Badkasira		
37	Bharrachua	7	
38	Kusumi	KH-10(P)	1.13
39	Sankasira	KH-15(P), KH-16(P)	3.00
40	Barigaon		
41	Dantiakacha	Part of BLW-9	3.00

42	Charabandh		
43	Kusumtota	BLW-13(P), BLE-4(P)	4.50
44	Chakidi		
45	Jamtolia	BLW-10(P)	7.24
46	Khadighati		
47	Amdapani		
48	Kukurbhuka		
49	Purunapani		
50	Phuljhari	BLE-5(P)	2.00
51	Bhaduakacha		
52	Jarkani	BLE-1	6.00
53	Barubeda		
54	Basilakacha		
55	Alapani		
56	Rajupal	BH-8	2.00
57	Kiajhari	WD-5(P)	2.00
58	Chaulajhari	Satkosia R.F. 1 and 3 and Nada	5.00
59	Duarsoni	R.F.	
60	Khandabarai		
61	Gahiganda		
62	Baldiha		
63	Tarana	Tunguru R.F. and Bidhubhandar	6.0
64	Hatichhad	R.F.	
65	Duarsuni		
		Total	103.11

#### **ANNEXURE LVIII**

#### NAXALITE ATTACK IN SIMILIPAL TIGER RESERVE

**28.03.2009:** At night 3 groups of naxalites which included some ladies attacked upon the Chahala cpmplex and bomb blasted the Range Office and staff quarters. They also attacked the tourists staying there, robbed up their valuables and ransacked the tourist complex and Forest Rest hpuse at chahala at about 8.40 PM. The naxalite did not spare the labourers camping at Chahala for departmental works and robbed their money accumulated by earning their wages. In the same night one group attacked Range Office and staff quarters of Nawana South Range located at dhudurchampa and torched the buildings along with all the furniture and office records. One group of naxalite attacked the wireless infrastructure of STR and Police at Meghasani hill top and at 12.00 midnight torched the accommodation available there.

**29.03.2009:** At about 5.00 AM in the morning the naxalites attacked upon the Range Office at Upper Barakamuda, bomb blasted and burnt the building and all the office records along with the furniture. The Range Officer was out of headquarters as he had been to Karanjia to remand seven accused persons arrested on 28.03.2009 out of around 200 persons who entered the core area for poaching.

**30.03.2009:** During day time the watch tower at Gurandia in Jenabil Range was torched.

**31.03.2009:** There were a series of attacks at different places. The tourist complexes and Forest Guard quarters at Joranda in Nawana North Range, Forest Guard quarters at Dhundubasa and Lengedakacha in Nawana South Range were torched and the tourist complex along with the Forest Rest house at Gurguria under Karanjia Forest Division was damaged. In the same night the captive elephant Mahendra sustained injury on his body due to gun shots, which was inflicted by the miscreants.

**01.04.2009:** The log house (FRH) and Range Office with its complex at Jenabil was broken and torched. On the same night the naxals attempted to attack upon the Range Office of Nawana North Range at Nawana but failed due to presence of police protection force and SOG.

**03.04.2009:** The check gate at Kalikaprasad under National Park Range was damaged and the seized produce were taken away. The Beat house at Khejuri under gurguria Range of Karanjia Division was also damaged and seized produce taken away.

**04.04.2009:** The Forest Rest house at Jamuani was damaged and the seized produce were taken away by the miscreants.

**05.04.2009:** In Pithabata (Wildlife) Range in Similipal Tiger Reserve, the naxalite attempted to attack upon the Range Office and took away the seized produce. The Beat house at Namti was damaged and seized produce were taken away. In the same night the miscreants attacked Brundaban check gate of Chahala Range and damaged it.

**06.04.2009:** The Beat house at Ransa in National Park Range was damaged and doors and windows were burnt, the seized produce were taken away. In the night the wooden bridge in

Gurguria-Nuagaon forest road was burnt, the seized produce were taken away. In the night the wooden bridge in Gurguria-Nuagaon forest road was burnt disrupting the communication.

**07.04.2009:** The miscreants torched the wooden bridge near Devasthali in UBK Range. On the same day the Beat house at Nuagaon, Kabatghai and Khejuri in National Park Range were torched and damaged. Bakua Beat house of Nawana South Range and Barehipani Beat house of Manada Range in Rairangpur Division were damaged and seized produce were taken away.

**15.04.2009:** The Beat house of Baniabasa in Udala Range of Baripada Division and check gate of Baniabasa under Jenabil Range were torched and damaged. The Forest Rest House and staff quarters at Bhanjabasa in UBK Range and staff quarters at Kachudahan in Pithabata (Wildlife) Range were damaged.

#### **Chronology of attack by Naxals**

Date & Time	Range	Place	Type of damages	Property damaged
28.03.09 (7.00 PM to 8.00 PM)	Nawana South	Dhudurchampa	Torched	Four buildings
28.03.09 (8.40	Chahala	Chahala	Bomb blast & torched	Range Office & staff quarters
PM)			Broken	i.Doors, windows of FRH, C-villa, E-villa ii. 17 tourist were robbed of
				their valuables iii. Labourers camping at Chahala were robbed of
			Torched	their money VHF station
28.03.09 (10.45 PM)	UBK	Meghasani	Bomb blast	VHF machinery removed
29.03.09 (5.00 PM)	UBK	UBK	Bomb blast	Range & staff quarters
30.03.09 day time	Jenabil	Gurandia	Torched	Watch tower
31.03.09 (2.00 PM)	Nawana North	Joranda	Torched	Four nos tented accommodation and FG quarters
31.03.09 day time	Nawana South	Dhundubasa	Torched	FG quarters
31.03.09 day time	Nawana South	Lengdakacha	Torched	FG quarters
31.03.09 night	Gurguria	Gurguria	Broken	Doors, windows of FRH & Bamboo Hut

			Gun & Arrow shot	Captive elephant "Mahendra"
01.04.09 day time	Jenabil	Jenabil	Torched	Log house & Range Office
01.04.09 night	Nawana North	Nawana	Attempted to attack	Nawana Range Office
03.04.09 night	National Park	Kalikaprasad	Damaged	Check gate and seized produce taken away
	Gurguria	Khejuri	Damaged	Beat house damaged & seized produce taken away
04.04.09 night	Manada	Jamuani	Damaged	Jamuani FRH damaged & seized produce taken away
05.04.09 night	Pithabata	Pithabata	Attempted to attack	Pithabata WL Range Office and seized produce taken away
		Namti	Damaged	Beat house damaged & seized produce taken away
	Chahala	Brundaban	Damaged	Beat house & check gate damaged
06.04.09	National Park	Ransa	Damaged/ Torched	Beat house damaged, doors & windows torched/ seized produce taken away
		Gurguria- Nuagaon forest road	Torched	Wooden bridge before Ransa
07.04.09	UBK	Near Devasthali	Torched	Wooden bridge
	National Park	Nuagaon	Torched & damaged	Nuagaon beat house
	National Park	Kabatghai	Torched & damaged	Beat house
	National Park	Khejuri	Torched & damaged	Khejuri Beat house
	Nawana South	Bakua	Damaged	Beat house & seized produce taken away
	Manada	Barehipani	Damaged	Beat house & seized produce taken away
15.04.09	Jenabil	Baniabasa	Damaged	Torched damaged Beat house
Date not ascertaine d	UBK	Bhanjabasa	Damaged	FRH/ staff quarters
Date not ascertaine d	Pithabata WL	Kachudahan	Damaged	Beat house
	records, go	ovt store artiles and	personal belongings	of staff have bee looted and

burnt

**ANNEXURE LIX** 

#### PAST EXPENDITURE OF PROJECT TIGER FUND

Sl No	Year	Allotment	Expenditure
1	2007-08	193.28	192.03
2	2008-09	602.46	439.94
3	2009-10	296.64	244.26
4	2010-11	868.87	835.43
5	2011-12	602.09	384.85
6	2012-13	195.540	195.540

**ANNEXURE LX** 

# LIST OF SURVEY OF INDIA TOPOSHEETS COVERING SIMILIPAL TIGER RESERVE

Sl. No.	Toposheet number	Scale
1.	73J/4	1:50,000
2.	73Ј/8	1:50,000
3.	73J/12	1:50,000
4.	73K/1	1:50,000
5.	73K/2	1:50,000
6.	73K/3	1:50,000
7.	73K/5	1:50,000
8.	73K/6	1:50,000
9.	73K/7	1:50,000
10	73K/9	1:50,000
11.	73K/10	1:50,000
12	73J	1:2,50,000
13	73K	1:2,50,000

#### **ANNEXURE LXI**

#### LIST OF THE SATELLITE IMAGERY WITH SPECIFICATIONS

- 1. False colour composite (FCC) image of Similipal IRS 1D LISS-III (February, 1997).
- 2. False colour composite (FCC) image of Similipal IRS 1D LISS-III (February, 2003).
- 3. False colour composite (FCC) image of Similipal IRS 1D LISS-III (2012)

# ANNEXURE LXII

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A C	500	ent of Odisha	all shaped
0 10 2 V	JF&E., Bhubaneswar, D	***	11 show
Q-Var	M 8F(S)-19/2012 From:	Val OUT	COLORANA OF HARESTS
And the second	B.P.Singh,IFS Spl. Secretary to Government.		AAWEENAE WAR
1965	The Principal secretary to Governmen	4	24/30
1	Townsm & Culture Department The Principal Chief Conservator of Fo Bhubaneswar	200 Ball 1	The second secon
The Parket of	The P.C.C.F(WL) and CWLW,Odisha, Bhubaneswar.		***
and the same of th	Project Director, OFSDP, Bhubaneswa PCCF(KL), Bhubaneswar Managing Director, OFDC Ltd,	<u>ir</u>	
	Bhubaneswar. Sub: Eco-Tourism Policy in Odisha.		
,	Sir, I am directed to send herewith the C	)disha Forest Sector – Eco –To	purism Policy duly
	approved by Government for necessary follows		
		Yours	faithfully,
e 0		8-8-12	tary to Government.
	Copy along with copy of the Odish to Principal Secretary to Government, R Executive, C.D.A, Bhubaneswar/Director,	evenue & Disaster Manage	ment Deptt./ Chief ler, OTDC Ltd for
<u>I</u>	information and necessary action.	Spl. Secre	arry to Government.
1	Memo No. 14992 /F&E,dtd. Copy along with copy of the Odisha		Policy forwarded to
	the All KCCFs/ All DFOs for information and	necessary action.	3-57-18 JUN
	PKIM/	Spi. Secre	tary to Government.

#### ORISSA FOREST SECTOR

#### **ECOTOURISM POLICY**

#### 1. BACKROUND

The state of Orissa with its rich natural and cultural heritage is one of the most attractive tourist destinations in the country. The tourists, who know Orissa for its temples, crafts and dance, deserve greater exposure to its hinterland of hills, forest and wildlife. Well-endowed with vast forest areas, rivers, coast line, beaches, lakes and lagoon, the State provides unique opportunities for ecotourism in the state.

Orissa has about 31% of its land covered with forests, supporting around 86 species of Mammals, 473 species of birds, 110 species of Reptiles, more than 3000 species of Plants including 132 species of orchids, 60 species of Mangrove Plants and 350 species of Medicinal Plants. The rich biodiversity of the state is conserved mainly through a network of protected areas comprising 2 National Parks and 18 Sanctuaries. This network is complemented by wilderness areas, wetlands and other bio diverse sites along the coasts including mangroves and turtle rookeries. Elephants, tigers, leopards, blackbucks, crocodiles, Olive ridley turtles, Irrawaddy dolphins and migratory birds provide special attraction to the tourists.

Ecotourism, distinguished from other forms of tourism in terms of its minimal impact on the visited areas, is defined as:

"Responsible travel to natural areas that conserves the environment and improves the welfare of local people." (TIES, 1991)

Ecotourism offers an opportunity to showcase the state's unique natural and associated cultural heritage to visitors while enhancing the livelihood options for the local people.

#### 2. VISION

Ecotourism will promote *responsible* travel to natural areas and provide opportunities for visitors to experience firsthand, understand and 'quietly' enjoy the state's natural and cultural heritage. This will lead to conservation of nature, sustaining of ecological processes, increased respect for local culture and traditions and tangible improvement in the local economy.

#### 3.GOAL

To provide recreation and promote understanding about nature and wildlife conservation with income generation and employment opportunity to local people while according priority to bio-diversity conservation, ecosystem functioning and socio-economic development.

#### 4. OBJECTIVES

The above will be achieved through the following objectives:

- Objective 1 Promote amongst all stakeholders, awareness, experiential learning and understanding of the values and principles of *sustainable* and *responsible* community based *tourism*, particularly in relation to the state's protected areas and other areas of wilderness.
- Objective 2 Develop, brand and market an Orissa style of visitor experience, particularly with respect to promoting a 'quiet' enjoyment of its natural heritage.
- Objective 3 Invest in appropriate and eco- friendly infrastructure for ecotourism for tourists.

- Objective 4 Establish partnerships between all stakeholders to develop and promote destinations and activities in accordance with defined principles, standards and legal requirements of community based ecotourism.
- Objective 5 Build capacity of all stakeholders in natural and cultural heritage interpretation, hospitality, business and communication skills to successfully and sustainably manage tourist traffic.

#### 5. GUIDING PRINCIPLES FOR ECOTOURISM

- 5.1 Development of ecotourism action plan for important destinations: Ecotourism policy should be the guiding principle for promotion of ecotourism & immediate steps should be taken for development of ecotourism action plan for important destinations within the state. Three important thrust areas for ecotourism remain (i) Simlipal, (ii)Satkosia and (iii)Bhitarkanika. These are to be planned and developed for the tourists from within and outside state and the procedure for online advance booking for accommodation and entry into the sanctuary should be streamlined and made simple. The tourist accommodations in the peripheral locations outside the Protected Areas & Forests can be developed by Tourism Department/ OTDC Ltd./OFDC Ltd on its own or in PPP mode.
- **5.2 Infrastructure Development:** Development of infrastructure, improvement of facilities, and tourist circuits within the Protected Areas should be the function of the Wildlife Wing of Forest Department in accordance with the rules & regulation for protected areas. The destination development for other potential forest areas outside the sanctuary should be carried out by the Principal CCF (Odihsa). While implementing the policy and developing and operating ecotourism at ecotourism destinations, the prevailing Acts and Rules shall be adhered to.
- 5.3 Eco-tourists facilitation: The facilitation of the ecotourists, tour packages, route management / development and movement needs to be carried out by some out side agency in coordination with the Protected Area manager or DFO concerned. For the present, Orissa Forest Development Corporation Ltd. can take up this responsibility. It should provide one-stop solution such as obtaining permission to visit the designated places from competent authority, provide accommodation, facilitate transport arrangements with the help of bus/ taxi operators etc. OFDC Ltd. may raise internal resources or avail assistance from the Tourism Department for developing infrastructure and building their staff capacity.
- **5.4 Ecotourism Principles**: Ecotourism will be promoted and developed in accordance with the above vision, goal and objectives, based on the following core set of principles:

- Principle 1 Nature Area Focus provide visitors with the opportunity to directly experience nature.
- Principl 2 Interpretation provide opportunities to visitors to experience nature in ways that lead to greater understanding, appreciation and enjoyment.
- Principle 3 Environmentally Sustainable Practice ensure environmentally sustainable practices within the carrying capacity of the area.
- Principle 4 Promotion of Conservation and Benefits to Local Communities ensure promotion of conservation and tangible returns to the local communities.
- Principle 5 Respect Culture be sensitive to understand oral local culture
- Principle 6 Strategic Marketing for Customer Satisfaction to market and promote effectively so that realistic customer expectations are achieved.

#### 6. IMPLEMENTATION STRATEGY

The objectives will be achieved through the implementation of a strategy based on the following key initiatives.

- Strategy 1 The unique values (Unique Selling Points) of Orissa will be identified and agreed through a participatory, consensus-building process involving all stake holders such as key Government Departments, non-government organisations, private sector entrepreneurs and the community concerned. This will provide the basis for establishing an Orissa brand and responsible marketing of sustainable tourism, in which community-based ecotourism in and around protected areas will play a significant role. Outputs from this participatory process will include:
  - Strategy for marketing a responsible and sustainable tourism in Orissa, of which community-based ecotourism will comprise the core.
  - Establishment of partnership between the stakeholders namely tourism industry, Forest Department and local communities, to steer and coordinate the development of community-based ecotourism in and around protected areas and other wilderness areas.
  - The income generated from eco-tourism activity shall be ploughed back for the welfare of the community managing eco-tourism and for provision of eco-development and eco-tourism facilities.
- **Strategy 2** Capacity in the designing , establishment and management of ecotourism initiatives including destinations, will be strengthened and developed by:
  - Establishment of a centre of excellence for responsible tourism to <u>build</u> capacity within the local communities, government and private sector to take responsibility for achieving sustainable tourism, and to create better places for people to live in and for people to visit.
  - In-house training in responsible and sustainable tourism within public sectors (tourism, culture, forests, wildlife, etc.).
  - Responsible and sustainable tourism will be reinforced through eco-clubs and Green Volunteers.
  - Customised training courses for those engaged in community-based ecotourism enterprises; in natural and cultural heritage interpretation, hospitality, business management, communication skills etc.

 Preparation and promotion of best practices guidelines, codes, standards, audits, accreditation schemes and models concerned with different aspects of ecotourism.

- **Strategy 3** A web site will be established to promote, and coordinate the marketing of quality ecotourism initiatives in Orissa. The web site will promote ecotourism by:
  - Explaining the concept of ecotourism and its principles, with examples of best practices.
  - Highlighting Orissa's special values, thereby encouraging potential visitors to explore the website (and its links) further for potential destinations.
  - Providing information on/links to ecotourism destinations, eco-lodges, home-stays and other facilities in Orissa, including on-line booking.
  - Providing a transparent and objective audit of ecotourism enterprises that
    indicates the extent to which eco-lodges, home-stays and other ventures
    meet a predefined set of best practice criteria. This will enable the
    responsible travelier to make an informed choice of their
    destination/accommodation facility, while also encouraging enterprises to
    adopt and develop best practice.
- **Strategy 4** The ecotourism market will be promoted by investing in the development of a network of prime ecotourism destinations, having good, reliable means of access and ecolodges (and home-stays) that demonstrate best practice in the use of renewable resources (materials, energy etc), community management and experiential learning and quiet enjoyment for the visitors. Destination outputs will:
  - Promote use of renewable and biodegradable resources.
  - Management by registered (Divisional level) ecotourism societies comprising Joint forest Management Committees.
  - Promotion of non-motorised forms of transports as far as possible.
  - Activities will be of an experiential nature, enabling the visitor to learn and see from 'doing'. Trained and knowledgeable local instructors and guides will be available to lead/facilitate/interpret such activities.
  - Promotion of eco-friendly waste disposal methodologies.
- **Strategy 5** Research and monitoring will inform the outcomes and effectiveness of policy implementation, and the future development of ecotourism will be determined by environmental impact assessment, socioeconomic evaluation and its contribution to environmental conservation as well as the availability of benefits to the local community. In particular;
  - Ecotourism will be monitored with respect to (a) visitor impacts on the environment and local communities, and (b) the conservation message conveyed to visitors. Eco tourism plan shall be an integral part of the Wild life Management Plan of the Protected Areas.
  - Research will focus on generating new knowledge, insights and modalities for sustainable ecotourism.

- Potential impacts of projects including construction and development of visitor facilities will be assessed.
- Monitoring of eco tourism as per the carrying capacity in Protected Areas (PAs) and delineation of tourism zone in PAs would be done by the CWLW.

**Strategy 6** The Forest and Environment Department, Government of Orissa shall be the Nodal Department to promote ecotourism in the state.

- The department shall constitute the Orissa Ecotourism Development Board (OEDB) to act as the nodal agency.
- It shall be the Board's mandate to ensure the attainment of the objectives and goals set forth in this policy.
- The Board shall develop necessary systems and standards for the purpose.
- The Board shall be equipped with the required technical and financial resources.
- In case of any dispute, management of Protected Areas, Wildlife and Bio diversity shall take precedence over tourism.

Strategy 7 In the Protected Areas where registered Eco-tourism and Eco-development Societies are functioning, the eco tourism will be managed / promoted by the same society. In the areas, where no such society has been formed, the eco tourism will be managed / promoted by involving the Local Advisory Committee (LAC) under the chairmanship of the Collector of the district concerned. The LAC will have the following mandate and composition.

#### Mandate of LAC:

- To oversee the working of the State Ecotourism Strategy with respect to the concerned area and make recommendations to the State Government whenever necessary.
- To advise local and state government on issues relating to development of ecological tourism in non-forest areas, ecological-tourism zones etc.
- To ensure that at least 50% revenue from eco tourism flows to the local community.

#### In case of Protected Areas

- To ensure site specific restrictions on buildings and infrastructure in private areas in close proximity to core / critical wildlife habitat / National Park / Sanctuary or buffer zone, keeping in mind the corridor value.
- Regularly monitor all tourist facilities falling within 5 km of a Protected Area vis-à-vis environmental clearance, area of coverage, ownership, type of construction etc. for suggesting mitigation / retrofitting measures, if needed.
- Regularly monitor the activities of tour operators to ensure that they do not cause disturbance to the flora and fauna while taking visitors into the Protected Areas

#### Composition of LAC:

- District Collector (Chairman)
- Forest Range Officer in charge of the site (Member Secretary)

- · Territorial DFO concerned
- Honourary Wild Life Warden (if present)
- Official of State Tourism Department
- Block Development Officer
- Members of local Panchayats (2)
- Wildlife Expert (1)
- Local conservationists (2)
- Representatives from Civil Society Institution (1)
- **Strategy 8** The Government will promote establishment of tourism facilities especially within 5 km of the boundary of the eco-tourism area in a Public-Private-Community (PPC) partnership mode. The local community will be engaged for providing the services in such projects. The communities will be entitled to at least 30% of the net profits of such projects run through PPC partnership.
- **Strategy 9** Govt. may levy a "Local conservation cess" as a percentage of turn-over (to be determined by the Government), on all privately-run tourist facilities within 5 km of the boundary of the eco-tourism area. The funds thus collected will be earmarked to fund the eco-tourism area management, conservation and livelihood development. The rationale for a local conservation cess will be explained to the public at large, including through clear signage at local tourist facilities.
- Strategy 10 Development of private Guest Houses and tourist lodges enroute and outside the Protected Area/ Forests limits should be planned and developed by the OFDC Ltd/OTDC Ltd/ Private Operators for facilitation of ecotourism in compliance with the guidelines issued by Ministry of Environment and Forestry in this regard.
- Strategy 11 The forest staff posted in the Protected Areas should be sensitized and trained to interact & facilitate the eco-tourists and explain about the various aspects of conservation and development of wilderness, forests & wildlife and natural resource. Good literature, Souvenir shops & signage etc. should also be developed to make the eco-tourism more attractive.

#### Appendix - I

#### **ECOTOURISM ACTIVITIES**

Ecotourism activities shall be site-specific. Following are some of the recommended ecotourism activities and facilities:

#### **FACILITIES**

- a. Nature Camps including day visitor centres and nature trails
- b. Eco-friendly accommodation including home stays
- c. Nature shops
- d. Nature Education and Interpretation Centres with guide service
- e. Amphitheatre
- f. Facilities for adventure sports (rock climbing, rappelling and parasailing along with water sports such as river rafting, boating and canoeing)
- g. Herbal Ecotourism with sale outlets
- h. Urban Ecotourism through Eco-Parks

#### **ACTIVITIES**

- 1. Trekking, cycling and Nature Walks.
- 2. Wildlife Viewing and River Cruise
- 3. Angling
- 4. Bird Watching
- 5. Elephant ride/ Bullock cart ride
- 6. Any other depending on the site in question

D:\ECOTOURISM POLICY\Revised Ecotour- Policy Draft.doc

#### ORISSA ECOTOURISM DEVELOPMENT BOARD (OEDB)

Orissa Ecotourism Development Board is proposed to be the apex body in the state engaged in promotion of ecotourism and development of requisite systems and standards for the same.

#### **CONSTITUTION:** The Board shall have the following composition

1. Chief Secretary	Chairperson
2. Secretary (Forest and Environment)	Member
3. Secretary (Tourism)	Member
4. Secretary (Finance)	Member
5. Secretary (Revenue)	Member
6. Secretary (Water Resources)	Member
7. PCCF Orissa	Member
8. CWLW Orissa	Member
9. Nominated members	
- Travel and Tourism (1)	
- Wildlife Conservationist (1)	
- NGO (1)	
10. MD, OFDC Ltd.	Member Secretary

#### **FUNCTIONS**

- i. Plan, develop and facilitate ecotourism projects compatible with this policy.
- ii. Identify and establish an Orissa brand with unique values of the State, through consensus building process involving all stakeholders.
- iii. Develop and enforce standards and norms for promotion and implementation of ecotourism destinations, based on specific carrying capacity studies conducted.
- iv. Identify and prioritize ecotourism destinations throughout the State based on parameters to be defined and approved by the Board.
- v. Establish partnerships between various government departments, local communities and other stakeholders.
- vi. Promote community based ecotourism enterprises in protected areas and other potential destinations through constitution of "Ecotourism and Eco development Societies" at the forest division/PA level.
- vii. Capacity building of various stakeholders.
- viii. Develop marketing strategies and promote networking among ecotourism enterprises and operators.
- ix. Facilitate education, research, monitoring and evaluation of the ecotourism activities.

# ANNEXURE LXIII NOTIFICATION OF HADGARH WILDIFE SANCTUARY

# 1. FOREST, FISHERIES AND ANIMAL HUSBANDRY DEPARTMENT NOTIFICATION the 6 th December, 1978

S.R.O. No. 213/80-In exercise of the powers conferred by section 18 of the Wildlife (Protection) Act,1972(53 of 1972),the State Government do hereby declare in the schedule below,including Satkosia Reserve Forests of Mayurbhanj district, Boula Reserve Forests of Keonjhar district and all other spread of Salandi Reservoir in the district of Mayurbhanj and Keonjhar to a Sanctuary for the purpose of protecting,propagating and developing Wildlife with effect from the date of publication of this notification and to be called "Hadagarh Sanctuary".

#### **SCHEDULE**

The northern boundary starts from Boundary Pillar No.82 of Satkosia Reserve Forest in the Thakurmunda Police Station of Panchpir sub-division in the district of Mayurbhanj and then runs along the Satkosia Reserved Forests boundary line in a clock wise direction up to boundary pillar No.38 of the said Reserved Forest forming the village boundary of Bhaliadol Village of Thakurmunda Police Station in Panchpir sub-division of Mayurbhanj district and then follows Bhaliadol-Maliposi extraction path till it meets the inter district boundary line between Mayurbhanj and Keonjhar district up to the tri-junction point of Panchpir, Kaptipada and Anandapur civil sub-division.

From there it follows the Inter-district boundary line between Mayurbhanj and Keonjhar and then Keonjhar and Balasore up to the point where the inter district boundary line finally leaves Boula Reserve Forest line of Police Station Anandapur, subdivision Anandapur west wards to meet the Salandi Dam axis near Hadagarh in Anandapur Police Station Sub-division Anandapur, District Keonjhar. From there it runs along dam axis and then along the Boula Reserve Forest line till it meets the nala on the south of Rangamatia Village of Police Station Thakurmunda of Panchpir sub-division in the district of Mayurbhanj to meet the Khagra nalla at a point' where the nalla joins Khagra nalla forming the inter district boundary of Mayurbhanj and Keonjhar'to the west of Mirgichua" village of Thakurmunda Police Station in Panchpir sub-division of Mayurbhanj district in Karanjia Forest Division. Then it follows the nalla to the highest

point of Kundipal Hill of Police Station Thakurmunda of Panchpir sub-division of Mayurbhanj district and then along Ridge till it meets the starting point of the sanctuary boundary (Satkosia Reserve Forest Boundary Pillar No. 82).

No.34113-81 (W)-160/78-FFAH.I

By the order of the Governor,

Deputy Secretary to Government.