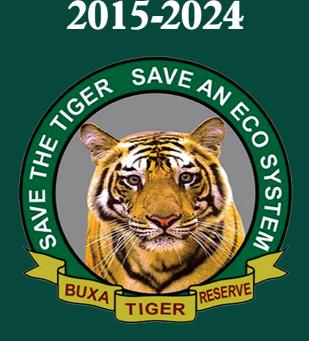
TIGER Conservation Plan 2015-2024



Prepared By

Bhaskar. J.V, IFS

&

Assisted by

Kalyan Rai, IFS

UNDER GUIDENCE AND SUPERVISION OF

Dr R. P. Saini, IFS Sri S. Sundriyal, IFS Sri U. Ghosh, IFS

Field Director, Buxa Tiger Reserve



Conservation Plan 2016-17 to 2026-27

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Foreword

Nature has blessed Bio-diverse Buxa Tiger Reserve with rich and incomprehensible variety of flora and fauna. Its wilds apart from Tiger and leopard are also home to an array of highly endangered species like Clouded leopard, Jungle cat, Marble Cat, Yellow breasted Martin, Burmese Ferret Badger, Chinese Pangolin, Great Indian Hornbill, Flying Squirrel etc.

In managing Buxa Tiger Reserve great emphasis has been imparted to sustainable Resource Conservation and management with the help of Joint Forest Management involving JFMCs (Joint Forest Management Committees) to achieve long term Biodiversity Conservation and Sustainability. This effort would continue.

This Tiger Conservation Plan contains comprehensive information on Buxa Tiger Reserve and the data on important aspects about its configuration, administration and Management. It has been prepared with the help of young Deputy Field Directors Shri Bhaskar J V, IFS, Shri Apurba Sen, IFS, Sri Harikrishnan, IFS, Shri R Jakher, IFS, Shri Subhankar Sengupta IFS, Sri Kalyan Rai, IFS and scientists namely Joydeep Bose, Rajshri Chakra borty of WWF, India, the Deputy Field Director's, support staff, Veterinary Officer, BTR and the Computer Operator of Dy. Field Director, Buxa Tiger Reserve (East) & Computer Operator of GIS Cell, PCCF, Wildlife for providing GIS maps. Their role is highly appreciative and commendable. A special word of appreciation goes to young officer Sh. Kalyan Rai, IFS/ AO, BTR(East) who has devoted his sincere time & effort for revising the previous plan to its present form. My sincere thanks also go to all the field and office staff of Buxa Tiger Reserve who contributed in implementation of works, compilation of data and information etc.

The TCP has been divided into five major parts with a note on Ecosensitive Zone proposal. Core, Buffer, Corridors form the major parts and since Tourism and Security plan are common for both Core and Buffer they have been accordingly dealt as separate parts so that in one part both Core and Buffer are covered and it would be easier to follow the proposals, prescriptions and guidelines.

I am also indebted to PCCF & Head of Forest Force along with PCCF, Wild Life and Chief Wild Life Warden, West Bengal for their support and encouragement. The help and support rendered by WWF India is duly acknowledged. Lastly thanks to Member Secretary NTCA and its Joint Director for keeping us on toes to finish this important task and for providing necessary guidelines and support.

This Plan would serve as a useful reference for monitoring and evaluation of forestry and allied works as well as a planning guide for all concerned.

Alipurduar, 24th November, 2016

Field Director Buxa Tiger Reserve



F. No. 1-14/2011-NTCA (Part-I) Government of India Ministry of Environment, Forest and Climate Change National Tiger Conservation Authority ****

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Dated: 26.12.2016

То

The Chief Wildlife Warden, Govt. of West Bengal, Kolkata

Sub: Approval of Tiger Conservation Plan (TCP) for the Buxa Tiger Reserve, West Bengal – reg.

Sir,

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

After examining the said draft, the observations of NTCA were communicated and discussed with Chief Wildlife Warden, West Bengal & the Field Director, Buxa 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 vide its letter No. 5413/WL/2W-579/2016(Pt.vii) dated 24.11.2016, and based on the recommendation of the technical committee, approval of the NTCA is hereby granted for the TCP of Buxa Tiger Reserve for the period from 2016-17 to 2026-27, under section 38 O (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 38 O (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. While implementing various prescriptions of the TCP, it shall be ensured by the Tiger Reserve Administration that no violation of the provisions of the following Acts takes place:
 - 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

- 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. Deviations, if any with respect to the provisions under section 38 O (1) (b) & (g) of the Wildlife (Protection) Act, 1972 observed/ cognized at any point of time should be brought forward for necessary evaluation and assessment of such cases/ instances by the National Tiger Conservation Authority and State Government joint team for strict compliance as well as to decide upon the future course of action under the provisions of the said Act.
- g. The following need to be ensured while executing forestry operations in the buffer area of the tiger reserve:
 - 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.
 - Compliance of section 38 V (2) of the Wildlife (Protection) Act, 1972 should be strictly ensured.
 - iii. No working or camping should be permitted in the area after sunset.
 - Daily monitoring of the tiger movement, water points and cattle kill should be done and recorded.
- h. The Tourism activities should be strictly managed/ regulated as per the comprehensive guidelines issued by the NTCA under section 38 O (c) of the Wildlife (Protection) Act, 1972 vide letter dated 15.10.2012.
- The necessary copies of the TCP will be provided to the concerned Department/ Agencies for coordinated implementation of the provisions concerned.
- j. The NTCA reserves right to review, modify and withdraw this approval at any time i.e. various maps indicative etc., if any of the conditions of approval are violated.
- k. Final TCP should have all necessary annexure viz maps etc. duly signed by competent authority.

Yours faithfully

 \mathcal{A}

Inspector General of Forests (NTCA)

Copy to:

- 1. The Principal Secretary of Forests, Government of West Bengal.
- The Principal Chief Conservator of Forest & Head of Forest Force, Forest Department, Govt. of West Bengal.
- The Additional Principal Chief Conservator of Forests (C), Regional Office (EZ), A/3, Chandersekharpur, Bhubaneswar-751023.
- 4. The Inspector General of Forests, Regional Office, Nagpur, Guwahati and Bangalore.
- The Field Director, Buxa Tiger Reserve, for necessary action and information please. You are requested to submit copies of Tiger Conservation Plan for due signature of competent authority.

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NAME OF THE TIGER RESERVE: BUXA TIGER RESERVE

Introduction of the Area

a) Description of the Tiger Conservation Unit/ Landscape and significance of the area for tiger conservation:-

The Eastern Himalayas Region contains 17 Tiger Conservation Unit (TCU) landscapes that have been identified to conserve metapopulations of tigers. Four of these are Level 1 TCUs or high priority tiger conservation landscapes (Wikramanayake *et al.* 1998b). All four of these Level 1 TCUs overlap with the landscapes; thus the tiger conservation priorities in the region are captured within the landscapes identified during this exercise, especially within the Terai Arc Landscape, Bhutan Biological Conservation Complex and The North Bank Landscape.

b) Map 1-Map of Tiger Conservation Unit/Landscape.

c) Legal provisions contained in the Wildlife (Protection) Act regarding Tiger Conservation Plan and brief description of their relevance in the Tiger Conservation Unit/ Landscape.

The Wildlife (Protection) Act, 1972 was amended in 2006, and a separate Chapter (IVB) has been added on the 'National Tiger Conservation Authority', which has replaced Project Tiger. This Chapter, interalia, has enabling provisions of Section 38V for preparing a 'Tiger Conservation Plan' for the proper management of a Tiger Reserve, which will also include staff development and deployment plan.

Section 38V (3) of Chapter IVB states:-

The State Government shall prepare a Tiger Conservation Plan including staff development and deployment plan for the proper management of each area referred to in sub-section (1), so as to ensure:

- (a) Protection of tiger Reserve and providing site specific habitat inputs for a viable population of tigers, co-predators and prey animals without distorting the natural prey-predator ecological cycle in the habitat;
- (b) Ecologically compatible land uses in the tiger Reserves and areas linking one protected area or tiger Reserve with another for addressing the livelihood concerns of local people, so as to provide dispersal habitats and corridor for spill over population of wild animals from the designated core areas of tiger Reserves or from tiger breeding habitats within other adjoining protected areas;
- (c) The forestry operations of regular forest divisions and those adjoining Tiger Reserves are not incompatible with the needs of tiger conservation

d) Delineation of Area into Core, Buffer and Adjoining Landscape.

Section 38V of Chapter IVB of Wildlife (Protection) Act, 1972 (amended 2006) states:-

(1) The State Government shall, on the recommendations of the Tiger Conservation Authority, notify an area as a Tiger Reserve.

(2) The provisions of sub-section (20 of section 18, sub-sections (2), (3) and (4) of section 27, sections 30,32 and clauses (b) and (c) of section 33 of this Act shall, as far as may be, apply in relation to a Tiger Reserve as they apply in relation to a sanctuary.

Under Section 38V (4), the expression "Tiger Reserve" includes:-

- (i) Core or critical tiger habitat areas of National Parks and Sanctuaries, where it has been established, on the basis of scientific and objective criteria, that such areas are required to be kept as inviolate for the purposes of tiger conservation, without affecting the rights of the Scheduled Tribes or such other forest dwellers, and notified as such by the State Government in consultation with an Expert Committee constituted for the purpose;
- (ii) Buffer or peripheral area consisting of the area peripheral to critical tiger habitat or core area, identified and established i0.n accordance with the provisions contained in Explanation (i) of section 38V (4), where a lesser degree of habitat protection is required to ensure the integrity of the critical tiger habitat with adequate dispersal for tiger species, and which aim at promoting co-existence between wildlife and human activity with due recognition of the livelihood, developmental, social and cultural rights of the local people, wherein the limits of such areas are determined on the basis of scientific and objective criteria in consultation with the concerned Gram Sabha and an Expert Committee constituted for the purposes.

In accordance of Sub-section (4) of Section 38 V of the Wildlife (Protection) Act, 1972, the area of 390.58 km² has been notified as Core or Critical Tiger Habitat of Buxa Tiger Reserve (Annexure 1) vide the Govt. of West Bengal's Notification No.3051-For/11M-28/07, Dated 06-08-2009 and an area of 370.28km2 as buffer vide Govt. of west Bengal Notification No 3051-For/11M-28/07, Dated 06-08-2009 (Annexure 2)

In pursuance to the Order No. 4-M/8-2015, dated 27-04-2015 by Principal Chief Conservator of Forests, Wildlife & Chief Wildlife Warden, West Bengal regarding Constitution of Expert Committee for Realignment of Core Zone of Buxa Tiger Reserve, the 1st meeting of the committee was held on 12.05.2015 in the Conference Room in the Office of PCCF, Wildlife & Chief Wildlife Warden, Bikash Bhawan, Kolkata (Annexure-2C). The necessity for realignment of core zone of Buxa Tiger Reserve has arisen after the State Board for Wildlife in its 9th meeting held on 10-02-2015 has approved the proposal for realignment of core zone of Buxa Tiger Reserve and in pursuance of the same u/s 38V of the Wildlife (Protection) Act, 1972, the Expert Committee has been constituted.

After having detailed discussion on the subject in the 1st meeting, the committee has considered all the aspects related to the existing core zone of Buxa Tiger Reserve in light of its habitat quality, habitat occupancy by major wildlife, availability of actual buffer to the existing core zone, the rights of Schedule Tribes and other forest dwellers mainly occupying the forest villages in Buxa Tiger Reserve, to ensure the availability of inviolate habitat for tigers and other wildlife. After detailed deliberation, the committee has unanimously concluded that:

The committee realigned core zone of Buxa Tiger Reserve for existing core zone with an area of 390.58 sq.km. to 417.55 sq.km. for proposed realigned core zone. The committee also realigned existing Buffer Zone of 370.28 sq.km. 343.32 sq.km.

The details of existing core zone and buffer zone are annexed as <u>Annexure-1</u> and <u>Annexure 2 respectively</u>, whereas the details of compartment wise proposed realigned core zone and buffer zone are annexed as <u>Annexure-2A</u>.

The details of population of Schedule Tribes and other forest dwellers in existing core zone and realignment of proposed core zone are annexed as $\underline{\text{Annexure-}}$ $\underline{2B}$.

The map of Buxa Tiger Reserve with existing core zone and proposed realigned core zone along with buffer zone is shown in Map 3 in List of Maps Core.

The committee is of the view that the proposed realigned core zone of Buxa Tiger Reserve shall address the issue of conservation of tiger and other wildlife by providing inviolate space. The proposed realigned core zone will address the issue of rights of Schedule Tribes and other forest dwellers in accordance with rules and laws in vogue. Most importantly the proposed realigned core zone will address management issues rather than pressing them under the carpet, which is not in the interest of public and wildlife both. Overall committee is of the view that proposed core zone of Buxa Tiger Reserve will help in conservation of tiger and other wildlife in better way on sustainable manner.

The current Tiger Conservation Plan is prepared based on the Realigned Core - Buffer Zone of Buxa Tiger Reserve as approved by the NTCA vide letter no. 1-14/2011-NTCA(Part-1), dt. 24.11.2015.

が 4 Kilometers 08 Cel. 2000 MASSA Map 1-Map of Tiger Conservation Unit/Landscape. Block and Compartment Map of BTR * IRI. (Mara Reserve Lund) M. International Bondary
M. Brasin. Bondary
// State Bennlary M. II (Dind. Halpete) MH (Ma Days Hall Board H.I (Juhaff. Haffpools) ND (Nard: Dense) and TO (Productory)
TO (Productory)
TO (Productory)
TO (Program) M.II (Newbords RI.) N.I (Nedmb RL) C1 (Chaighers) IR (DRonger) [L(Lobradium) Map-2



TIGER CONSERVATION PLAN – CORE AREA

PART A: THE EXISTING SITUATION

CHAPTER 1: INTRODUCTION OF THE AREA

1.1. Name, Location, Constitution and Extent

1.1.1. Name:-Buxa Tiger Reserve

In accordance of Sub-section (4) of Section 38 V of the Wildlife (Protection) Act, 1972, the area of 390.58 km² has been notified as Core or Critical Tiger Habitat of Buxa Tiger Reserve (Annexure1) vide the Govt. of West Bengal's Notification No.3051-For/11M-28/07, Dated 06-08-2009 and an area of 370.28km2 as buffer vide Govt of west Bengal Notification No. 3051-For/11M-28/07, Dated 06-08-2009 (Annexure 2)

In pursuance to the Order No. 4-M/8-2015, dated 27-04-2015 by Principal Chief Conservator of Forests, Wildlife & Chief Wildlife Warden, West Bengal regarding Constitution of Expert Committee for Realignment of Core Zone of Buxa Tiger Reserve, the 1st meeting of the committee has proposed **realigned core zone to 417.55 sq.km** from an existing core zone with an area of 390.58 sq.km. The proposed area for buffer **zone is 343.32 sq. km** from an existing area of 370.28 sq.km.

1.1.2 Location:-

Buxa Tiger Reserve (B.T.R.) is situated in Alipurduar Sub-division of Jalpaiguri District, West Bengal. It comprises of the entire erstwhile Buxa Forest Division (702.44 km²), and a part of erstwhile Cooch Behar Forest Division (now known as Wildlife III Division) 58.43 km² which was added subsequently The Reserve lies between latitudes 26°30′ and 26°55′ N and longitudes 89°20′ and 89°55′ E.

1.1.3 Constitution:-

The Buxa Reserve used to be an unoccupied wasteland. Those forests came under British rule in 1865 and the first reservations were made in 1879 according to the Indian Forest Act (Act VIII of 1878) and the process continued till 1940. Thus most of the forest areas of the Tiger Reserve had the status of reserved forests under the provision of the Indian Forest Act (IFA), 1927 upto 1982. BTR Was constituted in the Year 1983 in Jalpaiguri District vides Govt. of India's notification no. J-11025/18/B/FRY (PT) dated, 16th February, 1983 and became the 15th Tiger Reserve of the Country. Buxa Tiger Reserve was formed over an area of 758.78 Sq. Km of Reserved forests vide Govt. of India's notification No.J-11025/18/B/FRY (PT) dt.16-02-1983. District Magistrate, Jalpaiguri transferred 209.84 Ha resumed tea garden forest lands Vide memo no. 346(10)/LR-C dt.15.05.89 for inclusion in BTR. Thus, the total area of BTR is 760.87 km².

The Collector/ Jalpaiguri after settlement of rights and concessions under section 19 to 25 of said Act, declared an area of 331.60 km² of Buxa Wildlife Sanctuary vide his memo No.346 (10)/ LR-C dt.15-05-1989 and thereafter in the year 1990, an additional area of 54.47 km² was added to the Sanctuary vide Notification No.7588-For/11B-24/90

dt. 06-10-90 and 12-For/11B-24/90 dt. 01-01-91 under section 18(1) of Wildlife Protection Act, 1972 making the Sanctuary area of total 386.07 Sq. Km. In 1992 an area of 117.10 km² of this notified Wild life Sanctuary was preliminarily notified as National Park under section 35(2) of Indian Wildlife Protection Act, 1972 vide notification no.85-For/11B-42/91 dt 06-01-92 (Annexure 4) and finally constituted as Buxa National Park vide Notification No.3403-For/11B-6/95 dt. 05-12-1997, under section 35(4) of the said Act.

1.1.4 Extent (Area Statement and Legal Status)

BTR stretches over a length of 50 km. from West to East and 35 km. from North to South. The total area of the Reserve is 760.87 km² of which 390.58 km² has been constituted as Wildlife Sanctuary and National Park and the balance 370.29 km² area as Reserved Forests and Other Protected Forests. The details of Notification of Buxa Wildlife Sanctuary & Buxa National Park is annexed in Annexure-3 & Annexure-4 respectively.

The total core area of Buxa Tiger Reserve is of 417.55 sq. km. The break up of National Park and Wildlife Sanctuary in the core is given below:

| Sl. No. | Status | Area in sq.km |
|---------|--|---------------|
| 1. | Buxa National Park | 117.23 |
| 2. | Buxa Wildlife Sanctuary + Reserve Forest | 300.32 |
| | Total | 417.55 |

Location Map of Buxa Tiger Reserve (BTR)

| Comparison of December 1 | Comparison of December 2 | Comparison of December 2 | Comparison of December 3 | Comp

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Legal Boundaries:

The core area stretches from the westernmost boundary of the Tiger Reserve bordering Pana Range of BTR to the eastern most boundaries, fringing the state of Assam. The Eastern boundary of the Reserve is demarcated by Sankosh River. The Western boundary is fringed by Tea Estates.

The Reserve is demarcated on the North by the international boundary of Bhutan. It is rather difficult to categorically state demarcation of the southern boundary of the Reserve because of its peculiar shape. The Southern boundary is mainly fringed by the agricultural fields and Tea Estates (Majherdabri T.E., Srinathpur T.E., Rohimabad T.E., Chuniajhora T.E., Jainti T.E., Turturi T.E., Kartika T.E., Rydak T.E., Dhaulajhora T.E., Kohinoor T.E., Newlands T.E., Kumargram T.E. and Sankosh T.E.) and the National Highway (NH-31/C) running East-West.

Ecological Boundaries:

The legal boundary stated above encompasses a major portion of BTR Ecosystem. Considering the continuous distribution and ranging of wild animals e.g., Elephants, Tigers and Gaurs in the Reserve and in its vicinity, it is seen that the ecological boundary in the North extends within Bhutan across the Indo-Bhutan border along the contiguous Forest. In the South-West, the ecological boundary extends upto Chilapata Range and Jaldapara National Park of WildLife III Division, which is an Elephant corridor. Elephants and Gaurs frequently range between Poro forests of B.T.R. and Chilapata forests of WildLife III Division. In the West, the ecological boundary extends upto Titi block of WildLife III Division as Elephants are observed ranging between Barnabari block of BTR and Titi block. In the South, the ecological boundary coincides with legal boundary, as there are no natural habitats further south of the Reserve. The Eastern boundary of the Reserve is demarcated by Sankosh River, the ecological and legal boundaries appear to be coinciding along the Eastern boundary and extend up to Manas Tiger Reserve in Assam and to some extent Phipsu Wildlife sanctury in Bhutan.

1.1.5 Notifications:

Buxa wildlife sanctuary was first declared in the year of 1986 with an area of 314.52 sq. km, vide notification no. 316-For/118-1/86, dated 24.01.86. This area has been settled for rights and concessions u/s 19 to 25 of Indian Wildlife (Protection) Act, 1972 by the Collector, Jalpaiguri District An additional area of 54.47 sq km was added to the sanctuary vide memo no. 346(10)/ LR-C in 1989.

An area of 117.10 km² of the Sanctuary was preliminarily declared as National Park under section 35(1) (2) of Wildlife (Protection) Act, 1972 vide notification No.85-For/11B-42/91 dt.06-01-92. It was finally constituted as Buxa National Park vide Notification no.3403-For/11B-6/95 dt.05-12-97.

In accordance of Sub-section (4) of Section 38 V of the Wildlife (Protection) Act, 1972, an area of 390.58 km² has been notified as Core or Critical Tiger Habitat of Buxa Tiger Reserve vide Govt. of West Bengal's Notification no. 3051- For/ 11 M-28/07 dated Kolkata, the 6th August,2009. Notification and area statement of core is enclosed as **Annexure-1.**

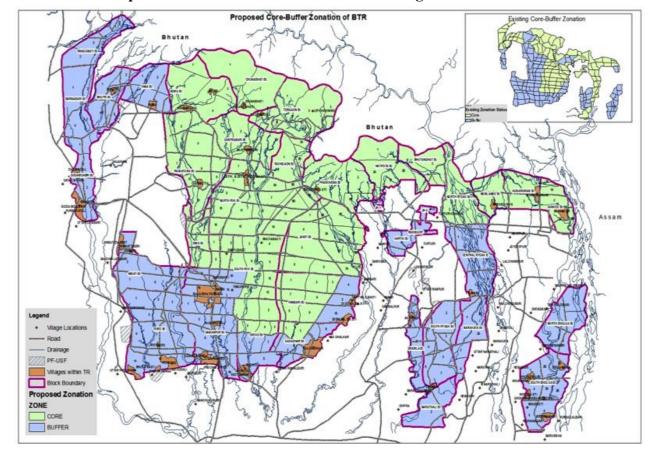
In pursuance to the Order No. 4-M/8-2015, dated 27-04-2015 by Principal Chief Conservator of Forests, Wildlife & Chief Wildlife Warden, West Bengal regarding Constitution of Expert Committee for Realignment of Core Zone of Buxa Tiger Reserve, the 1st meeting of the committee was held on 12.05.2015 in the Conference Room in the Office of PCCF, Wildlife & Chief Wildlife Warden, Bikash Bhawan, Kolkata. The committee realigned core zone of Buxa Tiger Reserve for existing core zone with an area of 390.58 sq.km. to 417.55 sq.km. for proposed realigned core zone.

The details of existing core zone and buffer zone are annexed as <u>Annexure-1 and Annexure 2 respectively</u>, whereas the details of compartment wise proposed realigned core zone and buffer zone are annexed as Annexure-2A.

The recommendation of the Standing Committee (39th Meeting) of National Board of Wildlife held on 23rd August 2016, for re-lignment of Core Zone of Buxa Tiger reserve, communicated vide memo F.No.6-109/2016/WL (39th Meeting dtd.19th Sept 2016 alongwith Chief Wildlife Warden, West Bengal's forwarding to Forest Dept, GoWB for issuance of necessary resolution are Annexed as Annexure-2D.

The Forest Settlement Officer inquired into the rights during the years 1890 to 1896. The first Sanctuary Notification was made over an area of 314.52 km² vide Notification No. 316-For/118-1/86 dated, 24.01.86. This area has been settled for rights and concessions u/s 19 to 25 of Indian Wildlife (Protection) Act, 1972 by the Collector, Jalpaiguri District. The collector declared that no right of any one exists in 331.60 km² of Buxa Wildlife Sanctuary in terms of Section 21(b) and Section 19 of Wildlife (Protection) Act, 1972. This declaration was made vide his memo No. 346(10)/ LR-C dated, 15th May, 1989. An additional area of 54.47 km2 has been added to this vide Notification No. 7588-For/119-24/90, dated, 06.10.90. An area of 117.10 km² of the Sanctuary was preliminarily declared as National Park under section 35(1) (2) of Wildlife (Protection) Act, 1972 vide notification No.85-For/11B-42/91 dt.06-01-92. It was finally constituted as Buxa National Park vides Notification no.3403-For/11B-6/95 dt.05-12-97. The Reserve consists of 35 (thirty five) Blocks in Reserve Forest with 195 (one hundred ninety five) compartments and 19 PF and USF.

In accordance with section 38U of the Wildlife (Protection) Amendment Act 2006, the Governor has constituted a steering committee for ensuring coordination, monitoring, protection and conservation of tiger, co predators and prey animals with Honourable Chief Minister, West Bengal as the Chairperson.



Map 3: The Core-Buffer Zonation of Buxa Tiger Reserve

1.2. Approach and Access:-

The Head quarter of Buxa Tiger Reserve is located at Alipurduar Town. The nearest Broad-gauge railway station is Alipurduar Junction and New Alipurduar is located at the out skirts of the town. Alipurduar is linked by train to Delhi, Kolkata and Guwahati. The town is on the broad-gauge line of the North -East Frontier Railway connecting Siliguri and Guwahati. The Reserve can be approached by road (30 Km.) from Cooch Behar. The nearest airport is at Bagdogra near Siliguri (175 Km. away). Bagdogra is connected to Delhi, Kolkata and Guwahati by air. From Siliguri, Alipurduar can be approached by train (broad-gauge) or by road. Alipurduar is 720 Km away from Kolkata by train. There are a number of direct trains from Kolkata and Delhi to Alipurduar.

1.3. Statement of Significance:-

1.3.1. General Significance.

Buxa Tiger Reserve is biologically very rich. It is located in the confluence of 3 major Bio-Geographic Zones viz. Lower Gangetic plains (7B), Central Himalayas (2C), and Brahammaputra valley (8A). The project site supports vital population of tiger (*Panthera tigris*). It is one of the world's most endangered carnivores and at the apexes of the food chain.

BTR represents several elements of Bio-diversity of North-East India, one of the most biodiverse Indian Regions. Most of the floral endemic species of N-E India (about 60%) are encountered in BTR.

The endemic Indo-Malayan species like Chinese Pangolin, Reticulated Python have been reported in Buxa Tiger Reserve. The rare Clouded Leopard, Marble Cat, Black-necked crane, etc. (some of the endemic species of North-East zone) are present in B.T.R. Moreover, the Reserve acts a carbon sink of the region. The mountain ranges intercept rain laden clouds and recharges ground water. It protects the catchments of several rivers and streams and thereby reduces soil erosion and maintains water regime. It sustains the economic prosperity of the region through down stream irrigation.

1.3.2. Significance at International/ Regional level:-

Significance of Buxa Tiger Reserve in the International context lies in the fact that it provides shelter and protection to various species of Wildlife included in the Red Data Book (R.D.B.) of the IUCN (International Union for Conservation of Nature and Natural Resources) and the appendices of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora).

Besides, Phipsu Wildlife Sanctuary of Bhutan is situated in the northern boundary of BTR. This is an international corridor of elephant migration. The natural Salt lick at Khurul/ Kalikhola is also situated beyond the international border of BTR and Bhutan.

TABLE – 1.1: RDB listing and CITES Appendix of Species.

| SL No. | Species | Schedule of W.L. Protection Act. | CITES Appendix | RDB listing |
|---------|----------------------|----------------------------------|-------------------|-------------|
| Mammals | | | | |
| 1. | Indian Tiger | I | I | Е |
| 2. | Leopard | I | I | T |
| 3. | Asian Elephant | Ι | I | Е |
| 4. | Indian Bison | I | I | V |
| 5. | Sloth Bear | I | I | I |
| 6. | Himalayan Black Bear | II | I | |
| 7. | Clouded Leopard | Ι | I | V |
| 8. | Leopard Cat | Ι | I | Е |
| 9. | Hispid Hare | Ι | I | R |
| 10. | Common Otter | Ι | I | K |
| 11. | Indian Pangolin | I | II | V |
| 12. | Chinese Pangolin | I | II | K |
| 13. | Rhesus Monkey | II | II | |
| 14. | Giant Squirrel | I | II | |
| 15. | Jungle Cat | II | II | |
| 16. | Fishing Cat | I | II | V |

| SL No. | Species | Schedule of W.L. Protection Act. | CITES Appendix | RDB listing |
|----------|----------------------------|----------------------------------|-------------------|-------------|
| Aves | | | | |
| 17. | Black necked Crane | I | I | V |
| 18. | Bengal Florican | I | I | Е |
| 19. | Great pied Hornbill | I | I | Е |
| 20. | Red breasted Parakeet | I | II | |
| 21. | Blossom Leaded Parakeet | I | II | |
| Reptiles | | | | |
| 22. | Common Monitor lizard | I | I | V |
| 23. | Indian Python | I | I | Е |
| 24. | Regal Python | Ι | II | Е |
| 25. | Cobra | II | II | |
| 26. | King Cobra | II | II | |
| 27. | Indian flap shelled turtle | I | II | V |

NOTE:

Appendix $I \rightarrow Ban$ on International Trade

Appendix II → International Trade permitted with restriction

 $E \rightarrow Endangered.$ $I \rightarrow Indeterminate$ $T \rightarrow Threatened.$

 $R \rightarrow Rare$ $V \rightarrow Vulnerable$ $K \rightarrow Insufficiently known$

1.3.3. National Level Significance:-

The Reserve lies in the Bio-geographic Zone of Central Himalayas (2C) and lower Gangetic Plains (7B) as recognized by Rodgers and Panwar (W.I.I., 1988). Significance of Buxa Tiger Reserve in the National context is expressed by the presence of several species that are included in Schedule-I of the Wildlife (Protection) Act, 1972. The following species have been given maximum protection at National level. The fragile "Terai Eco-System" constitutes a part of this Tiger Reserve. An area of 369 km2 Buxa Tiger Reserve is included in the eastern Duars Elephant Reserve and forms its core.

| 1. | Tiger (Panthera tigris) | 13. | Fishing Cat (Prionailurus viverrinus) |
|----|--|-----|---|
| 2. | Leopard (Panthera pardus) | 14. | Indian wolf (Canis lupas pallipes) |
| 3. | Indian Bison/ Gaur (Bos gaurus) | 15. | Leopard Cat (Prionailurus benghalensis) |
| 4. | Asiatic Elephant (Elephas maximus) | 16. | Common Otter (Aonyx cinerea) |
| 5. | Clouded Leopard (Neofelis nebulosa) | 17. | Sloth Bear (Melursus ursinus) |
| 6. | Chinese Pangolin (Manis pentadactyla) | 18. | Himalayan Black Bear (Ursus thibetanus) |
| 7. | Indian Pangolin (Manis crassicaudata) | 19. | Marbled Cat (Pardofelis marmorata) |
| 8. | Gaint Squirrel (<i>Ratufa indica</i> , <i>R.bicolor</i>) | 20. | Large Bengal Monitor Lizard (Varanus bengalensis) |

- 9. Hispid Hare (Caprolagus hispidus)
 - Hog badger (*Arctonyx collaris*)
- 11. Reticulated Python (*Python reticulatus*)

10.

- 12. Indian Python (*Python molurus*)
- 21. Black necked Crane (Grus nigriocollis)
- 22. Indian pied Hornbill (*Anthracoceros malbaricus*)
- 23. Bengal Florican (Eupodotis benghalensis)
- 24. Peafowl (Pavo cristatus)

1.3.4. Significance at Local level:-

Some of the forest blocks of the Reserve such as Jainti, Panbari, North Rajabhatkhawa, South Rajabhatkhawa, Nimati, Raimatang, Tashigaon and South Rydak provide excellent Elephant habitat. A substantial number (60%) of elephant of North Bengal reside in BTR. It provides fairly good habitat for Tigers and other animals. Both food and cover are adequately available for the large carnivores. The recently concluded elephant census in November 2010 has shown that there are 215+ elephants in BTR.

Fringe people gets fuel wood, fodder, small timber, cane, thatch, decorative and edible mushroom, simul floss, medicinal plants, etc, from the Reserve in recognition of the voluntary services rendered by them to protect and conserve flora and fauna of the Reserve. It provides recreation facility to the local people. It acts as a Carbon sink and reduces the harmful effects of pollution.

Forest villagers and FD holders are totally dependent on the Reserve for their fuelwood, small timber and other non-wood forest produces and also for grazing. Prior to 1983, these villagers used to be employed in timber harvesting and plantation work for nearly 100 - 120 days in a year. The employment generation of 5.9 lakh man days during the year 1984 has dwindled to 2.775 lakh man days in 1991 due to drastic reduction in clear felling and plantation activities. Employment generated over last few years is given below

| Year | No of Man days Generated (In Lakhs) |
|---------|--|
| 2008-09 | 5.27 |
| 2009-10 | 6.29 |
| 2010-11 | 5.97 |
| 2011-12 | 6.77 |
| 2012-13 | 3.86 |

The conservation efforts in the Reserve generate several activities. This benefits residents of forest villages as well as fringe villages. To seek the cooperation of local people in conservation efforts the forest department takes up many entry point activities like training people on improved agricultural practices, various small scale trades for income generation, introduction of Eco - tourism etc. these activities have augmented the income of the local people and reduced their dependence on the forests.

Thousands of pilgrims visit ancient mahakal Temple annually. Historical Buxa prison fort is located within BTR. It is situated at an elevation of 3000 ft. above MSL in Buxa hills. During British period it was a prison for those who were involved in freedom movement.

1.3.5. Scientific Significance:-

Buxa Tiger Reserve posesses significant potential for research work in all aspects as it has diverse types of flora and fauna, many endangered species, socio-economic issues, ethnic diversity etc. It is biologically very rich. More than 50% of the plant species of India are represented in North-East India. Of these 60% are endemic. BTR has many of those characteristics. The present check list shows 352 species of trees, 133 species of shrubs, 189 species of herbs, 108 species of climbers, 144 species of orchids, 46 species of grasses and reeds, 6 species of cane and 4 species of bamboo. Inventory is far from complete.

Along with the floral diversity, the Buxa Tiger Reserve has a wide range of faunal diversity. There are 68 species of mammals, 41 species of reptiles, 246 species of birds, 4 species of Amphibians, 103 species of fishes identified within the Reserve. It will be worth noticing that of these there are 20 nos. of species of mammals which are endangered and are included in Schedule-I of (Wildlife Protection Act, 1972) 7 nos. of birds, 10 nos. of reptiles that are also included within the endangered lists. Study on entomofauna of B.T.R. listed 500 species of insects belonging to 13 Orders, 65 families and 229 genera. The study is still continuing.

1.3.6. Conservation Values

Table-1.2: Categories of Values in Buxa Tiger Reserve

| Sl. No. | Value categories | Illustrative Constituents | | |
|------------|--------------------|---|--|--|
| 1 | Real / Economic | A part of it is a timber Reserve, it produces timber, fuel wood and non-timber forests produce for local people. It provides fodder for domestic livestock. It generates mandays for local people. | | |
| 2. | Biological | It is located in the confluence of 3-major Bio-geographic Zones viz. Lower Gangetic plains (7B), Central Himalayas (2C) and Brahmputra valley (8A). It provides shelter to many endangered, threatened and rare species of animals like Indian Tiger, Asian Elephant, Leopard, Gaur, Bear, Hispid Hare, Pangolin, Python, Monitor Lizard, Blacknecked Crane, Bengal Florican, Great Indian Pied Hornbill, etc. It harbours endemic species like Clouded Leopard, Chinese Pangolin, Reticulated Python, Marble Cat, etc. It has vast community diversity from East Himalayan sub-tropical wet hill forests (8B/C₁), East Himalayan Moist Mixed deciduous forests (3C/C_{3b}), Eastern Bhabar and Terai Sal (3C/C_{1b} and 3C/C₁c), Eastern sub-montane semi-evergreen forests (2B/C_{1b}), Northern dry deciduous seral Sal, Khair, Sissoo, Simul association (5B/IS₂) and moist Sal savannah (3C/DS₁) to low alluvium savannah woodland (3C/3/IS₁). It is a significant habitat for long ranging species (Elephant, Tiger and Gaur) and provides habitat connectivity. | | |

| Sl. No. | Value categories | Illustrative Constituents |
|------------|------------------------------------|--|
| 3 | Ecological processes and functions | Catchment conservation of several major rivers (Sankosh, Rydak, Jainti, Bala, Dima, Pana and Basra) for downstream habitations and irrigation which sustain economic well being of the region. Ecological security and environmental amelioration (pollution absorption) for the region. It acts as a carbon sink of the region. |
| 4 | Conceptual | ♦ It represents several elements of Bio-diversity of North-East India, one of the Bio-diverse Indian regions. About 60% of floral endemic species of N-E India are encountered in BTR. |
| 5 | Scientific | Significant scope of Wildlife research and education. It has socio-economic issues, ethnic diversity, and many endangered and endemic species. Thus, it provides an excellent opportunity to Scientists for improving understanding of the biological world. |
| 6 | Physical attributes | It represents the fragile Shiwalik and Himalayan landscape and rock features. It represents physical attributes of bhabar and terai eco-system. |
| 7 | Recreational | ◆ Potential for eco-tourism, aesthetic value, wilderness experience, close canopy and dense old forest, bird watching and Scenic beauty of Rydak River near Bhutanghat. |
| 8 | Educational | ♦ Significant scope for Nature interpretation and conservation awareness. |
| 9 | Assorted Religious | Pilgrimage to ancient Mahakal (Lord Shiva) Temple and Gumphas |
| | Historical | |
| | Cultural | Historical Buxa Fort |
| | | Rava, Dukpa, Garo, Nepali, Oraon, Santali and Mech tribal culture |

Table-1.3: Scaling Values in Buxa Tiger Reserve

| Sl. Value No. Category | Illustrative Constituents | |
|---------------------------|---|--|
| 1. Global | It provides shelter to Indian Tigers and Asiatic Elephant as representatives of highly endangered large mammals. It represents Himalayan landscapes and rock features. | |

| Sl. | Value | | | | |
|-----|----------|--|--|--|--|
| No. | Category | Illustrative Constituents | | | |
| 2. | National | It provides shelter to many endangered, threatened and rare species of animals like Indian Tiger, Asian Elephant, Leopard, Gaur, Bear, Hispid Hare, Pangolin, Python, Monitor Lizard, Black necked Crane, Bengal Florican, Great Indian Pied Hornbill, etc. It harbours endemic species like Clouded Leopard, Chinese Pangolin, Reticulated Python, Marble Cat, etc. It has vast community diversity from East Himalayan sub-tropical wet hill forests (8B/C₁), East Himalayan Moist deciduous forests (3C/C_{3b}), Eastern Bhabar and Terai Sal (3C/C_{1b} and 3C/C_{1c}), Eastern sub-montane semi-evergreen forests (2B/C_{1b}), Northern dry deciduous seral Sal, Khair, Sissoo, Simul association (5B/IS₂) and moist Sal savannah (3C/DS₁) to low alluvium savannah woodland (3C/3/IS₁). It represents the fragile Shiwalik eco-system., acts as huge carbon sink Immense scope of Wildlife Research and Education. <i>Historical Buxa Fort</i>. | | | |
| 3. | Regional | It acts as a Carbon Sink. It is located in the confluence of 3-major Bio-geographic Zones viz. Lower Gangetic plains (7B), Central Himalayas (2C) and Brahmaputra valley (8A). It provides habitat connectivity for long ranging animals (e.g. Elephant, Gaur, and Tiger). Catchment conservation of several major rivers (Sankosh, Rydak, Jainti, Bala, Dima, Pana and Basra) for downstream habitations and irrigation which sustain economic well being of the region. Ecological security and environmental amelioration (pollution absorption) for the region. It represents several elements of Bio-diversity of North-East India, one of the Bio-diverse Indian regions. | | | |
| 4. | State | It represents physical attributes of bhabar and terai eco-system. It has 3 natural water bodies in Hilly Section (locally called "Pokhries") and one wetland. It has potential for Eco-tourism, aesthetic value, wilderness experience, close canopy and dense old forest, bird watching and Scenic beauty of Rydak River near Bhutanghat. Immense scope of Natural Interpretation and conservation awareness. Rava and other tribal cultures. | | | |
| 5. | Local | ♦ The Multiple used Zone represents timber Reserve, it produce timber, fuel wood NWFP and employment for local people. ♦ It provides fodder for domestic cattle. ♦ It generates man days for local people. ♦ It has socio-economic issues, ethnic diversity. ♦ Immense scope of environmental education and conservation awareness. ♦ Ancient Mahakal (Shiva) Temple. | | | |

PART-A: THE EXISTING SITUATION

CHAPTER 2: BACKGROUND INFORMATION AND ATTRIBUTES:

- **2.1.** Geology, Rock and Soil: The Buxa Tiger Reserve is situated at the foot hills of Himalayan Ranges. It consists of the Himalayan formation of Darjeeling gneiss at an altitude of 1800 mt. The Great boundary fault (Gondwanas) lies just on South of it, followed by timulences of Shiwalik hills. Then follows the highly drained Bhabar tract and finally, South of 22nd mile, is the ill drained clayey Terai tract.
- **2.1.1. Rocky formation:-** The Buxa-Jainti Hills on the Northern part of the Reserve show the following geological formations:

Archaean System: The Dalings are mainly represented by slates, phyllite, quartzite, banded haematite, dolomite, quartz, mica, graphite and schists. Darjeeling gneiss very frequently passes into mica schists, or into a variety of intermediate between the two, e.g., a felspathic mica-schist or gneissose schist. Accessory minerals are kyanite, schorl and garnet. Banded hematite quartzites are found on the hills North-East of Raimatang and else where. Darjeeling gneiss represents the deep sea facies of sedimentation in an anaerobic condition which subsequently produced mobile metamorphics - primarily responsible for the landslides.

Early Palaeozoic: The Buxa series comprising chlorite schists, slates, phyllites, quartzites and dolomites is well developed in Buxa and Jainti Hills and dips towards N.E. The lower most rock type here is a dark grey dolomite which forms a band ranging in thickness between 30 and 40 meters. Dolomite is succeeded by crimson and green colored phyllites which in turn are overlain by quartzite band which is again overlain by dolomite band.

Gondwana System: The next younger rocks constitute a thin band of quartzitic and gritty sand stone with intercalations of carbonaceous slaty shale and thin lenses of graphitic coal often contaminated with calcareous matter. The major occurrences of Gondwana in this area are in the neighbourhood of Jainti. Vertically dipping hard calcareous sandstone, phyllitic shale, carbonaceous shale and flaky coal are the rocks noticed here.

Siwalik System: Micaceous and arkose sandstones, bluish and grayish siltstones, conglomerates and pebble beds comprise the Siwaliks of the area and constitute the lower hills between Dima river and Turturi stream. The formation extends east-west between Dima River and Bala River, E.N.E. – W.S.W. between Bala River and Jainti River, N.E. – S.W. between Jainti River and Phaskhawa stream and E.S.E. – W.N.W. and between Phaskhawa and Turturi stream. The dip is northerly and its magnitude varies between 20° and 60°, the higher dipping areas are generally seen at the contact of the Siwaliks with the Gondwanas.

2.1.2. Sub-Recent to Recent Formation:

The geological formations normally encountered towards the south of the Reserve are one of Sub-recent to recent origin and comprise of the following: -

Bhabar Formation: - This formation is represented by loose gravels, boulders and river deposits that are highly variable in composition and texture. This is also known as older alluvium. Sub-surface data indicate that clay is mixed in varying proportion and demarcation of distinct clay bed cannot be made. Except during monsoon, the formation is apparently devoid of water and the streams carrying water disappear in the porous structure of the formation and reappear further down south in the form of springs.

Terai Formation: - This formation is transitional in character between the alluvial formation in south and Bhabar formation in the north. It is better stratified and has more clay than in the Bhabar formation.

Alluvial Formation: - It is mainly represented by silt and clay without much gravel or boulder. It constitutes the flat plains to the South of the Reserve which is under extensive cultivation.

The soil is uniform throughout consisting of a light, friable loam varying in depth from 15 cms to 90 cms. In the uplands to the north of duars the soil is ferruginous clay and is particularly well suited to the growth of tea plant.

- **2.1.3. Buxa Dolomite:** The Buxa Dolomite is an important economic deposit of the area and its occurrence is noticed within latitudes 26°42′ and 26°44′ N. Dolomite is mainly present as a thick bedded rock in the Jainti hills within Phaskhawa and Hatipota blocks. The lower most rock type is dark grey which forms a thickness of 30-40 Mts. having very low Silica content.
- **2.1.4. Ground Water Resources:** The water table in the Northern Bhabar tract along Raimatang, Gangutia, Pana, Jainti, etc. is usually very low. In the southern Terai region along Damanpur, South Rydak, etc. the water table is high. The perennial streams and dug wells form the main source of water supply for plantation works and human habitation. Since most of the area is covered with loose sand and gravel, there is immense potential for the development of ground water. Ground water occurs both under water table as well as in deep aquifers. Slope of water table is generally parallel with the surface slope, which is southwards. At places, the water table slope intercepts the ground surface forming springs. Table-2.1 shows the level of water in various wells during summer months.

Table -2.1: Water table during summer at various locations.

| Tract | Locality | Water table in meters |
|--------|-----------|-----------------------|
| | Gangutia | 8.5 |
| Bhabar | Raimatang | 9.5 |
| | Sankosh | 7.6 |
| | Newlands | 9.0 |
| | Dima | 7.6 |
| Terai | Poro | 2.8 |
| | Gadadhar | 1.8 |
| | Garam | 1.5 |
| | Checko | 1.8 |
| | Damanpur | 1.5 |

2.1.5. Terrain:-

The Reserve is mainly situated in Bhabar and Terai areas consisting of slightly undulating land with a general inclination from North to South. It extends in some places into the outer range of Himalayas and reaches an elevation of 1800 mt. The hilly tracts (Adma, Chunabhati, Tobgaon, Santrabari, Phaskhawa, Tashigaon and Hatipota blocks) are steep and precipitous. The forests of this Reserve are intersected by numerous rivers originating both from hills and plains with a general flow from North to South. List of Survey of India topo-sheets covering management jurisdiction with scale is given in Table-2.2.

Table-2.2 List of Survey of India Topo-sheets covering management jurisdiction with scale

| S/L No. | Topo sheet no. | Scale |
|---------|----------------|----------|
| 1. | 78 F/5 | 1:50,000 |
| 2. | 78 F/6 | - do – |
| 3. | 78 F/9 | - do - |
| 4. | 78 F/10 | - do – |
| 5. | 78 F/14 | - do – |
| 6. | 78 F/15 | - do – |

2.1.6. Climate:-

2.1.6.1. Temperature: - The area lies in the moist tropical zone. The average day temperature varies from 12°C to 21°C from November to February, between 27°C to 32°C from May to September, between 24°C to 27°C for the rest of the months. The highest recorded temperature was 39°C (102.5°F) in 1899 and lowest was 2°C (36°F) in 1887 (Ref: 5th Working Plan of Buxa Division). There is an appreciable variation in day and night temperature throughout the year. Some times winter nights are too severe. From July to September, the days and early evenings are moist and hot and indeed oppressive; however, nights are always cooler. (Refer Annexure-5).

2.1.6.2. Rainfall:-

South – West monsoon is the main source of rainfall. The Reserve receives maximum rainfall from mid June to September. The rainfall is very high during the month of June, July and August. It subsides from the early September and disappears during the first week of October. December is the driest month with minimum rainfall.

March receives maximum of winter rain. Premonsoon showers accompanied by hail and thunder storm occur in the month of April to May.

The average annual rainfall in the Reserve is about 4100 mm, increasing a little towards North. Along the foot hills the rainfall varies according to the configuration of the hills; on the outer ranges of the hills it reaches around 5000mm.per year. The average annual rainfall at Rajabhatkhawa is 3750mm while that in Buxaduar (altitude 780 mt.) is 5600 mm. highest rainfall in a day in last 10 years was recorded as 992 mm. on 19th July 1993. It caused devastating flood in Alipurduar region. Refer Annexure - 6 for Average Annual and monthly Rainfall for 2001-2010.

2.1.6.3. Humidity:-

As the Reserve is located in the foothills of the outer Himalayas, it remain adequately humid throughout the year. Maximum relative humidity varies between 80% - 95%, seldom below 75% with a maximum in June to September and minimum in December to February.

2.1.6.4. Wind:-

The Reserve does not experience any high gale possibly due to existence of large chunk of dense forest cover. However, severe storms sometimes accompanied by hail occur in the months of April and May and rarely in September and October.

During $1942 - 4\overline{3}$ a heavy cyclone hit the Reserve causing enormous damage. It uprooted numerous trees and broke the crowns in good numbers. Such cyclones are not frequent but mild form of cyclone is almost an annual features causing lot of cyclone damaged trees.

2.1.6.5. Frost, Dew and Fog:-

From November to February the nights are very cold with much frost and dew and in low lying areas a dense fog lingers often even beyond 9.00 a.m. From March to the onset of monsoon fog and frost are absent but dew is deposited until April.

2.2. Hydrology and Water Sources:-

The forest tract is intercepted by numerous rivers, streams and jhoras of varying sizes which usually originate in the hills on the North and flow southwards. They rise and fall with great rapidity and frequently change their course causing damage to the Reserve. There are few natural pools and marshes situated within the Reserve. The list of natural and artificial water sources are given in Table-2.3.

| S/L No. | Name of Water Sources | Category | Natural / Artificial | Compartment No. |
|------------|--------------------------|----------|-------------------------|--|
| 1 | Sankosh | River | Natural | SNK-1, 3; NBH-2, 3, 4; SBH-2, 3 |
| 2 | Gholani | River | Natural | NBH-5; SBH-2, 3, 5, 6 |
| 3 | Rydak | River | Natural | NR-1, 2, 3; NLS-2, CR-2, 3, 6; MKT-1, 2, 3, 4; NRT-1; SR-3,5,7 |

Table-2.3. Natural and Artificial water sources in BTR

| S/L No. | Name of Water Sources | Category | Natural / Artificial | Compartment No. |
|------------|--------------------------|----------|-------------------------|--|
| 4 | Dhawla | River | Natural | DH-1, 2, 3; SR-6, 7 |
| 5 | Gadadhar | River | Natural | PNB-10; Gada-4, 5, 6 |
| 6 | Checko | River | Natural | Gada-1, 2 |
| 7 | Kalkut | River | Natural | Checko-6, 7, 8 |
| 8 | Nonai | Stream | Natural | DPO-8 |
| 9 | Garam | River | Natural | DPO-6; Poro-9 |
| 10 | Dima | River | Natural | SRVK-9, 16; Poro-3, 4, 8, 9 |
| 11 | Poro | River | Natural | NMT-3, 6; Poro-2, 5, 7, 10 |
| 12 | Barabeel | Lake | Natural | Narathali-2 |
| 13 | Pokhri | Pond | Natural | STB-1, TSGN-2; PHK-3 |
| 14 | Concrete Pond | | Artificial | RTG-3; TSGN-1;NRVK-13; JNT-9; SRVK-11; BGT-2; NLS-1; KGM-1 |
| 15 | Kaccha Pond | | Artificial | NRVK-6, 7,11, 12, 13, 14; JNT-9; SRVK-11,12, 14;SRK 2, SRVK 3, SRVK 5,PNB-1,2, 7 |

List of Natural wetlands with area statement and location by compartment number

| S/L No. | Location | Compartment No. | |
|---------|--------------------------|-----------------|--------|
| 1 | Narathali | Narathali-2 | 5.00ha |
| 2 | Phaskhawa | Phaskhawa-3 | 0.50ha |
| 3 | Tashigaon/ Pokhri Pahar | Tashigaon-2 | 0.50ha |
| 4 | Santarabari/ Adma Pokhri | Santrabari-1 | 0.50ha |

2.2.1. Nature and Distribution of Natural Water Sources:-

2.2.1. A. River System: The principal rivers that flow through this Reserve are Sankosh, Rydak, Jayanti, Bala, Dima and Gaburbasra. The rivers become full and fierce with torrents in the rains but are shallow and tame in the dry season. A short description of the principal rivers is given below.

The Sankosh: - The Western bank of the river is the eastern boundary of the project and is also the state boundary between West Bengal and Assam. It originates in Tibet and passes through Bhutan. Its principal tributary on its west bank is the Gholani. Sankosh River started eroding in 1921 into the Bholka forests. Since 1922 - 23, the river shifted west wards cutting across the North Bholka and South Bholka forests. Practically whole of the N. Bholka and S. Bholka forests was inundated. Sal and other trees died sporadically and in patches ultimately leading to invasion by tall grasses. It has a perennial flow throughout the year. In the year 1998 Gholani has shifted westwards and damaged badly Bangdoba F.V. and deposited huge sand and silt on forest land. This caused drying of teak plantations in SB-3 Comptt.

The Rydak: - This River rises in Tibet and after passing through Bhutan, flows through the forest blocks of Bhutanghat, North Rydak, Central Rydak, Marakata and Narathali. The river has changed its courses several times in 1905, 1930, 1933, 1950 and lastly in 1968 when heavy flood passed through the old course of the river along Central Rydak and Marakata forest blocks, causing extensive damage to the forests. Construction of a boulder crib embankment across the old Rydak River has completely blocked the course and as a result the chance of damage to the forests of Central Rydak and Marakata blocks has been diminished.

Presently the main course has been bifurcated at the apex of the compartment no 6 of Central Rydak block and have coursed out of the Reserve forest through the north – western boundary of the compartment. In the year 1998 Rydak shifted its course towards east near Newlands and damaged about 100 hectares of plantations of NLS-2, NR-3 and Newlands resume lands.

The Phaskhawa: - This River raises from the Jainti hills bordering Bhutan and flows through the boundary of Phaskhawa and Hatipota blocks and Jainti – Hatipota unclassed forests. Ultimately it merges with Turturi River, beyond southern boundary of the Reserve. It's a seasonal river. It remains dry throughout the year except rainy season.

The Jainti: - The River originates from Bhutan hills and flows to southwards through phaskhawa and Jainti blocks. It carries water upto January and remains dry till monsoon breaks. River is highly erratic. It often changes course. It threatens establishment along its banks. It destroys important habitats (Jainti-3, 6 and 7 comptts.) during such shifts.

The Bala: - The River originates in the Buxa hills and receiving the water from Thelchang and Kalkut rivers in its southern part and finally falls into Kaljani river. Since the flood of 1950, Bala river has been behaving very eratically and has caused considerable damage to the standing forest crop in SRVK and Checko blocks.

The Dima: - It originates from the lower Bhutan hills and flows southwards. In the northern portion this river receives the water of river Raimatang and Gangutia which also originate from the Buxa hills. Dima flows south to its confluence with Basra River where from the current stream takes the name of river Kaljani. This river flows through Dima Santrabari, NRVK, SRVK and Poro Blocks. Its lower part is perennial. In the year 1998 Dima has changed its course and shifted westwards and washed away lot of teak plantation of Dima-1 and 3 comptts. The main course is flowing near Dima Beat office leaving the older course.

The Gaburbasra: - The River originates from Bhutan hills and is the western most river of the Reserve. It flows through Rangamati, Bharnabari and Gudamdabri blocks. It receives discharges of Pana River in its upper catchment. It carries very small flow throughout the year except rainy season.

The Pana: - The River originates in the Bhutan hills. It has bifurcated, one part flows through Bhutri-forests and another part flows through Pana forests. Both the flows ultimately merge with Gaburbasra River above 0Gudamdabri block. It's a seasonal river and remains dry throughout the year except rainy season. It has damaged lot of forests of Bhutri and Pana blocks.

2.2.1. B. Other rivers/Streams/Jhoras: - Many other smaller perennial and seasonal streams are flowing through BTR. Some of them are described below.

I. Perennial water Sources:-

Poro River: Originates from Nimati –2, 3, 4 compartments and flows through Poro-2, 5, 7 and 10 compartments. It is a perennial river, ultimately merges with Kaljani River outside forests.

Nimti Jhora: Perennial stream originates from Nimti-2 comptt and passes through Poro-6 and 11 compartments.

Alibanka: Originates from Atiabari T.E. and passes through Nimati-4 and 5, Poro-2 compartments merges with Poro River.

Panchkaljhora: Perennial stream originates from Nimati-2 comptt and passes thorough Nimati-7, Poro-1, 5 and 6 compartments and merges with Poro River.

Dhawlajhora: Originates from Bhutanghat-I compartment and passes through NR-1, 2, CR-1, Turturi and Rydak T.E., Dhawla-1, 2, 3 compartments and merges with one branch of Rydak, South-West of Chipra Beat. Its upper course is seasonal but lower course is perennial.

Nonai River: Perennial stream originates from SRVK-10 compartment and passes through SRVK-15, DPO-3, 4, 7, and 8 compartments.

Turturi River: Originates from Indo-Bhutan boundary and passes through Hatipota block, Kartick P.F.

Cheko River: Perennial stream originates from Panbari-1, 2 comptts and passes through Pan-7, 8 and Gada-1, 2 compartments and ultimately merges with Kalkut River outside forests.

Gadadhar River: Perennial stream originates from Panbari comptts and passes through Gadadhar-1, 3 and 4 comptts.

II Seasonal water Sources:-

Kalikhola: Originates from Indo-Bhutan boundary above Kumargram Block and passes through KG-1, 2 and NLS-1, 2 compartments carries water during rainy season.

Khurul: Originates from Bhutan, just above Newlands and Kumargram blocks and passes through KG-1, 2 and NLS-1, 2 compartments carries water during rainy season.

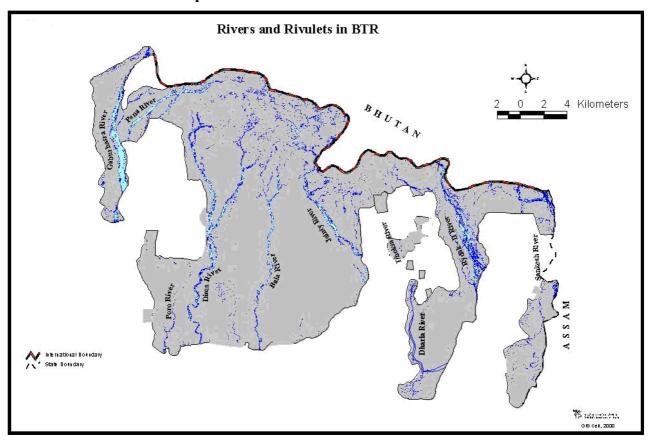
Dumrijhora: Originates from Jainti River and passes through Jainti-3b, 6b, 7b compartments carries water only during rainy season and becomes torrential at that time.

Chuniajhora: Seasonal stream, originates from chuniajhora T.E., passes through chuniajhora resume lands causing devastation during rains.

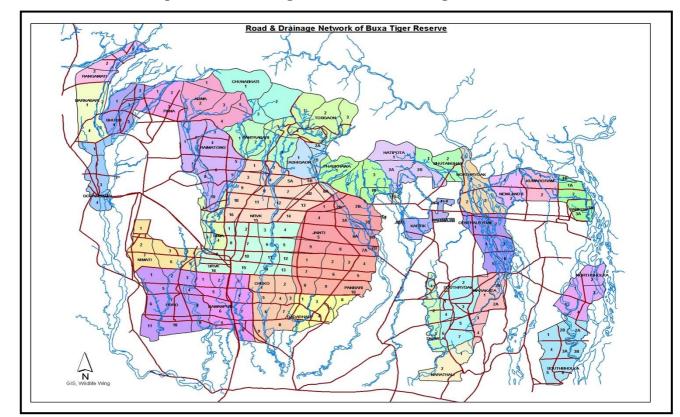
Buxajhora: Seasonal stream originates from STB-4 compartment passes through NRVK-2, 4, 8 and merges with Bala River.

Dianakhola: Originates from Phaskhawa comptts, passes through Phaskhawa block and merges with Phaskhawa River.

Guanala: Originates from Tashigaon compartment and merges with Jainti River.



Map-4A Rivers and Rivulets of BTR



Map-4B: The Drainage Network of Buxa Tiger Reserve

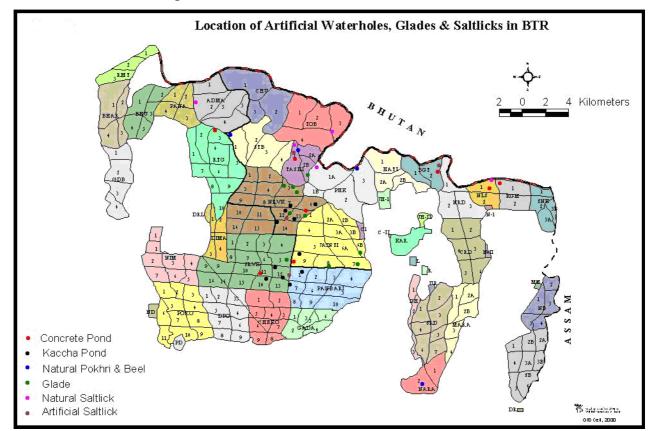
2.2.2. Nature and Distribution of Artificial Water Sources:-

As the major portion of the Reserve falls in Bhabar tracts, the water holding capacity of the area is very poor. Concrete tanks have been constructed in Central, Western and Eastern part of the Reserve to maintain the availability of water for wild animals in those areas. Range wise distribution of artificial waterholes is as given in Table-2.4:

S/L Name of the No. of artificial **Compartment-wise** No. Range water pool location RTG-3 Pana 1 2 Nimati 2 NIM-1,2 3 4 Pan-1, 7, SRVK-12, 14 Rajabhatkhawa (E) 4 8 TGN-1,NRVK-6,12, 13(2 Jainti no), 14, JNT-8, 9 BGT-2, KRT-PF 5 N.Rydak 2 6 2 NLS-1,KG-1 Kumargram

Table – 2.4: Artificial water holes in BTR

(Source: BTR Range offices Records)



Map -5 Artificial Water holes, Glades and Saltlicks

2.2.3. Natural Pools and Marshes:-

Water accumulates in the river channel at deeper places to form pools even during the lean months. There are three perennial geological basins locally called pokhri, one each in Tashigaon – 2, Phaskhawa-3 and Santrabari – 1 compartment. These pokhries are extremely important from Wildlife point of view. They provide water during learn period. A large number of turtles inhabit it. One large wetland / Water body, locally called Bara beel (1000 m x 50 m) is situated within Naratholi-2 compartment. Another small wetland, called chhoto beel is situated in Narathali-2 compartment. These are very important as lot of migratory birds come to these beels during winter season.

2.2.4. Natural Saltlicks:

Saltlicks are very important from Wildlife Management point of view. The hilly and foothill tracts of the Reserve consist of numerous natural saltlicks. These are located in Adma-1, Tashigaon-2, Phaskhawa-2 and 3, Kumargram-1.

| S/L No. | Category | Locations | Compartment No. |
|---------|-------------------|-----------|------------------------------|
| 1 | Natural Salt lick | Adma | Adma-1 |
| | | Hatinala | Tashigaon-2 |
| | | Guanala | Tashigaon-2 |
| | | Kalapani | Phaskhawa-2, 3 |
| | | Khurul | North of KGM-1 within Bhutan |

Table-2.5: List of Natural saltlicks

2.3. Vegetation Cover Types:-

2.3.1. Biogeographic classification:

The Reserve lies in the Bio-geographic Zones of Central Himalayas (2C) and lowers Gangetic Plains (7B) as recognized by Rodgers and Panwar, W.I.I., Dehradun, 1988. The lower-gangetic plain in North West Bengal, that separates the peninsula from Himalayas through a belt of siwaliks in between, is referred as sub-montane Terai or Duars (Mani, 1974).

2.3.2. The Forest Types and their distribution:

The Buxa Tiger Reserve is a Forest of multi-tier vegetation assemblage. The forests of the Reserve can broadly be classified as Moist Tropical Forest of Champion and Seth's recent classification. As the extent of this forest ranges from plains upto an elevation of 1,750 mt. in the hills, a distinct variation in the crop composition is visible depending on altitude, soil moisture, topography, and drainage and soil formation. So far 352 species of trees, 133 species of shrubs, 189 species of herbs, 108 species of climbers, 144 species of orchids, 46 species of grasses, 16 species of sedges, 6 species of canes and 4 species of bamboos are reported in this Reserve. (Annexure 7)

On the basis of the composition of crops, the forests can be classified into 8 broad types with their sub-types as indicated in Table 2.6 below:

Table 2.6: Forest classification as per composition of crops

| S/L No. | Types | Champion and Seth's classification | Principal localities of occurrence |
|---------|-------------------------------|---|---|
| I. | Riverine Forests | Northern dry deciduous seral Sal, Khair, Sissoo, Simul Association (5B/IS ₂) | River banks of Rydak, Pana, Jainti, Dhawla, Basra in NRD, CRD, MKT, Pana, Bhutri, Jainti, Dhawla, BNB and GDB blocks. |
| II. | Sal forests | Eastern Bhabar and Terai Sal (3C/C _{Ib} and 3C/C _{IC}) | Bhabar sal forest occurs in Raimatang, Jainti and few comptts of NRVK blocks. Terai sal forest occurs in S.Rydak, SRVK and Damanpur Blocks. |
| III. | Dry mixed forests | East Himalayan Moist Mixed deciduous forest (3C/C _{3b}) | Northern part of the Reserve. More/ less north of 25 th mile. |
| IV. | Wet mixed forests | Sub-Himalayan Secondary Wet Mixed forest (2B/2S ₃) | The forests South of 21 st Mile and some portion of S.Rydak block. |
| V. | Semi- evergreen forests | Eastern Sub-montane semi-evergreen forest (2B/C _{1b}) | This type is found in RTG-2, 3, STB-3, 4, Tashigaon-1 and Bhutanghat-1, 2 compartments. |
| VI. | Evergreen forests | Northern Tropical Evergreen forests (1B/C _{1a}) | This type is found close to streams which rises in the plains and occupies a very small area in comparison to |

| S/L No. | Types | Champion and Seth's classification | Principal localities of occurrence |
|---------|---------------------|---|--|
| VII. | Hill | East Himalayan | other types. Found in Adma, Chunabhati, |
| V11. | forests | Subtropical Wet Hill forest (8B/C _I) | Tobgaon, Santarabari, Tashigaon, Pashkhawa, and Hatipota blocks. |
| VIII. | Savannah forests | Moist Sal Savannah (3C/DSI) and Low alluvium Savannah woodland (3C/3/1S ₁) | Riverine areas of N.Rydak, S.Rydak and Bholka blocks. |

I. Riverine Forests:-

This type adjoins the principal rivers, viz. Rydak, Pana, Basra, Jainti, Dhawla and corresponds to Champion and Seth's classification of Northern dry deciduous forests. The Seral type of Khair – Sissoo association (5B/1S2) is seen on either bank of the river Rydak in North and South Rydak Ranges, Jainti in Jainti Range, Basra in Hemilganganj Range, and Pana in Pana Range. The distribution of this type is restricted mainly in the parts of Bhutanghat, North Rydak, Central Rydak, Marakata, Narathali, Dhawla, Jainti, Pana, Bhutri, Bharnabari and Gudamdabri blocks.

The ground that bears this type of forest ranges from unstable banks and islands of recent formation to older banks and islands of varying degree of stability and the vegetation varies accordingly. The more recently formed soil naturally carry crop that are comparatively early in the stage of progression. The principal constituents being Khair (Acacia catechu) and Sissoo (Dalbergia sissoo), occurring sometimes pure but usually in various degrees of admixture with Simul (Bombax ceiba), Albizzia spp., etc. constituting the secondary species. On older soils where progression has advanced, Khair and Sissoo form the secondary group of species while Albizzia spp., Bombax ceiba, Strebulus spp., Lagerstroemia parviflora (Sidha), Cassia fistula, Trewia nudiflora, Anthoceptatus chinensis, etc., constitute the principal species, with successive changes in edaphic conditions and progressive stability as one moves away from the riverfront.

Mainly Pitali (*Trewia nudiflora*), Kainjal (*Bischofia javanica*), with a few Chalta (*Dillenia indica*) and Gamar (*Gmelina arborea*) appear to do well in this type where ever the water table is not low. Tanki (*Bauhinia purpurea*) is the commonest in the neighbourhood of river beds where permanent water table is fairly deep.

II. Sal Forests:-

This type corresponds to Champion and Seth's classification of Northern Tropical moist deciduous forests (3C/CI) and contains both Eastern Bhabar (3C/CIb) and Eastern Terai Sal (3C/CIC). Sal forests of this area cover the maximum extent over the plains and the foothills. Eastern Bhabar Sal forests occur in Raimatang and Jainti blocks and a few compartments in North Rajabhatkhawa block. Eastern Terai Sal forests occur in Damanpur, South Rajabhatkhawa, Panbari, Poro, Nimati and South Rydak blocks. Soils with course gravels and boulders in the bhabar

tracts carry a fair percentage of Sal (*Shorea robusta*) in an admixture of various deciduous species namely Bahera (*Terminallia belerica*), Sidha, Tantari (*Dillenia pentagyna*), Odal (*Sterculia villosa*), Kumbhi (*Careya arborea*) and Chilaune (*Schima wallichii*).

Eastern Tarai sal occurs mostly in the Southern parts of the Reserve where soil is heavier and the water table is higher. In this type, though Sal is the predominant species, numerous other species such as Champ, Lali (*Amoora wallichii*), Chilaune, Bahera, Pakasaj (*Terminalia tomentosa*), Kawla (*Machilus villosa*), Angari (*Phoebe attenuata*) are also found.

In Sal forests the middle storey consists of Lahasune (*Aphanomixis polistachea*), Malata (*Macaranga denticulata*), Tanki (*Bauhinia purpurea*), Gineri (*Premna bengalensis*) etc. The ground flora is mainly composed of Galeni (*Leea species*), Assamlata (*Makania spp*), Bhant (*Clerodendrum viscosum*) and several climbers, Arare Kanta (*Mimosa spp*.), Bhoria (*Bauhinia vahlii*), etc.

III. Dry Mixed Forests

According to Champion and Seth's classification this type of forest belongs to East Himalayan moist mixed deciduous forest (3C/C3b). This type occurs mainly in the northern part of the Reserve, more/ less north of 25th mile, in parts of Pana, Raimatang, Jainty, NRVK, Newlands, Bhutanghat and Kumargram blocks. In this type Sal trees are met with very frequently and they are of finest quality. The upper storey is generally composed of Bahera, Odal, Amoora spp., Parari (Stereospermum tetragonum), Sidha, Gamar, Dysoxylum binectariferum and the middle storey is composed of Litsaea spp., Premna integrifolia, Mallotus philippinensis, Wrightia tomentosa, Machilus spp., Careya arborea and Oroxylum indicum. Grass is generally absent but may become abundant on burning and then the forest tends towards Savannah land.

IV. Wet Mixed Forests

According to Champion and Seth's classification, this type covers successive stages to north tropical evergreen forests. He designates it as Sub-Himalayan secondary Wet mixed forests (2B/2S3). This type consists of evergreen species, but must not be confused with the true evergreen forests. The point of difference is on the ecological status. This type is a secondary seral stage and the latter is a climax forest. The Wet mixed forests appear to be of recent origin which has spread under fire protection and is invading the Sal forests. This type of forest is found in the parts of South Rydak, Checko, Panbari, Damanpur, Nimati and Poro blocks. The more mesophytic species like Kawla (*Machilus villosa*), Jam (*Sygygium Spp.*) and Parari have replaced Sal. The top canopy consists of Kawla, Lali, Lampate (*Duabanga sonneritioides*), Malagiri (*Cinnamomum cecidodaphne*) etc. The middle storey is composed of Jam, *Meliosma simplicifolia, Turpinia pomifera*, Tanki and *Aesculus punduana* etc. The under storey is composed mainly of Canes.

V. Semi-Evergreen Forests

This type belongs to Eastern Sub montane Semi-evergreen forests (2B/CIb) according to the classification of Champion and Seth. The type is found in the Sub-Himalayan tract and the lower slopes of the hills, namely Rangamati, Tashigaon, Hatipota and Bhutanghat Blocks of this area.

The top storey is composed of Chilaune (Schima wallichii) in association with Tanki (Bauhinia purpurea), Toon (Toona ciliata), Lampate (Duabanga grandiflora), Maina (Tetrameles nudiflora), Champ (Michelia champaca), Gamar, Chikrasi (Chukrasia tabularis) and Gokul (Ailanthus grandis). Lower storey is composed of Angare (Litsea spp.), Dysoxylum spp., Mallotus spp., etc. In some places tufted bamboo (Dendrocalamus hamiltonii) are also found.

VI. Evergreen Forests:

This type corresponds to Champion and Seth's Northern Tropical Evergreen forests (1B/CIa). This type is found close to streams which rise in the plains and it occupies a very small area in comparison with other types. The most typical trees are Horse-chestnut (Aesculus punduana), Amboke (Eugenia formosa), Chalta (Dillenia indica), Gobre (Echinocarpus sterculiaceous), Katus (Castanopsis sp.), and among the more valuable species mention may be made of Bhalukat (Talauma hodgsoni), Lator (Artocarpus chaplasha), Gokul dhup (Canarium sikkimense), Lali (Amoora wallichii) and Malagiri (Cinnamomum cecidodaphne).

VII. Hill Forests

According to Champion and Seth's classification this type of forests belongs to East-Himalayan Sub-tropical Wet Hill forest (8B/CI). This type occurs in Hatipota, Phaskhawa, Tashigaon, Tobgaon, Chunabhati and Adma blocks. The distribution of species in the hills depends on elevation and to some extent on configuration. The foot hill portions generally hold dry mixed type of forest with some Sal along the crest of the Spurs and ridges along with *Dendrocalamous hamiltonii*, Mandane (*Acrocarpus fraxinifolius*), *Phoebe lanceolata*, *Pterocarpus acerifolium*, *Gynocardia odorata*. Upto 3000' elevation the most common large trees are Katus (*Castanopsis spp.*), Mandane, Bhalukat (*Talauma hodg*soni), Lampate, Panisaj (*Terminalia muriocarpa*), Gokul, Champ and Chikrase. The hill species noticeable above 3000' elevation are Oaks (*Quercus spp.*), Chestnuts; *Michelia cathecartii*, *Alnus nepalensis*, *Phoebe atten*uate, *Betula cylindrostachys*, *Acer Spp.* and various types of Bamboos.

VIII. Savannah.

There are two distinct types of Savannah forests recognised by Champion and Seth in this area:-

a) Moist Sal Savannah (3C/DS1) is characterised by the presence of Scattered Sal along with Kumbhi, Amloki, Sidha, Tanki, etc. Saccharum Species exhibits the most remarkable power of colonisation. It covers a vast area of riverine tracts, extending from fresh sandy deposits to swamps. In a variety of locations and under different conditions the grass thrives and then successfully stabilises very loose soil. The other predominant grasses are *Themeda arundinacea*, *Phragmites*

karka, Arundo donax and Imperata cylindrica. The grassy tracts occuring on the riverine formation are the association of the primary succession the stability of which is related to the behaviour of the river. The Savannah has often resulted due to change in the course of the river following flood and deposition of sand which completely destroyed the standing crops and brought about such drastic changes to encourage grass growth once again.

b) Low alluvium Savannah woodland (3C/3/IS1) is characterised by *Bombax – Albizzia* association. The area is dry throughout winter but is inundated during the rains. The important tree species found in this type are Khair, Kainjal and Pitali, Dillenia. Grasses are very dense and the notable grass species are *Saccharum procerum*. *Paspalidium punctuatum*, *Arundo donax*, *Saccharum spontancum*, *Pharagmitis karka*, *Themeda arundinacea*, *Cymbopogon nardus*, etc.

The Savannah types described in above paragraphs bear a great deal of resemblance to each other but their origin and mode of development helps us to distinguish each other.

2.3.3. The availability of forage to herbivores:

No information is available about the extent of forage available in different seasons in the year. Nevertheless for the large number of wild pigs and ungulates the area appears to be rich in forage. High incidence of occurrence of species per unit area and wide variety of grass, herbs and shrubs has enriched the fodder resources of the forests. Field observation indicates the presence of following grasses which are mostly preferred by the wild herbivores.

Paspalidium punctuatum Imperata cylindrica Panicum maxima Sateria glauca Oryza spp. Saccharum spp Andropogon spp Arundo donax Thysanolana spp Themeda arundinacea Phragmites karka

Besides, there are many species of bamboos and ferns which are browsed by the herbivores. The general availability of the browse species, their palatability, indices, temporal and spatial distribution of browse and temporal browse preference of the herbivores require detailed investigation. However, a list of plant species that serves food to wild herbivores is given in Table - 2.7.

Table - 2.7: List of Plant species that serve as food to wild herbivores

| Parts Used | Name of Species | Parts Used |
|------------------|--|--|
| Root | Mallotus phillipinensis | Leaves and |
| Shoot | Microstegiam ciliatum | twigs |
| Leaves and twigs | Ophiopogon spp | Shoots |
| Shoot | Oplismenus compositus | Shoots |
| Shoot | Oryza spp. | Shoots |
| Twigs and fruits | Panicum maxima | Shoots |
| Shoot | Paspalidium punctatum | Shoots |
| Shoots | Phragmitis karka | Shoots |
| Shoots | Saccharum arundineaceum | Shoots |
| Shoots | Sacchirum spontaneum | Shoots |
| Shoots | Sateria glauca | Shoots |
| Leaves and twigs | Smilax perfoliata | Shoots |
| Twigs and fruits | Stereospermum chelonoides | Shoots |
| Twigs and bark | Themeda villosa | Shoots |
| Shoots | Thunbergia coccinea | Shoots |
| Shoots | Thysanolena spp. | Shoots |
| Twigs | Tinospora cordiffolia | Shoots |
| Shoots | Vetiveria zizanoides | Shoots |
| | | Shoots |
| | Root Shoot Leaves and twigs Shoot Shoot Twigs and fruits Shoot Shoots Shoots Shoots Leaves and twigs Twigs and fruits Twigs and bark Shoots Shoots Twigs and bark Shoots Twigs | Root Shoot Microstegiam ciliatum Leaves and twigs Ophiopogon spp Shoot Oryza spp. Twigs and fruits Shoot Paspalidium punctatum Shoots Twigs and fruits Twigs and bark Shoots Thunbergia coccinea Shoots Thysanolena spp. Twigs Tinospora cordiffolia |

2.3.4. Phytosociology:

Detailed scientific study on plant associations (Phytosociology) is yet to be taken up in the Buxa Tiger Reserve. Based on the available information different plant associations are as below:

- 1) Khair Sissoo association Sal association
 - a. Eastern Bhabar Sal
 - b. Eastern Tarai sal
- 2) Dry Mixed Forests
- 3) Wet Mixed Forests
- 4) Semi-evergreen Forests
- 5) Evergreen Forests
- 6) Hill Forests
- 7) Savannah

2.3.5. Forest Cover

The information on the forest cover in Buxa Tiger Reserve is explained in section 2.3.2. The type and extent of forest is shown in the Map- 6.

- **2.3.6. Vegetation and Land cover: -** Shown in Map 7A & 7B
- 2.4. Wild Fauna, Habitats and Trophic Niches

2.4.1 Major wild fauna of BTR:

BTR harbours a wide range of animal diversity. In total, 68 species of mammals, 41 species of reptiles and more than 246 species of birds, 4 species of Amphibian along with 33 species of fishes as listed in **Annexture-8** have been recorded in BTR. Of these, there are 20 species of mammals which are endangered and are included in schedule I of Wildlife (Protection) Act, 1972, seven species of birds, 10 species of reptiles, are also included within the endangered lists.

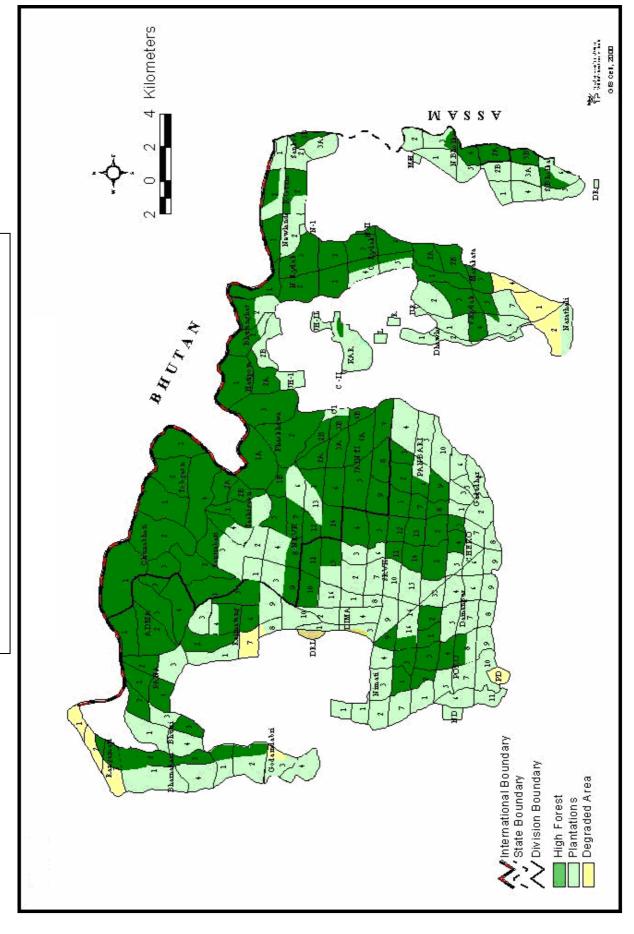
Mammals: The main carnivores of BTR are Indian Tiger (Panthera tigris tigris), Leopard (Panthera pardus), Clouded Leopard (Neofelis nebulosa), Hog badger (Arctonyx collaris), Jungle Cat (Felis chaus), Leopard Cat (Prionailurus bengalensis), Sloth Bear (Melursus unsinus), Fishing Cat (Prionailurus viverina), Civet Cat (Viverricula indica), Hyaena (Hyaena hyaena), Jackal (Canis aureus), Mongoose (Herpestes edwardsi)f Indian fox (Vulpes bengalensis), Wild dog (Cuon alpinus) etc. Marbled Cat (Pardofelis marmorata) and Golden Cat (Catopuma temmincki) were reported earlier but in recent years they are not sighted.

Among the herbivores of Buxa Tiger Reserve, the pre-dominants are Elephant (Elephus maximus), Gaur (Bos gaurus), Sambar (Cervus unicolor), Chital (Axis axis), Barking deer (Muntiacus muntjak), Hog deer (Axis porcinus), wild pig (Sus scrofa cristatus), Hispid Hare (Caprolagus hispidus), etc. Wild Buffalo (Bubalus bubalis) was historically reported from BTR. The great Indian one horned Rhino (Rhinocerous unicornis) was reported in South Bholka and Panbari blocks of Buxa Tiger Reserve upto 1968. Presumably they migrated to these forests from areas in Assam on the other side of Sankosh River.

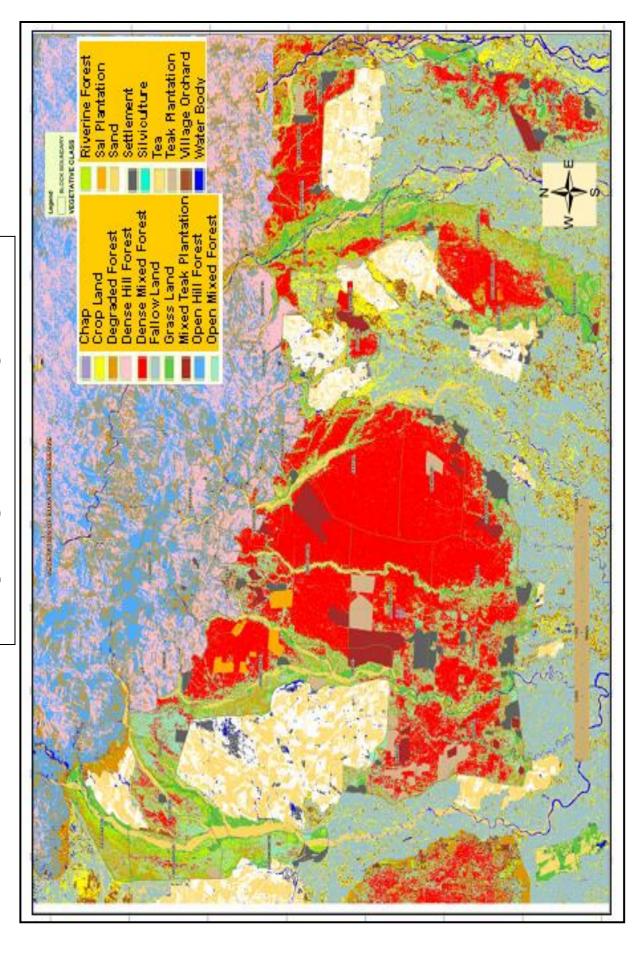
Many other animals like Porcupines (*Hystrix indica*), Rhesus macaque (*Macaca mulatta*), Squirrels, Common Pangolin (*Manis crassicaudata*) and Chinese Pangolin (*Manis pentadactyla*) are also frequently seen in these forests

Fishes: Numerous rivers and streams in the forests of this Reserve contain a variety of fish of which Mahseer is the biggest and most sought after in Rydak River near Bhutanghat. Fishes of several species like Boal (*Wallago attu*), Kalbaus (*Labeo calbasu*), Mrigel (*Cirrhinus cirrhosus*), Chital (*Notopterus chitala*), Sole (*Channa striatus*) are found. There are innumerable small fishes in the rivers and streams. Most common are chela (*Chela bacaila*), Hum, Puti (*Puntius ticto*), Boroli (*Barilius barila*), etc.

Map 6-Showing High Forest and Plantation



4 Kilometers Section 200 MASSA Map 7a - Showing Vegetation and Land Cover MInternational boundary
Division boundary
State boundary Plantation Dense Mixed Degraded Forest Dense Sal Open Sal Grasland



Reptiles: Among reptiles, tortoise, lizards, various kinds of Snakes such as King Cobra (*Ophiuphagus hannah*), Russel's viper (*Vipera russeli*), Black Crait (*Bungarus niger*), Indian Python (*Python molurus*) and Reticulated Python (*Python reticulatus*), Chinese pangolin (*Manis pentadactyl*) are found in this region (Annex-8). Gharial (*Gavialis gangeticus*) and Mugger (*Crocodilus palustris*) are reported in 6th Working Plan of Buxa Division (1965-66 to 1974-75), but these have not been sighted recently.

Avifauna: The forests are also rich in avifauna and the important ones are Hill Myna (Gracula religiosa), Crested serpent eagle (Spilornis chieela), the common Red Jungle Fowl (Gallus gallus murghi), the Flame backed woodpecker (Chrysocolaptus lucidus), Nightjar (Caprimulgus macrurus), Black francolin (Francolinus francolinus), Green pigeons (Treon sps), Hornbills (Tockus sps.) and various kinds of waterfowl. Peacocks are also seen quite frequently. Around the water pools, water birds such as Darter (Anhinga melanogaster), Gey heron (Ardea cinerea), Little egret (Egretta garzetta), Paddy bird (Ardeola gravil), Cattle egret (Buceros bicornis) are met with. The rare Bengal florican (Eupodotis bengalensis) was reported from the tiger Reserve though no recent sightings have been documented.

Entomofauna: Studies on entomofauna by Prof. D. Roychoudhury and others of Calcutta University listed 500 species of insects belonging to 13 orders, 65 families and 229 genera. Buxa Tiger Reserve is extremely rich in terms of invertebrates viz. insects, Spiders and butterflies, etc. The study was conducted from Nov'94 to Nov'97. Their findings are stated below:

Table –2.8: Insects Fauna of B.T.R (Species identified and listed so far)

| Order | Strepsiptera | Araneae | Coleoptera | Dermapera | Dictgoptera | Diptera | Heteooplara | Homoptera | Hymenoptera | Isoptera | Lepidoptera | Mantodear | Newropla | Odonata | Opiliones | Orthoptera | Phasmida | Total |
|----------------|--------------|---------|------------|-----------|-------------|---------|-------------|-----------|-------------|----------|-------------|-----------|----------|---------|-----------|------------|----------|-------|
| No. of Species | 1 | 69 | 183 | 6 | 4 | 10 | 63 | 2 0 | 49 | 1 | 78 | 5 | 2 | 10 | 3 | 20 | 1 | 525 |

Phasmida Stick and leaf insects Hymenoptera ⇒ Bees, Wasp, Ants. Orthopiera Hoppers and crickets. Diptera ⇒ Two Winged flies. ⇒ Roaches **Opiliones** Harvest man Dictypotera Odonata Dragon flies Dermaptera ⇒ Earwigs ⇒ Beettes and weevils Lace Wing bugs Coleoptera Neuroptera \Rightarrow **Prayhing Mantids** ⇒ Spiders Mantodea Araneae **Butterflies and Moths** Lepidoptera Strepsiptera Twisted wing Insects \Rightarrow Isoptera **Termites**

Thus beetles and weevils are the most abundant in BTR.

Table-2.9: Showing "Species –Richness" in different areas of B.T.R.

| | | No. of Species | | | | | | | | | | | | | | | | | | |
|---------------------|------------|----------------|-------|----------|----------|----------|---------|-----------|---------|--------|---------|-----------|------|-----------|---------------|---------|------------|--------------|-------------|-----------|
| Insect orders | Bhutanghat | Buxaduar · | Cheko | Damanpur | Gadadhar | Hatipota | Jayanti | Kumargram | Newland | Nimati | Panbari | Phaskhawa | Poro | Raimatang | Rajabhatkhawa | Sankosh | Santrabari | South Bholka | South Rydak | Tashigaon |
| 1. Araneae | 10 | 21 | 2 | 6 | 13 | 1 | 8 | 7 | 3 | 16 | 10 | 3 | 6 | 27 | 30 | 2 | 7 | 14 | 21 | 6 |
| 2. Coleoptera | 10 | 9 | 12 | 6 | 9 | 3 | 29 | 14 | 24 | 21 | 33 | 13 | 5 | 20 | 64 | 9 | 6 | 35 | 16 | 12 |
| 3. Dermaptera | - | - | - | - | - | - | - | - | - | 3 | - | - | - | - | 7 | - | - | - | - | - |
| 4. Dictyoptera | 1 | 1 | - | 1 | - | - | 1 | 1 | - | - | - | - | - | - | 1 | - | 1 | 1 | - | 1 |
| 5. Diptera | - | | - | 2 | • | • | 2 | | | - | | - | 1 | - | 2 | - | 1 | - | - | - |
| 6. Heteroptera | 15 | 7 | 3 | 14 | 7 | 1 | 18 | 5 | 6 | 15 | 10 | 20 | 5 | 17 | 50 | 8 | 3 | 9 | 13 | 5 |
| 7. Homoptera | 1 | 1 | - | - | 1 | - | 2 | - | - | 8 | 4 | 1 | 7 | 2 | 6 | 1 | - | 3 | 7 | - |
| 8. Isoptera | - | - | - | - | - | - | - | - | - | 1 | - | - | - | 1 | - | - | - | - | - | - |
| 9. Lepidoptera | 30 | 19 | 3 | - | - | 8 | 38 | 8 | - | 21 | 31 | 16 | 3 | 34 | 27 | 3 | 5 | 39 | 22 | 1 |
| 10. Mantodea | - | 1 | - | - | - | - | 1 | 1 | - | 1 | 1 | - | - | 1 | - | - | - | 1 | - | - |
| 11. Neuroptera | - 1 | - | - | - | - | - | 2 | 1 | - | - | - | - | - | 5 | 5 | - | - | - | - | - |
| 12. Odonata | 1 | 4 | - | | - | - | 5 | • | 1 | 6 | - | - | - | 2 | 3 | - | - | 2 | - | 2 |
| 13. Orthoptera | | 1 | - | - | - | - | 3 | - | - | 0 | - | 1 | - | | 3 | - | - | - | - | |
| 14. Phasmida Total | 68 | 65 | 20 | 29 | 30 | 13 | 107 | 37 | 34 | 94 | 89 | 52 | 26 | 110 | 195 | 23 | 21 | 104 | 79 | 26 |

Table-2.10: Population Dynamics of Wild animals in BTR. (Up to 2013)

| 140 | 1e-2.10: Popu | nation Dy | | vviid dillilli | Year | (Cp to 20 | 10) |
|----------|--------------------|-----------|-------|---------------------|---|--------------------|---------------------|
| S/l. No. | Species | 1992 | 1995 | 1997 | 2010 | 2011 | 2013 |
| 1 | Indian | 29 | 31 | 32 | 15 | 20 | results are awaited |
| | Tiger | | | (pugmark method) | Scat DNA method all India Tiger Monitoring report | Scat DNA method | |
| 2 | Leopard | 61 | 70 | | | | |
| 3 | Indian Elephant | 84 | 85 | | 215 | | |
| 4 | Gaur | | 310 | | | | 1387 |
| 5 | Sambar | | 80 | | | | 214 |
| 6 | Barking deer | | 920 | | | | 2095 |
| 7 | Hog deer | | 110 | | | | 97 |
| 8 | Cheetal | | 480 | | | | 780 |
| 9 | Wild Boar | | 2600 | | | | 2504 |
| 11 | Civets | | 315 | | | | |
| 12 | Rhesus Macaque | | 22000 | | | | |
| 13 | Peacock | | 2600 | | | | |
| 14 | Jungle fowl | | 5500 | | | | |
| 15 | Monitor Lizards | | 120 | | | | |

Endemic and Endangered Fauna:

As stated earlier, there are atleast 20 species of mammals which are included in Schedule-I of Wildlife protection Act, 1972, 7 spp of birds and 10 spp of reptiles are also included within the endangered lists. For many wild faunal species, regular population estimates are not taken. Even reporting of observations, sightings of animals is not systematic and regular, causing inassessibility abundance status of the species.

Presently Wild Buffalo (*Bubalus bubalis*) is not seen. But it was reported in past from Pokhri area of Jainti Range and Santarabari Range of BTR. Clouded Leopard (*Neofelis nebulosa*), one of the rarest species and endemic to north-eastern region of the country, is found in the Reserve.

Wild dog (*Cuon alpinus*), which was reported from Santrabari and Newlands area of the Reserve, is thought to have been extinct. It has been re-sighted during 1998 in Tashigaon block and is being sighted on regular basis in Santarabari and Jainti area.

Chinese Pangolin (*Manis pentadactyla*), one of the endangered and endemic to North-Eastern part of the country is found within the Reserve.

There are earlier reports of Marbled Cat (*Pardofelis marmorata*) and Golden Cat (*Catopuma temmincki*), but in recent years they have not been sighted.

Among the birds, rare Black necked crane (*Grus nigricollis*) and Ashy Minivet (*Pericrocotus divaricatus*) was photographed for the first time in Indian plain within Buxa Tiger Reserve.

Hispid hare and Hog deer which are endemic to this region are also found within the Buxa Tiger Reserve.

2.4.2 Distribution of Animals and Habitats, Habitat quality/ quantity:-

Distribution of wild animal is governed by the availability of food and water in association with shelter. Buxa Tiger Reserve has been classified into eight broad Habitat types.

2.4.2.1 Major Habitat Types and Trophic Niches:-

(i) Wet Mixed Forest: This type of habitat is found mainly in South Rydak-3,4,5, Panbari-7,8,9, SRVK-13,14, Gadadhar -1, 2, 3, Cheko-1 to 7, Nimati-4, 5, 6, Poro-2 to 8, and Damanpur-1 and 6 compartments.

It has a complete canopy of considerable height and fully shaded forest floor covered with leaf litter. Grasses and other herbs are usually very little and the top storey may be formed by some deciduous species. Grazing and browsing of ungulates are very rare except some degraded places where the canopy is open.

Foods available in this type are mainly underground corms and tubers of Curcuma amada, Zingiber roseum, Dioscorea bulbifera, Asparagus racemosa, Colocasia esculenta, Costos speciosus and others. The foliage of small trees and shrubs at low canopy level of Macaranga denticulata, Leea asiatica, Mallotus philippinessis, Litsaea monopetala and fleshy fruits of Syzygium cumini, Sapium baccatum, Litsaea gluitinosa, Cinnamomum glaucescens, Ficus benghalensis, Elaeocarpus lucidus, etc. Since this type is rich in foliage trees and fleshy fruits, arboreal Rhesus monkeys and Squirrels are

distributed very well. Due to absence of grass, large herbivores are usually not found except wild pigs, which dig up and eat underground corms and tubers. Elephants are present in this type of habitat.

(ii) Dry Mixed Forests: This type of habitat is found in Kumargram-2, Part of Bhutanghat-1,2, Part of Phaskhawa (adjucent to phaskhawa T.E.), Panbari-1,2,3,4, Jainti-3,4,5,6,7,8, SRVK-4,5, NRVK-11,14,15,16, Raimatang-5,6,7, Pana-4, Compartments. This type comprises of very diverse type of vegetation. No particular vegetation occurs continuously. Wild animals are observed to be distributed in pockets. Deciduous tree species of good health are found here. They form an open canopy. In dry season grasses are generally absent. Considerable quantity of grasses, shrubs and herbs are available during the monsoon.

This type of vegetation provide better habitat to wildlife than wet mixed forest. Population of monkey, Squirrel and other arboreal species are less due to lack of fleshy fruits and foliages. Ungulates like Barking deer, Sambar, Gaur and also Elephants prefer such area.

- (iii) Moist Sal Forests: This type of habitat found in NRVK-7, 8, 9, 11, 12, 13, 14, SRVK-2, 4, 5,12, Jainti-2,3,4,9, Tashigaon-1, Cheko-1,3, Poro-8,11, Nimati-5,6, Raimatang-2,3,4,5,6, compartments. In this type, Sal forms the top canopy with Bahera (*Terminallia belerica*), Sidha (*Lagerstroemia parviflora*), Udal (*Sterculia villosa*), Chilaune (*Schima wallichii*), Kawla (*Machilus villosa*), Bhadrase (*Elaeocarpus varunua*), Parrari (*Stereospenmum chelonoides*) as associates and the middle storey is composed of *Meliosma simplicifolia*, *Aphanomixis polistachae*, *Premna benghalensis*, *Bauhinia purpurea*, *Turpinia pomifera*, *Trewia nudiflora*, *Microstegium ciliatum*, *Dillenia pentagyna*, etc. This type of vegetation is not suitable for herbivores as food is not abundant but cover and water is available.
- (iv) Savannah Grass land including Khair-Sisoo and Simul- Sirish succession: This type of habitat is found in Newlands-1, Bhutanghat-2, North Rydak-1,2,3, Central Rydak-1,2,3, Marakata-2,3, Narathali-1,2, part of pana-1,4, part of Bhutri-2,3, part of Rangamati-1,2,3, Bharnabari-2,3, and part of Gudmdabri-2,3 compartments. The riverine grass lands and savannah woodlands occupy a considerable part of the Tiger Reserve. This type of vegetation offers best grazing ground for Cheetal (*Axis axis*), Sambar (*Cervus unicolor*), Barking deer (*Muntiacus muntjak*), Hog deer (*Axis porcinus*), Gaur (*Bubalus bubalis*) and Elephants.

The leaves flowers and fruits of Acacia catechu, Bombax ceiba, Dalbergia sissoo, Oroxylum indicum, Emblica officinalis, Bauhinia purpuria, Dillenia pentagyna, in grass land are liked by large herbivores for forage.

(v) Riparian Forests: This type of vegetation is mainly found in small strips along the rivers and streams and dominated by *Ficus racemosa*, F. semicordata, *Bischofia jovanica*, *Bridelia retusa*, *Macaranga denticulata*, *Duabanga grandiflora*, *Dillenia pentagyyna*, Zygiphus spp. in association with grasses *Saccharum sponstaneum*, *S. narenga*, *Themeda arundinacea*, *Imperata spp*, *Phragmitis karka*, *Arundo donax*, etc. Leaves, fruits and twigs of this vegetation are palatable food for sambars, elephants and monkeys. Giant squirrels are sighted in this region. Riparian grasslands are preferred by the birds as their nesting grounds.

(vi) Broad leaved Hill Forests: This type of habitat is found in Bhutanghat-1, Hatipota-1,2, Phaskhawa-1, Tashigaon-2, Tobgaon-1,2,3,4, Chunabhati-1,2,3, Santrabari-3,4, Adma-1,2,3,4,5, Compartments. In consequence to the variation of the altitudes, the type of vegetation varies considerably. The foothill portions generally bear dry mixed forests with some sal along the crest of the Spurs and ridges. *Dendrocalamus hemiltonii, Acrocarpus frexinifolius, Phoebe lanceolata, Pterospermum acerifolium, Gynocardia odorata*, etc. occur as associates. Wild animal sighting is rare in these compartments except Bhutanghat, Phaskhawa and Tashigaon blocks. Here wild animal concentration is higher.

2.4.3 Distribution of Herbivores according to the habitat types:-

Chital: Chitals are always associated with grassy forest glades and shaded streams. They are seen in herds of 5-25, which may contain 2-3 stags. They feed till late in the morning and again in the afternoon and lie down in the interval in some shaded spot. Chital are prolific breeders, an interval of 6 months may see the production of a new family. They are found to roam in Marakata, North Rydak, Bhutanghat, Raimatang blocks and Jainti glades.

Sambar: Sambar prefers wooded land. Their food consists of grass, leaves and various kinds of wild fruit. They feed mainly at night and retire into heavy cover at daybreak and do not usually come out till dusk. The males fight for territory. Sambars are rarely found associating in large numbers; group size is generally 3 –5. They are noticeable in good numbers in SRVK, NRVK, Jainti, and Panbari blocks.

Barking Deer: Barking deer prefer wooded land and are reported from South and North volka, Sankosh, Kumargram, Narathali, Marakara, South Rydak, Kartick, Jainti, SRVK, NRVK, Raimatang, Dima and Nimati blocks. They are seen singly or in pairs. They keep more to thick jungle and come out to graze in the outskirts of Forests or in open clearings. They are fairly diurnal in habit. The food consists of various leaves and grasses and wild fruits. The call from a distance sounds much like the bark of a dog.

Elephants: They are occasionally seen moving in herds and the maximum number has been found to be 24 - 30 in some cases. Some times lone elephants (mainly tusker) are also met with in these areas. They are noticeable in good numbers in Newlands, Bhutanghat, North and Central Rydak, Jayanti, Phaskhawa, Panbari, NRVK, SRVK, Cheko and Raimatang blocks. Migration of elephants is also reported to and fro from Jaldapara Wildlife Sanctuary, Bhutan and Assam.

Gaur: Gaurs are essentially foot hill animals. They are to be seen in Rajabhatkhawa, Jainti and Phaskhawa blocks. Recently a herd of 12 - 15 bisons used to be noticed on the Bala River bed to the north of 23^{rd} mile Road. Another two herds of 20 - 25 gets frequently reported from chengmari and Balapara Beat of Bholka Range. They come out to graze early in the morning and feed till late morning and again graze in the afternoon. During the hot hours of the day they retire to the shelter and seclusion of the forests. Their food is chiefly grass, they also browse on leaves and eat the barks of certain trees.

Wild Boar: Wild Boars are distributed more or less throughout the Tiger Reserve, in all the compartments. Indian Wild Boars live in grass or scanty bush jungle, sometimes in Forest. They are omnivorous, living on crops, roots, tubers, insects, snakes etc. They feed in early morning and late in the evening.

2.4.4. Avifauna: Avifauna and Reptiles are distributed all over the Tiger Reserve. Distribution of avifauna is no doubt higher along the rivers and streams. A total of about 230 Species of avifauna are found in the Reserve and the important ones are Nightjar (*Caprimulgus macrurus*), Kalij Pheasant (*Lophura leucomelanos*), Flame backed woodpecker (*Chrysocolaptus lucidus*), Lesser adjutant storks (*Leptoptilos javanicus*), Hill myna (*Gracula religiosa*), crested serpent eagle (*Spilornis cheela*), Red jungle fowl (*Gallus gallus murghi*), and various kinds of waterfowl. Peacocks are also noticeable and Indian large pied hornbills are also seen quite frequently.

Migratory birds: There are wetlands within the Buxa Tiger Reserve. Special mention may be made of Narathali wetland where 3 big shallow lakes harbour a good number of migratory ducks including Schedule-I species like whistling Teal as well as common Teal, Pintail, white eyed pochard, shoveller, etc. The swift streams of Jainti and Rydak harbour mergansers. The migratory birds appear during the end of Monsoon and fly away before summer. The noticeable avifauna include Ibisbill, Minivets, yellow crested sultan Tits, streaked spider hunter which suck nectar from Bombax flowers, Snipes, Wagtails, Leaf warblers, Sandpipers. Two endangered species, viz. Indian pied Hornbill and Greater pied Hornbill starts nesting in pokuri area in Phaskhawa block during spring season. (See Annexure 9 for migratory birds of Narathali).

2.5. Major Conspicuous Changes in the Habitat since Inception:-

2.5.1. Due to shifting river courses:

Wildlife habitat has been destroyed due to recurrent flood in the flood plains of river Sankosh, Rydak, Jainti, Bala, Dima and Gabur Basra. Usually during the month of July and August when the monsoon is at its peak, the hilly streams and rivers are in spate. Trees, Boulders, etc. are carried down and get fixed at places and form barrier. These barriers sometimes gradually enlarge and act like partial dams. The courses of streams are diverted with the consequent erosion of banks. Earth movement is sometimes responsible for the change of big rivers course.

Rivers and streams which have shifted their courses after 1930:

The Jainti: The movement of the course of this river is irregular. It threatened the Range Officer's Rest House at Panbari during 1934-35. During 1939 and the following years a part of its flow broke through its western bank only a few kilometer below Jainti Station and sweeping through portions of the Jainti and Panbari blocks causing devastation all the way. This created a new Jhora, Dumrijhora, still existing. During 1993 its course shifted to western bank at Jainti and damaged the bridge over it connecting Jainti and Bhutiabasti Beat. Presently it is a great threat to Jainti Forest Complex.

The Rydak: During 1930, the Rydak River left its old beds and moved east- ward near Teamari. During 1933, it broke through forests at Newlands on the East and at Chipra on

the West. The following year it eroded a part of the Central Rydak block. In 1968, heavy flood passed through the old course of the river along Central Rydak and Marakata Blocks causing extensive damage to the forests. In 2009, Rydak has shifted its course towards east near Newlands and damaged about 100 ha of plantation of NLS-2, NR-3 and Newlands R.L

The Sankosh: The river moved east during 1930s, between 1934-35 and eroded some portions of the Bholka forests. Its principal tributary on its west bank is the Gholani. Sankosh River started eroding in 1921 into the Bholka forests. Since 1922 – 23, the river diverted westwards cutting across the North Bholka and South Bholka forests. As a result, practically whole of the N. Bholka and S. Bholka forests was inundated. Sal and other trees died sporadically and in patches ultimately leading to invasion of tall grasses over the area. It has a perennial flow throughout the year. In 2007, Gholani shifted westwards and washed away Bangdoba F.V. and deposited huge sand and silt on forestland. This caused drying of teak plantations in SB-3 compartment.

The Gaburbasra: It started moving east during 1933 and eroded some forest areas. With the permission of the embankment committee, the Rangamati T.E. tried to check its movement, but the river cut about a mile of a new channel through the forest during 1938 after breaking through its western bank.

The Dima: In the year 1988, Dima changed its course and shifted west-wards and washed away a lot of teak plantation of Dima-1 and 3 compartments. The main course is now flowing near Dima Beat Office leaving the old course. The beat office has been shifted because of shifting of river.

2.5.2. Due to conversion of Natural Forests to monoculture:-

Natural habitats were converted to Teak (*Tectona grandis*) and Jarul (*Lagerstroemia speciosa*) (Monoculture) plantations (8,578 ha) in many areas of the Reserve like Sankosh, Kumargram, Bholka, Rydak, Dima, Rajabhatkhawa, Santrabari, Bhutri, Bharnabari, Godamdabri blocks as well as in National Park areas. About 34 % of total plantations (25,246 ha) of the Tiger Reserve is occupied by Teak and Jarul plantations which is not congenial for wild animals. Natural carrying capacity of the habitat is reduced considerably on account of such adverse changes.

2.5.3 Flood:-

The hill streams are always unpredictable. Devastating floods have been recorded in Rydak River during 1950, 1952 and 1954 causing massive damage to the forests and wildlife. The flood in 1968 has played havoc in the Central Rydak and Marakata blocks. Staff quarters of Tiamari Beat were damaged. The flood left long trail of sandy beds on either side of the main course. During the flood in 1993 the Tiger Reserve was flooded; as a result death of wild animals like deer, python, etc. was reported in B.T.R.

2.5.4 Disease :-

Wild animals particularly herbivores are very susceptible to diseases most of which are transmitted through domestic cattle. So due to grazing habitat is degraded as well as it has fair chance of transmitting many diseases to wild animals. Anthrax, Foot and mouth Disease (FMD), Tuberculosis etc. are the common diseases which usually kill

wild animals. As per available records, 4 wild elephant and 1 gaur died in 1994 due to attack of Anthrax.

2.5.5 Encroachment:-

Four forest blocks in hilly tract of B.T.R. viz. Adma, Chunabhati (CNBT), Santrabari (SNBR) and Tobgaon (TBGN) have some encroachment by way of unauthorised orange Orchards. These are all old encroachment.

| Year | No. of Patches | Area (Ha) | Av. Area per patch (Ha) | Compartments |
|------|----------------|-----------|----------------------------|-------------------------|
| 1989 | 425 | 199.26 | 0.47 | Adma-1,3,4,5, |
| 1992 | 520 | 216.69 | 0.42 | TBGN-2,3,4, SNBR-2,3,4, |
| 1994 | 600 | 287.00 | 0.48 | CNBT-2,3 |

Table-2.11: Year-wise Orange Orchards in B.T.R.

During 1994 drastic action was taken and large number of orange orchards was cut down. The extent has since been restricted. At present there are no orange orchards and the areas has been taken over more or less by natural vegetation.

2.5.6 Mining:

The Buxa Dolomite is located in the Jainti hills within Phaskhawa and Hatipota blocks. Four private companies were working within Phaskhawa Block and one Govt. undertaking (NBDL) was working within Hatipota Block. At present all the mining has been stopped from 1993 in Phaskhawa block and from 1996 in Hatipota block. But court cases in the matter are pending in High Court and Supreme Court. The natural rehabilitation of the land has taken place and vegetation has come up on mine dumps and exposed hills.

2.5.7 Roads, Railways and Electric Transmission line:

A number of P.W.D. roads and the National Highway pass through the Buxa Tiger Reserve. The meter gauge railway line from Damanpur to Hasimara passes through the Reserve. Electric transmission line also passes through the Reserve. As a consequence, one elephant died in 1996 by train accident at Gudamdabri, and 1 elephant died in 1997 at Bhutri due to fall of high tension line.

There is another threat of a busy road to Pepping in Bhutan (Proposed Tala – Rydak road) through the natural hill and foothill forests of Bhutanghat which is a part of core area of BTR. In fact the road connection of Bhutan is increasing which shall increase pressure of vehicular traffic along the existing roads coursing through forests of Bhutanghat as well as Kalikhola – Barobisha Road.

PART-A: THE EXISTING SITUATION

CHAPTER 3: STATUS OF TIGER AND CO-PREDATORS

3.1. Distribution:-

3.1.1. Tigers: Historically, tigers were distributed throughout the Reserve including the southernmost ranges and the fringe areas. Presently, however, due to the high disturbance gradient in some of those areas along with presence of forest and fringe villages and tea gardens that exert obvious pressure on the forest areas, their distribution has become patchy. The northern part of the Reserve is contiguous with Bhutan and includes some adjacent areas of Phipsu wildlife sanctuary across the border. While movement across the border for a carnivore like tiger with large home ranges is a definite possibility, reliable data is still lacking on the status of breeding within the Reserve and the accurate seasonal pattern of movements. BTR categorically falls under the low tiger density areas and therefore the home ranges and territories of the tigers have to be estimated to get a clearer picture of their ecological requirements.

The tiger census, conducted in 2007, came up with presence of a minimum of 12 tigers from the pugmarks, scats collected and considering the ecological factors involved. The genetic analysis of the scat samples, which were sent to Wildlife Institute of India established presence of twelve individual tigers. From the census results, it was observed that the tigers were distributed throughout the Northern, Central and North-Western parts of the Reserve, in areas like Pana, Adma, NRVK, SRVK, Kumargram, Jainti, Newlands, and Raimatong blocks. BTR has a total of 37 forest villages, 42 revenue villages and 34 tea gardens all of which exert considerable pressure on the forest areas with fuel and firewood collection, livestock grazing and NWFP/NTFP collection.

The sign encounter surveys carried out to establish the most recent distribution status of tigers in BTR included 42 trails ranging from 3-7 Km. A total of 187.49 km distance was walked which came up with seven confirmed signs of tigers in areas like Chunabhati, Hatipota, Panbari, Raimatang blocks along with unconfirmed reports. The same areas, which showed tiger signs during the census operation, did not present any fresh signs, which again showed the strong seasonality of the tiger movement associated with the low density tiger population. Intensive long-term study involving both active and passive monitoring is needed to establish the accurate status of tigers and their movement patterns.

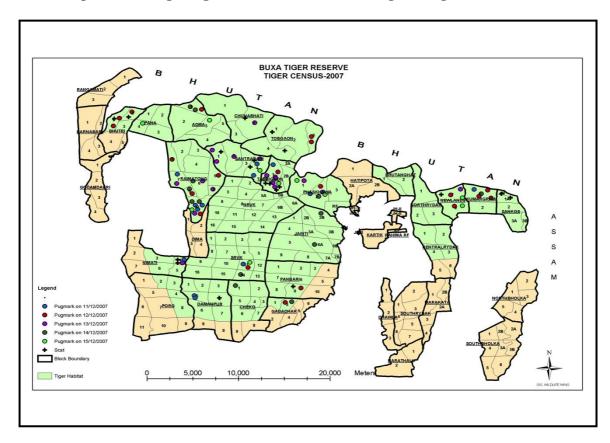
The sex and age wise classification of tigers in BTR in different census (pre-2007) is given Table - 3.1.

Table 3.1: Sex and Age wise classification of Tigers in Buxa Tiger Reserve in different census

| Year | Ad | lult | Sub-a | adult | Cubs | Total | |
|------|------|--------|-------|--------|---------|-------|-------------------------|
| | Male | Female | Male | Female | Unsexed | | Remarks |
| 1992 | 12 | 12 | | | 5 | 29 | |
| 1995 | 5 | 5 | 10 | 8 | 3 | 31 | Pug mark method |
| 1997 | 2 | 6 | 12 | 12 | | 32 | |
| 2007 | 6 | 4 | | | 2 | 12 | |
| 2010 | 12 | 3 | | | | 12 | |
| | | | | | | | DNA scat method(WII) |
| 2011 | 16 | 4 | | | | 20 | and CCMB) |
| 2014 | | | | | | 03 * | |

• In entire North Bengal Landscape

Map 8a: The Tiger signs observed in BTR during the Tiger census, 2007.



Tiger Census-using Scat DNA Analysis

Enumerations of Tigers and co predators have always been challenging task. Over the years several new methodologies have evolved to provide credible numbers too especially of Tigers. Until recently tiger census was used to be done by traditional pugmarks method. The pugmark method though combined with good field observation used to provide good results but had several shortcomings. With the advent of modern technology the census is being carried out through camera trap and DNA based methods using scats as they are more reliable and scientifically sound techniques.

Buxa Tiger Reserve was one of the first Reserves in the country to adapt census or enumeration of Tigers and co predators through scat DNA technique. The first such exercise started from the year 2007. In this method entire protected area was divided into census units comprising of 2-3 compartments. Census teams comprising of 4 staff and NGO members were formed which would traverse—through the compartments along patrolling paths, trail nalas, fire lines etc. While doing so they would collect 1-10 day old scats of Tiger and co predators in plastic pouch filled with silica gel and record GPS location of place of collection. Then it is sent to Division headquarter for further screenings. This kind of sampling was done over 1-45 days and was repeated 2-3 times. Such scats collected were scanned at division level and sent to labs for Genetic analysis by keeping portion of sample as representative sample. The detailed methodology of genetic analysis of scat is presented hereunder.

Flow Chart of Genetic Analysis

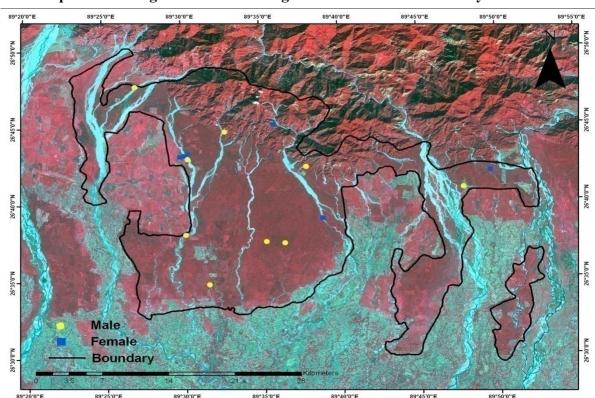
PIP using tiger specific primers

Genotyping of tiger positive scats using micro satellites

Estimation of population abundance and density

A) 2007 Tiger Census-Scat DNA analysis method:

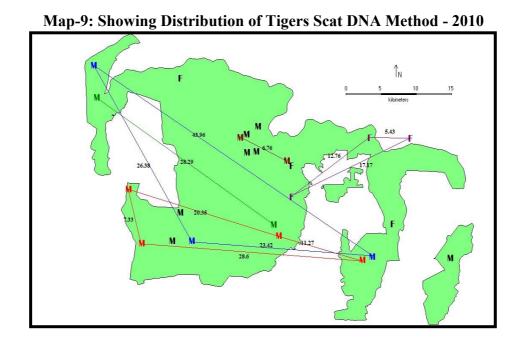
Enumeration of Tigers in 2007 in Buxa Tiger Reserve was mainly done through pug mark method, but during the course in addition some tiger scats were also collected and were sent to Wildlife Institute of India for genetic analysis. During this exercise altogether 39 scats [23 from BTR (E) and 16 from BTR (W)] were collected and were sent to WII, Dehradun for further analysis. Genetic analysis of scats by WII revealed the minimum population of tigers to be around 12 comprising of 6 female and 4 male and 2 cubs.



Map 8b -Showing Distribution of Tigers based on DNA scat analysis -2007

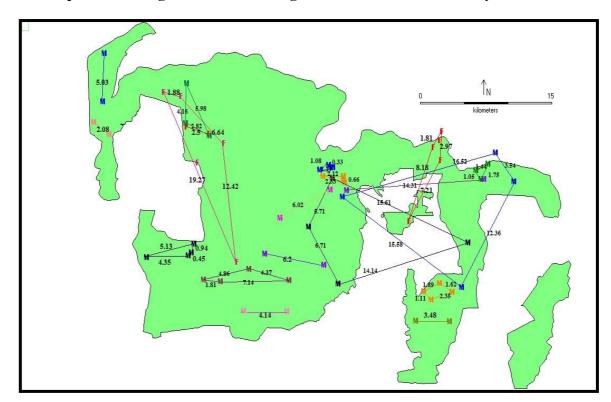
B) 2010 Tiger Census- Scat DNA analysis method

Considering the limitations of pugmark, trap camera method and on the basis of encouraging results from Wild life Institute of India, Dehradun in 2007, in the year 2010 Buxa Tiger Reserve adopted scat DNA method as main method for enumeration of Tigers. In total 83 scat samples were shortlisted and were sent to CCMB, Hyderabad and Aranyak, Guwahati, two renowned laboratories for analysis. The results were very encouraging. The total number of tigers after analysis by both the institutes stood at 12 to 15 with not so encouraging sex ratio of 9 Males and 3 females



C) 2011-Tiger Census –Tiger scat DNA analysis method

On the basis of encouraging results of 2010 by tiger scat DNA analysis method and on the recommendation of the CCMB and Aranyak as to the need of repetition of the exercise to arrive at consistent figures on the number of tigers in Buxa Tiger Reserve it was proposed to repeat the tiger scat collection and sign survey in 2011 in 3 phases starting in the month of January and till April with a gap of 25-30 days between each phase. In total 240 scats were collected and were sent to two labs i.e. CCMB, Hyderabad and Aranyak, Guwahati. After analysis CCMB revealed the presence of 20 individual tigers with sex ratio of 16 male and 4 female. The study revealed the presence of three tigers in neighbouring Jaldapara National park also.



Map-10 -Showing Distribution of Tigers based on DNA scat analysis - 2011

D) 2012-Tiger Census – Tiger scat DNA analysis method

In continuation of earlier efforts, in 2012 also the tiger census was carried out by way DNA scat analysis. The exercise was done in three phases from November to February and in total 468 samples were collected which included scats of leopard and other cats from Buxa Tiger Reserve and Jaldapara National park. Preliminary report from CCMB suggested that out of 468 scat samples collected from Buxa Tiger Reserve (3 sampling occasions) and 34 from Jaldapara, 178 from Buxa Tiger Reserve and 15 from Jaldapara National Park were found to be positively of tiger origin. After the analysis, the final conclusion is arrived at 3 Tigers in Buxa Tiger Reserve/Entire North Bengal Landscape.

3.1.2 Leopard: unlike the Tiger, leopards are equally at home in dense forest and fringe areas. The amount of anthropogenic disturbance does not seem to have a direct correlation on their presence as leopards are distributed more or less uniformly throughout BTR. The myriad forest villages and tea gardens only provide extra advantages for the leopards, as they adjust their diet to wild prey and the occasional livestock. The tea gardens are known throughout to be favoured breeding shelters for the felines and they are frequently sighted in and around these areas.

During the sign encounter surveys aimed at assessing the present distribution of carnivores leading to the preparation/drafting of the TCP, leopard signs were encountered in all the forest blocks surveyed. All the fringe areas and tea gardens encountered reported the occasional livestock kills caused by them. During the 187.49 km of sign encounter surveys, a staggering 228 confirmed leopard signs were found from 42 surveys. Outlying areas like North Bholka and South Bholka possibly have them as the dominant predators.

- **3.1.3** Clouded Leopard: Clouded Leopard is reported from Bhutanghat. One clouded Leopard was captured from a house in Alipurduar Junction during 1993 and was released in Bhutanghat Forest. Another clouded leopard was captured in 1999 from Chengmari Beat of Bholka Range. The markings of the clouded Leopard give it a beauty and distinction equaled by few of its tribe. They are largely arboreal and inhabit dense evergreen forests where they hunt their prey by night.
- **3.1.4** Leopard Cat: The Leopard cat is about the size of a domestic cat but rather longer in the legs. It preys upon small birds and mammals. It is nocturnal in habit and is seldom seen. Hollows in trees are a favourite shelter. Young have been obtained in March and May (Prater, 1971).
- **3.1.5 Fishing Cat:** The Fishing Cat is distinguished from the leopard-cat by its much larger size and shorter tail. The fishing cat inhabits hill forest as well as foothill forests. This cat lives in/ near heavy jungle, or in scrub, frequently in grassy swamps about rivers. It preys on any animal and bird that it can secure, and has been known to kill calves and sheep. It feeds on fish and fresh water mollusks as well.
- **3.1.6 Jungle Cat:** Jungle Cats inhabit the drier and more open parts of the Reserve, keeping more to grassland, scrub jungle, the reedy banks of rivers and marshes. Its movement in the open is much like those of a small panther. It preys on small mammals, birds and when near villages on poultry.
- **3.1.7 Wild Dog:** Though very patchily distributed, the Reserve has definite presence of these formidable predators. A clear picture of their status and distribution is lacking, but their signs were encountered in Raimatong and Hatipota blocks during the present sign encounter surveys. They are being sighted recently in Jainti, Santarabari and Raimatang along the foothills.

3.2. Abundance Status:-

Tigers: A minimum of 12 tigers were reported to exist based on the results of the tiger census, 2007. Genetic analysis of the scats collected established identities of twelve individual tigers though it was obviously a representative sample of all probable signs.

DNA based analysis conducted in 2010 has revealed that there are a minimum of 15 tigers, including 3 male, 9 female and 3 unknown gender identities.2011 DNA based analysis revealed the presence of 20 tigers with very skewed sex ratio comprising of 16 male and 4 female.

Leopards: No recent population figures are fully available for leopards since the last enumeration in 1995. The census figures for 1995 are provided in the table 2.10 though it can be assumed with reasonable confidence that the population has increased naturally.

3.3. Prey-Predator Relationships: In terms of prey abundance, Buxa Tiger Reserve seems to have less than optimum availability of herbivores throughout the area. Sambars are known to be the main prey for tigers in areas they are found together. While areas like NRVK, Jainti, ERVK, Panbari, and Nimati blocks have healthy signs of sambar presence, areas like Raimatong, Adma, Pana, Bhutri, Chunabhati, Tobgaon, Hatipota, Bhutanghat reported very patchy and scanty distribution. In absence of sambar, wild boars and barking deers would serve as the main prey for Tigers. Regarding Gaurs, they almost follow a similar distribution pattern as sambars and are absent from the majority of the northern hilly areas. While occasional lifting of a calf or a sub-adult cannot be ruled out, adult gaurs pose a too formidable challenge for tigers. In fringe areas their diet can possibly be supplemented with the occasional livestock though the majority of the kills turn out to be results of leopard depredations.

Leopards are probably the most adaptable wild cat in the subcontinent. Their presence in all the fringe and tea garden areas and the reported kills indicate that livestock and poultry form a definite component of their diet. Being cunning and more fleet-footed, they can also hunt smaller prey like hare, jackals, and peafowl. Prey-base census report of 1994 in BTR is given in Table-3.2 and range wise sighting of tiger prey (2003-08) in Fig.3.1.

Table –3.2a: Prey Base Census report of 1994 in BTR.

| Animal | No./Sq. Km. | Estimate R Kn | | Pro. Estimate | | | | |
|--------------|----------------|------------------|------|---------------|-------|--|--|--|
| | Kiii. | Min. | Max. | Min. | Max. | | | |
| Gaur (Bison) | 0.59 | 300 | 350 | 177 | 207 | | | |
| Barking deer | 1.45 | 650 | 700 | 943 | 1015 | | | |
| Hog deer | 0.47 | 310 | 360 | 146 | 169 | | | |
| Spotted deer | 1.26 | 210 | 260 | 265 | 328 | | | |
| Sambhar | 0.46 | 700 | 750 | 322 | 345 | | | |
| Mongoose | 0.21 | 650 | 700 | 137 | 147 | | | |
| Porcupine | 0.08 | 150 | 200 | 12 | 16 | | | |
| Wild boar | 3.75 | 700 | 750 | 2625 | 2813 | | | |
| Monkeys | 20.13 | 600 | 650 | 12078 | 13085 | | | |
| Peacock | 3.16 | 600 | 650 | 1896 | 2054 | | | |
| Jungle fowl | 3.29 | 600 | 650 | 1974 | 2139 | | | |

Table 3.2b: Prey Base as per Herbivore census by Line Transect Method-2013

| Species | Density | CV | Population Estimate |
|--------------|---------|-------|------------------------|
| Barking deer | 2.753 | 0.171 | 2095 |
| spotted deer | 1.026 | 0.497 | 781 |
| Bison | 1.823 | 0.456 | 1387 |
| Hog deer | 0.128 | 0.718 | 97 |
| Monkey | 8.569 | 0.32 | 6520 |
| Wild boar | 3.292 | 0.28 | 2505 |
| sambhar | 0.28 | 0.68 | 213 |

Regular herbivore census is required biannually to assess the prey base and accordingly measures need to be taken to augment the prey base for large carnivores like Tiger.

3.4. Assessment of Threats:-

3.4.1. Hunting and Poaching:

Hunting: Hunting statistics of Buxa Division showed that within a period of 20 yrs. (1930 to 1950) 150 tigers were killed. Shooting and fishing rights in the forests of Buxa division were formerly leased out to Torsa-Sankosh Game Association but the terms expired on the 31st March, 1958 Vide F.O. No. 5601-For/IL-6/58 dt. 30-04-1958 (Ref. 6th Working plan of Buxa Division). No further renewal/ extension were granted. After that shooting and fishing were regulated by the Divisional Forest officer by issue of permits on payment of Scheduled fees. Conservator of Forests, Northern circle, West Bengal has prohibited hunting, shooting or capture of animals and birds within the Reserved and protected forest except wild pigs, bears and man-eater vide his memo no.8476/ C.F.N. dt. 10-12-1962 for a period of 3 years. Due to these restrictions hunting of large carnivores came down in between 1955 and 1975 (36 tigers and 41 leopards). Besides tigers and leopards, other animals like deers, wild boars, Jungle fowl, and Sloth bear etc. were also killed due to unregulated hunting. At present hunting of all species is prohibited. During Holi and Chaitra Sankranti, hunting is a tradition with tribal groups. They try to enter the forest and kill wild boar, deer and Jungle fowl etc. This is also kept under control through rigorous patrolling and creating awareness among them.

Table 3.3: Kill data (Hunt statistics) for the period 1955-56 to 1973-74 of Buxa Division

| | | No. of Animals | | | | | | | | | | |
|---------|-------|----------------|-------|------|--------|---------|------|---------|------|------|--|--|
| Year | Tiger | Leopar | Sloth | Wild | Jungle | | Deer | Elephan | Hare | | | |
| 1 ear | riger | d | Bear | pig | fowl | Barking | Hog | Sambar | t | паге | | |
| 1955-56 | 5 | 7 | 5 | 108 | 411 | 56 | - | - | 1 | 35 | | |
| 1966-57 | 6 | 9 | - | 143 | 580 | 82 | 13 | - | - | 96 | | |
| 1957-58 | 5 | 8 | - | 80 | 332 | 57 | 3 | - | - | 25 | | |
| 1958-59 | 2 | 4 | 3 | 52 | - | - | - | - | - | - | | |
| 1959-60 | 2 | 3 | - | 40 | - | - | - | - | - | - | | |
| 1960-61 | 3 | 4 | _ | 28 | - | - | - | - | - | - | | |

| | No. of Animals | | | | | | | | | | |
|---------|----------------------|-------------|---------------|-------------|----------------|---------|-------------|--------|---------|------|--|
| Year | Tiger | Leopar d | Sloth Bear | Wild pig | Jungle fowl | Barking | Deer Hog | Sambar | Elephan | Hare | |
| 1961-62 | 1 | - | - | 34 | - | - | - | - | - | - | |
| 1962-63 | - | 1 | 7 | _ | - | - | _ | _ | - | - | |
| 1963-64 | 7 | 3 | 10 | 29 | - | - | - | - | - | - | |
| 1964-65 | Record not available | | | | | | | | | | |
| 1965-66 | 1 | - | - | 13 | - | - | - | - | - | - | |
| 1966-67 | Record | d not avail | able | | | | | | | | |
| 1967-68 | 4 | - | - | 4 | - | - | - | - | - | - | |
| 1968-69 | - | - | - | 9 | - | - | - | - | - | - | |
| 1969-70 | Record | d not avail | able | | | | | | | | |
| 1970-71 | - | - | - | 8 | - | - | - | - | - | - | |
| 1971-72 | - | 1 | - | 1 | - | - | - | - | - | - | |
| 1972-73 | - | 1 | 1 | - | - | - | - | - | - | - | |
| 1973-74 | - | 1 | - | 10 | - | - | - | - | - | - | |

(Source: 7th Working Plan and 1st Management Plan of BTR)

Poaching: Buxa Tiger Reserve is susceptible to poaching on account of its geographical location and its peculiar shape. Its northern boundary runs along Bhutan and eastern boundary with Assam. International boundary with Bangladesh is 20 Km away from its Southern boundary. Wild animals in Buxa are vulnerable to poaching. Currently elephants are most susceptible to poaching. From 1991 to 1997, 10 elephants were poached in Buxa. Labourers mainly from nearby tea estates are reported to indulge in poaching of deer, wild boar, jungle fowl, etc. It is suspected that poaching of bears for their bile and gallstone takes place in Jaigaon. Fishing also takes place in Rydak, Gholani, Dhawla, Poro and other rivers. It is also suspected that poachers enter Buxa through Indo-Bhutan Boundary (65 Km., open boundary). As the Indo-Bhutan boundary is inaccessible due to hilly terrain (outer Himalayas), effective patrolling lacks.

During 1994 four elephants were poached by Arunachal tribes in S.Rydak Range. They poached by arrow poisoning (vegetative poison). One male elephant calf was poached in 1997 at Tashigaon for supplying "Two small tusks with jaw" by a specific order from Bhutan. Year wise poaching figures in BTR for 1991 to 2013 are given in Table 3.4 below.

Table 3.4: Year-wise Poaching figure of wildlife in BTR from 1991-2013

| Year | Species | No. of Animals |
|------|----------|----------------|
| 1991 | - | - |
| 1992 | Elephant | 1 |
| 1993 | Elephant | 1 |
| 1994 | Elephant | 3 |
| | Pangolin | 1 |
| 1995 | Elephant | 1 |

| 1996 | Elephant | 3 |
|------|---------------------|---|
| | Leopard | 1 |
| | Bison | 1 |
| | Chital | 1 |
| 1997 | Elephant | 1 |
| 1998 | Sambar | 1 |
| 2005 | Leopard | 1 |
| 2005 | Barking deer | 1 |
| 2006 | Elephant | 1 |
| 2006 | Sambar | 1 |
| 2007 | Dolphin | 1 |
| 2008 | Spotted deer | 1 |
| 2008 | Wild boar | 1 |
| 2009 | Hill Myna | 4 |
| | Tortoise | 1 |
| 2010 | - | |
| 2011 | - | |
| 2012 | Bison, spotted deer | 1 |
| | Wild boar | 1 |
| 2013 | Elephant | 2 |
| | • | |

3.4.2. Grazing: Grazing by cattle inside the Tiger Reserve is a serious problem as it reduces the availability of fodder for the wild herbivores and exposes them to the risk of cattle born diseases. As per rules, no grazing is allowed. However, because of presence of large number of forest villages and fringe villages, livestock grazing is one of the most serious threats facing BTR. It is most severe in Rangamati, Bharnabari, Bhutri, Raimatang, Nimati, Poro, Damanpur, Checko, Gadadhar, Rydak, Newlands, Sankosh, Parts of SRVK, Panbari, NRD and Bholka block. The Reserve has 46 fringe villages, 34 tea gardens, 37 forest villages and 4 F.D. holding hamlets in and around it. These villages and Tea gardens have approx. 1.5 lakh domestic livestock. Fair percentage of these graze illegally inside the Reserve grazing during dry season (March-April), which affects habitat quality severely. Even hilly areas in the northern part like Tobgaon, Chunabhati, and Santarabari blocks have medium to large villages contributing to the grazing problem.

The domestic cattle compete directly with the wild herbivores for fodder. They share the common water holes with the wild animals. So, there is a fair chance of dissemination of cattle borne diseases (Anthrax, F.M.D., H.S.B.Q., etc.) to the wild animal.

3.4.3. Disease: Wild animals particularly herbivores are very susceptible to diseases, most of which are transmitted through domestic cattle. So, due to grazing, habitat is degraded as well as creating fair chance of transmitting of many diseases to wild animals. Anthrax, Foot and mouth Disease (FMD), Tuberculosis etc. are the common diseases, which usually kill wild animals. No case has been recorded for FMD in BTR. As per available records, 4 wild elephant and 1 gaur died in 1994 due to attack of Anthrax. This was the first incidence of anthrax outbreak. Entire Northern West Bengal was affected. These diseases are transmitted through domestic cattle. Cattle in fringes are regularly immunized against these.

3.4.4. Encroachment: Refer Para 2.5.6

3.4.5. Fuel and firewood collection:

Because of the several forest, fringe villages as well as tea gardens, BTR faces a huge threat in terms of fuel and firewood collection. The forest offences recorded during the period from 1993-94 to 2012-13 and the quantity of timber seized in both the Divisions of BTR is given in table -3.6.

The most vulnerable areas are Bharnabari, Rangamati, parts of Raimatang along T.E., Dima, Poro, Gadadhar, Parts of SRVK, Chuniajhora, Rydak and Newlands, Jainti beat, Jainti range, North and South Panbari beats, ERVK range, Bhutri beat, Hamiltonganj range; Kumargram and Sankosh beats, Kumargram range; Mainabari and Tiamari beats, North Rydak range; Santarabari and Buxa duar, Buxa road beats, Buxa duar range; West and East Nimati beats, Nimati Range.

There are many saw mills, Veneer mills and furniture shops present in Alipurduar, Kalchini (Jaigaon) and Kumargram P. S. and its adjoining areas. A part of the illicit timber is sold to these mills. A part of the illicit timber goes to Cooch Behar, Dinhata and Baxirhat and even to Bangladesh. A part is going to Bhutan through Jaigaon. Timber mafias are very active in this region. They entice poor villagers into the act.

Table 3.5: Offence cases and Illegal timber seized in Buxa Tiger Reserve

| | | | Vest) Divi | sion | BTR (East) Division | | | | Total | Total |
|---------|-----|-----|------------|---|---------------------|-------------|------|---|-----------------------------|--------------------------------------|
| Year | COR | POR | UDOR | Quantity of timber seized (m3) | COR | o. of offen | UDOR | Quantity of timber seized (m3) | No. of offence in BTR | Quantity of timber seized (m3) |
| 1993-94 | 218 | 21 | 512 | 760.913 | | | | | 751 | 760.913 |
| 1994-95 | 261 | 19 | 538 | 647.112 | | | | | 818 | 647.112 |
| 1995-96 | 169 | 26 | 625 | 670.153 | | | | | 820 | 670.153 |
| 1996-97 | 73 | 3 | 364 | 523.120 | 281 | 27 | 648 | 696.742 | 1396 | 1219.862 |
| 1997-98 | 56 | 30 | 1188 | 1175.800 | 459 | 16 | 653 | 797.437 | 2402 | 1973.237 |
| 1998-99 | 90 | 108 | 1476 | 1173.767 | 318 | 11 | 815 | 1190.565 | 2818 | 2364.332 |
| 2005-06 | 70 | 44 | 1003 | 1182.03 | 329 | 116 | 964 | 1431.968 | 2526 | 2613.998 |
| 2006-07 | 76 | 29 | 1046 | 1572.89 | 311 | 21 | 745 | 1119.685 | 2228 | 2692.575 |
| 2007-08 | 87 | 43 | 1182 | 1426.234 | 287 | 13 | 777 | 942.07 | 2389 | 2368.3 |

| | | | Vest) Divis | sion | | | ast) Divisi | | | |
|---------|-----|-----|-------------|---|-----|-------------|-------------|---|--------------------------------------|--------------------------------------|
| Year | COR | POR | UDOR | Quantity of timber seized (m3) | COR | o. of offen | UDOR | Quantity of timber seized (m3) | Total No. of offence in BTR | Total Quantity of timber seized (m3) |
| 2008-09 | 98 | 37 | 1058 | 1050.431 | 218 | 17 | 731 | 1006.519 | 2159 | 2056.950 |
| 2009-10 | 86 | 25 | 1322 | 1381.77 | 181 | 19 | 887 | 1264.13 | 2520 | 2645.9 |
| 2010-11 | 65 | 39 | 1440 | 1219.6 | 230 | 15 | 1004 | 1618.26 | 2793 | 2837.86 |
| 2011-12 | 147 | 34 | 2099 | 2841.0 | 188 | 23 | 983 | 1455.751 | 3474 | 4296.7 |
| 2012-13 | 78 | 21 | 1584 | 1736.2 | 235 | 14 | 984 | 1534.70 | 2916 | 3270.9 |

Firewood is collected by people not only for their own use but also for sale in local markets for this purpose they even fell green trees. Younger plantations are adversely affected because of this. Low survival in 5th year is testimony of this. Removal of timber from forest by wood poachers is done by "thela" and river rafting. Truck is rarely used. Firewood is removed by head load, cycle and thela.

During rainy season most of the areas of BTR become inaccessible due to the presence of numerous rivers and streams. River rafting of illegal timbers is a common feature in BTR. Two permanent river camp of Sankosh and Rydak and 4 temporary river camps on Poro, Dima and Gholani Rivers operate to check river rafting during rainy season.

Hatipota, Bhutanghat beats, Hatipota range, parts of Central Rydak range and North and South Bholka blocks face equal if not greater amount of threat due to their situation and presence of huge number of villages and tea gardens surrounding them. While resource dependency of these people cannot be diverted given the present situation, some enhanced measures can be undertaken to reduce the amount of disturbance.

3.4.6. Wild Fires:

Fire is not uncommon in B.T.R. The occurrence of fire particularly in the month of January to April is common in foothill areas above 23rd mile towards North and in areas occupied by pure teak plantations. The vulnerable areas are Bhutanghat, Phaskhawa, Santarabari, NRVK, and Raimatang Blocks, also the Riverian tract of Rydak blocks and grasslands of Narathali, Marakata, and Bholka blocks. Illicit fellers, grazier, thatch collectors and other NWFP collectors knowingly/ unknowingly lit the fire. Sometimes poachers lit fire to expose the wild animals.

Fire History:

Prior to 1877 it appears that ground fire used to be rampant, as a result Savannah grass lands were extensive. Strict fire protection measures were introduced in the year 1877, comprising of cleaning and burning of artificial boundaries fire lines and burning

Savannahs. It is also apparent from the records that as a result of these fire protection measures, the Savannahs were gradually replaced by mesophytes, increased evergreen undergrowth came up. This led to set back to natural regeneration of Sal.

This caused some foresters to urge the introduction of regulated burning and conflicting views were held as to the extent of damage that would result from fire as compared with the benefits that might be expected from it. Leaf fires, allowed in the forest from 1914, did not help much in regeneration of Sal. In many places the forest floor was too moist to burn. By 1941 unanimous decision was to suspend ground fire through the sal forests. Grasses were thus practically eliminated being replaced by evergreen shrubs. Controlled burning of Sal forests was prescribed in the 5th working plan (1945–46 to 1958–59) with a view to reduce evergreen undergrowth. Young plantations of Savannah were excluded from such controlled burning.

In 1956, Conservation of Forests, Northern Circle, West Bengal objected to the prescription for control burning. In his opinion it may throttle an ecological succession and many encourage creation of unhygienic condition that might lead to wide spread fungus attack. It was also felt that annual fire reduced the population of jungle fowl and other ground breeding birds by killing the eggs and the chicks. Controlled burning was stopped from latter part of 5th Working Plan.

But introduction of pure teak plantation in Buxa Division mainly from 1960's made the forest more fire prone. Being a deciduous tree, teak shades huge dry leaves on forest floor and makes the forest floor more conducive for fire. Attention is given for strict fire protection again in such tracts.

Types of Fire:

Crown fire is not reported from BTR except in few patches in hilly tract of Tashigaon block. Ground fire is common in BTR from January to April every year.

Causes of Fire:

In Buxa Tiger Reserve the reason for forest fires is purely man-made either deliberately or accidentally. Following are the main reasons of forest fires in BTR:

i) Fire due to graziers:

The cowboys or cattle graziers lit fire in forests. Sometimes these graziers deliberately fire the areas to get new flush of grasses. It is estimated that near about one lakh cattle graze in BTR every day. Lots of cowboys enter into the Reserve with those cattle. They are serious source of fire hazards.

ii) Fire due to pedestrians:

Large numbers of forest paths are used by local people for their day to day activities. While passing through knowingly or unknowingly they throw the burning butts of cigarette/ bidis, causing fires to forest.

iii) Fire due to poachers:

Poachers who set fire in the forest areas have two aims in their minds:

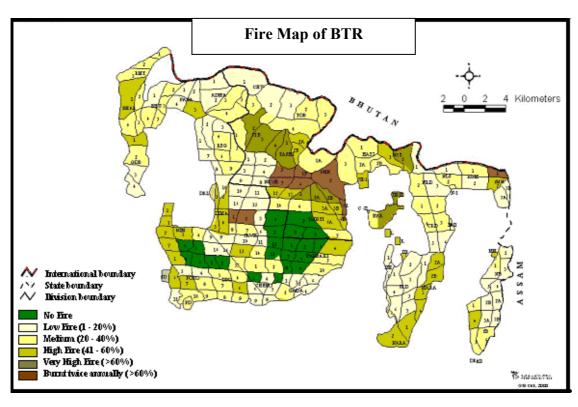
- a. To deviate attention of forest department staff from targeted timber felling areas to other areas, so that staff gets involved in fire fighting giving them access to targeted areas.
- b. To flush out wild animals from forest, for easy hunting.

iv) Fire due to NWFP collectors:

Fire is also being caused by forest produce collectors especially by people who collect "Phooljharu", as by fire clearing the area, they get, fresh/flush of Phooljharu and an increased growth of the same for their business.

Fire affected areas:

Most fire affected areas in BTR are the north of 23rd mile, mainly Bhabar and hilly tracts. As per the Survey conducted by M.P.O. and Ecologist of BTR in 1998 the total fire affected areas in BTR is 20415 ha (27% of total BTR). Most affected ranges are Jainti, Rajabhatkhawa (West), Santarabari and North Rydak.



Map 12-Fire Map of BTR

3.4.7. Mining:

The Buxa Dolomite is located in the Jainti hills within Phaskhawa and Hatipota blocks. Four private companies were working within Phaskhawa Block and one Govt. undertaking (NBDL) was working within Hatipota Block. At present all the mining has been stopped from 1993 in Phaskhawa block and from 1996 in Hatipota block though court cases in the matter are pending in High Court and Supreme Court.

3.4.8 Boulder collection:

Alipurduar Sub-division is situated in the flood plain of many rivers and streams. Lot of boulder and bed materials are required annually by the Irrigation Dep't., P.W.D., Railways, and Panchayat for various soil conservation, bank protection, roadside protection etc. works. Boulder is also available in rivers flowing through BTR. Legally boulder collection permission is not given to anybody from 1996-97. This has again been started after relaxation from Supreme Court appointed CEC guidelines. Boulder is now collected from Wildlife sanctuary areas in Pana, Jainti, rydak and Dima as per the CEC guidelines. There is a great demand for boulder in Cooch Behar and Bangladesh too.

3.4.9 Roads, Railways and Electric Transmission line:

None of these exist in the core area.

3.4.10 Uniqueness of location:

The entire northern boundary (50 Km) of BTR is running along the international boundary with Bhutan, its eastern boundary is merged with Assam and Bangladesh is 20 Km away from its southern most boundary. So it is very easy for the offenders to commit offence in BTR and escape quickly. Irregular shape of the Reserve also creates large interface for entry of offenders.

3.4.11 External Development Threats:

The external developmental threats to the Tiger Reserve include the proposed multipurpose Sankosh project. Tala-Rydak road passing through the reverian forests of Bhutanghat is another external threat.

a) Multipurpose Sankosh Project:

Ministry of Water Resources, Govt. of India is contemplating Sankosh-Teesta link project for carrying out 350 cumec water from the right bank of Sankosh lift dam to Teesta barrage in India. The total length of water conductor system is 145.69km. Out of the total length 66.27km is proposed as canal portion which completely lies in Bhutan and about 79.42 km is proposed as canal portion which completely lies in India. Sankosh flows through Bhutan up to a place called Kalikhola where it enters India and forms the boundary between Assam and West Bengal. Major dams and Power stations are proposed

to be constructed within Bhutan but the distribution canals and transmission lines will pass through West Bengal.

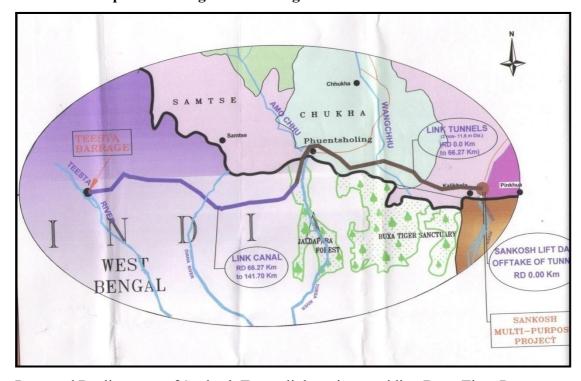
The project area, likely to be affected by it, is extremely rich in Wildlife. It contains some of the best natural saltlicks of the region (e.g., Khural and Bolu in Bhutan) which are used by elephants, gaur and other Wild animals. Natural corridor of wild animals between Bhutan, Assam and West Bengal will be destroyed as a result of the dams and canals. It also contains Phipsu Wildlife Sanctuary of Bhutan. If the project takes shape as planned, it will definitely exert adverse impacts on the wildlife population and its habitat in Buxa Tiger Reserve. The proposed canal traverses 14.6 km. of core area and 9.35 km. of buffer zone, practically making the Buxa Tiger Reserve into 2 halves. Total area of the Reserve to be acquired for this project is 478.34 Ha of which 290.0 Ha in core area and 188.34 Ha in Buffer zone (assuming the width of the strip needed as 200 mt.).

The anticipated adverse effects are:

Movement of Wildlife animals will be hampered. Fragmentation of habitat is likely to aggravate man-animal conflict in the eastern Duars to the level of that in Western Duars.

- Accessibility of outsider into the PA will increase which in turn may increase the illegal activities.
- Tendency to encroach of canal adjacent forest land may increase.
- Disturbances caused by continuous movements of vehicles and construction machineries.
- Illegal Firewood collection from the PA will cause further degradation to the habitat.
- Water table in tracts south of proposed canal shall rise. Table top tracts shall degenerate into marshes. Character of natural vegetation shall change drastically.

Considering the impact of project on wildlife and biodiversity in Buxa Tiger Reserve, CWC has come up with alternate plan which consist of 145.69km long water conductor system. The tunnel portion starts form lift Dam in River Sankosh near kalikhola and passes through three districts of Bhutan namely Dagana, Chukha, and Samtse before joining canal portion near Jaigaon town in West Bengal. This alignment may be adopted as it doesn't pass through Buxa Tiger Reserve, however the movement of wildlife between Buxa Tiger Reserve and Bhutan forests may be affected for which detailed study is required before commencement of the project and necessary ameliorative measures need to be taken to preserve the wildlife corridors between BTR and Bhutan. The canal is entirely in India thereafter and passes through Birpara, Binnaguri, etc.



Map 13-Showing alternate alignment of Teesta-Sankosh Canal

Proposed Realignment of Sankosh Teesta link project avoiding Buxa Tiger Reserve

3.4.12. Inadequacy of the core size:

The present core of BTR, at 417.55 km², is grossly inadequate for a stable and breeding population of even 50 tigers. With plans of strengthening the existing population by translocation in place, the core area should be maximized to ensure their long term survival. With Forest and Revenue villages and tea gardens all around, the focus should be on relocating some of the settlements and freeing select potential areas for future revival.

3.4.13 Patchiness of the core:

The distribution and situation of the core area do not co-incide with areas of maximum tiger usage and habitat potential in some cases. Areas like Raimatang block, parts of Adma block, Nimati block and some parts of West Damanpur and East Damanpur Range, which had promising results in the Tiger Census conducted in 2007, 2010 and periodically report tiger signs, are still not included in the core. While densely populated and degraded areas like Marakata and Narathali blocks, parts of South Rydak range, major parts of Hamiltonganj range are delineated as cores which restricts minor developmental and tourism related activities which could generate valuable revenue to be utilized for enhanced protection.

All these areas which are not included in the notification of core is included in the proposed realigned Core – Buffer. The notification of the same is under process.

3.4.14 Invasive Plants and Weeds:

Of late because of grazing cattle eupatorium, michenia are spreading into other areas.

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PART A: THE EXISTING SITUATION

CHAPTER 4: HISTORY OF PAST MANAGEMENT AND PRESENT PRACTICES

4.1. Conservation History

Prior to the treaty of 1865 between the then British Government in India and the Government of Bhutan, the tract dealt with in this plan used to be within the territory of Cooch Behar Raj. Aggressions of Bhutias were going on ever since the beginning of the 18th Century. In 1772 Raja of Cooch Behar appealed to the Company to overcome this intolerable state of affairs. In 1773 a treaty was concluded whereby Cooch Behar became a Feudatory State of the English and they later ejected Bhutia forces from Cooch Behar. A treaty was signed by the Company with Bhutan in 1774. In June 1863, the Government addressed letters to the Deb and Dharam Rajas, permanently annexing the district of Ambari Falakata (the Bengal Duars). On the 12th November, 1864 Government issued a proclamation permanently annexing the Bengal Duars. A treaty of peace was concluded on the 11th November 1865.

The district of Jalpaiguri as an administrative unit came into being on the 1st January, 1869 by the amalgamation of the Western Duars district with the Jalpaiguri subdivision of Rangpur. The forest dealt with in the plan lie completely within the Alipurduar subdivision of Jalpaiguri district. The Reserved forest of this Division has a lengthy common boundary with Bhutan and it will be interesting to record that the Bhutan boundary was first demarcated by T.H.O. 'Donel in 1866-67. The forests were selected out of unoccupied waste at the disposal of the Government and have been in charge of the department since 1866, but up to 1874-75 the working was very irregular and records were incomplete.

It will be worthwhile to trace the history of these forests leading to the final reservation in 1879. During 1868-69, four large forest blocks were demarcated in the Eastern Duars by the Revenue Survey Department, besides one immediately west of the Sankosh River called the Duars Buxa Reserve. The area of the four blocks in the Eastern Duars was about 200 square miles and Duars Buxa Reserve was 8413 acres or somewhat more than 13 square miles. During 1870-71, the whole of North Bengal forests came under the Cooch Behar Forest Division. During 1871-72, the Government forests in the Bhutan Duars were gazetted as open Govt. Forests from which selected tracts would be chosen in future as forest Reserves. The total area of the Bhutan Forests which were classed as open forests was 342 square miles in the Eastern Duars. During 1874-75, Jalpaiguri Division was created and it included the areas falling within the territorial jurisdiction of the present Buxa Division. In the year 1874-75, four blocks, namely Raimatang, Poro, Rajabhatkhawa and Panbari measuring 110 square miles were reserved. Buxa Division was created from the areas of Jalpaiguri Division in 1877-78. The first forests to be notified as Reserved Forests under Indian Forest Act were Buxa, Rydak, Dhumpara and Bholka forests measuring 1,32,391.37 acres Reserved by Gazette notification dated 23rd January, 1879.

Although the area remained under the control of Forest Dept. since 1865, no records are available for its management till 1875 when for the **First Working Plan** for Systematic management was prepared by Dr. William Schlich (1874-75 to 1905-06), the then Conservator of Forests.

In the **Second Working Plan** (1905-06 to 1919-20) Mr. C. C. Halt prescribed selection felling followed by natural regeneration. In **Third Working Plan** (1920-21 to 1924-25) Mr. Shebbear prescribed the artificial regeneration of clear felled areas by means of taungya plantation. Natural regeneration of Sal was known to have failed and the taungya method appeared to be the only solution. Selection felling outside P.B - I were provided for under this plan. Pending completion of the new working plan Shebbear's plan was extended for a further period of 4 years.

In **Fourth Working Plan** (1929-30 to 1948-49) Mr. Homfray emphasised the need for maintenance and improvement of the "Savannah" areas to provide habitat for the rich grass land fauna of this tract. Other prescriptions remain same as in Shebbear's plan.

A separate game Sanctuary working circle (Virtually entailing the present area of Jaldapara Wildlife Sanctuary) and Protection working circle was created in the **Fifth Working Plan** (1945-46 to 1964-65). The primary objective of constituting a separate game Sanctuary Working Circle was to preserve and improve the existing stock of indigenous fauna. All types of extractions including thatch were prohibited except limited felling of timber trees by Departmental agency. Control burning in alternate years and removal of evergreen crop invading the grassland were carried out in "Savannah". Protection working circle was created with the objective to protect the headwaters of the streams and steep hillside. No felling was prescribed except on a very restricted scale provided other conditions were favourable.

In **Sixth Working Plan** (1965-66 to 1974-75) and **Seventh Working Plan** (1975-76 to 1984-85) no special stress was given on wildlife except for the creation of protection working circle where no felling was prescribed. This W.C. was created for the protection of steep hill sides and head waters of Streams. Facilities for the extraction of forest produce were extremely limited. During these two plan period a vast area (5,300 ha) of the Reserve in Nimati, Dima, NRVK, SRVK, Panbari, Jainti, Tashigaon, Santarabari, Bhutanghat, SRDK, Kumargram and Sankosh Block were converted into Teak with an objective that teak will eradicate shrubs and weeds due to its dense shade.

Consequent to the constitution of Buxa Tiger Reserve in the year 1983, the **First**Management plan of the Reserve was prepared for the period from 1983-84 to 1989-90 which was approved by the chief Wildlife Warden (W.B.). The Management Strategy was to identify the limiting factors of the habitat and to seek to mitigate these by ameliorative management and compulsory development. The prescriptions implied arresting of regressive trends by intensive anti-poaching, fire protection, elimination of cattle grazing, eradication of weeds, Soil Conservation measures, relocation of human habitation, judicious water development etc.

However, one important target of the plan viz. relocation of human habitations outside the Reserve could not be achieved.

The **Eighth Working Plan** for buffer zone and **Second Management Plan** for core zone of the Reserve were taken up simultaneously for the period 1990-91 to 1999-2000. This management plan has not highlighted the Eco-Development aspect, which could have taken into account the anthropogenic pressure on the PA. Subsequently, the problem of anthropogenic stress on the protected areas was taken into consideration and the 2nd plan was revised accordingly in 1992. This plan was effective up to 1996 – 97. An Eco-Development scheme in the fringe as well as in forest villages was taken up in this revised plan. Under this scheme, works have been undertaken in the fringe villages, e.g. distribution of seedlings for farm forestry, improvement of village roads, construction of culverts and bridges, provision of drinking water, irrigation facilities, community pond, duckery, piggery etc. The idea was to provide alternate sources of fuel and fodder and to improve the economic condition of the villagers so as to reduce their dependence on the resources of the Reserve and also to win their sympathy and co-operation for the protection of wildlife and its habitat.

The present Hamiltonganj Range consisting of Gudamdabri, Bharnabari, Rangamati and Bhutri blocks were managed by Cooch Behar Division under Cooch Behar Working plan from 1962-63 to 1995-96. These blocks have come under the administrative control of Field Director, Buxa Tiger Reserve from 25th September 1995 vide G.O. No.4983-For.

First Management Plan of BTR (1983-84 to 1989-90):

Consequent to the constitution of Buxa Tiger Reserve in the year 1983 the First Management Plan for the period from 1983-84 to 1989-90 was prepared which was approved by the Chief Wildlife Warden, West Bengal. The management strategy was to identify the limiting factors of the habitat and to seek to mitigate these by ameliorative management and development. The prescriptions implied arresting of regressive trends by intensive anti-poaching, fire protection, elimination of cattle grazing, eradication of weeds, soil conservation measures, relocation of human habitation, judicious water development etc. However, one important target of the plan i.e., relocation of human habitations outside the Reserve could not be achieved.

Second Management Plan (1989-90 to 1999-2000):

A. Wildlife Conservation Measures:

• Absolute Protection of Core Area:

The core area enjoys absolute protection and commercial felling and commercial exploitation is not undertaken. Though 1900 ha of plantations fall under the core zone, no thinning was prescribed.

• Strict Protection of the Habitat:

Tiger and its biotope will be kept free from any sort of interference from unregulated forest exploitation. Regulated forestry operation only to the extent of thinning of plantation by way of opening canopy for improvement of habitat will be allowed. There shall not be normally any exploitation of M.F.P. from the area. Controlled tourism may be allowed to the extent that it does not interfere with the conservation principle.

• Improvement of Habitat:

About 2500 ha area in Narathali and Marakata blocks was almost without vegetation. In addition to this, there are many blank patches infested with Michenia and coarser grasses. These unpalatable grasses would be eradicated in phased manner and the areas should be regenerated with palatable grasses and fruit-bearing species. In the existing grassland where annual fire is prevalent, leading to coarser and unpalatable grass, rotational burning in alternate years will be adopted. Uncontrolled fires should be checked through cleaning of fire lines.

- Fodder Development.
- Development of Waterhole.
- Creation and maintenance of saltlicks.

4.2. Habitat Management

Silvicultural systems and Tending operations:

Working Plan-wise Silvicultural system and tending operations are presented below:

a. First Working plan (Sir William Schlich's plan), 1874-75 to 1905-06:

The First Working Plan was incorporated by Sir William Schlich in his Administration Report for 1874-75. Under this Plan sal trees over 5' girth were removed departmentally over one-eighth of the Rajabhatkhawa Block annually from 1875-76 to 1882-83 and the same procedure was carried out in the Poro block from 1882-83 to 1887-88. From 1888 onwards the exploitable girth was raised to 6'. The same system continued in parts not previously worked over except that the size of the annual coupe was fixed by the anticipated demand and that the timber was extracted by purchasers.

In 1900 departmental operations were again started and sleepers were sawn for the Eastern Bengal Railway till 1912 under the selection system up to 1906 as described above, and from 1906 onwards under Mr. Hatt's Working Plan.

ii) Second Working Plan (Mr. Hatt's Plan), 1906-07 to 1919-20: This Plan prescribed selected fellings on a 15 year cycle with a 6'-3" exploitable girth combined with improvement fellings. The improvement felling were carried out on inferior sal and other species interfering with promising sal which were so defective that it cannot grow into a good tree of the exploitable girth. At first trees of other species were felled at considerable cost often in the interest of a few saplings. As there was then no demand for them they were allowed to lie where they fell. About 1911, it was realised that these fellings tended to increase the already dense evergreen undergrowth and accordingly it was decided to deal with only such trees as were actually interfering with establishment of sal and these were girdled instead of being felled. In 1906 the bad effect on sal regeneration led to start of cleanings to free sal seedlings. These were to be continued annually for five years after the coupe. There was a good deal of discussion as to the efficacy of these cleanings which were abandoned in 1910. In 1912 departmental sleeper work was abandoned, and from that time all sal timber has been sold by auction.

b. Third Working Plan (Mr. Shebbeare's Plan), 1920-21 to 1924-25:

This came into force in 1920-21 and prescribed the artificial regeneration of clear-felled areas by means of taungya plantations. Natural regeneration of sal was known to have failed and the taungya method appeared to be the only solution. The objective of this plan was to provide for clear felling followed by taungya plantations. The existing stock of sal area was to be exploited uniformly over the entire time period which sal plantations were likely to take to reach maturity. Another objective was to provide for a maximum outturn of two classes of produce (kukat and fuel) which, though growing with sal, have different rotations for their exploitable girth.

This plan for which no enumerations were made was quite mechanical and provided for the clear felling of one-eightieth of the Sal Working Circle, annually. Miscellaneous timber species (called kukat) and fuel were similarly to be worked on rotations of 40 and 20 years respectively to meet the demand for these.

Selection fellings outside Periodic Block I was provided for under this plan. The other working circles under this plan were the Plateau, the Stable Sissu, the Unstable Sissu, the Hill, the Rajabhatkhawa and the Tea Garden Working Circle. Period from 1925-26 to 1928-29: Pending completion of the new working plan, Shebbeare's Plan continued to be in force for a further period of four years.

c. Fourth Working Plan (Mr. Homfray's Plan) 1929 – 30 to 1948 – 49:

The forests of the division were divided into ten working circles, viz... (1) The Sal Uniform, (2) The Rajabhatkhawa, (3) The Sal Selection, (4) The Bholka, (5) The Dhumpara, (6) The miscellaneous, (7) The hill, (8) The Khair and Sisoo, (9) The Savannah and (10) The Cane (Overlapping).

Sal Uniform Working Circle: The working circle contained all sal bearing areas of the plains together with such wet and dry mixed forests as could not conveniently be separated from them. The rotation was fixed on 80 years and the total area was divided into four periodic blocks. The Silvicultural system adopted was clear felling followed by artificial regeneration.

Fuel felling: The demand for fuel wood for tea gardens was met firstly from clear felling coupes and then by felling miscellaneous trees on a 20 (twenty) years cycle from the wet mixed areas along the edges of the annual coupes.

Selection felling: Selection felling was to be made whenever necessary, over areas which would not come under regeneration within the next ten years, according to a fixed sequence and controlled by exploitable girth limits.

Dry sal felling: Dry sal felling was done on a 5-year cycle according to a fixed programme. Dry felling was intended to remove the dead and dry trees to reduce the accumulation of large number of over mature trees.

Mr. Homfray's working plan was designed for 20 years with a revision recommended after 7 years. Due to want of staff no revision could be undertaken after 7

years and it was followed until March 1945 with certain amendments made from time to time.

d. Fifth Working Plan (1945 – 46 to 1964 - 65):

The fifth working plan of the undivided Buxa Division was drawn up for a period of 20 years with a recommendation to revise it after 10 years. In the mean time a separate forests division viz. Cooch Behar Division was formed with effect from 1st March 1951 and the entire area of Nilpara and Chilapata ranges was transferred to the Cooch Behar Division. In this plan the entire of the Division was divided into 10 working circle viz. (1) Sal conversion, (2) Short Rotation Miscellaneous, (3) Long Rotation Miscellaneous, (4) Fire wood Conservation, (5) Sal Improvement, (6) Riverain, (7) Torsa, (8) Protection, (9) Undeveloped and (10) Game Sanctuary.

Sal Conversion Working Circle: This W.C. composed of potential Sal bearing areas of Panbari, Checko, Damanpur, Poro, Nimati, SRVK, NRVK, Jainti, Raimatang and S.Rydak blocks. Exploitable size of 7'-0" at breast height and a rotation of 100 years were fixed. There were 10 felling series, each divided into 5 periodic blocks. Silviculture system adopted is clear felling followed by artificial regeneration, preferably taungya.

Short Rotation Miscellaneous W.C.: This working circle extended over the comparatively low lying and flat areas of Poro, Damanpur, Checko and Gadadhar Blocks. The rotation was fixed at 50 years. Clear felling followed by artificial regeneration with taungya was prescribed.

Long Rotation Miscellaneous W.C.: Primary objective of this working circle was the production of hard wood species of 8' girth and over. Rotation was fixed on 80 years and a system of clear felling followed by artificial regeneration was prescribed. Species prescribed were teak with alternate lines of Lali, Lahasune, Pakasaj and Chilaune as associate species. Teak plantation continued to be raised in Nimati, Pana and Santarabari and grass affected areas of Bholka Range.

Fire wood Conversion W.C.: This working circle was formed with the objective of meeting the demand of fire wood for the neighbouring tea estates at 20 years cycle.

Riverain W.C.: This working circle was constituted with the areas adjoining the principal rivers. To avoid any risk of soil erosion, selection felling was adopted with a felling cycle of 15 years over the whole area with the indication of exploitable girth for different species. Dry felling was prescribed at 5 years cycle.

Protection W.C.: The areas of Adma, Chunabhati, Tobgaon, Tashigaon, Santrabari, Hatipota, Bhutanghat and Phaskhawa were clubbed on the protection working circle on steep hill slopes. The primary objective of forming the working circle was to protect the headwaters of streams and steep hillside. No felling was prescribed.

Undeveloped W.C.: This working circle comprised the areas (Sankosh, N.Bholka, S.Bholka, and Bhutanghat) where means of communication and other facilities for working the forests were not developed. Hence no clear felling was prescribed, only selection felling of exploitable girth was adopted.

e. Sixth (1965–66 to 1974–75) and Seventh (1975–76 to 1984–85) Working Plan:

In this two working plan 6 working circles viz. (1) Sal, (2) Teak conversion, (3) Soft wood, (4) Development, (5) Riverain, (6) Protection were prescribed.

Sal Working Circle: All the best sal bearing forests have been put in this working circle. Clear felling and artificial regeneration by taungya was adopted. Rotation age was fixed at 80 years with an exploitable size of 6'-6" girth at breast height.

Teak conversion Working Circle: Due to increasing demand of quality timber, areas which were suitable for growing teak have been included in this working circle. Clear felling with artificial regeneration by taungya was prescribed.

Soft wood Working Circle: To cater to the demand of wood-based industries this working circle was formed. Wet mixed forests of entire Poro, Gadadhar, Damanpur and Checko blocks south of 21st mile constituted this working circle. Clear felling and artificial regeneration by taungya was adopted.

Development Working Circle: All blank and derelict forests which require special treatment on special footing have been included in this working circle. Method of treatment adopted clear felling where necessary, followed by artificial regeneration with suitable species.

Riverain Working Circle: The land located in the riverain tract is unstable. Some of these forests were in the early seral stage and were reproducing naturally. Restocking and improvement planting with suitable species as well as selection felling of Khair and Simul was prescribed.

Protection Working Circle: Its constitution and prescriptions are same as described under Fifth Working Plan.

Past Management of Hamiltongani Range

In 1st working plan of Cooch Behar Division (1962-63 to 1971-72), Bhutri block was managed under clear felling system in Teak Conversion Working Circle with a rotation of 60 years. A part of Rangamati (1b, 2b, and 3b), Bharnabari (1b, 2b, 3b, 4b) and Gudamdabri (1b, 2b, 3b, 4b) blocks were managed under clear felling system in Long Rotation Miscellaneous Working Circle with a rotation of 50 years. The other parts of Rangamati (1a, 2a, and 3a), Bharnabari (1a, 2a, 3a, 4a) and Gudamdabri (1a, 2a, 3a, 4a) were managed under selection system in Riverain Working Circle. Exploitable girth was fixed at 3 ft., 8 ft. and 6 ft. for Khair, Simul and Pitali respectively at breast height.

In 2nd Working Plan of Cooch Behar Division (1972-73 to 1981-82), Bhutri, part of Rangamati, Bharnabari and Gudamdabri blocks were managed under clear felling system in Teak Conservation Working Circle with a rotation of 60 years. The other portions of Rangamati, Bharnabari and Gudamdabri blocks were managed under selection system in Riverain Working Circle.

Third Working Plan of Cooch Behar Division (1990-91 to 1999-2000), prescribed clear felling system in Miscellaneous Timber Working Circle for Bhutri (1, 2b, 3b, 4, 5b),

Bharnabari (1b, 2b, 3b, 4b), Gudamdabri (1b, 2b, 3b) and Rangamati (3b) blocks with a rotation of 60 years. The other parts of Bhutri, Rangamati, Bharnabari and Godamdabri blocks will be managed under clear felling system in Riverain Working Circle with a rotation of 60 years. These prescriptions were applied to Godamdabri block only, as the other blocks were brought under Buxa Wildlife Sanctuary since 1991.

Even aged Systems and Uneven aged System:

Natural forests are uneven aged. First and second working plan of Buxa Division worked mostly on uneven aged forests. Extraction of timber was done based on certain exploitable girth. From 3rd working plan onwards clear felling followed by artificial regeneration was introduced. Since then the uneven aged crops are converted to even age crop through plantations. Presently in BTR both even aged and uneven aged crops exist.

Bamboo and Cane Working:

Bamboo is called "Poor man's timber" due to its versatile utility. Distribution of bamboo is mainly restricted to Santarabari (Compt. - 1, 2, 3, 4), Tashigaon (Comptt.-1, 2) and Adma (Comptt.-1, 2) Blocks of this Reserve. To regulate cutting and to afford rest for further growth, a cutting cycle of 5 years was adopted. Annually 350 ha to 400 ha bamboo area was operated from 1965 – 66 to 1984 – 85 as per the rules prescribed by the working plans. Thinning of bamboo was left at the discretion of the territorial Divisional Forest Officer. There were some other areas where bamboo is available in a limited extent (Bhutanghat, Tobgaon, and Chunabhati blocks) but those were not included in this programme. Presently no bamboo extraction is done.

Cane holds an important place in the tea industries as it is used for basket making. In past some quantities of cane were being exported for making furniture and other articles. Canes are available mainly in Nimati (Comptt.-3, 4, 5, 6, 7), Poro (Comptt.-1, 2, 3, 4, 6, 8, 11), Damanpur (Comptt.-1, 2, 5), Checko (Comptt.-1, 2, 3, 5, 6, 7), Panbari (Comptt.-1, 2, 3, 6, 7, 8, 10), SRVK (Comptt.-1, 8, 9, 10, 11, 12, 13, 14, 16) and S. Rydak (Comptt.-1, 2, 3, 4, 6) Blocks. To regulate cutting and afford rest for further growth a cutting cycle of 5 years was adopted. There are some other areas, where cane is available in a very limited extent. These areas were not included in the programme. Annually 1300 ha to 1500 ha cane was operated from 1965 - 66 to 1984 – 85 as per the rules prescribed by the working plan. No cane operation is done now.

Firewood Collection:

Large quantity of firewood is required annually by the neighbouring tea estates and fringe population for industrial and domestic use. This demand was earlier met from the clear felling coupes by allotting areas to each tea estate. Normally the entire area earmarked for a particular tea estate was not allotted all at a time. Only a portion of the area was allotted at first. Further area was allotted only when the already allotted area was completely worked out. This was necessary to ensure completion of the work in time. The following table will give an idea about the F.W. demand of 15 (out of 34) tea gardens situated in the fringe of BTR.

Table – 4.1: Requirement of firewood of 15 Tea gardens (out of 34) during 1997-98 located in the fringes of BTR

| Name of Gardens | Daily rated workers @ 2½ Stacks per worker/ annum | Monthly rated workers @ 3 Stacks per workers/ annum | Monthly rated workers and Tech. 'C' @ 4 Stacks per workers/ annum | Clerical and Medical Staff and Tech. A and B @ 12 Stacks/ annum | Manager ial, Hospital and others Stacks | Total Domestic use Stacks | Factory Use Stacks | Total require ment Stacks | Less available in T.G. Stacks | Balance requirem ent from forest Departm ent for 1997 – 98 in T.G. Stacks |
|------------------|--|--|---|---|--|------------------------------------|--------------------------|------------------------------------|--|---|
| BTR (W) Division | | | | | | | | | | |
| Atiabari | 2790 | 150 | 520 | 0 | 560 | 4020 | 500 | 4520 | 2100 | 2420 |
| Bhatpara | 2787 | 537 | 292 | 336 | 12 | 3964 | 0 | 4164 | 100 | 4064 |
| Bhatkhawa | 2750 | 0 | 680 | 360 | 463 | 4253 | 200 | 4265 | 250 | 4015 |
| Chuapara | 2042 | 273 | 312 | 86 | 24 | 2737 | 12 | 3137 | 1342 | 1795 |
| Nimtijhora | 1847 | 48 | 440 | 276 | 484 | 3096 | 400 | 3176 | 419 | 2757 |
| Dima | 3155 | 189 | 60 | 0 | 176 | 3580 | 80 | 3680 | 50 | 3630 |
| Kalchini | 3744 | 63 | 664 | 312 | 124 | 4907 | 100 | 4907 | 600 | 4307 |
| Patkapara | 1450 | 276 | 36 | 156 | 12 | 1930 | 0 | 1935 | 150 | 1785 |
| Rajabhat | 1452 | 240 | 40 | 280 | 304 | 2316 | 5 | 2316 | 950 | 1366 |
| Total BTR (W): | | | | | | 30803 | 1297 | 32100 | 5961 | 26139 |
| BTR (E) Division | | | | | | | | | | |
| Jainti | 1370 | 448 | 56 | 36 | 46 | 1956 | 0 | 4838 | 600 | 4238 |
| Kartick | 1210 | 180 | 52 | 228 | 2900 | 4570 | 2882 | 5020 | 800 | 4220 |
| Phaskhawa | 452 | 93 | 24 | 96 | 450 | 1115 | 450 | 3176 | 0 | 3176 |
| Sankosh | 2367 | 0 | 552 | 248 | 2226 | 5393 | 2061 | 5591 | 600 | 4991 |
| Newlands | 2040 | 312 | 52 | 0 | 246 | 2650 | 198 | 2848 | 550 | 2298 |
| Rydak | | | | | | 3333 | 2061 | 5394 | 600 | 4794 |
| Total BTR (E): | | | | | | 19017 | 7652 | 26867 | 3150 | 23717 |
| Grand Total : | | | | | | 49820 | 8949 | 58967 | 9111 | 49856 |

(Source: Adopted from DBITA, Binnaguri, Jalpaiguri)

As is seen, despite persistent persuasion, TGs generate only one sixth of their firewood requirement. Out turn of firewood has gone down drastically in recent years. As a result illicit removal from forests has increased.

After extraction of timber, tops and branches are converted into firewood. Substantial quantity of firewood was extracted from thinning of plantations. Firewood has tremendous demand not only in neighbouring Tea Estates but also in peripheral villages. Villagers for their daily firewood need go inside the forests and collect it. They used the dead trees, branches, wind fallen produce etc. Sometimes they illegally cut small trees/branches and then collect it after drying. Mainly women folk do this work. Illegal collection of firewood sometimes reaches to the extent that younger plantations are damaged.

Firewood demand of Tea garden is met with the outturn resulting from shade tree felling of tea gardens and Tea gardens are mandated to distribute firewood generated out of shade tree felling to Tea garden labourers. Also some part of fire wood collected from Buffer zone generated out of thinning shall be distributed among the dependent villages, and Tea gardens. However Tea gardens are also inhabited by population other than labours who are not entitled to such firewood and their firewood is mostly met from collection from Tiger Reserve areas. The Jote land trees that are outside the forest areas also generate considerable amount of firewood for which no Transit permit is issued and is made to be consumed locally to meet the demand of firewood and reduce dependency on Tiger Reserve.

4.3. Protection and Intelligence Gathering

Forest Protection:

Regular patrolling is organised to protect the forests and Wildlife. Rifle and D.B.B.L. guns are used for self protection during patrolling. Patrolling is done regularly on foot, on bicycle and by vehicle. Patrolling is done on elephant back during monsoon in inaccessible areas.

R.T. networks have been installed in most of the Range and in some Beat Offices. Walkie Talkie is used by Patrolling teams. Few Beats are provided with Departmental elephants for intensive patrolling. Some more departmental elephants are required in Newlands, Bhutri and Bhutiabasti Beats for intensive patrolling during monsoon. Extensive road net works, fire line, patrolling path, etc. exist. River camps at Rydak, Sankosh and Gholani and temporary camps on NH-31C are established to check the river rafting of illegal timbers during rainy season.

Since recent past Eco-development Committees (EDC) and Forest Protection Committees (FPC) have been formed in local villages. They involve Forest Villagers and Fringe villagers in Sanctuary and buffer zones respectively. They are protecting forest and wildlife along with BTR personnel.

4.3.1. Hunting: hunting is described in 3.4.1 Para of chapter 3

4.3.2. Illegal activities:

Illegal cutting of trees, illegal removal of firewood and NWFP, poaching of Wild animals, boulder collection, illegal grazing, and encroachment are the main illegal activities in BTR.

4.3.2.1. Poaching: Refer para 3.4.1 of Chapter 3

4.3.2.2. Illegal cutting of trees:

Refer Para 3.4.5 of chapter 3

4.3.2.3. Illegal removal of N.W.F.P.'s:

N.W.F.P. collection is not allowed in core area though in fringe areas of core some WF is collected illegally.

4.4. Tourism and Interpretation

4.4.1 Tourism

Annually 40000 – 50000 tourists visit this Reserve mainly for nature and adventure tourism. A substantial fraction of recreational and religious devotion based tourism also takes place in of BTR.

Table 4.2: Annual influx of Tourists in BTR for last 8 years. (Source- Annual divisional report)

| No. of Tourist visited the National Park and Tiger Reserve | | | | | | | |
|--|------------|------------|------------|---------|---------|---------|-----------|
| 2005-06 | 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-2013 |
| 23509 | 27003 nos. | 31000 nos. | 43385 nos. | 49760 | 52230 | 40593 | 49612 |
| nos. | | | | | | | |

4.4.1.1. Picnic spots:

BTR has good picnic spots all over. Presently Jainti is the most popular. The main picnic season is noticed from 25th December to 26th January. The picnicking in Jainti, however, has been severely restricted.

4.4.1.2. Pilgrims to Mahakal Temple:

Large number of pilgrims (about 8,000/year) visit Mahakal Temple during "Mahashiva Ratri". Mahakal (Lord Shiva) Temple is situated in the Indo-Bhutan border of the Reserve in Phaskhawa block at an altitude of 2500'. The spot is about 6 Km. away from Jainti location. Hoards of pilgrim visit this ancient Shiva temple during "Shiv-Chouturdoshi" in the month of March every year. Free permit is granted to all the pilgrims from Rajabhatkhawa check post. Annually 7000-8000 pilgrims visit this temple during the above occasion. Beyond Rajabhatkhawa the route passes through the core area of the Reserve. The movement of the pilgrims are regulated by Forest Dep't, Police and SSB.

4.4.1.3. Wildlife and Nature Tourism:

Due to luxuriant vegetation dense habitat and lack of open grassland animal sighting in BTR is very poor. The main tourist attracting sites in BTR are Rajabhatkhawa (WRVK Range), Buxaduar (Buxa duar Range), Jainti (Jainti Range) and Hatipota.

Day Visitors:

Day visitors are generally local people, with school children coming in groups. Most day visitors go up to Rajabhatkhawa, visit Nature Interpretation Centre (NIC) and Rescue Centre.

Infrastructure:

Roads:

Very few roads are open for tourism. Development of tourism has both negative as well as positive impact on forest. Whereas tourism development brings about the awareness of forest conservation and livelihood generation among people, it also leads to disturbance to the Wildlife. No new construction of roads is proposed.

Accommodation:

For accommodation of visitors the following rest houses and dormitories are available.

Table 4.3: Accommodation available at BTR

| | Location | Accommodation available | No. of Suites | No. of Beds |
|-----|---------------|---------------------------------|------------------|------------------|
| | BTR (West) | | | |
| 1. | Rajabhatkhawa | Main Forest Rest House (FRH) | 2 | 4 (Single bed) |
| | | Leo House | 3 | 6 (Double bed) |
| | | Dormitory | 2 | 4 |
| 2. | Nimati | Rest house | 3 | 2 |
| 3. | Ban Mayuri | Dormitory | 5 | 6 |
| 4. | Raimatang | FRH | 2 | 4 (Single bed) |
| 5. | BTR (East) | FRH | 2 | 4 (Single bed) |
| | Jainti | Jainti II | 3 | 6+12 (dormitory) |
| 6. | Buxaduar | FRH | 2 | 4 (Single bed) |
| | Dunadan | Dormitory | 2 | 16 (Single bed) |
| 7. | Hatipota | FRH | 2 | 4 (single bed) |
| 8. | Rydak | FRH | 2 | 4 (Single bed) |
| 9. | Silbungalow | FRH | 2 | 4 (Single bed) |
| 10. | Kumargram | FRH | 2 | 3 (Single bed) |

Elephant ride:

Wildlife sighting in BTR is poor due to dense vegetation and lack of open grasslands. Elephant riding is currently not available for tourists.

Regulations:

Following regulations were in vogue which has been revised recently

Entry Fee: for Detailed fee structure is given below

Table 4.4: Rate chart for BTR

| Sl.No. | Category | Total Charges in `./day |
|--------|---|-------------------------|
| 1 | Adult (Indian) | 40 |
| 2 | Student (Indian) | 10 |
| 3 | Vehicle a) Scooter/Motor cycle b) Light Motor Vehicle c) Heavy Motor Vehicle | 20 200 200 |
| 4 | a) For Commercial Feature Film i) Govt. Sponsored ii) Indian (Private) iii) Foreigner | 2500 15000 25000 |
| | b) For Documentary Film i) Govt. Sponsored ii) Indian (Private) | 1500 5000 |
| | c) For Television Serial i) Govt. Sponsored ii) Indian (Private) | 2500 15000 |
| | ii) Indian (Private) d) For Tourist video camera i) Indian | 200 |

Other regulations within the Reserve:

- 1. No entry after sunset and before sunrise. Night driving is prohibited in the Reserve.
- 2. Pets, transistors, tape-recorders, stereos are not permitted.
- 3. No arms and ammunitions are allowed.

- **4.** Carelessly throwing and leaving trash litter is strictly prohibited.
- **5.** Kindling fire in the forest is prohibited.
- **6.** Fast driving (>20 Km/ Hr.) and blowing of horn is strictly prohibited.
- 7. Shouting, teasing or chasing of animals are prohibited.
- **8.** Staying in rest houses without reservation is prohibited.
- **9.** Hunting and fishing are strictly prohibited.
- 10. Use of flash camera to take a snap of wild animals is not allowed.

Closed period:

Park remains closed for tourists from 15th June to 15th September.

4.4.2 Interpretation:

There are two Nature Interpretation Centres (NIC), at Rajabhatkhawa and Buxafort. Rajabhatkhawa NIC is an excellent creation, consists of reception, displays, library and auditorium. This NIC remain open for the visitors daily from 10.00 am to 5.00 pm. Two staffs (F.G.) are deputed to take care of tourists and NIC. A visitor book is maintained at NIC to get the Visitor's feedback and to assess the number of visitors. Besides Nandadevi Foundation, Alipurduar Nature club, Rovers and Mountaineers (NGOs) conducts Nature Education Camp at Howdah (Jainti) every year involving students and teachers from different schools. Now they also conduct nature education camps in fringe villages. Alipurduar Welfare Organisation organises health camps in various forest villages in collaboration with Forest Dep't. Some youth from Jainti EDC have been trained as Eco-guide. They assist tourists as guides. Himalayan nature and Adventure Foundation (HNAF), a reputed NGO of the region, also holds annual nature camps with underprivileged and handicapped children in Jainti and Bhtuiabasti. One such camp with partially handicapped children was held in winter of 2008.

4.5. Research and Monitoring

4.5.1. Research:

The Reserve has no field research laboratory and research officer, (Post of Research Officer has not yet been sanctioned for BTR) and trained staff. This is a serious impediment. The responsibility of research lies on Working Plan officer who is attached to the Field Director's office. The post is lying vacant presently. One Research range was established at Rajabhatkhawa to collect routine data, compile monitoring and census data. At present research range has been removed. Research infrastructure is inadequate. It needs strengthening and systematic methods of data collection.

Following studies have been conducted in BTR by various agencies a) Study on Status of Orchids in B.T.R.

A study on status of orchids in B.T.R. was conducted by Mr. Tapan Katham of Blue Heaven Orchid Farm, Jalpaiguri and Mr. S. S. Bist, I.F.S., Ex-Field Director, Buxa Tiger Reserve during 1994-95. Their findings are –

- i) 141 Species of orchids are found in BTR belonging to 47 genera.
- ii) Only 16 species of orchids are terrestrial in nature. Rests are epiphytes.

Relative abundance of orchids:

Table 4.5

| Category | No. of Species | Remarks |
|-------------|----------------|----------------------------|
| | 21 | Thus, 109 (76%) species of |
| Very Common | | orchids are found to be |
| Common | 11 | uncommon/ scare in BTR. |
| Uncommon | 51 | |
| Scarce | 58 | |

iii) Distribution of orchids over different habitat:

Table 4.6

| Habitat type | No. of Species | Habitat type | No. of Species |
|--------------|----------------|--------------------|----------------|
| Hill forest | 91 | Bhabar Sal | 27 |
| Dry Mixed | 46 | Terai Sal | 24 |
| Wet Mixed | 25 | Khair-Sissoo | 20 |
| Evergreen | 24 | Moist Sal Savannah | 22 |

iv) Distribution of orchids over different altitude:

Table 4.7

| Altitude | No. of Species |
|----------------|----------------|
| Up to 500m | 52 |
| 501 – 1000m | 53 |
| 1001 – 1500m | 54 |
| 1500 and above | 32 |

v) Areas of BTR designated as Sanctuary/ National Park provide shelter to only 44 species (30.5%) of orchids. Rests are all in buffer zone.

vi) Rare and Endemic species:

Paphiopedilum fairieannum, P. Venustrum, Cymbidium eburneum, Diplomeris hirsuta Vanda punnila, Anoectorchilus bravilabris, C. devoniannum, C. masters, Bulbophyllum, leopardiinum, Coelogyne cristata, Dendrobium amoenum, Pholidota potoacta.

The study recommended further investigation, notification as orchid sanctuary, establishment of orchidarea, etc.

b) Study on Entomofauna of BTR:

The study on entomofauna of BTR was conducted by Prof. D. Roy Choudhury etc. (1994-97), Zoology Department of Calcutta University.

c) Study on Leopard and Bison in North Bengal:

This study was conducted by World Wide Fund for Nature – India, Eastern Region during 1994-97. This study has covered Buxa Tiger Reserve. The study includes

i) Study on the present status and distribution of Leopard in North Bengal. BTR is situated in High abundance zone.

Table – 4.8: Status of leopard in North Bengal in 1993

| Gorumara | BTR | Jaldapara | Mahananda | Others | Total |
|----------|-----|-----------|-----------|--------|-------|
| 2 | 63 | 9 | 2 | 31 | 107 |

Study on the breeding behavior of Leopard. No sharp seasonal peak exists. Pre-monsoon period (April-June) and post monsoon period (Nov-Dec) are the preferred months for littering (Fig-4.1).

ii) Study on the prey availability in relating to Leopard population. Preferred prey of leopard in BTR are Rhesus Macaque, civets, Mongoose, Giant Squirrel, porcupine, Indian Hare, Sambar, Hog deer, Wild boar, Barking deer, Peafowl, Red jungle fowl, spotted deer.

Highest concentration of leopards in Eastern Duars is corroborated by the highest cattle lifting in the region (Fig-4.2).

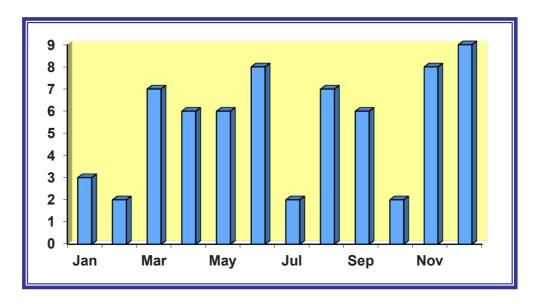
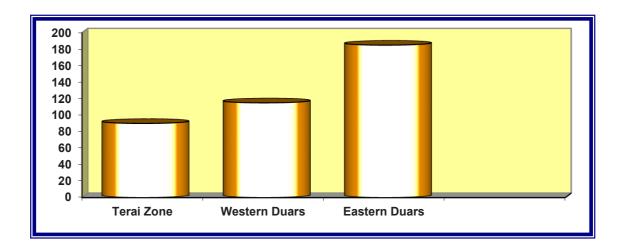


FIG. - 4.1: Month wise birth incidents of leopard

(Source: Leopard study by WWF- India in N.B.)

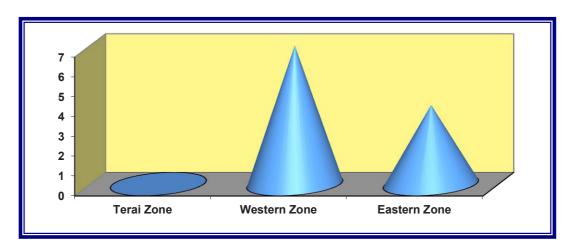
FIG. - 4.2: Zone wise livestock lifting by leopard during 1995 to 1997.



(Source: Leopard study by WWF-India in N.B.)

iii) Human death by leopards follows the pattern of death by Wild elephant (Fig-4.3). This is probably due to more porous forests of Western Duars.

FIG. - 4.3: Zone wise death of human being by leopard during 1990 to 1997.



iv) Other observations: Study made some valuable observations. Manleopard conflict is the greatest in Dima, Gangutia, Nimati, Raimatang, Pana, Gudamdabri, Bhutri and Rangamati forest blocks. Most affected Tea Gardens are Atiabari, Gangutia, Dima, Chinchula, Jainti, Phaskhawa, Turturi, Rahimabad, Sankosh, Kumargram, and Hatipota. Garo Pampu Basti and Kanjali basti are also affected. A five km. wide tract separates Santosh forests from North Bholka forest block. This tract encounters severe leopard depredation.

v) Survey of some of forest villages and Tea Gardens reveals significant results (Table-4.9). Jainti and Phaskhawa T.G.s are the worst affected. 28th and 29th mile forest villages appears the worst affected.

Table – 4.9: Incidence of Leopard attack on livestock/ days in Buxa Tiger Reserve during 1995 to June 1997

| Tea Estate/ Human | Within | Year- Recorded No. of Incidence | | | | | <u> </u> | | | |
|---|---------|---------------------------------|----|----|----|----|----------|----|----|-------|
| Habitat at Forest Fringe | Complex | Forest at 2-3 Km. around | 90 | 91 | 92 | 93 | 95 | 96 | 97 | Total |
| Bhatkhawa T.E. | + | | 8 | 2 | 0 | 1 | 0 | 1 | 0 | 12 |
| Pampu Basti forest village | | + | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 2 |
| Garo Basti forest village | | + | 0 | 0 | 0 | 0 | 2 | 1 | 0 | 3 |
| Gangutia forest village | | + | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 7 |
| RTG forests village | + | + | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 |
| Pana forest village | | + | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 3 |
| Gudamdabri forest village | | + | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| STB/ 28 th – 29 th Mile FV. | | + | 0 | 0 | 2 | 0 | 3 | 7 | 0 | 12 |
| Jainti T.E. | + | | 0 | 0 | 0 | 0 | 20 | 0 | 27 | 47 |
| Turturi T.E. | + | | 0 | 0 | 0 | 0 | 0 | 4 | 0 | 4 |
| Kanjali Basti R.V. | + | + | 0 | 0 | 0 | 0 | 4 | 5 | 0 | 9 |
| Phaskhawa T.E. | + | | 0 | 0 | 0 | 0 | 20 | 32 | 0 | 52 |
| Rahimabad T.E. | + | | 0 | 0 | 0 | 0 | 0 | 8 | 0 | 8 |
| | Total: | | 9 | 2 | 3 | 1 | 51 | 67 | 29 | 162 |

Note: Data for 1994 not available.

(Source: Leopard study by WWF-India)

d) Study on management of Elephant populations in West Bengal for mitigating Man-Elephant conflicts:

This study was conducted by Wildlife Institute of India, Dehradun during 1994-97. This study included BTR also. The study included North Bengal and South Bengal elephant population.

In North Bengal the study included – historical accounts of elephant population, movement, utilization of habitat and corridors, food habits and nutritive values of elephant food, chemical immobilization and radio-collaring, evaluation of energized fences, man-elephant conflict and action plan for conservation and management of elephants.

Their observations relevant to BTR are as follows:-

• **Population Structure:** Herd consists of adult (>7'), Sub-adult juveniles (4'-5') and calves (<4'). Lone tusker is also reported. The sex ratios of adult male: adult female was found 1: 0.65 while for sub-adult male: female 1: 1.57. Increased female ratio in sub-adult segment might be due to females with sub-adult maknas. Population turnover rate was found 7.7% per year for the region.

The crude density of elephants is 1 elephant/10.7 Sq. Km.

Habitat use pattern:

Table – 4.10: Showing Habitat use pattern by Elephant.

| Dense mix forest | Dense Sal forest | Grassland | Open mix forest | Agricultur e area | Plantation s |
|------------------|---------------------|-----------|--------------------|----------------------|--------------|
| 47% | 2% | 10% | 15.1% | 24.7% | 2.2% |

Thus dense mixed and open mixed forests account for more than 62% of habitat use. (Table-4.10).

Food habits in different habitat types:

Elephants primarily fed on 12 plant species in the open mix forests. In these habitats *Acacia pinnata* and *Microstegium citiatum* contributed maximum to the diet of elephants. In grass land habitats over 50% of the bites were recorded. *Microstegium ciliatum, Tinospera, Laportia* and *Herdicium* species dominated the diet of elephants in these habitats. Study identifies the tract between Sankosh and Torsa River as a highly valuable elephant habitat.

• Man-animal conflict: As is seen, close to 60 percent incidents of Man-Elephant conflict occurs during paddy season. Maize is much less affected. (Tab-4.11).

Table – 4.11: Incidences of elephant conflicts (Property damage, human kill and injuries) in T.G.s during crop and non-crop seasons between 1994 and 1996.

| | No. of incidences | | | | |
|-------|---|-------------|--------------------|-------|--|
| Year | CROP S | EASONS | NON-CROP SEASON | | |
| | PADDY MAIZE (Aug – Jan) (Mar – June) | | (Feb and July) | TOTAL | |
| 1994 | 86 (60.1%) | 31 (21.6%) | 26 (18.1%) | 143 | |
| 1995 | 108 (61.7%) | 31 (17.7%) | 36 (20.5%) | 175 | |
| 1996 | 133 (51.9%) | 56 (21.8%) | 67 (26.1%) | 256 | |
| Total | 327 (56.9%) | 118 (20.5%) | 129 (22.4%) | 574 | |

(Source: W.I.I.'s elephant study in West Bengal)

e) Study on Control of illegal trade in Wildlife and Wildlife products:

This study was conducted under the West Bengal forestry project by Wildlife Protection Society of India (W.P.S.I.), New Delhi during 1996-97. This study covered B.T.R. Study aimed at compiling Wildlife offences in past, identifying extent and routes of illicit wildlife trade, etc. in North Bengal

A finding of the study relevant to BTR is emergence of North Bengal as a crucial trade route in Wildlife articles. Wildlife articles from Assam too pass through North Bengal. Proximity of such trade routes to BTR exposes it to great danger of poaching.

The study identifies Tiger skins and bones, Leopard skins, bones, Ivory, Rhino horn, Bear bile, Reptile skins, Clouded and snow Leopard skins, lesser cat skins, Deer skins, Turtle and tortoise, orchids and Medicinal plants as the major wildlife products that are traded. A total of 27 elephants have been poached during 1979-1997. 15 were poached in BTR (Table-4.12). Substantial seizures have also been done in BTR (Table-4.13).

Table – 4.12: Elephant poaching cases recorded in West Bengal and Their locations during 1979-1997

| Species | Location | District | Animals poached |
|---------------------|---------------------|-------------|-----------------|
| Elephant | Cooch Behar | Cooch Behar | 1 |
| | Darjeeling District | Darjeeling | 4 |
| | Jalpaiguri | Jalpaiguri | 1 |
| | Buxa Tiger Reserve | | 15 |
| | Other divisions | | 2 |
| | East Midnapore | Midnapore | 4 |
| Total Elepha | 27 | | |

Table – 4.13: Seizures of Elephant products in West Bengal during 1979 – 1997

| Species | Location | District | Item Seized | Quantity seized |
|----------|-----------------|-------------|------------------------|----------------------|
| Elephant | Calcutta | Calcutta | Ivory articles | 243 pcs. + 2.28 kgs. |
| | | | Ivory carving | 6 pcs. + 0.15 kgs |
| | | | Raw Ivory | 40.4 kgs. |
| | Cooch Behar | Cooch Behar | Raw Ivory | 9.45 kgs. |
| | Baikunthpur | Jalpaiguri | Raw Ivory | 6.1 kgs. |
| | Buxa Tiger | | Raw Ivory | 24.495 kgs. |
| | Reserve | | Bones (carved as tusk) | 6 pcs. |
| | | | Tusks | 2 pcs. |
| | | | Raw Ivory | 15 pcs. |
| | Other divisions | Murshidabad | Raw Ivory | 6.5 kgs. |
| | | | | |

The study recommended increased vigilance, proper training of staff, better information gathering and better interagency coordination to combat the menace.

f) Survey of Monitor Lizards in BTR:

Shri Brij Bhushan Sharma – a scientist of Jiwaji University, Gwalior (M.P.), carried out a survey of Monitor Lizards in Buxa Tiger Reserve (BTR) during August 1994 under MOEF project "Conservation status survey of Monitor Lizards in India". He has reported the presence of three species of Monitor Lizards in B.T.R. viz. – Bengal Monitor Lizard (Varanus bengalensis), Yellow Monitor Lizard (Varanus flavescens) and Water Monitor Lizard (Varanus salvator). Forest areas near rivers and wet lands in East Rajabhatkhawa, S.Rydak, Kumargram and Nimati Range have been indicated as potential areas for Monitor Lizards. Monitor Lizards are threatened. They are killed for skin. Yellow Monitor lizard, Bengal Monitor and Water Monitor lizard is included in Schedule I, of the Wildlife (Protection) Act, 1972.

g) Study of Ichthyofauna of BTR

Interestingly there were no records of Fish inhabiting forest of Buxa, though there were sporadic records available in general. In order to record the Ichthyofauna of BTR a survey was carried out by Himalayan Nature and Adventure Foundation wherein they have recorded 33 species of fishes along with 75 species of ornamental fishes. some of the important fishes found in BTR are barbs, minnows, Gourami, Glass fish, Perch, Needle fish, Knife fish, Puffer fish, Snake headed fish, cat fish, Pipe fish, Mullet, Eel, loaches Etc.

4.5.2 Monitoring:

Research and Monitoring are two interrelated works. Day to day monitoring of Wild animals is urgently needed for better management. At present following types of monitoring are done:

- i) Weekly (Saturday) monitoring of Tigers: This provides location and movement of tiger in different comptts. This is done on every Saturday as per field census unit through the collection of pugmarks. Weekly report in prescribed proforma is sent to Range Office from Beats and monthly consolidated report is sent to Deputy Field Director's office.
- **ii)** Day to day tracking of Elephant herds: This is also needed to know their movement and location in different comptts. This is being done regularly when staff goes out for patrolling. One animal monitoring book is maintained in every Beat where they record day to day reports. Report is transmitted through R.T. network. This enables advance planning against probable elephant depredation. Report is compiled monthly, too.
- **iii)** Monitoring of animals other than Tiger and Elephants: Monitoring of other animals is also done and recorded on animal monitoring book. This book is maintained in each Beat.

- **iv)** Monitoring health of Captive elephants: There are 9 captive elephants in BTR. These need monitoring related to health diet, prenatal care, weaning of calf, care of weaned calf, disease, etc. Veterinary Surgeon is responsible for it.
- v) Looking after of Rescue Centre: Animals rescued from different places are kept in rescue centre, Rajabhatkhawa and constant monitoring of rescued animals is done.

4.6. Relocation of Villages

It is essential to have a minimum inviolate area (forming the core of the Tiger Reserve) capable of supporting 20 breeding tigresses. On an average, a tigress requires 40-60 km² of territory for successful breeding. Pressure of human habitation is detrimental in sustaining high density breeding tiger populations. Settlements, therefore, need to be re-habilitated from the core area of a tiger Reserve. The relocation site should be so chosen so as not to compromise the conservation value of the Tiger Reserve i.e. it should be as far away from the core as possible and not located in connecting habitat corridors

In BTR, several villages have been proposed from relocation from the Critical Tiger Area:

- 1. 28th and 29th Mile Forest Village.
- 2. Santarabari Forest Village.
- 3. Jainti Fixed Demand Holders.
- 4. Bhutia Basti Forest Village.
- 5. Pampu Basti
- 6. Pana Forest Village.
- 7. Bhutri Forest Village.
- 8. Raimatang
- 9. Gangutia
- 10. Adma
- 11. Kumargram
- 12. Newlands
- 13. Chunabhati
- 14. Lepchakhawa(Tashigaon)
- 15. Buxaduar FD holding

The village relocation plan for BTR is described in detail in Chapter 7 of the core section of TCP.

4.7. Administration and Organization

4.7.1 Core / Buffer Area Description and Administrative Control:

The Core Area of Buxa Tiger Reserve consists of both Buxa National Park and Wildlife Sanctuary with the administrative control resting with the Field Director. The Reserve is administratively divided into East and West divisions; with the core spread over both of them. The buffer area consists of Reserve Forests. The administrative control of the buffer also lies with the Deputy Field Directors and the Field Director. The detail and breakup of the area is given below:

Table – 4.14: Arrear Statement of Core & Buffer in BTR

| S. No. | Zone | Status | Area in km² |
|-------------------|--------|--------------------|-------------|
| 1 | Core | National Park | 117.23 |
| | | Wildlife Sanctuary | 300.32 |
| | | Total Core Area | 417.55 |
| 2 | Buffer | Wildlife Sanctuary | 112.42 |
| | | RF/USF | 230.88 |
| | | Total Buffer area | 343.30 |
| Total Area of BTR | | | 760.85 |

The Administrative set up of the Buxa Tiger Reserve (BTR) is based on the erstwhile Buxa Division. This came under the control of Field Director, BTR on 27-04-92. From that date the post of DFO has been upgraded to the rank of Conservator of Forests. Field Director of the Reserve is assisted by two Deputy Field Directors in rank of D.C.F. The present administrative set up, staff strength, organization of division/circle into ranges, beats along with their jurisdiction is given in 13.4.1. Field Director is the overall in charge of the Tiger Reserve. He is assisted by two DFDs. Both the DFDs are drawing and disbursing officers. There are 13 territorial Ranges and 47 territorial Beats.

- **4.8. Communication:** The accessibility of Buxa Tiger Reserve is adequate but during rainy season few areas become inaccessible. The existing communication system is through wireless network, roads, elephants and vehicles.
- **4.8.1. Wireless Network:** Wireless network form the backbone of communication in the Reserve. Presently, there is a control room named Tiger Control that is common for both East and West Division. Control is open at one hourly interval throughout the day. Apart from these individual Ranges, patrolling vehicles are also fitted with RT Sets. There are 34 fixed stations, 78 walkie talkie sets in BTR.

4.8.2. Vehicles:

The vehicle status of BTR is currently as given in the following table:-

| No. of Patrolling Vehicles (Scorpio) | 2 no. |
|--------------------------------------|--------|
| No. of Patrolling Vehicles (Gypsy) | 5 nos. |
| No. of Patrolling Vehicles (Jeep) | l no. |
| No. of Mobile Van | 3 nos. |
| No. of truck (medium size) | 2 nos |
| No. of Motor Cycle | 25 nos |
| No. of boat (Country made) | 4 nos. |
| Inflatable Rubber Dinghi | 2 nos. |
| Mechanised speed boat | 1 no. |

Still there is shortage of vehicle. Hired vehicle is used for Management and Other purposes whenever necessary.

4.8.3. Telephones:

Some problematic and distant Ranges have telephone facility viz. Buxaduar, Jainti, Pana, South Rydak, Kumargram, Kamakhyaguri and Bholka Ranges. Currently mobile phone network is also well spread out.

4.8.4. Road networks:

The whole area of BTR is furnished with network of roads. Most of them are fair weather roads. At every mile both east-west as well as north-south roads/ fire lines are there. List of roads is furnished in annexure-

4.8.5. Departmental Elephants:

Departmental elephants also act as an effective means of communication especially during rainy season. During rainy season elephants are the only means of communication in few areas. Presently there are 9 departmental elephants the details of which are given in **Annexure 12**

PART A: THE EXISTING SITUATION

CHAPTER 5: LAND USE PATTERNS & CLASSIFICATION, MANAGEMENT ISSUES

5.1 Land Use Classification

The project area falls in eastern part of Indo-Gangetic plain is formed by the basin of river systems - the Ganga and the Brahmaputra. The Plains extend up to Brahmaputra valley in the East. Major Part of West Bengal falls in the region these plains comprise one of the world's greatest stretches of flat and deep alluvium. The forest tract of BTR lies in the bioGeographic zones of Central Himalayas, lower Gangetic plains and Brahmaputra valley.

The details of land use classification are discussed in para5.1.2 of chapter 5 of Buffer

a. Socio Economic profile of Villages

No village is located in core as per the latest notification. The details of socio economic profile of villages that are lying adjacent to core has been discussed in detail chapter 5 of Buffer

b. Resource dependence of villages

As Buxa National Park and Buxa Wildlife sanctury forms the core of the Tiger Reserve and as per the Honble Apex court collection of NTFP and other resources is not allowed in the core. The dependency of people on areas adjoining tiger reserve is mainly for firewood, NTFP, Boulder, grazing and employment. Firewood extraction and NWFP collection is allowed only in buffer.

Grazing-Lakhs of cattle are reared in forest villages, Revenue villages lying adjacent to Tiger Reserve. In tea gardens also thousands of cattle are reared by tea garden residents though it is illegal. All these cattle are let loose in forests to graze because of absence of pasture lands and stall feeding. These cattle compete with herbivores and other animals in the tiger reserve for food.

Employment-In 1940s forest villagers were settled in forest villages mainly to supply labor force to timber operations, plantation and tending operations. Since the declaration of Tiger Reserve such operations have been stopped owing to which these villagers face huge employment problems. Some migrate to other parts of country whereas most of the labor is dependent of forestry operations generated man days for employment. At present employment is generated through forestry schemes, boulder collection and MGNREGS though it doesn't sufficiently fulfill the demand.

c. Human Wildlife Conflicts

Thus human wildlife conflict has been described in detail in chapter 4 of core and chapter 5 of Buffer along with statistics.

d. Assessment of Inputs by line Agencies/other Departments

This part has been dealt in detail in chapter 5 of buffer part

PART B: THE PROPOSED MANAGEMENT

CHAPTER 6: VISIONS, GOALS, OBJECTIVES AND PROBLEMS

6.1 Vision: BTR core has extremely rich biodiversity and can provide ideal breeding ground for Tigers and other co predators for long term sustainable conservation.

6.2 Management Goals:-

- To maintain the unique habitat and bio-diversity of the area.
- > To maintain the source population of tiger and healthy population of other copredators.

6.3 Management Objectives:-

The Management objectives of a Tiger Conservation Plan for core are follows: -

- 3.1 Recent estimation of Tigers in BTR have established the presence of 15 to 20 Tigers, the objective is to endeavor to attain the maximum carrying capacity of the Tiger Reserve area which has the potential for 30-35 tigers.
- (i) To ensure ecologically compatible land use in the buffer and adjoining areas of core so as to provide dispersal habitats and corridor for spillover population of wild animals especially tigers.
- (ii) To maintain and improve the existing grasslands to provide better habitats for smaller herbivores and in turn increase the prey base.
- (iii) To reduce the man- animal conflict by relocating some villages which are existing as enclaves within core and thereby reduce the biotic interference in the tiger reserve.
- (iv) To increase the density prey base of tiger and co predators by augmenting the prey by way of release, captive breeding and protecting the existing stock.
- (v) To improve the water availability during pinch period especially in the Bhabar tract part of core by creating water holes and water retention structures.
- (vi) To reduce the grazing pressure on core area by providing alternate opportunities to fringe population.
- (vii) To ensure intactness and undisturbed protection to core

6.4 Problems in Achieving Objectives:-

- Lack of proper back ground information on habitat utilization by tigers in the area due to lack of proper study
- Lack of data on tiger, co-predator and prey distribution both in terms of time and space
- Lack of political will in shifting the human population and cattle from the core area.
- Lack of young, energetic workforce
- Huge vacancies at all field level staff
- Excessive dependence of fringe area people on the forest resources.

6.5 Strengths – Weaknesses – Opportunities – Limitations (SWOT) Analysis:-Strengths:

- i. A good and only compact patch of forests of the region
- ii. A good landscape situation with Jaldapara, Bhutan and Manas/Assam close by.
- iii. Enormously rich bio-diversity
- iv. Variety of forest types that can cater to all sorts of wildlife
- v. Well demarcated administrative system
- vi. Presence and access of forest personnel to almost all corners of the Reserve

Weakness:

- i. Huge number of vacancies for all level of field staff for execution of works and monitoring
- ii. Competition for food and water between wild animals and domestic cattle.
- **iii.** Lack of detailed scientific study about habitat utilization and spatial distribution of tiger, co-predator and prey
- iv. Lack of young, energetic workforce
- v. Existing staff not properly trained, equipped and motivated due to various reasons
- vi. Absence of political will and democratization of procedures in removal of human settlements from inside the critical tiger habitat.
- vii. Inadequate camping facilities and watch towers for protection and monitoring
- viii. Lack of proper infrastructure like road conditions, patrolling Elephants etc
- ix. Lack of technical support like E-patrolling, GIS and Research cell
- x. Lack of effective intelligence network
- xi. Presence of several and active NGOs in the area to provide necessary support to the forest department in various conservation activities

Opportunities:

- i. Undisputed presence of Forest Department and control all over the area.
- ii. Well built in system of Joint Forestry Management in place
- iii. Satisfactory and timely release of budgetary support from State and Central Government.
- iv. Presence of paramilitary forces in the strategic Indo-Bhutan International border area which can be sensitized/trained properly specially for wildlife crime prevention in the area
- v. Healthy co-ordination among other line departments like Police and Civil Administration.
- vi. Strengthening & consolidating veterinary care unit
- vii. Creation of Sniffer dog/ Canine unit as effective antipoaching tools

Limitations/ Threats:

- i. Excess biotic interference in the form of human habitation, small timber collection, firewood collection, cattle grazing.
- ii. Pressure of illicit felling of timber from tea gardens and villages because of huge unemployed youth.
- i. Geological disturbance damaging habitat over which forest department has no control
- iii. Political instability/ turmoil at the local level
- iv. Destruction/degradation/shrinkage of habitat through illicit felling of timber and cattle grazing requiring complete shifting of forest villages from core area
- vi. Occasional poaching of small animals for meat/hunting
- vii. Porous interstate and international boundary making it vulnerable to poaching
- viii. Presence of Tea Estates all around the boundary. Industry becomes sick day-by-dayfollowed by biotic pressure of excess unemployed labour on the reserve.

PART B: THE PROPOSED MANAGEMENT

CHAPTER 7: MANAGEMENT STRATEGIES

7.1 Delineation of Critical Wildlife Habitats and Inviolate Areas

A total of 390. 58 km² area of Buxa National Park and Buxa WLS was proposed as Core Area or Critical Tiger Habitat of Buxa Tiger Reserve vide Govt. of West Bengal Forest Department's Notification no. 3051-For/11 M-28/07 dated Kolkata the 6th August 2009.

A total of 417.55 km² area of Buxa National Park and Buxa WLS was proposed as Core Area or Critical Tiger Habitat of Buxa Tiger Reserve by the Expert Committee constituted vide Order No. 4-M/8-2015, dated 27-04-2015 by Principal Chief Conservator of Forests, Wildlife & Chief Wildlife Warden, West Bengal.

7.2. Zone and theme approaches to management strategies:

The "zone" and "theme" approaches have been adopted in the proposed management strategies of BTR. 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 core can be recognized 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:

A zone is an area of specific management category distinguishable on account of its objectives. Zonation is required to achieve the different objectives of management. Zones should be clearly demarcated. Buxa Tiger Reserve (760.86 km²) consists of National Park (117.10 km².), Sanctuary (273.47 km².) and other Forests (R.F., P.F. and U.S.F-367.32 km²). The National Park and the Wildlife Sanctuary form the Core zone or Critical tiger habitat while the R.F., P.F. and USF form the buffer zone of the BTR. People living in Forest Villages, F. D. Holdings within BTR and the members of JFMCs depend on the Reserve for grazing of their cattle and collection of firewood, NWFP and small timber. Some sanctum sanctorum is absolutely necessary for the wilderness to flourish. BTR attracts many tourists and picnickers. Some religious places in BTR also draw lots of devotees. The conservation/management Plan has to cater to all such visitors. Considering all these factors, the entire core area of the BTR is divided into the following management zones.

| Management Zone | Area (Sq. Km.) | <u>Legal Status</u> |
|------------------------------|----------------|--------------------------|
| I. Habitat Management Zone | 417.55 | National Park, Sanctuary |
| Grassland/Meadows | | |
| Wetlands/Waterbodies | | |
| Wilderness areas | | |
| Special Habitats | | |
| II. Ecotourism Zone | 83.44 | National Park, Sanctuary |
| III. Village relocation Zone | 6.5 (approx) | |

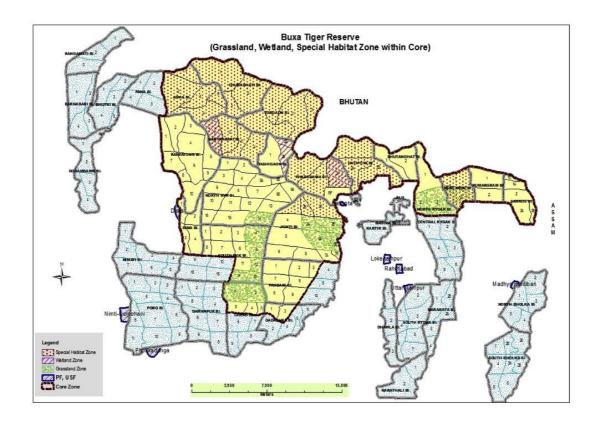
IV. Erosion / Landslide prone Zone 25.5 km stretch of rivers and 50 ha hills/year

7.2.1.1 Habitat Management / Improvement Zone:

A total core area of 417.55 km² is included under the Habitat Management zone, which is further classified into existing Grasslands, Wetlands, Wilderness areas and Special Habitats. The Ecotourism zone and Village Relocation zone within the Management zone is considered separately. Habitat improvement works in the Reserve will be based on following considerations:-

- *i)* Preserving and Protecting the diversity and interspersion of habitat.
- *ii)* Protecting the habitat against factors causing degradation.
- iii) Making habitat conditions suitable for target species.
- *iv)* Restoring the natural grasslands which existed earlier
- v) Providing water to wildlife in pinch period especially in Babhhar tract area of Jainti, Raimatang, Hatipota, Santarabari etc.

Map 14: Showing of Grassland, Wetland, Special Habitat Zone within Core Area



7.2.1.1.1 Wilderness Zone:

The Wilderness zone constitutes all the areas of management zone including the Ecotourism zone and Village relocation zone. The Main objective of constituting this zone is to preserve constituent forests in as near natural conditions as possible by providing complete protection against all the forms of biotic interference and maintaining natural course of ecological succession. Entire National Park area has been brought under this zone.

General constitution:

All the blocks and compartments falling within the Buxa National Park and some parts of Buxa Wildlife Sanctuary are included in this Zone. These areas extend over Jainti, East Rajabhatkhawa, West Rajabhatkhawa, Buxaduar, North Rydak and Kumargram Ranges. Block/ Compartment-wise constitution of the Wilderness zone is given in Table-7.1.

Table 7.1-Wilderness Zone

| Sl No. | Block-Compartment | Area (Ha) | Legal Status |
|--------|---|-----------|--------------|
| 1. | Tashigaon (1, 2) | 1,255 | NP |
| 2. | North Rajabhatkhawa (1-16) | 5304.63 | NP+RF |
| 3. | South Rajabhatkhawa (1,2,3, 4, 5, 6,7,8,11,12,13) | 3,051 | NP |
| 4. | South Rajabhatkhawa (14) | 235 | WLS |
| 5. | Jainti (1-9) | 4,021 | NP |
| 6. | Panbari (1-3, 6-9) | 2,066 | NP |
| 7. | Checko (1) | 395 | WLS |
| 8. | Checko (2) | 392 | NP |
| 9. | Checko (3,4,5) | 639 | RF |
| 10. | Chunabhati [1, 2, 3] | 2,002 | WLS |
| 11. | Tobgaon (1-4) | 3,136 | WLS |
| 12. | Phaskhawa [1, 2,3] | 2,487 | WLS+RF |
| 13. | Hatipota [1,2] | 1,415 | WLS+RF |
| 14. | Bhutanghat (1, 2) | 1,031 | WLS |
| 15. | Adma [1,2,3,4,5] | 2,507 | WLS |
| 16. | Santrabari [1, 2a, 2b,3, 4] | 2,300 | WLS |
| 17. | North Rydak (1,2,3) | 1538 | WLS |
| 18. | Newlands (1, 2a,2b) | 846 | WLS |
| 19. | Kumargram [1,2] | 1,051 | WLS+RF |
| 20. | Sankosh [1,2,3] | 1,105 | WLS |
| 21. | Dima (1,2,3,4) | 1,027 | RF |
| 22. | Gadadhar 1,3 | 448 | RF |
| 23. | Raimatang (1,2,3,4,5,6,7,8,9,10) | 3,504 | RF |
| 24. | Total | 41,755 | |

Objectives of management:

- (a) To preserve the entire zone in as near natural condition
- **(b)** To maintain natural courses of ecological succession and dynamics within the zone.

Strategies to be followed in this Zone:

- I. Natural forests in this zone shall be strictly preserved and protected.
- II. Only limited use for scientific and research purpose shall be allowed with permission of CWLW.
- III. Improvement and protection works shall be carried out for the purpose of:
 - (a) Maintenance of roads and fire lines
 - (b) maintenance of Natural and existing artificial waterholes
 - (c) Soil- moisture conservation works for improvement and protection of habitat.
 - (d) Maintenance of staff infrastructure
- IV. Grazing and fire shall be strictly prohibited in this zone.
- V. Restricted vehicular movement except for protection duties shall be permitted in this zone.
- VI. No collection of NTFP will be permitted in this zone.

About 36.54 Sq Km of forests presently included under the fringe of Sanctuary in Narathali, Marakata, Rangamati and Bharnabari comprises of highly degraded areas with virtually, no wildlife values. These areas can be developed and protected for increasing their habitable value for wildlife by planting palatable and native species in the interest of wildlife. During the plan period 200ha may be taken up for plantations of grass species on annual basis. Soil conservation division and Siliviculture division may also be given responsibility of rising plantations of grass species in these areas.

7.2.1.1.2 Grasslands / meadowsmanagement zone:

The maintenance of Grasslands and meadows is mainly applicable in Habitat Management zone but wherever grasslands exist, those should be preserved and maintained.

There exist remnants of natural grasslands in N.Rydak-2, 3 and C. Rydak-2, 3 compartments (Table-7.2). Grasslands also exist in patches along river banks of Bala, Dima, Jainti and Basra rivers. Small meadows exist in the hill areas. The grassland mainly consists of *Saccharam spp., Imperata cylindrica and Desmostachea bipinata*. They should be preserved by cultural operations every year so that they are not converted to woodlands.

| Table -7.2. Location and Extent of Grassianus in BTR | | | | |
|--|-------------|---------------------|--------------|--|
| Range | Beat | Compartment | Area (ha) | |
| N. Rydak | Mainabari | N. Rydak-2, 3 | 300. | |
| Jainti | N Jainti | NRVK 14 | 100 | |
| Hatipota | Chuniajhora | JNT 3A, 3B, 6A, 6B | 300 | |
| Kumargram | Newlands | NLS2 | 100 | |
| WRVK | SRVK | SRVK4,5,12,13 | 500 | |
| EDPO | SRVK | SRVK 14, Checko 1,2 | 400 | |
| | | | | |
| | | Total | 1700 | |

Table -7.2: Location and Extent of Grasslands in RTR

Following strategies are proposed to maintain these grasslands:

- (i) Woody encroachments should be removed as and when detected.
- (ii) Fruit trees (especially Zizyphus and Ficus) should be retained and care should be taken so that the trees retained should not encroach the grassland and maintained accordingly.
- (iii) The grassland should be protected against grazing and deliberate fire, controlled burning should be carried out periodically.
- (iv) Monitoring of the area will be done regularly.

Buxa Tiger Reserve (Grassland Zone within Core Area)

Legend

CHURGHAIT BI

CHURGHAIT

Map 15: Grassland Zone within Core Area

ExistingGlades and Saltlicks in BTR

The maintenanceof **Glades and Saltlicks** is applicable to Habitat Management and Eco-Tourism Zones. No new glades and saltlicks are proposed. The existing glades and salt licks are given in Table-7.3.

| | | Glades (ha) | | Salt lick |
|--------|----------|-------------|---------------|-----------|
| Range | Location | No. | Area (Ha.) | No. |
| Jainti | NRVK-13 | 4 | 7.00 | 4 |
| | NRVK-5a | 1 | 2.50 | |
| | TSNG-1 | 3 | 17.00 | 2 |
| | TSNG-2 | 1 | 4.5 | 1 |
| | JNT-7A | 1 | 5.0 | 1 |
| | JNT-8 | 1 | 8 | 1 |

Table 7.3: Location of Glades and Salt licks in BTR

| WRVK | SRVK-5 | 1 | 4.00 | |
|---------|-----------|---|------|----|
| | Panbari-1 | | | 1 |
| N.Rydak | NRD-1 | | | 1 |
| Total | | 7 | 48 | 11 |

Strategies for maintenance of glades and saltlicks:

Weeding of unwanted weeds (*Lantana, Michenia, Eupatorium*, etc.) should be carried out twice a year in all glades. Woody encroachments should be cut back regularly. Planting of indigenous fodder grasses (Dhadda, Malsa, Chepti, Banspati, Purundi, etc.) should be done in blank patches. The glades in disuse must be maintained henceforth. A big natural saltlick exists at Khurul (Bhutan) near Newlands. All precautions should be taken to ensure free approach of wild animals to this saltlick. Earthen mounds may be created as per requirement.

7.2.1.1.3 Existing and Natural wetlands zone:-

This operation is applicable to all the Management Zones.

1) Maintenance of Existing Waterholes:

A vast area of B.T.R. lies in the Bhabar tract. During winter and summer (December to May) there is acute shortage of water in the National Park and the Sanctuary areas, particularly north of the 23rd mile. So the existing artificial water holes must be maintained as suggested below:

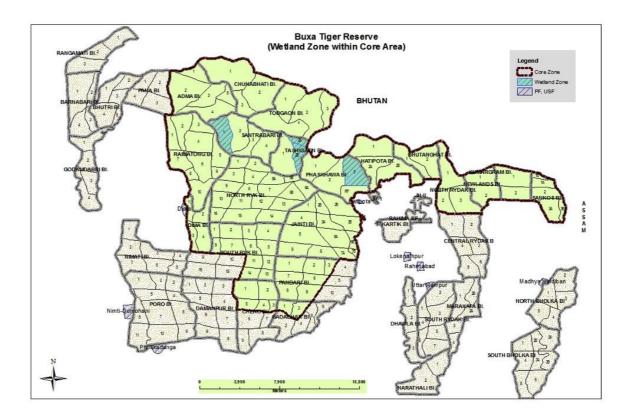
- a) Entire water should be pumped out before the onset of rains (May-June) every year and de-silted manually. These should then be left to be filled by rain water.
- b) All cracks should be repaired from time to time.
- c) To maintain the hygiene and ecological balance of waterholes, a few endemic spp of Turtles and Fishes may be introduced.
- d) Domestic livestock should not be permitted to use these waterholes.
- e) Few new water holes are planned in the plan period. A review of existing water holes may be carried out and those found unnecessary or posing threat of safety of wild animal may be discarded and filled up.

2) Maintenance of Natural wetlands:

The Natural waterholes at Narathali-2, Tashigaon-2, and Phaskhawa-3 and Santrabari-1 blocks will be maintained and protected. Tashigaon, Phaskhawa and Santarabari ponds are located in hilly tracts and provide water to wild animals throughout the year. These ponds also harbour turtles and tortoise, which need protection particularly during the breeding season. The wetland at Narathali is important for water birds and other aquatic fauna and it should be maintained as follows:

- i) A portion (50% of total length) of Narathali beel should be cleaned every year through manual removal of Pistia and water hyacinth during Oct. Nov.
- *ii)* Plantations around wetlands should be avoided and natural succession allowed to take place which may be arrested at the grassland stage itself to cater to a better prey population.

iii) Adequate protection against direct (hunting, fishing, unauthorised cattle grazing) and indirect influences (contamination and pollution of water) should be ensured.



Map 16: Wetland Zone within Core area

7.2.1.1.4Maintenance of Special habitats like Snags, dens, down woods, old growths and unique habitats like caves, overhangs, etc.

This strategy is applicable to all the Management Zones. A number of special micro habitats exist within BTR which need to be identified, surveyed and mapped. The following guidelines are being proposed for such habitats:-

- All the existing snags, dens, etc should be protected
- Clouded Leopard habitat at foot hills.
- All uprooted trees etc in core not be removed except for road and communication clearance.

The following compartments have been identified as special habitats owing to its above characteristics.

| Tabgaon 1, 2, 3, 4 $Jainti - 1, 2A$, | 2B |
|---|--------|
| Chunabhati $-1, 2, 3$ Newlands $-1,$ | 2a, 2b |
| Santarabari – 1, 2a, 2b, 3, 4 Hatipota – 1, 2 | |
| Phaskhawa – 1, 2, 3 Adma – 1, 2, 3 | , 4, 5 |

Buxa Tiger Reserve (Wilderness Area and Special Habitat Zone)

| Continue of the Continue of t

Map 17: Wilderness area and Special Habitat Zone within core area

7.2.1.2 Eco Tourism Zone:

This Zone comprises Jainti and parts of Buxaduar, SRD, and NRD which are in core and are included within 20% permissible tourism zone within core. Important religious tourist destinations like Jainti Pokri and approach route to Mahakal Temple exist here. Large number of pilgrims visits Mahakal temple during Mahashivratri. Similarly Jainti Pokri is important religious site for Budhist. Since these are religious activities these sites are included in tourism zone.

Constitution of tourism zone –the tourism zone in core comprises areas of Bhutanghat, Narathali, Santarabari, Jainti, Tashigaon and NRVK compartments.

Table 7.4: Constitution of Tourism Zone

| Sl. No | Block and Compartment | Area(ha) | Legal status |
|--------|-----------------------|----------|-----------------|
| 2 | Santarabari 3 | 423.71 | WLS |
| 4 | Santarabari 2a | 644.27 | NP |
| 5 | Santarabari 2b | 125.05 | WLS |
| 7 | Phashkawa 1 | 667.34 | NP |
| 8 | Tashigaon 1 | 804.74 | WLS |
| 11 | Jainti 1 | 250.29 | NP |

| Sl. No | Block and Compartment | Area(ha) | Legal status |
|--------|-----------------------|----------|--------------|
| 12 | Jainti 2a | 222.35 | NP |
| 13 | Jainti 2b | 322.79 | NP |
| 14 | Jainti 3a | 268.11 | NP |
| 15 | Jainti 4 | 386.79 | NP |
| 16 | NRVK 14 | 368.96 | NP |
| 17 | NRVK 12 | 278.64 | NP |
| 18 | NRVK 13 | 218.7 | NP |
| 19 | NRVK6a | 315.52 | NP |
| 20 | NRVK 6b | 40.46 | NP |
| 21 | NRVK 7 | 359.24 | NP |
| 22 | NRVK 5a | 424.85 | NP |
| 23 | NRVK 10 | 326.59 | RF |
| 24 | NRVK 16 | 242.42 | RF |
| 25 | NRVK 8 | 193.85 | RF |
| 26 | NRVK 11 | 382.44 | RF |
| 27 | SRVK 1 | 197.90 | RF |
| 28 | SRVK 2 | 333.07 | RF |
| 29 | SRVK 8 | 176.45 | RF |
| 30 | NRVK 9 | 370.3 | RF |
| | Total | 8344.83 | |

Details of tourism plan are discussed in Chapter 11.

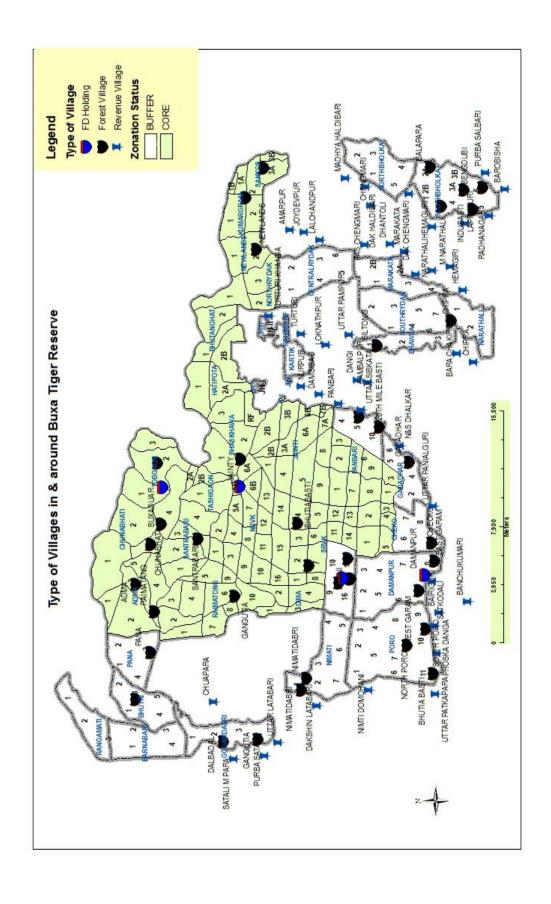
7.2.1.3 Village Relocation zone

Relocation of villages out of core of BTR:

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.

BTR has several villages lying adjacent to the core or are islands within the core. Relocating such villages from Core, though they are notified as buffer, will aid in completely removing any kind of disturbance in core and will provide inviolate space for tiger and wild life. The relocation proposals will be taken up only after settlement of Rights under Forest Rights Act is completely settled. After due consultation with the villagers and upon their willingness, the following villages have been identified for relocation from core critical tiger habitat neighbourhood.

Map 18: Village to be relocated from Core Zone



Villages and FD holdings in Core Zone of BTR proposed for relocation

| S/L No. | Village Name | Total No. of family * |
|---------|-----------------------|--------------------------|
| 1 | Pampu Basti | 41 |
| 3 | Raimatang | 81 |
| 4 | Gangutia | 68 |
| 5 | Adma | 64 |
| 6 | 28 th Mile | 51 |
| 7 | 29 th Mile | 25 |
| 8 | Sankosh | 98 |
| 9 | Kumargram | 56 |
| 10 | Newlands | 40 |
| 11 | Chunabhati | 70 |
| 13 | Lepchakhawa | 86 |
| | (Tashigaon) | 80 |
| 12 | Santrabari | 96 |
| 13 | BhutiaBasti | 72 |
| 14 | JAINTY FD Holding | 92 |
| 15 | BUXADUAR FD Holding | 79 |

7.2.1.4 Erosion / Landslide prone zone

Soil and moisture conservation and water management plan:-

This strategy is applicable to all the management Zones. Bank erosion of numerous rivers and streams is a major problem in Buxa Tiger Reserve (Table-7.5). This causes huge damage to the habitat. This also leads to erosion of forestlands, uprooting of big trees and damage to plantations.

Strategies to overcome bank erosion and landslide problems:

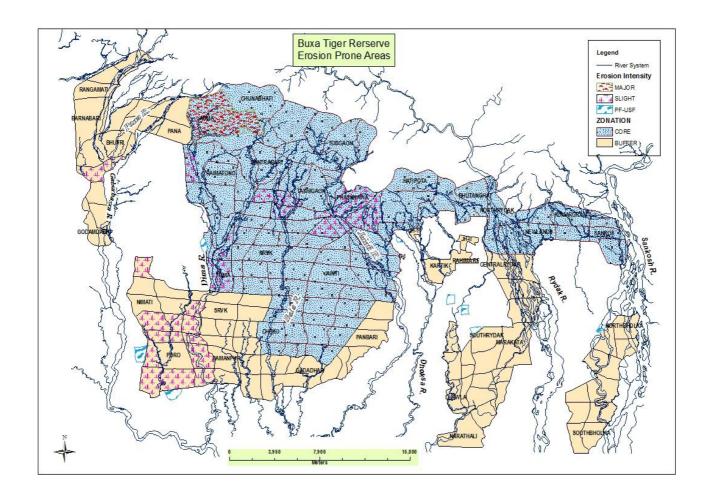
It should be noted that occasional shifting of rivers/ streams courses is a natural phenomenon. This can't be completely stopped. But some temporary measures for bank protection in the forest through sausage walls and spurs may be undertaken to protect forest villages, roads and forest establishments. Shifting of establishment may be more economical in some cases than the river protection measures.

Table-7.5: Affected areas and proposed soil conservation sites in BTR.

| | ne of River/ | Affected Block and Compartments | Affected Length (Km.) | Proposed Soil conservation Sites |
|----|--------------|------------------------------------|-----------------------------|--|
| 1. | Hatinala | SNK- 2, 3 ; KG-2 | 3 Km. | ½ Km. in KG-2 near KG F.V. 1 Km. in SNK-3 near SNK F.V. |
| 2. | Khurul | KG – 1, 2; NLS – 2 | 3 Km. | • 1 Km. in NLS-2 near NLS F.V. |
| 3. | Kalikhola | KG-1 ; SNK-1 | 2 Km. | • ½ Km. in KG-1 near KG F.V. |
| 4. | Rydak | NLS – 2; NLS – USF, NR – 3 | 5 Km. | 1 Km. in NR-1 near BGT FRA2 Km. in NLS-2 and NR-3 |

| | ne of River/ | Affected Block and Compartments | Affected Length (Km.) | Proposed Soil conservation Sites |
|----|--------------|------------------------------------|-----------------------------|---|
| 6. | Buxajhora | NRVK-2,4 ;STB-4 | 3 Km. | • 1.5 Km. in between 28 th and 30 th mile |
| 7. | Jainti | NRVK – 5, 6 ; JNT- 2,3,6 | 5 Km. | Near Jainti location (some work already done) |
| 8. | Dumrijhora | JNT – 7 | 1 Km. | • 1 Km. near 23 rd mile Beat Office |
| | 7 | Total: | 22.0 Km | |

Map 19: Erosion Prone Area within core area



a) Bank protection and river training works:

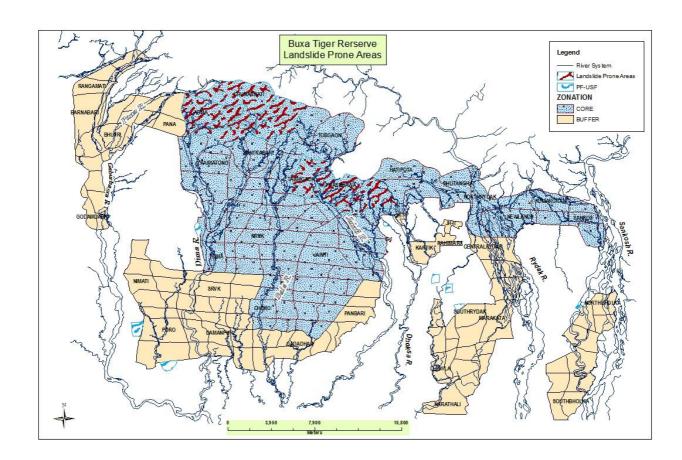
Bank protection and river training works will be undertaken in consultation with the Irrigation Dept. and Soil Conservation (North) Division.

b) Stabilization of landslips/landslides:

Landslip/ Landslide stabilization works should be taken up in consultation with Soil Conservation wing of the Directorate. Such works are needed in hill areas of Adma 1, 2, 3, 4, 5; Chunabhati 1, 2, 3; Tobgaon 1, 2, 3, 4; Tashigaon 1, 2 and Phaskhawa 1, 2, 3 compartments. In all, 50 ha of affected areas are proposed to be treated during the plan period using the following strategies.

- *i)* Construction of pallisheds/ check dam/ retention walls/ check water drains and other engineering structures where necessary.
- *ii)* Raising plantations with the help of good imported top soil from adjoining forests.
- iii) Selection of good soil binder species such as Vitex sp., Moringa sp., Amlisho (*Thysanolaena maxima*), Callicarpa sp., Bamboo, etc.
- *iv)* Application of F.Y.M. in pits. This shall enhance moisture retentivity of root zone.
- v) Close planting (1m. x 1m.), so that the Canopy closes within 3 years.
- vi) Protection of treated area against fire and grazing for at least 5 years.

Map 20: Laldslide Prone Area within core area



• Removal of Boulder and Bed materials from River beds for habitat protection:

Boulders and bed materials from the river beds will be extracted as per existing rules and orders will be issued time to time, for habitat protection.

7.2.2. Theme plans:

- Tiger translocation theme
- Mitigating theme
- Protection theme
 - Fire
 - ➤ Illicit felling and collection of Firewood and NWFP, etc
 - Grazing
 - > Encroachment
 - > Antipoaching

7.2.2.1 Tiger Translocation theme: -

Considering the fact that BTR has been assessed to be performing below its ecological potential as per the recent all India tiger estimation using the refined methodology (2005-08), the NTCA had taken up the issue of addressing the population status of tiger and its prey in the BTR in June 2008. Since then the status of tigers and their habitat has not improved in the Reserve owing to several decimating factors which *inter alia*, include, poaching, anthropogenic pressures, and habitat and prey depletion. Hence, to prevent total depletion of tigers in the tiger Reserve owing to such causative factors, an active managerial intervention for in-situ build up of tiger and its prey populations was advised to the CWLW, West Bengal vide letter no. PS-MS (NTCA)/2008-Miscle dated 27th May 2009 by NTCA.

Suggestions by NTCA

- i. A founder population of two adult tigresses and a tiger should be translocated from the same habitat or from a tiger bearing forest within the same landscape, into a large enclosure (more than 50 ha. For each tigresses) built in-situ within the tiger reserve.
- ii. The enclosures for the tigresses would form part of a larger enclosure (more than 200 ha.) housing the male, with facility for the tigresses to interact separately with the tiger for courtship.
- iii. The in-situ enclosures would contain natural prey animals (supplemented with food provisioning if necessary)
- iv. The tigress would be allowed to breed within their enclosures.
- v. The mother and cubs would be released back in the wild with radio collars, once the cubs attain two years of age.
- vi. Depending on the population status after release, the entire operation may be repeated with a new set of tiger/tigresses
- vii. As far as possible, tiger/tigeresses should be from the same tiger reserve. However, in case if this is not possible owing to small numbers, then the animals should be brought from the landscape complex or areas having similar genetic structure.

viii. Attempt should also be made to radio collar and monitor as many tigers/tigresses as possible (apart from those released from the in-situ enclosure), for ensuring protection.

This intensive, active management is aimed to allow tiger population to build up in the tiger reserve, and protect it from poaching and other decimating factors. In the Buxa Tiger Reserve, the tiger density and numbers are so low that the removal and subsequent release of wild tigers is unlikely to result in any land tenure disputes. The above practice of building up the tiger population by offering protection to the most vulnerable stage of their life cycle should be stopped once tiger density in the reserve reaches the minimum for the habitat type.

Simultaneously, enclosures for breeding and releasing prey species (Chital and Sambar) should also be built in the tiger reserve. Once the population of such ungulates within the enclosure has increased, batches of >20 ungulates should be released back into the wild. Some of these animals may also be released within the tiger enclosures, so that the tigers subsist mostly on natural prey, and the cubs are taught to hunt by their mothers.

Proposed locations for soft release of Tigers

- 25th mile of SRVK 3,6,11 compartments
- NRVK 12,13 compartments

Proposed Typer

Wilder Excitions

Road

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Proposed Typer

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Map 21: Tiger translocation zone within core area

7.2.2.2 Mitigating human-wildlife conflicts theme:

Wild animal depredation is one of the problems in the fringe villages, tea gardens and forest villages of Buxa Tiger Reserve. Depredation is mainly caused by Wildelephant, leopard, wild boars, monkey and gaur.

To reduce man-animal conflicts the following strategies are proposed. These strategies are applicable to all the management Zones of BTR.

1) Erection of multi strand energized fencing at strategic points (around forest village and in the periphery adjacent to revenue village and tea garden):

Regular maintenance of energized fencing must be done by the local EDC/ FPC members, by cleaning 1.00 mt wide strips, by replacing damaged posts, by repairing damaged line, by regular checking of voltage and by timely checking of energizer and batteries. They should be trained by the Forest Dep't.

2) Formation of trained anti-depredation voluntary squad in Tea garden and villages:

The number of elephants in North Bengal is on increase and the recent census in 2010 has shown presence of more than 500 elephants in North Bengal and of which 215 elephants are present in Buxa Tiger Reserve alone which is highest for any forests in North Bengal. Because of this and several other reasons the problems related to elephant depredation is increasing and there is need for a well trained and equipped elephant Squad to monitor elephant movements and manage cases of depredation.

The forest landscape of Buxa and adjoining areas is highly fragmented and elephants keep moving from one forest area to another as these are their natural corridors. The growth of habitations on these corridors coupled with intensification of agriculture has led to increase in elephant-human interface leading to damages to crop and property, injuries and in some cases human deaths.

There are 37 Forest villages inside the Buxa Tiger Reserve forests and also there are 45 Revenue villages and 34 Tea Gardens surrounding Buxa Tiger Reserve. These habitations have huge human population and large patches agricultural fields. Elephants stray into these places during their natural movement and also being attracted to agricultural crops. There is very few staff in Ranges and Beats and it becomes very difficult for the staff to effectively manage elephant depredation. The presence of a separate Wild Life Squad will be very useful in managing cases of elephant depredation and save loss of crops, property and human life. Following is the list of damage to human life and crops in last five years.

| | Persons killed by elephants | | | Crop loss | Compensation |
|---------|-----------------------------|--------|-------|-----------|------------------------|
| Year | BTR(E) | BTR(W) | Total | (in Ha) | paid (Rs. In Lakhs) |
| 2007-08 | 3 | 5 | 8 | 3843.00 | 17.00 |
| 2008-09 | 5 | 9 | 14 | 467.27 | 19.15 |
| 2009-10 | 3 | 4 | 7 | 353.00 | 21.72 |
| | | | | | |

| Year | Persons killed by elephants | | | Crop loss (in Ha) | Compensation paid (Rs. In Lakhs) |
|---------|-----------------------------|--------|-------|----------------------|----------------------------------|
| | BTR(E) | BTR(W) | Total | | |
| 2010-11 | 7 | 2 | 9 | 238.00 | 10.55 |
| 2011-12 | 8 | 3 | 11 | 260.00 | 18.63 |
| 2012-13 | 6 | 10 | 16 | 256.00 | 29.49 |
| Total | 32 | 33 | 65 | 5417.27 | 116.54 |

Hence, it is proposed that two Wild Life Squads, one at Samuktala & another at Rajabhatkhawa may be created to tackle the menace of Elephant depredation in and around Buxa Tiger Reserve.

| | <u>LocationLati</u> | L <u>ongitude</u> |
|-----------------------|-----------------------------|-------------------------------|
| BRT (E) Samuktala | N 26 ⁰ 32' 16.4" | E 089 ⁰ 43'18'.7" |
| BTR (W) Rajabhatkhawa | N 37 ⁰ 03' 31" | E 089 ⁰ 31'39'.25" |

Composition of stafffor each Squad:

- One Forest Ranger
- Two Deputy Ranger/Forester
- Eight Forest Guard.
- Eight member (on honorarium from self help groups to be
- Trained and raised from among the Forest villagers exclusively).

Infrastructure required:

- 2 Barrack
- one at Rajabhatkhawa, one at Samuktala
- 2 Forest Ranger Quarters
- one each at Rajabhatkhawa, one each at Samuktala
- Deputy Ranger/Forester Quarters
- Two each at Rajabhatkhawa, two each at Samuktala
- 16 Forest Guard Quarter
- Eight each at Rajabhatkhawa, eight each at Samuktala

Equipment:

8 Tents
 4 each per squad
 2 each per squad
 2 Leopard cages of Iron
 10 Search light
 5 each squad

5. First aid Box

Training:

A modular training in tackling with Wild Life, managing elephant depredation and tranquilizing may be arranged at Forest Training Centre, Rajabhatkhawa with the help of already wild life trained officers and staff.

- **3 Electrification of vulnerable T.G. colonies:** Tea garden management should be requested to electrify their vulnerable labour lines to reduce the elephant depredation.
- 4 Problem of Leopard depredation: Leopard being an animal of wide habitat adaptability, straying of it into tea gardens from adjoining forests is a normal phenomenon. T.G. management has to ensure adoption of pre-cautionary measures (identification of sections visited by leopards, bursting of fire crackers to scare away leopard from such sections, to organize plucking of leaves in such sections from one side so that leopard if any, have an open escape route) to avoid surprise encounters. They should not collect leopard cubs from T.G.The advisory issued by Field Director in this regard be strictly adhered to.

Advisory on Wild Life Depredation in Tea Estates:

Generally the Tea Estates around Buxa Tiger Reserve experiences the wrath of Wild life depredation mainly due to straying of Bisons during the dry periods, Leopards in Tea Estate's plucking areas and Elephants depredate almost throughout the year but more extensively during and around the monsoons. This phenomenon is there on record since inception of tea cultivation in Duars.

Monsoon is the time for leopard breeding and it coincides with the best tea plucking season of a Tea Estate. During the monsoons the Tea Estate and neighbouring Forest drains and camouflaged low lying grasslands and Guatemala grass plantations in general provide an ideal place for leopard breeding. Generally female leopard with her cubs or a pregnant female leopard when encountered by humans in fear of being attacked / self defence retaliates and injures the humans nearby their approach. Similarly the elephants quite often raid the Tea Estate areas for crops like maize, paddy etc being raised by labourers in the fringes with the forests or for the brew being made illicitly in some labour lines. In the process damages are caused to the huts and sometimes human casualties also occur. Also, during the dry months some Bisons stray into the Tea Estates and create panic and at times injury to the labourers.

Here are few advisories for tackling the Wild life depredation and related Problems.

- 1. Before start of plucking of tea bushes of a section by the labourers the area in advance must be disturbed by beating of drums, shouts or a nominal bursting of few crackers so that it disturbs the animal if present nearby and gradually it retreats to a safer zone
- 2. The labourers should be advised to avoid going in open for nature calls.
- 3. The labourers should be desisted from laying any traps within Tea Garden or vicinity of Forest to control intrusion of any wild animal as it injures animal and also invites retaliation by the animal. This is also a punishable offence under Wild Life Protection Act, 1972.
- 4. Hunting of any Wild Life is a serious punishable offence under The Wild life (Protection) Act, 1972. The labourers in general may be educated about this.

- 5. On sighting of a Bison in the garden area in general the labourers should be advised to stay at a safe distance and management should immediately inform the nearest forest office. Also, any other Wild animal sighted or creating trouble should be promptly informed to the nearest Forest office.
- 6. Compensation or injury or death by Wild Life is paid when a person is attacked outside the forest area. No compensation is paid for any incident within a forest area.
- 7. Labourers should be advised not to go to forest for collection of firewood etc. Any visit to Reserve Forest is liable for attack by a wild animal and trespassing is also an offence. The Tea Estates should ensure supply of fuel wood or its alternates. Similarly since cattle's rearing in TE is legally prohibited the initiatives for discouraging the labourers to do so must be taken. Soon an awareness campaign would also be launched from this end with help of NGOs.
- 8. Rising of crops like maize, banana, fodder grass etc in vacant tea areas and in vicinity of Forests which is legally prohibited should be discouraged as they invite elephants.
- 9. Local unauthorized brewing in some labour lines invite elephants visit. This should be discouraged and reported to police.
- 10. Labour lines along forest fringes may be fenced up with energized fencing.
- 11. Eco clubs may be formally formed in the TE. The concerned Manager may kindly take initiative so that actions for awareness and creation of voluntary squads against Wild Life depredation could be undertaken.
- 12. Tea Gardens should raise their own fuel wood plantations. Necessary help with regard to rising of plants, nursery and planting design would be provided from this end.
- **Equipment and tools:** Forest Department should have sufficient no. of trap, trained staff and tranquillizing equipment and staff trained to use the same. The Ranges in the problem areas should have sufficient no. of search light, batteries, crackers, etc. to overcome the problem. A special team at rajabhatkawa is in place to tackle emergency depredation cases and to rescue the strayed out animals.
- **Timely payment of compensation:** Timely payment of compensation immediately after depredation should be ensured. For this purpose Joint enquiry by Forest Dep'tt. and Panchayat will be completed immediately after depredation. In case of death, compensation will be paid most promptly.
- 7 Awareness generation programmes among people through film show, distribution of leaflets, etc.: Villagers and tea gardens labourers should be educated dealing with wild animals and how to live peacefully with them.
- **8** Formation of Eco clubs in Tea Gardens-BTR is surrounded by 34 tea gardens with huge manpower sitting idle. These unemployed youth exert direct pressure

on BTR and many of them have turned into notorious timber smugglers. These tea gardens because of their geographical location are also corridors of wildlife movement especially of elephant. These corridor and frequent wildlife movement creates rather unpleasing man animal conflicts leading to loss of life and property. This more often create resentment among the laborers of Tea gardens against BTR. Tea gardens also serve as effective breeding ground for leopards as they provide ideal habitat in the form of drain. This loss is leading to increased man animal conflict. As tea gardens are important neighbor of BTR they form main stake holders in the protection and well being of BTR.

Considering the importance of tea gardens it is proposed to form eco Clubs in Tea gardens comprising the youth for creating awareness and also to tackle wildlife depredation problems.

| Divisions | No of Tea Gardens | Eco -clubs |
|-----------|-------------------|------------|
| BTR East | 12 | 12 |
| BTR West | 20 | 20 |

An awareness campaign to be created among these eco-clubs and these clubs in turn shall help in tackling elephant depredation and also shall act as helping units for staff of BTR in tackling protection issues and man animal conflict issues.

These clubs to be provided with

- Publicity material like leaflets, brochures, etc
- They be trained in tackling depredation problems by the staff of BTR
- Basic wildlife driving material like search lights, crackers to be provided to these clubs by BTR.

9 Employing JFMCs & Tea Estate for Forest protection & Wild Life Depredation:-

From the fund accumulated from boulder royalty as per Hon'ble Supreme Court directive for "Community Development", the members of JFMCs and youth of neighbouring Tea Estate would be trained and employed for overall forest protection and Wild Life depredation. Also, during the period of monsoons when eco-tourism is stopped the eco-guides on wages can be utilized by deploying them for forest protection, River camps elephant and wildlife depredation duties. Further the JFMC share shall also be utilized in strengthening protection, community development of forest dependent communities through JFMC and mitigating Man animal conflict.

7.2.2.3 Protection theme

a) Fire protection theme

Fire is not uncommon in BTR. During winters ground fires in monoculture like Jarul and Teak is common. Most fire-affected areas are the north of 23rd mile, mainly Bhabar and Hilly tracts. The most affected ranges are Jainti, Santrabari, Rajabhatkhawa

(West) and North Rydak. The detailed protocol of Fire protection measures of BTR is discussed in Part 5.

b) Regulation on Collection of fuelwood and N.W.F.P theme:

No collection of NWFP shall be permitted in core area of the Tiger Reserve.

Control of fuel and firewood collection:-

Because of the many forest, fringe villages as well as tea gardens, BTR faces a huge threat in terms of fuel and firewood collection. Following areas were found to be heavily affected by illicit fuel and firewood collection:

- Hatipota, Bhutanghat beats, Hatipota range.
- Jainti beat, Jainti range.
- North and South Panbari beats, ERVK range.
- Bhutri beat, Hamiltongani range
- Kumargram and Sankosh beats, Kumargram range.
- Mainabari and Tiamari beats, North Rydak range.
- Santarabari and Buxa duar, Buxa road beats, Buxa duar range.

Parts of Central Rydak range and North and South Bholka blocks face equal, if not greater amount of threat due to their situation and presence of huge number of villages and tea gardens surrounding them. While resource dependency of these people cannot be diverted, given the present situation, some enhanced measures can be undertaken to reduce the amount of disturbance. These might include:-

- Strict vigilance and patrolling in problem areas.
- Swift seizure of materials followed by ensuring proper punishment for the guilty.
- Ensure safety of seized material.
- Conversion of degraded areas in the Resume Lands and Unclassed State Forests to fast-growing fuel and firewood plantations for meeting the need of the nearby habitations.

c) Control of grazing by domestic livestock:

The strategies described below are applicable to wilderness Zone. The forests of BTR suffer on account of illicit grazing. It is most rampant in southern and Western fringe (Bholka, Rydak, Damanpur, Nimati, Pana and Hamiltonganj Ranges). Forest villagers and F. D. holders maintain a large number of cattle within the Reserve. Illicit grazing by the cattle of the tea garden labourers and other fringe villagers is also very serious (Map-14).

To control grazing following strategies are proposed:

- i) No staff should be allowed to keep cattle within the Tiger Reserve.
- ii) No grazing should be allowed in the Core area.
- iii) No cattle of tea gardens and revenue villages should be allowed for grazing in Core.
- iv) The cattle owners living on the fringe villages/ tea gardens should be encouraged to raise fodder plantations on private land, or panchayat land,

- or vested land. Plantations consisting of high yielding fodder grasses like hybrid Napier, Anjan, Guinea, Paspalum, Dinanath etc., and fodder legumes like Stylo, Rice bean etc. and fodder trees like Subabul, Ficus spp, etc. should be recommended for planting. Seeds/ slips for such plantations may be supplied by the BTR authorities.
- v) Members of FPC/ EDC should be encouraged to use power tillers and other mechanical appliances for ploughing to enable them to reduce the number of draught animals.
- vi) Attempt should be made in collaboration with the Dep't. Of Animal Resources Development to improve the breed of the livestock in and around BTR through A. I. and castration of inferior quality of bull, thereby helping the villager to reduce their dependence on scrub cattle. Some young people from the Tea Estates and fringe villages should be provided with suitable training in Veterinary techniques for the improvement of livestock in their areas.
- vii) Extensive patrolling should be organized to stop illicit grazing. Graziers caught should be heavily penalized and the cattle confiscated to the Govt. in all the cases under Wildlife (P) Act, 1972. Cattle pounds may be established in those villages where grazing problem is acute.
- viii) A publicity drive should be under taken through frequent meetings, distribution of leaflets, posters and display of signboards at strategic points to make the people aware of the adverse effect of grazing on PA and penalties for illegal grazing in the PA.

d)Mitigating Encroachment problem:

Strategies to overcome encroachment problem:

- (i) Survey and demarcation of the external boundary of the Reserve should be completed within first two years of the plan period. Encroachment, if any, should be vacated and the area should be restocked with suitable species.
- (ii) Survey and demarcation of the land holdings of the forest villagers should be done within the plan period. Encroachment, if any, should be vacated and the area should be restocked with suitable species.
- (iii) Survey and demarcation of the old orange orchards in the hilly tracts of the Reserve that were destroyed and study of those areas as to reoccupation by natural vegetation may be done. No fresh encroachment in the form of orange orchards in the hilly tracts will be allowed.

E) Antipoaching theme

Described in section Chapter 10 of Core and Part 5 under "Security plan for strenghthening forest protection"

PART B: THE PROPOSED MANAGEMENT

CHAPTER 8: RESEARCH, MONITORING AND TRAINING

8.1 Research Priorities:-

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 Reserve would undertake basic research programmes aimed at evaluating systematic factors and influences, for devising pragmatic management practices to cover specific populations and the entire ecosystems.

Research on natural and social aspect is essential for PA management. Management practices of Buxa Tiger Reserve has vast scope of incorporation of research findings on aspects such as diverse types of flora and fauna, status of endangered and endemic species, elephants behaviour, socio-economic issues, etc.

Wildlife management is a mix of field craft and science based on field research. Research in the Tiger Reserve should 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 should be "problem solving studies", based on a consultative process involving PA management, indigenous people and overall ground reality prevailing in our tropical setting. Some "pressure points" for PA management are common to most of our PAs.

8.1.1. Objectives:

- 1. Aim of management related research and monitoring must be to reduce, progressively, the extent and degree of uncertainty on which, management decisions and management strategies are based.
- 2. Long term aim of the plan is to achieve better understanding of BTR Ecosystem, functional relationship among biotic communities, and impact of anthropogenic pressure on natural systems.

8.1.2. Problems in achieving objectives:

- 1) Lack of infrastructural facility like research laboratory and research unit and human resources.
- 2) Lack of co-ordination amongst different recognized Institutes, Universities and park authority.
- 3) Lack of financial support for research and monitoring.
- 4) Lack of proper data storage and retrieval system.
- 5) Inadequate access to literature.

8.1.3. Strategies:

8.1.3.1. Infrastructure Development: Establishment of Field Research Station

There is at present a research laboratory at Rajabhatkhawa with principally veterinary tools and equipment. There is adequate stock of inject guns and immobilizing drugs. One research main field station will be set up at Damanpur and two sub-stations will be located one each at Jainti and Kumargram. These stations will accommodate research consultants / personnel during field trips and provide basic tools for data gathering, entry, analysis and retrieval. For this purpose main field research station will have a computer with peripheral, Microscopes, weighing machines, desiccators, autoclave, hot air oven, refrigerator, and other necessary instruments, materials and reagents. The sub-field stations will also be equipped with relevant instruments. A light transport vehicle will be purchased for transportation of personnel of FD, Consultants and research materials. Funds for this purpose will be drawn from the Project. This vehicle will remain under the control of Research coordinator.

8.1.3.2. Posting of a Research Co-coordinator with office and financial support:

As the post of Research Officer (Common for any Project Tiger area) has not yet been sanctioned for BTR, an interested ACF/ DCF may be posted as Research Coordinator. He shall co-ordinate with all agencies engaged in research and will have an independent charge.

Research Coordinator should compile and analyze the data and intimate the findings to the park Director.

8.1.3.3. Co-ordination of Research activities:

The proposed Head quarter DFD will establish formal linkages with Research Institutes, Universities, and N.G.O's to carry out research on biological, social and ecological aspects of BTR Ecosystem. Wildlife Institute of India (WII), Dehradun should play an important role in this aspect. NGO's can be useful to do socio-economic research and can act as facilitator to solve anthropogenic problems.

Research will be handled by consultants, research Organizations/ Institutes, Universities, individual researchers and competent NGOs. Much of this research will be carried out by local institutions located near the PA (Siliguri/ Kolkata) and individual researchers who have worked in this area earlier. This would build up research interest and expertise around BTR and support local talent. With some financial arrangement in a post-project scenario, BTR Would then have a sustainable arrangement for flow of information for PA management and eco-development.

8.1.3.4. Funding of Research Activities:

Funding will be sought from NTCA. Books and Journals should be kept in the library of Research Unit.

8.1.3.5. Establishment of Computerized data storage and Retrieval system:

Data storage system is most essential to keep the records of research work. All the information from day to day monitoring of animals, vegetation study, bio-diversity study, habitat utilization, death and poaching cases, offence cases, Socio-economic data, etc. should be stored in computer. Analysis becomes for more faster. Retrieval becomes prompt.

8.1.3.6 Enriching BTR library through purchasing some relevant Journals and Books.

It is proposed to enrich the existing library by few books during plan period

8.1.4 Research Priority Matrix:-

Research on following topics as emerged from GOPP (Goal Oriented Project Planning) workshop and from the seminar on "Research strategies" (held on 24th and 25th January, 1997) would be of immense use for evolving management strategies. An attempt has been made to prepare a research priority matrix. It needs to be stated that the ideas on each of the proposed areas are indicative. Detail proposals will need to be developed which clearly cannot be accomplished within this plan. This also will have to be a consultative process involving those interested individuals within the Forest Department; Scientists/ Managers from reputed Institutions; Teachers in Universities, NGO and NGIs.

Research Priority Matrix of Buxa Tiger Reserve

| Field of Research | Priority One | Priority Two |
|-------------------|---|---|
| Biological | Study on Impact of Cattle grazing in Sanctuary and National Park and mitigation measures. Population –Habitat Viability analysis of Tiger. Poaching and illegal Wildlife tradeproblem and mitigation measures Population dynamics and feeding behavior of ungulates. Study to identify actual Tiger niche, their distribution, seasonal variability, food habit and population dynamics. Study on enumeration techniques of wild animals in BTR, their distribution pattern, seasonal movement and habitat use behavior. | Study on Inventory, status and distribution of lesser cats in BTR Study on Inventory, status and distribution of arboreal mammals other than lesser cats. Study on canopy manipulation followed by under planting in BTR and monitoring the changes in floristic composition. Preparation of flora of BTR. |

| Field of Research | Priority One | Priority Two | | | |
|-------------------|--|---|--|--|--|
| Ecological | Study on river system and Environmental impact assessment of boulder extraction from riverbeds. Identification of fragile ecosystem and habitats/ niches and means for their conservation. Study on effect of fire incidences on flora and fauna of BTR and mitigation measures. | Impact of habitat changes on population of wildlife. Habitat suitability study for reintroduction of wild Buffalo. | | | |
| Socio-Economic | Study on NTFP and its impact on village economy. Study on institution development, participation and empowerment of social organization and financial sustainability of village Institutions. Study on tea garden's intervention and measures to mitigate them. Impact assessment of dependence of local people on BTR. | Study on prospects and strategy for Eco-tourism. Study on wildlife health and diseases in BTR | | | |
| Others | Documentation and databasePublication of monographs and reports | | | | |

8.1.5 Evaluation of Research outputs:

One Review Committee will evaluate the output of the researchers from time to time by scrutinizing the periodic, draft final and final reports. The Composition of the Review Committee is suggested as follows: –

- i. Field Director ---- Convener-Chairman
- ii. Deputy Field Directors-member
- iii. Ecologist
- iv. NGO having experience of working in the area

It will be ensured that evaluation will take place within a reasonable period of time.

8.1.6 Dissemination of Research outputs:

Any useful output from the research projects will be incorporated in the management plan. The plan will be for 10 years with provision for review at the 5th year. Final research outputs will be incorporated during the 5th yearly review of the plan. Research findings of BTR Will have relevance for neighbouring PAs and other forest areas due to regional connectivity. Thus these research results can be usefully utilised by these neighbouring PAs and other forest areas.

8.2. Research projects: - Following Research projects are proposed.

8.2.1 Study on Impact of Cattle grazing in Sanctuary and National Park and mitigation measures:

Cattle's grazing is prohibited inside the Sanctuary and National park as per law but practically it is impossible to stop it though incidences can be reduced. No Study has been done on the effect of cattle grazing on the vegetation and wildlife. Study should be carried out to evaluate and monitor how far cattle graze inside the forest, changes of vegetation due to grazing, intensity of incidences of grazing in different blocks, frequency of sharing of water sources, and disease dissemination due to cattle grazing etc.

8.2.2 Population-Habitat viability analysis of Tiger:

To project the future population of tigers in BTR, population-habitat viability analysis (PHVA) should be done. This shall provide population dynamics. This shall help to evolve strategies for better management of tiger and its habitat.

8.2.3 Study to identify actual Tiger niche, their distribution, seasonal variability, food habit and population dynamics.

A study is proposed

8.2.4 Study on enumeration of wild animal, their distribution pattern, seasonal movement and habitat use behavior, etc.

A study is proposed to find out the appropriate method of census of wild animals in BTR especially herbivores.

8.2.5 Identification of Fragile Ecosystem and habitats or niches and means for their conservation:

Microhabitats should be identified. They are very fragile. Study for their conservation is necessary. This is short term study and can be done by the Ecologist, BTR.

8.2.6 Study on Inventory, Status and Distribution of lesser cats in BTR:

Lesser cats form a sensitive group. They are also one of the least studied groups. They can also be good indicators of the overall health of habitats. Importance is given to the cats but study of lesser cats should be given still more importance. Capturing of certain animals may be allowed for this study.

8.2.7 Poaching and illegal wildlife trade-Problems and mitigation measures:

Duars is one of the major traffic routes for wildlife trade. A study has already been done for entire West Bengal. Specific study for BTR is necessary.

8.2.8 Inventory, Status and Distribution of arboreal mammals other than lesser cats:

BTR is principally wood land. Arboreal mammals should form a major component of its wildlife. No study has been done so far. One of the rare species, clouded leopard, is arboreal. Study is important for knowing and also for evolving suitable strategies.

8.2.9 Population dynamics and feeding behavior of ungulates:-

BTR has much less meadows and grasslands. Study on population dynamics of ungulates is important. This shall guide us regarding its population dynamics and adequacy of glades and meadows.

8.2.10 Documentation of flora of BTR:-

Flora of BTR has been studied. But available information is mostly of commercially important species. This needs detail study

8.2.11 Impact of habitat changes on population of wildlife:

Habitat changes impact different animal species differently. Good indications about health of habitat could be developed from this study.

8.2.12 Study on wildlife health and diseases:

A large number of cattle graze in forests. The danger of spread of contagious diseases is always there. This study shall identify issues, diseases, etc. This shall provide suitable strategies to eliminate them.

8.2.13 Study on effect of fire incidences on flora and fauna of BTR and mitigation measures:

Fire is prevalent in hills and foothills. Teak monoculture is badly affected. Sal forests are also affected. This study shall identify issues. It shall also provide us proper strategies.

8.3. Monitoring Framework:-

Eco-systems are dynamic. Monitoring of impacts of management interventions is necessary. It enables the management to analyze and evaluate the effect of changes. Continuous monitoring and recording of data are proposed to be done through an elaborate, systematic and management-oriented monitoring mechanism.

The Park Management should continue to 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. Though it may sound an unplanned and subjective procedure, it is easy to collect useful biological information in a simple, systematic and scientific manner. The management should 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. All such data should be incorporated in the MIS in a routine manner.

8.3.1 Monitoring Physical changes:-

Monitoring of physical changes, mainly air and water qualities, is essential. Monitoring the water quality of streams and rivers passing through the Tiger Reserve particularly with reference to pesticides is very important as some water sources passes through tea gardens which use pesticide heavily.

8.3.2 Monitoring changes in vegetation:

Vegetational changes will be monitored in different vegetation types, both natural and man-made. Information should be collected every year for changes in pattern of succession, species composition, effect of grazing and fire on vegetation, etc. It should be recorded systematically and analysed through computer. Some permanent vegetation plot (50 m X 40 m) should be laid out for this purpose.

Some plots should be laid out in riparian area. Similarly some plots should be laid in fringe area. Study of density and frequency of species should be done by Point centred Quarter (PCQ) method and ground cover by Area Sampling or point sampling method.

8.3.3 Monitoring Changes in wildlife population:

(a) By regular recording of animal sighting in different comptts. When staff go for patrolling:

A register will be maintained in each Beat and weekly data will be sent to Range Office in a following prescribed proforma and from there data will be sent to Division office for consolidation and analysis to get information about seasonal movement, habitat utilization, etc.

Proforma for Monthly Wild Animal Monitoring:

| | | | | | | | SEX | | AGE | |
|-------|------|---------------------|-------------------|-----|--------|---|-----|---------|-------|-------|
| Range | Beat | Date and Time | Animal Sighted | No. | comptt | M | F | Unknown | Adult | Young |
| | | | | | | | | | | |

Tiger monitoring should be done by regular tracing of pugmarks to know the population dynamics, movement pattern, and identification of individual and sex ratio, etc.

(b) by conducting periodical census operation:

Herbivore census by King's method and Tiger/ Leopard Census by DNA scat anlysis method should be conducted every two year's interval. For conducting census the entire area of Tiger Reserve should be converted into a no. of smaller blocks called census unit. The existing census units should be followed for conducting census operation.

M-Stripes

M-stripes protocol for protection and monitoring of Wildlife will be followed as per the standard protocol of NTCA. For collection, compilation and analysis of data as per MSTriPES protocol in Buxa Tiger Reserve needs engagement of ten technical Assistants (8 persons). The annual financial requirement is projected to be as –

- for data compiler and analysts (2 persons) @ Rs 20000/month/person = Rs 4.80 lakh
- for field assistants (8 persons) @Rs 15000/person/month = Rs14.40 lakh Total = Rs 19.20 lakh

The other cost involved is the purchase of GPS/PDA for collection of data in the field and set up of Computers and software facilities for analysis.

8.3.4 Monitoring wildlife health and diseases:

It should be done regularly as there is danger of spread of epidemic through domestic cattle grazing in the Reserve. Water Samples should be regularly checked by field research Laboratories. Survey of adjacent fringed villages should be done to know about the spread of any epidemic. Vaccination of fringe cattle against F.M.D., Anthrax, H.S.B.Q, etc. should be done at suitable intervals by veterinary unit. This is discussed in details in item no. 12.2 of Chapter 12.

8.3.5 Monitoring the Impact of management practices initiated in and around B.T.R.:

Management interventions impact human population in and around BTR .Monitoring of such impacts is necessary. Its socio-economic impact is especially important. Cultural impacts can also be not neglected. Management intervention only with congenial impacts is sustainable over a long period of time.

8.3.6 Monitoring the impact of Tourism:

Tourism impacts P.A. and people. It impacts them socio-economically. It also impacts them culturally. Tourism has both positive and negative impacts on PA and people .Monitoring of impacts of tourism is necessary to know sustainability of tourism in BTR.

8.4. Training needs assessment:

Training forms an important area for all levels in the administration which results in generation of better and innovative ideas leading to enhanced conservation and managerial measures. There is a lack of intensive training in almost all the strata which will address important practical and day-to-day issues facing the frontline men in particular.

Training is essential to increase the managerial capability and technical skill of the staff. Present days PA planning and management is a highly technical science bringing together the theory of several diverse disciplines, i.e., ecology, forestry, geography, wildlife

Training should be carried out in an organised and structured manner in order to achieve optimum result. It should be organised for the different levels of staff. It should address the specific needs, duties and responsibilities carried out by the staff.

In order to increase the managerial capability of BTR staff and managers following training are important.

8.4.1 On the Job Training:

This informal training should be organised at Rajabhatkhawa NIC for Forest Rangers, DR/ Forests, Forest Guards, Bana Shramiks, Mahuts and Grasscutters during the close period of the park (June – September).

Experienced A.C.F., D.C.F., C.F., experts of other organised Institutes and NGO, legal experts/ public prosecutors, Police personnel, Research Officer, Veterinary Surgeon, Ecologist, and Sociologists etc. will be resource person.

Training subjects should be as follows:

- (1) Protection duties including identification of vulnerable areas, anti-poaching measures, use of firearms, and target practice of firearms, conducting raids, wireless set operation.
- (2) Survey and demarcation.
- (3) Fire fighting.
- (4) Tourism management, interpretation and conservation awareness among people, extension and motivation methodology.
- (5) JFM and interaction with fringe people, Micro planning and PRA.
- (6) Wildlife biology, ecology, habitat management including census of wild animals, grass lands ecology and management, monitoring of animal signs and evidences, (including scats and kills), monitoring of animal diseases, movement pattern and habitat utilization, identification of diseased animal and monitoring of treated animals.
- (7) Tranquilization including use of tranquilizing gun, doses of drugs, treatment of animal; Rescue of straying wild animals, veterinary care of rescued and captive elephants and their management and other wildlife health care.
- (8) Cattle improvement works like A. I., castration and immunisation.
- (9) Training on Nursery and plantation techniques.
- (10) Erection and maintenance of energised fencing.
- (11) Application of laws and regulations including knowledge about different Act, provisions and implementation of Act, booking of offenders, proper documentation of P.O.R., building up intelligence networks and dealing with informers.
- (12) Training to some staff to combat Malaria, Diarrhoea, etc. in BTR.
- (13) Training on river rafting to some staff.

It is to be noted that all the training should be field oriented. All the staff need not be trained at a time. It must be done in rotation. Training should be arranged in each year to ensure that staff is trained in all required subjects.

8.4.2 Formal Training Courses:

Formal training is generally conducted by recognised Institutes on national, International level. Wildlife Institute of India (W.I.I.) Dehradun organises a large no. of training courses under Govt. of India assistance or with the collaboration of International organizations.

It is proposed that every year one RO will be sent for 3 months diploma course in WII. Training needs of BTR will be communicated to the Research and Training wing of Forest Department.

8.4.3 Establishing PA as a learning Centre (Extension and Education Programme):

Any training activity is not an end in itself. Besides its specific inputs, the role of training is to launch support and maintain the process of learning with objectivity, ultimately leading to the enhancement of management capability.

People residing in and around B.T.R. are only little aware about nature conservation and wildlife protection. A massive extension and education programme has to be taken up to make the people conscious about nature conservation. Following strategy is suggested.

(1) Nature and Environmental Education programme for local people:

Such education programme is aimed at enlisting support of local people mainly forest villagers, fringe villagers and Tea garden labourers. To focus on the issues that are crucial with local people who live in and around BTR, the nature and environmental education plan is to be based on the biological importance of the area.

(2) Study Tours:

Field study tours for local people, NGOs and Staffs are proposed. Such tours would be organized within the State/ in other State as per requirement of target group.

(3) Training to Tourist Guides:

Guides working at Jainti and Buxa duar do not yet have adequate skills to communicate with visitors. These shortcomings are to be removed by selecting proper persons and imparting them suitable training.

(4) Workshop/ Seminar:

A seminar is a good tool to obtain broad agreement with local people, other stakeholder groups, administrators, scientists and nature lovers on the issues related to management of BTR. Frequent meeting with the FPC/ EDC is needed occasional meeting (at least one meeting in each Gram panchayat/ year) should be conducted involving panchayat and NGOs to make them aware about this project and for reminding them their duties and responsibilities in respect of BTR's natural resource management.

Some of the topic for workshop and field study may 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.

8.5. HRD Plan:-

Along with monitoring and need-based training, HR measures should include more activities directed towards better management and welfare of the staff. Long term plans should include encouragement of small scale cottage industries based on the traditional knowledge, proper marketing as well as setting up of sale and distribution centres.

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.

8.5.1 Staff Amenities:

The Staff amenities presently provided are far from satisfactory. A large number of the field staff is living deep in the forests. They keep their family either in adjoining town or with their parents for educating their children. This is also done to get medical facilities for their family. Thus they maintain double establishment. This causes financial hardships. Following basic amenities to staff are proposed:

8.5.1.1 Housing facility:

Because of lack of education and health facilities within the area, housing has to be seen from two different perspectives i.e. in situ housing at camp sites and housing for families at some stations where basic education and health facilities for kith and kin of staff are available. The buildings are to be maintained in such a way that they have toilets, non-leaking roofs, mosquito net protection, and white washed etc so they are livable.

It is proposed that building will be concrete structure with G.I. sheet roof. Annually three forest guard quarters and one Dr/Fr quarter are required to be constructed.

8.5.1.12 Reward for good works and Punishment for bad works:

Staff should be rewarded for performing good works by giving medal, certificate or some money with certificate to boost up their morale.

Following rewards should be considered for introduction:-

- i) Best worker for Wildlife Protection.
- ii) Best worker for raising plantation.
- iii) Best worker for Eco-development programme implementation.
- iv) Best worker against Wildlife depredation.

On the other hand, staff may be penalized as per law for incompetence and non performance.

PART B: THE PROPOSED MANAGEMENT CHAPTER 9: TIGER POPULATION AND HABITAT ASSESSMENT

9.1 Daily Monitoring and Forecasting:

Day to day monitoring of wild life is one of the most important task of the camping staff. All the information is recorded in Camp register daily by patrolling party. For the impression of Pugmarks of Tiger, Panther and other carnivores, impression pads (PIPs) must be laid out on the roads at distance of 1000 meters. At the junction of the road impression pad may be laid on all roads just few feet away from the junction. Impression pad may be made on both side of the road crossing a river or nala. The width of PIPs should be almost the width of the road and length should cover two strides i.e. almost 4-5 meters. All the PIPs should be serially numbered. The PIPs should be monitored on the basis of day-to-day gasti, at least twice in a week for Tiger evidences. The plaster cast, photograph and tracing of pugmark may be taken. The data must be compiled, mapped and maintained monthly to know the trend. With experience and exposure to resident tiger and their pugmarks, the staff may be able to identify individual tigers from their track set characteristics. Sign survey and individual tiger monitoring should remain a regular task for every guard.

For a low tiger density area such as BTR, it is very important that all the signs encountered are properly documented. These records will give valuable information about the movement pattern, an idea about their abundance, habitat use as well as evidence of ongoing breeding. To monitor the trends, a weekly tiger monitoring mechanism is already in place in the potential areas of BTR. However, to increase the coverage and accuracy of detection, daily monitoring routines should be set up which will include the following steps to be taken:

9.1.1. Identification of Monitoring/ Patrolling routes:

In each block/ beat, monitoring trails or paths should be identified for the daily monitoring schedule. These trails should be demarcated in consultation with the past records of signs in the area, recent encounter of signs/ sightings, easy detection capability (nature of the substratum) and sufficient coverage of the potential patches.

9.1.2. Design of simple data sheets to properly document observations:

Simple data sheets should be designed to properly document all the resultant observations. Care should be taken to ensure that all the relevant information is gathered in easy formats without being too technical or complicated. If possible, GPS locations of the tiger signs should be collected. Tiger monitoring form that is being used currently may be adopted as data sheet for recording monitoring observation.

9.1.3. Identification of monitoring personnel:

In each beat/ block, young and energetic personnel should be identified who would carry out the monitoring schedules in an enthusiastic fashion. NGOs, talented and enthusiastic college/university students as volunteers may also be used along with forest staff.

9.1.4. Compilation of observations:

Each month, all the resultant data and observations should be compiled according to the ranges/ blocks. The existent signs/sightings should be plotted on the maps to demarcate vital habitat patches for tigers. Records should be exchanged between all the ranges to monitor possible movement patterns. Utmost care is to be taken to prevent duplication of data.

It is proposed here that a special "Tiger Monitoring Team" be formed from select young, energetic and enthusiastic personnel across all the ranges. The team shall be responsible for solely intensive field surveys to locate tiger use and movement pattern and shall be based in the field itself, all over the Reserve. The TMT shall need to camp and monitor an area for long stretches of time if such a need arises. Apart from providing vital information about occurrence of tigers, the designated team will also generate a database of other carnivore presence, signs of disturbance and can aid the other staff with timely detection of emergency situations. The monitoring and survey schedule for the special monitoring team can be established based on the observations of the daily patrolling parties.

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 programme 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. In case of the tiger, only form of countrywide monitoring was based on the pugmark system, which depends on identifying individual tiger by experts. The system generated a total count of tigers, but gave no indication of spatial occupancy, population extent and limits, connectivity between population, habitat and prey conditions. Realizing the shortfalls of the pugmark monitoring system, Project Tiger directorate evolved a programme "Monitoring Tiger, co-predators, Prey and their Habitats" in collaboration with wildlife Institute of India and State Forest Departments. This program is based on a four-stage approach.

II. Phase I: Spatial mapping and monitoring of Tigers, Prey and Habitat

For estimating the distribution, extent and relative abundances 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 concerned staff must 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 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 tigers and leopards have a tendency of using dirt roads, trails, foot paths, river beds and nullahs, 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 should conduct the search for tiger sign.
- There should be 3-5 separate searches (in different compartments within the beat and/or at different times 1-5 days apart) each search covering about 4-6 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. If possible the GPS coordinate 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 15 km per beat.
- Tiger and leopard signs should 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 should 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 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 tiger cubs (sightings of cubs, lactating tigress, tracks, etc.) obtained within the past twelve months should be mentioned in the data sheet
- While sampling for tiger and leopard signs, record should 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 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 signs and for appropriate analysis of this data the actual data should be reported. For the above mentioned monitoring guidelines and data sheet provided by WII may be used.

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 analysis 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 use 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. National and international expert would act as observer while official in charge ensure adherence to the prescribed protocol and transparency of protocol implementation. 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 modeling in a GIS domain. The vegetation map, terrain model, night light satellite data, drainage, transportation network, forest cover, climate data, Normalized Difference Vegetation Index, livestock abundance, human density, socioeconomic parameters, etc will be used for modeling 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 modeling helped 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. Teams of researchers were deployed for estimating tiger density and ungulate densities within stratified sampling units.

1. Tiger Numbers

After stratifying landscape into tiger sign abundance classes of high, medium, low and no tiger sign at the beat and larger spatial resolution (100 km²). In each of these strata, within a landscape, estimated actual tiger density in 3-5 replicates of sufficient size (100-200 km²). Primarily depended on remote camera traps to identify individual tigers based on stripe patterns, population estimates based on mark-recapture framework shall

be done using CAPTURE, CARE 2 and Density 4 (Carbone et al 2001, Chao and 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 and Burnham 1991). These densities may 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 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.

Estimation of Tigers by Scat DNA Method

Enumerations of Tigers and co predators have always been challenging task. Over the years several new methodologies have evolved to provide credible numbers too especially of Tigers. Until recently tiger census was used to be done by traditional pugmarks method. The pugmark method though combined with good field observation used to provide good results but had several shortcomings. With the advent of modern technology the census is being carried out through camera trap and DNA based methods using scats, as they are more reliable and scientifically sound techniques.

Census teams comprising of 4 staff and NGO members is formed which will travel through these compartments along patrolling paths, trail nalas, fire lines etc. While doing so they collect 1-10 day old scats of Tiger and co predators in plastic pouch filled with silica gel and record GPS location of place of collection. Then it is sent to Division headquarter for further screenings. This kind of sampling is done over 1-45 days and is repeated 2-3 times. Such collection scats are scanned at division level and sent to labs for Genetic analysis by keeping portion of sample as representative sample. The detailed methodology of genetic analysis of scat is presented hereunder.

Flow Chart of Genetic Analysis

Scat collection

DNA extraction

PIP using tiger specific primers

Genotyping of tiger positive scats using micro satellites

Estimation of population abundance and density

2. Tiger Prev

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. 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 modeling. These estimates of effective stripe width will be used for converting encounter rates of ungulates to density estimate by modeling detection probabilities. A team of researchers sampled the beat transects in each habitat type using distance sampling technique (Buckland et al. 1993). Pellet group counts on transects would serve as an index to the presence and relative abundance of ungulates. In addition biannual herbivore census may be carried out using kings method/line transect method to assess the periodical density of prey base and its distribution.

3. Carrying Capacity of Tiger

Buxa tiger reserve is a low density tiger reserve. The detail of area and inviolate space is given below

Area of Tiger Reserve- 760.85 sq km

Core area- 417.55 ha. (Sanctuary- 300.32 sq km & National Park 117.23 sq km.)

Buffer - 343.30 sq km

Carrying capacity is calculated using the Hayward's equation;

Log tiger= -2.158+0.377 log (prey biomass/sq km)

| S.No. | Preferred Prey | Density/ sq km (2014) | Male Body wt in kgs | Female body wt in kgs | ³¼ of female body wt | Available Biomass (kg/sq km) |
|-------|-------------------|--------------------------|---------------------------|-----------------------------|----------------------------|------------------------------------|
| 1 | Chital | 2.4 | 85 | 45 | 33.75 | 81 |
| 2 | Sambar | 1.0 | 225 to 320 | 200 | 150 | 150 |
| 3 | Barking Deer | 6.2 | 22 to 23 | 20 | 15 | 93 |
| 4 | Gaur | 0.3 | 900 | 400 | 300 | 90 |
| 5 | Wild Boar | 4.3 | 70 to 80 | 50 | 37.5 | 161.25 |
| | Total | | | | | 757.25 |

 $\log \text{tiger} = -2.158 + 0.377 \log \text{(prey biomass/sq km)}$

 $\log \text{ tiger} = -2.158 + 0.377 \log (757.25)$

 $\log \text{tiger} = -2.158 + 0.377 (2.759857)$

log tiger = -2.158 +

1.040466

 $\log \text{ tiger} = -1.117534$

Tiger = antilog (-1.447534)

Tiger = 0.1111124471/sqkm = 11.11/100 sq

km

Phase IV: Intensive monitoring of source populations

The following methodology for this monitoring:

1. Photo registration of Tigers:

Pictures of individual tigers obtained by camera traps or by regular cameras should be maintained in the form of a photo identity album. Records should be kept on the location, condition (breeding status, injury, etc) and associated tigers whenever a tiger is sighted. This will provide crude data on ranging patterns, demography and mortality.

2. Tiger pugmark and other Signs:

Regular monitoring of tiger signs (pugmark tracings, plaster casts, etc) should 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:

WII, NGO's,

Univ. NGI's

Use modern technology of VHF, GPS and satellite telemetry 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 should be estimated using camera traps, digital images of pugmarks and/or DNA profile from non-invasive methods biannually.

hase I Tiger / Carnivore Sign Survey **Ungulate Encounter Rate Habitat Quality** State FD Beat level sampling (10-20 Km²) Occupancy & Relative Abundance Spatio-Temporal Monitoring Landscape Complex Characterization (Remotely Sensed & attribute data in GIS) WII & PT Modeling Patterns Underlying Tiger Occupancy, Source Population Stratified Sampling based on Phase I & II for -WII & SFD Tiger Density - Capture - recapture frame work **Ungulate Density - Distance sampling** Convert Indices to Density & Numbers **Intensive Monitoring of Source Populations -**Photo ID's

Radio telemetry

Sign Surveys – 3 monthly

Chart-Phase wise Monitoring of Tigers and Co predators.

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.

- **9.3.1.** Apart from the daily monitoring for tiger and related carnivore signs, a schedule for habitat assessment also needs to be formulated. It is even more paramount for an area like BTR With considerable amount of anthropogenic disturbances involved that a regular framework for habitat monitoring be established which will provide vital timely detection of problems and illegal activities. The habitat assessment framework should include the following points:-
 - The same daily monitoring teams looking out for tiger and other carnivore signs shall monitor their paths or trails for signs of illegal activities such as lopping, woodcutting, livestock grazing, etc.
 - For this purpose, a separate simple datasheet shall be designed which will enable them to document the signs of disturbances.
 - For each tiger sign encountered, the personnel can document some simple observations like the number of lopped trees or cut tree stumps, number of cattle dung piles, signs of grass collection within a 10 meter radius around the location, etc. These data will provide information about the use of different habitat types by tigers and possible correlation between the gradient of disturbance and presence of tigers in an area.
 - The data sheet used in all India Tiger monitoring may be adopted for recording observation.

9.3.2. Research activities:-

For a more robust and accurate assessment of habitat, long-term research activities aimed at spatio-temporal assessment of habitat health should be encouraged. These studies should include change detection using satellite imagery, intensive study of vegetation composition, vegetation regeneration in and around disturbed sites, species diversity estimation. In future, the resultant findings will provide a clear idea about the habitat preference of tigers in the Reserve.

9.4 Spatial Database Development

The Tiger population is estimated during phase II by extrapolating the density for the area. This area wise data is put in GIS Domain to get spatial database. The density of ungulate are also to be put area wise in GIS Domain do get their presence pattern.

From the monitoring schedules for tiger signs as well as habitat conditions, the resultant documentation and compilation will ultimately aim at development of specific databases pertaining to both flora and fauna.

9.4.1. Database for Tigers and other Carnivores:-

The tiger monitoring routines will turn up with distribution and presence status of tigers in the entire Reserve in due course of time. These observations need to be properly maintained in area/ range specific databases which would contain all the signs/ sightings sorted according to the dates and other relevant information. The estimation activities like departmental tiger census and capture-recapture studies would give more robust information down to the individual level. These data matched and compared with the resultant distribution and occurrence data will provide an even more enhanced repository of information. For a low-tiger density area like BTR, eventual field identification of all individual tigers is quite possible and that could stem out of the activities described already. Once that is achieved, individual tiger databases can be developed containing their movement and possible other ecological patterns.

Similar species –wise databases can be generated for other carnivore species as well.

9.4.2. Habitat assessment databases:-

Along with tiger and other carnivore monitoring, the habitat assessment and monitoring and similar research activities will generate data to be incorporated into areawise habitat condition databases. These databases shall contain information about the vegetation composition, species diversity and also about the extent of anthropogenic pressure in terms of presence of nearby human habitations, amount of grazing, quantified firewood collection, etc.

9.5 Analyses and Reporting Framework

Data analysis was done by WII during All India monitoring tiger, co-predators prey base and their habitat, so the analysis and reporting framework developed by WII will be used in future.

9.5.1. Collection and institutionalizing data collection and reporting:

The resultant data from all the monitoring and surveying activities needs to be institutionalized with a proper analysis and reporting framework which shall include the following points:-

- The daily monitoring observations relating to tigers and other co-predators needs to be collected beat wise.
- Since each range comprises of several adjoining beats, the data resulting out of them needs to be reported on a monthly basis to the designated Range Officers.

- The Range Officers need to be submitted with all the datasheets at the end of the month containing data from all the designated beats.
- The resultant compiled data needs to be presented to the ADFO/ DFO level where there would be such results from all the ranges on a monthly basis.
- The basic and preliminary analyses shall be conducted at the ADFO/DFO level and the resultant report shall be submitted to the Field Director of the Reserve.

9.5.2. Reporting of research activities:-

All the relevant research activities carried out within the Reserve need to have regular reporting about the progress in a monthly/ bi-weekly manner. The regular reporting needs to be done to the ADFO/DFO level. At the completion of such activities, a detailed report should be given to the Field Director for future managerial and conservation references.

PART B: THE PROPOSED MANAGEMENT

CHAPTER 10: PROTECTION AND INTELLIGENCE GATHERING:

The key to conservation success in a Tiger Reserve is the level of security enjoyed by the tiger and all other species that inhabit the area. Even if every other factor remains very favourable, lack of security can lead to irrevocable and sudden losses of the biodiversity wealth of the area. The case of Sariska Tiger Reserve losing all its tigers in a short span of time due to poaching is a grim case in point. Given that a forest area has its own unique characteristics, it is important that any plan to address its security must comprehensively address these unique challenges presented by the terrain and other related factors.

BTR faces immense pressure from the surrounding fringe population as well as the forest villages located inside the Reserve. Apart from this its proximity to the international borders i.e. Bhutan, Nepal and Bangladesh renders it highly vulnerable both as a poaching route and as a poaching destination. In the past also, parts the Reserve have suffered from insurgency problems. In view of all these existing and potential threats the maintenance of roads, fire lines, bridges, vehicles communication, and arms etc. play a vital role.

10.1 The Tiger Cell:

In order to facilitate the conservation of tigers through mainstreaming of developmental activities a Tiger Cell will be set up at the reserve level. The headquarter of the same will be at Alipurduar/Rajabhathkhawa/Barabesia. The main task of the Tiger Cell will be to oversee protection of tigers through collection of intelligence from various sources such as the WCCB, Police, para military forces and other stakeholders involved in combating wildlife crimes.

The proposed tiger cell will have following members along with provision for additional members as per the requirement

- Field Director of Buxa Tiger Reserve
- Deputy Field Directors
- Range Officers of BTR
- Members of Police/ Army/ Para military forces
- Members of Green Force/RAF/STF, if any.

The detailed protection is mentioned in Security plan part of the Plan.

10.2 The Special Tiger Protection Force

Presently no such provision is provided for Buxa Tiger Reserve. However provision of Green Force and Rapid Action Force is proposed.

10.2.1 "Green Force" in beats to strengthen forest patrolling

At present the frontline staff strength in beats is diminished to about 40% due to retirement. Also the existing staff is aged, most being more than 55 years in age. While beat strength is the key element for forest patrolling, this situation has deeply constrained forest protection and antipoaching vigilance in Buxa Tiger Reserve in recent times.

With this view, to strengthen territorial beats in Buxa Tiger Reserve, it is proposed that a Green Forece comprising 3 persons/beat shall be engaged to strengthen the forest patrolling teams in territorial beats. The annual financial requirement is projected to be 3 persons/territorial beat in 48 territorial beats -144 persons @ Rs 5720/person/month = Rs 98.84 lakhs.

10.2.2 "Rapid Action Force" in squads for strenghthening Forest Protection

Squads function in Buxa Tiger Reserve from Pana, Damanpur, Kamakhyaguri and the fourth squad is in the process of being set up at Samukhtala. The squads are mobile units, which supplement specific forest protection actions, as well as elephant depredation actions, and provide support to beats and ranges. It is felt that augementing squad teams with persons from ex-army, paramilitary, police etc. is essential to meet the field requirements.

With this view, therefore, it is proposed that "Rapid ActionForce" comprising 6 persons (from ex-army, paramilitary, police etc) shall be engaged in each of the squads for strengthening them. The annual financial requirement is projected to be 6 persons per squad for 4 squads -24 persons \times @ Rs 11440 per person per month = Rs 32.94 Lakh

10.3 e-Eye for 24×7 surveillance for forest protection and anti poaching vigilance

"e-Eye" pilot project can be taken up in fringe areas of Buxa Tiger Reserve which are sensitive on account of forest protection and poaching like Nimati, South Rydak etc. the area chosen may be open canopy fringes as "e-Eye" thermal cameras have penetration limitation in dense canopy. Primary objective of this pilot project will be early detection of offenders/poachers by 24×7 surveillance through "e-Eye". The project is proposed in pilot mode and like in Corbett Tiger Reserve, NTCA may be requested to consider the same process of implementation as was done in Corbett Tiger Reserve as local/Regional agencies are not available for this specialized project. The financial requirement of "e-Eye" project in Buxa Tiger Reserve can be assessed after reconnaissance visit by technical experts. As a reference, in Corbett Tiger Reserve "e-Eye" project, initial cost was approx. Rs 3 crores, annual recurring cost is approx. Rs 45 lakh (15% of initial cost) and mandatory equipment component replacement costs (e.g for refresh core of thermal camera, being about 30 % of thermal camera cost i.e 30 % of Rs 30 lakh approx. = Rs 10 lakh approx. per thermal camera).

10.3 Strategy for Protection and Communication

Details of protection strategy are discussed separately in security plan Chapter

PART B: THE PROPOSED MANAGEMENT

CHAPTER 11: ECOTOURISM AND INTERPRETATION:

- 11.1 Organizational Set Up and Management
- 11.2 Determination of carrying capacity
- 11.3 Implementation of Ecotourism Guidelines
- 11.4 Park Interpretation Programme

Ecotourism is described in detail in Ecotourism Plan which is given in Part IV

PART B: THE PROPOSED MANAGEMENT

CHAPTER 12. MISCELLANEOUS ISSUES:

12.1. Housekeeping of Departmental Elephants:

The Tiger Reserve has a total of 7 departmental Elephants belonging to different age and sex classes whose services are utilized for patrolling throughout the year. They are particularly useful during the monsoon season when movement inside the park gets severely hampered.

Guidelines issued by Chief Wildlife Warden, West Bengal, related to housekeeping of departmental elephants are being reproduced below:

- Elephants should not be put to work between 10 A.M. and 4.0 P.M. in summer and 11 AM to 3 P.M. in winter which are inconvenient hours for the elephants to work.
- No elephant should be put to duty both in forenoon and afternoon, this harms the animal.
- The working hours of an elephant should not exceed 5 hours a day to allow it sufficient time for grazing, fodder collection, bath and rest.
- As soon as the elephant comes back from duty its *guddi*, *guddila* etc., are to be removed immediately because it is a tiring for an elephant to remain saddled as being in work.
- Pregnant elephant should not be used with *guddi*, etc after 12 months of pregnancy. It can, however, be used to 15 months duty on bare back.
- After a calf is born the mother elephant should not be put to use up to 3 months of delivery, after which it can be put to light duty, say for 3 hours a day. In any case, such elephant should not be used at night.
- All calves should be weaned away from the mother after 18 to 24 months of delivery, when they attain a height of 4 feet.
- A baby elephant requires about 10 to 14 hours of sleep in the early months. This should not be lost sight of.
- There should be a Service book, logbook and a diary for each elephant. The log book should indicate the movement of elephant from place to place on hour to hour basis and the diary should record in addition to any other incidents, treatment, etc. The log book and diary should be checked by the superior officers at the time of the local visits and their remarks regarding the elephant including instructions, if any, should be noted there under with date and signature. Person riding should sign on the register with date.
- The ration register for the elephants should be made up to date daily with the record of issue and receipt duly posted in such register. The inspecting officers should check this register as well as the stock as frequently as possible.
- The feeding of ration of elephant should be made in presence of highest rank of staff or officer should make it a practice to check the quality and quantity of ration being fed to such departmental elephants. The *mahut* should also be present at the time of feeding.

- The fodder for the elephant has to be cut by the grass cutter and given to the elephant and not uprooted by the elephant, as the latter reduces the future stock and makes the elephant tired.
- The daily bathing of the elephant should be properly supervised to ensure proper rubbing of the skin and the sole of the feet which is essential for good health of the elephants.
- The elephant should not be allowed to drink water immediately after a long march on hot days and bathing of the elephant should also be done after half an hour rest after completion of long march.
- Guddi, guddila, etc. of the elephant should be of proper quality and this should be checked and inspected by the superior officers while using the elephant every time.
- It should be ensured that leather *peti* and *dumchi* are of proper quality and fitting.
- The *pilkhana* should be cleaned regularly and the elephants should not be kept of rotten debris to avoid infection. Periodically all such debris should be removed and burnt by throwing them in a pit.
- 1. Due precautions should be exercised while dealing with elephants in "musth"
- 2. Since the habitat has a pastoral history of livestock grazing, the prescribed prophylactic immunization schedule should be scrupulously followed
- 3. Apart from the *mahut* a *chara* cutter should also be sanctioned for each elephant to ensure the basic housekeeping
- 4. Elephants that show fear in tiger habitats should not be used alone

Mahut of elephant should not be changed frequently because it breaks the man-animal relationship. Herbal medicines used by mahut should be administered as far as possible instead unnecessary use of drugs.

It is a good idea to give periodic exposure to mahuts and G.C.'s regarding modern concepts of elephant care, maintenance and command. Some of them can be sponsored every year to visit elephant camps in South India or Assam to gain experience on management and training of elephants in other parts of the country. At least some seminar must be arranged with them where discussion can be done with the experts.

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, TB, Pasteurellosis and Trypanosomiasis etc. have been reported in captive elephants (Mikota et al., 1984). Though the information regarding susceptibility and prevalence of diseases is meager, the diseases like Anthrax and BQ are common in animals of this area. Captive elephants are also prone to parasitic infections of alimentary tract. Therefore, the apprehension calls for a strict and regular schedule of vaccination.

To prevent Foot and Mouth Disease and anthrax disease vaccination must be done in every year. Dung analysis and necessary deworming generally done once in two months.

Once a week V.S. visit all the captive elephants. All vital measurements such as weight, height, circumference of the front feet etc. of all elephants should also be taken during Wildlife Week every year.

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 hematology
- Urine and fecal 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 fecal and urine samples for colour, quantity, endoparasitic infestations and food habits apart from observations relating to movements of body parts are essential.

Vaccination and De-worming Schedule

The vaccination programme should be as per the prevalence and previous reports on outbreaks of infectious diseases in the area it is desirable that the vaccination should be done in the supervision of qualified wildlife Vet. The schedule for vaccination/administering of medicines is given below:-

| 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 |

12.2. Wildlife Health Monitoring:-

Monitoring of wildlife health forms an important component of the managerial measures and can give vital and timely knowledge about possible outbreak of diseases, incidences of poaching etc.

While the staff are told to keep a regular eye on any signs of abnormal health during their daily patrolling routines, some enhanced measures can be thought of regarding better monitoring:-

- Design of simple pictorial information material aiding detection of diseased animas in the field
- Training and sharing of information regarding some common diseases of wild animals specially ungulates.
- Swift communication of information in case some abnormality is observed.
- Intensive following and monitoring of a diseased animal.

12.2.1 Disease surveillance and Prophylactic Immunization:

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 Kaziranga National Park (1981) by Foot and Mouth Disease (FMD) in 1952 had been reported in the past. Dissemination of a number of diseases, like; 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), Anthrax, Foot and Mouth Disease (FMD), Haemorrhagic Septicaemia (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)

Free-ranging wild animals are as susceptible to diseases as any other living beings. 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 should 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 programs will be a major aid in the implementation of long-term health management plan on the appropriate measures 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.

In free ranging Wildanimals, only a fraction of mortalities due to diseases are visible at a time, except during epizootics, when the mortality exceeds the rate of predation and scavenging. Hence, the impact of diseases visible in these animals is far lesser than the actual scenario. Therefore it is essential to understand the magnitude of disease problem in free-ranging wild animals. More recent investigations by conservation agencies have shown that diseases and parasites are a decimating factor affecting population dynamics of wild animals.

It is of utmost importance to carry out epizootiological studies covering at least 3 complete years so as to generate information on prevalence of infectious and parasitic diseases and various climatic factors influencing the rate of infection. This will help in proper mapping and developing a forecasting system on various infections among native wild animals. This contribution will be a major aid in the implementation of long-term health management plan and guarding the wild animals from the risk of sudden and heavy mortality or morbidity. To achieve the above objective need of establishing a well-equipped field veterinary laboratory is of utmost importance along with the trained staff.

(A) Prophylactic Immunization:

Some diseases which are common to this area and are 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 of FMD, BQ and HS. Prophylactic immunization to cover FMD, BQ and HS are 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 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 may also be kept in the mind. The knowledge of animal species typical to the given area and particular disease maintained and spread by them may 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 -

- 1. General examination
 - i. Physical examination
 - ii. Clinical observation
- 2. Laboratory investigations
 - i. Faecal examination
 - ii. Heamatological examination
 - iii. Serological examination
- 3. Study of kill / Mortality
- 4. Detailed post-mortem examination
- 5. Collection of material for laboratory examination

The general examination, Laboratory investigation, study of kill / mortality, Post mortem examination and collection of material of laboratory examination will be done in accordance with the standard established procedures.

12.2.2 Care of rescued animals

Strategies:-

- 1) The V.S. should prescribe the diet of each animal in the rescue centre and also enforce quality control.
- 2) Health record of each captive animal should be maintained.
- 3) Deer and other herbivores should not be kept in captivity for long but should be released in the sanctuary as soon as they are fit to fend for themselves.
- 4) Leopard and other carnivores should not be kept in captivity for long. All trapped adult carnivores may be released in suitable habitat in the sanctuary or any other suitable forest area other than sanctuary as soon as it has been declared medically fit by the V.S. Leopards which have been in captivity for long, cannot be released in the wild because they lose their hunting capacity and defending power due to being kept in safe place and readymade food being made available. It is better to dispose them by way of gift to some Zoos in India or abroad. But, in future whenever a cub of leopard or other carnivore is received in the sanctuary, it should be prepared for ultimate rehabilitation in the wild. These animals, when released, should be marked properly and monitored regularly to know whether or not they have been successfully rehabilitated.

12.3. Mortality Survey:

This should be continued as before every six months. The camp staff should be suitably instructed to collect all mandibles/ skulls from the habitat for an assessment of species specific/ age – specific mortality.

PART B: THE PROPOSED MANAGEMENT

CHAPTER 13: ORGANIZATION, ADMINISTRATION AND BUDGET

13.1 Tiger Steering Committee:-

The Wildlife (Protection) Amendment Act, 2006 (Section 38 U) provides for constitution of a Steering Committee as follows:-

- (1) The State Government may constitute a Steering committee for ensuring coordination, monitoring, protection and conservation of tiger, co-predators and prey animals within the tiger range states.
- (2) The Steering Committee shall consist of:-
- (a) The Chief Minister-Chairperson;
- (b) Minister-in-charge of wildlife-Vice-Chairperson;
- (c) such number of official members not exceeding five including at least two field Directors of tiger Reserve or Director of National Park and one from the State Government's Departments dealing with tribal affairs;
- (d) Three experts or professionals having qualifications and experience in conservation of wildlife of which at least one shall be from the field of tribal development;
- (e) Two members from the State's Tribal Advisory Council;
- (f) One representative each from State Government's Departments dealing with Panchayat Raj and Social Justice and Empowerment;
- (g) Chief Wildlife Warden of the State shall be the Member-Secretary, ex officio, to be notified by the State Government, in the Official Gazette.

The steering committee has been constituted vide the government notification no. 140-For/11M-42/06 dated 10-01-2008.

13.2 Tiger Conservation Foundation:-

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 should be registered under the relevant rules of the State as a Trust 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 ecodevelopment 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: ecodevelopment, staff welfare, visitor regulation, field research, facilitating ecodevelopment committees for market access, conducting capacity building programs, ecotourism and Joint Forest Management. The TCF for BTR has been constituted, under sec 38 X of Wildlife protections Act 1972 vide deed of Trust duly registered AR Registration of Assurances Kolkata on 19/03/2010.

| Area of Operation of the Trust | Buxa Tiger Reserve (BTR) and its adjoining landscape, forming the impact zone with possible corridor value for disposal of wild animals from the Tiger Reserve. |
|---|--|
| Aims of the Trust | To facilitate and support the BTR management for conservation of tiger and biodiversity through multi stakeholder participation as per approved management plans and to support similar initiatives in adjoining landscapes, consistent with the National and State legislation. |
| Objective of the Trust | To facilitate ecological, economic, social and cultural development in the tiger Reserve and adjoining landscape. To provide support to safeguard the natural environment in the tiger Reserve and relevant places. To facilitate the creation of and/or maintenance of such assets as felt necessary for fulfilling the above said objectives. To solicit technical, financial, social and other support required for the activities of the foundation trust for achieving the above and related fields to support the implementing agency. Anything incidental or ancillary to the above for furthering the above |
| Governing Body of the Trust – Composition | 1) MIC,Dept of Forests, Govt of West Bengal-President 2) MOS, Deptt of Forests, GoWB – Vice President 3) Principal Secretary to GoWB, Deptt of Forests – Member 4) PCCF.Wildlife &CWLW,WB – Member Secretary 5) PCCF,HoFF,WB—Member 6) APCCF,Wildlife,WB—Member 7) CCF,WL(North)—Member 8) FD,BTR—Member 9) DFD,BTR(East)-Member 10) DFD,BTR(West)-Member 11) MLA,Alipurduar—Member 12) MLA,Kumargram—Member 13) MLA,Kalchini—Member 14) Karmadhyaksha, Bon O Bhumi Sanskar Sthayee Samity as representative of Jalpaiguri Zilla Parishad – Member 15) Two prominent scientists or qualified experts in the field – Member (Nominated by State Govt.) 16) Two member of the Executive Committee of BTCFT |
| Executive Body | 1) FD, BTR – Member & Executive Director Cum Treasurer |

| of the Trust – Composition | 2) DFD, BTR(East) and One AFD, BTR(East)- Member 3) DFD, BTR(West) and One AFD, BTR(West)- Member 4) Two representatives of JFMC working from the Tiger Reserve as nominated by the Field Director – Members 5) Two front line staff of BTR not below the rank of DR/Fr nominated by the FD – Member(s) 6) Senior between the two DFDs of BTR shall be nominated by the FD as Member Secretary to the Executive Committee |
|---|---|
| Registered Office of the Trust | Office of the Field Director, Buxa Tiger Reserve, Alipurduar, Dist- Jalpaiguri |
| Source of Funds of the Trust – Corpus Fund | i) Grants from the State Govt/ Union Govt ii) Grants and contribution from other corporate bodies, agencies, institutions and individuals including international funding agencies and non resident Indians iii) Loans from the Government and financing institutions. iv) Fees collected by way of user charges – The income generated from levying tourist entry fees and other charges for the service generated out of the Tiger Reserve |
| Proposed activities of Trust | Undertaking welfare measures and community development of Forest dependent communities and for the people residing inside Tiger Reserve. Improvement of Habitat as per the approved Tiger conservation Plan Efforts towards mitigation of Man animal Conflict. Strengthening protection measures by involving Joint forest management committees. |

13.3 Coordination with Line agencies/departments

Co-ordination with line agencies / departments is needed with police, Revenue, Railways and Judiciary for better protection measures and outputs. Eco development can be achieved by having good coordination with Revenue, rural development, Agriculture, animal husbandry, Zila Panchayat, Women and child development, Education, Tribal welfare etc. Further such coordination is required for conflict resolution especially man animal conflict.

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 could be adopted:-

- Regular meetings with line departments like police, administration, revenue, land reforms, Agriculture and animal husbandry.
- Co-coordinating with District Collector and CEO, Zilla Parishad (ZP) for organizing special meetings with line departments.
- Knowing various schemes of line departments and identifying schemes suitable for the Reserve area.

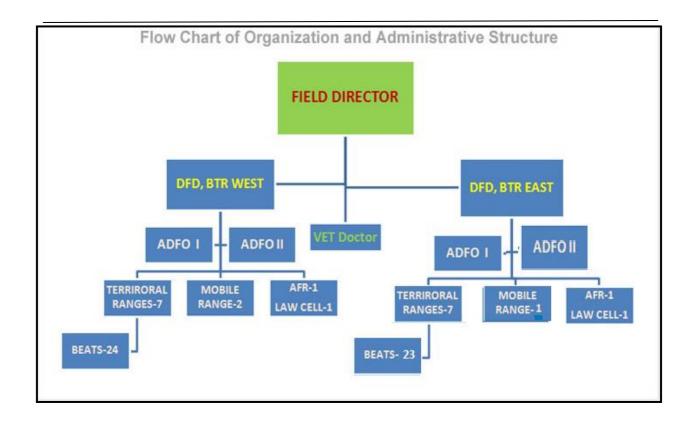
- Reserve tour of officials of line departments.
- Accreditation and highlighting achievements of other departments in reserve area.

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.

13.4 Staff Deployment

13.4.1 Administrative set up:-

The Reserve is administered by the Field Director in the rank of Conservator of Forests. The Reserve is divided into 2 Divisions viz., BTR (East) and BTR (West) Divisions.



Field Director is the overall in charge of the Tiger Reserve. He is assisted by two DFDs. Both the DFDs are drawing and disbursing officers. There are 13 territorial Ranges and 47 territorial Beats.

Staff strength status of BTR

| | | FD/BTF | R | В | TR(Eas | st) | E | TR(Wes | t) | Total FD/BTR | | |
|-------------------|-----|--------|-----|-----|--------|-----|-----|--------|-----|--------------|-----|-----|
| Designation | S.S | E.S | E.V | S.S | E.S | E.V | S.S | E.S | E.V | S.S | E.S | E.V |
| ADFO | 1 | 0 | 1 | 2 | 2 | 0 | 2 | 2 | 0 | 5 | 4 | 1 |
| AO | | | | 0 | 1 | -1 | | | | 0 | 1 | -1 |
| ACF | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Forest Ranger | 1 | 1 | 0 | 12 | 8 | 4 | 12 | 8 | 4 | 25 | 17 | 8 |
| DR/Fr | 0 | 0 | 0 | 36 | 24 | 12 | 39 | 30 | 9 | 75 | 54 | 21 |
| Head Forest Guard | 0 | 0 | 0 | 14 | 12 | 2 | 14 | 13 | 1 | 28 | 25 | 3 |
| Forest Guard | 0 | 0 | 0 | 115 | 78 | 37 | 118 | 78 | 40 | 233 | 156 | 77 |
| Driver | 1 | 1 | 0 | 4 | 2 | 2 | 4 | 1 | 3 | 9 | 4 | 5 |
| Bano Shramik | 0 | 2 | 0 | 0 | 43 | 0 | 0 | 57 | 0 | 0 | 102 | 0 |
| Bano Mazdoor | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 0 | 3 | 0 |
| Mali | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 2 | 2 | 0 |
| G.C | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 2 | 0 | 2 | 2 | 0 |
| Parmanent Watcher | 0 | 0 | 0 | 3 | 1 | 2 | 2 | 1 | 1 | 5 | 2 | 3 |
| Cleaner | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Orderly | 3 | 2 | 1 | 11 | 10 | 1 | 11 | 10 | 1 | 25 | 22 | 3 |
| Mahut | 0 | 0 | 0 | 2 | 2 | 0 | 1 | 0 | 1 | 3 | 2 | 1 |
| Sweeper | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 2 | 1 | 1 |
| Dakwala | 1 | 0 | 1 | 4 | 1 | 3 | 3 | 0 | 3 | 8 | 1 | 7 |
| O.P | 1 | 0 | 1 | 3 | 2 | 1 | 2 | 2 | 0 | 6 | 4 | 2 |
| B.C | 0 | 0 | 0 | 5 | 3 | 2 | 5 | 2 | 3 | 10 | 5 | 5 |
| Darwan | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | 1 |
| Head Clerk | 1 | 1 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 3 | 3 | 0 |
| Accountant | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 2 | 0 | 2 |
| UDC | 2 | 0 | 2 | 10 | 8 | 2 | 10 | 5 | 5 | 22 | 13 | 9 |
| C.T | 3 | 0 | 3 | 6 | 0 | 6 | 6 | 2 | 4 | 15 | 2 | 13 |
| Typist | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| TOTAL:: | 14 | 7 | 9 | 232 | 199 | 76 | 237 | 221 | 76 | 483 | 427 | 161 |

Note:- S.S. - Sanction strength; E.S. - Existing strength; E.V - Existing Vacancy

Organization of the Division/Circle into Ranges, Beats (territorial and functional) along with their jurisdiction (block/compartment and area in Ha as well as Deployment of Staffs):-

BTR (West):-

| Range | Beat | Compartment | Area (Ha.) | FR | DR/Fr | HFG | FG | BS | BM | Others | Total |
|--------------|--------------------|---------------------------------------|------------|----|-------|-----|----|----|----|--------|-------|
| | Range Hq. | | | 1 | 1 | 1 | 2 | 2 | - | 1 | 8 |
| Hamiltonganj | Godambari | GDB – 1,2,3,4 | 1613.44 | - | 1 | - | 1 | 2 | - | - | 4 |
| нашиопдапј | Bharnabari | BNB - 1,2,3,4 | 1685.39 | - | 1 | - | 3 | 2 | 1 | - | 7 |
| | Rangamati | RMT – 1,2,3; | 908.25 | - | 1 | - | 2 | 2 | - | - | 5 |
| | Bhutri | BHUTRI – 1,2,3,4,5 | 1526.62 | - | 1 | - | 4 | 2 | - | - | 7 |
| | Range Hq. | | - | 1 | 1 | 1 | 2 | 2 | - | 1 | 8 |
| | Pana | PANA – 1,2,3,4 | 1336.66 | - | 1 | - | 4 | 3 | - | - | 8 |
| Pana | Adma | ADMA – 1,2,3,4, | 2507.44 | - | 1 | - | 2 | 2 | 1 | - | 6 |
| | Raimatang | RTG – 1,2,3,4,5 (P) | 1749.51 | - | 1 | - | 4 | 3 | - | 1 | 9 |
| | Gangutia | RTG – 5(P),6,7,8,9,10 | 1754.73 | - | 1 | - | 4 | 3 | 1 | - | 9 |
| | Range Hq. | | - | 1 | 1 | 1 | 2 | 2 | - | 1 | 8 |
| | Nimati (West) | NIMATI – 1,2,7 | 1189.01 | - | 1 | - | 2 | 2 | - | - | 5 |
| Nimati | Nimati (East) | NIMATI – 3,4,5,6 | 1170.78 | ı | 1 | - | 4 | 3 | - | - | 8 |
| | Poro (West) | PORO – 1,5(P),6,11; Nimatidomohani PF | 1223.64 | ı | 1 | - | 2 | 2 | - | - | 5 |
| | Range Hq | | - | 1 | 1 | 1 | 2 | 1 | 1 | - | 7 |
| | Poro (East) | PORO – 2,5(P),7,10 | 1076.43 | - | 1 | 1 | 3 | 3 | - | - | 7 |
| W. Damanpur | Garam (East) | DPO – 1,2,5,6,9 | 1341.5 | - | 1 | - | 3 | 2 | - | - | 6 |
| | Garam (West) | PORO – 3,4,8,9 | 1361.35 | - | 1 | - | 3 | 2 | - | - | 6 |
| | Range Hq. | | | 1 | 1 | 1 | 2 | 2 | - | 2 | 9 |
| | Damanpur | DPO - 3,4,7,8 | 1233.48 | - | 1 | - | 2 | 3 | - | - | 6 |
| E. Damanpur | Checko | CHECKO – 3,4,5,6,7,8,9 | 1761.12 | - | 1 | - | 2 | 3 | - | - | 6 |
| | SRVK | SRVK - 11,12,13,14 | 1771 | - | 1 | - | 3 | 3 | - | - | 7 |
| | Range Hq. | | - | 1 | 1 | 1 | 2 | 2 | - | 4 | 11 |
| | WRVK | SRVK - 7,8,9,10,15,16 | 2470.7 | - | 1 | - | 3 | 3 | - | - | 7 |
| WRVK | CRVK | SRVK - 3 4 5 6 | 1252.19 | - | 1 | 1 | 2 | 3 | - | - | 7 |
| WKVK | NRVK | SRVK – 1,2; NRVK – 10,11,15,16 | 1986.68 | 1 | 1 | - | 3 | 3 | - | - | 7 |
| | Dima | DIMA – 1,2,3,4; DIMA RF | 1081.25 | - | 1 | - | 2 | 3 | - | - | 6 |
| | Range Hq. | | - | 1 | 1 | 1 | 1 | 2 | - | 1 | 7 |
| ERVK | Panbari (South) | PAN – 6,7,8,9,10 | 1573.1 | 1 | 1 | - | 4 | 2 | - | - | 7 |
| Livix | Panbari (North) | PAN – 1,2,3,4,5 | 1599.28 | - | 1 | - | 4 | 2 | - | - | 7 |
| | Gadadhar | GADA – 1,2,3,4,5,6 | 1433.86 | - | 1 | 1 | 2 | 2 | - | - | 6 |
| Mobile | Mobile West | - | - | 1 | 1 | 1 | 4 | 3 | 1 | 1 | 12 |
| Mobile | Central (RBK) | - | - | 1 | 1 | 1 | 4 | 3 | - | 1 | 11 |
| Law Cell | | - | - | 1 | 1 | 1 | 2 | - | - | - | 5 |
| A.F.R. | | - | - | 1 | 1 | 1 | 2 | 1 | - | - | 6 |
| | TOTA | AL :: | 3660.41 | 11 | 35 | 13 | 93 | 80 | 5 | 13 | 250 |
| | | | | | | | | | | | |

BTR (East):-

| Range | Beat | Compartment | Area (Ha.) | FR | DR/Fr | HFG | FG | BS | BM | Others | Total |
|-------------|---------------|---|---------------|----|-------|-----|-----|----|----|--------|-------|
| Buxaduar | Range hq. | | - | 1 | - | 1 | 1 | - | - | - | 3 |
| | Santrabari | STB-1,2,3,4 | 2299.85 | - | 1 | - | 2 | 1 | - | - | 4 |
| | Buxaroad | NRVK-1,2,3,4,8,9 | 1783.94 | - | 1 | - | 5 | 3 | - | - | 9 |
| | Chunabhati | CNBT-1,2,3. | 2001.58 | - | - | - | 2 | 1 | - | - | 3 |
| | Buxaduar | Tobgaon-1,2,3,4. | 3135.95 | - | 1 | - | 1 | 1 | - | - | 3 |
| Jainti | Range hq. | | - | 1 | 1 | 1 | 1 | 2 | - | - | 6 |
| | Phaskhawa | Tashigaon-1,2; NRVK-5. | 1717.99 | - | 1 | 1 | 3 | 1 | - | - | 6 |
| | Bhutiabasti | Phk-1,2 | 1681.67 | - | 1 | - | 2 | 1 | - | - | 4 |
| | Janti(North) | NRVK-6,7,12,13,14; JNT-1,2a. | 2074.79 | - | 1 | 1 | 3 | 1 | - | - | 6 |
| | Jainti(South) | JNT-3a,4,5,6a,7,8,9 | 2782.77 | - | 1 | 1 | 4 | 3 | - | - | 9 |
| Hatipota | Hatipota Hq. | | | 1 | 1 | 1 | 1 | 1 | - | - | 5 |
| | Hatipota | Hatipota-1,2; PHK-3; JNT-HP - IandII | 2709.35 | - | 1 | - | 2 | 2 | - | - | 5 |
| | Chuniajhora | Jainti-2b,3b,6b; Chuniajhora- I and II, Phaskhawa RL | 1195.45 | 1 | 1 | - | 2 | 3 | - | - | 6 |
| N.Rydak | Range Hq | | - | 1 | 2 | 1 | 4 | - | - | - | 8 |
| | Mainabari | BGT-1,2; NRD-1,2,3; CRD-1,2; Turturi-PF; T-Khanda | 3353.60 | - | 1 | - | 3 | 3 | - | - | 7 |
| | Kartick | KRT-PF ,KRT-USF, Rydak- USF, | 726.11 | - | 1 | - | 4 | 2 | - | - | 7 |
| | Tiamari | CRD-3,4,5,6 | 1290.14 | - | 1 | - | 5 | 2 | - | - | 8 |
| S. Rydak | Range hq | | - | 1 | 2 | 1 | 5 | 2 | - | - | 11 |
| | S.Rydak | SRD-1,2,3,4 ; DH-1,2 | 1858.38 | - | 1 | - | 6 | 1 | - | - | 8 |
| | Chipra | SRD-5,6,7; DH-3, U.Rampur- PF,Rahimabad-PF, Loknathpur-PF | 1229.69 | - | 1 | - | 4 | 2 | - | - | 7 |
| | Narathali | NRT-1,2 | 1288.12 | - | 1 | - | 5 | 1 | - | - | 7 |
| | Marakata | MKT-1,2,3,4 | 1352.04 | - | 1 | - | 4 | 3 | - | - | 8 |
| Bholka | Range hq | | 0 | 1 | 2 | 2 | 6 | 5 | - | - | 16 |
| | Barobisha | SBH-5, 6; D. Rampur-PF | 688.47 | - | 1 | 1 | 4 | 1 | - | - | 7 |
| | Ghoramara | SBH-1,2b,3a,4 | 1201.94 | - | 1 | - | 5 | 1 | - | - | 7 |
| | Balapara | SBH-2a,3b,NBH-5 | 805.62 | - | 1 | - | 4 | 1 | - | - | 6 |
| | Changmari | NBH-1,2,3,4 ; M-Haldibari-PF | 1133.52 | 1 | 1 | - | 5 | 1 | - | - | 7 |
| Kumargram | Range hq | | 0 | 1 | 1 | 1 | 2 | 2 | - | - | 7 |
| | Newlands | NLS-1,2; NLS-USF | 942.42 | - | 1 | - | 4 | 1 | - | - | 6 |
| | Kumargram | KGM-1,2 | 1051.37 | - | 1 | - | 3 | 1 | - | - | 4 |
| | Sankosh | SNK-1,2,3 | 1105.17 | - | 1 | - | 4 | 4 | - | - | 9 |
| Mobile | ME HQ. | - | - | 1 | 2 | 1 | 5 | 4 | - | - | 13 |
| Law Cell | | | | 2 | 1 | 1 | 1 | 1 | - | - | 6 |
| A.F.R. | | | | 1 | 1 | - | 3 | 1 | - | - | 6 |
| Head Office | | | | 1 | - | - | - | - | - | - | 1 |
| | TOT | ΓAL :: | 39,409.93 | 12 | 36 | 14 | 115 | 59 | - | - | 236 |

13.4.2 Staff Amenities:

The Staff amenities presently provided are far from satisfactory. A large number of the field staff is living deep in the forests. They keep their family either in adjoining town or with their parents for educating their children. This is also done to get medical facilities for their family. Thus they maintain double establishment. This causes financial hardships. Following basic amenities to staff are proposed:

13.4.3 Housing facility:

Because of lack of education and health facilities within the area, housing has to be seen from two different perspectives i.e. in situ housing at camp sites and housing for families at some stations where basic education and health facilities for kith and kin of staff are available. The buildings are to be maintained in such a way that they have toilets, non-leaking roofs, mosquito net protection, and white washed etc so they are livable.

It is proposed that building will be concrete structure with G.I. sheet roof. Annually three forest guard quarters and one Dr/Fr quarter are required to be constructed.

13.4.4. Field Equipments:

Necessary camp and field equipments for the protection of staff should 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. Assistance of NGOs which provide essential equipments may also be taken.

13.4.5 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, helmets etc should also be provided specially to the personnel deputed on Bordering areas.

13.4.6 Education facility to the Children of Staff:

One Hostel building (25 - 30 seats) at Damanpur is proposed to be constructed. Both higher Secondary school and college are available at Alipurduar (adjacent to Damanpur). Children of staff can avail schooling and college facilities from there.

13.4.7 Provision for Difficult Area Allowance:

It is desirable to reward staff posted in interior localities adequately. Govt. may be requested to consider possibility of declaring certain places of posting as difficult areas (Bhutiabasti, Hatipota, 23rd mile/ Panbari, Bhutri, Adma, Chunabhati, Buxaduar). Process should be initiated to provide difficult area allowance for staff posted in such locations.

13.4.8 Provision of drinking water facility in Staff locations:

A large number of staff locations in BTR suffer from drinking water scarcity. Within the terai area of the PA (below 23rd mile) shallow tube well with high yield is possible while in the Bhabar area (23rd mile and above) such as Newlands, Hatipota, Panbari (23rd Mile), Bharnabari, Buxa Road, Jainti, etc. deep bore well or tapping of surface water is the only answer. The facility should be provided in a phased manner within the first half of the plan period.

13.4.9 Provision of Medical facility:

Buxa Tiger Reserve is a malaria prone area. Health centers are far away from staff locations. Conveyance to reach them is not readily available. Preventive measures should get priority. Free supply of malaria and other medicines should be made. Forest villagers also suffer from malaria and gastrointestinal problems.

Regular health camps should be organized for health checkups of staff. This will ensure better health and will in turn result into better output from staff and will have great value.

One mobile medical unit with medical officer for BTR staff and forest villagers is proposed. In severe cases Range vehicle should be used to shift patients to nearby hospitals.

13.4.10 Insurance scheme for staff:

Possibilities of Health insurance for staff and field assistants living in interior areas should be explored with insurance company and take up the scheme. Accident insurance benefits offered by NGOs may also be availed for the staff.

13.4.11 Electrification of Staff Compound:

In large number of staff locations electric supply is not available. Electrification of staff locations should be taken up on priority. Raimatang, Gangutia, North Panbari, South Panbari, Chunia jhora, Buxa Road, locations can be electrified.

Where electrification is not possible, solar lantern and solar street light should be provided. Every year one or two beats shall be taken up for electrification.

13.4.12 Rotational transfer from difficult area to better place:

Transfer policy guidelines as finalized by Field director being implemented to ensure rotational transfer.

13.4.13 Safety and improvement of Staff compound:

Staff locations should be fenced by compound wall/Power fence/barbed wire. The compounds should be cleaned 3-4 times/ year. Roads connecting staff locations should be repaired and improved.

13.5 Fund Raising Strategies

State government supplemented by NTCA is the main fund provider for development, eco-development, research, protection, environmental education and other activities. All establishment costs and other recurring costs are borne by the state government.

The gate money kept in BTCFT will be used for protection and management of Protected Area, Eco-tourism and development of host community. Fund may be raised from different donors through Tiger Foundation. Assistance of NGOs maybe sought on various relevant aspects.

13.6 Schedule of Operations

All the operations in the PA will be completed as per the direction, APO and schedule prevailing in the department.

13.6.1 Schedule

The annual schedule should be prepared by Deputy Field Directors on the basis of various prescriptions of plan proposals, under the personal supervision of Field Director, Buxa Tiger Reserve and should be send to the Chief Wildlife Warden (West Bengal) well in time for approval. After the Chief Wildlife Warden's approval various works should be implemented as per the schedule.

13.6.2 Record of Deviations and Implemented Targets

The record of deviation statements were not being maintained properly till the preparation of the last Management plan 2000-2001 to 2009-2010. The Tiger Reserve should pay proper attention and ensure that deviation statements are maintained properly as per prescription of Tiger Conservation plan. Deviation statement should be recorded and maintained in the standard prescribed proforma which is applicable throughout West Bengal. The plan should provide for maintenance of a book called Tiger Reserve book to record the deviation proposals, made and approved. This will include annually deferred targets which might be accomplished during overall plan period. There also might be strategies put off indefinitely for compelling reasons. There might be new strategies not previously included in the plan. All should be recorded. At the time of revision of the plan the deviation proposals need to be referred to especially on matters which relate to strategies in the field. Further, a record should be maintained for each category of strategy proposed and undertaken e.g. fire protection, control of weeds, habitat improvement works etc. This is essential for evaluating the plan performance. The information from the book as relevant should annually be entered in the control forms. For this purpose each range must maintain a Range Book.

13.6.3 Record of Employment Generations

So far no records of employment generation are maintained in Buxa Tiger Reserve. It is very important to know as to how much man days has been created in a financial year through different forestry works. Range officers should maintain a register of employment generation in the following proforma.

PROFORMA

| S/l No | Name of range and its location | Month | Year | Nature of works | Total No. of man days generated | Approx. Expenditure | Remarks |
|--------|--------------------------------|-------|------|-----------------|---------------------------------|------------------------|---------|
| | | | | | | | |

Date:

Signature of R.O.

13.6.4 The Control Forms

At the end of the each financial year all the control forms are to be posted. To facilitate the posting of information each range should maintain registers on each set of information to be reported. These registers should be posted as and when each activity is initiated. The progress of the activity/ operation will need to be collated across the range registers and addition information from the headquarters office which would not be reflected at the Range level.

FORM WM-1.1

Maintenance of Water holes: Natural

| S/L No. | Category | Perennial or seasonal | Location | Year | Nature of work | Cost | Performance |
|------------|----------|-----------------------|----------|------|-------------------|------|-------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| | | | | | | | |

Note:

CategoryLocationNatural depression, a flowing stretch, reservoir spring, Seep.By compartment or by a named feature and name given if any.

Nature of work: Desilting, provision of apron, any other category.

Performance: Successful, partially successful, failure (reason for the last two).

FORM WM-1.2

Maintenance of Water holes: Artificial created before the plan period

| S/L No. | Category | Perennial or seasonal | Location | Year | Nature of work | Cost | Performance |
|------------|----------|-----------------------|----------|------|-------------------|------|-------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| | | | | | | | |

Note:

Category: Wallow pool, Masonry anicut, earthen bundh, Brushwood bund, lined

depression, spring fed, aquifer.

Location: By compartment or by named feature and name give if any.

Year : Year of maintenance, with year of establishment with parenthesis.

Nature of works: Desilting, grouting, repairing leaks, closing anicut opening etc.

Performance: Successful, partially successful, failure (reasons for the latter two).

FORM WM-2

Restoration of Habitat: Weed control, initial operation

| S/L No. | Location and name of site | Year | Extent of Area in ha. | Species of weed | Opera tion | Total cost | Cost per ha. | Remarks |
|------------|---------------------------|------|-----------------------|-----------------|---------------|------------|-----------------|---------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | | | | | | | | |

Note:

Location
Operation
Remarks
By compartment, site name or land feature.
Uprooting, cutting, burning, ploughing, etc.
Measure of success and or problem faced.

FORM WM-2.1

Restoration of Habitat: Weed control, subsequent operations

| S/L No. | Location and name of site | Year | Extent of Area in ha. | Complete or partial in ha. | Species of weed | Opera tion | Total cost | Cost per ha. | Remarks |
|------------|---------------------------|------|--------------------------|----------------------------|-----------------|---------------|---------------|-----------------|---------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | | | | | | | | |

Note:

LocationOperationUprooting, cutting, burning, ploughing, etc.

Remarks: Percent cover of weed/s before operation, problems, if any.

FORM WM- 2.2

Restoration of Habitat: Control of regeneration of Woody species in grassland.

| S/L No. | Location and name of site | Year | Extent of Area in ha. | Species of weed | Operation | Total cost | Cost per ha. | Remarks |
|------------|---------------------------|------|-----------------------|-----------------|-----------|------------|-----------------|---------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | | | | | | | | |

Note:

Location : By compartment, site name etc.

Species controlled: List of species e.g. Lantana, Leea, and Michenia etc. **Operation**: Uprooting, cutting, burning etc., manual or mechanical.

Remarks: The measures of success, suitability of methods, problem encountered.

FORM WM-2.3

Restoration of Habitat: Prescribed burning.

| S/L No. | Location and name of site | Year | Extent of Area in ha. | Area treated (ha.) | Period | Total cost | Cost per ha. | Remarks |
|------------|---------------------------|------|-----------------------|--------------------|--------|------------|-----------------|---------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | | | | | | | | |

Note:

LocationPeriodBy compartment or name of site name.Date of starting Operation and completion.

Remarks: Mention resultant structure e.g. mosaic % burnt, % intact. Problems

Encountered in conducting the operation e.g. fire escape.

FORM WM-2.4

Restoration of Habitat: Cutting back of Tree Species operation.

| S/L No. | Location and name of site | Year | Extent of Area in ha. | Species of plant | Period | Total cost | Cost per ha. | Remarks |
|------------|---------------------------|------|-----------------------|------------------|--------|------------|-----------------|---------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | | | | | | | | |

Note:

Location : By compartment or name of site name.

Period : Date of starting Operation and completion.

Remarks: Measures of success i.e. condition of grassland after cutting back of

tree species. Problem faced in conducting the operation. Quantity of

timber poles, firewood extracted.

FORM WM-2.5

Restoration of Habitat: Soil Conservation measures initial operations and subsequent maintenance.

| S/L No. | Location and name of site | Year | Extent of Area in ha. | Area treated (ha.) | Operation | Total cost | Cost per ha. | Remarks |
|------------|---------------------------|------|-----------------------|--------------------|-----------|------------|-----------------|---------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | | | | | | | | |

Note:

Location : By compartment, name of site or landmarks.

Extent of Area: Total area identified for such treatment. In case of streams or gullies,

the length involved.

Area treated: If linear feature then quote length; otherwise area.

Operation: Structures involved such as gully plugs, trench, mound, terracing,

spurs and bundhs etc. quote quantity nos. and m³ of earth work.

Remarks: Mention the initial work or maintenance.

FORM WM- 2.6

Restoration of Habitat: Planning, sowing initial operation.

| S/L No. | Locati on | Year | Extent of Area in ha. | Species | Planting Stock | Spacing | Opera- tions | Total Cost | Cost per ha. | Remarks |
|------------|--------------|------|-----------------------|---------|-------------------|---------|-----------------|---------------|-----------------|---------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| | | | | | | | | | | |

Note:

Location: By Comptt. or landmarks and describe the site factors e.g. vegetation

cover, soil perturbation etc.

Planting stock: Kind of condition e.g. root shoot, slips, seedlings in polythene bags,

direct showing, naked root seedlings, age or average size.

Operation: Mention site preparation if any, crow bar holes, pits and pit size,

trench, seed sowing (rate), protection measures.

Remarks: Mention operational problems if any.

FORM WM-2.7

Restoration of Habitat: Response of planting, sowing and subsequent operation.

| S/L No. | Loca- tion | Year | Extent of Area in ha. | Species | Survival % | Casualty replacement weeding cleaning | Opera- tions | Total Cost | Cost per ha. | Remarks |
|------------|---------------|------|-----------------------------|---------|---------------|---|-----------------|---------------|-----------------|---------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| | | | | | | | | | | |

Note:

Location: By Comptt. or landmarks.

Casualty: Mention planting stock by species, replacement number and kind

(Polythene bag, rootstock, slips, root, shoot, rhizome etc.)

Operation: Planting, showing technique protection measures weeding and cleaning. **Remarks:** Operational problems, protection problems, any other useful information.

Asses and mention survival percentage and growth before taking up

casualty replacement and weed cleaning.

FORM WM-2.8

Restoration of Habitat: Area under protection/ closure

| S/L No. | Location | Year | Extent of Area in ha. | Description of site | Regulation or protection measure | Response | Remarks |
|------------|----------|------|-----------------------|---------------------|----------------------------------|----------|---------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| | | | | | | | |

Note:

Location : By Comptt. or landmarks.

Site description: % of tree, shrub, ground cover, main factors causing perturbations. **Response**: To be recorded annually. Consider trend of regeneration, vegetation

cover, change in structure and composition, wildlife use index.

Remarks: State problems or any other useful information, including alternatives

if area being used by people for specific purpose.

FORM WM-3

Animals: measuring trend in populations

| S/L | Spec | Population | Adults | | Sub-adults | | Yardl | | | | |
|-----|------|---------------------------|--------|--------|------------|--------|-------|------|------|-------|---------|
| No. | | estimation methodology | Male | Female | Male | Female | ings | Fawn | Cubs | Total | Remarks |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| | | | | | | | | | | | |

Note:

Population estimation: e.g. pugmarks, line transect, roadside count, elephant ride count

etc. area covered, sampling intensity, data treatment,

extrapolation. Where involved. In case of indices of density or dung count mention those figures under the remarks, column use

details as pertinent. Describe age classes for each species.

Remarks: Operational problems, protection, problems, any other useful

information. Indices of density or dung count details to be recorded

here.

FORM WM-3.1

Animals: New Records

| S/L No. | Species | Locati ons | Year | How describe | Details of number, age, sex | Habitat description | Remarks |
|------------|---------|---------------|------|--------------|-----------------------------|------------------------|---------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| | | | | | | | |

Note: Animals will include vertebrates and invertebrates.

How discovered: Sighting, dead specimen, reliability of sighting, captured specimen,

Incontrovertible other evidence.

Number, age, sex, etc: As applicable to vertebrates. Habitat description: Broad

habitat description such as vegetation, and elements such as water, large old trees, dentrees, snags, down log material. Use

micro habitat description only if relevant.

Remarks: Any other useful information.

FORM WM-3.2

Animals: Mortality other than that attributable to an offence.

| S/L No. | Species | Locati ons | Year | Sex and age | Number | How discovered | Cause of mortality | Remarks |
|------------|---------|---------------|------|-------------|--------|-------------------|--------------------|---------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | | | | | | | | |

Note:

Location : By comptt. landmarks etc.

Sex and age: As per parameters for age class, sex if possible to identify. **How discovered:** Carcass, complete or partial. Skull or other any recognizable

remains collected where only some remains of an animal are found.

Cause of morality: If known e.g. territorial fight, accident, drowning, mud tract,

interspecies fight, fold age, cause difficult to determine, predation,

possible disease (following postmortem results) etc.

Remarks: Any other useful information.

FORM WM-3.3

Animals: Mortality attributable to an offence.

| S/L No. | Species | Locations | Causes of mortality number, sex, age class | Remarks |
|---------|---------|-----------|--|---------|
| 1 | 2 | 3 | 4 | 5 |
| | | | | |

Note: Location: By comptt. 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.

FORM WM-3.4

Animals: Predation on domestic livestock by Wild Carnivores.

| S/L No. | Range | Month | Category | Location | Number | Compensation paid (Rs.) | Carnivore involved | No of cases undecided | Remarks |
|------------|-------|-------|----------|----------|--------|-------------------------|--------------------|-----------------------|---------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| | | | | | | | | | |

Note:

Category of Livestock: Buffalo, cow, bulk, (Adult, killed, sub-adult, calf), goat, sheep, poultry etc.

Location: Compartment no or land marks where killed and the village of the owner. **Carnivore involved:** Indicate species responsible for the kill if identify is confirmed.

No. of cases undecided: Either in progress or dropped.

Remarks: Record observation like attended for unattended animal. Killed in

forest or waterhole or in the pen/ shed, filled and whether kill was in

area closed to livestock trespass.

FORM WM-3.5

Animals: Killing of human by Wildlife or injury caused

| S/L No. | Range | Month | No of incidents | No of people killed, age and sex | Location circumstances and species | No of people injured, age and sex | Location circumstances and species | Compensation (Rs) |
|------------|-------|-------|-----------------|--|------------------------------------|---|------------------------------------|-------------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | | | | | | | | |

Note:

Location, Circumstances: Location by comptt., No., the village and species to which the persons belongs and description of the site and activity such as—open grassy patch, cutting grass; or under a mahua tree collection flowers etc. Mention species on proof.

FORM WM-3.6

Animals: Wildlife damage to private or public property

| S/L No. | Range | Month | Category of property | Extent of damage | Species involved and number | Remarks |
|------------|-------|-------|----------------------|------------------|-----------------------------|---------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | | | | | |

Note:

Location: By comptt. no., village survey no., name of village or landmark.

Category of property: eg. agricultural field-wheat, huts in a villages, any kind of vehicle.

Extent of damage: Crop damage by area, estimated loss off produce and monitory loss. Similar yardsticks for other items like partial or total destruction of huts and belongings with estimated monitory loss.

Remarks: Any relevant information or circumstances eg. a wild elephant was provoked by people.

FORM WM-4

Plants: new records

| S/L No. | Family | Species | Year | Location | Habitat | Status | Remarks |
|---------|--------|---------|------|----------|---------|--------|---------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| | | | | | | | |

Note:

Habitat: Description by vegetation associates at various levels, % canopy closure if relevant, soil/site, microhabitat elephants such as higher level of moisture,

woody debris or humus etc.

Status: A broad idea on its frequency, national status eg. endangered, rare, endemic etc.

Remarks: Any specific information.

FORM WM- 4.1

Plants: disease and mortality

| S/L No. | Species | Location | Year | Extent of damage | Extent of damage Species involved and number | |
|---------|---------|----------|------|------------------|--|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | | | | | |

Note:

Location: By compartment of landmarks.

Particulars of disease: In case of trees, the morality by diameter classes and number, symptoms, insect pest activity or any other external indicators if visible

Area affected: In hectares.

Remarks: Any specific environmental condition or site factors you may suspect as being related to the problem or any other useful information.

FORM WM- 4.2

Plants: Illegal and legal collection

| S/L No. | Year | Species | Location | Details of material | Quantity | Trade particulars | Remarks |
|------------|------|---------|----------|---------------------|----------|-------------------|---------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| | | | | | | | |

Notes:

Location: By compartments or landmarks.

Details of material: To include timber, firewood, bamboo, NWFPs. Plants collected

could be of local significance or of trade significance on a national or international scale. Distinguish between legal and

illegal activity in the remarks column.

Quantity: In appropriation units.

Trade particulars: What is traded? Portions, partially processed or processed

material and where are the major trade centres, known or

suspected to be.

Remarks : Any other useful information. Legal collection applies to PA, if

permitted for research; to TUZ or to the buffer zone.

FORM WM-5

Grazing of domestic livestock Year

| S/L No. | Grazing Unit No. | List of villages in | Village-wise listed population of | Capacity of the unit (cattle units) and number of cattle | Total cattle units grazed | | Remarks |
|------------|---------------------|---------------------|-----------------------------------|--|---------------------------|---------|---------|
| 110. | Omt 110. | the unit | cattle | grazed. | Legal | Illegal | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| | | | | | | | |

Note:

Remarks:(i) Mention number of cattle immunized against FMD, RP, anthrax as the case might be and the number of cattle without the prophylactic cover.

(ii) If grass is allowed to be cut for cattle being stall-fed, mention the village and number of such cattle.

FORM WM-6

Inter-agency programmes: agencies and schemes (Government) Year

| S/L | Name of | Central or State | No. and name of | Physical an | d financial targets | Area and | Remarks |
|-----|---------|------------------|-----------------|-------------|---------------------|-------------|---------|
| No. | agency | in the unit | scheme operated | Given | Achieved | location | |
| 1 | 2 | 3 | 4 | 6 | | 7 | 8 |
| | | | | | | | |

Note:

Name of the Scheme: This includes all activities in the Govt. Sector, i.e. construction, use of resources, development processes etc. mention names of schemes, projects or

normal operations. This will address all departments in the management area and those activities outside but capable of influencing the management area.

Remarks: Success, adverse impacts, incompatibility with PA management objectives or failures should be mentioned. Detailed notes to go in the PA book.

FORM WM-6.1

Programmes of NGOs Year

| S/L | /L Name of HO No. of | | No. of the scheme | Physical and fin | nancial targets | Area | Damada |
|-----|----------------------|----------|-------------------|------------------|-----------------|-----------------|---------|
| No. | agency | location | operated | Given | Achieved | and location | Remarks |
| 1 | 2 | 3 | 4 | 6 | | 7 | 8 |
| | | | | | | | |

Note:

Remarks: Success or adverse impacts, incompatibility with PA management objectives or failures should be mentioned.

FORM WM-7

Construction */ maintenance * / of infrastructure: Road and bridges (* existing/ new) Year

| S/L No. | Category | Range | Surface | Name or No. | Length covered (Km) | Cross drainage works bridges with types | Total cost and status |
|------------|----------|-------|---------|-------------|------------------------|---|-----------------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| | | | | | | | |

Note:

Category of road: National highway, State highway, district road etc. public road

or open only to managers should be started.

Surface type : Black topped metal, earth etc. Applies to roads.

Name of number: As the case may be.

Cross drainage: e.g. for culverts – box, hume pipe culverts etc.

Bridge type : Wooden trestile, suspension, metal multi span, masonry arch etc.

Status: Work completed or on going. Use separate forms as required; for

construction and for maintenance details.

FORM WM-7.1

Development */ maintenance * / of infrastructure: Communication (* existing/ new) Year

| S/L No. | Range | Type of facility | Location | Number | Cost | Advantage gained | Remarks |
|---------|-------|------------------|----------|--------|------|------------------|---------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| | | | | | | | |

Note:

Type of facility: e.g. telephone, wireless.

Location : Staff HQ location, village, landmark etc.Advantage gained : Area served, staff locations connected etc.

Remarks: Record status – complete, ongoing, functional, non-functional.

FORM WM-7.2

Development */ maintenance * / of infrastructure: Vehicles (* existing/ new) Year

| S/L No. | Kind of vehicles | Number | HQ if any | Intended use | Cost | Remarks |
|---------|------------------|--------|-----------|--------------|------|---------|
| 1 | 2 | 3 | 4 | 5 | 6 | 8 |
| | | | | | | |

Note:

Kind of vehicle: Jeep, trailer, tractor, truck, minibus, tanker, motorcycle, bicycle, boat (Paddle or motor), launch, car, riding elephant, ponies, etc.

Intended use: Management support, patrolling/ anti-poaching, tourism etc.

Remarks: Any other useful information. Mention written off vehicles, retired or

dead animals.

*Strike out the inapplicable. Use separate forms as required to indicate acquisition, maintenance.

FORM WM-7.3

Development of infrastructure: Manpower recruitment */ existing manpower * Year

| S/L | Category of Number | | Status | | Scale of | Intended Deployment/d | Remarks | |
|-----|--------------------|--------|-------------|--------------------|----------|-----------------------|---------|--|
| No. | Post | Number | Recruitment | uitment Vacant Pay | | employed as | Kemarks | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | |
| | | | | | | | | |

Note:

Status: Permanent, temporary, contractual.

Intended deployment : State purpose e.g. conservation education, research, anti-

poaching, etc. as applicable.

Remarks: Any other useful information. New recruits within the year

Should be mentioned. This will also include officers and staff

Obtained on transfer/ deputation. Likewise changes due to

personnel going out on transfer, deputation, retirement, removal,

resignation, death should be reflected in this column.

FORM WM-7.4

Developing infrastructure: Construction of boundaries, fences, CPTs, EPTs, enclosures, enclosures (* existing/ new) Year

| S/L No. | Category construction | Range | Location | Length (meters) | Number | Specifications | Remarks |
|------------|-----------------------|-------|----------|-----------------|--------|----------------|---------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| | | | | | | | |

Note:

Category: Kind of boundary e.g. comptt, block, zone etc. In case of fences: Power

fence, etc.

Location: By compartment or suitable landmark.

Numbers: In case of enclosures, number of pillars etc. as applicable.

Specifications: As applicable to the construction: dry rubble, chain link, local material,

height, area, depth, width etc.

Remarks: Any other relevant information.

Strike out that is inapplicable. Use a form each for maintenance of existing

features and for new features.

FORM WM-7.5

Developing infrastructure: Firelines (* existing/ new) Year

| S/L No. | Range | Fireline category or width | Name of points connected | Length (meters) | Cost | Remarks |
|---------|-------|----------------------------|--------------------------|-----------------|------|---------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | | | | | |

Note:

Category: Main or subsidiary etc. Record width.

Proposal : Maintenance of fire lines: 100km/yr @ Rs5000/km = Rs 5 lakh/yr

FORM WM-8

Tourism - Year

Total number of visitors all categories: Name of complex:

Total Revenue earned

:

| 6/1 | Category | Category of visitors by month and number | | | | | Indian | | | No. staying |
|------------|----------|--|--------|-------|-------|-------|-----------|---------|----------|-------------|
| S/l No. | Adult | | | Chinl | Forei | Dunal | ral Urban | Revenue | days | over night |
| No. | Month | Male | Female | dren | gners | Rural | Orban | Revenue | visitors | and revenue |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| | | | | | | | | | | |

^{*}Strike out that is applicable. Use one form each for maintenance of existing fireline and creation of new.

Note: Column 2 to 5 will be written in three successive lines for the month pertinent, one below the other. First line information pertains to foreign tourists. Put a tick (/) in col. 6 Second and third line details rural and urban tourists respectively. Put a tick (/) in Col. 7, Column 8 as applicable.

FORM WM-8.1

Tourism: Use of tourist facilities – field trips Year

Name of complex

| S/l No. | Month | Riding elephant use. Month trip capacity | Utilization | Revenue (Rs.) | Use of month trip quantum | Guides utilization | Revenue (Rs.) |
|------------|-------|---|-------------|------------------|---------------------------|-----------------------|------------------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| | | | | | | | |

Note:

Riding elephant: Month trip capacity e.g. 2 elephants, 4 trips/day, each to carry 4 people,

Therefore the elephant month trip capacity = $2 \times 4 \times 4 \times 30 = 960$.

Guide-month : 1 guide, 4 trips/day = 1 X 4 X 30 = 120 trip quantum/ guide.

FORM WM-9

Outbreak of fires

Year

| S/l | Danga | Location | | Da | tes | Reasons | Estimated | Remarks |
|-----|-------|-------------------------------------|---|---------|-----------|----------|-----------|---------|
| No. | Range | Location Extent Detected Controlled | | Reasons | Estimated | Kemai Ks | | |
| 1 | 2 | 3 | 4 | 5 | | 6 | 7 | 8 |
| | | | | | | | | |

Note:

Location : By compartments.

Reasons: Established or suspected.

Estimated Loss: e.g. number of trees damaged, stacked firewood/ bamboo destroyed/ damaged by volume and cost, wild animals dead, particulars of

sensitive sites affected, other property or life destroyed.

Remarks: State particularly problems encountered in detection and suppression and any other useful information. State also whether the extent of fire has been mapped.

FORM WM-10

Offence cases detected

Vear

| | _ | | | | | | | | |
|-----------|--------------------|----------|--------|----------------|---------|---------------|--------------|---------|--|
| S/I Banga | | Catagory | | No. of cases d | lecided | No. of cases | No. of cases | Remarks | |
| No. | No. Range Category | | Number | Successful | Failure | under process | compounded | Kemarks | |
| 1 | 2 | 3 | 4 | 5 | | 6 | 7 | 8 | |
| | | | | | | | | | |

Note:

Category: e.g. illegal cutting of trees, illegal firewood, illegal NWFP, poaching, encroachment, illegal cattle grazing etc. category be codified by letters of alphabet.

Remarks: Any other useful information. This should also include the number of cases pending decision with the department. The cases under column 8 pertain to area of non PA status under management which do not involve an endangered species (Schedule-I).

FORM WM-11

Incentives and awards

Year

| S/l No. | Range | No. of recipients of incentives for detecting offence | Amount paid (Rs.) | Kind of award | No. of recipients | Remarks |
|------------|-------|---|-------------------|---------------|-------------------|---------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | | | | | |

Note:

Kind of award: e.g. a medal like the Shaury Chakra, any other such awards instituted by

the State or Central Government. Includes citations, extra increments etc.

Remarks : Any other useful information. If an award carried cash, mention the amount.

FORM WM-12

Research projects under implementation through PA manpower with or without collaboration with other agencies

Year

| S/l No. | Title | Completed | Ongoing | New | Status | Financial outlay (Rs.) | Expenditure incurred (Rs.) | Remarks |
|------------|-------|-----------|---------|-----|--------|------------------------|----------------------------|---------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | | | | | | | | |

Note:

Completed: State date of completion and the status of the project report.

Ongoing: State since when the project is under operation and expected period of completion.

New: State the date of commencement and duration.

Status: State the progress towards achievement of objectives: or project which has been dropped or held in abeyance etc.

Remarks: Any other relevant information. If the project is in collaboration with any other agency or is a contractual arrangement, state the situation and the name of the collaborating agency. If animal/ plant specimen are being collected, state authority and where the collections are being housed.

FORM WM-12.1

Research projects under implementation by other agencies

Year

| S/I No. | Title | Completed | Ongoing | New | Status | Financial outlay (Rs.) | Expenditure incurred (Rs.) | Remarks |
|------------|-------|-----------|---------|-----|--------|------------------------|----------------------------|---------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | | | | | | | | |

Note:

Completed: State date of completion and the status of the project report.

Ongoing: State since when the project is under operation and expected period of completion.

New: State the date of commencement and duration.

Status: State the progress towards achievement of objectives; or project which has been

dropped or kept in abeyance etc.

Remarks: Any other relevant information. If the project is in collaboration with any other agency or is a contractual arrangement, state the situation and the name of the collaborating agency. If animal/ plant specimen are being collected, state authority and where the collections are being housed.

FORM WM-13

Survey and inventories

Year

| S/l No. | Title of survey, inventory activity | Completed | Ongoing | New | By Sanctuary | By other agency | Remarks |
|------------|-------------------------------------|-----------|---------|-----|-----------------|-----------------|---------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| | | | | | | | |

Note:

Completed: State date of completion of field work and the status of the report.

Ongoing: State since when is it under operation and when is it expected to be completed.

New : State the date of commencement and duration.

By PA personnel: Will include collaboration or contractual arrangement. State the case as relevant.

Other agency: State the name of the agency.

Remarks : If specimen of plants/ animals are being collected, state where the collection

is being housed and authority. Any other useful information.

Proposal : Rs 3 lakh/yr

FORM WM-14

The monitoring programme

Year

| S/l No. | Title of the programme | Date of initiation | Responsible agency | Technique | Status collaboration and analysis of data | Remarks |
|------------|------------------------|--------------------|--------------------|-----------|---|---------|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| | | | | | | |

Note:

Technique: PCQ, beld transect, line transect and plots, pugmarks etc.

Status of collaboration: Write only if applicable.

FORM WM-15

Ecodevelopment programme: Targets and implementation

Year

| S/I | Nature of | Sector (Central/ | Target set | | Achieveme | nts | Village | |
|-----|------------------|-------------------------|------------|-----------|-----------|-----------|-----------------------|---------|
| No. | the programme | State) or NGO sponsored | Physical | Financial | Physical | Financial | (buffer/ enclaved) | Remarks |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | | | | | | | | |

Note:

Nature of the Programme: e.g. pasture development, fodder plantations, establishing biogas units, livestock improvement, establishment and development of sericulture, revival of local skills such as handicraft, water harvesting systems, adult's education etc.

Village: Site where programme is being implemented whether buffer or inside PA.

Remarks: State problems, state failures and reasons thereof, reasons for not attaining targets, for non-implementation or deviation etc. State whether it is on the right tracks in context of achievement of objectives.

FORM WM-16

Progress of all strategies under the Zone and Theme plans Year

| S/I | Zone/ Theme | Nature of | Target as per of operations | the schedule / APO * | Achievemen | nts | Location | Remarks |
|-----|----------------|--------------|-----------------------------|-------------------------|------------|-----------|----------|---------|
| No. | plan | strategy | Physical | Financial | Physical | Financial | | |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | | | | | | | | |

Note:

Zone/ Theme Plan: Mention title.

Nature of Strategy: e.g. demarcation of boundary, creation of artificial water source, salt

lick, maintenance of water sources (desilting), cutting and burning of fireline, prescribed burning, weed control, immunization of cattle, maintenance of nature trails, setting up wayside exhibits,

recruitment of staff, and number of villages translocated, settled on new sites etc.

Location: Where pertinent, mention location.

Remarks: State problems, failures and reasons thereof, shortfall and reason, deviation

if any and reasons, non-implementation with reasons etc.

* APO: (Annual Plan of Operations). Under Col. 4 and 5, each column will have two figures, First the figure as per the schedule of operations in the plan and next to it in the same column the figure as per APO. If they differ it amounts to a deviation.

FORM WM-17

Progress of legal settlements under the Wildlife (Protection) Act 1972 in context of attainment of the status of a WLS Year

| S/l No. | Nature of settlement/ enquiry and section under the Act | Progress achieved till the commencement of the year under report | Progress achieved during the year | Remarks |
|------------|---|--|-----------------------------------|---------|
| 1 | 2 | 3 | 4 | 5 |
| | | | | |

Note:

Remarks: State the problems encountered and any other useful information such as reasons for inadequate/ lack of progress.

FORM WM-18

A summary of allotment of funds, revenue and expenditure Year

| S/I | Plan/ non- | Sector | Allotment recei | ived | Expenditure | incurred | Revenue | |
|-----|--------------------------|----------------------------|-------------------|-----------|-------------------|-----------|----------|---------|
| No. | plan/ any other grant | (Central/ State/ Other) | Non- recurring | Recurring | Non- recurring | Recurring | realised | Remarks |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| | | | | | | | | |

Note: Explain under expenditure, over expenditure, savings and surrenders. State the extent of demand for the year as per the schedule of operations/ APO.

PART B: THE PROPOSED MANAGEMENT

CHAPTER 14: MONITORING AND EVALUATION

14.1 Criteria

Any plan that is not monitored properly loosed focus and fails to meet its desired goals and objectives. A mechanism needs to be developed for time bound evaluation and stock taking of the progress of implementation of the plan as well as for making necessary changes in the plan if required based on ground realities, with proper authorization.

14.2 Process:-

14.2.1 Record of Deviations and Implemented Targets

A book at the Reserve level should be maintained to record deviation and implemented targets. This book shall also include annually deferred targets. It should be attempted to accomplish tasks in year in which its provisions are made and if some tasks could not be taken up in the prescribed year, they should be taken up in plan period. There may be strategies to put off indefinitely for some unseen or compelling reasons.

There are some strategies / prescriptions which are not in Tiger Conservation Plan, but at particular time need are felt to include new strategies to be included. These strategies should be proposed with justifications to competent authority and obtain due approvals. There may be need in future to change certain strategies / prescription, similar procedure shall be adopted for them too. These deviations should be duly recorded in this book.

Implemented targets both in terms physical and financial achievement should be recorded with highlights and 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 should 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.

14.2.2 Maintenance of Compartment Histories

Compartment histories are important documents for deciding strategies of management. All compartment histories in due format shall be prepared. The formats are simple all entries shall be made and the required three 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 should 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-dation 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
 - Damage to signboards
 - Recovery of logs
 - Theft of bed materials, boulder
 - Other illegal activities
- Observations
 - Animal signs / movements
 - New water sources / saltlicks
 - New micro habitat locations
 - Important change in vegetations
 - Any other useful information regarding management

Compartment histories would be duly checked by senior officers on annual basis. Following minimum checking by various levels of officers is prescribed as below:-

ACF's/ADFO's - 30% Deputy Director - 10% Field Director - 05%

| | | | ACTIV | ACTIVITY CHART | IART | | | | | | | | | |
|--------------|--|----------------|---|----------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| \mathbf{z} | | 2000 | | | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 |
| No | Description of works | CSS Fara No | Location | Unit | Phy. |
| | | | NON F | NON RECURRING | IING | | | | | | | | | |
| | Supply of solar lights | 4.1 | North panabari, Raimatang, Gangutia, watch towers, Balapara, chunia, SAP camps, | No | 30 | 15 | 15 | 10 | 15 | 30 | 15 | 15 | 10 | 15 |
| 2 | Supply of GPS | 4.2 | all ranges | No | 20 | 10 | 10 | | 10 | 20 | 10 | 10 | | 10 |
| 3 | Amenities to staff welfare like batteries, mosquito nets, uniform, boots, protection gear, torch etc | 4.8, 4.16 | all ranges | | FS | ГS | rs | rs | rs | rs | TS | TS | TS | rs |
| 4 | Supply of camera, binoculars | 4.1,4.2 | all ranges | No | 20 | 10 | 10 | | | 20 | 10 | 10 | | |
| 5 | Tiger census | 4.7 | All ranges | | ΓS | | | | FS | ST | | | | TS |
| 9 | laying of pug mark impression pads | 4.7 | all ranges | No | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| 7 | Supply of camera traps for monitoring tiger and co predators | 4.2 | all ranges | No | 100 | 50 | 50 | | 50 | 100 | 50 | 50 | | 50 |
| ∞ | Procurement of tranquilising equipment | 4.4 | all ranges | | FS | | | | | FS | | | | |
| 6 | Procurement of vet equipment and medicines | 4.4 | All ranges | | FS | LS | LS | | rs | rs | TS | TS | | TS |
| 10 | Procurement of arms | 4.1 | All ranges | | 10 | 12 | 12 | 12 | 10 | 10 | 12 | 12 | 12 | 10 |
| | Procurement of ammunition | | All ranges | | 99 | 75 | 75 | 75 | 08 | 65 | 75 | 75 | 75 | 80 |
| 11 | Construction of Barrack | 4.1 | All ranges | No | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 |
| 12 | Construction of Forest Guard quarter | 4.1 | All ranges | No | 2 | 2 | 2 | 7 | 2 | 2 | 2 | 2 | 2 | 2 |
| 13 | Creation of grasslands in open and canopy opened areas | 4.12 | all ranges | ha | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| 14 | Construction of water storage structures | 4.2 | all ranges | No | 4 | 2 | 2 | 2 | | 4 | 2 | 2 | 2 | |
| 15 | Installation of entry gates | 4.4 | all ranges | No | 4 | 2 | 2 | | | 4 | 2 | 2 | | |
| 16 | Electrification of remote beats | 4.2 | all ranges | No | 2 | 1 | 1 | | | 2 | 1 | 1 | | |
| 17 | Procurement of tents, rain coats, accessories of Antipoaching duties | 4.8, 4.16 | all ranges | | rs | rs | rs | TS | LS | rs | LS | LS | rs | TS |
| 18 | Installation of deep tube well in remote beats | 4.1 | all ranges | No | 2 | 2 | 2 | | | 2 | 2 | 2 | | |
| 19 | Payment of exgratia, compensation, crop loss etc | 4.4 | All ranges | | FS | LS | FS | ΓS | | TS | FS | rs | FS | |
| 20 | Procurement of traps and cages | 4.4 | all ranges | No | 2 | | 2 | | 2 | 2 | | 2 | | 2 |
| 21 | Publication of publicity material, awareness material and study reports | 4.12 | all ranges | | rs | rs | rs | TS | rs | LS | rs | TS | rs | TS |

| No. | 7 | | | | | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 |
|--|-----|---|----------------|--------------|--------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| NON RECIPIENT NON RECIPIENT NON RECIPIENT NON RECIPIENT NON RECIPIENT NON RECIPIENT NOT RECIPIEN | No. | Description of works | CSS Para No | Location | Unit | Phy. |
| Construction of clancings of calcinations of a contraction of clancings of clancing of clancing of contractions of clancings of a contraction of clancings with for cond backet schilliants of clancings with for cond backet schilliants of a clans and a clanding service of clancing service of clanding servic | | | | NON F | RECURI | SING | | | | | | | | | |
| Construction of briggiesses 42 all ranges A 12 all ranges B 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 | 22 | Constructions of culverts | 4.2 | all ranges | No | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Construction of causeways 4 2 all ranges No 4 4 | 23 | Construction of bridges | 4.2 | all ranges | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| Solusings work for road banch subilization (a fig. 4) all ranges of all ranges of all ranges work for road banch subilization of the subilization | 24 | Construction of causeways | 4.2 | all ranges | No | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Solution view bank stabilization 4 1 2 all ranges of all ranges work for river bank stabilization of 4 2 all ranges and view conservation for recharging ground water (4 2 all ranges) and view conservation for recharging ground water (4 2 all ranges) and view conservation for recharging ground water (4 2 all ranges) and view conservation for recharging ground water (4 2 all ranges) and view conservation of generator of wireless and accessorics and 4 2 all ranges (4 2 all ranges) (5 2 all ranges) (7 2 all ranges) (7 2 all ranges) (8 2 all ranges) (8 2 all ranges) (8 2 all ranges) (8 2 all ranges) (9 2 all ranges) | 25 | Sausage work for road bench stabilization | 4.2 | all ranges | £m | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| Soli and valet concervation for rechanging ground water a latinges by occurrence of generation DRAM walls become dwater of generation DRAM walls become and excessories at all ranges by concurrenced of generation of valentation of generation of valentation of generation of valentation of generation of valentations and excessories at all ranges by concurrenced of computer and accessories at all ranges by concurrenced of computer and accessories at all ranges by a latinges by a significant of valentation of valentation of the protection of valentation of valentation of valentation of the part of the part of the valentation of the part of the vale | 26 | Sausage work for river bank stabilization | 4.2 | all ranges | £m | 009 | 500 | 200 | 500 | 500 | 009 | 500 | 500 | 500 | 500 |
| Procurement of generator A 42 all ranges No 2 a Morcanemator of vivieless 4.2 all ranges A 5 all ranges A 6.2 all ranges A 6. | 27 | Soil and water conservation for recharging ground water by construction DRM walls | 4.2 | all ranges | m3 | 009 | 009 | 009 | 009 | 009 | 009 | 009 | 009 | 009 | 009 |
| Procurement of wireless 42 all ranges 4 a langes 5 de fereignement of wireless 4 b langes 5 de la frances 5 de | 28 | Procurement of generator | 4.2 | all ranges | No | 2 | | | | | 2 | | | | |
| Procurement of cell phones 4,1 all ranges 4,2 all ranges 4,3 all ranges 4,4 all ranges 4 | 29 | Procurement of wireless | 4.2 | all ranges | | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Procuement of computer and accessories 4.1 all ranges 4.2 4.4 2. 2. 2. 2. 2. | 30 | Procurement of cell phones | 4.2 | all ranges | | 3 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 4 |
| Construction of valentholes 4.3 all ranges 4 | 31 | Procurement of computer and accessories | 4.1 | all ranges | | 4 | 2 | 2 | 2 | 2 | 4 | 2 | 2 | 2 | 2 |
| Procurement of tigger and leopard guard 44 all ranges 44 bamanpur/RVK No 10 5 5 5 5 5 5 5 5 5 | 32 | Creation of waterholes | 4.3 | all ranges | | 4 | 2 | 2 | 2 | 2 | 4 | 2 | 2 | 2 | 2 |
| Construction of energised fencing 44 all ranges 10 5 <td>33</td> <td>Procurement of tiger and leopard guard</td> <td>4.4</td> <td>all ranges</td> <td></td> <td>4</td> | 33 | Procurement of tiger and leopard guard | 4.4 | all ranges | | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| Construction of Research station 4.4 DamanpurRNK No 1 7 7 1 7 </td <td>34</td> <td>Installation of energised fencing</td> <td>4.4</td> <td>all ranges</td> <td></td> <td>10</td> <td>5</td> <td>5</td> <td>5</td> <td>5</td> <td>10</td> <td>5</td> <td>5</td> <td>5</td> <td>5</td> | 34 | Installation of energised fencing | 4.4 | all ranges | | 10 | 5 | 5 | 5 | 5 | 10 | 5 | 5 | 5 | 5 |
| Construction of Hostel facility for children of staff 44 Damanpur No 2 <td>35</td> <td>Construction of Research station</td> <td>4.4</td> <td>Damanpur/RVK</td> <td>No</td> <td>1</td> <td></td> <td></td> <td></td> <td></td> <td>1</td> <td></td> <td></td> <td></td> <td></td> | 35 | Construction of Research station | 4.4 | Damanpur/RVK | No | 1 | | | | | 1 | | | | |
| Construction of Boundary wall of beats 4.4 all ranges NO LS 2 < | 36 | Construction of Hostel facility for children of staff | 4.4 | Damanpur | oN | | 1 | | | | | 1 | | | |
| payment of compensation and exgratia 4.4 all ranges NO LS | 37 | Construction of Boundary wall of beats | 4.4 | all ranges | ON | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Creation of Sal Plantation 4.3 all ranges Ha 40 | 38 | payment of compensation and exgratia | 4.4 | all ranges | ON | ΓS | ST | ST | TS | FS | TS | TS | TS | ST | TS |
| Creation of Miscellaneous plantation 4.3 all ranges Ha 120 | 39 | Creation of Sal Plantation | 4.3 | all ranges | На | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| Creation of grass plantation 4.3 all ranges Ha 100 < | 40 | Creation of Miscellaneous plantation | 4.3 | all ranges | На | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 |
| Creation of Bamboo Plantation 4.3 all ranges ha 20 | 41 | Creation of grass plantation | 4.3 | all ranges | На | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| Maintenance 4.2 all ranges km 40 <td>42</td> <td>Creation of Bamboo Plantation</td> <td>4.3</td> <td>all ranges</td> <td>ha</td> <td>20</td> | 42 | Creation of Bamboo Plantation | 4.3 | all ranges | ha | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| Maintenance 4.2 all ranges km 40 <td></td> <td></td> <td></td> <td>REC</td> <td>CURRIN</td> <td>Ç</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> | | | | REC | CURRIN | Ç | | | | | | | | | |
| ing path 4.2 all ranges km 40 <t< td=""><td>1</td><td>Maintenance</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<> | 1 | Maintenance | | | | | | | | | | | | | |
| 4.2 all ranges km 200 2 | | Roads | 4.2 | all ranges | km | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| . 4.2 all ranges km 100 100 100 100 100 100 100 100 100 10 | | Patrolling path | 4.2 | all ranges | km | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| 4.2 all ranges km 5 5 5 5 5 5 5 5 5 5 | | Fire lines | 4.2 | all ranges | km | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | | Pilkhana | 4.2 | all ranges | km | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |

| 5 | | | | | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018_10 | 2010-20 | 2020-21 | 2021-22 | 2022-23 |
|---------|--|----------|------------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 7 2 | Description of months | CSS Para | 1,000 | 7, | 11-0107 | C1_107 | 01-C10# | 71-010- | 01-/107 | 71-010- | 07-7107 | 17-0707 | 77-1707 | 07-7707 |
| NO N | Description of works | No | Location | nuit | Phy. |
| | | | REC | RECURRING | Ç. | | | | | | | | | |
| | Energised fencing | 4.4 | all ranges | km | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | Wooden bridges | 4.2 | all ranges | No | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | Feed and vet care of rescued animals | 4.1 | all ranges | | ls | | | | | ls | | | | |
| 2 | Buildings | 4.2 | | | | | | | | | | | | |
| | Group D | | all ranges | No | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | Group C | | all ranges | No | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | ~ |
| | Inspection camps | | all ranges | No | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | Watch towers, anti poaching camps | 4.2 | all ranges | No | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | ~ |
| 3 | Departmental vehicles, pol | 4.2 | all ranges | No | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| 4 | Maintenance of rivereine grass lands by cut back and burning | 4.2 | all ranges | ha | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| 5 | Wages for watchers, anti poaching camps | 4.1 | all ranges | No | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| 9 | Reward for infomers | | all ranges | | ST | | | | | TS | | | | |
| 7 | Vaccination of cattle | 4.4 | all ranges | No | 200 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 |
| 8 | Office expenses | 4.2 | all ranges | | sI | ST | ST | FS | FS | ls | TS | FS | TS | LS |
| 6 | Feed and vet care of departmental elephants | 4.1 | all ranges | No | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| 10 | Artificial waterholes | 4.2 | all ranges | No | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| 11 | Soil and moisture conservation works | 4.2 | all ranges | | ls | ST | ST | FS | FS | ls | TS | FS | ST | rs |
| 12 | Desiltation of water bodies | 4.3 | all ranges | ha | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 13 | Capacity building of staff | 4.8 | all ranges | | ls | ST | ST | rs | FS | ls | TS | rs | TS | rs |
| 14 | Training programmes for villagers and JFMC | 4.17 | all ranges | | ls | ST | ST | FS | FS | ls | TS | rs | TS | rs |
| 15 | Study tour to other tiger reserves for appraisal of good practices | 4.8 | all ranges | | sI | ST | ST | FS | FS | ls | TS | TS | rs | TS |
| 16 | Herbivore census | 4.12 | all ranges | | ls | FS | | LS | | ls | TS | | rs | |
| 17 | Conducting research on mentioned topics in TCP | 4.12 | all ranges | | rs | rs | FS | LS | rs | TS | LS | rs | LS | rs |
| 18 | Cut and burning of grasslands | 4.3 | All ranges | ha | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| 19 | Training programmes for tourist Guides | 4.12 | all ranges | | LS | rs | TS | Ls | LS | rs | LS | LS | Ls | LS |



PART TWO - BUFFER

TIGER CONSERVATION PLAN – BUFFER AREA

PART A: THE EXISTING SITUATION

CHAPTER 1: INTRODUCTION OF THE AREA

1.2. Name, Location, Constitution and Extent

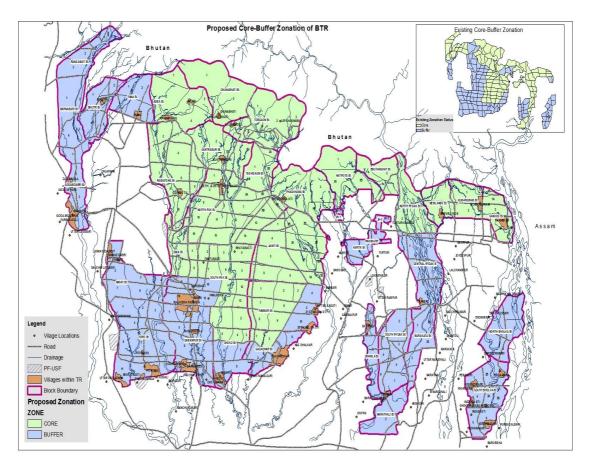
1.2.1. Name:-Buxa Tiger Reserve

1.2.2. Location:-

Buxa Tiger Reserve (B.T.R.) is situated in Alipurduar Sub-division of Jalpaiguri District, West Bengal. The existing buffer area (370.29 km²) of the Tiger Reserve consists of RFs (367.8 km²) and USFs. (2.44 km²) vide notification 3050-For/11 M-28/07- Govt. of West Bengal), dated 6th august, 2009.

The proposed buffer area of the tiger reserve is 343.32 km² vide Order No. 4-M/8-2015, dated 27-04-2015 by Principal Chief Conservator of Forests, Wildlife & Chief Wildlife Warden, West Bengal regarding Constitution of Expert Committee for Realignment of Core and buffer Zone of Buxa Tiger Reserve.

Map 1 - BTR--Buffer Area



The notification of existing Buffer is enclosed in Annexure 2 & the report of Expert Committee for Realignment of Core and Buffer Zone is enclosed in Annexure-2C.

1.1.3 Constitution:

Described in section 1.1.3 of Core Area Part.

1.1.4 Extent (Area Statement and legal Status)

BTR stretches over a length of 50 km from West to East and 35 km from North to South. The total area of the Reserve is 760.87 km². The total Buffer area of Buxa Tiger Reserve is of 370.29 km². The breakup of RF,

USF and others in the Buffer is given below:-

| Sl. No. | Status | Area in km ² |
|---------|--------|-------------------------|
| 1. | WLS | 112.42 |
| 2. | RF | 228.55 |
| 3. | USF | 2.33 |
| Total | | 343.32 |

Legal Boundaries

The buffer area stretches from the Western most boundary of the Tiger Reserve bordering Phuentsoling town of Bhutan to the Eastern most boundaries, fringing the state of Assam. The Eastern boundary of the Reserve is demarcated by Sankosh River. The Western part is profusely fringed by Tea Estates.

The Reserve is demarcated on the North by the international boundary of Bhutan. It is rather difficult to categorically state demarcation of the southern boundary of the Reserve because of its peculiar shape. The Southern boundary is mainly fringed by the agricultural fields and Tea Estates.

Ecological Boundaries:-

Described in core part of 1.1.4.

1.2. Approach and Access:-

Described in section 1.2 of Core

1.3 Statement of significance:-

1.3.1. General Significance.

The buffer areas are part of Buxa Tiger Reserve which is one of the most important protected area of Central Himalayas and Lower Gangetic Plains. It represents the diversity of flora and fauna of Terai Ecosystem. The extensive buffer areas act as a shook absorber to the fragile core by absorbing the biotic pressure. Lying adjacent to the Jaldapara National Park and bordering with Assam, the buffer areas play an important role in the movement of Asian Elephant in the landscape.

Buxa Tiger Reserve is biologically very rich. It is located in the confluence of 3 major Bio-geographic Zones viz. Lower Gangetic plains (7B), Central Himalayas (2C), and Brahammaputra valley (8A). The project site supports vital population of tiger (*Panthera tigris*). It is one of the world's most endangered carnivores and at the apexes of the food chain.

BTR represents several elements of Bio-diversity of North-East India, one of the most biodiverse Indian Regions. Most of the floral endemic species of N-E India (about 60%) are encountered in BTR.

The endemic Indo-Malayan species like Chinese Pangolin, Reticulated Python have been reported in Buxa Tiger Reserve. The rare Clouded Leopard, Marble Cat, Black-necked crane, etc. (some of the endemic species of North-East zone) are present in B.T.R. Moreover, the Reserve acts a carbon sink of the region. The mountain ranges intercept rain laden clouds and recharges ground water. It protects the catchments of several rivers and streams and thereby reduces soil erosion and maintains water regime. It sustains the economic prosperity of the region through down stream irrigation.

1.3.2. Significance at International/Regional level:-

Significance of Buxa Tiger Reserve in the International context lies in the fact that it provides shelter and protection to various species of Wildlife included in the Red Data Book (R.D.B.) of the IUCN (International Union for Conservation of Nature and Natural Resources) and the appendices of CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora).

Besides, Phipsu Wildlife Sanctuary of Bhutan is situated in the northern boundary of BTR. This is an international corridor of elephant migration. The natural Salt lick at Khurul/ Kalikhola is also situated beyond the international border of BTR and Bhutan.

TABLE – 1.1: RDB listing and CITES Appendix of Species.

| SL No. | Species | Schedule of W.L. Protection Act. | CITES Appendix | RDB listing |
|-----------|----------------------|----------------------------------|-------------------|-------------|
| Mam | mals | | | |
| 1. | Indian Tiger | I | I | Е |
| 2. | Leopard | I | I | T |
| 3. | Asian Elephant | I | I | Е |
| 4. | Indian Bison | I | I | V |
| 5. | Sloth Bear | I | I | I |
| 6. | Himalayan Black Bear | II | I | |
| 7. | Clouded Leopard | I | I | V |
| 8. | Leopard Cat | I | I | Е |
| 9. | Hispid Hare | I | I | R |
| 10. | Common Otter | I | I | K |
| 11. | Indian Pangolin | I | II | V |
| 12. | Chinese Pangolin | I | II | K |
| 13. | Rhesus Monkey | II | II | |

| SL No. | Species | Schedule of W.L. Protection Act. | CITES Appendix | RDB listing |
|-----------|----------------------------|----------------------------------|-------------------|-------------|
| 14. | Giant Squirrel | I | II | |
| 15. | Jungle Cat | II | II | |
| 16. | Fishing Cat | I | II | V |
| Aves | | | | |
| 17. | Black necked Crane | I | I | V |
| 18. | Bengal Florican | I | I | Е |
| 19. | Great pied Hornbill | I | I | Е |
| 20. | Red breasted Parakeet | I | II | |
| 21. | Blossom Leaded Parakeet | I | II | |
| Repti | les | | | |
| 22. | Common Monitor lizard | I | I | V |
| 23. | Indian Python | I | I | Е |
| 24. | Regal Python | I | II | Е |
| 25. | Cobra | II | II | |
| 26. | King Cobra | II | II | |
| 27. | Indian flap shelled turtle | I | II | V |

NOTE:

Appendix $I \rightarrow Ban$ on International Trade

Appendix II → International Trade permitted with restriction

 $E \rightarrow Endangered.$ $I \rightarrow Indeterminate$ $T \rightarrow Threatened.$

 $R \rightarrow Rare$ $V \rightarrow Vulnerable$ $K \rightarrow Insufficiently known$

1.3.3. National Level Significance:-

The Reserve lies in the Bio-geographic Zone of Central Himalayas (2C) and lower Gangetic Plains (7B) as recognized by Rodgers and Panwar (W.I.I., 1988). Significance of Buxa Tiger Reserve in the National context is expressed by the presence of several species that are included in Schedule-I of the Wildlife (Protection) Act, 1972. The following species have been given maximum protection at National level. The fragile "Terai Eco-System" constitutes a part of this Tiger Reserve. An area of 369 km2 Buxa Tiger Reserve is included in the eastern Duars Elephant Reserve and forms its core.

Tiger (Panthera tigris) 13. 1. Fishing Cat (*Prionailurus viverrinus*) 2. Leopard (*Panthera pardus*) 14. Indian wolf (*Canis lupas pallipes*) 3. Indian Bison/ Gaur (Bos gaurus) 15. Leopard Cat (*Prionailurus benghalensis*) 4. Asiatic Elephant (Elephas 16. Common Otter (*Aonyx cinerea*) maximus) Clouded Leopard (Neofelis 5. 17. Sloth Bear (Melursus ursinus) nebulosa) Chinese Pangolin (Manis 18. Himalayan Black Bear (Ursus thibetanus) 6. pentadactyla) 7. Indian Pangolin (Manis 19. Marbled Cat (*Pardofelis marmorata*) crassicaudata) 8. Large Bengal Monitor Lizard (Varanus Gaint Squirrel (Ratufa indica, 20. *R.bicolor*) bengalensis) 9. Hispid Hare (Caprolagus hispidus) 21. Black necked Crane (Grus nigriocollis) 10. Hog badger (*Arctonyx collaris*) 22. Indian pied Hornbill (Anthracoceros malbaricus) Bengal Florican (Eupodotis benghalensis) 11. Reticulated Python (Python 23. reticulatus) 12. Indian Python (*Python molurus*) 24. Peafowl (*Pavo cristatus*)

1.3.4. Significance at Local level:-

Some of the forest blocks of the Reserve such as Jainti, Panbari, North Rajabhatkhawa, South Rajabhatkhawa, Nimati, Raimatang, Tashigaon and South Rydak provide excellent Elephant habitat. A substantial number (60%) of elephant of North Bengal reside in BTR. It provides fairly good habitat for Tigers and other animals. Both food and cover are adequately available for the large carnivores. The recently concluded elephant census in November 2010 has shown that there are 215+ elephants in BTR.

Fringe people gets fuel wood, fodder, small timber, cane, thatch, decorative and edible mushroom, simul floss, medicinal plants, etc, from the Reserve in recognition of the voluntary services rendered by them to protect and conserve flora and fauna of the Reserve. It provides recreation facility to the local people. It acts as a Carbon sink and reduces the harmful effects of pollution.

Forest villagers and FD holders are totally dependent on the Reserve for their fuelwood, small timber and other non-wood forest produces and also for grazing. Prior to 1983, these villagers used to be employed in timber harvesting and plantation work for nearly 100 - 120 days in a year. The employment generation of 5.9 lakh man days during the year 1984 has dwindled to 2.775 lakh man days in 1991 due to drastic reduction in clear felling and plantation activities. Employment generated over last few years is given below

| Year | No of Man days Generated (In Lakhs) |
|---------|--|
| 2008-09 | 5.27 |
| 2009-10 | 6.29 |
| 2010-11 | 5.97 |
| 2011-12 | 6.77 |
| 2012-13 | 3.86 |

The conservation efforts in the Reserve generate several activities. This benefits residents of forest villages as well as fringe villages. To seek the cooperation of local people in conservation efforts the forest department takes up many entry point activities like training people on improved agricultural practices, various small scale trades for income generation, introduction of Eco - tourism etc. these activities have augmented the income of the local people and reduced their dependence on the forests.

Thousands of pilgrims visit ancient mahakal Temple annually. Historical Buxa prison fort is located within BTR. It is situated at an elevation of 3000 ft. above MSL in Buxa hills. During British period it was a prison for those who were involved in freedom movement.

1.3.5. Scientific Significance:-

Buxa Tiger Reserve posesses significant potential for research work in all aspects as it has diverse types of flora and fauna, many endangered species, socioeconomic issues, ethnic diversity etc. It is biologically very rich. More than 50% of the plant species of India are represented in North-East India. Of these 60% are endemic. BTR has many of those characteristics. The present check list shows 352 species of trees, 133 species of shrubs, 189 species of herbs, 108 species of climbers, 144 species of orchids, 46 species of grasses and reeds, 6 species of cane and 4 species of bamboo. Inventory is far from complete.

Along with the floral diversity, the Buxa Tiger Reserve has a wide range of faunal diversity. There are 68 species of mammals, 41 species of reptiles, 246 species of birds, 4 species of Amphibians, 103 species of fishes identified within the Reserve. It will be worth noticing that of these there are 20 nos. of species of mammals which are endangered and are included in Schedule-I of (Wildlife Protection Act, 1972) 7 nos. of birds, 10 nos. of reptiles that are also included within the endangered lists. Study on entomofauna of B.T.R. listed 500 species of insects belonging to 13 Orders, 65 families and 229 genera .The study is still continuing.

1.3.6. Conservation Values

Table-1.2: Categories of Values in Buxa Tiger Reserve

| Sl. No | Value categories | Illustrative Constituents |
|-----------|---|---|
| 1 | Real/ Economic | A part of it is a timber Reserve, it produces timber, fuel wood and non-timber forests produce for local people. It provides fodder for domestic livestock. It generates mandays for local people. |
| 2. | Biological | ♦ It is located in the confluence of 3-major Bio-geographic Zones viz. Lower Gangetic plains (7B), Central Himalayas (2C) and Brahmputra valley (8A). ♦ It provides shelter to many endangered, threatened and rare species of animals like Indian Tiger, Asian Elephant, Leopard, Gaur, Bear, Hispid Hare, Pangolin, Python, Monitor Lizard, Blacknecked Crane, Bengal Florican, Great Indian Pied Hornbill, etc. ♦ It harbours endemic species like Clouded Leopard, Chinese Pangolin, Reticulated Python, Marble Cat, etc. ♦ It has vast community diversity from East Himalayan sub-tropical wet hill forests (8B/C₁), East Himalayan Moist Mixed deciduous forests (3C/C₃b), Eastern Bhabar and Terai Sal (3C/C₁b and 3C/C₁c), Eastern sub-montane semi-evergreen forests (2B/C₁b), Northern dry deciduous seral Sal, Khair, Sissoo, Simul association (5B/IS₂) and moist Sal savannah (3C/DS₁) to low alluvium savannah woodland (3C/3/IS₁). ♦ It is a significant habitat for long ranging species (Elephant, Tiger and Gaur) and provides habitat connectivity. |
| 3 | Ecological processes and functions | Catchment conservation of several major rivers (Sankosh, Rydak, Jainti, Bala, Dima, Pana and Basra) for downstream habitations and irrigation which sustain economic well being of the region. Ecological security and environmental amelioration (pollution absorption) for the region. It acts as a carbon sink of the region. |
| 4 | Conceptual | ♦ It represents several elements of Bio-diversity of North-East India, one of the Bio-diverse Indian regions. About 60% of floral endemic species of N-E India are encountered in BTR. |
| 5 | Scientific | Significant scope of Wildlife research and education. It has socio-economic issues, ethnic diversity, and many endangered and endemic species. Thus, it provides an excellent opportunity to Scientists for improving understanding of the biological world. |
| 6 | Physical attributes | It represents the fragile Shiwalik and Himalayan landscape and rock features. It represents physical attributes of bhabar and terai eco-system. |
| 7 | Recreational | ◆ Potential for eco-tourism, aesthetic value, wilderness experience, close canopy and dense old forest, bird watching and Scenic beauty of Rydak River near Bhutanghat. |
| 8 | Educational | Significant scope for Nature interpretation and conservation awareness. |

| Sl. No | Value categories | Illustrative Constituents |
|-----------|------------------------|---|
| 9 | Assorted Religious | Pilgrimage to ancient Mahakal (Lord Shiva) Temple and Gumphas |
| | Historical Cultural | Historical Buxa Fort |
| | | |
| | | Rava, Dukpa, Garo, Nepali, Oraon, Santali and Mech tribal culture |

Table-1.3: Scaling Values in Buxa Tiger Reserve

| Sl. | Value | Illustrative Constituents | | | | |
|-----|----------|---|--|--|--|--|
| No. | Category | | | | | |
| 1. | Global | It provides shelter to Indian Tigers and Asiatic Elephant as representatives of highly endangered large mammals. It represents Himalayan landscapes and rock features. | | | | |
| 2. | National | It provides shelter to many endangered, threatened and rare species of animals like Indian Tiger, Asian Elephant, Leopard, Gaur, Bear, Hispid Hare, Pangolin, Python, Monitor Lizard, Black necked Crane, Bengal Florican, Great Indian Pied Hornbill, etc. It harbours endemic species like Clouded Leopard, Chinese Pangolin, Reticulated Python, Marble Cat, etc. It has vast community diversity from East Himalayan sub-tropical wet hill forests (8B/C1), East Himalayan Moist deciduous forests (3C/C3b), Eastern Bhabar and Terai Sal (3C/C1b and 3C/C1c), Eastern sub-montane semi-evergreen forests (2B/C1b), Northern dry deciduous seral Sal, Khair, Sissoo, Simul association (5B/IS2) and moist Sal savannah (3C/DS1) to low alluvium savannah woodland (3C/3/IS1). It represents the fragile Shiwalik eco-system., acts as huge carbon sink Immense scope of Wildlife Research and Education. Historical Buxa Fort. | | | | |
| 3. | Regional | It acts as a Carbon Sink. It is located in the confluence of 3-major Bio-geographic Zones viz. Lower Gangetic plains (7B), Central Himalayas (2C) and Brahmaputra valley (8A). It provides habitat connectivity for long ranging animals (e.g. Elephant, Gaur, and Tiger). Catchment conservation of several major rivers (Sankosh, Rydak, Jainti, Bala, Dima, Pana and Basra) for downstream habitations and irrigation which sustain economic well being of the region. Ecological security and environmental amelioration (pollution absorption) for the region. It represents several elements of Bio-diversity of North-East India, one of the Bio-diverse Indian regions. | | | | |
| 4. | State | It represents physical attributes of bhabar and terai eco-system. It has 3 natural water bodies in Hilly Section (locally called "Pokhries") and one wetland. It has potential for Eco-tourism, aesthetic value, wilderness experience, | | | | |

| Sl. No. | Value Category | Illustrative Constituents | | | | | |
|------------|-------------------|---|--|--|--|--|--|
| | | close canopy and dense old forest, bird watching and Scenic beauty of Rydak River near Bhutanghat. | | | | | |
| | | ◆ Immense scope of Natural Interpretation and conservation awareness. | | | | | |
| | | ♦ Rava and other tribal cultures. | | | | | |
| 5. | Local | The Multiple used Zone represents timber Reserve, it produce timber, fuel wood NWFP and employment for local people. It provides fodder for domestic cattle. It generates man days for local people. It has socio-economic issues, ethnic diversity. | | | | | |
| | | ♦ Immense scope of environmental education and conservation awareness. ♦ Ancient Mahakal (Shiva) Temple. | | | | | |

1.4 Geology, rock and soil:

Described in detail in section 2.1 of Core area

1.4.1 Rocky formation:-

Described in detail in section 2.1.1 of Core area

1.4.2 Sub-recent to recent formation:

Described in detail in section 2.1.2 of Core area

1.4.3 Ground Water Resources: - The water table in the Northern Bhabar tract along Raimatang, Gangutia, Pana, Jainti, etc. is usually very low. In the southern Terai region along Damanpur, South Rydak, etc. the water table is high. The perennial streams and dug wells form the main source of water supply for plantation works and human habitation. Since most of the area is covered with loose sand and gravel, there is immense potential for the development of ground water. Ground water occurs both under water table as well as in deep aquifers. Slope of water table is generally parallel with the surface slope, which is southwards. At places, the water table slope intercepts the ground surface forming springs. Table-1.4 shows the level of water in various wells during summer months.

Table – 1.4: Water table during summer at various locations.

| Tract | Locality | Water table in meters | |
|--------|-----------|-----------------------|--|
| | Gangutia | 8.5 | |
| Bhabar | Raimatang | 9.5 | |
| | Dima | 7.6 | |
| Terai | Poro | 2.8 | |
| | Gadadhar | 1.8 | |
| | Garam | 1.5 | |
| | Checko | 1.8 | |
| | Damanpur | 1.2 | |

1.4.4 Terrain:-

The Reserve is mainly situated in Bhabar and Terai areas consisting of slightly undulating land with a general inclination from North to South. It extends in some places into the outer range of Himalayas and reaches an elevation of 1800 mt. The forests of this Reserve are intersected by numerous rivers originating both from hills and plains with a general flow from North to South. List of Survey of India toposheets covering management jurisdiction with scale is given in Table-2.2 of Core

1.4.5 Climate:-

Described in detail in section 2.1.6 of Core area

1.4 Hydrology and Water sources:-

The forest tract is intercepted by numerous rivers, streams and jhoras of varying sizes which usually originate in the hills on the north and flow southwards. They rise and fall with great rapidity and frequently change their course causing damage to the Reserve. There are few natural pools and marshes situated within the Reserve. The list of natural and artificial water sources are given in Table-1.5.

Table-1.5. Natural and artificial water sources in Buffer of BTR

| S/L No. | Name of Water Sources | Category | Natural / Artificial | Compartment No. |
|------------|--------------------------|----------|-------------------------|-----------------------------|
| 1 | Sankosh | River | Natural | NBH-2, 3, 4; SBH-2, 3 |
| 2 | Gholani | River | Natural | NBH-5; SBH-2, 3, 5, 6 |
| 3 | Rydak | River | Natural | SR-3,5,7 |
| 4 | Dhawla | River | Natural | DH-1, 2, 3; SR-6, 7 |
| 5 | Gadadhar | River | Natural | PNB-10; Gada-4, 5, 6 |
| 6 | Checko | River | Natural | Gada-1, 2 |
| 7 | Nonai | Stream | Natural | DPO-8 |
| 8 | Garam | River | Natural | DPO-6; Poro-9 |
| 9 | Dima | River | Natural | SRVK-9, 16; Poro-3, 4, 8, 9 |
| 10 | Poro | River | Natural | NMT-3, 6; Poro-2, 5, 7, 10 |
| 11 | Pokhri | Pond | Natural | STB-1, TSGN-2; PHK-3 |
| 12 | Concrete Pond | | Artificial | RTG-3; TSGN-1;NRVK-13; |
| | | | | SRVK 2-1, Jainti 4 -1 |
| 13 | Kaccha Pond | | Artificial | NRVK-6, 7, 12, 13, 14; |

1.5.1 Nature and Distribution of Natural water sources:-

The natural rivers namely Poro, Bala, Dima, Rydak, Cheko, Nonai, Gadadhar, Gholani flow through the buffer and are distributed throughout the reserve. Dima and Bala are seasonal rivers and rest for perennial source. The river system of BTR and seasonal water sources has been

Described in detail in section 2.2.1 of Core area

1.5.2. Nature and Distribution of Artificial water sources:-

As the major portion of the Reserve falls in Bhabar tracts, the water holding capacity of the area is very poor. Concrete ponds have been constructed in Central, Western and Eastern part of the Reserve to maintain the availability of water for wild animals in those areas. Range wise distribution of artificial waterholes is as given in Table-1.6.

Table – 1.6: Artificial water holes in Buffer - BTR

| S/L No. | Name of the Range | No. of artificial water pool | Compartment-wise location |
|------------|-------------------|------------------------------|---------------------------|
| 1 | Pana | 1 | RTG-3 |
| 2 | Nimati | 2 | NIM-1,2 |
| 3 | Rajabhatkawa | SRVK 12, | SRVK 12, SRVK 14 |

(Source: BTR Range Records)

1.6 Vegetation Types:-

1.6.1 Bio geographic Classification:

The Reserve lies in the Bio-geographic Zones of Central Himalayas (2C) and lower Gangetic Plain (7B) as recognised by Rodgers and Panwar, W.I.I., Dehradun, 1988. The lower-Gangetic plain in North West Bengal, that separates the peninsula from Himalayas through a belt of Siwaliks in between, is referred as sub-montane Terai or Duars (Mani, 1974).

1.6.2 The Forest Types and their Distribution:

Described in detail in section 2.3.2 of Core area

1.6.3 The Availability of forage to Herbivores:

High incidence of occurrence of species per unit area and wide variety of grass, herbs and shrubs has enriched the fodder resources of the buffer forests. Field observation indicates the presence of following grasses which are mostly preferred by the wild herbivores.

Paspalidium punctuatum
Imperata cylindrica
Panicum maxima
Sateria glauca
Oryza spp.
Saccharum spp.
Arundo donax
Thysanolana spp
Themeda arundinacea
Phragmites karka

Besides, there are many species of bamboos and ferns which are browsed by the herbivores. The general availability of the browse species, their palatability, indices, temporal and spatial distribution of browse and temporal browse preference of the herbivores require detailed investigation.

1.6.4 Forest cover and Vegetation and Land cover:

The forest cover and vegetation is shown in map no 7 of core

1.7 Wild Fauna, Habitats and Trophic Niches- The details are similar in core and buffer area of the Reserve as continuous movement of animals is noticed. Details are described in section 2.4 of core.

1.7.1 Major wild fauna of BTR:

Distribution of Animals and Habitats, Habitat quality/ quantity:-

Distribution of wild animal is governed by the availability of food and water in association with shelter. Buxa Tiger Reserve is quite dynamic and movement of animals in different parts of core and buffer has been observed quite frequently.

Described in detail in section 2.4.2 of Core area

1.8 Major Conspicuous Changes in the Habitat since Inception:-

1.8.1 Due to shifting River courses:-

Described in detail in section 2.5.1 of Core area

1.8.2 Due to conversion of natural forests to monoculture:-

Natural habitats were converted to Teak (*Tectona grandis*) and Jarul (*Lagerstroemia speciosa*) (Monoculture) plantations (8,578 ha) in many areas of the Reserve like Bholka, Rydak, Dima, Rajabhatkhawa, Santrabari, Gudamdabri blocks as well as in National Park areas. About 34 % of total plantations (25,246 ha) of the Tiger Reserve is occupied by Teak and Jarul plantations which is not congenial for wild animals. Natural carrying capacity of the habitat is reduced considerably on account of such adverse changes. These areas are now being converted in to grasslands and fodder plantations through canopy opening. The areas are again becoming useful for wild life.

1.8.3 Flood:-

The hill streams are always unpredictable. Devastating floods have been recorded in Rydak River during 1950, 1952 and 1954 causing massive damage to the forests and wildlife. The flood in 1968 has played havoc in the Central Rydak and Marakata blocks. Staff quarters of Tiamari Beat were damaged. The flood left long trail of sandy beds on either side of the main course. During the flood in 1993 the Tiger Reserve was flooded, as a result deaths of wild animals like deer, Python, etc. was reported in B.T.R. Dima beat was later on shifted to eastern bank of Dima River near WRVK Range.

1.8.4 Grazing :-

Grazing by cattle inside the Tiger Reserve is a serious problem as it reduces the availability of fodder to the wild herbivores and exposes them to the risk of cattle born diseases. Buffer area is highly prone to grazing by the forest villages, Revenue villages and Tea gardens. More than one lakh cattle are reared by people residing within and on fringe of Tiger Reserve

1.8.5 Mining:

No mining was done in buffer area nor is being done now.

PART-A: THE EXISTING SITUATION

CHAPTER 2: STATUS OF TIGER AND CO-PREDATORS

2.1. Distribution:-

2.1.1. Tigers: Historically, Tigers were distributed throughout the Reserve including the southernmost ranges and the fringe areas. Movement across the border for a carnivore like tiger with large home ranges is a definite possibility, reliable data is still lacking on the status of breeding within the Reserve and the accurate seasonal pattern of movements. BTR categorically falls under the low tiger density areas and therefore the home ranges and territories of the tigers have to be estimated to get a clearer picture of their ecological requirements.

The 2007 tiger census came up with presence of a minimum of 12 tigers from the pugmarks, scats and other signs collected and the ecological factors involved. The genetic analysis of the scat samples, which were sent to Wildlife Institute of India established presence of twelve individual tigers. It was observed that the tigers were distributed throughout the Northern, Central and North-Western parts of the Reserve, in areas like Pana, NRVK, SRVK, Jainti, Poro, Nimati and Raimatang blocks of buffer.

Clouded Leopard: One clouded Leopard was rescued from a house in Alipurduar Junction in 1993 and was later released in Bhutanghat Forest. Another clouded leopard was captured in 1999 from Chengmari Beat of Bholka Range. Clouded leopard is mostly present all along foothills and shares common areas with Bhutan Forest in Northern side. Detailed study is required to ascertain its distribution.

Leopard Cat: The Leopard cat is about the size of a domestic cat but rather longer in the legs. It preys upon small birds and mammals. It is nocturnal in habit and is seldom seen. **Fishing Cat:** Though the sighting reports are not conclusive but its presence is documented and recent sightings confirm this. The Fishing Cat is distinguished from the leopard-cat by its much larger size and shorter tail.

Jungle Cat: Jungle Cats inhabit the drier and more open parts of the Reserve, keeping more to grassland, scrub jungle, the reedy banks of rivers and marshes. It preys on small mammals, birds and when near villages on poultry.

Wild Dog: Though very patchily distributed, the Reserve has definite presence of these formidable predators. A clear picture of their status and distribution is lacking, but their signs were encountered in Raimatang and Hatipota blocks during sign encounter surveys.

2.2. Abundance status: - No Tiger prescence was recorded in buffer areas during Phase-IV monitoring during 2015.

Refer Chapter 3, para 3.2

2.3. Prey-Predator Relationships: In terms of prey abundance, Buxa Tiger Reserve seems to have less than optimum availability of herbivores throughout the area. Sambars are known to be the main prey for tigers in areas they are found together. While areas like NRVK, Jainti, ERVK, Panbari, and Nimati blocks have healthy signs of sambar presence, areas like Raimatong, Adma, Pana, Bhutri, Chunabhati, Tobgaon,

Hatipota, Bhutanghat reported very patchy and scanty distribution. In absence of sambar, wild boars and barking deers would serve as the main prey for Tigers. Regarding Gaurs, they almost follow a similar distribution pattern as sambars and are absent from the majority of the northern hilly areas. While occasional lifting of a calf or a sub-adult cannot be ruled out, adult gaurs pose a too formidable challenge for tigers. In fringe areas their diet can possibly be supplemented with the occasional livestock though the majority of the kills turn out to be results of leopard depredations.

Leopards are probably the most adaptable wild cat in the subcontinent. Their presence in all the fringe and tea garden areas and the reported kills indicate that livestock and poultry form a definite component of their diet. Being cunning and more fleet-footed, they can also hunt smaller prey like hare, jackals, and peafowl. Prey-base census report of 1994 in BTR is given in Table-2.2 and range wise sighting of tiger prey (2003-08) in Fig.3.1.

Table -2.2a: Prey Base Census report of 1994 in BTR.

| Animal | No./Sq. Km. | Estimate Range (Sq. Km.) | | Pro. Estimate | |
|--------------|----------------|-----------------------------|------|---------------|-------|
| | | Min. | Max. | Min. | Max. |
| Gaur (Bison) | 0.59 | 300 | 350 | 177 | 207 |
| Barking deer | 1.45 | 650 | 700 | 943 | 1015 |
| Hog deer | 0.47 | 310 | 360 | 146 | 169 |
| Spotted deer | 1.26 | 210 | 260 | 265 | 328 |
| Sambhar | 0.46 | 700 | 750 | 322 | 345 |
| Mongoose | 0.21 | 650 | 700 | 137 | 147 |
| Porcupine | 0.08 | 150 | 200 | 12 | 16 |
| Wild boar | 3.75 | 700 | 750 | 2625 | 2813 |
| Monkeys | 20.13 | 600 | 650 | 12078 | 13085 |
| Peacock | 3.16 | 600 | 650 | 1896 | 2054 |
| Jungle fowl | 3.29 | 600 | 650 | 1974 | 2139 |

Table 2.2b: Prev Base as per Herbivore census by Line Transect Method-2013

| b. Trey Dase as pe | y Line ITansect with | | |
|--------------------|----------------------|-------|------------------------|
| Species | Density | CV | Population Estimate |
| Barking deer | 2.753 | 0.171 | 2095 |
| spotted deer | 1.026 | 0.497 | 781 |
| Bison | 1.823 | 0.456 | 1387 |
| Hog deer | 0.128 | 0.718 | 97 |
| Monkey | 8.569 | 0.32 | 6520 |
| Wild boar | 3.292 | 0.28 | 2505 |
| sambhar | 0.28 | 0.68 | 213 |

Regular herbivore census is required biannually to assess the prey base and accordingly measures need to be taken to augment the prey base for large carnivores like Tiger.

Sambars are known to be the main prey for tigers in areas they are found together. While areas like NRVK, ERVK, and Nimati blocks have healthy signs of sambar presence, areas like Raimatang, Pana, have possess patchy and scanty distribution. In absence of sambar, wild boars and barking deers serve as the main prey for tigers.

Regarding gaurs, they almost follow a similar distribution pattern as sambars and are absent from the majority of the northern hilly areas. In fringe areas tiger's prey is possibly supplemented with the occasional livestock though the majority of the kills turn out to be results of leopard depredations.

Leopards are present in all the fringe and tea garden areas and the reported kills indicate that livestock and poultry form a definite component of their diet. Being cunning and more fleet-footed, they can also hunt smaller prey like hare, jackals, and peafowl. Prey-base census report of 1994 and 2013 of BTR are given in Table-3.3a and 3.3b of core part in chapter 3.

2.4. Assessment of Threats:-

2.4.1. Hunting and Poaching:

Hunting statistics of Buxa Division showed that within a period of 20 yrs. (1930 to 1950) 150 tigers were killed. After 1958, Shooting and Fishing rights were regulated by issue of permits on payment of Scheduled fees. Conservator of Forests, Northern circle, West Bengal has prohibited hunting, shooting or capture of animals and birds within the Reserved and protected forest except wild pigs, bears and maneater vide his memo no.8476/ C.F.N. dt. 10-12-1962 for a period of 3 years. Due to these restrictions hunting of large carnivores came down in between 1955 and 1975 (36 tigers and 41 leopards). At present hunting of all species is prohibited. During Holi and Chaitra Sankranti, hunting is a tradition with tribal groups. They try to enter the forest and kill wild boar, deer and Jungle fowl etc. This is also kept under control through rigorous patrolling and creating awareness among them.

Currently elephants are most susceptible to poaching. From 1991 to 1997, 10 elephants were poached in Buxa. Labourers mainly from nearby tea estates are reported to indulge in poaching of deer, wild boar, jungle fowl, etc. It is suspected that poachers enter Buxa through Indo-Bhutan Boundary (65 Km., open boundary). As the Indo-Bhutan boundary is inaccessible due to hilly terrain (outer Himalayas), effective patrolling lacks. During 1994 four elephants were poached by Arunachal tribes in S.Rydak Range. They poached by arrow poisoning (vegetative poison).

Year wise poaching figures in BTR for 1991 to 2009 are given in table 3.5 of core.

2.4.2. Grazing: Grazing by cattle inside the Tiger Reserve is a serious problem as it reduces the availability of fodder for the wild herbivores and exposes them to the risk of cattle born diseases. As per rules, no grazing is allowed. However, because of presence of large number of forest villages and fringe villages, livestock grazing is one of the most serious threats facing BTR. It is most severe in Rangamati, Bharnabari, Bhutri, Raimatang, Nimati, Poro, Damanpur, Checko, Gadadhar, Rydak, Newlands, Sankosh, Parts of SRVK, Panbari, NRD and Bholka block. The Reserve has 46 fringe villages, 34 tea gardens, 37 forest villages and 4 F.D. holding hamlets in and around it. These villages and Tea gardens have approx. 1.5 lakh domestic livestock. Fair percentage of these graze illegally inside the Reserve grazing during dry season (March-April), which affects habitat quality severely. Even hilly areas in the northern part like Tobgaon, Chunabhati, and Santarabari blocks have medium to large villages contributing to the grazing problem.

The domestic cattle compete directly with the wild herbivores for fodder. They share the common water holes with the wild animals. So, there is a fair chance of dissemination of cattle borne diseases (Anthrax, F.M.D., H.S.B.Q., etc.) to the wild animal.

2.4.3. Disease: Wild animals particularly herbivores are susceptible to diseases transmitted through domestic cattle. So, Grazing, besides degrading habitat also create chances of transmitting of many diseases to wild animals. Anthrax, Foot and mouth Disease (FMD), Tuberculosis etc. are the common diseases, which usually kill wild animals. No case has been recorded for FMD in BTR. As per available records, 4 wild elephant and 1 gaur died in 1994 due to attack of Anthrax. This was the first incidence of anthrax outbreak. Entire Northern West Bengal was affected. Cattle in fringe and forest villages are regularly immunised against these.

2.4.4. Encroachment:

No encroachment is reported in Buffer

2.4.5. Fuel and firewood collection:

BTR faces a huge threat in terms of fuel and firewood collection. The vulnerable areas are parts of Raimatang along T.E., Dima, Poro, Gadadhar, Parts of SRVK, Rydak, West and East Nimati beats. Firewood is collected by people not only for their own use but also for sale in local markets. For this purpose local people even fell green trees. Firewood is removed by head load and cycle.

North and South Bholka blocks face equal if not greater amount of threat due to their situation and presence of huge number of villages and tea gardens surrounding them. While resource dependency of these people cannot be diverted given the present situation, some enhanced measures can be undertaken to reduce the amount of disturbance.

2.4.6. Illegal removal of N.W.F.P.'s:

N.W.F.P. collection by JFMCs members is legally permissible as per Govt. order. But there is no definite harvesting procedure for it. JFMCS members, many Tea garden labourers are also involved in its collection. Thatch is collected from grasslands for thatching roofs. Several people enter illegally into the forest for collection of simul floss and decorative fungi (cheu) and create disturbance to wild animals.

2.4.7. Tea Industries:

There are 34 Tea gardens situated in the fringe of the Tiger Reserve. Many labourers of Tea Gardens are associated with illegal removal of timber, firewood, N.W.F.P.s, hunting of deer, Wild boars, hares, Jungle fowl and other birds. Tea gardens act as a barrier for easy movement of Wildlife from one forest to another especially for elephants and gaur. Also, the associated settlements create additional pressure on the forest in terms of fuel, firewood and NTFP collection.

2.4.8. Wild fires:

Fire is not uncommon in B.T.R. The occurrence of fire particularly in the month of January to April is common in foothill areas and in areas occupied by pure teak plantations. The vulnerable areas are Santarabari, NRVK, SRVK and Raimatang Blocks, also the Riverine tract of Rydak blocks and Bholka blocks. Illicit fellers, razier, thatch collectors, and other NWFP collectors knowingly/ unknowingly lit the fire. Sometimes poachers lit fire to expose the wild animals.

Fire History: dealt in section 3.4.8 of core.

Crown fire is not reported from BTR Except in few patches in hilly tract of Tashigaon block. Ground fire is common in BTR from January to April every year.

Causes of Fire: dealt in section 3.4.8 of core.

Fire affected areas:

Most fire affected areas in BTR are the north of 23rd mile, mainly Bhabar and hilly tracts. Teak plantations of Buxaroad, Rajabhatkhawa, Dima and Dry forests of Raimatang are prone to fire and ground fire in these regions is reported on regular basis.

2.4.9. Mining:-

No mining area was done in buffer areas.

2.4.10 Boulder collection:

Boulder collection from buffer area especially from Dima, Pana and Gaburbasra is allowed presently as per guidelines of Supreme Court. The collection of boulders is beneficial in keeping the river bed low and also provides employment to Forest village settlements within the forest areas.

2.4.11. Roads, Railways and Electric Transmission line:-

A number of P.W.D. roads and the National Highway pass through the Buxa Tiger Reserve. National Highway NH31C passes through the fringe of reserve bisecting the forest at Poro, Nimati and Damanpur areas. The broad gauge railway line from Damanpur to Hasimara passes through the Reserve for almost 16 kilometres. Number of elephants has been killed due to collision with railway engines as the number of trains travelling in this sector has increased many folds after conversion of the track to broad gauze. Electric transmission line also passes through the Reserve. As a consequence, an elephant died in 1997 at Bhutri due to fall of high tension line.

There is another threat of a busy road to Pepping in Bhutan (Proposed Tala – Rydak road) through the natural hill and foothill forests of Bhutanghat which is a part of core area of BTR. In fact the road connection of Bhutan is increasing which shall increase pressure of vehicular traffic along the existing roads coursing through forests of Bhutanghat as well as Kalikhola – Barobisha Road.

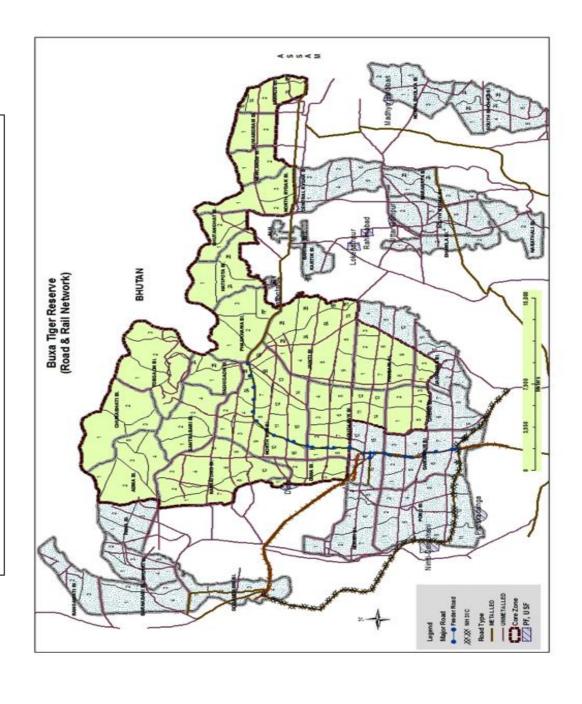
2.4.12. External Development Threats:

The external development threats to the Tiger Reserve include the proposed Rail line to Phuentsoling from Hasimara, and expressway to Bhutan project. These projects may hamper the corridor connectivity between Buxa and Jaldapara if proper impact assessment and corrections are not implemented.

2.4.13. Invasive plants and weeds:

Of late weeds are encroaching into areas of BTR due to grazing pressure. Weeds like eupatorium, michenia and to a little extent lantana are found along the fringes of villages and roads.

MAP 2: Road & Rail Network within BTR



PART A: THE EXISTING SITUATION

CHAPTER 3: HISTORY OF PAST MANAGEMENT AND PRESENT PRACTICES

3.1. Conservation and Forest Management History

This is same for both core and buffer and has been discussed in detail in section 4.1 of Core.

a) Forest Village:

In 1894 cultivators were first allowed to settle in the forest in connection with the scheme of taungya sowings. About 1904 establishment of forest villages became a regular policy and very large numbers of forest villagers were allowed to settle in the forest. Forest villagers were found very useful for undertaking cultural operations in the forest and also for fire protection purposes. Initially there was not sufficient control over the amount of land a villager might cultivate and number of cattle he might keep.

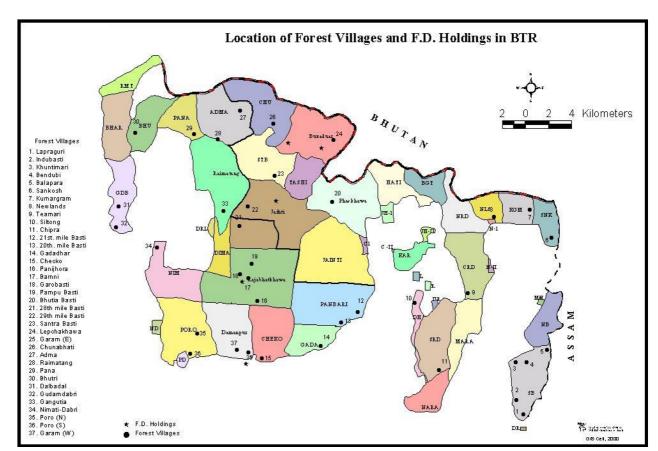
In 1912 rules were made limiting the cultivation and homestead land to $2\frac{1}{2}$ acres in plains and $1\frac{1}{2}$ acres in hills per family. Each household was allowed to keep not more than 2 plough cattle, 2 milch cow and 4 calves; 2 goats/ sheep may be allowed provided that they are always stall fed. As a result of this restriction all the undesirable villagers left but the useful villagers in nearly all cases returned shortly agreeing to abide by the rules.

At present there are 37 forest villages existing in this Reserve with a total strength of 2948 families of which 1011 are agreement holder. These forest villages were looked after by the Forest Village Development Division which was created in 1988 with HQ at Jalpaiguri. The forest villagers have been provided with wooden departmental quarters in most cases. Construction of wooden huts has been started from the year 1947 – 48 and has continued till 1960 – 61. Further welfare measures have been undertaken in the forest villages by providing ring wells, construction of pipelines for supply of water and also by providing primary schools and teachers' quarters to cater to the requirement of forest villagers with the closing of Forest Village Development Division now the onus of development of these villages is completely with civil administration and Panchayat. Forest villages come under the Panchayat system from 1998.

b) Fixed Demand holding:

No new fixed demand holdings are created and no permission is granted for exchange or mutation of names in the existing fixed demand holding as per order of the Chief Conservator of Forests, West Bengal contained in his memo. No.2932/C/5D-1 dated 26th March, 1965. (Ref. 7th Working Plan of Buxa Division). This, however, shall not apply to fixed demand holding on water pipeline, water channel and road passing through Govt. forests, which cases will be judged on their individual merit.

The policy is to recover gradually fixed demand holdings by resumption where the original recorded holders are either dead or absent and to resume through legal procedure, if the holders are no longer running any trade with Forest Directorate. Policy decision in this regard has to be taken by Govt taking into consideration and impact of Scheduled Tribes and other Forest Dwellers act.



Map 3 -Location of forest villages and FD holdings

3.2 Protection of Tiger, its Prey and Habitat

The protection mechanism is detailed in Security Plan part.

3.3 Other Land Use-villages, Agriculture, Developmental Programmes, Tourism etc.

3.3.1 Villages and agriculture: The project area is fringed by 34 tea gardens and 46 revenue villages on Western and Southern sides. Seventy nine mouzas (considering 2 km from Reserve boundary), having a population of 2.55 lakhs fringe the Reserve. Total population of forest villagers (in 37 forest villages) and fixed demand holders in BTR is 17587 as per 2011 population census.

Most of the people living in non-Tea Estate mouzas depend primarily on agriculture. Their income is also supplemented in most cases by primitive animal husbandry. Forest villagers cultivate their land and rear large number of cattle.

3.3.1.1 Land Use Patterns:

The village areas located at the outskirts of forest in South and South-East are mostly cultivated fields. In the Western portion, tea gardens dominate. There are tea gardens in between the forest areas. Tea gardens predominate in the central portion too. Agriculture is mostly rain fed. Household orchards contain Jack fruit, Banana & Areca nut. Agricultural crops raised during pre-kharif are Maize and Jute. Millet, Mustard, Potato and vegetables are grown during Rabi season. Paddy is the main crop. Traditional practice is followed for agriculture but the pattern is changing gradually. Average production of paddy are Jute 15 – 35 quintal/ ha. Potato production is 60-90 quintals per ha. Rice is the most dominant crop (90.4% area). Jute (14.55%) is the second most important crop of the region. Vegetables (2.53%) are the third most important crop grown.

Table 3.3: Land – Use situation in PA interface

| | BLOCKS | | | |
|-----------------------------|------------|-----------|-----------|------------|
| LAND USE | Alipurduar | Kumargram | Kalchini | TOTAL |
| Total area (Ha) | 68,472.20 | 70,477.69 | 51,767.75 | 190,717.64 |
| Area under Tea Gardens (Ha) | 9,360.08 | 18,507.73 | 11,248.86 | 39,116.67 |
| (% of Total area) | (13.67%) | (26.26%) | (21.72%) | |
| Area under Forest (Ha) | 13,160.43 | 44.957.36 | 21,713.08 | 79,830.87 |
| (% Of Total area) | (19.22 %) | (63.79%) | (41.94%) | |
| Area under Cultivation (Ha) | 45,951.69 | 7013.60 | 10,265.54 | 63,230.83 |
| | (67.11%) | (9.95 %) | (19.83%) | |
| Area under Irrigated | 1,305.03 | 764.48 | 1220.57 | 3.290.08 |
| Agriculture(Ha) | (2.84 %) | (10.90 %) | (11.89%) | |
| (% of item 4) | | | | |

Source: Jalpaiguri District Handbook, W.B (2011).

3.3.1.2 Socio-Economic and Cultural Environment: District Scenario: The socioeconomic and cultural factors exert strong influence on the forest. There are 595 villages and 15 towns including three municipalities in Jalpaiguri district. Out of a total population of 38, 72,846 (2011 census), about 84% (32, 53,191) are rural. Migration from adjoining Bangladesh and Nepal has led to steady increase in population. The density of population is 622 per km² as per 2011 census, whereas as per 1981 census, it was 353 per km². About 70% of rural population is engaged in agriculture and allied activities and rest 14% is in non-agricultural activities. A large number of female workers are engaged in the tea gardens and in agricultural activities. The pressure on agricultural land is increasing gradually.

Out of 6, 24,500 Ha of land, 37,409 Ha is under irrigation. Irrigation is mainly done through shallow tube well, ponds, dug wells, etc. Transport network is not very developed in the district. The district has 24% area under forest, 20% under tea garden, 36% under field crops and 20% under rivers, roads, towns, villages, etc.

3.3.1.3 People's Economy and Major Employment Sources: People residing in and around the Tiger Reserve are very poor. There is no industry except tea. Agriculture is the main occupation. Villagers follow the traditional agricultural practices. Irrigation facilities are poor and majority of the agricultural lands are mono cropped.

Huge labour force is present. The sources of employment that now exists are forestry works, buildings and road construction, fishing in rivers, soil conservation and river training works, honey and other NWFP collection, works in tea gardens, etc. The main season of unemployment is winter (December – March). Villagers maintain large no. of cattle, most of which are scrub cattle. No dairy co-operative is present. Cow dung is used mainly as manure in agricultural fields. People largely depend on forests for fuel wood.

Number of regularly employed is very little. In tea gardens, labourers get employment from April- November. December to April is the lean period. During this lean period, most of the tea-garden labourers cut firewood from forests. There are 37 sawmills including 5 Veneer mills in the vicinity. Villagers migrate to Bhutan, Gujarat, Delhi, Meghalaya, Arunachal Pradesh and Assam in search of work.

Traditionally, local economy is dependent on forest resources. Saw mills, veneer mills, furniture shops depend on forest resources. Poor families depend on sale of firewood for earning their livelihood. Milk production in forest villages and T.Gs. depend heavily on grazing in forests of Tiger Reserve. No in-depth study report on resource dependency of local people is available in the area. Almost 2/3rd of the fuelwood obtained from forests found its way away from the fringe area to Cooch Behar and Siliguri. Urban conglomerate in the Duars and Terai regions yet remain the major fuel wood consuming centres. Fuel wood, agricultural waste, cow dung, coal, kerosene and cooking gas are traditional sources of energy.

3.3.1.4 Implications of the Land use and Resource Dependence for the Conservation issues in the Tiger Reserve:

People have subsistence level of economy. To augment their scarce income villagers illegally remove trees, cut fodder grasses and thatch, graze cattle inside the forest. This exerts tremendous pressure on the Reserve.

Flood and soil erosion from time to time cause heavy damage to vegetation and agricultural land. Forest villages situated inside the forest also hold more land beyond their allotment. Human and cattle population of forest villages is also increasing. This increases pressure on wildlife habitat.

Large quantity of firewood is removed through head loads. This is sold for earning livelihood. This is degrading habitat. Grazing is reducing palatable fodder resources of the Reserve affecting population dynamics of wild animals. Graziers fire forest floor and extensive area is burnt. This degrades habitat quality.

Man-animal conflict is increasing gradually due to human settlement, development of agriculture and tea industry. Wild animals are getting disturbed and their habitat is shrinking gradually. Wild animals, particularly elephant and gaur, occasionally come out of the forests and cause damage to the cultivated field.

3.3.2 Developmental Programmes: The land devoted to developmental programmes is limited. Very little of irrigation facilities are available. In few villages adjoin forest, forest department has developed jumpoi system, that is earthen canal system in which a stream is dammed and water is diverted through earthen canals for irrigation purpose. In forest villages certain land has been set aside for development of facilities like school, community centres etc.

3.3.3 Tourism:

Detailed in Ecotourism Part

3.4 Research, Monitoring and Wildlife health

This is as detailed in Chapter 11 of BTR-TCP (Buffer).

3.5 Nature Education and Interpretation

Buxa Tiger Reserve offers an ideal environment for nature interpretation as well as an educational activity, aiming at revealing meaning and relationships of complex ecosystems and natural food web. There are two Nature Interpretation Centres (NIC), one at Rajabhatkhawa and another at Buxa fort. Rajabhatkhawa NIC is an excellent creation. It consists of reception, displays, library and auditorium. This NIC remain open for the visitors daily from 10.00 am to 5.00 pm. A visitor book is maintained at NIC to get the Visitor's feedback and to assess the number of visitors.

Nandadevi Foundation, Mountaineers Rovers, Alipurduar Nature Club (NGOs) conducts Nature Education Camps every year involving students and teachers from different schools. Himalayan nature and Adventure Foundation (HNAF), a reputed NGO of the region, also holds annual nature camps with underprivileged and handicapped children in BTR.

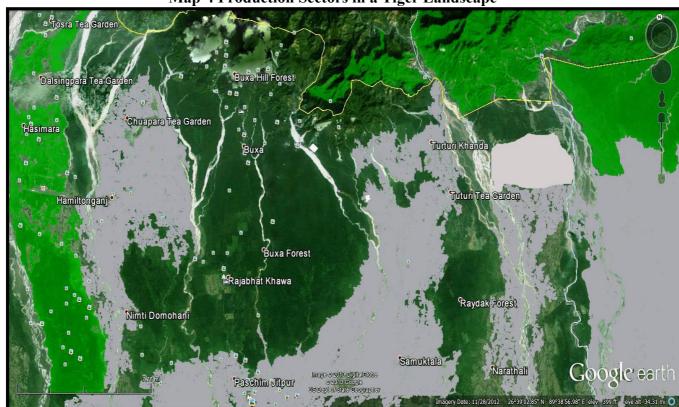
3.6. Administration and Organization

As detailed in Chapter 4 of BTR-TCP (Core area)

PART-A: THE EXISTING SITUATION

CHAPTER 4: PRODUCTION SECTORS IN THE LANDSCAPE

A number of production sectors operate in the buffer area and surrounding landscape of a Tiger Reserve, which directly (D) or incidentally (I) affect tiger conservation (**Plate 1**). Therefore, the basic managerial strategy for the buffer area should focus on mainstreaming wildlife concerns amongst such sectors.



Map-4 Production Sectors in a Tiger Landscape

Tea Garden & Tea Industry and Agricultural Area adjoining

Buxa Tiger Reserve Adjoining Forest Areas



4.1 Forestry

Forestry operations are aimed towards concurrent promotion of biodiversity conservation and meeting resource needs of and generating employment for local people. The dependence of local population is also high on forestry activities. The following measures will have direct bearing in Tiger Reserve

- (i) JFM resolution vide no 5969-For dated 3.10.2008 envisages active participation and involvement of local people for generation, maintenance of and protection of afforested forests and protection of Wildlife habitat as per the resolution the Forest are being managed jointly by BTR management and 61 JFMCs constituted by involving local people.
- (ii) JFMCs shall be entitled to collect fallen twigs, grass, fruits, flowers, mushrooms, seeds, leaves subject to guidelines and restrictions imposed from time to time.
- (iii) Members of JFMCs receive 15% of net sale proceeds of timber and firewood.

- (iv) Preferential and concessional availability of wood and non-wood resources to local people directly participating in conservation of forest and other resources.
- (vi) Economic employment generation through weed suppression e.g. Lantana harvests

for pulp, chipboard or basket making on small or cottage industry scale.

(v) Simple water harvesting and catchment treatment works.

4.2 Agriculture (D)

Agriculture in Buxa Tiger Reserve landscape is predominantly rice based and is mono cropping systems except few patches. Though several perennial rivers flow in the region not much of development has been done in tapping these for irrigation of fields. Main agriculture season is Monsoon. The growing crops like Maize and Rice attract elephants and leads to Man animal conflict and the conflict is of highest intensity in the region. The villages in and around the tiger reserve still cultivate and practice primitive agriculture with little penetration of modern technologies.

Agro forestry in some patches of Kalchini, Samuktala and Kumargram is promising. People grow tree species which are quick growing and provide good returns like Gamar, Teak, and Simul in their farmlands. Bamboo is also cultivated or grown in their backyards and is also a source of income for majority of groups.

BTR management has introduced apiculture in few JFMCs like Pannialguri, Sibkata, Ghoramara, and Kumargram which is being picked up the people in a big way. The area has got plenty of potential for vegetable growing and main vegetables that are cultivated are potato, brinjal and chilli. The age old practice of taungya is still practiced by some forest villagers and they earn good income from this practice.

4.3 Integrated Development (Eco development, Development through Dist. Administration) (D)

- (i) Since the area is border are of state as well as country some important development schemes like Border area development programme is being implemented by administration
- (ii) Zila parishad, Panchayat samity and Gram Panchayat undertake many welfares schemes for the villagers residing in and around the tiger Reserve.
- (iii) Preferential employment to locals, is being provided through NREGS
- (iv) 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.
- (v) Cooperative dairying with marketing support is lacking. Most of the cattle are reared for slaughter and cow dung. Scientific animal husbandry is yet to take off in the region.

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4.4 Tourism (D)

Jalpaiguri district receives good number of tourists every year. Ecotourism is being carried out within a limited area of the Reserve. The Department of tourism has included B.T.R. within the tourist circuit. Presently the main tourist attractions are places scattered all over the East and West Divisions, namely Jainti, Buxaduar, Bhutanghat, Rajabhatkhawa etc. Though, tourists visit this Reserve mainly for nature and adventure tourism and the main focus is on wildlife tourism, Pilgrimage based tourism also takes place in the core of BTR. Commercialization of tourism within BTR is not compatible with its main objective of protecting bio-diversity of the area. But restricted tourism in the form of nature education tour and eco-tourism help the people appreciate the need for preserving wilderness values. An enlightened nature tourist is an ally in the cause of bio-diversity conservation.

4.5 Fisheries (D)

Fishery is being practice din unorganised way in the region. People mainly fish in rivers, streams and jhoras. Some do pisciculture in local ponds but mostly by traditional methods.

4.6 Tea Estates (affects incidentally) (I**)

There are 34 Tea gardens situated in the fringe of the Tiger Reserve. A large area of landscape is occupied by tea gardens. The sector provides employment to large number of people. It also provides seasonal employments. The populations inside tea gardening is quite high. Many labourers of Tea Gardens are associated with illegal removal of timber, firewood, N.W.F.P.s, hunting of deer, Wild boars, hares, Jungle fowl and other birds. Tea gardens act as a barrier for easy movement of Wildlife from one forest to another especially for elephants and gaur and create lot of depredation to crop and private property. Also, the associated settlements create additional pressure on the forest in terms of fuel, firewood and NTFP collection.

4.7 Road / Rail transport (D)

This sector is not much developed in the landscape, although a major broad gauge railway line passes through the landscape. A national highway also passes through the landscape. This sector provides employment to a small number of people. The railway affects the wildlife movements. Several elephants have been killed by trains in recent past. Northeast Frontier Railways are plying passenger and freight trains from west to east and back and in North Bengal on a track located for a large part inside forests. The portion between Siliguri to Alipurduar stretches for about 160 km. In the Terai and western Duars sectors the track is mostly on the base of the foothills and further eastwards located on flat plains of eastern Duars. The track cuts across innumerable rivers and streams flowing from north to south and also lie stretched on lush green tea gardens at places. From west to east the line passes through forests over 74 km. including 2 sanctuaries, viz. Mahananda, Chapramari and Jaldapara National park and buffer areas in 4 forest divisions viz. Kalimpong, Jalpaiguri, Cooch Behar and Buxa Tiger Reserve. 36% length of major migration paths of Elephants cut across the track at various places. Ever since the conversion of the track into broad gauge the traffic along the route has increased many fold and to which lot of elephants and other wildlife have become victims.

Table. 4.1 Details of Elephants killed by speeding trains in Buxa Tiger Reserve since 1996

| | Statistics of Elephant killings by Rail in BTR | | | | | | | | |
|----------|--|------------------|-------------|------------------------------|---------------------|---|---------------|--|--|
| SI no | Date | Time of incident | Km post | Division | No of animal killed | Sex of the animal | Location | | |
| 1 | 04-06-1996 | 23.00 | 138 | BTRW | 1 | adult female | Forest and TE | | |
| 2 | 09-06-2001 | 0.45 | 159/2 | BTRW | 1 | adult female | Forest and TE | | |
| 3 | 28-05-2006 | 19.30 | 162/4 | BTRW | 1 | adult makna | Forest | | |
| 4 | 11-04-2007 | 4.40 | 151/5 | BTRW | 1 | adult makna | Forest | | |
| 5 | 09-11-2007 | 1.00 | 157/2 | BTRW | 1 | adult makna | Forest | | |
| 6 | 15-01-2008 | 4.30 | 154/4 | BTRW | 1 | Male calf | forest | | |
| 7 | 03.06.2010 | 2.08 | 149/4 | Garopara Chopathy; BTR | 1 | sub adult male | corridor | | |
| 8 | 03-06-2010 | 05:00 | | BTRW | 1 | | Forest | | |
| 9 | 05-01-2013 | 18.14 | 161/1- 5 | BTRW | 4 | 3 sub adult male & one sub adult female | forest | | |
| 10 | 05-03-2013 | 6.40am | | BTR W | 1 | Tusker | Forest | | |
| | | | | Total | 12 | | | | |

4.8 Industry (D)

Major industries in the region are Tea, Timber and some brick kilns are operating.

4.9 Mining (I)

At present all the mining activities has been stopped inside the Tiger Reserve.

- **4.10 Thermal Power Plants (I):** The landscape does not have a thermal power project.
- **4.11 Irrigation Projects (D):** At present only one large scale irrigation project is located in the landscape. The Teesta river water is being used for irrigation in certain part of Jalpaiguri district. The Tiger project is however located quite away from the project site. Sankosh multipurpose project is being planned by Ministry of water resources, Govt of India and the proposed alternate route bypasses the Tiger Reserve area and route is described in core part of TCP

4.12 Temple Tourism (I)

Dealt separately in Tourism Plan

4.13 Communication Projects (D) No major communication project operates in the landscape.

PART-A: THE EXISTING SITUATION

CHAPTER 5: LAND USE PATTERNS AND CONSERVATION-MANAGEMENT ISSUES

5.1. Land Use Classification:

5.1.1. The Existing Situation in the Zone of Influence:-

The project area is fringed by 34 tea gardens and 46 revenue villages on Western and Southern sides. Seventy nine mouzas (considering 2 km from Reserve boundary), having a population of 2.55 lakhs fringe the Reserve. Total population of forest villagers (in 37 forest villages) and fixed demand holders in BTR was 18,503 in 2011. This population has a fairly high representation of schedule castes and Schedule Tribes. They account for more that 50% population. Most of the people living in non-Tea Estate mouzas depend primarily on agriculture. Their income is also supplemented in most cases by primitive animal husbandry.

Forest villagers cultivate their land and rear large number of cattle. Reduction in forest harvesting, extent of creation and maintenance of plantations mean substantial reduction in employment of both forest villagers and fringe dwellers. The human population of 46 revenue villages is 1, 38,367 (2011 census). Other relevant information about the three P.S. connected with BTR are as follows:-

Table 5.1-: Demographic figure in the PA Interface blocks

| | | Alipurduar I | Alipurduar II | Kalchini | Kumargram | TOTAL |
|-----|--|-----------------|------------------|-----------|-----------|----------|
| 1. | Geographical Area (Ha) | 378.59 | 318.92 | 711.61 | 517.68 | 1926.8 |
| 2. | Total Population | 219721 | 217517 | 279684 | 199615 | 916537 |
| 3. | No. of Household | 40269 | 40245 | 50231 | 45292 | 166421 |
| 4. | No. of inhabited Village | 48 | 79 | 43 | 55 | 225 |
| 5. | No. of Forest Village (+F.D. holdings) | | | 30 (+4) | 7 | 41 |
| 6. | No. of Tea Garden | 5 | | 22 | 11 | 38 |
| 7. | Literate (% Literacy) | 76.9 | 73.7 | 65.2 | 69.7 | 71.37 |
| 8 | Agricultural laborers | 18711 | 22619 | 6617 | 15315 | 63262 |
| 9. | Net are cultivated | 16829 | 25845 | 21935 | 19673 | 84282 |
| 10. | Forest area (ha) | 15576 | | 63254 | 23893 | 102723 |
| 11. | Livestock | | | | | |
| | a)cattle | 66659 | 92499 | 61239 | 61744 | 2,82,141 |
| | b)Buffalo | 413 | 165 | 579 | 591 | 1748 |
| | c)goats | 36505 | 44915 | 51592 | 36062 | 1,69,074 |

Source: Jalpaiguri District statistical Handbook

About 88% of the population is rural. Such an interface exerts tremendous pressure on the Reserve.

Table 5.2. Population Figures for different settlement categories inside BTR (2011-Census)

| Village/TE | BTR(East) | | BTR | (West) | BTR Total | |
|------------|-----------|------------|--------|------------|-----------|------------|
| | Number | Population | Number | Population | No | population |
| Forest | 17 | 4801` | 21 | 10919 | 38 | 15720 |
| villages | | | | | | |
| F.D. | 2 | 1315 | 2 | 1468 | 4 | 2783 |
| holdings | | | | | | |
| Tea garden | 12 | 46285 | 28 | 130188 | 40 | 176473 |
| Revenue | 26 | 62815 | 23 | 75552 | 49 | 138367 |
| village | | | | | | |

5.1.2. Land use patterns

The use of land in the Northern and Southern part of the Reserve varies greatly depending on the nature of the parent material- soil, terrain, hydrological conditions, drainage, rainfall, temperature, irrigation facility etc. Lands are more fertile in south than in north; soil depth is more in south than in north.

The village areas located at the outskirts of forest in South and South-East are mostly cultivated fields. In the western portion, tea gardens dominate. There are tea gardens in between the forest areas. Tea gardens predominate in the central portion too.

Agriculture is mostly rain fed. Household orchards contain Jack fruit, Banana, Mango, Areca nut, Bamboo etc. Agricultural crops raised during pre-kharif are Maize and Jute. Millet, Mustard, Potato, wheat and vegetables are grown during Rabi season. Paddy is the main crop. Traditional practice is followed for agriculture but the pattern is changing gradually. Average production of paddy are Jute 15-35 quintal/ ha. Potato production is 60-90 quintals per ha.

Rice is the most dominant crop (90.4% area). Jute (14.55%) is the second most important crop of the region. Vegetables (2.53%) are the third most important crop grown (Chakraborty, 1993).

Table 5.3: Land – Use situation in PA interface

| | | BLOCKS | | | | |
|----------------------------------|------------|-----------|-----------|------------|--|--|
| LAND USE | Alipurduar | Kumargram | Kalchini | TOTAL | | |
| Total area (Ha) | 68,472.20 | 70,477.69 | 51,767.75 | 190,717.64 | | |
| Area under Tea Gardens (Ha) | 9,360.08 | 18,507.73 | 11,248.86 | 39,116.67 | | |
| (% of Total area) | (13.67%) | (26.26%) | (21.72%) | | | |
| Area under Forest (Ha) | 13,160.43 | 44.957.36 | 21,713.08 | 79,830.87 | | |
| (% 0f Total area) | (19.22 %) | (63.79%) | (41.94%) | | | |
| Area under Cultivation (Ha) | 45,951.69 | 7013.60 | 10,265.54 | 63,230.83 | | |
| | (67.11%) | (9.95 %) | (19.83%) | | | |
| Area under Irrigated Agriculture | 1,305.03 | 764.48 | 1220.57 | 3.290.08 | | |
| (Ha) (% of item 4) | (2.84 %) | (10.90 %) | (11.89%) | | | |

Source: Jalpaiguri District Census Handbook, W.B.

Socio- Economic Profile of Villages:-

There are 37 forest villages and 4 F.D. holding inside the Reserve and 46 revenue villages, 34 tea gardens are situated outside the Reserve (within 2 Kms. from external boundary of the Reserve). The list of these habitations with their associated populations as per 2011 census is given below in the following tables:-

Table 5.4: Forest villages within BTR and their Human population: 2011 Census

| Location of Villages | Male | Female | Total |
|----------------------|------|--------|-------|
| Rydak forest | 454 | 411 | 865 |
| Dhumpara forest | 718 | 720 | 1438 |
| Bholka forest | 735 | 703 | 1438 |
| Gabur basra forest | 275 | 259 | 534 |
| Bhutri forest | 124 | 99 | 223 |
| Buxa Forest | 4671 | 4576 | 9247 |
| Hill forest | 1528 | 1327 | 2885 |
| Sachapu Forest | 51 | 45 | 96 |
| Panbari forest | 447 | 414 | 861 |
| Total | 9003 | 8554 | 17587 |

Table – 5.5: Revenue villages outside the Reserve, located in fringes and their Human Population: 2011 Census

| Sl. | Name of Revenue village | J.L. | | | POPULATION |
|-----|-------------------------|------|------|--------|------------|
| | | | Male | female | Total |
| 1 | Madhya Narathali | 12 | 2579 | 2382 | 4961 |
| 2 | Paschim Narathali | 13 | 2434 | 2228 | 4662 |
| 3 | Uttar Narathali | 24 | 1152 | 1068 | 2220 |
| 4 | Narathali | 23 | 3321 | 3011 | 6332 |
| 5 | Marakata | 25 | 1582 | 1454 | 3036 |
| 6 | Paschjim Changmari | 26 | 1595 | 1521 | 3116 |
| 7 | Lalchandpur | 27 | 366 | 324 | 690 |
| 8 | Joydevpur | 29 | 1145 | 1005 | 2150 |
| 9 | Amarpur | 30 | 1240 | 1181 | 2421 |
| 10 | Madhya Haldibari | 38 | 2232 | 2020 | 4252 |
| 11 | Dakshin Haldibari | 39 | 978 | 969 | 1947 |
| 12 | Changmari | 41 | 836 | 824 | 1660 |
| 13 | Dhantali | 28 | 400 | 366 | 766 |
| 14 | Turturikhand | 7 | 1461 | 1382 | 2843 |
| 15 | Dakshin Chengmari | 42 | 1921 | 1854 | 3775 |
| 16 | Hemaguri | 43 | 433 | 369 | 802 |
| 17 | Ghaksapara | 45 | 1601 | 1524 | 3125 |

| Sl. | Name of Revenue | J.L. | | | POPULATION |
|-----|-------------------|------|-------|--------|------------|
| | village | J.L. | Male | female | Total |
| 18 | Radhanagar | 46 | 1072 | 1008 | 2080 |
| 19 | Purba salbari | 48 | 1475 | 1349 | 2824 |
| 20 | Barobisha | 49 | 2311 | 2122 | 4433 |
| 21 | Uttar Rampur | 116 | 439 | 394 | 833 |
| 22 | Bara Chakirbas | 123 | 1392 | 1333 | 2725 |
| 23 | Chipra | 125 | 1189 | 1110 | 2299 |
| 24 | Loknathpur | 117 | 1894 | 1778 | 3672 |
| 25 | Nurpur | 113 | 962 | 896 | 1858 |
| 26 | Turturi | 114 | 1067 | 990 | 2057 |
| 27 | Dakshin Dhalkar | 77 | 888 | 814 | 1702 |
| 28 | Uttar Patkapara | 38 | 1576 | 1496 | 3072 |
| 29 | Satkodali | 41 | 940 | 939 | 1879 |
| 30 | Paschim Jitpur | 49 | 4512 | 4400 | 8912 |
| 31 | Uttar panialguri | 59 | 1941 | 1797 | 3738 |
| 32 | Uttar Dalkar | 79 | 1153 | 1051 | 2204 |
| 33 | Uttar Sibkata | 80 | 1578 | 1439 | 3017 |
| 34 | Sambalpur | 107 | 374 | 372 | 746 |
| 35 | Dangi | 109 | 814 | 796 | 1610 |
| 36 | Panbari | 110 | 554 | 507 | 1061 |
| 37 | Damsibad | 112 | 1240 | 1198 | 2438 |
| 38 | Banchukumari | 42 | 1324 | 1453 | 2777 |
| 39 | Phoskadanga | 40 | 1482 | 1385 | 2867 |
| 40 | Bairiguri | 47 | 1409 | 1326 | 2735 |
| 41 | Chuapara | 34 | 230 | 199 | 429 |
| 42 | Nimti Domohani | 12 | 1740 | 1648 | 3388 |
| 43 | Dakshin Latabari | 13 | 1245 | 1206 | 2451 |
| 44 | Uttar Latabari | 14 | 8242 | 8118 | 16360 |
| 45 | Satali Mandalpara | 16 | 939 | 924 | 1863 |
| 46 | Purba Satali | 15 | 1769 | 1810 | 3579 |
| | Total | • | 71027 | 67340 | 138367 |

Table –5.6: Tea Gardens Situated in fringe areas of BTR and their Human Population: 2011 Census

| Sl no | Name of Tea Garden | Male | Female | Total |
|-------|--------------------|------|--------|-------|
| 1 | Majherdabri | 1002 | 890 | 1892 |
| 2 | Dima | 2865 | 2964 | 5829 |
| 3 | Srinathpur | 815 | 764 | 1579 |
| 4 | Rajabhatkhawa | 2136 | 2134 | 4270 |
| 5 | Nimtijhora | 2014 | 2101 | 4115 |

| 6 | Patkapara | 4378 | 2197 | 6575 |
|----|-------------|-------|-------|--------|
| 7 | Atiabari | 3711 | 3785 | 7496 |
| 8 | Madhu | 2236 | 2310 | 4546 |
| 9 | Kalchini | 11181 | 10890 | 22071 |
| 10 | Chinchula | 1406 | 1375 | 2781 |
| 11 | Bhatkawa | 2948 | 2981 | 5929 |
| 12 | Radharani | 726 | 764 | 1490 |
| 13 | Chuapara | 3524 | 3703 | 7227 |
| 14 | Bhatpara | 4991 | 4993 | 9984 |
| 15 | Mechpara | 3016 | 3086 | 6102 |
| 16 | Gangutia | 2638 | 2650 | 5288 |
| 17 | Rangamati | 4984 | 5002 | 9986 |
| 18 | Raimatang | 394 | 395 | 789 |
| 19 | Sankosh | 3274 | 3369 | 6643 |
| 20 | Newlands | 3163 | 3198 | 6361 |
| 21 | Kumargram | 3125 | 3369 | 6494 |
| 22 | Phaskhawa | 603 | 593 | 1196 |
| 23 | Chuniajhora | 1386 | 1387 | 2773 |
| 24 | Jainti I | 2560 | 2540 | 5100 |
| 25 | Jainti II | 428 | 141 | 569 |
| 26 | Kartick | 2472 | 2308 | 4780 |
| 27 | Rahimabad | 1821 | 1749 | 3570 |
| 28 | Turturi | 1409 | 1473 | 2882 |
| 29 | Kohinoor | 4271 | 4116 | 8387 |
| 30 | Rydak | 3806 | 3814 | 7620 |
| 31 | Dhowlajhora | 1682 | 1720 | 3402 |
| | Total | 84965 | 82761 | 167726 |

5.2.1. Ethnic Identities of the villages:-

A substantial proportion of the population comprises of tribes such as *Rava*, *Garo*, *Mechia*, *Oraon*, *Modesia* (*Santhal*), *Bhutia* etc. The people are mostly farmers or labourers in farms and tea gardens. People belong to Hindu, Muslim and Christian communities. The S.C. population varies from 10.9% to 72.6% while the S.T. population varies from 5.4% to 85.9%. S.T. community is proportionately higher among the tea garden labourers and forest villagers. People live in complete communal harmony. Relationship of villagers within their own group and with other groups is normally good.

Hunting is the tradition among tribes and they hunt generally wild boar, deer and avifauna. *Durgapuja*, *Shyama Puja*, *Saraswati Puja*, etc. are main festivals among Hindus and Christmas is the main festival among Christians. All are living peacefully and help one another and attend social functions of each other. The tribal population includes mainly *Rava*, *Mech*, *Oraon and Madeshia* on southern sides, Dukpas who live on extreme Northern hills and Nepalese who are scattered all over. There are some *Rajbanshis* in the villages outside forest on Southern sides. A good number of Bengalis (non-tribal) too live in the vicinity of the Reserve. Among

Mechia, *Batho Puja* is famous. It is celebrated during the month of Baisakh (April). Batho is a male God and his wife Mainas is a goddess of wealth. Baisakh is the first month in Bengali Calendar. Batho puja is done during the month to please God. Bihu – mainly Baisakhi bihu is celebrated on 1st day of Baisakh. Bihu is the main festival of the state of Assam. Small fairs take place during different festivals. Drinking of local liquor is common in all tribes.

5.2 .2 Resource Dependence of Villages:

Traditionally, local economy is dependent on forest resources. In fact, it used to be too heavily dependent on it. Saw mills, veneer mills, furniture shops depend on forest resources. Poor families depend on sale of firewood for earning their livelihood. Milk production in forest villages and T.Gs. depend heavily on grazing in BTR. No indepth study report on resource dependency of local people is available in the area. It is seen that $2/3^{\rm rd}$ of the total fuel-wood obtained from forests found its way away from the fringe area to Cooch Behar and Siliguri. Urban conglomerate in the Duars and Terai regions yet remain the major fuel wood consuming centres. Fuel wood, agricultural waste, cow dung, coal, kerosene and cooking gas are traditional sources of energy.

5.3 Human-wildlife conflicts:

5.3.1. Livestock killing by Wildlife:

Livestock killing is reported in BTR both within and outside. Cow, Bullock, calf and goats are involved in the list. The following table shows the cattle lifting figures of various Ranges in BTR. North Rydak, Jainti, Buxaduar, Kumargram, South Rydak and Pana are most affected Ranges.

Table 5.7.: Cattle lifting in 2004-05 to 2008-09 in BTR (East)

| Sl. No. | Year | Range | Beat | Compartment | No. | Species | Location | Killed by |
|------------|---------|-------------|-------------|----------------|-----|--------------|---------------|-----------|
| 1. | 2004-05 | North Rydak | Mainabari | BHT-1,NR-3 | 2 | Cow | | |
| 2. | 2004-05 | North Rydak | Karthika | USF | 4 | Cow | Rahimabad | |
| 3. | 2004-05 | North Rydak | Karthika | Outside forest | 1 | Buffalo calf | Turturi Khand | |
| 4. | 2004-05 | North Rydak | Tiamari | CR-4 | 1 | Cow calf | | |
| 5. | 2005-06 | North Rydak | Karthika | Tea garden | 2 | Cow | Rohimabad | |
| 6. | 2005-06 | North Rydak | Mainabari | NR-2 | 2 | Cow | | |
| 7. | 2005-06 | North Rydak | Karthika | KTPF | 1 | Pig | Kartick | |
| 8. | 2005-06 | North Rydak | Kartick | KTPF | 1 | Cow calf | | Leopard |
| 9. | 2005-06 | North Rydak | Mainabari | NR-2 | 1 | Cow calf | | Leopard |
| 10. | 2005-06 | Hatipota | Hatipota | Tea Garden | 2 | Goat | Rahimabad | Leopard |
| 11. | 2006-07 | North Rydak | Mainabari | NR-1 | 1 | Cow | | |
| 12. | 2006-07 | North Rydak | Mainabari | NR-3 | 1 | Cow | | |
| 13. | 2006-07 | North Rydak | Mainabari | BHT-1 | 2 | Cow | | |
| 14. | 2006-07 | North Rydak | Karthika | Tea garden | 1 | Cow | Kartick TG | |
| 15. | 2006-07 | Hatipota | Hatipota | Tea garden | 1 | Cow | Rahimabad | |
| 16. | 2006-07 | Hatipota | Chuniajhora | Rev village | 1 | Cow | Nurpur | |
| 17. | 2007-08 | South Rydak | SRD | Forest village | 35 | Cow and Goat | | |

| Sl. No. | Year | Range | Beat | Compartment | No. | Species | Location | Killed by |
|------------|---------|-------------|-------------|-----------------|-----|--------------|---|-----------|
| 18. | 2007-08 | North Rydak | Tiamari | Forest village | 9 | Cow | | |
| 19. | 2007-08 | Bholka | Chengmari | Rev village | 1 | Cow | | |
| 20. | 2007-08 | Hatipota | Hatipota | | 24 | Cow and Goat | | |
| 21. | 2008-09 | Bholka | Barobisha | Forest Village- | 2 | Cow | Purbasalbari | Leopard |
| 22. | 2008-09 | Buxaduar | Santarabari | STB-4 | 2 | Cow | Furshe Jhora near 30 th mile | Wild Dog |
| 23. | 2008-09 | Buxaduar | Buxaroad | NRVK 1 | 1 | Pig | 29 th mile F.V | Leopard |
| 24. | 2008-09 | Buxaduar | Santarabari | STB 3 | 1 | Goat | STB F.V. | Leopard |

Cattle Lifting (2009-10 to 2013-14) in BTR (East)

| Sl. | Date | Range | Location | | Sighted | by whom |
|-----|----------|-------------|--------------|---|---------|-----------|
| No. | | _ | Location | A | В | |
| 1. | 09-01-09 | Hatipota | PHK-3 | | 1 | By staff |
| 2. | 16-06-09 | Bholka | NBH-4 | 1 | | By staff |
| 3. | 21-07-09 | Hatipota | PHK-3 | 1 | | By staff |
| 4. | 08-09-09 | Kumargram | KG-1 | 1 | | By staff |
| 5. | 17-07-10 | Hatipota | USF-1 | 1 | | By staff |
| 6. | 31-07-10 | Hatipota | JNT-2b | | 1 | By staff |
| 7. | 17-09-10 | Kumargram | SK-1 | 1 | | By staff |
| 8. | 11-10-10 | Hatipota | JNT-2b | | 1 | By staff |
| 9. | 30-11-10 | Hatipota | JNT-6b | 1 | | By staff |
| 10. | 25-12-10 | Hatipota | JNT-2b | | 1 | By staff |
| 11. | 19-12-10 | Kumargram | SK-2 | 1 | | By staff |
| 12. | 25-01-11 | Kumargram | NLS-2 | 1 | | By staff |
| 13. | 31-01-12 | SRD | DH-1 | | 1 | By staff |
| 14. | 10-03-12 | Hatipota | JH-1 | 1 | | By staff |
| 15. | 24-03-12 | Hatipota | HP-2a | | 1 | Villagers |
| 16. | 01-04-12 | South Rydak | U/Rampur | 1 | | By staff |
| 17. | 01-04-12 | South Rydak | SRD-2 | | | By staff |
| 18. | 07-04-12 | Hatipota | Rahimabad TE | 1 | | By staff |
| 19. | 16-10-12 | Hatipota | HP-2b | 1 | | By staff |

Cow- A; Goat- B;

Cattle lifting 2004-05 to 2008-09 in BTR (West)

| Sl. No. | Year | Range | No. | Species | Location | Killed by |
|---------|---------|-------|-----|---------|----------|-----------|
| 1 | 2005-06 | ERK | 2 | Cow | Panbari | - |
| 2 | | ERK | 5 | Cow | Panbari | Tiger |
| 3 | | ERVK | 2 | Cow | | - |
| 4 | | Pana | 2 | Cow | | - |
| 5 | 2006-07 | WRVK | 3 | Cow | - | - |

| Sl. No. | Year | Range | No. | Species | Location | Killed by |
|---------|---------|--------|-----|---------|------------|-----------|
| 6 | | WRK | 2 | Cow | - | - |
| 7 | | WDP | 2 | Goat | - | - |
| 8 | | HTG | 2 | Cow | - | - |
| 9 | | ERVK | 6 | Cow | - | - |
| 10 | 2007-08 | Pana | 1 | Cow | - | - |
| 11 | | ERVK | 4 | Goat | Panbari | - |
| 12 | | E.RVK | 3 | Cow | Checko | - |
| 13 | | WRVK | 2 | Cow | Dima | - |
| 14 | | W.DPO | 1 | Cow | East Garam | - |
| 15 | | PANA | 3 | Cow | Raimatang | - |
| 16 | 2008-09 | NIMATI | 1 | Cow | Nimati | |

Cattle lifting 2009-10 to 2013-14 in BTR (West)

| Sl. No. | Date | Range | Location | A | В | C | Sighted by |
|------------|----------|----------|-----------------------|---|---|---|------------|
| 20 | 25.10.09 | Bholka | BH4 | 1 | | | By staff |
| 21. | 01-03-09 | Pana | RTG-4 | 1 | | | By staff |
| 22. | 23-02-09 | Nimati | NMT-4 | 1 | | | By staff |
| 23. | 28-03-09 | West RVK | SRVK-5 | | | | By staff |
| 24. | 06-04-09 | West DPO | DPO-7 | | | | By staff |
| 25. | 14-04-09 | West RVK | 24 th Mile | | | 1 | By staff |
| 26. | 05-03-09 | East RVK | Panbari | | | | By staff |
| 27. | 05-04-09 | East RVK | Panbari | 1 | | | By staff |
| 28. | 05-05-09 | Nimati | NMT-3 | 1 | | | By staff |
| 29. | 21-06-09 | West RVK | Dima-3 | 1 | | | By staff |
| 30. | 20-08-09 | West RVK | Dima-3 | 1 | | | By staff |
| 31. | 08-11-09 | Pana | Bhutri | 1 | | | By staff |
| 32. | 17-12-09 | WRVK | Gta-9 | 1 | | | By staff |
| 33. | 22-12-09 | HTG | RTG-4 | 1 | | | By staff |
| 34. | 05-01-10 | NMT | BHT-3 | 1 | | | By staff |
| 35. | 05-02-10 | Pana | NMT-1 | 1 | | | By staff |
| 36. | 16-02-10 | Pana | RTG-10 | 1 | | | By staff |
| 37. | 21-02-10 | ERVK | RTG-3 | 1 | | | By staff |
| 38. | 23-02-10 | Pana | Poro-1 | 1 | | | By staff |
| 39. | 28-02-10 | Nimati | DPO-2 | 1 | | | By staff |
| 40. | 11-03-10 | Nimati | RMT-1,2 | 1 | | | By staff |
| 41. | 26-03-10 | East RVK | | | | | By staff |
| 42. | 23-09-10 | HTG | BHT-1 | 1 | | | By staff |
| 43. | 29-09-10 | HTG | BNB-4 | 1 | | | By staff |
| 44. | 27-12-10 | WRVK | SRVK-16 | 1 | | | By staff |
| 45. | 03-01-11 | WDPO | Poro-3 | 1 | | | By staff |
| 46. | 24-01-11 | HTG | RMT-2 | | 1 | | By staff |
| 48. | 02-02-11 | EDPO | Checko | 1 | | | Villagers |
| 49. | 02-02-11 | Pana | RTG-9 | 1 | | | CDL staff |
| 50. | 07-02-11 | EDPO | Checko | 1 | | | By staff |
| 51. | 27-03-11 | WRVK | SRVK-3 | | | | By staff |
| 52. | 20-04-11 | WRVK | SRVK-5 | | | | By staff |
| 53. | 12-06-11 | WDPO | | 1 | | | By staff |
| 54. | 11-07-11 | HTG | BNB-3,4 | 1 | | | By staff |
| 55. | 05-01-12 | HTG | RMT-2 | 1 | | | By staff |
| 56. | 08-01-12 | WDPO | Poro-7 | | 1 | | Villagers |
| 57. | 16-01-12 | WDPO | Poro-7 | | 2 | | By staff |
| 58. | 05-02-12 | WDPO | Poro-7 | 1 | 1 | | By staff |
| 59. | 10-02-12 | HTG | RMT-1 | 1 | | | By staff |
| 60. | 07-05-12 | HTG | RMT-2 | 1 | 1 | | Villagers |
| 61. | 28-06-12 | HTG | RMT-2 | 1 | | | By staff |
| 62. | 19-11-12 | WDPO | Poro-10 | 1 | | | By staff |

| 63. | 24-11-12 | WDPO | Poro-10 | 1 | | By staff |
|-----|----------|------|---------|---|--|-----------|
| 64. | 27-01-13 | HTG | BHT-4 | 1 | | By staff |
| 65. | 03-02-13 | HTG | RMT-1,2 | 1 | | By staff |
| 66. | 01-05-13 | WRVK | SRVK-4 | | | By staff |
| 67. | 19-05-13 | WDPO | Poro-10 | | | Villagers |

Cow- A; Goat- B; Buffalo-C

5.3.2. Human Death and Injuries by Wildlife:

Human death and injuries are reported in BTR mainly from tea gardens and fringe villages. Forest villages are also affected. Human death and injuries are mainly caused due to elephants and leopards. The following table shows the Range-wise human death and injuries figures in BTR by elephants and leopards.

Table –5.8. Human death and injury by Elephant and Leopard/ Tiger in BTR From 1988 to 1998

| | | | | | | B | TR | (W |) Di | visi | on | | | | | | В | BTR | (E) | Div | isio | n | |
|------|---|------|---|-----|---|--------|----|------|------|------|----|------|---|------|---|------|---|-----|-----|--------|------|-----|---|
| Year | | Pana | | HTG | | Nimati | | EDPO | | WDPO | | ERVK | | WRVK | | INI. | 1 | SRD | | Bholka | | KGM | |
| | | D | I | D | I | D | I | D | I | D | I | D | I | D | I | D | I | D | I | D | I | D | I |
| 1988 | E | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - |
| 1900 | L | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 1989 | E | - | ı | - | ı | - | ı | - | ı | - | ı | - | ı | 1 | ı | - | ı | - | - | - | ı | - | 2 |
| 1909 | L | ı | 1 | - | ı | - | ı | - | ı | - | ı | ı | 1 | ı | ı | 1 | ı | - | - | - | ı | - | 1 |
| 1990 | E | - | - | - | • | 1 | - | - | ı | - | • | - | - | • | - | - | - | 1 | - | - | • | - | • |
| 1990 | L | 1 | - | - | - | - | - | - | - | - | - | 1 | - | - | - | 1 | - | - | - | - | - | - | - |

| | | | | | | B | TR | (W) |) Di | visi | on | | | | | | E | TR | (E) | Div | isio | n | |
|------|---|------|---|-----|---|--------|----|-------------|------|------|----|------|---|------|---|------|---|-----|-----|--------|------|-----|---|
| Year | | Pana | | HTG | | Nimati | | EDPO | | WDPO | | ERVK | | WRVK | | TNI. | | SRD | | Bholka | | KGM | |
| | | D | I | D | I | D | I | D | I | D | Ι | D | I | D | I | D | Ι | D | I | D | Ι | D | I |
| 1991 | E | - | - | - | ı | 2 | - | - | ı | ı | ı | - | ı | • | · | 2 | ı | - | ı | - | ı | • | - |
| 1991 | L | - | - | - | ı | - | - | - | ı | ı | ı | - | 1 | - | ı | - | ı | - | ı | - | ı | - | - |
| 1992 | E | 1 | - | - | ı | 2 | 1 | - | ı | ı | ı | - | ı | ı | ı | - | ı | 1 | ı | - | ı | ı | 1 |
| 1992 | L | - | - | - | ı | - | 2 | - | ı | ı | ı | - | ı | ı | ı | - | ı | - | ı | - | ı | ı | 1 |
| 1993 | E | 1 | - | - | - | 3 | - | - | - | - | - | 2 | - | 1 | - | - | - | - | - | - | - | 1 | - |
| 1993 | L | - | 1 | - | - | - | 1 | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | 1 | - |
| 1994 | E | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - |
| 1994 | L | - | 2 | - | 1 | - | - | - | - | - | - | - | 2 | - | - | - | - | - | - | - | - | - | - |
| 1005 | E | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | 1 | - |
| 1995 | L | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | 3 | 1 | 1 | - | - | - | - |
| 1007 | E | 1 | - | - | - | 2 | | 1 | 2 | - | - | - | - | 1 | - | - | - | - | - | - | - | 1 | 1 |
| 1996 | L | - | - | | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 2 |
| 1007 | E | - | - | - | - | - | - | - | 1 | 1 | 1 | 1 | - | - | - | 1 | - | - | - | - | - | - | 1 |
| 1997 | L | - | 2 | - | 1 | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - |

| 1998 | E | 1 | - | - | - | 1 | - | 1 | - | - | - | 1 | - | - | - | - | - | 2 | 1 | - | - | - | - |
|-------|---|---|---|---|---|---|--------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1990 | L | - | - | - | - | - | ı | - | 4 | ı | ı | ı | ı | ı | - | - | - | ı | ı | ı | - | - | - |
| Total | E | 5 | - | - | - | 1 | 1 l | 2 | 3 | 1 | 1 | 4 | ı | 2 | - | 3 | - | 4 | 1 | ı | - | 3 | 3 |
| | T | | 6 | _ | 1 | | 3 | _ | 1 | _ | _ | _ | 4 | | _ | 2 | 3 | 1 | 1 | _ | _ | _ | 3 |

Note: $E \rightarrow Elephant, L \rightarrow Leopard/Tiger, D \rightarrow Death, I \rightarrow Injury$

Table 5.9. Summary of Human Death and Injury by Wildlife in BTR From 2005 to 2013.

| | BTR | East | BTR | West | Total | | | |
|---------|-------------------|-----------------|-------------------|-----------------|-------------------|-----------------|--|--|
| Year | Persons killed | Persons injured | Persons killed | Persons injured | Persons killed | Persons injured | | |
| 2005-06 | 4 | 10 | 13 | 8 | 17 | 18 | | |
| 2006-07 | 4 | 6 | 5 | 4 | 9 | 10 | | |
| 2007-08 | 2 | 7 | 5 | 9 | 7 | 16 | | |
| 2008-09 | 4 | 15 | 8 | 10 | 12 | 25 | | |
| 2009-10 | 6 | 0 | 4 | 8 | 10 | 8 | | |
| 2010-11 | 3 | 8 | 32 | 5 | 5 | 13 | | |
| 2011-12 | 4 | 16 | 3 | 17 | 7 | 23 | | |
| 2012-13 | 6 | 23 | 10 | 11 | 16 | 34 | | |

5.3.3. Damage to Agricultural crops and Human properties by Wildlife:

Elephant, Wild boar, Bison and Monkeys damage agricultural crops in peripheral and forest villages. Maximum damage to the crop takes place from Aug-Sept. to Dec.-Jan. They damage mainly Paddy, Maize, Wheat, millets, etc. The following table will give an idea about the magnitude of crop damage in B.T.R.

Elephants are involved in house/ hut damage in peripheral villages and tea garden labour lines.

Table-5.10. Crop damage and hut damage by wildlife in BTR

| | | BTR (W) | Division | 1 | | BTR (E) l | Divisior | 1 | Total |
|---------|-----------------|-----------------------------------|------------------------|-----------------------------------|--------------------|--------------------------|-------------------|-----------------------------------|----------------------------|
| | Crop | Damage | Hut 1 | Damage | Crop | Damage | Hut 1 | Damage | Totai Compensati |
| Year | No. of Cases | Compen sation Paid (Rs.) | No. of Case s | Compe nsation Paid (Rs.) | No. of Cases | Compen sation Paid (Rs.) | No. of Case | Compe nsation Paid (Rs.) | on paid in BTR (Rs.) |
| 2005-06 | 675 | 2,70000 | 86 | 97,200 | 967 | 363173 | 93 | 54600 | 784973 |
| 2006-07 | 708 | 318600 | 82 | 80400 | 897 | 390500 | 102 | 51350 | 522250 |
| 2007-08 | 723 | 2,89200 | 102 | 1,10800 | 1283 | 389200 | 490 | 157400 | 946600 |
| 2008-09 | 958 | 4,75350 | 108 | 1,22000 | 849 | 4,18400 | 107 | 52000 | 1067750 |
| 2009-10 | 800 | 395750 | 140 | 147850 | 1448 | 71520 | 90 | 106400 | 703520 |
| 2010-11 | 1303 | 775200 | 167 | 221000 | 768.5 | 425700 | 148 | 240500 | 1662400 |

| 2011-12 | 521 | 303500 | 219 | 308999 | 805 | 329300 | 113 | 186500 | 1128299 |
|---------|------|---------|-----|--------|------|---------|-----|--------|---------|
| 2012-13 | 1617 | 1109750 | 699 | 962750 | 2125 | 1074710 | 421 | 707270 | 3854480 |

5.4. Inputs from other Agencies/ Departments:-

The following developmental activities were taken up by the Govt. and Non-Govt. agencies in the Zone of Influence.

- i) Road construction -- Mainly un metalled roads, sometimes metalled roads are Constructed.
- ii) Road improvement -- Existing village roads are repaired from time to time for better communication.
- iii) Development of minor irrigation As the area is situated in Bhabar tracts, No water is available during winter. Perennial water sources are tapped for irrigating agricultural crops through the construction of "Jampoi".
- iv) Construction of culvert and causeway -- Small culverts, causeways and wooden bridges are constructed for better communication.
- v) Increasing drinking water facility--For increasing drinking water facility, ring wells, tube wells are dug. Sometimes pipelines are laid for tapping perennial springs in the hills for supply of drinking water.
- vi) Ponds and earthen dams -- To encourage fishery and to supply water to domestic cattle during lean period ponds and dams are constructed.
- vii) Construction and repairing of school buildings -- To provide education facility to school going children, these activities are going on.
- viii) Rehabilitation of landless -- To rehabilitate landless and refugees and to provide house to the poor, construction of huts are taken up by the civil administration under "Indira Avas Yojona". They are rehabilitated on the vested lands.
- ix) Self employment Scheme -- Various self employment schemes are being implemented by the Govt. in the fringes of the Reserve, e.g. TRYSEM, Prime Minister's Rojgar Yojona, etc.
 - Under IRDP, ITDP programme, loans are provided from banks to the poor villagers for agricultural purpose, Dairy development, Poultry, Piggery, Carpentry, establishing SSI unit, etc. Objective of this programme is to make rural people self- sufficient. Under dairy development scheme, the villagers who own improved/high yielding cattle, stall feed the cattle.
- x) Welfare scheme --- DWCRA (Development of Women and Child in Rural Areas), ICDS, etc. are working for the well being of child and mother in the rural areas. Family planning is also included in this scheme. *Mahila samities* (female associations) are formed in villages.
- xi) Social Forestry Scheme -- Under this scheme, afforestation works have been taken up by the *Panchayat* (village council) for planting up of roadsides, canal banks, riverbanks, community lands, etc. This is to meet up the future fodder and fuel wood demand of the fringe villages.
- xii) Soil conservation and riverbank protection --- Under this scheme, river bank protection, DRM with net (Dry Rubble Missionary), etc. are taken up by Govt-departments (mainly Irrigation Deptt and Soil Conservation wings of Forest Department.). All the above activities are in the well being of Reserve, people and the zone of influence.

- xiii) Forest department -- Forest department has taken up afforestation works in forest areas through the timber, fuel wood and fodder plantations. Fodder plantations are taken up in forest areas for supply of fodder to herbivores.
- xiv) NGO activities -- There are a limited number of NGOs and Eco-club in the vicinity of B.T.R. There are Himalayan Nature and adventure Foundation, Paschimbanga Vigyan Mancha, Alipurduar Welfare Organization, Rovers and Mountaineers, Basundhara, Nandadevi foundation, Alipurduar Nature club, HNAF, People for Animal etc. They conduct study tours, hold seminars, organize awareness campaigns, hold nature camps, etc. for increasing education and awareness among people.

PART-B: THE PROPOSED MANAGEMENT

CHAPTER 6: VISIONS, GOALS, OBJECTIVES AND PROBLEMS

6.1 Vision: A Well defined buffer zone established ensuring maintenance of the dynamics of meta-population of tiger, co-predators and prey in BTR

6.2 Management Goals:

- Mainstreaming of Wildlife Concerns through An integrated Landscape approach
- Creating situation conducive for co existence of Tiger, co predators and Prey by Joint Forest Management
- Integrating the Habitat isolates and linking them with core
- Increasing the stake of fringe population in Tiger and other wildlife conservation through various initiatives like, eco development, ecotourism

6.3 Management Goals and Objectives:

- To reduce the grazing pressure on buffer by providing alternate livelihood sources
- To attain the limits of viable population of Tigers in the landscape by providing congenial breeding environment by reducing the biotic disturbance in buffer there by increasing the inviolate spaces.
- To provide corridor connectivity to wildlife including tiger for effective dispersal and establishing corridor connectivity to other protected areas in the vicinity like Jaldapara National Park, Phipsoo Wildlife Sanctuary in Bhutan etc
- To mitigate man animal conflict by effectively adopting modern technology and compensating the losses.
- To improve the habitat wherever is degraded by replenishing such areas with suitable native species.
- To increase the prey base from existing levels and provide adequate prey base for long term sustainable management of tiger and other co predators
- To reduce the dependency of fringe population by generating employment, alternate sources of livelihood through eco development and ecotourism.
- To effectively implement ecotourism as per the guidelines of NTCA for generating awareness, livelihood and to create employment opportunities to forest dependent youth
- To give away benefits of Joint Forestry Management through fuel wood, fodder, small timber, NTFP collection, ecotourism.
- To reduce the dependence of the fringe area people of forest by taking initiatives under J.F.M. concept to
 - To stop/regulate use of firewood
 - To stop grazing by initiating stall feeding option
 - To reduce the number of scrub cattle
 - To grow cash/commercial crop in agricultural land, instead of food grain cultivation to reduce man-animal conflict.
- To take proper eco-development initiatives in consultation and in coordination with other line departments to improve the economic condition of the fringe area population through JFMCs and SHGs by:

- Giving training in handicrafts, bamboo weaving, local handlooms, apiculture, sericulture/tassar cultivation, soft toy/bag making, repairing of electronic and electrical goods, cycle/motorcycle repairing etc.
- Providing veterinary care in the form of A.I., Vaccination for improvement of the quality of the cattle.
- Raising intercrop in forestry plantations.
- Arranging and managing eco-tourism activities as an alternative income generation resource, resource besides raising funds for management.
- > To provide proper protection to the buffer habitat from illegal felling, poaching of wild animals, uncontrolled grazing of cattle, and collection of fuel wood by involving JFMC /SHG members with the departmental staff through regular patrolling.
- To reduce the dependency of Tea Garden population by having coordinated approach with other developmental agencies and Tea garden management.

6.4 Problems in Achieving Objectives:

- High population density around the area (the state of West Bengal has the highest population density among all states in the country).
- Fragmented forest area and hence lack of connectivity between habitats.
- Large number of tea gardens having innumerable labourers with hardly any work/lot of free time (to indulge in unlawful activities adversely affecting BTR)
- > Small or no land holding of the fringe population with increasing dependence on natural resources.
- ➤ Huge problem of unemployment idle youth (who indulge in unlawful activities adversely affecting BTR
- > Traditional dependence on forests and other natural resources by the locals
- Lack of sufficient/adequate man power of Forest Department at all levels
- Lack of proper orientation/capacity building of Forest Departmental staff.

6.5 Strengths – Weaknesses – Opportunities – Threats (Limitations) (SWOT) Analysis:

Strengths:-

- a) Presence of good, productive, resilient forest cover.
- b) Well distributed population of predators other than tiger and prey and elephants in the buffer region.
- c) Presence of network of well established JFMCs with good relation with administration
- d) Good network of perennial water sources
- e) Vast potential of wildlife and aesthetics

Weaknesses:-

- f) Overpopulated fringe area.
- g) Over dependence on forestry resources by local people, mainly due to overall backwardness of the area
- h) Easy access for cattle grazing and fuel wood, timber collection.
- i) Lack of young, energetic and trained workforce

- j) Lack of marketing linkage for local/traditional produce.
- k) Lack of employment opportunities to young population
- 1) Lack of effective intelligence network
- m) Inadequate camping facilities and watch towers
- n) Lack of knowledge on microflora, microfauna and species requirement

Opportunities:-

- o) Availability of good habitat to achieve the goal of management.
- p) Willingness of people to accept changes for betterment.
- q) Undisputed presence and control of Forest Department all over the area.
- r) Resilience of habitat
- s) Good coordination with JFMCs
- t) Renewed coordination with line departments
- u) Vast scope of ecotourism.
- v) Well demarcated Administrative network, with both Core and buffer under one administrative control of Field Director
- w) Effective system of Interstate and International Coordination
- x) Renewed system of marketing channels for local produce and capacity bulding of JFMC's
- y) Coordinated and Continuous research

Limitations/ Threats:-

- z) Severe unemployment among locals
- aa) Backwardness of local area due to poor development of infrastructure etc.
- bb) Traditional dependence on forests and other natural resources.
- cc) Occasional poaching of small animals for local consumption.
- dd) Porous border with Bhutan and Assam
- ee) Absence of young, energetic, trained workforce and vacancies at all levels to sustain all round developmental activities.
- ff) Lack of proper coordinated utilization of development funds by line departments
- gg) Interstate border issues plagued with insurgency

PART B: THE PROPOSED MANAGEMENT

CHAPTER 7: MANAGEMENT STRATEGIES

7.1 Delineation of Buffer Areas and Other Zones within the Buffer Area

7.1.1 Delineation of Buffer Areas:-

- 7.1.1.1 Constitution: As per section 38V (4ii) of the Wildlife (Protection) Amendment Act 2006, an area of 370.28km2 is declared as buffer vide Govt of West Bengal Notification No 3051-For/11M-28/07 dated 06/08/2009 (Annexure 2). The committee also realigned existing Buffer Zone of 370.28 sq.km. 343.32 sq.km.(Annexure-2C).
- **7.1.1.2 Status:** The buffer zone of a Tiger Reserve is not having the status of a National Park or Wild Life Sanctuary. However, as a "multiple use area", it may encompass conservation or community Reserves, apart from revenue lands, private holdings, villages, towns and other production sectors. Buffer zone management should address threats to wildlife conservation emanating from regional developmental activities such as forest concessions, industrial pollution, highway development, extensive high value farming or ecologically unsustainable and intensive land uses like mining through appropriate mainstreaming in such sectors. The working plan provisions for forest areas in the buffer zone would be implemented after duly mainstreaming wildlife concerns.
- **7.1.1.3 Administration:** The buffer zone is under the unified control of the Field Director of the Tiger Reserve. Field Director is assisted by Two Deputy Field Directors in the administration of Buffer.
- **7.1.1.4 Legal provisions for Buffer zone:** The existing rights/concessions of local people would be regulated as per the legal provisions in vogue. As provided in Section 38-V of the Wild Life (Protection) Act, 1972 (as amended in 2006), the provisions of sub-section (2) of section 18, sub-sections (2), (3) and (4) of section 27, sections 30, 32 and clauses (b) and (c) of section 33 shall apply to the buffer zone of a tiger Reserve, to accord protection to wildlife in the area.

7.1.1.5 Major functions of the Buffer zone:

The Buffer area of a Tiger Reserve will have following major functions:

- 1. To provide habitat supplement to the spill over population of tiger and its prey from the core area, conserved with the active cooperation of stakeholder communities.
- 2. To provide site specific, need based, participatory eco-development inputs to local stakeholders for rationalizing their resource dependency on the Tiger Reserve and strengthen their livelihoods, so as to elicit their support for conservation of the area.
 - 3. Mainstreaming wildlife concerns in various production sectors in the area.

7.2 Zone plans and Theme Plans

7.2.1 Zone Plans

Consistent with the objective of management as stated above, it has been decided to distribute the buffer areas of BTR into the following zones:

- 1. Restoration zone
 - a. Grassland restoration zone
 - b. Wetland restoration zone
 - c. Blank/degraded area restoration zone
- 2. Ecodevelopment zone
- 3. Ecotourism zone
- 4. Conflict mitigation zone
- 5. Biodiversity conservation zone
- 6. Zone plan for Forestry plantations
 - a. Miscellaneous & Teak
 - b. Sal
- 7. Zone plan for watershed & soil conservation

Zonation Map of Buffer is given in Annexure-18.

7.2.1.1 Restoration Zone

The main objective of creation of this zone is to restore the existing degraded habitat back to its natural condition for the benefit of wildlife. There are mainly three kinds of habitat exist in the buffer of Buxa Tiger Reserve which needs intervention. The management strategy of these restoration zones is dealt in separate heads.

A) Grasslands / meadows management zone:

The maintenance of Grasslands and meadows is mainly applicable in Restoration zone but wherever grasslands exist, those should be preserved and maintained.

There exist remnants of natural grasslands in C. Rydak-2, 3; Poro 5, 7; Bhutri 1, 4, 5; Bharnabari 3, 5 compartments (Table-7.6). Grasslands also exist in patches along river banks of Bala, Dima, Jainti and Basra rivers. Small meadows exist in the hill areas. The grassland mainly consists of *Saccharam spp., Imperata cylindrica and Desmostachea bipinata*. They should be preserved by cultural operations every year so that they are not converted to woodlands.

Table -7.1: Location and Extent of Grasslands in BTR

| Range | Beat | Compartment | Area (ha) |
|----------|--------------------|-----------------|-----------|
| C. Rydak | Tiamari | C. Rydak-2, 3 | 300. |
| WDPO | Poro | Poro 5, 7 | 300 |
| HTG | Bhutri, Bharnabari | Bhutri 1,4,5 | 300 |
| | | Bharnabari 3, 5 | |
| | | Total | 900 |

Following strategies are proposed to maintain these grasslands:

- (i) Woody encroachments should be cut back on a 3-years cycle.
- (ii) Fruit trees (especially Zizyphus and Ficus) should be retained.

- (iii) The grassland should be protected against grazing and deliberate fire, controlled burning should be carried out periodically.
- (iv) Monitoring of the area should be done regularly.

Existing Glades and Saltlicks in BTR

The maintenance of **Glades and Saltlicks** is applicable to Habitat Management and Eco-Tourism Zones. No new glades and saltlicks are proposed. The existing glades and salt licks are given in Table-7.7.

| T 11 7 3 | T 4. C | α | 10 | 14 10 1 | • | |
|------------|--------------|----------|--------|------------|----|--------|
| Inhia / /· | I acation at | | and Sa | It links | ın | RIP |
| | Location of | THAUES | anu sa | 11. III.KS | | 1) 1 |
| | | | | | | |

| n | T | Gla | des (ha) | Salt lick |
|---------|-----------|-----|---------------|-----------|
| Range | Location | No. | Area (Ha.) | No. |
| Jainti | NRVK-13 | 4 | 7.00 | 4 |
| | NRVK-5a | 1 | 2.50 | |
| | TSNG-1 | 3 | 17.00 | 2 |
| | TSNG-2 | 1 | 4.5 | 1 |
| | JNT-7A | 1 | 5.0 | 1 |
| | JNT-8 | 1 | 8 | 1 |
| WRVK | SRVK-5 | 1 | 4.00 | |
| | Panbari-1 | | | 1 |
| N.Rydak | NRD-1 | | | 1 |
|] | Total | | 48 | 11 |

Strategies for maintenance of glades and saltlicks:

Weeding of unwanted weeds (*Lantana, Michenia, Eupatorium*, etc.) should be carried out twice a year in all glades. Woody encroachments should be cut back regularly. Planting of indigenous fodder grasses (Dhadda, Malsa, Chepti, Banspati, Purundi, etc.) should be done in blank patches. The glades in disuse must be maintained henceforth. A big natural saltlick exists at Khurul (Bhutan) near Newlands. All precautions should be taken to ensure free approach of wild animals to this saltlick. Earthen mounds may be created as per requirement.

B) Wetland Restoration Zone

1) Maintenance of Existing Waterholes:

A vast area of B.T.R. lies in the Bhabar tract. During winter and summer (December to May) there is acute shortage of water in the National Park and the Sanctuary areas, particularly north of the 23rd mile. So the existing artificial water holes must be maintained as suggested below:

- a) Entire water should be pumped out before the onset of rains (May-June) every year and de-silted manually. These should then be left to be filled by rain water.
- b) All cracks should be repaired from time to time.
- c) To maintain the hygiene and ecological balance of waterholes, a few endemic spp of Turtles and Fishes may be introduced.
- d) Domestic livestock should not be permitted to use these waterholes.

e) Few new water holes are planned in the plan period. A review of existing water holes may be carried out and those found unnecessary or posing threat of safety of wild animal may be discarded and filled up.

2) Maintenance of Natural wetlands:

The Natural waterholes at Narathali-2 compartment will be maintained and protected. The wetland at Narathali is important for water birds and other aquatic fauna and it should be maintained as follows:

- *i)* A portion (50% of total length) of Narathali beel should be cleaned every year through manual removal of Pistia and water hyacinth during Oct. Nov.
- *ii)* A vegetative Zone (about 50m. wide) should be created and maintained around the wetland through planting of medium sized big canopy evergreen trees (e.g. *Jamun, Kainjal, Lali, Ficus, etc.*).
- *iii*) Adequate protection against direct (hunting, fishing, unauthorised cattle grazing) and indirect influences (contamination and pollution of water) should be ensured.

C) Blank/Degraded area restoration zone

Habitat improvement works in the Reserve will be based on following considerations:-

- (a) Preserving and increasing the diversity and interspersion of habitat.
- (b) Protecting the habitat against factors causing degradation.
- (c) Making habitat conditions suitable for target species.
- (d) Raising local, palatable and nutritive fodder grasses, shrubs and fruit trees for increasing the quality of degraded habitats.

Based on the above considerations following habitat improvement works are proposed.

Blank and degraded area available for habitat improvement and plantations in BTR

| Range | Block /Compartment | Approx Blank area and |
|-------------|--------------------|-----------------------|
| | | degraded area(in ha) |
| | NRT1 | 400 |
| | NRT2 | 260 |
| | MKT1 | 100 |
| | MKT2 | 100 |
| South Rydak | MKT3 | 50 |
| | MKT4 | 160 |
| | SR 5, SR 6 | 200 |
| | DH 1,2,3 | 300 |
| | SR 1,2,3,4 | 300 |
| | RMT 1 | 150 |
| HTG | RMT 2 | 170 |

| | RMT 3 | 150 |
|-------------|-------------------|---------|
| HTG | BNB 2 | 40 |
| | BNB 4 | 70 |
| | GDB 1,2,3,4 | 150 |
| | CRD2 | 80 |
| | CRD3 | 100 |
| North Rydak | CRD4 | 50 |
| | CRD5 | 40 |
| | CRD6 | 40 |
| | Karthika PF | 40 |
| Pana | Gangutia 1,7,8,9 | 100 |
| WRVK | Dima 1,2,3,4 | 200 |
| | DPO 4 | 100 |
| | DPO 3 | 100 |
| | DPO 7 | 75 |
| EDPO | DPO 8 | 100 |
| | PORO 2,5,7,10 | 250 |
| | PORO 3,4,8,9 | 300 |
| WDPO | DPO 6,9 | 200 |
| | Nimati 1,2,7 | 250 |
| | Nimati 3,4 | 200 |
| Nimati | Poro 11,6,7 | 200 |
| | SBH 5,6 | 50 |
| | SBH 1, 2b, 3a, 4 | 50 |
| | SBH 2a, 3b, NBH 5 | 150 |
| Bholka | NBH 1,2,3,4 | 200 |
| ERVK | Gadadhar 5,6 | 25 |
| EKVK | Pan 4,5,10 | 50 |
| | Total | 5550 ha |

These degraded areas shall be taken up for plantation creation, fodder plantations and grasslands. The habitats in these areas shall be restored by plantations of local and native species, palatable grasses and fruit and fodder species. Annualy 100ha may be taken up for plantation and grassland creation in these areas based on the budget availability.

Habitat improvement in such degraded areas may be done by following restoration methods.

Plantation with Miscellaneous Species- Such degraded area shall be planted with local miscellaneous species including fodder and fruit species. During the plan period 120ha may be taken up annually. Such plantations may be raised with locally available mixed species such as lali, lasuni, Chalta, Amla, Bahera, Gamar, Chikrasi, Panisaj, Pakasaj, Jarul, Kanjal, Kawla, Rita, Pitali, Simul, Kadam, Sisso, Khair, Siris, Latur, Toon Champ, Lampate, Sidha, Katus, Arjun, Gokul and other locally available species etc. While raising such plantations

JFMCs may be involved and wherever possible traditional practice of taungya/intercropping may be allowed. Spacing of plantation is prescribed at 2mt X2mt with 4 year maintenance.

- 2 **Restoration by Raising Bamboo plantation**-Some of the areas are traditionally Bamboo bearing and in view of good elephant population some areas be brought under Bamboo plantation with locally available bamboo species. Annually 20ha of area be planted with bamboo. Spacing prescribed for bamboo is 4mt x4mt and such plantation must be protected by energised fencing with 4 year maintenance.
- 3 Restoration of Traditional Sal areas by Sal Plantation-Some areas were Sal bearing areas and over the years they have been degraded owing to various kinds of biotic pressures. It is very important to restore these areas with Sal and its associate species. Such blank areas may be reviewed back to its originality by rising Sal plantations. In bad Sal seed year such areas may also be restored with miscellaneous plantation. In such blank areas 40ha of Sal plantations may be raised on annual basis. Such plantations may be raised with minimum 40 per cent Sal. While raising such plantations JFMCs may be involved and wherever possible traditional practice of taungya/intercropping may be allowed.
- 4 **Restoration with Grassland Creation-**Buxa Tiger Reserve has very little grassland, as much of the erstwhile habitat was converted to plantations of monoculture. In order to supplement herbivore population and also to reduce man animal conflict it is very pertinent to bring additional areas under grasslands. The degraded areas and blank areas be planted with grass species such Dadda, Masla, Chepti, Banaspati, Purundi, and other palatable grasses. Such grasses may be planted at a spacing of 1mtx1mt with seed dibbling wherever applicable and protected with energised fencing with two year maintenance. Annually 100ha be brought under grassland creation.

Such plantations may also be raised by Soil Conservation division and Silviculture after due permission from concerned Deputy Field directors. Such plantations shall also be protected by Soil moisture conservation works wherever required.

7.2.1.2 Ecodevelopment Zone

Ecodevelopment zones consists of the entire buffer areas together with human habitations and their area of operation for livelihood. This zone also overlaps with that of Ecotorism Zone and. the management strategies of this zone is described in detail in the chapter 17 and 18.

7.2.1.3 Ecotourism Zone

Ecotorism zone in the buffer area consists of a total of 11486.97 ha spreading over parts of Raimatang, North Rajabhatkhawa, South Rajabhatkhawa, Dima, Poro, Bholka, Jainti and Damanpur. Strategies for Tourism and visitor Management is desribed in Part 4 "Ecotorism Plan of Buxa Tiger Reserve".

7.2.1.4 Conflict Mitigation Zone

Man-Animal conflict:

Buxa Tiger Reserve landscape is surrounded by 37 tea gardens, 46 revenue villages and inhabited by 34 forest villages with nearly 3 lakh population. Such huge population living in and around tiger reserve landscape puts tremendous pressure on natural resources of tiger reserve and also creates huge biotic disturbances. In addition location of most of the village and tea gardens is in crucial wildlife corridor wherein wild lives like Tigers, leopards and elephant move from one part of the reserve to other part. In the meanwhile they come in contact with human population and results in Man animal conflict.

Man animal conflict happens mainly because of

- Straying of Bison which usually happens in summer during the months of Feb to May
- Elephant depredation resulting in crop raids, hut damages etc
- Littering of cubs by leopards in tea garden drains leads to encounter with tea garden labourers
- People while venturing into forest for fuel wood collection and grazing encounter wildlife and results in attacks

Major reasons for man animal conflict in Buxa Tiger Reserve landscape.

- 1. Location of Tea gardens and villages all along the periphery and in corridors of crucial wildlife
- 2. Competition for natural resources
- 3. Nearly three lakh population dependent on tiger Reserve for natural resources.
- 4. Tea gardens serve as ideal dens for leopard breeding
- 5. New settlement coming up and blocking the corridors
- 6. Illicit liquor brewing attracts elephants in Tea gardens and revenue villages
- 7. Mono crop agriculture practices like paddy which attracts elephants
- 8. Plantations raised in grasslands in the tiger reserve few decades back have more or less led to grassland eradication there by bringing changes in habitat

Strategies to mitigate Man animal conflict

- 1. Prompt and immediate compensation to human loss, property loss and loss of crops
- 2. Creating physical barriers like elephant proof trenches wherever possible like, Marakata, Chipra, Kanjalibasti, Nimati, Pana, HTG, Rajabhatkhawa all long the periphery of village boundaries
- 3. Erection solar energized fencing with a maintenance MOU with local JFMCS

- 4. Raising fodder plantations and grass lands for providing better fodder to wildlife especially Elephants
- 5. Issuing advisory to tea gardens for effective management of leopard straying in tea gardens
- 6. Raising elephant squad at Rajabhatkhawa, Hamiltongunj and Samuktala to tackle elephant depredation problems.
- 7. Creation of awareness among public by print media, and electronic media
- 8. Training of local FPC and EDC people and rising small squads village wise to cater to immediate response.

Elephant - Rail Conflict

Ever since the conversion of Alipurduar –Siliguri rail track to broad-gauge the Elephant- rail conflict has increased many fold. The broad-gauge ensured increase in traffic and accordingly the Elephant rail conflict. Over the last one decade more than dozen elephants have fallen victims to speeding trains in Buxa tiger Reserve alone. The following measures may be adopted to reduce the incidents of killing of Elephant by speeding trains.

Measurers to prevent killing of elephants by speeding trains

Preventive measures

- Speed restriction of min 25km/hr Shall be imposed between Sunset to sunrise
- Local villagers from FPC may be trained and engaged to track the movement of elephants on daily basis along the track and they will inform the railway authorities for necessary action
- Regular training and sensitization programme be undertaken for loco pilots and assistant loco pilots regarding elephant behavior, corridors, sensitive seasons for caution
- Regular meetings shall be held between Railway and forest authorities to exchange information
- Installation of solar lights along the track in the sensitive areas may be tried as pilot project by NGOs
- Use of modern technologies by Railways to in early detection and prevention of animals near rail tracks
- Construction of underpasses, ramps as suggested by expert committee constituted by MoEF and West Bengal Forest Department.
- Installation advanced electronic alarm systems/Early warning Systems to alert the loco pilots regarding the presence of Elephants.
- Clearing of ground vegetation upto 20 mt all along tracks on either side
- Complete stoppage of growing agriculture crops near railway tracks
- Installation of warning signs at all the corridors to alert loco pilots
- Diversion of weekly and late running trains to alternate route

Permanent measures:

- Total Stoppage of night time movement of trains
- Doubling of already existing Falakata route so that excess traffic can be diverted to that line and using this track only for military emergency
- Exploring the possibility of having elevated tracks in forest areas

7.2.1.5 Biodiversity conservation zone

General Constitution of Working Zone

The National Forest Policy 1988 laid highest stress on conservation of our national forest and bio-diversity. In accordance with the guidelines of the said Policy, all the natural forests of this division have been kept under this Working Zone.

Within buffer zone, certain blocks and compartments have been constituted as Eco sensitive/ Eco fragile zone which accounts to 13,853.21 hectare and the rest of the blocks and compartments in the buffer zone accounts to 14,149.22 hectares. The total area under this Working Zone is 67,060.56 hectare.

7.2.1.5.1 BLOCKS AND COMPARTMENTS:

1. Eco-sensitive Zone / Eco-fragile

A. Buxa Tiger Reserve (West)

| Range | Range Beat | | Area in ha. |
|--------------|--------------------|-------------------------|-------------|
| Hamiltonganj | Bhutri | Compartment Bhutri-3(p) | 172.30 |
| Hamiltonganj | Bhutri | Bhutri-5 | 220.55 |
| EDPO | Checko | Checko-3 | 142.85 |
| EDPO | Checko | Checko-4 | 237.15 |
| EDPO | Checko | Checko-5 | 259.00 |
| EDPO | Damanpur | Damanpur-3 | 320.92 |
| EDPO | Damanpur | Damanpur-4 | 312.82 |
| ERVK | Gadadhar | Gadadhar-1 | 161.48 |
| ERVK | Gadadhar | Gadadhar-3 | 286.93 |
| ERVK | Gadadhar | Gadadhar-5 | 206.40 |
| ERVK | Gadadhar | Gadadhar-6 | 197.09 |
| Hamiltonganj | Godamdabri | Godamdabri-1a | 40.46 |
| Hamiltonganj | Godamdabri | Godamdabri-1b | 267.09 |
| WRVK | NRVK | NRVK-11 | 382.43 |
| WRVK | NRVK | NRVK-15 | 504.26 |
| ERVK | Panbari(N) | Panbari-4 | 380.40 |
| ERVK | Panbari (N) | Panbari-5 | 272.77 |
| ERVK | Panbari (S) | Panbari-10 | 453.67 |
| Pana | Raimatang | Raimatang-1 | 216.91 |
| Pana | Raimatang | Raimatang-2 | 516.39 |
| Pana | Raimatang | Raimatang-3 | 326.18 |
| Pana | Raimatang | Raimatang-4 | 477.53 |
| Pana | Raimatang/Gangutia | Raimatang-5 | 424.94 |
| WRVK | NRVK | SRVK-2 | 333.07 |
| WRVK | WRVK | SRVK-7 | 341.57 |
| WRVK | WRVK | SRVK-10 | 417.64 |
| WRVK | WRVK | SRVK-15 | 379.61 |
| | | Total area in ha. | 5932.01 |

B. Buxa Tiger Reserve (East)

| Range | Beat | Block and Compartment | Area in ha. |
|-------------|----------------|----------------------------------|-------------|
| Buxaduar | Chunabhati | Chunabhati 3(P) | 11.33 |
| South Rydak | Chipra | Dhawla-3 | 199.60 |
| Hatipota | Hatipota | Hatipota-2(P) | 647.00 |
| Kumargram | Kumargram | Kumargram-1(P) | 23.00 |
| Kumargram | Kumargram | Kumargram-2(P) | 38.00 |
| Buxaduar | Buxaroad | NRVK-1 | 327.80 |
| Buxaduar | Buxaroad | NRVK-2 | 236.34 |
| Buxaduar | Buxaroad | NRVK-4 | 250.91 |
| Jainti | Phaskhawa | NRVK-5b | 38.44 |
| Jainti | Jainti (North) | NRVK-6a(p) | 11.40 |
| Jainti | Jainti (North) | NRVK-6b | 40.46 |
| Buxaduar | Buxaroad | NRVK-8 | 193.84 |
| Jainti | Bhutiabusti | Phaskhawa-1b | 86.63 |
| Jainti | Bhutiabusti | Phaskhawa-2 | 927.74 |
| Hatipota | Hatipota | Phaskhawa-3(p) | 207.63 |
| South Rydak | South Rydak | S.Rydak-2 | 429.55 |
| South Rydak | South Rydak | S.Rydak-3 | 487.00 |
| South Rydak | Chipra | S.Rydak-5 | 275.70 |
| South Rydak | Chipra | S.Rydak-6 | 309.71 |
| South Rydak | Chipra | S.Rydak-7 | 362.35 |
| Kumargram | Sankosh | Sankosh-2(P) | 16.02 |
| Kumargram | Sankosh | Sankosh-3a+3b | 442.92 |
| Buxaduar | Santrabari | Santrabari-3(P) | 20.18 |
| Buxaduar | Santrabari | Santrabari-4(P) | 17.25 |
| | | Total area in ha. | 5600.80 |
| | Total ar | rea of Eco Sensitive Zone in ha. | 13853.21 |

2. Full Natural Forest Area

A. Buxa Tiger Reserve (West)

| Range | Beat | Block and Compartment | Area in ha. |
|--------------|---------------|--------------------------|-------------|
| Pana | Adma | Adma-1 | 343.99 |
| Pana | Adma | Adma-2 | 887.09 |
| Pana | Adma | Adma-3 | 574.26 |
| Pana | Adma | Adma-5(p) | 7.00 |
| WDPO | Range Hq. | Banmayuri Complex | 3.01 |
| WDPO | Garam (East) | Damanpur-1 | 199.50 |
| WRK | Dima | Dima RL | 53.81 |
| WRK | Dima | Dima-1 | 197.49 |
| WRK | Dima | Dima-3 | 205.59 |
| Hamiltonganj | Godamdabri | Godamdabri-2a | 114.93 |
| Hamiltonganj | Godamdabri | Godamdabri-2b | 419.66 |
| Hamiltonganj | Godamdabri | Godamdabri-3a | 189.80 |
| Hamiltonganj | Godamdabri | Godamdabri-3b | 280.04 |
| Hamiltonganj | Godamdabri | Godamdabri-4a | 159.44 |
| Hamiltonganj | Godamdabri | Godamdabri-4b | 142.04 |
| Nimati | Nimati (West) | Nimati-1a | 123.27 |
| WRVK | NRVK | NRVK-10 | 326.59 |

| Range | Beat | Block and Compartment | Area in ha. |
|--------|---------------|--------------------------|-------------|
| Nimati | Poro (West) | Poro-1 | 39.09 |
| WDPO | Poro (East) | Poro-2 | 170.47 |
| WDPO | Garam (West) | Poro-3 | 333.46 |
| WDPO | Garam (West) | Poro-4 | 193.68 |
| Nimati | Nimati (East) | Phoskadanga | 35.97 |
| | | Total area in ha. | 5000.18 |

B. Buxa Tiger Reserve (East)

| Range | Beat | Block and Compartment | Area in ha. |
|-------------|-----------|-----------------------|-------------|
| Bholka | Barobisha | Dakshin Rampur USF | 9.00 |
| North Rydak | Mainabari | Turturikhand | 2.66 |
| | | Total | 11.66 |

3. Sal Natural Forest

A. Buxa Tiger Reserve (West)

| Range Beat | | Block and Compartment | Area in ha. | |
|-------------|------------------|--------------------------|-------------|--|
| Nimati | Nimati | Nimati-1b | 95.71 | |
| Nimati | Nimati | Nimati-2 | 60.36 | |
| WRVK | NRVK | NRVK-16 | 198.42 | |
| WDPO/Nimati | Poro (East)/Poro | | | |
| | West | Poro-5 | 150.22 | |
| Pana | Gangutia | Raimatang-6 | 257.18 | |
| Pana | Gangutia | Raimatang-7 | 347.54 | |
| Pana | Gangutia | Raimatang-8 | 110.32 | |
| Pana | Gangutia | Raimatang-9 | 116.15 | |
| Pana | Gangutia | Raimatang-10 | 249.08 | |
| WRVK | NRVK | SRVK-1 | 0.90 | |
| WRVK | WRVK | SRVK-8 | 176.45 | |
| | | Total area in ha. | 1762.33 | |

Buxa Tiger Reserve (East)

| Range | Beat | Block and Compartment | Area in ha. |
|-------------|-------------|-----------------------|-------------|
| Buxaduar | Buxaroad | NRVK-3 | 187.24 |
| Buxaduar | Buxaroad | NRVK-9 | 358.30 |
| Bholka | Ghoramara | S.Bholka-1 | 74.62 |
| Bholka | Ghoramara | S.Bholka-4 | 161.18 |
| Bholka | Barobisha | S.Bholka-5 | 65.73 |
| Bholka | Barobisha | S.Bholka-6 | 251.30 |
| South Rydak | South Rydak | S.Rydak-1 | 109.85 |
| South Rydak | South Rydak | S.Rydak-4 | 232.20 |
| | | Total area in ha | 1440.42 |

4. Miscellaneous Natural Forest

A. Buxa Tiger Reserve (West)

| Range | Beat | Block and Compartment | Area in ha. |
|--------|---------------|-----------------------|-------------|
| EDPO | Checko | Checko-6 | 25.74 |
| EDPO | Checko | Checko-7 | 99.60 |
| EDPO | Checko | Checko-8 | 55.04 |
| EDPO | Checko | Checko-9 | 104.92 |
| WDPO | Garam (East) | Damanpur-2 | 172.57 |
| WDPO | Garam (East) | Damanpur-5 | 54.27 |
| WDPO | Garam (East) | Damanpur-6 | 17.27 |
| EDPO | Damanpur | Damanpur-7 | 170.63 |
| EDPO | Damanpur | Damanpur-8 | 243.72 |
| WDPO | Garam (East) | Damanpur-9 | 162.30 |
| WRVK | Dima | Dima-2 | 201.29 |
| WRVK | Dima | Dima-4 | 82.65 |
| ERVK | Gadadhar | Gadadhar-2 | 164.79 |
| ERVK | Gadadhar | Gadadhar-4 | 159.32 |
| Nimati | Nimati (East) | Nimati-3 | 160.89 |
| Nimati | Nimati (East) | Nimati-4 | 136.52 |
| Nimati | Nimati (East) | Nimati-5 | 240.27 |
| Nimati | Nimati (East) | Nimati-6 | 242.07 |
| Nimati | Nimati (West) | Nimati-7 | 143.58 |
| Nimati | Poro (West) | Poro-6 | 17.71 |
| WDPO | Poro (East) | Poro-7 | 126.39 |
| WDPO | Garam (West) | Poro-8 | 288.85 |
| WDPO | Garam (West) | Poro-9 | 119.32 |
| WDPO | Poro (East) | Poro-10 | 157.34 |
| Nimati | Poro (West) | Poro-11 | 121.17 |
| WRVK | WRVK | SRVK-9 | 556.06 |
| WRVK | WRVK | SRVK-16 | 416.64 |
| | | Total area in ha. | 3334.86 |

C. Buxa Tiger Reserve (East)

| Range | Beat | Block and Compartment | Area in ha. |
|---|--------------------|-----------------------|-------------|
| South Rydak | South Rydak | Dhawla-1 | 138.98 |
| South Rydak | South Rydak | Dhawla-2 | 5.87 |
| South Rydak | Chipra | Lokhnathpur | 0.79 |
| Bholka | Chengmari | Madhya Haldibari | 13.76 |
| Bholka | Chengmari | N. Bholka-1 | 129.92 |
| Bholka | Chengmari | N. Bholka-2 | 186.88 |
| Bholka | Chengmari | N. Bholka-3 | 169.86 |
| Bholka | Chengmari | N. Bholka-4 | 124.97 |
| Bholka | Balapara | N. Bholka-5 | 124.29 |
| North Rydak | Kartick | Rydak USF | 107.29 |
| Bholka | Balapara | S.Bholka-2a | 182.08 |
| Bholka | Ghoramara | S.Bholka-2b | 89.60 |
| Bholka | Ghoramara/Balapara | S.Bholka-3(a+b) | 217.06 |
| North Rydak | Mainabari | Turturikhand USF | 2.36 |
| | | Total area in ha. | 1493.71 |
| | Abstract | | |
| Eco Fragile Zone | | | 13853.21 |
| Full Natural Forest | | | 5011.84 |
| Sal Natural Forest | | | 3202.75 |
| Miscellaneous Natural Forest | | | 5934.63 |
| Area of Bio-Diversity Conservation Zone in Buffer(in ha) | | | 28,002.43 |

7.2.1.5.2 GENERAL CHARACTER OF VEGETATION IN BIODEVRSITY ZONE :

The forest of this Zone consists of natural forests mainly comprising of Sal (Shorea robusta), Teak (Tectona grandis) and associate like Chiloune (Schima wallichii,), Chikrasi (Chukrassia tabularis), Champ (Michelia champaca), Chalta (Dillenia indica), Bahera (Terminalia belerica), Panisaj (Terminalia myriocarpa), Pakasaj (Terminalia alata), Gokul (Ailanthus grandis) Kusum (Baccaurea ramiflora), Lahasune (Aphanamixis polystachya), Lali (Amoora spectabilisi), Gineri (Premna bengalensis), Kumbhi (Careya arborea), Kawla (Persea fructifera), Malata (Macaranga denticulata), Siris (Albizia sp), Patpati (Magnolia pterocarpa), Pitali (Trewia nudiflora), Sinduri (Mallotus philippensis) and Premna sp. etc.

7.2.1.5.3 SPECIAL OBJECT OF MANAGEMENT:

- 1. To adopt adequate measure for conservation and management of the Biodiversity of the Natural forests.
- 2. To improve the existing degraded patches by restocking through artificial regeneration.
- 3. To cover all the existing blanks by suitable miscellaneous, fruit, fodder and grass species for Wildlife.
- 4. To create a congenial habitat for the migrant and resident wildlife.
- 5. To adopt soil and moisture conservation practices to enhance the quality of habitat.
- 6. Old plantations containing high percentage of Teak shall be subjected to canopy opening and subsequently planting of local miscellaneous species, fruit and fodder bearing species for habitat improvement for the wildlife.

7.2.1.5.4 SILVICULTURAL SYSTEM:

There shall be "no felling" in natural forests area of various blocks of this Circle. In case of any epidemic outbreak, the diseased tree may be extracted after obtaining prior permission from the Chief Wildlife Warden. Cyclone damaged trees may be extracted after leaving sufficient number of trees for wildlife as par existing rules. The sale proceeds of such extraction shall be flown back to the benefit of the Tiger Reserve. No extraction of any kind shall be permitted from block and compartment falling in the eco-sensitive zone. Blank areas in Sal natural forest areas, miscellaneous natural areas, riverine natural areas and eco-sensitive zones should be regenerated with local miscellaneous fodder and grass species analogous to the adjoining high forest and should not be raised in monoculture. Approximate blank area available is given in the table below.

A. Buxa Tiger Reserve (West)

| Year | Range | Beat | Block and Compartment | Blank area available in ha. | Annual plantation target in ha. |
|---------|--------------|--------|--------------------------|-----------------------------------|---------------------------------|
| 2013-14 | EDPO | Checko | Checko-8 | 3.690 | 3.690 |
| 2015-16 | Hamiltonjung | GDB | GDB-4a | 18.28 | 18.28 |
| 2016-17 | Hamiltongunj | GDB | GBD-3a | 9.62 | 9.62 |
| 2017-18 | Hamiltongunj | GDB | GBD-2a | 20.50 | 20.50 |

B. Buxa Tiger Reserve (East)

| Year | Range | Beat | Block and Compartment | Blank area available in ha. | Annual plantation target in ha. |
|---------|--------|-----------|--------------------------|-----------------------------------|---------------------------------|
| 2013-14 | Bholka | Barobisha | South Bholka-6 | 13.138 | 13.138 |
| 2014-15 | Bholka | Barobisha | South Bholka-5 | 7.315 | 3.315 |
| 2015-16 | Bholka | Chengmari | N. Bholka | 6.075 | 6.075 |
| 2016-17 | SRD | Chipra | Dhowla-3 | 4.101 | 4.101 |
| 2017-18 | SRD | SRD | Dhowla-1 | 3.985 | 3.985 |
| 2018-19 | Jainti | Phaskhawa | NRVK-5b | 13.524 | 13.524 |
| 2019-20 | Jainti | Phaskhawa | NRVK-5a | 9.244 | 9.244 |

Planting pattern and maintenance should preferably be with sufficient fodder grasses, NTFP and fruit such as Amloki, Haritaki, Aam, Kathal, Jam etc at the spacing of 10m X 10m all over the areas. Soil study should be carried out one year before taking up plantations to ascertain the reason of devoid of trees in those areas if necessary, soil amendments wherever necessary may be done. The eco sensitive areas shall remain free from any interference.

7.2.1.6 Zone plan for Forestry plantations

- a. Miscellaneous & Teak
- b. Sal

A) MISCELLANEOUS SPECIES & TEAK PLANTATION ZONE

GENERAL CONSTITUTION OF WORKING ZONE:

- A) Teak Monoculture Plantations
- b) Miscellaneous Species Plantations

CANOPY OPENING IN TEAK MONO CULTURE PLANTATIONS:

As per the summary of prescriptions given in the 1st Combined Management Cum Working Plan (2000-01 to 2009-10) canopy opening was prescribed in compartments having plantations where pure Teak was there. During this plan, pure Teak plantations were not visualized but some areas where Teak is more than 80% (Godamdabri-1b) and (SRVK-2 where Teak is in place of Sal) has been identified for canopy opening to facilitate wildlife habitat improvement. Such compartments within this Working Zone which do not constitutes natural forest areas and where old plantation exits in which Teak constitutes 80% and more may be subjected to canopy opening.

| Block and compartment | Year of plantation | Plantation area in ha. | Canopy opening year |
|-----------------------|--------------------|------------------------|---------------------|
| Godamdabri-1b | 1957 | 22.00 | 2014-15 |
| | 1958 | 28.33 | 2015-16 |
| | 1959 | 28.33 | 2016-17 |
| | 1960 | 28.33 | 2017-18 |
| | 1961 | 28.33 | 2018-19 |
| | 1962 | 28.33 | 2019-20 |
| | 1963 | 12.33 | 2014-15 |
| | 1987 | 10.50 | 2015-16 |
| SRVK-2 | 1971 | 36.80 | 2016-17 |
| | 1973 | 36.80 | 2017-18 |
| | 1974 | 36.80 | 2018-19 |

| Block and compartment | Year of | Plantation area in ha. | Canopy opening |
|-----------------------|------------|--------------------------|----------------|
| | plantation | | year |
| | 1975 | 36.80 | 2019-20 |
| | 1976 | 20.00 | 2020-21 |
| | 1981 | 23.00 | 2021-22 |
| | 1991 | 5.00 | 2022-23 |
| | | Total area in ha. 381.68 | |

During the opening of canopy only the block having dense Teak would be identified and marked for felling. Canopy opening should be done in small plot of size 25 to 30 hectare in one place. Such plots may be laid out in staggered manner and should be at least 50 meters away from streams and rivers and should be done in irregular shape so that maximum light penetrates. The principle of retaining 40% of the trees will be followed so that the excessive opening may not result in heavy weed and grass growth. Marking of Teak trees should be done during September/October and should be completed by February. During marking and felling, all miscellaneous species including fruit, fodder and trees of NTFP importance should be retained. Teak stumps will have to be battered to discourage coppicing. Canopy opened areas should be regenerated with fodder and grass species. The timber extracted from such canopy opening shall be utilized back to welfare of the park by keeping the earning in Buxa Tiger Conservation Foundation Trust.

Plantation and Maintenance prescription for Canopy Opened Area:

Deputy Field Directors would decide the planting pattern based on the actual field requirements. Emphasis should be given to raise grasslands as the reserve doesn't have enough grassland. However a model is prescribed hereunder for ready reference.

| Species to be planted | Planting pattern |
|------------------------------|--|
| Bamboo (Bambusa arundinacea, | Bamboo and grasses may be planted either |
| Dendrocalamus hamiltonii) | 1x1mt or 2x2 mt spacing. |
| Grassess such as Purundi, | |
| Chepti, Malsa, Dadda etc. | |
| | |
| | |

Such plantations shall be maintained as follows:

| Year | Maintenance | Infilling |
|----------------------|----------------------------|------------|
| Creation 0 year | 5 weeding / cleaning | - |
| 1 st year | 4 weeding / cleaning | To be done |
| 2 nd year | 3 weeding / cleaning | To be done |
| 3 rd year | 3 weeding / cleaning | - |
| 4 th year | 2 weeding / cleaning | - |
| 5 th year | Climber cutting/removal of | |
| | eupatorium, michenia etc | |

Some of the areas under this Working Zone are frequently visited by the herds of Elephants and other wild animals. Therefore, special attention should be paid to preserve the riparian zone and preferred microhabitat of elephant and other wild

animals. It requires suitable planting of fodder and fruits species. Enrichment plantation should be taken annually on a regular basis.

All the plantations should be completed before the onset of monsoon. The conditions of all the plantations shall be monitored in the 1st, 3rd, and 5th years respectively by the Monitoring Division (North) and the report should be pasted in the plantation journal.

B) Miscellaneous Species Plantations

Parts of Checko, Damanpur, Dima, Gadadhar, Poro and SRVK etc. which consists of the artificially regenerated forests of Teak and Miscellaneous species has been placed in this Working Zone during this plan.

The total area of this Working Zone is 6977.82 ha. The following blocks and compartments constitute this Working Zone.

A. Buxa Tiger Reserve (West)

| Range | Beat | Block & Compartment | Area in ha |
|--------|---------------|---------------------|------------|
| EDPO | Checko | Checko-6 | 285.44 |
| EDPO | Checko | Checko-7 | 159.00 |
| EDPO | Checko | Checko-8 | 238.48 |
| EDPO | Checko | Checko-9 | 77.20 |
| WDPO | Garam (East) | Damanpur-2 | 58.90 |
| WDPO | Garam (East) | Damanpur-5 | 297.00 |
| WDPO | Garam (East) | Damanpur-6 | 355.04 |
| EDPO | Damanpur | Damanpur-7 | 124.79 |
| EDPO | Damanpur | Damanpur-8 | 60.60 |
| WDPO | Garam (East) | Damanpur-9 | 24.66 |
| WRVK | Dima | Dima-2 | 65.00 |
| WRVK | Dima | Dima-4 | 275.50 |
| ERVK | Gadadhar | Gadadhar-2 | 171.52 |
| ERVK | Gadadhar | Gadadhar-4 | 86.33 |
| Nimati | Nimati (East) | Nimati-3 | 221.55 |
| Nimati | Nimati (East) | Nimati-4 | 106.70 |
| Nimati | Nimati (East) | Nimati-5 | 14.28 |
| Nimati | Nimati (East) | Nimati-6 | 48.50 |
| Nimati | Nimati (West) | Nimati-7 | 200.00 |
| Nimati | Poro (West) | Poro-1 | 313.80 |
| WDPO | Poro (East) | Poro-2 | 8.00 |
| WDPO | Garam (West) | Poro-4 | 90.00 |
| WDPO | Poro (East) | Poro-6 | 340.44 |
| WDPO | Poro (East) | Poro-7 | 209.10 |
| WDPO | Garam (West) | Poro-8 | 141.73 |
| WDPO | Garam (West) | Poro-9 | 194.31 |
| WDPO | Poro (East) | Poro-10 | 225.90 |
| Nimati | Poro (West) | Poro-11 | 143.05 |
| WRVK | WRVK | SRVK-16 | 182.72 |
| | | Total area in ha. | 2049.05 |

B. Buxa Tiger Reserve (East)

| Range | Beat | Block & Compartment | Area in ha |
|-------------|-------------------------|-------------------------------|------------|
| South Rydak | South Rydak | Dhawla-1 | 110.00 |
| South Rydak | South Rydak | Dhawla-2 | 133.00 |
| South Rydak | Chipra | Lokhnathpur | 6.50 |
| Bholka | Chengmari | Madhya Haldibari | 38.45 |
| Bholka | Chengmari | N.Bholka-1 | 158.75 |
| Bholka | Chengmari | N.Bholka-2 | 108.66 |
| Bholka | Chengmari | N.Bholka-3 | 60.50 |
| Bholka | Chengmari | N.Bholka-4 | 142.23 |
| Bholka | Balapara | N.Bholka-5 | 217.00 |
| Buxaduar | Buxaroad | NRVK-3 | 54.00 |
| North Rydak | Kartick | Rydak USF | 20.00 |
| Bholka | Ghoramara | S.Bholka-1 | 167.08 |
| Bholka | Balapara | S.Bholka-2a | 101.72 |
| Bholka | Ghoramara | S.Bholka-2b | 193.80 |
| Bholka | Ghoramara/Balapara | S.Bholka-3 | 310.47 |
| Bholka | Ghoramara | S.Bholka-4 | 118.30 |
| Bholka | Balapara | S.Bholka-5 | 248.73 |
| Bholka | Barobisha | S.Bholka-6 | 53.20 |
| North Rydak | Mainabari | Turturikhand | 8.77 |
| South Rydak | Chipra | Uttar Rampur USF | 7.12 |
| | | Total area in ha | 2258.28 |
| | Total area of Miscellar | neous Species Plantation Zone | 6977.82 |

CHOICE OF SPECIES & PLANTING PATTERN

Local & indigenous forest spp like Gamar, Chilauni, Chikrasi, Panisaj, Pakasaj, Amloki, Jamun, Bahera, Haritaki, Kainjal, Jarul, Champ, Myna, Pitali, Khair, Sissoo, Lali, Lasuni etc. will be planted at a spacing of 2m x 2m considering the edaphic factor of the site.

GENERAL CHARACTER OF VEGETATION:

Past history of vegetation of these areas shows the areas to be covered by dry mixed forest with small patch of Sal scattered in the Southern parts of wet mixed forests mainly in the streams banks. The Sal forest had a mixture of Chiloune (Schima wallichii), Toon (Toona ciliata), Lampate (Duabanga sonneratioides), Moina (*Tetrameles nudiflora*) etc.

These areas had been gradually reforested with Teak and Miscellaneous species in the older Plans. In this Plan, only area with artificial Teak and Miscellaneous plantation raised in the past have been kept under this Working Zone.

SUBSIDIARY SILVICULTURAL OPERATION **CLEANING** AND THINNING:

Thinning is to be carried out to create open spaces for promoting natural undergrowth & other endemic spp to improve habitat.

Silvicultural operations in buffer is to be undertaken as per the prescriptions of supplementary guidance documents of NTCA to facilitate dispersal.

All experimental plantations like Seed stands, MPCA, Plus tree etc. selected by Silviculture (North) Division for research study will be conducted as per the prescription of Divisional Forest Officer, Silviculture (North). The reserve having

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very less quantum of grassland, hence grassland may be increased by way of canopy manipulation of Teak monoculture on the basis of research findings.

Habitat management and improvement activities will be carried out in the existing habitat of tiger and its prey species through active involvement of local communities.

B) SAL PLANTATION ZONE

GENERAL CONSTITUTION OF WORKING ZONE:

The Sal plantation areas of Raimatang, Cheko, Damanpur, South Bholka, Nimati, NRVK etc. blocks has been placed in this Working Circle. The total area of this zone is 1961.00 ha. The following blocks and compartments constitute this Working Zone.

A. Buxa Tiger Reserve (West)

| Range | Beat | Block & Compartment | Area in ha |
|-------------|-----------------------|---------------------|---------------|
| Nimati | Nimati (West) | Nimati-1a | 132.58 |
| Nimati | Nimati (West) | Nimati-1b | 159.97 |
| EDPO | Checko | Checko-6 | 66.81 |
| Nimati | Nimati | Nimati-2 | 273.51 |
| WRVK | NRVK | NRVK-16 | 44.00 |
| WDPO/Nimati | Poro (East)/Poro West | Poro-5 | 136.30 |
| Pana | Gangutia | Raimatang-6 | 52.00 |
| Pana | Gangutia | Raimatang-7 | 56.75 |
| Pana | Gangutia | Raimatang-8 | 124.40 |
| Pana | Gangutia | Raimatang-9 | 188.18 |
| Pana | Gangutia | Raimatang-10 | 40.68 |
| WRVK | NRVK | SRVK-1 | 197.00 |
| | | Total area in ha. | 1472.18 |

B. Buxa Tiger Reserve (East)

| Range | Beat | Block & Compartment | Area in ha |
|-------------|-------------|---------------------|---------------|
| Buxaduar | Buxaroad | NRVK-3 | 163.04 |
| Buxaduar | Buxaroad | NRVK-9 | 12.00 |
| Bholka | Ghoramara | S.Bholka-1 | 5.66 |
| Bholka | Ghoramara | S.Bholka-4 | 34.69 |
| Bholka | Barobisha | S.Bholka-5 | 24.40 |
| Bholka | Barobisha | S.Bholka-6 | 36.39 |
| South Rydak | South Rydak | S.Rydak-1 | 164.64 |
| South Rydak | South Rydak | S.Rydak-4 | 48.00 |
| | | Total area in ha. | 488.82 |
| | | Grand total in ha. | 1961.00 |

CHOICE OF SPECIES & PLANTING PATTERN

Sal and its associates like Chilauni, Chikrasi, Panisaj, Pakasaj, Amloki, Jamun, Bahera, Haritaki, Kainjal, Lali, Lasuni etc.will be planted at a spacing of 2m x 2m considering the edaphic factor of the site. Planting of Seven (07) lines of sal and Five (05) lines of Misc. Spp is to be repeated.

GENERAL CHARACTER OF VEGETATION:

Sal plantations mostly have *Machilus sp.*, *Alpanamixis polystachya*, *Premna sp.* and *Dillenia* species as principal associates in order of abundance. Valuable species that come next are Odal (*Sterculia villosa*), Gamar (*Gmelina arborea*), Bahera (*Terminalia belerica*), Dabdabe (*Garuga pinnata*), Chiloune (*Schima wallichii*), Champ (*Michelia champaca*) and Sidha (*Lagerstroemia parviflora*) also occur at a lesser percentage.

In this plan, only artificially regenerated Sal plantation have been kept under this Working zone.

TENDING SCHEDULE:

Tending schedule as prescribed for miscellaneous plantation shall be followed in case of Sal also.

7.2.1.7 Zone plan for Watershed & Soil Conservation

SOIL CONSERVATION OVERLAPPING WORKING ZONE

General Constitution:

The general ground configuration of the forest areas of this division is flat with no or little erosion except on river side and Adma compartment which are susceptible to erosion. However, erosion may be present on river banks and for the protection of such areas against soil erosion various structures are generally made for erosion control.

Special Objectives of Management:

- i) To improve the socio economic condition of the local FPC members.
- ii) To take anti-erosion measures and improve the soil and moisture conservation carrying capacities of these lands.

Erosion & Soil Conservation: In area affected by erosion, steps are to be taken up to check it. These will consist of construction of check dams and gully plugging. Diversion channels shall also be constructed. Sal forests on plain land with bare floor need contour trenching at suitable intervals and ploughing up the land in between the contour trenches. These will supplement the natural regeneration of Sal. Soil conservation measures on Watersheds basis should be taken up where People's participation is assured through contribution of labour, cash, material etc. for its development as well as for the operation and maintenance of the assets created. Erosion becomes serious where the forests are heavily grazed and ground cover is absent and slopes vary beyond 15 degree to 20 degree Erosion has been aggravated by frequent fires, unrestricted grazing flood plain topography. Gully erosion can be seen at the heads of rivers & nallas. Erosion should be checked by soil conservation means like trenches, gully plugging, check dams etc. It is proposed that soil and moisture conservation works should be taken up in all the Working Circles as and where required.

In Buxa Tiger Reserve there is no severe erosion problem except Adma, Buxaduar, and Sankosh which are the hilly areas. However, near rivers or jhoras slight erosion may be noticed where appropriate soil conservation measure can be taken for protection of erosion. The following table shows the location where slight

erosion is noticed and approximate area in percentage subjected to erosion is also stated in the table. Adequate soil conservation measures depicted below is to be taken for stopping of erosion in the area shown in the table below:-

A. Buxa Tiger Reserve (West)

| Range | Beat | Compartment | Erosion Status | Approximate % of area under slight erosion. |
|--------------|---------------|-------------|-----------------|---|
| | | | | 60.00 |
| Pana | Adma | Adma-1 | Erosion problem | (susceptible to erosion) |
| Pana | Adma | Adma-2 | Erosion problem | -do- |
| Pana | Adma | Adma-3 | Erosion problem | -do |
| Pana | Adma | Adma-5(p) | Erosion problem | -do- |
| Damanpur (W) | Poro (East) | Poro-10 | Slight erosion | 0.39 |
| Damanpur (W) | Poro (East) | Poro-2 | Slight erosion | 0.61 |
| DPO(W) | Garam (West) | Poro-3 | Slight erosion | 0.85 |
| DPO(W) | Garam (West) | Poro-4 | Slight erosion | 0.55 |
| Damanpur (W) | Poro (East) | Poro-5 | Slight erosion | 0.76 |
| DPO(W) | Garam (West) | Poro-8 | Slight erosion | 0.49 |
| DPO(W) | Garam (West) | Poro-9 | Slight erosion | 0.47 |
| Hamiltonganj | Godamdabri | GDB-1 | Slight erosion | 1.01 |
| Nimati | Poro (West) | Poro-1 | Slight erosion | 0.31 |
| Nimati | Poro (West) | Poro-6 | Slight erosion | 0.19 |
| Nimati | Poro (West) | Poro-11 | Slight erosion | 0.52 |
| Nimati | Nimati (West) | Nimati-1 | Slight erosion | 0.09 |
| Nimati | Nimati (East) | Nimati-5 | Slight erosion | 0.43 |
| West RVK | Dima | Dima-2 | Slight erosion | 2.55 |
| West RVK | Dima | Dima-3 | Slight erosion | 2.96 |
| West RVK | Dima | Dima-4 | Slight erosion | 1.71 |
| Pana | Raimatang | Raimatang-1 | Slight Erosion | 10.00 |

B. Buxa Tiger Reserve (East)

| Range | Beat | Compartment | Erosion Status | Approximate % of area under slight erosion. |
|-------------|-------------|--------------|-------------------|---|
| Jainti | Phaskhawa | NRVK-5(b) | Slight erosion | 1.10 |
| Jainti | Phaskhawa | NRVK-6a(P),b | Slight erosion | 1.50 |
| Range | Beat | Compartment | Erosion Status | Approximate % of area under slight erosion. |
| Jainti | Bhutiabasti | PHK-1 | Slight erosion | 9.11 |
| Jainti | Bhutiabasti | PHK-2 | Slight erosion | 0.33 |
| Santarabari | Buxaduar | NRVK-1 | Slight erosion | 1.05 |
| Santarabari | Buxaduar | NRVK-2 | Slight erosion | 1.26 |
| Santarabari | Buxaduar | NRVK-4 | Slight erosion | 2.59 |

Methods of Soil Conservation: There is no doubt that most of the continued degradation and the low productivity of the forests is attributed to the immense biotic pressure caused by the increase of human and cattle population, growth of civilization

and industries and increase in demand for mining timber. Thus the solution is not just planting up the blanks and restoring the degraded forests to good cover and treating the heavily eroded areas but also one of mitigating the biotic interference by the regulation of grazing in form of the provision of non-forest produce, by providing suitable substitutes, creating mass awareness, involving the fringe dwellers in the rehabilitation and management of degraded forests and above all generating sufficient employment opportunities and creation of healthy living conditions in the village through regular contacts and development of backward areas.

Objectives:

- i. To check the surface run off of water by harvesting every drop of rainwater for purposes of plantations, soil and moisture conservation, water supplies etc to create sustainable sources of income for the village community as well as for drinking water supplies.
- ii. To retain water for a longer period of the year.
- iii. To restore ecological balance by harnessing, conserving and developing natural resources i.e. land, water, vegetative cover especially plantations.
- iv. To mitigate the adverse effects of extreme climatic conditions such as drought and soil erosion on crops, human and livestock population for the overall improvement of forest areas.

Activities:

- i. Construction of masonry check dams on streams.
- ii. Construction of earthen water retention dams and water harvesting tanks on community land.
- iii. Planting of fodder and soil binding species of trees on the raised banks.

The following treatment models will be adapted to check soil erosion depending upon the suitability of a model to a particular eroded site.

Prescriptions Suitable For Heavily Eroded Forest Land

ADVANCE WORK

- i. The site is to be protected against grazing by trench fencing of 1.75 m x 12.5m x 1.25m size.
- ii. Contour trenches to be dug on hill slopes and foot hills of 30 cm x 30 cm x 8 m size, 2 m apart along the contour, spaced in staggered fashion against the contour, 1 m apart in case of gentle gradients.
- iii. In case of small erosions, where gully formation is on way gullies to be plugged by small sized check dams and diversion channels to be provided.
- iv. Ring bund or circular trenches to be provided on tops of gullies.
- v. In case of ravines or widely gullied portions, silt detention dams to be constructed.
- vi. The projecting ends of land enclosing the ravines or branched gullies to be joined by stone wall or masonry check dams with safe outlets.

- vii. Raising nursery for the selected species of plants in 30% excess of the requirement.
- viii. Digging of pits 30cm x 30cm x 30cm x 30cm, 2.5m x 2.5m apart.
- ix. All gully plugs check dams and silt detention dams to be vegetative reinforced by planting indigenous grasses and plants.
- x. The whole area to be planted up with suitable species prescribed in the Working Circles.

POST TREATMENT OPERATIONS

- i. Employing a cattle watcher from among the fringe villagers for protection of each 50 hectare, up to the end of the second year of completion.
- ii. In case of the treated land falling in the forests with rights, local villagers that have committed the protection reimbursements in the form of cattle watchers etc may made to them through different developmental funds like FDA, RIDF, NREGS etc.

Prescriptions for Areas under Good Forest Cover

The portions of forests enjoying a good cover of trees should also be reinforced against the slow erosion process by contour trenching on gentle slopes, the berms of the trenches or bunds being planted up preferably with the tree species naturally growing all around or to be left as such for natural regeneration of Sal and its associates in predominantly Sal areas of good crops.

- i. In localities where bamboos are naturally found in the surroundings it should be planted in proportion.
- ii. In riverain areas Sissoo, Khair etc. should be selected for planting.
- iii. By the bunds of trenches Sissoo, and Gamar should planted.

Other Regulations:

- i. All the works in this zone is FPC oriented work. So, participation / involvement of FPC members to be ensured.
- ii. Before taking up the plantation work a resolution will be taken from the FPC members to ensure the protection of the plantation. In this connection a general meeting may be held before taking up the plantation work.
- iii. Control of grazing and fire protection measures to be initiated. Fire line to be done in the younger plantation areas in a suitable interval and according to the intensity of fire hazard.
- iv. Soil and moisture conservation works shall be taken along with marking, and will be completed before onset of monsoon in the next year. These works include two main operations namely, contour trenching and gully plugging for rain water conservation and to check soil erosion. Also check dam / earthen dam may be constructed to reduce the runoff and to arrest the silted soil.

Table-7.3: Affected areas and proposed soil conservation sites Buffer areas of BTR.

| Nam Strea | e of River/ | Affected Block and Compartments | Affected Length (Km.) | Proposed Soil conservation Sites |
|--------------|-------------|------------------------------------|-----------------------|---|
| 1. | Rydak | USF, NR – 3 | 5 Km. | • 1 Km. in NR-1 near BGT |
| | | | | • 2 Km. in NLS-2 and NR-3 |
| 2. | Gholani | NB-4,5 ;SB-2,3,6 | 3 Km. | • 1 Km. in HB-2, 3 near Bengduba F.V. |
| | and Chikia | | | • ½ Km. in SB-6 near Barobisha Beat Off. |
| 3. | Buxajhora | NRVK-2,4 ;STB-4 | 3 Km. | • 1.5 Km. in between 28 th and 30 th mile |
| 4. | Jainti | NRVK – 5, 6; | 5 Km. | Near Jainti location (some work already done) |
| 5. | Nonai | DPO – 8, 7 | 2 Km. | • ½ Km. near DPO F.D. holding |
| | | | | • ½ Km. near Panijhora Forest village |
| 6. | Poro and | Poro – 6, | 3 Km. | • ½ Km. near Poro(W) Beat Office |
| | Nimtijhora | (W. Poro Beat),9 | | • 1 Km. near Poro (E) Forest village |
| 7. | Gangutia | RTG – 8, 9,3 | 2 Km. | 1 Km. near Gangutia Forest village |
| 8. | Dima | Dima – 1, 3; SRVK- | 5 Km. | 1 Km. near Dima Beat Office |
| | | 15,16 | | • 1 Km. near RVK complex |
| 9. | Raimatang | RTG – 2, 3 | 2 Km. | • ½ Km. near RTG Forest village |
| 10. | Kalkut | Checko-9 | 1 Km. | 1 Km. near Kalkut Forest village |
| 11. | Dhawla | SRD-17,NR-2 | 2.5 Km. | • ½ Km. near Mainabari Beat Office |
| | | | | • ½ Km. near S.Rydak Beat Office |
| | | | | • ½ Km. near Chipra Beat Office |
| 12. | Daria | DPO-6,9 | 1 Km. | • ½ Km. near DPO Range Off. Complex |
| | | Total: | 34.5 Km | Approximately 14 Km. |

i) Bank protection and river training works:

It is proposed to take up construction of sausage works and spurs over 20 Km. during first 5 year of the Plan period @ 4.0 Km. /year. These soil conservation measures will be maintained in subsequent years wherever necessary. Other than above smaller soil conservation works are needed in Raimatang Block for protection of Shikari Road as well as for soil conservation works.

ii) Stabilization of landslips/landslides:

Such works are needed in hill areas of Adma, Chunabhati, Tobogaon, Tashigaon and Phaskhawa blocks. In all, 50 ha of affected areas are proposed to be treated.

7.2.2 Theme Plans

Buffer area of BTR will be managed with the following theme specific plans.

i. Protection theme

Fire Management theme Illicit felling theme

Encroachment Eviction theme

- ii. Conservation education theme
- iii. Theme plan for prophylactic immunization of livestock
- iv. Theme plan for sustainable fuelwood and NWFP collection
- v. Theme plan for Joint Forest Management

7.2.2.1 Protection Theme

Forest protection is a term which is use to combat all illegal activities that is likely to occur in the forest areas and which are responsible for destruction of forests. Each activity needs to be acted upon by the concerned officers and staffs. Such activities include fire, illicit felling, encroachment etc.

The prescriptions for some of the illegal activities are as follows

7.2.2.1.1 Fire:

Occurrence of fire is the annual feature. Most of the fires are accidental and generally no major damage is reported. Last five years record suggests that fire occurs during January to April where the climate is dry and the forests are covered with dry fallen leaves which catch fire quickly. Generally most of the fire that occurs is surface fire causing less damage to the forest vegetation.

Though no major fire has happened in Buxa Tiger Reserve yet special precautions are necessary to avoid large scale fire in the forest areas.

The following general prescriptions are laid out for controlling fire:

- 1. Fire lines should be maintained every year before the winter season starts. In fire prone areas, widening of existing fire line may be done.
- 2. Quick communication of information should be there amongst the staffs and headquarter. Sufficient fixed and hand R.T. sets should be available. All watch towers should be well interconnected through R.T. sets.
- 3. The existing number of watch towers should be increased, apart from existing watch tower in BTR (East) and BTR (West).
- 4. Control burning of ground litter in fire prone areas and lopping of lower branches for prevention of crown fire should be undertaken annually before the outset of dry season. Counter firing also reduces spreading of fire.
- 5. All roads, block boundaries, external boundaries should be treated as fire lines. Special precaution is to be taken along railways track during the winter season extending up to April every year.
- 6. Vehicles and departmental elephant should be utilized during fire control. Their number should be suitable enough.
- 7. Conducting meeting and if possible training of the local people and the forest villagers in combating fire is necessary. Help may be taken from local fire department. This will also create public awareness.
- 8. The district administration, police, etc is to be informed and involve as sometimes, evacuation of people may be required in case of large fire.

- 9. Fire alerts are being issued daily by fire cell of the state Working Plan and GIS Wing. The data being accurate, Divisional office and staff should promptly act on any such alerts.
- 10. Maintenance of fire registers in every Range and Division where every detail is to be recorded.

7.2.1.1.2 Encroachment:

Encroachment to the extent of 7.80 ha has been recorded in the buffer area of Buxa Tiger Reserve during the recent survey though nothing was recorded during the last plan. Special care is to be taken to evict these encroachments.

The following general prescriptions are laid out for controlling encroachment:

- 1. All the external boundaries are to be well defined and external pillars are to be preserved and guarded. There are tendency of displacing boundary pillar for the exact station by land mafia or else. The staffs should be conscious and if detected, the matter is to be brought to notice of the higher Officer at once.
- 2. Help from local Police and District Administration should be taken during evacuation.
- 3. During meeting with the JFM committees, people should be made known of the concept of Forest Conservation Act 1980. This may bring public awareness.
- 4. Even though encroachments are negligible yet special precaution are to be taken. Evacuation of encroachments should be taken up immediately and the area should taken up for plantation

7.2.1.1.3 Illicit felling:

Illicit felling is yet another major issue. Extensive patrolling measures both day and night are to be taken. Patrolling party should be provided with vehicles and communicating devices. Enough funds should be provided for the purpose. Informer network does well in many cases and should be of great benefit and may be utilized.

The following general prescriptions are laid out for controlling illicit felling It includes illicit felling. This general prescription includes.

- 1. Extensive patrolling is to be organized both day and night.
- 2. Sufficient R.T. sets handsets and fixed sets should be available.
- 3. The staffs should be equipped with modern arms, lathis and Khukries, etc for self protection during patrolling.
- 4. Patrolling in inaccessible areas during monsoon becomes big problem. Sufficient departmental elephants should be utilized. Beside vehicle, boats should always be in readiness when required. Register is to be maintained in which staffs doing patrolling shall record area wise patrolling were done and any recovery/arrested etc is also to be made.
- 5. Often joint patrolling with the help of Range staffs should be organized.
- 6. The forest protection force should be well utilized during patrolling and raid programs
- 7. The Eco Development and Forest Protection Committee should be utilized for protection duty along with the staffs.
- 8. Intelligence network should be well established.
- 9. The number of mobile squads should be increased in BTR and should undertake frequent raid program in nearby tea estate, villages and trains. Regular checking of nearby markets should be done by staffs.

- 10. Watch towers should be well connected by R.T. sets. As already proposed during this plan period, at least 3 watch towers should be made every year at least in the areas covered under Bio Diversity Conservation Working Circle.
- 11. The three check posts at Rajabhatkhawa, Damanpur and Barobisha should be adequately strengthened with sufficient staffs both day and night. Vehicles should be provided to each check post and should always be in readiness
- 12. Help from Police should always be taken particularly during raid.

7.2.2.2 Consevation Education theme

7.2.2.2.1 Interpretation programme

Regular interpretation programme for Tiger reserve is very essential for creating awareness and education people about the conservational values of Tiger reserve. One such interpretation centre exists at Rajabhatkawa and one small one at Buxaduar as heritage Museum. One new interpretation centre may be developed at Narathali for birds. Existing Interpretation centre at Rajabhatkawa may be remodeled on theme basis and regular documentaries on wildlife and conservation may be screened for visitors.

7.2.2.2.2 Nature education.

Along with interpretation programmes nature education is an important educative issue that should be addressed by the park especially for school children. Some such programmes are organized by local NGOs as camps for school kids mainly at Jainti, Raimatang, Buxaduar, Hatipota, and Kumargram. Such programmes will expose school kids to nature and will be extremely educative. Tiger reserve should organize such camps with the help form NGOs and shall include the children from forest villages also so that stake holding of all the concerned is increased in the tiger reserve.

The detailed Conservation and Nature Education is dealt in Part 4 under Eco Tourism Plan of Buxa Tiger Reserve

7.2.2.3 Theme plan for prophylactic immunization of livestock

The strategies to control the common diseases like Foot and Mouth Disease, Black Quarter, Haemorrhagic septicimia etc. prevalent in this area is to take prophylactic immunization. The details of the programme is given in section 11.5 under Wildlife Health Monitoring.

7.2.2.4 Theme plan for sustainable fuelwood and NWFP collection

7.2.2.4.1 Introduction:

The present threat of depleting forest resources justify the need of changing management practices and emphasis on medicinal, aromatic, dye and other NTFP species. Medicinal Plants bioresearches Forest-based medicinal and aromatic plants (MAPs) are an essential part of traditional health care systems. Their gathering and cultivation provide a critical source of income for many rural communities, especially landless poor and marginalized farmers. MAPs are also inextricably linked to the region's natural biodiversity. Unfortunately, MAPs are increasingly threatened by various environmental, socioeconomic and institutional problems. At the same time traditional and indigenous knowledge about these plants is weakening and, in some cases, vanishing altogether. Besides health benefits; MAPs also provide crucial

livelihood options for millions of rural people in South Asia, particularly women, tribal peoples and the very poor. India is the centre of South Asia's export trade in medicinal plants, and in this country alone, it is estimated that the collection and processing of medicinal plants contributes to at least 35 million workdays of employment a year. Given this scenario, we at present have no base line data in the division regarding the status of NTFP's and MADP's in the division so a overlapping Zone of NTFP and Medicinal Plants shall have the mandate of collecting the baseline data over the next five years, and later formulating further strategies based on the data so obtained and analyzed, which shall be incorporated in the Mid-term appraisal after five years for issuing further guidelines.

North Bengal, because of its rich biodiversity favoured by desirable climatic condition has a good resource of Non timber forest produces. Till date, base line data are not available and efforts have been made during this plan period to carry out resource survey in all the compartments by laying sample plots of desired dimension to find the extent of this valuable resources which will definitely help in formulating future strategies for its conservation and sustainable utility. Prescriptions have been suggested for planting of important plants in both the Sal as well as in the Miscellaneous Species Plantation Working Circles.

7.2.2.4.2 Object of Management:

- 1. To encourage value addition of NTFP and medicinal plants among local people and to revive lost local knowledge of traditional usage of medicinal plants.
- 2. To develop sustainable harvesting and marketing methods of medicinal plants, NTFP and develop the strategies of in-situ and ex-situ conservation involving local Forest villagers, for utilizing the baseline data so obtained and formulating the strategies of sustainable harvesting and marketing of medicinal plants in the area.
- 3. To develop infrastructure for proper storage and marketing of NTFP's and medicinal plants.
- 4. To protect and encourage customary use of biological resources in accordance with traditional culture practices that are compatible with conservation or sustainable use requirements.
- 5. To provide 2 hectares of blank areas for creation of NTFP plantations by MFP Division for 2 or 3 years in Miscellaneous Species Plantation Zone and Sal Plantation Zone for the benefit of local people.

7.2.2.4.3 Choice of Species:

For the current plan strategies of sustainable harvesting and marketing of at least the following seven medicinal plants in the area may be tried and selected as per suitability e.g., Rauvolfia serpentine (Sarpgandha), Emblica officinalis (Amloki), Terminalia chebul (Harra), Terminalia balerica (Bahera), Baro bans (Bambusa balcooa), Jamuna (Syzygium cumini), Chalta (Dillenia indica). Emphasis should also be given for prioritized species listed below

7.2.2.4.4 Prescription: Nursery raised seedlings of herbs or shrub species which have medicinal value, will be planted in the intercrop areas of Miscellaneous Species Plantation zone and Sal Plantation Zone at the spacing of 5m along the line and 2m spacing between the line and should be distributed well over the plantation areas. Research wing should develop spacing mechanism. Regular weeding, cleaning &

mulching are essential. Fertilization during mulching should be ensured for their better growth and development.

Standards for few species will be utilized for imparting benefits to local species in form of extraction of fruits; roots etc and a marketing chain should be brought into operation for getting proper prices of these products. If possible value addition may also be thought of in order to get better prices of these products involving the FPC's.

Five to ten meter spacing in the lines should have enough space of lateral branch development. No thinning is proposed during the period of this plan. However, Research wing should develop spacing and thinning regime for betterment of the crop.

Seedlings should be raised in Nursery (preferably to nearest Beat office location) and treatment of nursery seedlings to be followed as standard Silviculture system. In case of herb or shrubs species which have medicinal value such species should be planted as intercropping in both the Working Circles. The standards for planting NTFP and Medicinal plants species should be developed by the Silvicultural division or help may be taken up from Forest Research Institute, Dehradun and should be utilized for imparting benefit to local FPC members in form of extraction of fruit, roots etc. A marketing chain should be brought into operation for fetching proper price for these products. FPC members should be involved for planting maintenance and harvesting works of such species.

7.2.2.4.5 Other Regulation:

- 1 NTFP collection shall be allowed as per the existing guidelines and Apex court directives in this regard
- 2 Rights as provided under FRA be honoured to provide livelihood to local and indigenous tribes
- 3 Regular study of status of NTFP shall be carried out.
- 4 Scientific method of harvesting should be employed and local stake holders be trained to follow such methods

7.2.2.4.6 Utilization:

Most of the NTFP & Medicinal Plants are seasonal, mainly herbs and shrubs. So, collection should never be done during flowering. Otherwise such unsustainable practices would deteriorate the biodiversity of the area. Care should be taken and restrictions to be implemented strictly. Utilization of products for some species having medicinal value is given below:

| List of Medicinal | Plants and | other | plants | of Ir | nportance |
|--------------------------|------------|-------|--------|-------|-----------|
| | | | | | |

| Plant | Family | Local name | Part used | Status | Collection period | Propagation method. |
|--------------------------|---------------|-------------|--------------------------|-----------|-------------------|---------------------|
| Abroma augusta | Sterculiaceae | Ulat Kambal | Root, leaf. | Medicinal | Jan- Dec | Seed. |
| Achyranthes aspera | Amaranthaceae | Apang | Root, seed | Medicinal | Jan-Dec | Seed. |
| Adhatoda vasica | Acanthaceae | Basak | Leaf | Medicinal | NA | NA |
| Andrographis paniculata* | Acanthaceae | Kalmegh | Whole plant, leaf, root. | Medicinal | Jan- Dec. | Seed. |
| Alstonia scholaris | Apocynaceae | Chitiwan | Bark | Medicinal | NA | Seed |

| Plant | Family | Local name | Part used | Status | Collection period | Propagation method. |
|---|------------------|---|-----------------------|-----------|-------------------|------------------------|
| Alpinia galanga | Zingiberaceae | Barakulanjan. locally Jungli Shora** | Rhizome | Medicinal | Dec-Jan | Rhizome |
| Alternanthera sessilis | Amaranthaceae | Locally Mongidatan** | Whole plant | Medicinal | NA | NA |
| Anthocephalus kadamba* | Rubiaceae | Kadam | Bark, leaf | Medicinal | NA | Seed |
| Asparagus racemosus* | Liliaceae | Shatavari. Locally Satamul** | Root, leaf. | Medicinal | Jan-Dec | Seed. |
| Ardisia solanaceae | Myrsinaceae | Banjam. Locally Magmedo** | Root | Medicinal | NA | NA |
| Aphanomixis polystachya | Meliaceae | Lahasune | Bark, seed | Medicinal | NA | Seed |
| Azadirachta indica | Meliaceae | Neem | Leaf | Medicinal | April-Dec | Seed |
| Costus speciosus | Zingiberaceae | Bet lauri | Root | Medicinal | | |
| Bacopa monnieri* | Scrophulariaceae | Brahmi | Whole plant. | Medicinal | Jan-Dec | Stem cutting. |
| Boerhavia diffusa | Nytaginaceae | Punarnava | Shoot | Medicinal | Jan-Dec | Stem cutting |
| Calotropis gigantea | Asclepiadaceae | Akanda | Root, bark | Medicinal | Jan-Dec | Seed, stem, Cutting |
| Cassia angustifolia* | Caesalpiniaceae | Seena, Sonamukhi. | Leaf, fruit. | Medicinal | Jan-Dec | Seed. |
| Careya arborea | Locythidaceae | Kumbhi | Leaf, bark, fruit | Medicinal | NA | Seed |
| Centella asiatisa | Umbelliferae | Thankuni | Leaf | Medicinal | Jan-Dec | Seeds. |
| Chlorophytum arundinaceum/ boerivilliannum* | Liliceae | Safed Musli | Fruit, root | Medicinal | Jan-Dec | Seed. |
| Cinnamomum tamala | Lauraceae | Jungli Tejpata | Leaf. | Medicinal | NA | NA |
| Cissus quadrangularis | Vitacease | Harhjorha | Whole part | Medicinal | Jan-Dec | Stem cutting. |
| Citrus medica | Rutaceae | Baranimbu. Locally Jungli libu | Root, Fruit | Medicinal | NA | NA |
| Clerodendrum viscosum/infortunatum | Verbenaceae | Bhant, Ghentu | Leaf, root | Medicinal | Jan-Dec | Seed |
| Clitoria ternatea | Papilionaceae | Aprajita | Root, seed | Medicinal | Jan-Dec | Seed |
| Commiphora wightii* | Burseraceae | Guggul | Root, leaf. | Medicinal | Jan-Dec | Seed. |
| Combretum decandrum | Combretaceae | Kasaidatan | Leaf | Medicinal | NA | NA |
| Costus speciosus | Zingiberaceae | Kew. Locally Betlauri** | Rhizome | Medicinal | Oct-Feb | Rhizome |
| Curculigo orchoides | Amaryllideceae | Taramuli, locally Chagna /Jungli or ban supari** | Rhizome | Medicinal | NA | Rhizome |
| Datura metel | Solanaceae | Kalo Dhutura | Whole plant,. | Medicinal | Jan-Dec | Seed |
| Datura stramonium | Solanaceae | Sada Dhutura | Leaf, Fruit | Medicinal | NA | NA |
| Dillenia indica | Dilleniaceae | Chalta | Fruit | Medicinal | NA | NA |
| Drimia indica | Hyacinthaceae | Jungli piyaj | Bulb | Medicinal | Sept-Oct | Bulb |
| Elaeocarpus serrata/E. floribundus | Elaeocarpaceae | Jalpai | Bark, leaf | Medicinal | NA | NA |
| Euphorbia hirta | Euphobiaceae | Bara-Keuri** | Whole plant | Medicinal | Jan-Dec | Seed |
| Elephantopus scaber | Asteraceae | Gajalata, locally Bhui kumbi** | Root, leaf, flower | Medicinal | NA | NA |
| Flacourtia indica | Flacourtiaceae | Bincha. Locally Monkata** | Fruit | Medicinal | NA | NA |
| Garcinia indica* | Clusiaceae | Kokum | Fruit, seed. | Medicinal | Jan-Dec | Seed. |
| Garuga pinnata | Burseraceae | Dabdabe | Leaf | Medicinal | NA | Seed |
| Gloriosa superba* | Liliaceae | Kalihari, | Leaf, | Medicinal | Jan-Dec | Seed, rhizome. |
| | | Ulatchandal. | rhizome | | | |

| Plant | Family | Local name | Part used | Status | Collection period | Propagation method. |
|--|---------------------------|-------------------------------------|---------------------------|------------------------------|-------------------|---------------------------|
| Gymnema sylvestre* | Asclepiadaceae | Gudmar | Leaf, root, fruit. | Medicinal | Jan-Dec | Seed. |
| Grewia asiatica | Tiliaceae | Phalsa.Locally SealForsa** | Root | Medicinal | NA | NA |
| Heliotropium indicum | Baraginaceae | Hatisund | Root | Medicinal | Jan-Dec | Seed |
| Hemidesmus indicus | Asclepiadaceae | Anantamul | Root | Medicinal | Jan-Dec | Stem/root cutting |
| Holarrhena pubescen/antidysenterica | Apocynaceae | Kurchi | Bark, leaf | Medicinal | Jan-Dec (bark) | Seed. |
| Lagerstroemia speciosa | Lythraceae | Jarul | Seed, bark, leaf ,root | Medicinal | NA | Seed,seedling |
| Lasia spinosa | Araceae | Kantakachu. Locally Lodha** | Leaf, Root | Medicinal | NA | NA |
| Lygodium flexuosum | Schizaeaceae | Berajal. Locally kabutorpata** | Leaf, root | Medicinal | NA | NA |
| Mimosa pudica | Mimosaceae | Lajjabati | Leaf, root | Medicinal | June-Jan | Seed |
| Momordica cochinchinensis | Cucurbitaceae | Kakrol. Locally Bankakor** | Seed | Medicinal | NA | NA |
| Morinda citrifolia | Rubiaceae | Aal.Locally Haldikat | Leaf, Fruit | Medicinal | NA | NA |
| Murraya koenigii | Rutaceae | Barsunga. Locally Karipatta | Whole plant, Leaf | Medicinal | NA | NA |
| Ocimum sanctum* | Labiatae | Tulsi | Leaf, seed, root | Medicinal | Jan-Dec | Seed. |
| Ocimum americannum/gratissimu m | Labiatae | Ramtulsi. Locally Bantulsi** | Whole plant | Medicinal | NA | NA |
| Oroxylum indicum | Bignoniaceae | Totola | Bark | Medicinal | Dec-Jan | Seed |
| Phyllanthus emblica | Euphorbiaceae | Amloki | Fruit | Medicinal | Jan-Dec | Seed |
| Phyllanthus urinaria | Euphorbiaceae | Hazarmani, Locally Bantetul** | Whole plant | Medicinal | NA | NA |
| Piper hamilatonii | Plumbaginaceae | Jungli pan | Leaf aromatic | NA | NA | NA |
| Piper longum* | Plumbaginaceae | Pipla | Root, fruit | Medicinal | Jan-Dec | Stem cutting. |
| Plumbago zeylanica | Plumbaginaceae | Chita | Root, bark | Medicinal | Jan-Dec | Stem cutting |
| Plumeria rubra | Apocynaceae | Tagar | | | | |
| Pterospermum acerifolium | Sterculiaceae | Hatipaily | Leaf decorative | NA | NA | NA |
| Rauvolfia serpentine* | Apocynaceae | Sarpagandha | Root, Leaf | Medicinal | Oct-May | Seed, stem cutting, root. |
| Rubia cordifolia | Rubiaceae | Manjistha. Locally Datarangi | Whole plant | Medicinal | NA | NA |
| Pterospermum acerifolium | Sterculiaceae | Parari | Twig, flower bark. | Fodder, Medicinal | NA | Seed, seedling |
| Schima wallichii* | Ternstroemiaceae | Chilauni | Bark | Medicinal | NA | Seed |
| Sida cordifolia | Malvaceae | Brelo. Locally Khareto** | Root, seed | Medicinal | NA | NA |
| Strebolus asper | Moraceae | Sheora Kanta | Root | Medicinal | NA | NA |
| Sterospermum tetragonum | Bignoniaceae | Parari | Leaf | Medicinal | NA | Seed |
| Syzygium cumini | Myrtaceae | Jam | Fruit, Bark. | Edible, Medicinal | NA | Cutting. |
| Terminalia arjuna | Combretaceae | Arjun | Bark | Medicinal | Jan-Dec | Seed |
| Terminalia bellirica | Combretaceae | Bahera | Fruit | Medicinal | Dec-Feb | Seed. |
| Terminalia myriocarpa Thysanolena maxima | Combretaceae Gramineae | Panisaj Amliso | Bark Inflorescenc e | Medicinal Making broom | Sept-Dec | Seed Seed |

| Plant | Family | Local name | Part used | Status | Collection period | Propagation method. |
|------------------------|----------------|----------------------------|--------------------|-----------|----------------------|---------------------|
| Tinospora cordifolia * | Menispermaceae | Gulancha | Stem leaf | Medicinal | Jan-Dec | Stem cutting |
| Zizyphus jujuba | Rhamnaceae | Bonkul | Fruit edible, root | Medicinal | NA | NA |
| Toona ciliate* | Meliaceae | Toon | Bark | Medicinal | Dec-Jan | Seed. |
| Curcuma longa | Zingiberaceae | Locally jungle haldi/ada** | Rhizome | Medicinal | Dec-Jan | Rhizome |

(Information from extended Shorea Herbal Garden of Silviculture (North Div)

7.2.4.7 Sustainable Management Regime:

A sustainable harvesting system for non-timber forest resources is generally defined as one in which fruits, roots, leaves, nuts, latexes and other products can be harvested till perpetuity from a given forest area without any adverse impact on the species being harvested. Sustainable harvesting is possible with various safeguards and methods, the best is to use only matured parts, harvest only at maturity and leave 20 to 40% parts behind for regeneration, which may be applicable through previous information at local experiences. On the following procedures shall be adopted for sustainable management during the plan period.

- **1. Sustainable harvesting-** More specifically, the following aspects need to be looked into-
 - Sustainable harvesting should take into consideration the following aspect: (a) time/season of harvest, (b) quantum of harvest/collection, (c) technique of harvest, (d) area of harvest.
 - The local people's knowledge about the yield, as well as the sound scientific basis shall be considered while determining the sustainable harvesting limit. The help of research institutions shall be taken up in developing sustainable scientific harvesting practices.
 - Special care should be taken for post-harvest and value addition. The species specific post-harvest technique shall be developed in consultation with the research institute for this purpose during the plan.
 - Community adaptive management strategy based on sound scientific silviculturist and local harvesting knowledge shall be developed during the plan.
 - There should be restriction on multiple harvests of a particular species. For example Sal crop manage for leaf collection should not be harvested for gum. This decision shall be taken in discussion with local people.
- **2. Silvicultural treatment** –Silvicultural treatments of the prioritized NTFP species need to be developed by research institutions based on sound scientific as well as local knowledge. These prescriptions should be species and site specific. Since NTFP are available in plenty on forest floor, special care should be taken for ground floor management like fire, grazing etc, which do maximum damage to the NTFPs. A synergy needs to be developed between the community management practices and Silviclutural techniques.

7.2.4.8 Artificial regeneration-

Restocking (enrichment) of commercially important, threatened and potential NTFP species should be done by artificial regeneration through different methods. Assisted natural regeneration shall also be adopted during the plan.

Nursery and plantation techniques should be developed for selected important prioritized species by the research wing. Care shall be taken for factors like seed viability, problematic regeneration etc. during the plan.

7.2.4.9 PRIORITY AREAS FOR NTFP CONSERVATION

| | LOW DENSITY AREAS | | | | | | |
|--------------|----------------------|----------------|----------|----------------|--------------------|--|--|
| Range | Beat | Compartment | Range | Beat | Compartment | | |
| 1. F | Buxa Tiger Reserve (| West) | 2. | Buxa Tiger Res | serve (East) | | |
| EDPO | Checko | Checko-6 | Buxaduar | Buxaroad | NRVK 1,2,3,4,8,9 | | |
| WRVK | Dima | Dima-1 | SRD | Chipra, SRD | SRD 1,2,3,4, 5,6,7 | | |
| WRVK | Dima | Dima-3 | SRD | SRD | DH, 1,2,3 | | |
| WRVK | Dima | Dima-4 | Bholka | Barobisha | SBH 5, 6, 1,2,3,4 | | |
| WRVK | Dima | Dima-RL | Bholka | Chengmari | NBH 1,2,3,4 | | |
| ERVK | Gadadhar | Gadadhar-3 | | | | | |
| ERVK | Gadadhar | Gadadhar-6 | | | | | |
| Hamiltongunj | Godamdabri | Godamdabari-1a | | | | | |
| Hamiltongunj | Godamdabri | Godamdabari-2 | | | | | |
| Hamiltongunj | Godamdabri | Godamdabari-3 | | | | | |
| Hamiltongunj | Godamdabri | Godamdabari-4 | | | | | |
| WRVK | NRVK | NRVK-11 | | | | | |
| WDPO | Poro (East) | Poro-7 | | | | | |
| WDPO | Garam (West) | Poro-9 | | | | | |
| WRVK | NRVK | SRVK-1 | | | | | |
| WRVK | NRVK | SRVK-2 | | | | | |
| WRVK | WRVK | SRVK-7 | | | | | |

Special care shall be taken up to prevent exploitation of NTFPs in low density areas. Only the harvesting should be allowed in the dense areas that too sustainably.

7.2.4.10 CONSERVATION STRATEGY-

In situ conservation:

Conservation through the protection and assistant natural regeneration activities of natural areas should be the main focus for in situ conservation. Some of the other points are as follows.

- 1. Natural regeneration through renewal of degraded forest and augmentation of NTFP resources through supplemental planting shall be taken up.
- 2. The Forest department staff as well the communities should be jointly trained and motivated through reorientation of ecological and economic importance of the NTFP species.

Ex-situ conservation:

Species listed in CITES and Negative listed shall not be allowed to be extracted from the forest area. However, efforts shall be made to try to promote the ex-situ conservation of these species outside forest areas in order to sensitize the local population about the benefits and marketing opportunities of NTFP species. The following points needs to be considered for ex-situ conservation of the NTFPs.

- 1. Plant genetic resource management (Germplasm collection, characterization and evaluation) of priority species needs to be developed by the research wing.
- 2. Herbal garden with genetic diversity for conservation and need based use shall be developed during the plan.

3. Domestication and cultivation of NTFP species shall be promoted by offering technical and material inputs to the farmers/villagers.

7.2.4.11 List of Local Vaidyas in and around Alipurduar.

- i). Sri. Khusi Mohan Saha, Railway Gate, Alipurduar, Dt. Jalpaiguri.
- ii). Sri Santosh Kumar Saha, Railway Gate, Alipurduar, Dt. Jalpaiguri.

7.2.4.12 Role of Vaidyas in Promoting the Local Traditional Knowledge:-

During the Plan period, the incentives to the Vaidyas should be given to promote the traditional local knowledge for promoting the use of medicinal plants amongst the FPC members. This knowledge should be further canalized to establish the link between collection of NTFP's and the market for the betterment of local people.

7.2.2.5 Theme plan for Joint Forest Management

7.2.5.1 Joint Forest Management

West Bengal is the pioneer state in India in initiating Joint Forest Management. This movement of Joint Forest Management had its genesis of Arabari in Midnapur District in West Bengal where 618 families of 11 villagers were motivated in early 70's to rejuvenate 1,186ha of degraded Sal forest by roping in their participation through a set of activities of employment generation and sharing of NTFP from such forests. This was followed by the adoption of the Govt's decision in 1989 to share 25% of usufructs of the intermediate and final yield. The Govt. of West Bengal passed a resolution vide No. 8554-For dt. Calcutta the 15th Nov 1991 which included the composition of FPC's and EDC's, duties and functions of members of FPC's and EDC's, usufructuary benefits etc. The JFM movement gained momentum with the implementation of World Bank aided West Bengal Forestry Project, the main objective of which inter alia was to promote peoples participation in management and development of forests during the 90's.

Buxa Tiger Reserve (East) Division has 31 JFM Committees protecting 32835.26 ha. of forest areas constituting the Critical Tiger Habitat or Core Area of the Buxa Tiger Reserve. Similarly, Buxa Tiger Reserve (West) Division has 33 JFM Committee protecting 25959.22 ha. Still a large area has to be brought under FPC cover. Not only Reserve forest areas but resume forests should also be covered and brought under the preview of Joint Forest Management as this may help in warding off encroachment in small isolated patches of land lying close to villages or lying engulfed by agricultural fields. The latest JFM Resolution is provided in **Annexure 14**

7.2.5.2 Factors important for success of JFM:

- 1. Realization of the natural resource managers of the failure of custodial system of management in containing degradation of forests and their growing perception that only participation of stake-holders can bring in a change in an otherwise blank scenario.
- 2. Empowerment of the people at grass-root level through installation at different levels of Panchayat tiers.

- 3. Adoption of micro-planning through P.R.A as a tool for involvement of communities in developmental activities and management of NWFPs/Silvicultural and harvesting operations.
- 4. Community/Eco-development activities by way of infrastructural development, vocational training and input support for increased productivity of land based systems, creation of assets for supplemental income & generation of adequate employment in forestry and allied activities.
- 5. sharing of usufructs with participating communities as promised in the resolution resulted in credibility to the Government intension to carry forward the mission of JFM. Marketing of timber and other forest products to ensure optimum realization of usufractory share reflected departments concern for the communities.
- 6. Persistent efforts by forest personnel, NGOs and natural leaders of F.P.C(s) to motivate and build awareness through face to face communications, group meetings, workshops, awareness campaigns etc.

7.2.5.3 Joint Forest Management – Support Activities:

People around forests are integral part of forest ecosystem and their livelihood needs must be reckoned as very important for ensuring long term conservation of resources. While direct benefits flow to the members of JFMC s from forest resources by way of sharing of usufructs and employment generation is limited, there is scope of improvisation of traditional activities and allied land based or skill based activities like:-

- 1. Agricultural development through creation of irrigation facility and supply of improved inputs.
- 2. Animal husbandry by introduction of improved breeds and veterinary care and promoting stall feeding.
- 3. Promotion of cottage industries.
- 4. Vocational trainings for income generation activities such as mushroom cultivation, Sal leaves plate making, pisciculture, tailoring, weaving, sericulture, bee-keeping etc.
- 5. Agro-forestry & farm forestry practices including intercropping in plantations raised by forest department in FPCS located outside the Reserve.
- 6. Self employment group oriented activities both for men and women (self help group activities), dairy farming, poultry farming, piggery, pisciculture etc.
- 7. Development of marketing facilities.
- 8. Value addition of NTFP resources.

7.2.5.4 Prescription for consolidation of JFM and its sustenance:

- 1. The management of JFMCs shall be as per the existing JFM resolution.
- The benefit sharing shall be as per the modified GO No 87-For/FR/O/FP/6M-28/2002 dated 11/01/2013

7.2.3 ECO FRAGILE ZONE:

7.2.3.1: Blocks and Compartments
A. Buxa Tiger Reserve (West)

| Range | Beat | Block and Compartment | Area in ha. |
|--------------|--------------------|--------------------------|-------------|
| Hamiltonganj | Bhutri | Bhutri-3(p) | 172.30 |
| Hamiltonganj | Bhutri | Bhutri-5 | 220.55 |
| EDPO | Checko | Checko-3 | 142.85 |
| EDPO | Checko | Checko-4 | 237.15 |
| EDPO | Checko | Checko-5 | 259.00 |
| EDPO | Damanpur | Damanpur-3 | 320.92 |
| EDPO | Damanpur | Damanpur-4 | 312.82 |
| ERVK | Gadadhar | Gadadhar-1 | 161.48 |
| ERVK | Gadadhar | Gadadhar-3 | 286.93 |
| ERVK | Gadadhar | Gadadhar-5 | 206.40 |
| ERVK | Gadadhar | Gadadhar-6 | 197.09 |
| Hamiltonganj | Godamdabri | Godamdabri-1a | 40.46 |
| Hamiltonganj | Godamdabri | Godamdabri-1b | 267.09 |
| WRVK | NRVK | NRVK-11 | 382.43 |
| WRVK | NRVK | NRVK-15 | 504.26 |
| ERVK | Panbari(N) | Panbari-4 | 380.40 |
| ERVK | Panbari (N) | Panbari-5 | 272.77 |
| ERVK | Panbari (S) | Panbari-10 | 453.67 |
| Pana | Raimatang | Raimatang-1 | 216.91 |
| Pana | Raimatang | Raimatang-2 | 516.39 |
| Pana | Raimatang | Raimatang-3 | 326.18 |
| Pana | Raimatang | Raimatang-4 | 477.53 |
| Pana | Raimatang/Gangutia | Raimatang-5 | 424.94 |
| WRVK | NRVK | SRVK-2 | 333.07 |
| WRVK | WRVK | SRVK-7 | 341.57 |
| WRVK | WRVK | SRVK-10 | 417.64 |
| WRVK | WRVK | SRVK-15 | 379.61 |
| | | Total area in ha. | 8254.41 |

B. Buxa Tiger Reserve (East)

| Range | Beat | Block and Compartment | Area in ha. |
|-------------|----------------|-----------------------|-------------|
| Buxaduar | Chunabhati | Chunabhati 3(P) | 11.33 |
| South Rydak | Chipra | Dhawla-3 | 199.60 |
| Hatipota | Hatipota | Hatipota-2(P) | 647.00 |
| Kumargram | Kumargram | Kumargram-1(P) | 23.00 |
| Kumargram | Kumargram | Kumargram-2(P) | 38.00 |
| Buxaduar | Buxaroad | NRVK-1 | 327.80 |
| Buxaduar | Buxaroad | NRVK-2 | 236.34 |
| Buxaduar | Buxaroad | NRVK-4 | 250.91 |
| Jainti | Phaskhawa | NRVK-5b | 38.44 |
| Jainti | Jainti (North) | NRVK-6a(p) | 11.40 |

| Range | Beat | Block and Compartment | Area in ha. |
|-------------|----------------|------------------------------|-------------|
| Jainti | Jainti (North) | NRVK-6b | 40.46 |
| Buxaduar | Buxaroad | NRVK-8 | 193.84 |
| Jainti | Bhutiabusti | Phaskhawa-1b | 86.63 |
| Jainti | Bhutiabusti | Phaskhawa-2 | 927.74 |
| Hatipota | Hatipota | Phaskhawa-3(p) | 207.63 |
| South Rydak | South Rydak | S.Rydak-2 | 429.55 |
| South Rydak | South Rydak | S.Rydak-3 | 487.00 |
| South Rydak | Chipra | S.Rydak-5 | 275.70 |
| South Rydak | Chipra | S.Rydak-6 | 309.71 |
| South Rydak | Chipra | S.Rydak-7 | 362.35 |
| Kumargram | Sankosh | Sankosh-2(P) | 16.02 |
| Kumargram | Sankosh | Sankosh-3a+3b | 442.92 |
| Buxaduar | Santarabari | Santrabari-3(P) | 20.18 |
| Buxaduar | Santarabari | Santrabari-4(P) | 17.25 |
| | | Total area in ha. | 5600.80 |

7.2.3.2 General objective of Management:

- 1. To maintain environmental stability through preservation of existing natural forests & Biodiversity and restoration of ecological balance.
- 2. To conserve and maintain habitats and viable populations of Wild animals along with its associated species and prey-base especially the endangered, threatened, endemic and rare species of animals and plants.
- 3. To reduce negative impacts of local people on biodiversity and to get increased support of local people for conservation through appropriate Joint Forest Management Programme.
- 4. To check soil erosion and denudation in the catchment areas of rivers, streams etc.

7.2.3.3 General Prescriptions:

- 1. In the blocks/compartments constituting Eco-sensitive zones, no felling is prescribed. This is to reduce biotic pressure on Wildlife. Plantation is prescribed in blank areas and the species prescribed will be the one prescribed for Sal Plantation Working Circle. Unpalatable grasses may be removed and fodder grasses may be planted. Fruit bearing species should be planted along with the prescribed species for the benefit of Wildlife. The blocks/compartments constituting Eco-sensitive zone has been included in the Biodiversity Conservation Working Circle. No extraction of any kind is permissible and the area should be kept free of any type of interferences.
- 2. Salt licks should not be created in Eco-sensitive zone and areas outside it as this may result in straying of Wildlife from protected areas to blocks/compartment falling outside.
- 3. Grazing should be restricted. No grazing shall be allowed as this may pave way for transmission of diseases to Wildlife. Further, this will decrease the availability of grasses to the herbivores.
- 4. Regular patrolling both day & night is to be done. Modernization of patrolling staffs by supporting them with strong R.T. network, vehicles and modern arms

- will prove beneficial. In water logged areas where movement vehicle is impossible, patrolling using departmental elephant would solve most of problems.
- 5. If departmental elephants are kept for patrolling and other purpose they should be well fed with balance diet. Health care should be given priority. Regular vaccination against Anthrax, FMD and other common diseases should be ensured. Vaccination of fringe cattle can also be taken up. Mahuts should be well trained; pilkhanes should be kept dry and well drained. Dungs should be removed every morning. They should be bathed daily and it should not be forced to work between 10am to 4pm in summer and between 11am to 3pm during winter. The symptom of sick elephant is its laziness in movement, lack of ear flapping and refusal to take food. Immediate veterinary care is to be taken. Every departmental elephant should have a Service book.
- 6. Regular cleaning of fire lines should be ensured.
- 7. Collection of NTFP such as Totala fruit/flowers and other fruits should be restricted.
- 8. During patrolling, the field staffs should carefully note if any sign of unhealthiness or disease or death is noticed in Wild animals. If any unhealthiness is visualized, immediate help from Veterinarian should be taken. Nearest Wildlife Division should be informed and involved in it.
- 9. Necessary training to the staffs can be given on chemical immobilization, capturing wild animals by trapping cage and nets and animal health care. Help in this respect can be taken from Wildlife wing.
- 10. One rescue centre fitted with sophisticated equipment is essential for swift health care and posting of one Veterinary Doctor from the Animal health Department is very essential
- 11. Hunting is an illegal activity and is totally prohibited. During Holi and Chaitra Sankrati festival, the local tribal's indulge themselves in hunting Wild boors, deers etc. which is to be prohibited. Intensive patrolling day and night is to be ensured during this period and no persons should be allowed to enter the forests. Forest Protection Committee members should be brought into confidence and Forest Protection Force should be utilized for joint patrolling.
- 12. Construction of watch tower near fringe forest village can help detect animals and their movement.
- 13. Breeding sites of all animals is to be protected and preserved.
- 14. Periodic census for Elephants and other carnivores is to be conducted.
- 15. Since flood is a major cause, which results in bank cutting, erosion and uprooting of trees, soil conservation works, may be permitted in forest areas.
- 16. Both the Range and Division level officers should establish effective intelligence network for gathering information on seizure/confiscation of

- illegal Wildlife products and arrest of persons involved in such illegal activities. The system of paying rewards to informers for providing valuable information will prove beneficial.
- 17. Coordination between various enforcement agencies like BSF, Railway Police, Customs, Revenue, Intelligence, Police etc. is a must to control poaching and illegal trade of Wildlife products since Buxa Tiger Reserve lies very close to the state of Assam and even Bhutan.
- 18. One monthly meeting with the District Superintendent of Police for exchange of crime dossiers from the Division level will be beneficial.
- 19. Creation of public awareness is very effective in propagating the idea of conservation of forest and wildlife. Attempts to equip the NIC at Rajabhatkhawa should be improved with more models and information, trophies, maps and signage etc. Schools in the vicinity of P.A. should be made major target and publicity campaign.
- 20. Since Buxa Tiger Reserve is very close to Bhutan, Bangladesh and even Nepal, the Officers should maintain co-operation and even contact with the Enforcement agencies of those neighbouring countries to curb illicit traffic of wildlife produces.

PART B: THE PROPOSED MANAGEMENT

CHAPTER 8: ECO-DEVELOPMENT AND LIVELIHOODS

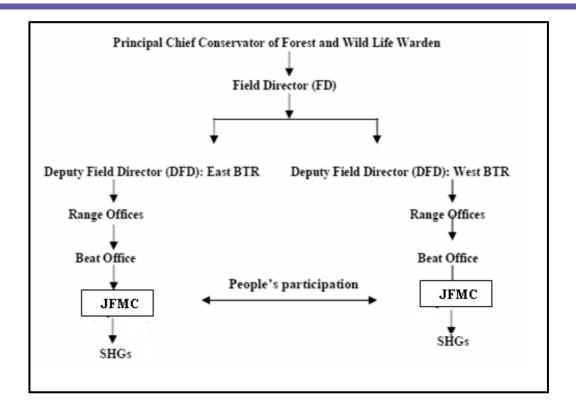
Buxa Tiger Reserve is dotted with numerous forest villages (37) and is fringed by populous 33 tea gardens and 46 revenue villages along the periphery and thus heavily influenced by local people who are largely dependent on natural resources like fuel wood, fodder, N-W-F-P for their livelihood. This has resulted in severe biotic pressure on the Reserve especially for firewood and grazing. It is a serious problem with thousands of cattle entering the Reserve daily from the forest villages, tea gardens and surrounding revenue villages. These act as carriers of deadly zoonotic diseases, apart from competing with the wild herbivores for fodder resources.

Traditional lifestyles of these communities have become unsustainable because of the high population growth, depletion of forest resources, and the pressures of market forces. Further, the existing rural development programmes have not taken adequate notice of the issue of natural resources degradation.

As part of the confidence building measures and with a view to reduce the dependencies of the people on the forest resources, a number of Forest Protection Committees / Eco-development Committees have been constituted. There are 62 JFMCs altogether in BTR East and West Division (Annexure 14). Each JFMC may have control over more than one village. There are examples of a single management committee presiding over multiple villages in different categories. Now all the committees would be collectively known as Joint Forest Management Committees (JFMCs).

8.1 Policy and Institutional Framework

Eco-development is a strategy for protecting the ecologically valuable areas from the pressure of unsustainable use of natural resources by the people living in and around the protected area. Conservation of the BTR started in 1983 as it came under Project Tiger. Regarding forest management there exist several tiers of managing institutions. At the level of government at the top, there is a Field Director (FD) under the Principal Chief Conservator of Forest and Wild Life Warden of West Bengal. Under the purview of Field Director, there are two, Deputy Field Directors (DFD) in East and West Divisions, who are in charge of Forest Divisions. Forest Range officers control 'Beat Offices' and under their purview lie villages in the protected area of the forest. At the level of people's participation there exists at Joint Forest Protection Committee (JFPC), each carrying out participatory management in a village (sometimes in two or three) either directly or indirectly through SHGs.



EDCs for BTR Were created from a State Government order (3841-For/ FR/6/11M-7/95) in June 1996 and were intended mainly to launch the Central Government's eco-development programme (sponsored by the World Bank). FPCs on the other hand have an earlier origin: from the state government's Joint Forest Management Programme in the 1980s (Wild Life Wing: Directorate of Forests, WB, 2002).constitution and functioning of Joint Forest Management Committees is as per the JFM resolution No 5969-For dated 3.10.2008.

Eco-development at BTR attempts to do this by the following means.

- (i) By identifying, establishing and developing sustainable alternatives to the biomass resources use and to the incomes that are presently being obtained from the protected area.
- (ii) By increasingly involving the people living in and around the PA, into conservation, planning and implementation in the management of the area.
- (iii) By raising the levels of awareness among local community for the value and conservation needs of the PA.
- (iv) Royalty from boulder collection as per CEC guidelines will be utilized for the community development of villagers, that are inside the tiger reserve.

8.1.1 Objectives:-

8.1.1.1 Broad objectives:

- To conserve the bio-diversity of the area through increased local participation and empowering local people to reduce negative impacts of PA on people.
- To reduce negative impacts of local people on bio-diversity and to get increased support of local people for Conservation through appropriate eco-development programme.

8.1.1.2 Specific Objectives:-

- To involve local people actively in PA planning and protection.
- To generate employment opportunity in PA through various silvicultural activities and improved PA management.
- To generate alternate employment to change traditional forest dependent mode of livelihood of people through vocational training and other inputs.
- To reduce grazing pressure on PA.
- To reduce fuel wood collection from PA.
- To generate awareness among people through conservation education and publicity.
- To reduce man-animal conflicts and to improve Park-people relationship.
- To relocate voluntarily the forest villages which are in the interior and are occupying key habitats.
- To generate employment opportunity outside the PA to improve Socioeconomic condition of the people to change their traditional forest dependent mode.
- To reduce NTFP collection from key areas and critical habitats of the PA.
- To integrate PA concerns into regional planning.

8.1.2 Specific issues:-

The main issue in conserving bio-diversity in this Reserve is the protection of existing forests as well as repairs of the damage already caused to the habitat.

The following issues and constraints are easily identifiable:-

- The local resentment for curtailment of income and employment through establishment of protected area and stoppage of annual forest felling.
- Existence of a very large cattle population within the protected area and in its interface which graze in P.A. Villagers are still apathetic to rearing of better breed of cattle and adapting stall feeding
- Dearth of basic facilities at the village level for health care and education.
- Existence of orange orchard (approx. 100 ha. in about 700 patches) in hilly portion of the P.A.
- Increasing trend of depredation by elephant population owing to its increase in no.
- Doubts among the field staff regarding usefulness of such programmes
- Lack of interdepartmental linkages
- Tea Gardens not supplying fuel wood to their laborers who in turn meet their fuel wood demand from Reserve
- Tea garden laborers forest and Revenue villagers damage forest through illicit felling
- Increasing trend of Elephant, leopard and Bison depredation.
- Scarcity of drinking water in some forests villages which are located in hilly and Bhabar tracts of the Reserve, particularly during summer seasons (from Feb. to March).

- Most of the agricultural lands are mono cropped. Villagers practice traditional agriculture.
- Most of the people in and around the Tiger Reserve depend on fuel wood for cooking, No alternate use of fuel wood is in vogue.
- Illiteracy and lack of environmental awareness among people living in and around PA
- About 20% of fringe population is land less. Their dependence on PA creates lot of pressure on Tiger Reserve

8.1.3 Broad Strategies:

- Introducing improved agricultural practices.
- o Improving minor irrigation facility and putting the agricultural lands under multiple cropping.
- o Encouraging and motivating people for the use of alternatives of fuel wood like use of bio-gas, coal, coal briquettes, cooking gas, use of fuel shaving chullahs.
- Increasing the scope of fodder cultivation in private/ panchayat lands and encouraging stall feeding to reduce grazing pressure on PA.
- Motivating people for cattle improvement by A.I. of Cows and castration of useless bulls thereby reducing the surrounding cattle number.
- Encouraging people for non-forest dependent occupations like Agriculture, Horticulture, Apiculture, Sericulture, Pisciculture, Poultry, Piggery, Handlooms and Handicrafts.
- o Increasing the scope of health care and primary education among villagers particularly in forest villagers.
- o Improving the drinking water facilities in villages through tube wells, ring wells or deep bore wells.
- o Increasing the availability firewood and small timber to villagers through farm forestry /social forestry.
- Trying to reduce man-animal conflict through people's awareness and education and erecting electric fencing where feasible.
- Developing alternate employment generation programme for fringe people to improve their occupation and providing needful training to them.
- o Awareness generation through education and publicity.
- Training and orientation of staff regarding effectiveness of Eco-development project.
- o Integration with other Govt. Deptts. and NGOs for smooth implementation of Eco-development project.
- Increasing the scope of work in the PA through improved PA management activities like canopy opening, plantation in degraded areas, maintenance of roads and fire lines, thinning of older plantations outside wilderness zone.
- o Integration of PA concerns into regional planning.
- Voluntary relocation of some of the forest villagers which are in the interior and occupying key habitats.
- Site specific, need based and participatory selection of work programmes and implementation thereof adopting appropriate technologies.

- o Education programme about family planning for the villages in collaboration with Health Department and Family Planning Association of India (FPAI), Kalchini.
- Restoring degraded habitats through JFMCs with native species and grasslands to cater to the needs of wild fauna there by reducing depredation.

8.2 Livelihood support initiatives through village micro-plans

Alternative employment generation can be achieved through Mushroom culture, Poultry, Duckery, Piggery, Pisciculture, Horticulture (cultivation of Area nut, Coconut, Papaya, Banana, Jack fruit, Zinger, etc.), Sericulture, Apiculture, Sewing and Knitting machine, Bamboo mattings, Cultivation of citronella grass private land and selling it to MFP division, raising plantation of Matchwood/ plywood Spp. Like Kadam, Simul, etc. on private land and selling it to WIMCO.

The village oriented site specific alternative employment generation activities will be decided through participatory **micro-planning**. Marketing is a vital part of the strategy. Department should provide necessary technical expertise. Training is yet another important component. Department should provide it.

Vocational training: It is proposed to provide vocational training to interested JFMCs members with the help of Khadi and District Industries Centre (DIC), ITI, NGOs and other concerned agencies in respect of various trades and vocations. The objective is to expose the villagers, particularly the unemployed youth, to the employment opportunities commensurate with their background and surroundings and to encourage them to be self reliant. No material /financial support other than training and counseling are proposed to be given. The beneficiaries will be put in touch with banks and other institutions, which may provide them with necessary assistance.

To make the members of the committees economically stable Self Help Groups (SHGs) with up gradation of their skills in carpet weaving, cloth sewing, Jute and Bamboo Handicrafts along with Honey manufacturing, Vegetables etc are being formed. Already about 400 such groups have been formed and are doing well.

Table 8.1 Summary of constitution and various activities of EDCs, FPCs and SHGs in BTR

| | Туре | BTR (E) | BTR (W) |
|----|---|---------------------|---------------------|
| A. | No. of FPCs now JFMCs | 17 nos. | 24 nos |
| B. | No. of EDCs-now JFMCs | 14 nos. | 7 nos |
| C. | No. of Revenue Villages | 26 nos. | 23 nos |
| D. | No. of Forest Villages | 18 nos. | 20 nos |
| E. | Total human population | 20,000 nos. approx. | 28,000 nos. approx. |
| F | Total cattle (Cow, buffalo, goat, sheep, etc.) population | 50,350 nos. approx. | 60,000 nos. approx. |
| G | Total forest area protected (in ha.) | 32612.88 ha | 36607.41 Sq km. |
| Н | No. of micro plans prepared and | 29 nos. | 31 nos. |

| | Туре | BTR (E) | BTR (W) |
|---|-------------------|----------|----------|
| | under preparation | | |
| J | No. of S.H.G. | 210 nos. | 187 nos. |

8.3 Integration of Rural Development Programmes

Financing forest management-related activities is a key area. In this context, the Central Government's Swarnajayanti Gram Swarojgar Yojana (SGSY), or Rural Self- employment Generating Schemes are playing a significant role. Under this scheme a District Rural Development Cell (DRDC) provides cash credit (a part of this being subsidy) to SHGs from BPL households to finance 50% of a project cost. Since 1998, the Forest Department in our study area in collaboration with JFMCs and some reputed NGOs has been taking the initiative to form SHGs. JFMCs assign their various forest management-related actions to those SHGs (mostly constituted by women members with group size varying from 10 to 14). Principally those actions of SHGs are being financed by (i) group's self-generated and self-rotated fund, (ii) DRDC funds routed directly to the SHG from a bank or indirectly through JFMCs. Forest department is also utilizing the services of local people for different works utilizing the National Rural Employment Guarantee Scheme (NREGS).In addition Panchayat is generating employment in forest villages, Revenue villages through NREGS, however its implementation in tea gardens is lacking. Besides this Block is implementing Border area development programmes in the border areas.

8.4 Monitoring and Evaluation

Monitoring and evaluation is an extremely important component for the successful implementation of the Eco-development programme. This will highlight the strengths and weakness of the system and suggest midterm corrective measures.

The following records have to be maintained for monitoring and evaluation.

- 1) Resolution of formation of JFMC s
- 2) Minutes of meetings in JFMC s
- 3) Village register
- 4) Bimonthly account of JFMC s with Assetts /Activity Register
- 5) Annual audit register
- 6) Monitoring and evaluation remarks

In addition to the self review of JFMC s the functioning of village Eco-development will be reviewed by the TR management (Chief Wildlife Warden, Field Director and Dy. Field Directors), the funding agency and an independent agency selected by them. Tiger Reserve management will carry out suitable monitoring and evaluation from time to time.

Indicators of Success:

The following indicators are identified for monitoring the success of the scheme --

- 1) Better natural regeneration in areas identified to be protected through EDC/FPCs .
- 2) Reduction in no. of illicit felling, fuel wood collection and illegal

- N.W.E.P. Collection and poaching cases
- 3) Reduction in no. of fire incidences in the specified area of villages
- 4) Reduction in grazing incidences in the assigned PA areas
- 5) Better peoples participation in forest protection and better dialogue with PA staff
- 6) Improvement of the economic condition of the village people
- 7) Adoption of alternatives (alternative of fuel wood as well as alternate employment) and change in resource use pattern
- 8) Increase in literacy and health care
- 9) Reduction in incidence of crop depredation by wild animals
- 10) No. of offence cases detected through the help of committee members

Means of Verification:

The following means of verification is proposed:-

- 1) Sample survey of PA and the villages at an interval of 6 months with the involvement of EDC/FPCs, NGO and PA staff
- 2) Interview with the villagers and field staff at a suitable interval
- 3) Study of village register and forest records
- 4) Offence register in Range office

Other indicators, sampling tools, sampling intervals and assessment criteria for project activities relating to different P.A. values, disturbances, socio economies values etc. can be suitably chosen

PART-B: THE PROPOSED MANAGEMENT

CHAPTER 9: IMPLEMENTATION STRATEGY

9.1 State level steering committee

The Wildlife (Protection) Amendment Act, 2006 (Section 38 U) provides for constitution of a Steering Committee as follows:-

- (1) The State Government may constitute a Steering committee for ensuring coordination, monitoring, protection and conservation of tiger, co-predators and prey animals within the tiger range states.
- (2) The Steering Committee shall consist of:-
- (a) The Chief Minister-Chairperson;
- (b) Minister-in-charge of wildlife-Vice-Chairperson;
- (c) such number of official members not exceeding five including at least two field Directors of tiger Reserve or Director of National Park and one from the State Government's Departments dealing with tribal affairs;
- (d) Three experts or professionals having qualifications and experience in conservation of wildlife of which at least one shall be from the field of tribal development;
- (e) Two members from the State's Tribal Advisory Council;
- (f) One representative each from State Government's Departments dealing with Panchayat Raj and Social Justice and Empowerment;
- (g) Chief Wildlife Warden of the State shall be the Member-Secretary, ex officio, to be notified by the State Government, in the Official Gazette.

The steering committee has been constituted vide the government notification no. 140-For/11M-42/06 dated 10-01-2008.

9.2 Tiger Conservation Foundation and District Level Coordination Committee

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 should be registered under the relevant rules of the State as a Trust 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 ecodevelopment 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: ecodevelopment, staff welfare, visitor regulation, field research, facilitating ecodevelopment committees for market access, conducting capacity building programs, ecotourism and Joint Forest Management. The TCF for BTR has been constituted, under sec 38 X of Wildlife protections Act 1972 vide deed of Trust duly registered AR Registration of Assurances Kolkata on 19/03/2010.

| | D T D (DTD) 11: 11: 1 1 1 1 1 1 |
|--------------------------------|---|
| Area of Operation of the Trust | Buxa Tiger Reserve (BTR) and its adjoining landscape, forming the impact zone with possible corridor value for disposal of wild animals from the Tiger Reserve. |
| Aims of the Trust | To facilitate and support the BTR management for conservation of tiger and biodiversity through multi stakeholder participation as per approved management plans and to support similar initiatives in adjoining landscapes, consistent with the National and State legislation. |
| Objective of the Trust | iv) To facilitate ecological, economic, social and cultural development in the tiger Reserve and adjoining landscape. v) To provide support to safeguard the natural environment in the tiger Reserve and relevant places. vi) To facilitate the creation of and/or maintenance of such assets as felt necessary for fulfilling the above said objectives. iv) To solicit technical, financial, social and other support required for the activities of the foundation trust for achieving the above and related fields to support the implementing agency. v) Anything incidental or ancillary to the above for furthering the above and abjectives. |
| | said objectives. |
| Governing | 1) MIC,Dept of Forests, Govt of West Bengal-President |
| Body of the | 2) MOS, Deptt of Forests, GoWB – Vice President |
| Trust – | 3) Principal Secretary to GoWB, Deptt of Forests – Member |
| Composition | 4) PCCF.Wildlife &CWLW,WB – Member Secretary |
| | 5) PCCF,HoFF,WB–Member |
| | 6) APCCF, Wildlife, WB–Member |
| | 7) CCF,WL(North)–Member |
| | 8) FD,BTR–Member |
| | 9) DFD,BTR(East)-Member |
| | 10) DFD,BTR(West)-Member |
| | 11) MLA,Alipurduar–Member |
| | 12) MLA,Kumargram–Member |
| | 13) MLA,Kalchini–Member |
| | 14) Karmadhyaksha, Bon O Bhumi Sanskar Sthayee Samity as |
| | representative of Jalpaiguri Zilla Parishad – Member |
| | 15) Two prominent scientists or qualified experts in the field – Member |
| | (Nominated by State Govt.) |
| | 16) Two member of the Executive Committee of BTCFT |
| Executive Body | y 1) FD, BTR – Member & Executive Director Cum Treasurer |
| | |

| of the Trust – Composition | 2) DFD, BTR(East) and One AFD, BTR(East)- Member 3) DFD, BTR(West) and One AFD, BTR(West)- Member 4) Two representatives of JFMC working from the Tiger Reserve as nominated by the Field Director – Members 5) Two front line staff of BTR not below the rank of DR/Fr nominated by the FD – Member(s) 6) Senior between the two DFDs of BTR shall be nominated by the FD as Member Secretary to the Executive Committee |
|---|---|
| Registered Office of the Trust | Office of the Field Director, Buxa Tiger Reserve, Alipurduar, Dist- Jalpaiguri |
| Source of Funds of the Trust – Corpus Fund | i) Grants from the State Govt/ Union Govt ii) Grants and contribution from other corporate bodies, agencies, institutions and individuals including international funding agencies and non resident Indians iii) Loans from the Government and financing institutions. iv) Fees collected by way of user charges – The income generated from levying tourist entry fees and other charges for the service generated out of the Tiger Reserve |
| Proposed activities of Trust | Undertaking welfare measures and community development of Forest dependent communities and for the people residing inside Tiger Reserve. Improvement of Habitat as per the approved Tiger conservation Plan Efforts towards mitigation of Man animal Conflict. Strengthening protection measures by involving Joint forest management committees. |

- 9.3 Formation of Eco-development Committees (EDCs), Confederation of EDCs and Other Supporting Institutions like Self Help Groups (SHGs) and Nature Clubs
- 9.3.1 EDCs , Forest protection Committees (FPCs) and Self Help Groups (SHGs)

At the level of people's participation there exists either a Joint Forest Management Committee (JFMCs) each carrying out participatory management in a village (sometimes in two or three) either directly or indirectly through SHGs. Several conservation programmes are managed by JFMCs or SHGs induced by such committees. The executive body of both JFMCs is constituted by members elected by general members in an annual general meeting. In the co-management model, JFMCs are entrusted with carrying out the government's conservation programme. There is a government order (vide resolution no. 5062-For/D/IS-16/88) dated27th July, 1990), dealing with meeting protocol for forest protection committees which was revised vide Resolution No 5969-For, dated 3.10.2008

• The JFMCs shall hold a general body meeting once every year where activities of the Committee as well as details of distribution of usufructary benefits are to be discussed, besides electing representatives of the beneficiaries to the Executive Committee.

• The JFMCs shall maintain a minutes book where in proceedings of the meetings of the Executive Committee held from time to time as well as the proceedings of the Annual General Meeting of the JFMCs will be recorded under the signature of the President of the Committee and such minutes duly attested shall be sent to the concerned Range Officer for record.

The SHGs are groups that come together under the Central government's selfemployment generation programme, which encourage the development of microentrepreneurship among low-income groups.

Nature clubs- Nature clubs will be formed by involving school children of forest villages and revenue village that are in and around the Tiger Reserve. Apart from this some nature clubs and NGOs that are actively working in the area are

- o Alipurduar Nature club
- o Himalayan Nature and Adventure Foundation
- o Rovers and Mountaineers club
- Nandadevi Foundation
- o People for Animal
- o Vasundhara

Eco clubs- it is also proposed to form eco clubs in tea garden by including volunteers from the tea garden labourers.

9.4 Livelihood Support Initiatives through Village Micro Plans

All the 63 JFMCs that are already formed and established will prepare micro plans envisaging the needs of development, problems and solutions and accordingly these proposals shall be included in the community development programmes by Tiger Reserve management and also by line departments. Apart from this the JFMCs themselves may take up the developmental works from the funds provided by way of benefit sharing and other schemes.

9.5 Integration of Rural Development Programmes

Eco-development/Rural development programmes can be made more effective by integrating it with other departments of the district and interested NGOs .

Following departments should be involved for development of forest and fringe villages:-

- (1) Agriculture (2) Animal husbandry/A.R.D.D
- (3) Irrigation (4) Rural development
- (5) Education . (6) Health deptt.
- (7) Tribal welfare. (8) Public Health Engineering
- (9) Horticulture (10) Fishery deptt.
- (11) Sericulture . (12) Electricity Board
- (13) Cottage Industry (14) Cultural affairs
- (15) Tourism (16) Relief
- (17) Public Works (18) Non-Conventional energy.
- (19) I.C.D.S. (20) F.P.A.I.

NGOs should also be involved in village eco-developmental activities and awareness activities. The different Govt. schemes, especially for BPL families like National Rural Employment Guarantee Scheme (NREGS), Indira Awas Yojna etc. may be utilized.

9.6 Monitoring and Evaluation

Monitoring and evaluation is extremely important component for successful implementation of Eco development programme. This will highlight the strengths and weakness of the system and suggest midterm corrective measures.

The following records have to be maintained for monitoring and evaluation.

- o Resolution of formation of JFMCs
- o Minutes of meeting of JFMCs
- o Village Register
- o Account of JFMCS with Asset Register
- o Annual audit register
- o Monitoring and evaluation remarks

Monitoring and evaluation of JFMCs from time to time be done by independent agencies and midterm correction about effectiveness may be adopted

TIGER CONSERVATION PLAN (BUFFER AREA)

PART-B: THE PROPOSED MANAGEMENT

CHAPTER 10: MAINSTREAMING STRATEGY WITH VARIOUS PRODUCTION SECTORS

Mainstreaming

Mainstreaming of wildlife concerns should be understood as a process to integrate wildlife conservation in various production sectors of the buffer zone where the primary emphasis is not conservation. This would safeguard wildlife interests by ensuring habitat supplements in outer areas beyond the core for tiger spatial land tenure dynamics. Further, it would also strengthen conservation by reducing the possible interface conflicts between various production sectors and conservation, which otherwise leads to wild animals earning a 'pest value' and eventually getting eliminated from the area. Thus, mainstreaming of wildlife concerns in the outer buffer landscape is essential to prevent such area from turning into 'ecological sinks'.

Process of mainstreaming

Mainstreaming tiger (wildlife) conservation concerns in various production sectors is imperative for the buffer zone to be viable and fulfil its objectives. This would involve modification of developmental activities /practices in the key production sectors to make them more 'conservation friendly'. The process is sector as well as landscape specific. However, some generic suggestions based on guidelines issued by the Ministry of Environment and Forests for developmental projects in different sectors are given below.

A number of production sectors operate in the buffer area of a tiger Reserve, which directly (D) or incidentally (I) affect tiger conservation Therefore, the basic managerial strategy for the buffer area should focus on mainstreaming wildlife concerns amongst such sectors. Some of the common production sectors in the buffer areas are:

- (a) Forestry (D)
- (b) Agriculture (D)
- (c) Integrated Development (eco-development, development through District Administration)
- (d) Tourism (D)
- (e) Fisheries (D)
- (f) Tea/Coffee Estates (I)
- (g) Road / Rail transport (D)
- (h) Industry (D)
- (i) Mining (I)
- (j) Thermal power plants (I)
- (k) Irrigation projects (D)
- (1) Temple tourism (I)
- (m) Communication projects (D)

Main strategies for the different Production Sectors are as follows:-

10.1 Forestry

- ♦ Monitoring wildlife/tiger presence in standardized formats on a daily basis
- Foot patrolling by staff to ensure protection
- ◆ Exchange of tiger/wildlife presence data with nearby Protected Area or Tiger Reserve
- ♦ Monitoring of carnivore kills
- Monitoring of water points
- ♦ Timely payment of compensation for livestock depredation by wild carnivores
- Regulating livestock grazing in areas prone to wild ungulates
- Payment of compensation for crop damage by wild animals
- Setting up of and make functional fire protection Village Forest Committees
- Review of wildlife status in the meetings of Forest Development Agency
- Regulating collection of Non Timber Forest Produce
- Monitoring village cattle for disease
- Maintenance of village level wildlife crime dossier
- ♦ Protection of riparian margins
- ♦ Retention of old/dead trees
- Staggering of forest stands belonging to different age groups
- ♦ Maintaining grassy blanks
- Retention of endemic species
- ♦ Incentives to local communities from the fund accruing through recycling of gate receipts, as a reciprocal commitment for their involvement in addressing wildlife concerns, forming part of a MoU with the Tiger Conservation Foundation in the village level micro plan

10.2 Agriculture

- ◆ Adoption of 'eco-agriculture' as a land use to produce food as well as to conserve wildlife
- ♦ Maintaining non -domestic habitat
- ◆ Discouraging sudden change in cropping patterns(viz lure crops) to avoid accentuating man-wild animal conflicts
- ♦ Maintaining a habitat mosaic, *viz*. fallow land, cultivation field, fruit orchard, plantation, under planting of spices, small timber etc. to mimic natural forest
- ♦ Promoting soil conservation
- Providing economic incentives for safeguarding wildlife concerns
- ◆ Providing incentive for carbon, water and other environmental services to local people
- ♦ Compensating losses due to wildlife
- Recognizing the value of traditional farming in conservation
- Fostering use of green manure and discourage use of chemical manures and pesticides
- ◆ Facilitating marketing of local products through the Tiger Conservation Foundation
- Recognizing property rights of farmers for genetic resources
- Fostering rural tourism
- ♦ Use of market instruments through the Tiger Conservation Foundation (production certificate for organic products)

10.3 Integrated Development

10.3.1 Eco-development

- ◆ Participatory village level planning and preparation of village level micro plans for eco development
- ♦ Providing inputs for resource substitution, income generation, community welfare, ecotourism for reducing the resource dependency of local people on surrounding forests
- Ensuring reciprocal commitments with the local people through respective eco-development committees, forming part of a MoU in the micro plan for safeguarding wildlife interests

10.3.2 Development through District Administration

This involves a multiplicity of sectors operating in the landscape pursuing development, where wildlife concerns have to be integrated through formal contracts/ agreements between the Tiger Conservation Foundation, district authorities and eco-development committees. The responsibilities of various parties should be spelt out in the contract/agreements for safeguarding wildlife concerns along with reciprocal commitments. Normally, such contracts/ agreements should discourage any detrimental practice and assign responsibility to the community for carrying out some interventions. In return, the community should receive an assurance from the tiger Reserve authorities for access to certain natural resources in the area or benefits.

10.4 Tourism

- Facilitating ecotourism involving local host communities
- Facilitating ecotourism only as per the normative guidelines
- ♦ Obtaining contributions from private commercial tour operators and lodge owners for local community development, so that locals are benefitted from such activity
- ♦ Obtaining contributions from tour operators for maintaining tourist facilities , staff welfare to Trust
- ♦ Recycling of tourist gate receipts for community welfare through the Tiger Conservation Foundation

10.5 Fisheries

- Promoting fishery as alternate income generation activity
- Discouraging fishing in rivers and Jhors to protect the diversity and breeding grounds.
- Exposing the communities towards scientific pisciculture to increase the productivity.

10.6 Tea /coffee plantations (For BTR, only tea is relevant)

- Encouraging Tea gardens to generate their own fuel wood for labourers by fuel wood plantations
- Formation of eco clubs in Tea gardens for spreading and generating awareness and elucidating cooperation during depredation.
- Promoting tea tourism to divert visitor pressure from PA and also to generate additional employment in Tea garden for unemployed youth.

10.7 Road / Rail transport

- Strict restriction of vehicular movement through check posts
- ♦ Vehicle movement only between 6am to 6pm which may be modified in winter depending upon the need
- ♦ Speed restriction measures to be put in place
- ♦ Installation of sign boards for educating the public regarding movement in Protected areas
- ♦ Minimal maintenance of Roads
- ♦ Safeguards to prevent fires
- Compensation for habitat fragmentation and barrier effect

10.8 Rail Transport

- ♦ Stoppage night time movement of trains
- ♦ Speed restriction on trains while travelling through Tiger Reserve areas
- Deployment of villagers to monitor the movement of wild animals along the track and informing the railways authorities accordingly
- Regular meetings between forest and Rail authorities
- ♦ Training and sensitizing Loco pilots and asst loco pilots in Elephant behavior, movement and sensitive periods for caution.

10.9 Industry

- ♦ No industry to be allowed within the eco sensitive zone
- ♦ 5km of from boundary of Tiger Reserve may be considered as eco sensitive zone (Proposal for declaration of Eco sensitive Zone is annexed as Annexure 16)
- Preventing pollution on account of gaseous and other effluents from industry
- ♦ Encouraging Tea gardens in usage of Bio control agent instead of chemical pesticides and insecticides

10.10 Mining projects

No mining to be allowed within the eco sensitive zone

10.11 Temple tourism to Mahakal, Pokri etc

- ♦ Preparation of a master plan and adherence to its normative standards for crowd regulation and visitor facilitation
- Ensuring proper garbage disposal
- Avoiding / safeguarding passages / corridors used by wild animals
- Avoiding contamination / pollution of local streams and water bodies
- ◆ Providing local shopping facilities to tourists through the Tiger Conservation Foundation, involving the Eco-development Committees

PART B: THE PROPOSED MANAGEMENT

CHAPTER 11: RESEARCH, MONITORING, TRAINING AND WILDLIFE HEALTH

11.1 Research Priorities, Main projects and Implementation:-

11.1.1 Research Priorities

This has been discussed in core part in chapter no 8 of core

Strategies:

- a) Infrastructure Development: Establishment of Field Research Station
- b) Posting of a Research Co-ordinator with office and financial support:
- c) Co-ordination of Research activities:
- d) Funding of research activities:
- e) Establishment of Computerized data storage and retrieval system:
- f) Enriching BTR library through purchasing some relevant Journals and Books.

11.1.2 Main Projects:-

1. Study on Impact of Cattle grazing and Mitigation measures:

Cattle's grazing is prohibited inside the reserve as per law but practically it is impossible to stop it though incidences can be reduced. No Study has been done on the effect of cattle grazing on the vegetation and wildlife. Study should be carried out to evaluate and monitor how far cattle graze inside the forest, changes of vegetation due to grazing, intensity of incidences of grazing in different blocks, frequency of sharing of water sources, and disease dissemination due to cattle grazing etc.

2. Study on NTFP and its Impact on Village Economy:

The study should include quantity of NTFP available in BTR, their regeneration status, means of multiplication, time of collection, technique of collection and assessing its impact on village economy.

NTFP is significant item for improving the village economy. NTFP plays an important role in subsistence village economy. But collection of NTFP must follow study regarding their availability, regeneration status, method of collection, sustainable level of collection and season of collection should be carried out. The products, which are collectable sustainably, can be collected by the JFMCs members. Proper marketing channel should be evolved for better income of JFMCs members.

3. Population-Habitat viability analysis of Tiger:

To project the future population of tigers in BTR, population-habitat viability analysis (PHVA) should be done. This shall provide population dynamics. This shall help to evolve strategies for better management of tiger and its habitat.

4. Study to identify actual Tiger niche, their Distribution, seasonal variability, food habit and Population dynamics.

5. Study on enumeration of wild animal, their distribution pattern, seasonal movement and habitat use behavior, etc.

The study is required to find out the appropriate method of census of wild animals in BTR.

6. Study on Institution development, Participation and Empowerment of Social organizations and financial sustainability of village institutions:

This study is important. Unless villages impacting P.A. are developed as institutions, chances of failure of participatory approach are very high. Empowerment of women is extremely important. Studies should be directed as what best could be done to achieve them.

7. Study on river systems in BTR and Environmental Impact Assessment (EIA) of boulder extraction from river beds:

BTR and its adjoining fringe are situated on the flood plains of many rivers. Every year boulder is required by the Irrigation Department, PWD, Railways, and Panchayat etc. for bank protection and soil conservation works. Boulder is available on the Upper stream of rivers flowing through BTR. An environmental impact analysis (EIA) of boulder collection and its consequences on debris flow in rivers should be done.

8. Identification of fragile ecosystem and habitats or niches and means for their conservation:

Microhabitats should be identified. They are very fragile. Study for their conservation is necessary. This is short term study and can be done by the Ecologist, BTR.

9. Study on Inventory, Status and distribution of lesser cats in BTR:

Lesser cats form a sensitive group. They are also one of the least studied groups. They can also be good indicators of the overall health of habitats. Importance is given to the cats but study of lesser cats should be given still more importance. Capturing of certain animals may be allowed for this study.

10. Poaching and illegal wildlife trade-Problems and Mitigation measures:

Duars is one of the major traffic routes for wildlife trade. A study has already been done for entire West Bengal. Specific study for BTR is necessary.

11. Inventory, Status and Distribution of Arboreal mammals other than lesser cats:

BTR is principally wood land. Arboreal mammals should form a major component of its wildlife. No study has been done so far. One of the rare species, clouded leopard, is arboreal. Study is important for knowing and also for evolving suitable strategies. Capturing of certain animals may be allowed for this study.

12. Study on Prospects and strategy for Eco-tourism and its impact:

Eco-tourism creates constituency of wildlife supporters. Eco-tourism should expose people to the problems and prospects and bio-diversity conservation. Study should identify issues. It should formulate strategies.

13. Population dynamics of ungulates:-

BTR has much less meadows and grasslands. Study on population dynamics of ungulates is important. This shall guide us regarding its population's dynamics and adequacy of glades and meadows.

14. Documentation of Flora of BTR:-

Flora of BTR has been studied. But available information is mostly of commercially important species. This needs detail study.

15. Study on Canopy manipulation followed by under planting in BTR and Monitoring the changes in floristic composition and its usage by Wildlife:-

Canopy opening by removal of Teak followed by under planting is an experiment in BTR. The extent of canopy to be opened and number of trees to be retained per ha should be properly studied. Changes in floristic composition due to conservation initiatives need study.

16. Impact of habitat changes on population of wildlife:-

Habitat changes impact different animal species differently. Good indications about health of habitat could be developed from this study.

17. Study on wildlife Health and Diseases:

A large number of cattle graze in forests. The danger of spread of contagious diseases is always there. This study shall identify issues, diseases, etc. This shall provide suitable strategies to eliminate them.

18. Habitat suitability study for Reintroduction of wild Buffalo and Rhino:

The Dhumpara and Bholka forests once harbored wild buffalo. Now they are not seen. Bholka forest was all jungle of Dhadda and Prundi. This study shall show us the possibility about re-introductions of wild buffalo.

19. Impact assessment of dependency of local people on BTR.

Local people are dependent on BTR for fuel wood, fodder, small timber, grazing, NWFP including boulder, etc. Detail study is required to ascertain the extent of local dependence on BTR.

20. Study on effect of Fire incidences on Flora and fauna of BTR and mitigation measures:

Fire is prevalent in hills and foothills. Teak monoculture is badly affected. Sal forests are also affected. This study shall identify issues. It shall also provide us proper strategies.

11.2 Monitoring framework:-

Eco-systems are dynamic. Monitoring of impacts of management interventions is necessary. It enables the management to analyze and evaluate the effect of changes. Continuous monitoring and recording of data are proposed to be done through an elaborate, systematic and management-oriented monitoring mechanism.

The Park Management should continue to 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. Though it may sound an unplanned and subjective procedure, it is easy to collect useful biological information in a simple, systematic and scientific manner. The management should 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. All such data should be incorporated in the MIS in a routine manner.

11.2.1 Monitoring physical changes:-

Monitoring of physical changes, mainly air and water qualities, is essential. Monitoring the water quality of streams and rivers passing through the Tiger Reserve particularly with reference to pesticides is very important as some water sources passes through tea gardens which use pesticide heavily.

11.2.2 Monitoring changes in vegetation:-

Vegetation changes will be monitored in different vegetation types, both natural and man-made. Information should be collected every year for changes in pattern of succession, species composition, effect of grazing and fire on vegetation, etc. It should be recorded systematically and analysed through computer. Some permanent vegetation plot (50 m X 40 m) should be laid out for this purpose.

Some plots should be laid out in riparian area. Similarly some plots should be laid in fringe area. Study of density and frequency of species should be done by Point centred Quarter (PCQ) method and ground cover by Area Sampling or point sampling method.

11.2.3 Monitoring Changes in wildlife population:

This can be done,

(a) By regular recording of animal sighting in different compartments, when staff go for patrolling:

A register will be maintained in each Beat and weekly data will be sent to Range Office in a following prescribed proforma and from there data will be sent to Division office for consolidation and analysis to get information about seasonal movement, habitat utilization, etc.

Proforma for monthly animal monitoring:

| | | | | | | | | | SEX | | AGE |
|---|-------|------|---------------------|-------------------|------------------|-------------|---|---|---------|-------|-------|
| | Range | Beat | Date and Time | Animal Sighted | No.of Animals | Comp tt. | M | F | Unknown | Adult | Young |
| L | | | 1 11110 | | | | | | | | |
| | | | | | | | | | | | |

Tiger monitoring should be done by regular tracing of pugmarks to know the population dynamics, movement pattern, and identification of individual and sex ratio, etc.

(b) by conducting periodical census operation:

Herbivore census by King's method and Tiger/ Leopard Census by pugmark method should be conducted every two year's interval. For conducting census the entire area of Tiger Reserve should be converted into a no. of smaller blocks called census unit. The existing census units should be followed for conducting census operation.

11.2.4 Monitoring wildlife Health and Diseases:

It should be done regularly as there is danger of spread of epidemic through domestic cattle grazing in the Reserve. Water Samples should be regularly checked by field research Laboratories. Survey of adjacent fringed villages should be done to know about the spread of any epidemic. Vaccination of fringe cattle against F.M.D., Anthrax, H.S.B.Q, etc. should be done at suitable intervals by veterinary unit. This is discussed in details in item no. 12.2 of Chapter 12.

11.2.5 Monitoring the Impact of management Practices initiated in and around B.T.R.:

Management interventions impact human population in and around BTR. Monitoring of such impacts is necessary. Its socio-economic impact is especially important. Cultural impacts can also be not neglected. Management intervention only with congenial impacts is sustainable over a long period of time.

11.2.6 Monitoring the impact of Tourism:

Tourism impacts P.A. and people. It impacts them socio-economically. It also impacts them culturally. Tourism has both positive and negative impacts on PA and people .Monitoring of impacts of tourism is necessary to know sustainability of tourism in BTR.

11.3 Training needs assessment:

Training forms an important area for all levels in the administration, which results in generation of better and innovative ideas leading to enhanced conservation and managerial measures. There is a lack of intensive training in almost all the strata, which will address important practical and day-to-day issues facing the frontline men in particular.

Training is essential to increase the managerial capability and technical skill of the staff. Present days PA planning and management is a highly technical science bringing together the theory of several diverse disciplines, i.e., ecology, forestry, geography, wildlife

Training should be carried out in an organised and structured manner in order to achieve optimum result. It should be organised for the different levels of staff. It should address the specific needs, duties and responsibilities carried out by the staff. Details of training needs are described in core part of TCP.

11.3.1 Formal Training Courses:

Formal training is generally conducted by recognised Institutes on national, International level. Wildlife Institute of India (W.I.I.) Dehradun organises a large no. of training courses under Govt. of India assistance or with the collaboration of International organizations.

Followings are the some training programme or courses organised at national level.

| | Name of the Course | Duration | Eligibility |
|----|--|-------------|-----------------|
| 1. | Post Graduate diploma course in Wildlife | 9 months | DCF and ACF |
| | management at W.I.I. | | |
| 2. | Certificate course in Wildlife management at | 3 months | Forest Ranger |
| | W.I.I., Dehradun | | |
| 3. | Wildlife Management Training in State training | 3 months | Dr/Fr. and F.G. |
| | school (B.F. School) as prescribed by W.I.I. | | |
| 4. | Wireless operation and Weapon training at Police | | DR/Fr. and F.G. |
| | academy | | |
| 5. | Tourism management, receptionist, interpretation | | ACF and FR |
| | and environmental education at C.E.E., | | |
| | Ahmadabad | | |
| 6. | Wildlife health, Chemical immobilisation, | | FR and DR/Fr. |
| | application of power fencing etc. at W.I.I, | | |
| | Dehradun | | |
| 7. | Capsule courses in Wildlife | 7 – 15 days | CCF and CF |
| 8. | Remote sensing at IIRS at Dehradun | 10 months | DCF and ACF |

Proposed trainings for Staff and JFMC members

| A | Study tours to other tiger reserves |
|---|--|
| В | Formal training courses: National/international at training institutes |
| С | Training on census works of carnivores and Herbivores |
| D | Training on capture of wild animals for tranquillisation of chemical |
| | immobilization, capture of wild animals by other methods |
| Е | Training on eco development work |
| F | Computer training |
| G | On the job training to fresh recruits |
| Н | Workshops/Seminars held-location, period, topic, participants, Resource |
| | persons, etc. On Wildlife laws, investigation, booking of offence, court |
| | procedures, offence detection, evidence collection etc |
| I | Apiculture, pisciculture vermin compost, soft toys making, bamboo weaving, |
| | Jute carpet, hand bag preparation, etc for JFMC members |
| J | Training on grassland creation and maintenance |

11.4 HRD plan:

Along with monitoring and need-based training, HR measures should include more activities directed towards better management and also towards welfare of the staff. Welfare schemes like subsidized availability of ration, literacy drives for the children of staff, arrangement of transport facility for school students residing in core areas, formation of women self-help groups will be encouraged. More long term plans should include encouragement of small scale cottage industries based on the traditional knowledge, proper marketing as well as setting up of sale and distribution centres.

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.

11.4.1 Training programs These has been described in section 11.3 of core

11.4.2Staff Amenities:

The Staff amenities presently provided are far from satisfactory. A large number of the field staff is living deep in the forests. They keep their family either in adjoining town or with their parents for educating their children. This is also done to get medical facilities for their family. Thus they maintain double establishment. This causes financial hardships. Following basic amenities to staff are proposed:-

11.4.3 Housing facility:

Because of lack of education and health facilities within the area, housing has to be seen from two different perspectives i.e. in situ housing at camp sites and housing for families at some stations where basic education and health facilities for kith and kin of staff are available. The buildings are to be maintained in such a way that they have toilets, non-leaking roofs, mosquito net protection and white washed etc so they are liveable.

Re-organization of Buxa Tiger Reserve was done without developing the infrastructure. Staff has increased from time to time. Existing residential accommodations are inadequate. Further, in 1997 about 200 C.D.L. became permanent. They are serving as Bana shramik. They do not have accommodation. Following additional requirement of staff quarters should be fulfilled during the plan period. The existing staff quarters should also be repaired periodically. It is proposed that building will be concrete structure with G.I. sheet roof. It needs less maintenance, as concrete building last longer than wooden structures.

11.5 Wild Life Health Monitoring.

11.5.1 Disease surveillance and Prophylactic Immunization:

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 Kaziranga National Park (1981) by Foot and Mouth Disease (FMD) in 1952 had been reported in the past. Dissemination of a number of diseases, like; 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 Anthrax, Foot and Mouth Disease (FMD), Haemorrhagic Septicaemia (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

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 should 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 programs will be a major aid in the implementation of long-term health management plan on the appropriate measures 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.

In free ranging Wild animals, only a fraction of mortalities due to diseases are visible at a time, except during epizootics, when the mortality exceeds the rate of predation and scavenging. Hence, the impact of diseases visible in these animals is far lesser than the actual scenario. Therefore it is essential to understand the magnitude of disease problem in free-ranging wild animals. More recent investigations by conservation agencies have shown that diseases and parasites are a decimating factor affecting population dynamics of wild animals.

It is of utmost importance to carry out epizootiological studies covering at least 3 complete years so as to generate information on prevalence of infectious and parasitic. diseases and various climatic factors influencing the rate of infection. This will help in proper mapping and developing a forecasting system on various infections among native wild animals. This contribution will be a major aid in the implementation of long-term health management plan and guarding the wild animals from the risk of sudden and heavy mortality or morbidity. To achieve the above objective need of establishing a well-equipped field veterinary laboratory is of utmost importance along with the trained staff.

(A) Prophylactic Immunization:

Some diseases which are common to this area and are 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 of FMD, BQ and HS.

Prophylactic immunization to cover FMD, BQ and HS are regularly carried out with the help of Veterinary Department every year, to reduce the chances of spread of disease from cattle to the wildlife.

Buxa Tiger Reserve (BTR) has 46 fringe villages, 34 tea gardens, 37 forest villages and 4 F.D.holding hamlets in & around it. Most of the Forest villagers depend on agriculture and livestock rearing for their daily source of income. They cultivate their land & rear large number of livestock. The following table presents recent livestock census figures of Blocks in and around BTR.

Livestock census figures (2012) in PA interface blocks (source ARD, Jalpaiguri)

| Livestock | APD-I | APD-II | Kalchini | Kumargram | Total |
|-----------|-------|--------|----------|-----------|----------|
| Cattle | 66659 | 92499 | 61239 | 61744 | 2,82,141 |
| Buffalo | 413 | 165 | 579 | 591 | 1748 |
| Sheep & | 36505 | 44915 | 51592 | 36062 | 1,69,074 |
| Goat | | | | | |

Wildlife and livestock can have the same diseases. Such large number cattle residing in and around Buxa can be a major source of diseases and may come in Contact with wild animals and can be dangerous to health of wildlife & vice versa. The domestic livestock compete with the wild counterparts for fodder in the fringe areas. They share the common water holes with wild animals. So, there is a fair chance of dissemination of life threatening livestock borne diseases (F.M.D, H.S., B.Q., etc.) to wildlife. Thus, livestock vaccination at recommended intervals is a must to indirectly protect wildlife. Vaccination promotes animal welfare by protecting animal health-both domestic & wildlife. In this regard, vaccines are an important tool, which increases the level of immunity in a herd & the relative resistance of individual animals. The following vaccine is prescribed and can be used for livestock vaccination as per recommended dose & interval in BTR at the said time & year for routine vaccination of livestock present at the PA interface villages. Apart from this ARD department also vaccinates and takes measures to prevent spread of diseases in domestic animals

| Name of Vaccine | Ingredients/adjuvant | Dose recommended. |
|-----------------|-------------------------------|--------------------------|
| Raksha trio vac | FMD inactivated antigens | 3 ml, mid-neck, deep i/m |
| (FMD+HS+BQ) | against O, A, Asia-1 and | (Vial: 30 ml) |
| | formaldehyde | |
| | inactivated Pasteurella | |
| | multocida culture, | |
| | inactivated Clostridium | |
| | chauvoei culture mixed | |
| | together in light mineral oil | |
| | emulsion | |

It is estimated that around 2 lakh cattle are residing in the Tiger Reserve interface and vaccinating them is a must as a precautionary measure. Pre-monsoon season is the

best time for vaccination of livestock-regularly this schedule shall be followed practically as far as possible. Cattle reared in all the forest villages, revenue villages and tea gardens in the vicinity of tiger reserve shall be vaccinated during pre monsoon season annually.

Some awareness programmes about livestock, diseases & importance of vaccination are necessary and should be organized to take these villagers in confidence so that every shed keeping animals are vaccinated for the betterment of wildlife. A healthy collaboration should be established between Tiger Reserve, Animal husbandry department and NGOs to create awareness among villagers and also lean them away from letting their cattle into tiger reserve to stall feeding.

(B) Disease Surveillance:

A quick disease reporting detection 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 may also be kept in the mind. The knowledge of animal species typical to the given area and particular disease maintained and spread by them may 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 –

- 1. 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

11.5.2 Care of rescued animals

Strategies:-

- (a) The V.S. should prescribe the diet of each animal in the rescue centre and also enforce quality control.
- (b) Health record of each captive animal should be maintained.

- (c) Deer and other herbivores should not be kept in captivity for long but should be released in the sanctuary as soon as they are fit to fend for themselves.
- (d) Leopard and other carnivores should not be kept in captivity for long. All trapped adult carnivores may be released in suitable habitat in the sanctuary or any other suitable forest area other than sanctuary as soon as it has been declared medically fit by the V.S. Leopards which have been in captivity for long, cannot be released in the wild because they lose their hunting capacity and defending power due to being kept in safe place and readymade food being made available. It is better to dispose them by way of gift to some Zoos in India or abroad. But, in future whenever a cub of leopard or other carnivore is received in the sanctuary, it should be prepared for ultimate rehabilitation in the wild. These animals, when released, should be marked properly and monitored regularly to know whether or not they have been successfully rehabilitated. A case has been found that a full-grown leopard released in Buxa Forest could not accustom itself in the forest and jumped over human being and injured one person after few days. That leopard was kept in captivity for long time. Ultimately the leopard was recaptured and kept in the rescue centre. During recapturing he was highly injured. After proper veterinary care it was sent to Darjeeling Zoo. Leopards in rescue centre are fed with beef as per V.S's prescription and mating is not allowed.

11.5.3 Rescue Centre

There is a rescue centre in Rajabhatkhawa established in 1993. Main objective to develop rescue centre is:-

- (a) To take care of captured wild animals from the sanctuary or outside the sanctuary.
- (b) Treatment of small herbivores, etc and
- (c) Then release in the wild.

The rescue centre may be strengthened during the plan period with additional facilities.

11.6 Mortality survey:-

This should be continued as before every six months. The camp staff should be suitably instructed to collect all mandibles/ skulls from the habitat for an assessment of species specific/ age – specific mortality.

PART B: THE PROPOSED MANAGEMENT

CHAPTER 12: TIGER POPULATION AND HABITAT ASSESSMENT

Tiger is a territorial animal, which advertises its presence in an area and maintains a territory. It is a well known fact that partial overlaps of resident male territories in an area do occur. However, the degree of overlap increases lethal internecine combats. 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, periodically replacing old males by young adults from nearby forest areas

The ongoing studies 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 -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. Therefore, buffer areas with forest connectivity are imperative for tiger dynamics, since such areas foster sub adults, young adults, transients and old members of the population. The young adults periodically replace the resident ageing males and females from the source population area.

The buffer area absorbs the "shock" of poaching pressure on populations of tiger and other wild animals. In case of severe habitat depletion in buffer areas, the source population would get targeted and eventually decimate.

- 12.1 Daily Monitoring protocol –
- 12.2 Tiger Population Estimation Framework (Phase I,II and III)
- 12.3 Habitat Assessment Framework
- 12.4 Spatial Database Development
- 12.5 Analysis and Reporting framework

Since in Buxa Tiger Reserve, the Core and Buffer are under the same administrative control of Field Director, the methodology as discussed in core shall be adopted in Buffer too.

PART B: THE PROPOSED MANAGEMENT

CHAPTER 13: PROTECTION AND INTELLIGENCE GATHERING:

The key to conservation success in a Tiger Reserve is the level of security enjoyed by the tiger and all other species that inhabit the area. Even if every other factor remains very favourable, lack of security can lead to irrevocable and sudden losses of the biodiversity wealth of the area. The case of Sariska Tiger Reserve losing all its tigers in a short span of time due to poaching is a grim case in point. Given that a forest area has its own unique characteristics, it is important that any plan to address its security must comprehensively address these unique challenges presented by the terrain and other related factors.

BTR faces immense pressure from the surrounding fringe population as well as the forest villages located inside the Reserve. Apart from this its proximity to the international borders i.e. Bhutan, Nepal and Bangladesh renders it highly vulnerable both as a poaching route and as a poaching destination. In the past also, parts of the Reserve have suffered from insurgency problems. In view of all these existing and potential threats the maintenance of roads, fire lines, bridges, vehicles communication, and arms etc. play a vital role.

13.1 Deployment of native workforce

Local people or the native population in and around the Tiger Reserves are a wealth of information on local conditions, geography, wildlife and other issues, specially at the ground level and as such worthy of being tapped for conservation work, specially at the EDC level. Lower level staff is best selected locally. Protected Areas are usually understaffed specially for field level wildlife crime prevention activities. Local competent people can also fill-in the gaps on temporary basis from time to time and on specific issues. Besides, involving the local populace in conservation work also gives them a sense of belonging, bringing in goodwill and participation for conservation work. Some of the areas where native work force may be deployed are in infrastructure work (maintenance of fire lines, roads etc.), habitat improvement work (water holes, grassland management etc.), as fire watchers in fire protection, animal rescue operations in flood prone areas after proper training, human-wildlife conflict resolution, protection etc. In protection and intelligence gathering, the native work force may be utilized for, amongst others:-

- Manning patrolling camps
- As part of Defence squads which can assist the PA staff in protection and intelligence gathering
- As informants for reporting illegal activities and for setting up of informant network with support of locals
- Maintenance of fire lines
- Maintenance of road network for better communication

13.2 Patrolling Strategy including Joint Patrolling

13.2.1 Planning a Patrol:

Discussed in detail in Security plan

13.2.2 What to look for:

Patrols must actively look for signs of human presence which should ideally not be there. They must learn the art of moving slowly and silently in the forest, without advertising signs of their presence by smoking cigarettes or bidis or walking on a hill crest with their silhouettes against the sky. They must check for human signs around waterholes or other water bodies, slat licks, forest trails, deserted camp sites etc.

The party should be equipped with pH or litmus paper to check for poisoning of water bodies by urea. They should also look for machans on trees and ground hides near waterholes. If found the area near machans/hides should be searched for empty cartridges/ percussion aps or If any such trail or sign is seen, they must carefully trace and follow the same and try to surprise the infiltrators at their camp. Scan the hill sides and tall trees for any look outs/scouts that may be placed there to keep an eye on any approaching patrol. Surprise and swift action is the key in dealing with such situations. If is assessed that the number of persons and their firepower is of an order that cannot be handled independently be the patrolling party, additional help should be summoned using the wireless, all the time keeping an eye of the offenders.

Full moon nights are generally known to be favoured by poachers. On and around such dates, special vigil must be mounted, especially around water holes and other water bodies. The units manning protection huts on elevated places must immediately report even the slightest flicker of light or any unusual tiger call at night.

Patrolling should be intensive during full moon bracket (5 days before and after full moon. During this time the patrolling party should look for these particular signs. If there are signs of the animal track being closed or narrowed down using twigs and branches or distractions in the form of cloth/flags being hung on branches. If there are series of twin pits (one of 20+ cm diameters and another less than 10 cm diameter but 2-3 feet deep) on bridle paths indicating spring traps being set up and removed. Patrolling party should also keep a close watch on kills made by tigers.

Field staff regularly patrolling the forest areas should be aware of the presence and movement patterns of major species such as Tigers, Leopards and Elephants in such areas. They should actively look for direct and indirect evidences of such species' presence on a regular basis. Any inconsistencies should be immediately investigated.

Water bodies should be examined for signs of poisoning or of attempts of snaring or trapping around it. Sometimes, fishes are killed using chemical additives. This can be detected by telltale signs of small fish floating dead on the surface. Signs of poison such as sulphur and other chemicals ground on rocks near the water are also a pointer to such criminal activity.

The flight distance of animals and birds and their general demeanour in human presence is also an indicator of disturbance. In areas where hunting is common, animals are generally wary and keep a larger distance between them and humans. This is also true for areas which are have a more frequent human visitation and such these need to be factored in also. Thus, animals in the relatively undisturbed "Core Zone" of a Protected Area generally have a larger flight distance than those in the "Tourism

Zone". An entire Forest Range must be comprehensively covered once a month by such patrols.

A comprehensive Patrolling Plan will lay out the key areas to be patrolled, routes to be followed and persons responsible for leading the patrols and those for debriefing them, frequency of such patrols and any other significant facts related to the patrol. A copy will be available at each Range HQ and the Range Officer will be responsible for random deployment of Patrols within his/her Range so that the area is effectively covered. Trans Range Patrols should be organised periodically.

Cattle kill evidences are important signs to be observed. Sometimes, the aggrieved villagers retaliate by poisoning the kill, hence resulting in the poaching of wild animals. Professional poachers also keep an eye on cattle kills for ascertaining presence of carnivores. Where ex-gratia schemes are in place, speedy disbursement of such money is the first step towards preventing retaliatory killings. When a tiger or leopard is located at such a kill, it should not be disturbed but allowed to feed on it as otherwise it will only go away to make another kill. Driving away the animal from such a kill only leads to another conflict situation at some other point in time and space.

Certain areas are prone to a particular modus operandi for poaching like snares, traps, use of hunting dogs, poisoning of kills and water holes, electrocution, shooting etc. Based on the crime/ poaching history. Patrolling parties should be aware of such local variations in poaching techniques and especially look out for these during patrols.

In General:-

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 of allotted to them
- Special instructions/ provisions for squads:
- □ Surveillance: hotels, tourist points, vehicles, bus stand, Trains and other means of transportation.
- □ Surveillance: *bahelias*, Paradhi's and traditional hunters etc.
- □ Coordination with local police
- □ Sanctioning labourers for patrolling (2/ team)
- □ Networking
- □ Special POR book issued
- □ 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
- □ Incineration of half eaten carcasses of livestock on account of carnivore depredation should be carried out in presence of gazetted officer to eliminate the possibilities of poising of revenge killing relation by local people.
- □ Continuous monitoring of the area were more than three incidents of livestock depredation reported within a fortnight.
- □ Village level crime register should be maintained at the EDCs level to keep track of villagers involve in wildlife offences.
- ☐ Maintained list of vehicles passing through manned barrier and surprise check by senior officer at such point every month.

13.3 Maintenance of Village level Crime Dossiers

All TRs must maintain records of persons with a history of poaching and/or wildlife trade in their 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 sources of such transactions.

Photographic dossiers can be very useful in investigation. Maintenance of crime dossiers at the State level is very important. These dossiers can be collated with other states on a need base. In case of TRs located near international borders, such dossiers should have information about poachers from both sides of the border 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 should be regularly analyzed. Such dossiers especially in all cases of poaching shall be maintained at divisional level and shall be shared with police also. Areas concerning Assam Bengal Border, troubled teagardens shall be looked into for such records.

13.4Fire protection:-

Dealt separately in security plan

13.4.1 Causes of fire in BTR:-

Dealt in detail in Core

13.4.2 Fire protection measures:-

Dealt in core

13.4.2.1 Preventive measures:

Dealt in core

13.4.2.2Combative measures:-

Dealt in core

vii) Suppression of Fire: -

Dealt in core

viii) Active involvement of local people -

Dealt in core

13.4.3 Monitoring of fire incidences:-

Monitoring of fire incidences in BTR is very essential to assess the impact of fire and to formulate future strategies. Following fire record must be maintained in each Range.

i) A fire register will be maintained in each Range Office to record the cases of forest fire in the following format.

| Cas e No. | Date of fire | Beat | Comp tt | Specif ic locati on | Area burnt in (Ha) | Damage of fauna, flora and other properties | Probab le cause of fire | Actio n taken | After effect of fire |
|-----------------|--------------|------|------------|------------------------------|-----------------------------|---|----------------------------------|---------------------|----------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |

ii) Map of fire prone and vulnerable areas:

A map should be prepared from the fire data collected from past incidences. Fire prone areas should be identified. They should be classified by degree of burning intensity.

While there are no major instances of forest fires resulting into heavy losses in BTR, enhanced preventive measures need to be implemented which might include the following:-

13.5 Intelligence gathering and coordination:

13.5.1 Intelligence networking

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.

People residing within the forest and on revenue villages shall be used as intelligence source. All 63 JFMC of Tiger reserve will act as crucial intelligence, as social fencing is biggest intelligence for any tiger Reserve.

by Field Director for collection of intelligence. Apart from local intelligence, the inputs by Sashatra Seema Bal, Army, Police, DIB, RPF etc should be sought regularly. A liaison meeting with these agencies may be held on monthly basis for sharing intelligence and information.

13.6 Collaboration with other Enforcement Agencies:

Memorandums of Understanding with other enforcement agencies like Shashatra Seema Bal (SSB), Border Security Force (BSF), Central Reserve Protection

Force (CRPF), Railway Protection Force (RPF), Indo- Tibetan Border Police (ITBP), Assam Rifles etc will prove to be a very useful strategy in combating poaching and illegal trafficking.

13.7 Media Management:

Wildlife crimes attract a lot of media attention. If not handled properly, Park Management authorities often face undue criticism. Efforts should be made to provide fair and accurate information to the media, without any attempt to hide or distort facts. A statement/press release should be made available, giving details of the incident for providing information to the media and public. If considered necessary, a Press Conference may also be organized. Only the authorized officer should talk to the media and sweeping statements should be avoided. In situations where the media persons want to visit the field, this can be facilitated after keeping into account other operational exigencies. Please note that the media is also performing its role in reporting such instances and if they are not provided the information, they may resort to reporting unverified and inaccurate versions of the incident, which can do greater damage.

PART B: THE PROPOSED MANAGEMENT

CHAPTER 14: ECOTOURISM, INTERPRETATION AND NATURE EDUCATION:

14.1 Tiger Conservation Foundation and management of Community Based Ecotourism programmes

14.1.1 Tiger Conservation Foundation.-the details of Buxa Tiger Conservation and Foundation trust has been described in the chapter 13 of Core.

14.1.2-Management Community based Ecotourism projects-Ecotourism in Buxa Tiger Reserve shall be of totally community based. No outside operator's shall be allowed to operate and run ecotourism. The eco guides from forest villages shall be trained and employed for ecotourism purposes. Even the safari vehicles may be procured from Forest protection Committees and Eco development committees so that the earnings are directly flown to JFMCs. The entry fee generated from tourism be deposited to Buxa Tiger Conservation Foundation Trust account and shall be utilized for the welfare of tiger reserve and improvement of community based ecotourism. A separate Range may be created as Ecotourism range with head quarter at Rajabhatkawa for the purpose of management of community based ecotourism, so that regular staff engaged in protection duties is not spared for these purposes.

14.2 Ecotourism Guidelines and constitution of Park Welfare Fund

14.2.1 Ecotourism guidelines

- To abide by the planning restrictions, codes and standards prescribed by the authorities
- Implementation of desired environmental principles through regulation
- Conducting environmental audits on regular basis for eco-tourism projects
- Being sensitive to the conservation of endangered species and 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 and convenience of tourists
- To use local material and design as far as possible,
- 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 instead of AC, self-sufficiency in food through kitchen garden and farming
- Energy and water saving devices should be used apart from controlled sewage disposal
- Control of noise pollution, chemical pollution and air emissions
- Use of signage's/ boards as per the standard prescriptions in the code
- Prohibiting use of environmentally 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 and local culture

- Ensuring proper marketing of eco-tourism products of local communities
- Ensuring training of staff on environmental issues
- Ensuring safety and security of visitors
- Respecting local inhabitants, culture and involving them in various activities and vocations as far as possible
- No new tourist farcicalities or infrastructure shall be set up within the core or critical tiger Habitat of tiger Reserves
- State level steering committee shall review the implementation of state level tourism and ecotourism strategy in Tiger Reserves
- A local advisory committee is constituted for the Tiger Reserve by state Govt which shall oversee tourism strategy, implementation of carrying capacity, advising state government, monitoring tourism facilities and encouraging local employment through ecotourism without causing disturbance to wildlife.

14.2.2 Constitution of Park Welfare Fund

Gate receipts form visitors shall be deposited to Buxa Tiger conservation foundation trust and shall be exclusively used for management of specific conservation purposes, local livelihood development and tackling human wild animal conflict and welfare measures of field staff

State Govt to charge conservation fee from Tourism facilities/infrastructure operating within and around Tiger Reserve for eco development and local community development works. Conservation fee to be decided by sate govt based on the occupancy rate over a year (refer NTCA guidelines in this regard. Such fund shall be administered by Buxa Tiger conservation Foundation trust.

The income earned from entry fee of visitors and vehicle shall be deposited to foundation Trust of Tiger Reserve and shall exclusively be used for the purpose of park. 50 % of the income generated from entry fee may be reserved as Park welfare fund and shall exclusively used for the welfare of the Tiger Reserve.

14.3 Interpretation programme

Regular interpretation programme for Tiger reserve is very essential for creating awareness and education people about the conservational values of Tiger reserve. One such interpretation centre exists at Rajabhatkawa and one small one at Buxaduar as heritage Museum. One new interpretation centre may be developed at Narathali for birds. Existing Interpretation centre at Rajabhatkawa may be remodeled on theme basis and regular documentaries on wildlife and conservation may be screened for visitors.

14.4 Nature education.

Along with interpretation programmes nature education is an important educative issue that should be addressed by the park especially for school children. Some such programmes are organized by local NGOs as camps for school kids mainly at Jainti, Raimatang, Buxaduar, Hatipota, and Kumargram. Such programmes will expose school kids to nature and will be extremely educative. Tiger reserve should organize such camps with the help form NGOs and shall include the children from forest villages also so that stake holding of all the concerned is increased in the tiger reserve.

PART B: THE PROPOSED MANAGEMENT

CHAPTER 15: ORGANIZATION, ADMINISTRATION AND BUDGET

15.1 Buffer Areas Coordination Committee and its Linkages with Tiger Steering Committee and Tiger Conservation Foundation:-

Buffer Area Coordination Committee:

The Buffer Area Coordination Committee will comprise of division level JFMC coordination committee, BTCFT executive committee.

They have to carry out the management of the Buffer Area in association with Tiger Steering Committee and Tiger Conservation Foundation on following broad principles:

- 1. Implementation of forestry activities after mainstreaming wildlife concerns.
- 2. Implementation of eco-developmental activities for reducing resource dependency of local people on surrounding forests.
- 3. Coordination with governmental / nongovernmental production sectors in the landscape for mainstreaming conservation.
- 4. Habitat management and improvement activities will be carried out in the existing habitat of tiger and its prey species through active involvement of local communities. The existing silvicultural operations will be accordingly modified to promote conservation of the area and the management will be based on specific forest lands forming part of village level micro plans. Community will be involved in the overall management of the buffer area.
- 5. Site specific eco-development initiatives based on participatory village level micro plans will be carried out for the local communities for strengthening their livelihoods through a balanced approach of rationalization of resource use, biomass regeneration and alternatives, so that the ecological status of the area could be improved and maintained
- 6. Reciprocal commitments by the local people through specific measurable actions as per MoUs for improving protection and conservation of the area will be implemented. This may include rationalization of resource use from the forest, participation in fire protection and anti-poaching efforts.
- 7. Ecotourism activities in the Buffer Area will be used as an important component of eco development for strengthening the livelihood of the local people and the protection of the area.
- 8 Capacity building of the field staff as well as eco-development committee member will be undertaken on a regular basis through the Tiger Conservation Foundation. Similarly intensive nature conservation awareness programme should be part of the buffer area management plan with a focus on different stakeholders' particularly local communities.

15.2 Coordination with, Confederation and other Line Agencies/Departments/ Production Sectors

Co-ordination with line agencies / departments is needed for better protection, eco development and conflict resolution. For ensuring better protection measures in the tiger reserve better coordination is must with Police, Revenue intelligence, Railway, Judiciary, SSB and Army. Similarly for inclusive development of villages and forest dependent communities coordination with

Revenue department, rural development, Agriculture, health, Panchayat Raj institutions Education and Tribal welfare etc. Man animal conflict is major issue which needs addressal and for which it requires intimate coordination with police, Revenue, Tea garden Management and judiciary.

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 could be adopted:-

- Regular meetings with line departments.
- Co-ordinating with District Collector and CEO, Zilla Parishad (ZP) 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.

15.3 Staff deployment: Since the buffer area is also under administrative control of Field Director and staff deployment is same as discussed in core Chapter 13

15.3.1 Administrative set up: - Discussed in chapter 13, section 13.4 of core part.

15.4 Fund raising strategies

The NTCA will be the main fund provider for development, eco-development, research, protection, environmental education and other activities. The State Govt. will help in establishment, other developmental activities and tourism. Apart from these funds form project elephant shall be sought as BTR is also core area of Eastern Duars Elephant Reserve.

Funds may also be sought from schemes like JICA, RIDF, FVD schemes.

The revenue generated form entry fee, boulder royalty and JFM share deposited into trust account shall also farm major source of fund for various works in the tiger reserve.

15.5 Schedule of operations

All the operations in the PA will be completed as per the direction and scheduled prevailing in the department. Details are described in Chapter-13.6 of BTR-TCP (core area).

15.6 Activity budget

The Budget requirement for all the activities to be carried out for the plan period is given in the table below. The budget provided here is only indicative and may be modified as per requirement

| N S | | | ACTIVITY CHART | <u> </u> | ART | | | | | | | | | |
|-----|--|----------------|--|---------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| | | | | | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 |
| | Description of works | CSS Para No | Location | umit | Phy. |
| | | | NON R | NON RECURRING | ING | | | | | | | | | |
| - | Supply of solar lights | 4.1 | North panabari, Raimatang, Gangutia, watch towers, Balapara, chunia, SAP camps, | No | 30 | 15 | 15 | 10 | 15 | 30 | 15 | 15 | 10 | 15 |
| 2 | Supply of GPS | 4.2 | all ranges | No | 20 | 10 | 10 | | 10 | 20 | 10 | 10 | | 10 |
| 3 | Amenities to staff welfare like batteries, mosquito nets, uniform, boots, protection gear, torch etc | 4.8, 4.16 | all ranges | | rs | TS | rs | rs | rs | rs | TS | TS | rs | FS |
| 4 | Supply of camera, binoculars | 4.1,4.2 | all ranges | No | 20 | 10 | 10 | | | 20 | 10 | 10 | | |
| S | Tiger census | 4.7 | All ranges | | rs | | | | rs | rs | | | | TS |
| 9 | laying of pug mark impression pads | 4.7 | all ranges | No | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| 7 | Supply of camera traps for monitoring tiger and co predators | 4.2 | all ranges | No | 100 | 50 | 50 | | 50 | 100 | 50 | 50 | | 50 |
| 8 | Procurement of tranquilising equipment | 4.4 | all ranges | | TS | | | | | rs | | | | |
| 6 | Procurement of vet equipment and medicines | 4.4 | All ranges | | TS | FS | FS | | rs | TS | FS | FS | | LS |
| 10 | Procurement of arms | 4.1 | All ranges | | 10 | 12 | 12 | 12 | 10 | 10 | 12 | 12 | 12 | 10 |
| | Procurement of ammunition | | All ranges | | 92 | 75 | 75 | 75 | 80 | 92 | 75 | 75 | 75 | 80 |
| 11 | Construction of Barrack | 4.1 | All ranges | No | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 1 |
| 12 | Construction of Forest Guard quarter | 4.1 | All ranges | No | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 13 | Creation of grasslands in open and canopy opened areas | 4.12 | all ranges | ha | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| 14 | Construction of water storage structures | 4.2 | all ranges | No | 4 | 2 | 2 | 2 | | 4 | 2 | 2 | 2 | |
| 15 | Installation of entry gates | 4.4 | all ranges | No | 4 | 2 | 2 | | | 4 | 2 | 2 | | |
| 16 | Electrification of remote beats | 4.2 | all ranges | No | 2 | 1 | 1 | | | 2 | 1 | 1 | | |
| 17 | Procurement of tents, rain coats, accessories of Antipoaching duties | 4.8, 4.16 | all ranges | | rs | TS | rs | rs | rs | rs | TS | TS | rs | FS |
| 18 | Installation of deep tube well in remote beats | 4.1 | all ranges | No | 2 | 2 | 2 | | | 2 | 2 | 2 | | |
| 19 | Payment of exgratia, compensation, crop loss etc | 4.4 | All ranges | | rs | TS | TS | rs | | rs | LS | LS | rs | |
| 20 | Procurement of traps and cages | 4.4 | all ranges | No | 2 | | 2 | | 2 | 2 | | 2 | | 2 |

| \mathbf{S} | | Sec Bane | | | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 |
|--------------|---|----------|--------------|-----------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| No | Description of works | No No | Location | unit | Phy. |
| 21 | Publication of publicity material, awareness material and study reports | 4.12 | all ranges | | TS | rs | rs | rs | TS | ST | ST | rs | rs | FS |
| 22 | Constructions of culverts | 4.2 | all ranges | No | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 23 | Construction of bridges | 4.2 | all ranges | | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 24 | Construction of causeways | 4.2 | all ranges | No | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 25 | Sausage work for road bench stabilization | 4.2 | all ranges | m3 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| 26 | Sausage work for river bank stabilization | 4.2 | all ranges | m3 | 009 | 200 | 500 | 500 | 500 | 009 | 200 | 500 | 200 | 500 |
| 27 | Soil and water conservation for recharging ground water by construction DRM walls | 4.2 | all ranges | m3 | 009 | 009 | 009 | 009 | 009 | 009 | 009 | 009 | 009 | 009 |
| 28 | Procurement of generator | 4.2 | all ranges | No | 2 | | | | | 2 | | | | |
| 29 | Procurement of wireless | 4.2 | all ranges | | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | Procurement of cell phones | 4.2 | all ranges | | 3 | 4 | 4 | 4 | 4 | 3 | 4 | 4 | 4 | 4 |
| 28 | Procurement of computer and accessories | 4.1 | all ranges | | 4 | 2 | 2 | 2 | 2 | 4 | 2 | 2 | 2 | 2 |
| 29 | Creation of waterholes | 4.3 | all ranges | | 4 | 2 | 2 | 2 | 2 | 4 | 2 | 2 | 2 | 2 |
| 30 | Procurement of tiger and leopard guard | 4.4 | all ranges | | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| 31 | Installation of energised fencing | 4.4 | all ranges | | 10 | 5 | 5 | 5 | 5 | 10 | 5 | 5 | 5 | 5 |
| 32 | Construction of Research station | 4.4 | Damanpur/RVK | No | 1 | | | | | 1 | | | | |
| 33 | Construction of Hostel facility for children of staff | 4.4 | Damanpur | No | | 1 | | | | | 1 | | | |
| 34 | Construction of Boundary wall of beats | 4.4 | all ranges | NO | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 35 | payment of compensation and exgratia | 4.4 | all ranges | NO | LS | LS | LS | LS | TS | LS | LS | LS | rs | TS |
| 36 | Creation of Sal Plantation | 4.3 | all ranges | На | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| 37 | Creation of Miscellaneous plantation | 4.3 | all ranges | На | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 |
| 38 | Creation of grass plantation | 4.3 | all ranges | На | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| 39 | Creation of Bamboo Plantation | 4.3 | all ranges | ha | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 |
| | | | REC | RECURRING | IG. | | | | | | | | | |
| 1 | Maintenance | | | | | | | | | | | | | |
| | Roads | 4.2 | all ranges | km | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| | Patrolling path | 4.2 | all ranges | km | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| | Fire lines | 4.2 | all ranges | km | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |

| S | | CSS Dara | | | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 | 2022-23 |
|----|--|----------|------------|------|---------|---------|---------|---------|---------|------------|------------|---------|---------|---------|
| No | Description of works | No | Location | unit | Phy. | Phy. | Phy. | Phy. | Phy. | Phy. | Phy. | Phy. | Phy. | Phy. |
| | Pilkhana | 4.2 | all ranges | km | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| | Energised fencing | 4.4 | all ranges | km | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | Wooden bridges | 4.2 | all ranges | No | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | Feed and vet care of rescued animals | 4.1 | all ranges | | ls | | | | | ls | | | | |
| 2 | Buildings | 4.2 | | | | | | | | | | | | |
| | Group D | | all ranges | No | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| | Group C | | all ranges | No | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| | Inspection camps | | all ranges | No | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 | 4 |
| | Watch towers, anti poaching camps | 4.2 | all ranges | oN | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| 3 | Departmental vehicles, pol | 4.2 | all ranges | No | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| 4 | Maintenance of rivereine grass lands by cut back and burning | 4.2 | all ranges | ha | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| 5 | Wages for watchers, anti poaching camps | 4.1 | all ranges | oN | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| 9 | Reward for infomers | | all ranges | | LS | | | | | TS | | | | |
| 7 | Vaccination of cattle | 4.4 | all ranges | No | 500 | 200 | 500 | 500 | 500 | 500 | 500 | 500 | 500 | 500 |
| 8 | Office expenses | 4.2 | all ranges | | ls | ST | ST | ST | TS | ls | ST | TS | ST | TS |
| 6 | Feed and vet care of departmental elephants | 4.1 | all ranges | No | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| 10 | Artificial waterholes | 4.2 | all ranges | No | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |
| 11 | Soil and moisture conservation works | 4.2 | all ranges | | ls | TS | rs | LS | TS | ls | rs | rs | TS | TS |
| 12 | Desiltation of water bodies | 4.3 | all ranges | ha | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| 13 | Capacity building of staff | 4.8 | all ranges | | ls | LS | LS | LS | LS | ls | LS | rs | TS | TS |
| 14 | Training programmes for villagers and JFMC | 4.17 | all ranges | | ls | LS | LS | LS | TS | ls | LS | rs | TS | TS |
| 15 | Study tour to other tiger reserves for appraisal of good practices | 4.8 | all ranges | | ls | LS | LS | LS | LS | ls | Γ S | LS | rs | rs |
| 16 | Herbivore census | 4.12 | all ranges | | ls | LS | | LS | | ls | LS | | TS | |
| 17 | Conducting research on mentioned topics in TCP | 4.12 | all ranges | | LS | TS | FS | LS | TS | Γ S | TS | rs | rs | TS |
| 18 | Cut and burning of grasslands | 4.3 | All ranges | ha | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 | 400 |
| 19 | Training programmes for tourist Guides | 4.12 | all ranges | | TS | TS | FS | Ls | rs | rs | TS | rs | Ls | LS |

PART THREE - CORRIDOR

PART A: THE EXISTING SITUATION

CHAPTER 1: INTRODUCTION OF THE AREA

1.1 Brief Description of the Area and significance for Tiger Conservation

1.1.1 Brief Description of the Area:-

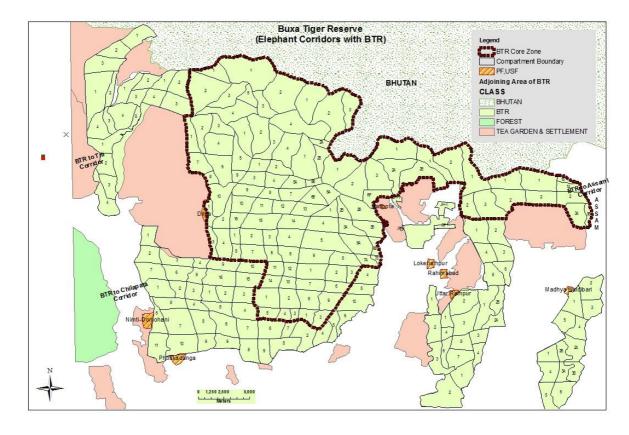
- Chilapata and Kodalbasti Ranges between BTR-Jaldapara WLS Corridor: The area consists of reserved forest lying to the west of Hasimara-Joygaon PWD road. The Chilapata and Kodalbasti Reserve forest lies about 3 km from the national highway no. 31. The area consist of several forest blocks viz, Mendabari, Chilapata, Bania, Kodalbasti. The Torsa River flows right through this forest. The forest type is mainly North Indian moist tropical forest of Champion Seth's recent classification. The vegetation mainly consist of Sal (Shorea robusta) in association with Chilauni
- (Schiima wallichii), Champ (Michelia champaka), Chikrase (Chukrasia tabularis) and Bahera (Terminalia belerica).
- Area between BTR and Manas NP in the North-Eastern fringe: Manas is located in the Eastern Himalaya foothills. The park is densely forested. The Manas River is the main river, a major tributary of Brahmaputra River. The Manas River flows through the west of the park, further it splits into two separate rivers, the Beki and Bholkaduba. Manas and five other small rivers flow through the National Park which lies on a wide low-lying alluvial terrace below the foothills of the outer Himalaya. The river also acts an international border diving India and Bhutan. The bedrock of the savanna area in the north of the park is made up of Limestone and sandstone, whereas the grasslands in the south of the park are made up of deep deposits of fine alluvium. The combination of Sub-Himalayan Bhabar Terai formation along with riveraine succession continuing up to Sub-Himalayan mountain forest.
- Kochugaon-Sankosh Corridor in the Eastern fringe: Kochugaon covers an area of around 214 sq km and has rare and endangered species such as gaur, golden langur, spotted deer and elephant. Kochugaon Reserve is located at Kochugaon in Bongaigaon District of Assam.

1.1.2 Significance for Tiger Conservation.

The corridors mentioned above form part of North east and Brahmaputra Valley Tiger landscape. The corridors provide crucial linkages for the dispersal of tigers to various protected areas like, Buxa, manas Tiger Reserve, phipsoo wildlife sanctuary in Bhutan and Jaldapara Widllife sanctuary. Bhutan has reported the presence of tigers and similarly there have been reports of tiger movement and between Jaldapara and Buxa. CCMB has confirmed the presence of tigers in Jaldapara. Historically this landscape used to be very good home for large number of tigers hence it forms a significant landscape connectivity for Tiger Conservation.

Brief description of Corridors

- **Buxa-Titi Corridor:** Connecting Rangamati Reserve Forest area of Buxa Tiger Reserve with Titi Reserve Forest in the North. In the south it is connected with Bharnabari Reserve Forest of Buxa Tiger Reserve and Titi Reserve Forest situated south of Dalsingpara tea estate by passing through Bharnabari tea estate and Beech tea estate.
- Nimati-Chilapata (Buxa-Chilapata) Corridor: Facilitating elephant movement between Nimati Range of Buxa Tiger Reserve and Chilapata Reserve Forest of Wildlife III Forest Division thereby maintaining elephant movement between Buxa Tiger Reserve and Jaldapara Wildlife Sanctuary
- Buxa-Ripu at Sankosh (Sankosh) Corridor: This corridor is a contiguous forest that connects Buxa Tiger Reserve of West Bengal with the Ripu Reserve Forest of Kochugaon Forest Division, Assam.



Map 1 Brief Description of Corridors

These corridors may also serve as tiger corridors due to limited otherwise ecological connectivity of BTR to adjoining potential habitats.

Of the above corridors, Corridor I and II, i.e. Buxa-Titi and Chilapata-Nimati might still be functional. Tiger signs have been discovered both in Nimati and Chilapata during previous censuses and Titi-Torsa stretch uncovered tiger signs during our

validation surveys. Regarding Titi- Bharnabari, it seems like a long shot given the number of settlements and disturbance gradient of the areas. The entire stretch on BTR side (Hamiltongani range) is conducive only for leopards and hardy herbivores.

1.2 Habitat corridors: A linear strip of vegetation that provides a continuous (or near continuous) pathway between two habitats. This term has no implications about its relative use by animals

1.2.1 Natural Habitat Corridors

Buxa Ripu is Natural corridor

1.1.2 Remnant Habitat Corridors

Such as strips of unlogged forest within clear cuts, natural woodland along roadsides or natural habitats retained as links between natures Reserves, are the result of clearing, alteration or disturbance to the surrounding environment. The Chilapata Nimati corridor provides shelter through plantations.

1.1.3Regenerated Habitat Corridors

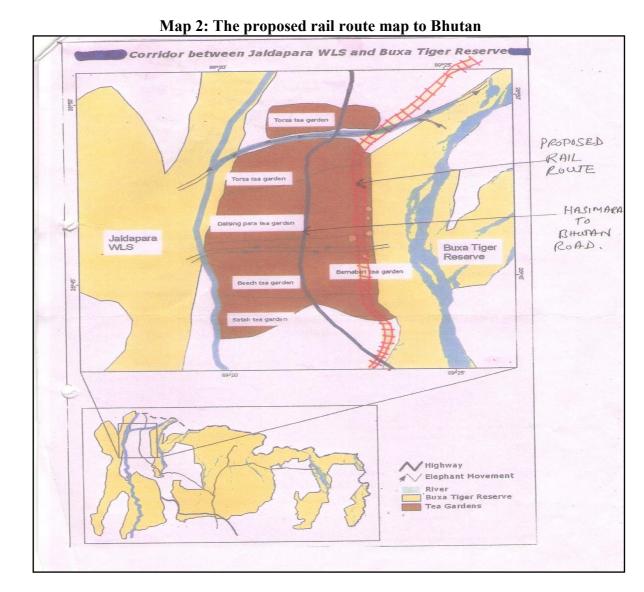
Nil

1.1.4 Planted Habitat Corridors (from plantations, shelter belts, etc.)

Plantations of teak, Gamar near Nimati act as corridors for elephants, Tiger and Leopard between Chilapata and Buxa Forests

1.1.5 Disturbances in Habitat Corridors (Railway lines, cleared transmission line, etc.)

Ministry of Railways Govt of India has proposed one rail route under SAARC treaty between Hasimara (West Bengal) to Phuentsholing (Bhutan). The proposed route though is outside forest area but runs through very important and ecologically strategic Buxa- Titi corridor which is crucial link between Buxa Tiger Reserve and Jaldapara National Park. This route is very regularly used by Elephants, Bison, leopard and tigers. If this proposed track is constructed the entire corridor may get blocked and will lead to death of wild animals on the proposed track and will act as death trap for wildlife. If at all this track is to be made then it would be better to have an elevated track in the interest of the existing corridor.



A) Buxa-Titi (via Torsa river, Beech and Bharnabhari Tea Estate) Corridor: Road (Hasimara- Phuntsoling)

B) Nimati-Chilapata (Buxa-Chilapata) Corridor: National Highway-31

C) Buxa-Ripu at Sankosh (Sankosh) Corridor: NIL

1.1.6 Stepping Stones (suitable habitat patches)

Private plantation and tea Gardens provide shelter for animals to move between two PAs

- 1.3 Major Land use Classification in the Area.
- 1.3.1 Reserve Forest/ Proposed Reserve Forests/ Unclassified State Forests (Divisions/ Range/ Blocks/ Beats)
 - A) Buxa-Titi (via Torsa, Beech and Bharnabari Tea estate) Corridor:

- Forest division: Buxa Tiger Reserve, Coochbehar Forest Division and Wildlife III forest division
- Legal status: Reserve forest and land leased to tea gardens.

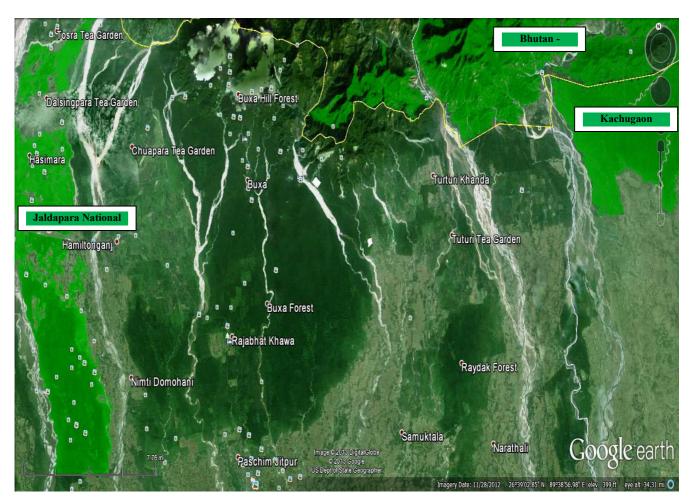
B) Nimati-Chilapata (Buxa-Chilapata) Corridor:

- Forest division: Buxa Tiger Reserve (West) and Wildlife III Reserve Forest
- Legal status: Revenue land and forest land leased to tea gardens

C) Buxa-Ripu at Sankosh (Sankosh) Corridor:

- Forest division: Buxa Tiger Reserve of West Bengal with the Ripu Reserve Forest of Kochugaon Forest Division, Assam
- Legal status: Reserve Forest and revenue land

Map 3: Showing Landscape Beyond Core and Buffer areas



Buxa Tiger Reserve-Forest areas Adjoining BTR-

1.3.2 Villages/ Towns/ Cities (Districts, Sub-Divisions, Blocks, Panchayat)

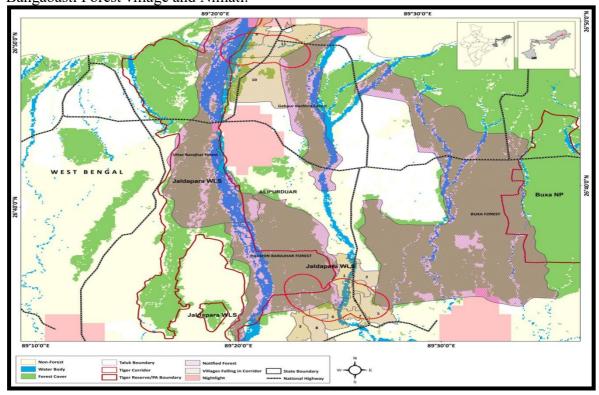
A) Buxa-Titi (via Torsa, Beech and Bharnabari Tea estate) Corridor:

Torsa and Mahua Tea Garden labour colonies. There are a few settlements along the river. Corridor dependent villages are Mahua labor lines and Gopal Bahadur basti and Balalguri revenue village (near Titi).

Corridor dependent villages are Gopal *basti*, Labor lines of Beech tea garden and Titi forest village and Ballalguri revenue village

| SI no | State | District | Block | Village/Tea garden | Area ha | No of House holds | Total Population |
|----------|--------|------------|-----------|---------------------------|------------|-------------------------|---------------------|
| 1 | | | Kalchini | Torsa Tea Garden | 3329.48 | 957 | 6257 |
| 2 | | | Kalchini | Mahua Tea garden | 93.38 | 59 | 436 |
| 3 | West | Alipurduar | Kalchini | Gopal Bahudur basti | 116 | 1060 | 5309 |
| 4 | Bengal | _ | Madarihat | Ballalguri- Totopara | 1176 | 392 | 1849 |
| 5 | | | Kalchini | Beech Tea Garden | 1628.62 | 1006 | 6894 |
| 6 | | | Madarihat | Titi Forest Village | 30 | 14 | 38 |

B) Nimati-Chilapata (Buxa-Jaldapara) Corridor: South Mendabari, Bangabasti Forest Village, Mendabari Beat office. Corridor dependent villages are South Mendabari, Bangabasti Forest village and Nimati.



| Village ID | State | District | Tehsil/Block | Village | No households | Total Population |
|------------|----------------|------------|--------------|------------------------|------------------|---------------------|
| 1 | | | Kalchini | Rajabhatkawa | 1511 | 7071 |
| 2 | | | Alipurduar I | Dakshin Barajar forest | 218 | 1077 |
| 3 | | | Kalchini | Dakshin Mandabari | 516 | 2625 |
| 4 | | | Kalchini | Nimtijhora Tea garden | 870 | 4266 |
| 5 | W | | Alipurduar I | Kumarpara | 345 | 1823 |
| 6 | West Bengal | Alipurduar | Alipurduar I | Uttar Patkapara | 545 | 2716 |
| 7 | Deligai | | Alipurduar I | Paitakapara Tea garden | 905 | 4654 |
| 8 | | | Alipurduar I | Uttar Chakoakheti | 241 | 1251 |
| 9 | | | Alipurduar I | Madhya Paitkapara | 331 | 1712 |
| 10 |] | | Alipurduar I | Mathura tea Garden | 1705 | 8472 |
| 11 | | | Madarihat | Baniya basti | 80 | 210 |

C) Buxa-Ripu at Sankosh (Sankosh) Corridor: Corridor is dependent on Kumar gram, Newlands and Sanakosh forest village and Newlands, Kumar gram and Sanakosh Tea gardens.

| Sl. No. | State | District | Block | Village/Tea garden | Area in Ha. | No of House holds | Total population |
|------------|-------------|------------|------------|------------------------------|----------------|-------------------------|------------------|
| 1 | | | | Kumar gram Forest Village | 61 | 77 | 510 |
| 2 | | | | Sanakosh Forest Village | 108 | 130 | 786 |
| 3 | West Bengal | Alipurduar | Kumar gram | Newlands Forest Village | 26 | 38 | 195 |
| 4 | | | | Kumar gram tea garden | 760 | 1900 | 12005 |
| 5 | | | | Sanakosh tea garden | 715 | 650 | 7000 |
| 6 | | | | Newlands tea garden | 849.3 | 1400 | 10000 |

1.3.3 Other uses (Agriculture, Tea Gardens and Plantations etc.)

- A) Buxa-Titi (via Torsa river, Beech & Bharnabari Tea estate) Corridor: Tea garden and forest and settlements
- B) Nimati-Chilapata (Buxa-Chilapata) Corridor: Forest, agriculture and Tea garden
 - C) Buxa-Ripu at Sankosh (Sankosh) Corridor: Forest and settlement

1.3.4 Government Lands

- A) Buxa-Titi (via Torsa river, Beech and Bharnabari Tea estate) Corridor: RF/Govt leased land
- B) Nimati-Chilapata (Buxa-Chilapata) Corridor: RF
- C) Buxa-Ripu at Sankosh (Sankosh) Corridor: RF

1.3.5 Quality of Habitat

A) Buxa-Titi (via Torsa river, Beech and Bharnabari Tea estate) Corridor:

The forest is comparable to Champion and Seth's 2B/C1b type Eastern Sub Montane Semi Evergreen Forests. The composition in the top storey consists of sal in association with Tanki, Toon, Lamptae, Moina, Champ, Gamar, Chikrasi and Gokul. The lower storey is composed of Angare, Litsea sp, Dysoxylum spp, etc. in some place Choya bans (*Dendrocalamus hamiltonii*) are also found profusely.

The corridor is interrupted by some tea estates (Satali, Malangi, Beech, Bharnabari, Dalsingpara and Torsa) and settlements further north of the tea estates up to the foothills on either side of the road. The developments in this region have cut off the forest corridor.

- **B)** Nimati-Chilapata (Buxa-Chilapata) Corridor: This is corridor is extensively used by the wild animals especially the elephants for movement between Buxa and Jaldapara. The signs of tiger have been found in the Bania Forest block in the past. The area consist of Sal forests, wet mixed forest, riveraine forest and savannah forest types. The corridor is interrupted by national highway 31, human habitations and farmlands.
- C) Buxa-Ripu at Sankosh (Sankosh) Corridor: The accessible place through which the tigers can move is narrow. Two villages, Kumargram and Sankosh that lie in the narrow corridor area further reduce its width. The habitat of Ripu is similar to that of Manas Tiger Reserve.

1.4 Statement of Significance (not covered less than 1.1 above).

A) Buxa-Titi (via Torsa river, Beech and Bharnabari Tea estate) Corridor:

This corridor connects Rangamati Reserve Forest area of Buxa Tiger Reserve with Titi Reserve Forest. There is a stream (Gabarjithi *jhora*) that passes between Dalsingpara tea garden and Torsa tea garden and crosses the Hasimara-Phuntsoling road finally meeting the Torsa River. Elephants use this stream to move between Buxa Tiger Reserve and Titi Reserve Forest.

This corridor connects Bharnabari Reserve Forest of Buxa Tiger Reserve and Titi Reserve Forest situated south of Dalsingpara tea estate by passing through Bharnabari tea estate and Beech tea estate. Solitary elephants and small herds generally use the corridor during night as there is heavy traffic along the Hasimara-Phuntsoling road that passes through the corridor with Beech tea garden to its west and Barnbari tea estate to its east

B) Nimati-Chilapata (Buxa-Chilapata) Corridor: This corridor facilitates elephant movement between Nimati Range of Buxa Tiger Reserve and Chilapata Reserve Forest of Cooch Behar Forest Division thereby maintaining elephant movement between Buxa Tiger Reserve and Jaldapara Wildlife Sanctuary

C) Buxa-Ripu at Sankosh (Sankosh) Corridor: This corridor is a contiguous forest that connects Buxa Tiger Reserve of West Bengal with the Ripu Reserve Forest of Kochugaon Forest Division, Assam. The Sankosh River passes through Buxa Tiger Reserve and Kochugaon.

1.5 Geological attributes and Hydrology.

A) Buxa-Titi (via Torsa river, Beech and Bharnabari Tea estate) Corridor:

It's a flat terrain covered with alluvium, gravel etc. The corridor is traversed by Torsa River and many other smaller streams. The change of course of river is common. The floods are common phenomena in this region. The average rainfall of the area is 420cm, rain sets towards the end of May and continue up to middle of October. Water table in summer 2.5 to 3 mt.

- **B)** Nimati-Chilapata (Buxa-Chilapata) corridor: It's a flat terrain covered with alluvium, gravel etc. Hydrology is same as Titi corridor. Water table in summer is 3 to 4 mts.
- C) Buxa-Ripu at Sankosh (Sankosh): The corridor is traversed by Sankosh River. The average annual rainfall of the area is 450cm.

1.6 Vegetation Types

- A) Buxa-Titi (via Torsa, Beech and Bharnabari Tea estate) Corridor: Tropical semi evergreen and riparian forest
- B) Nimati-Chilapata (Buxa-Chilapata) Corridor: Tropical moist deciduous forest and tea garden
- C) Buxa-Ripu at Sankosh (Sankosh) Corridor: Tropical semi-evergreen, and tropical deciduous forest.

1.7 Wild Fauna and Habitats

- A) Buxa-Titi (via Torsa, Beech and Bharnabari Tea estate) Corridor:
- B) Nimati-Chilapata (Buxa-Chilapata) Corridor:
- C) Buxa-Ripu at Sankosh (Sankosh) Corridor:

RC- The general wildlife signs observed during our validation surveys in the above areas:

- Chilapata- Tiger, Elephants, Sambars, Jackals, Leopards, Barking deer, Gaurs, Rhinos (Occasionally from Jaldapara WLS.
- Bharnabari-Dalsingpara- Elephants, Leopards, Sambar, Gaur, Jackals.
- Nimati- Tiger, Elephants, Leopards, Barking deer, Gaur, tiger (Sighting reported by departmental staff in 2009)

1.8 Major changes in the landscapes (Settlements/ other infrastructure).

A) Buxa-Titi (via Torsa, Beech and Bharnabari Tea estate) Corridor:

- Settlement of Mahua Tea Garden labour colonies and Gopal Bahadur basti
- Stone crushing unit on stream bank near the bridge on the Hasimara- Phuntsoling road
- Tea gardens and human activities during the day
- Heavy traffic along the Hasimara-Phuntsoling road
- Expansion of Gopal basti and Titi forest village and the resultant biotic pressure
- Conversion of rail line to Broad gauze

B) Nimati-Chilapata (Buxa-Chilapata) Corridor:

- Heavy traffic on National Highway-31
- Biotic pressure from adjacent villages, Bangabasti and Tea Gardens

C) Buxa-Ripu at Sankosh (Sankosh) Corridor:

- The biotic pressure from Sankosh and Kumargram villages
- Degradation of forest in and around the villages
- RC- possible disturbance from the Kalikhola-Bhutan road

1.9 Administration and Organization.

- **A)** Buxa-Titi (via Torsa, Beech and Bharnabari Tea estate) Corridor: Field Director, BTR and DFO, Wildlife III Forest division. Also Tea estate managers concerned railways and NHAI.
- **B)** Nimati-Chilapata (Buxa-Chilapata) Corridor: Field Director, BTR and DFO, Wildlife III Forest division. Also SDO/BDO and Tea estate managers concerned and NHAI.
- C) Buxa-Ripu at Sankosh (Sankosh): Field Director, BTR and DFO, Kochugaon Forest division, Assam. Also SDO/BDOs concerned.

CHAPTER 2: STATUS OF TIGER AND CO-PREDATORS

2.1 Distribution and Abundance Status with Type of Use by the Tiger and Co-Predators

In the recent census report of tiger by CCMB has confirmed the presence of Tigers in Jaldapara and the movement has been documented by the villagers and tea garden. Regular signs of Tiger presence in Bhutan forests adjoining BTR have been documented by Bhutan Forest department. Study needs to be conducted covering the areas of Jaldapara WLS and Parts of Bhutan forest. However local villagers report the movement of tiger from Nimati forest to Chilapata Forests. The movement of elephant, Bison, leopard is well known fact. Recently movement of Wild Dog is also reported in the corridor

2.2 Prey-Predator Relationships

"There are insufficient records to elaborate upon. Further research needs to be done to document this."

2.3 Assessment of Threats

The corridors face many threats most of which are anthropological. Some of the threats include human settlements, roads passing through the corridors, partially non protected status of the corridors, lack of enough prey base, degraded forests etc.

Major threats in each corridor:

Buxa-Chilapata Corridor:

- NH-31 passing through the middle of the corridor in Chilapata creates heavy disturbance in terms of vehicular movements.
- Revenue villages and tea gardens in Nimati side of BTR cause heavy anthropogenic pressure.

Sankosh-Kochugaon Corridor:

- Number of settlements (Forest villages and tea gardens) in BTR side. (Sankosh F.V, Tea Gardens, enforcement agency bases)
- Degraded quality of habitat (Mostly plantations with heavy disturbance gradient) in Sankosh.
- Lack of good prey populations

Buxa - Titi corridor:

- Human movements along Torsa riverbed (Fishing, livestock movement etc)
- Heavy vehicular traffic along the Hasimara-Phuntsoling road.
- Broad Gauze Rail line running just adjacent to corridor
- Large number of settlements in the area (revenue villages, forest villagers, tea gardens)
- Degraded quality of habitat in BTR side. (Hamiltonganj range)
- Heavy vehicular traffic along the Hasimara-Phuntsoling road.

CHAPTER 3: LAND USE PATTERNS AND CONSERVATION-MANAGEMENT ISSUES

3.1 Socio-Economic Profile of Villages and Resource Dependency and Human-Wildlife Mutual Impacts.

The socio-economic and cultural factors exert strong influence on the forest. There are 595 villages and 15 towns including three municipalities in Jalpaiguri district. Out of a total population of 38, 72,846 (2011 census), about 84% (32, 53,191) are rural. Migration from adjoining Bangladesh and Nepal has led to steady increase in population. The density of population is 622 per km² as per 2011 census, whereas as per 1981 census, it was 353 per km². About 70% of rural population is engaged in agriculture and allied activities and rest 14% is in non-agricultural activities. A large number of female workers are engaged in the tea gardens and in agricultural activities. The pressure on agricultural land is increasing gradually.

Out of 6, 24,500 Ha of land, 37,409 Ha is under irrigation. Irrigation is mainly done through shallow tube well, ponds, dug wells, etc. Commercial Bank & Development Banks provide loans to the farmers for seeds, fertilizers, pesticides & irrigation. Transport network is not very developed in the district. The district has 24% area under forest, 20% under tea garden, 36% under field crops and 20% under rivers, roads, towns, villages, etc.

3.1.1. People's Economy and Major Employment sources:-

People residing in & around the Tiger reserve are very poor. There is no industry except tea. Agriculture is the main occupation. Majority of families are small and marginal farmers and number of large farmers are very few. Huge labourers force is present. Villagers follow the traditional agricultural practices. Irrigation facilities are poor and majority of the agricultural lands are mono cropped.

The sources of employment that now exists are plantation works, annual felling and thinning coupes, buildings and road construction, cane industry, fishing in rivers, soil conservation and river training works, honey & other NWFP collection, works in tea gardens, etc. The main season of unemployment is winter (December – March). Villagers maintain large no. of cattle, most of which are scrub cattle. No dairy co-operative is present. Cow dung is used mainly as manure in agricultural fields. People largely depend on forests for fuel wood while some fuel also comes from agricultural waste.

Vocations of people living in & around the Tiger reserve are agriculture, animal husbandry and agro-based, forestry-based cottage industries. Number of regularly employed is very little. Except school teaching, there is little scope of getting a job. Few are engaged in banking service. Few people are engaged in cottage industries. Some are engaged in small scale business. In Tea Gardens, labourers get employment from April-November. December to April is the lean period. During this lean period, most of the Tea-Garden labourers cut firewood from forests. Villagers migrate to Bhutan, Meghalaya, Arunachal Pradesh and Assam in search of work.

3.1.2 Human Wildlife Mutual impacts

The landscape of the corridors in west is mostly dominated by Tea gardens. Tea gardens invariably are contiguous with Forests and provide ideal shelter to wildlife during their movement along the corridors. Some fringe village farmers have raised plantations to save themes elvs from depredation problems of elephants. Such planktons especially near Nimati- Chilapata corridor also provide ideal route for wild animal movement. Here farmers in turn can good returns and wildlife is also benefitted.

3.2 Assessments of Inputs of Line Agencies/ Other Departments

The following developmental activities were taken up by the Govt. & Non-Govt. agencies in the Zone of Influence.

- i) <u>Road Construction</u>: Mainly unmetalled roads, sometimes metalled roads are constructed.
- ii) Road improvement: Existing village roads are repaired from time to time for better communication.
- iii) Development of minor irrigation: As the area is situated in Bhabar tracts, no water is available during winter. Perennial water sources are tapped for irrigating agricultural crops through the construction of "Jampoi".
- iv) <u>Construction of culvert & causeway</u>: Small culverts, causeways and wooden bridges are constructed for better communication.
- v) <u>Increasing drinking water facility</u>: For increasing drinking water facility, ring wells, tube wells are dug. Sometimes pipelines are laid for tapping perennial springs in the hills for supply of drinking water.
- vi) Ponds and earthen dams: To encourage fishery and to supply water to domestic cattle during lean period ponds & dams are constructed.
- vii) Construction and repairing of school buildings: To provide education facility to school going children, these activities are going on.
- viii) Rehabilitation of landless: To rehabilitate landless and refugees and to provide house to the poor, construction of huts are taken up by the civil administration under "Indira Abash Yojona". They are rehabilitated on the vested lands.
- ix) <u>Self employment Scheme</u>: Various self employment schemes are being implemented by the Govt. in the fringes of the Reserve, e.g. TRYSEM, Prime Minister's Rojgar Yojona, etc.

Under IRDP, ITDP programme, loans are provided from banks to the poor villagers for agricultural purpose, dairy development, poultry, piggery, carpentry, establishing SSI unit, etc. Objective of this programme is to make rural people self-sufficient. Under dairy development scheme, the villagers who own improved/high yielding cattle, stall feed the cattle.

- welfare scheme: DWCRA (Development of Women & Child in Rural Areas), ICDS, etc. are working for the well being of child & mother in the rural areas. Family planning is also included in this scheme. *Mahila samities* (female associations) are formed in villages.
- **xi)** Social Forestry Scheme: Under this scheme, afforestation works have been taken up by the *Panchayat* (village council) for planting up of roadsides, canal banks, riverbanks, community lands, etc. This is to meet up the future fodder & fuel wood demand of the fringe villages.
- xii) Soil conservation & riverbank protection: Under this scheme, river bank protection, DRM with net (Dry Rubble Missionary), etc are taken up by Govt-departments (mainly Irrigation and Waterways Deptt.). All the above activities are in the well being of Reserve, people and the zone of influence.
- **xiii)** Forest Department: Forest department has taken up afforestation works in forest areas through the timber, fuel wood & fodder plantations. Fodder plantations are taken up in forest areas for supply of fodder to herbivores.
- **xiv)** NGO activities: There are a limited number of NGOs & Eco-club in the vicinity of B.T.R. There are *Paschimbanga Vigyan Mancha*, Alipurduar Welfare Organization, Rovers & Mountaineers, *Basundhara*, etc. They conduct study tours, hold seminars, organize awareness campaigns, hold nature camps, etc. for increasing education & awareness among people.

PART B: THE PROPOSED MANAGEMENT

CHAPTER 4: VISIONS, GOALS, OBJECTIVES AND PROBLEMS

4.1 Vision:

Well defined corridors established ensuring maintenance of the dynamics of metapopulation of tiger, co-predators and prey in BTR

4.2 Management Goals:

- Mainstreaming of wildlife concerns through an integrated landscape approach.
- Creating situation conducive to have a dynamic population of tiger, co-predators & prey.
- Integrating the habitat isolates and correlating/upgrading the sink populations with source population of mainland core.
- > To establish secured corridor connectivity by acquiring private lands wherever possible
- Ensuring better management in sync with the concept of Joint Forestry Management.
- Improving condition of fringe area people to remove hostility towards wild animals like tiger, co-predators, their prey as well as elephants.
- Promoting farmers to go far plantation crops so that corridor connectivity and shelter can be ensured for wild animals

4.3 Management Objectives:

- To provide suitable passage to the spill over population of tiger, co-predators and prey and to link the meta-populations with the core, source population at BTR
- To create proper sustainable passage for the tiger, co-predators and prey population by way of creating plantation of indigenous and local trees, grasses, fodder and fruit species.
- To give away benefits of Joint Forestry Management through fuel wood, fodder, small timber, NTFP collection, ecotourism.
- To reduce the dependence of the fringe area people of forest by taking initiatives under J.F.M. concept to:
 - regulate use of firewood
 - minimize grazing by initiating stall feeding option
 - reduce the number of scrub cattle
 - grow cash/commercial crop in agricultural land, instead of foodgrain cultivation to reduce man-animal conflict.
- To take proper eco-development initiatives in consultation and in coordination with other line departments to improve the economic condition of the fringe area population through FPC/JFMCS & SHGs by-

• Giving training in handicrafts, bamboo weaving, local handlooms, apiculture, sericulture/tassar cultivation, soft toy/bag making, repairing of electronic & electrical goods, cycle/motorcycle repairing etc.

- Providing veterinary care in the form of A.I., Vaccination for improvement of the quality of the cattle.
- Tying up with user agencies for collection and marketing of NTFP, creation of medicinal plant gardens and plantations.
- Raising intercrop in forestry plantations.
- Arranging and managing eco-tourism activities as an alternative income generation resource, resource besides raising funds for management.
- To provide proper protection to the corridors from illegal felling, poaching of wild animals, uncontrolled grazing of cattle, and collection of fuel wood by involving FPC/JFMCS/SHG members with the departmental staff through regular patrolling.

4.4 Problems in Achieving Objectives:

- High population density in the area (the state of West Bengal has the highest population density among all states in the country).
- Large number of tea gardens having innumerable labourers with hardly any work/lot of free time (to indulge in unlawful activities adversely affecting BTR)
- Small or no land holding of the fringe population with increasing dependence on natural resources.
- ➤ Huge problem of unemployment idle youth (who indulge in unlawful activities adversely affecting BTR)
- > Traditional dependence on forests and other natural resources by the locals
- Lack of sufficient/adequate man power of Forest Department at all levels
- Lack of proper orientation/capacity building of Forest Departmental staff.
- Permanent disturbing barriers like Roads and rail lines

4.5 Strengths – Weaknesses – Opportunities – Threats (Limitations) (SWOT) Analysis:

Strengths:-

- i. Presence of well established historic corridors
- ii. Presence of good, productive, resilient forest cover.
- iii. Well distributed population of predators other than tiger and prey and elephants in the buffer region.
- iv. Well demarcated Administrative network.
- v. Presence of network of FPCs with good relation with administration
- vi. Potential area for wildlife and aesthetics

Weaknesses:-

i. Overpopulated fringe area.

- ii. Over dependence on forestry resources by local people, mainly due to overall backwardness of the area
- iii. Easy access for cattle grazing and fuel wood, timber collection.
- iv. Lack of young, energetic workforce.
- v. Lack of co-ordination among line departments.
- vi. Lack of coordination among the states
- vii. Absence o proper ecotourism initiatives.
- viii. Huge man animal conflict in the zone
- ix. Presence of migrant population settlements

Opportunities:-

- i. Availability of good habitat to achieve the goal of management.
- ii. Willingness of people to accept changes for betterment.
- iii. Undisputed presence and control of Forest Department all over the area.
- iv. Good coordination with FPC/JFMCS/SHGs
- v. Renewed coordination with line departments
- vi. Vast scope of ecotourism.
- vii. Protocols for interstate coordination
- viii. Coordinated and continuous research

Limitations/ Threats:-

- i. Severe unemployment among locals
- ii. Backwardness of local area due to poor development of infrastructure etc.
- iii. Traditional dependence on forests and other natural resources.
- iv. Occasional poaching of small animals for local consumption.
- v. Absence of young, energetic, trained workforce and vacancies at all levels to sustain all round developmental activities.
- vi. xxiii. Lack of proper coordinated utilization of development funds by line departments.
- vii. Private tea estates in the corridor
- viii. Busy road network
- ix. Severe grazing pressure/heavy settlements
- x. Overdependent of fringe population on forest resources viz. fuelwood, timber & NTFP

CHAPTER 5: MANAGEMENT STRATEGIES

5.1 Delineation of Corridors and Other Habitat Used By Tigers and Co-Predators

Conservation of Tiger will not only require the management of core and the buffer areas but it will also be the necessary to maintain connectivity to other core areas for ensuring gene flow as an ecological requirement for long term survival of the species. Therefore, it will be necessary to identify these areas of connectivity /corridors between two source populations.

In fact management of these critical areas will be as important as the core areas. In most of the cases such areas will be under traditional forestry practices and other land uses. These areas will also the under tremendous pressures due to habitations and human activities. Therefore in such areas the existing management practices will have to be modified so as to upgrade and maintain the ecological status of the connectivity/corridors. Obviously the agenda of co-existence will have to be implemented for such areas with a focus on the wildlife habitat parameters and the livelihoods/developmental needs of the local communities. Role of the local communities, line agencies and other stakeholders will be extremely important for the management of such areas.

5.1.1. Buxa-Titi (via Torsa, Beech and Bharnabari Tea estate) Corridor:-

This corridor connects Rangamati Reserve Forest area of Buxa Tiger Reserve with Titi Reserve Forest. There is a stream (Gabarjithi *jhora*) that passes between Dalsingpara tea garden and Torsa tea garden and crosses the Hasimara-Phuntsoling road finally meeting the Torsa River. Elephant uses this stream to move between Buxa Tiger Reserve and Titi Reserve Forest.

It also connects Bharnabari Reserve Forest of Buxa Tiger Reserve and Titi Reserve Forest situated south of Dalsingpara tea estate by passing through Bharnabari Tea Estate and Beech tea estate. Solitary elephants and small herds generally use the corridor during night as there is heavy traffic along the Hasimara-Phuntsoling road that passes through the corridor with Beech tea garden to its west and Bharnabari Tea Estate to its east

Forest Division: Buxa Tiger Reserve and Cooch Behar

Geographical coordinates: 26°46′ - 26°48′ N and 89°19′ – 89°23′ E

Length: 10- 12 km **Width:** 1.5 km

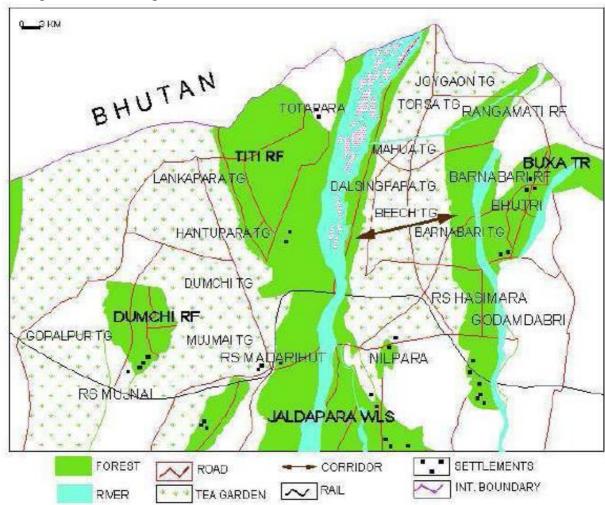
Forest type/ Vegetation: Tropical semi evergreen and riparian forest

Nearest PA: Buxa Tiger Reserve and Jaldapara Wildlife Sanctuary

Legal status of the corridor: Reserve forest and land leased to tea gardens.

Major land-use: Tea garden, forest and settlements

Major habitation/settlements in corridor: Torsa and Mahua Tea garden labour colonies, Gopal *basti* (350 houses), Labor lines of Beech tea garden and Titi forest village **Corridor dependent villages:** Few settlements along the river, Mahua labour lines and Gopal *basti* (350 houses), Labor lines of Beech tea garden and Titi forest village and Bailelguri revenue village



Human artifacts' on the corridor: Road (Hasimara-Phuntsoling) **Threats to the corridor**

- 1. Tea gardens and human activities during the day
- 2. Heavy traffic along the Hasimara-Phuntsoling road
- 3. Expansion of Gopal *basti* and Titi forest village and the resultant biotic pressure.
- 4. Stone crushing unit on stream bank near the bridge on the Hasimara-Phuntsoling road

Conservation plan:

- 1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
- 2. Regulation of traffic at night on the Hasimara-Phuntsoling road
- 3. Prevent change in the land-use pattern in and around the corridor area

- 4. Prevent the expansion of Gopal *basti* village towards the Gabirijithi jhora and seek alternatives
 - 5. Stopping the stone crushing unit on jhora (river) bed

5.1.2. Nimati-Chilapata (Buxa-Chilapata) Corridor:

This corridor facilitates elephant movement between Nimati Range of Buxa Tiger Reserve and Chilapata Reserve Forest of Cooch Behar Forest Division thereby maintaining elephant movement between Buxa Tiger Reserve and Jaldapara Wildlife Sanctuary

Forest Division: Buxa Tiger Reserve (West) and Cooch Behar

Geographical coordinates: 26°35′–26°36′N and 89°23′–89°24′E

Length: 6 km Width: 1-1.5 km

Forest type/ Vegetation: Tropical moist deciduous forest and tea garden

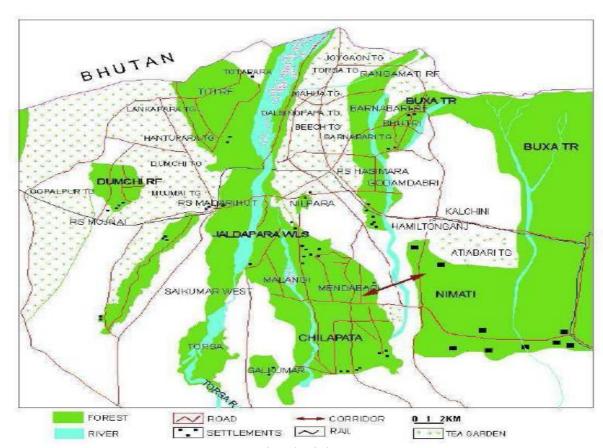
Nearest PA: Buxa Tiger Reserve and Jaldapara Wildlife Sanctuary

Legal status of the corridor: Reserve Forest, revenue land and forest land leased to tea gardens

Major land-use: Forest, agriculture and Tea garden

Major habitation/settlements in corridor: South Mendabari, Bangabasti Forest village, Mendabari Beat office

Corridor dependent villages: South Mendabari, Bangabasti Forest village and Nimati



Human artifacts' on the corridor: National Highway-31

Threats to the corridor:

- 1. Heavy traffic on National Highway-31
- 2. Biotic pressure from adjacent villages, Bongobasti and tea gardens

Conservation plan:

- 1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state
- 2. Prevent change of land-use patterns in the tea gardens
- 3. Regulate vehicular traffic at night
- 4. Relocation of habitations with proper compensation package and linking the area with Jaldapara national park for free movement of Tiger, Elephant, bison and Rhino as Jaldapara is reaching saturation point in terms of carrying capacity

5.1.3. Buxa-Ripu at Sankosh (Sankosh) Corridor:

This corridor is a contiguous forest that connects Buxa Tiger Reserve of West Bengal with the Ripu Reserve Forest of Kochugaon Forest Division, Assam. The Sankosh River passes through Buxa Tiger Reserve and Kochugaon.

Geographical coordinates: 26°41′ N and 89°52′ E

Length: 2.5 km Width: 1–1.5 km

Forest type/ Vegetation: Tropical semi-evergreen, and tropical deciduous forest.

Nearest PA: Buxa Tiger Reserve

Legal status of the corridor: Reserve Forest and revenue land

Major land-use: Forest and settlement

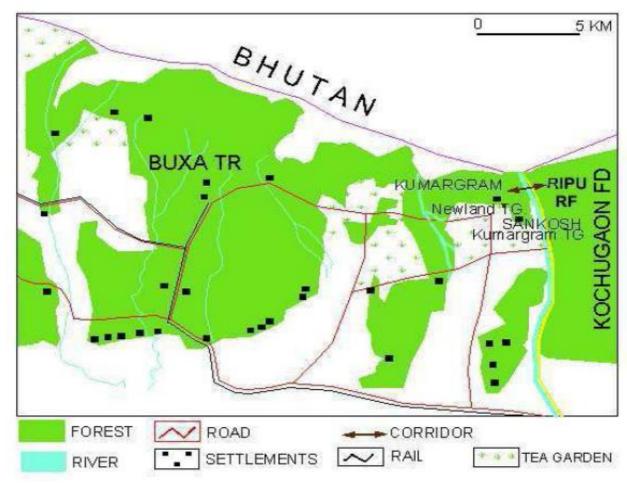
Major habitation/settlements in corridor: Kumargram (70-72 families) and Sankosh

(98 families) forest village

Corridor dependent villages: Kumargram (70–72 families) and Sankosh (98 families)

forest village

Human artifacts' on the corridor: Nil



Threats to the corridor:

- 1. The biotic pressure from Sankosh and Kumargram villages
- 2. Degradation of forest in and around the villages

Conservation plan:

1. Declaration, demarcation and legal protection of the corridor under various laws appropriate for the state

2. Habitat improvement in Ripu Reserve Forest of Assam

5.2 Prioritization of linkages

Considering the importance of Tiger Conservation in the given landscape and its low density proportion, the Nimati Chilapata corridor and Sankosh Riphu corridors should be considered as priority corridors. As Nimati Chilapata corridor provides important linkage for Tiger to visit Jaldapara from Buxa Tiger reserve and Jaldapara being National park with abudnud prey will act as ideal habitat for tiger breeding. Similarly the Riphu Sankosh Corridor is crucial in providing linkage with Manas Tiger Reserve as aerial distance is just 100km from Buxa Tiger Reserve and for large carnivore like Tiger, it provides important linkage and will help in exchange of gene flow between population and also will act as satellite area for spill over populations.

5.3 Development of integrated Land use Approach for the Area commensurate with Tiger Conservation and Co-existence agenda (Formulation and Coordination).

Since no scientific data is available it is proposed to undertake study and then land use approach may be adopted.

5.4 Wildlife management in territorial forest areas

A) Titi (via Torsa, Beech and Bharnabari Tea estate) Corridor:

In 4402 ha of Titi forest block and 303.52ha of Titi extension no forestry operation will be taken up for restoring the natural habitat situation for the undisturbed movement through the corridor. No green felling is permitted in this area. Only wind fallen, dead, dying and diseased trees shall be removed.

- **B)** Nimati-Chilapata (Buxa-Chilapata) Corridor: 4513.03 ha of Chilapata (including Bania, Chilapata and Mendabari) forest are managed as Biodiversity Conservation. The working plan prescribes no specific prescription. No green felling is permitted in this area. Only wind fallen, dead, dying and diseased trees shall be removed.
- 1123.74 Ha of forests in Bania and Mendabari beats are managed under sal zone. In this the working plan prescribes harvesting of mature sal plantations followed by artificial regeneration. Intercropping should be done departmentally for at least two years. No teak is to be planted in these areas.
- 131.48ha of forest in Chilapata beat is managed under Riveraine plantations. No harvesting is prescribed in plantations of this area as stress will be on conservation of riveraine areas. However, selective removal of dead, dying and diseased trees and trees uprooted by water flow in areas badly damaged by flash floods or debris deposited or for any other reason, may be extracted.

5.5 Zone Plan Management Strategies (Protection, Habitat Management and Habitat Restoration, Supplementing Declining Local Populations and Facilitating their Decolonization)

For the present plan entire zone be considered as protection zone. A study is proposed to formulate the zone plan based on scientific data.

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

Proposal: "The Tiger Reserve will have an Adjoining Corridor Area Management Committee that includes all officers of Deputy Conservator of Forests Rank that manage either a territorial division or a wildlife division within the Tiger Reserve and adjoining areas, all managers of private lands (Govt./semi-govt./companies/individuals) which tigers use either seasonally or the whole year around, one elected representative/their nominee from local bodies (e.g. Panchayat/Municipalities etc.), local political leader (MLA/MP-could be tricky of course) as opinion maker, police chief or his representative, representative of a regional/national wildlife scientific institution/wildlife biologist with a history of conducting research in that area (preferably on Tigers), heads of departments of zoology, botany/life sciences of nearest relevant University and members of two NGOs/individuals with significant conservation work in and around the Tiger Reserve. Other individuals/NGOs/Researchers, with certain skills, that may be required, can be invited as observers to the management committee meetings from time to time. The Reserve Director will be the member secretary of this committee. This committee will ideally meet once every month otherwise at least once every three months. The proceedings of the meetings should be placed in the public domain (through project tiger website) within a month of such meetings. The Chief Wildlife Warden of the state shall be the chair of such Committee."

6.2 Formation of Joint Forest Management Committee and supporting institutional framework

Discussed in detail in Buffer part of TCP

6.2.1 Joint Forest Management Committee and Self Help Groups (SHGs)

At the level of people's participation there exists either a Joint Forest Management Committee (JFMCs) each carrying out participatory management in a village (sometimes in two or three) either directly or indirectly through SHGs. Several conservation programmes are managed by JFMCs or SHGs induced by such committees. The executive body of both JFMCs is constituted by members elected by general members in an annual general meeting. In the co-management model, JFMCs are entrusted with carrying out the government's conservation programme. There is a government order (vide resolution no. 5062-For/D/IS-16/88) dated27th July, 1990), dealing with meeting protocol for forest protection committees which was revised vide Resolution No 5969-For dated 3.10.2008

• The JFMCs shall hold a general body meeting once every year where activities of the Committee as well as details of distribution of usufructary benefits are to be discussed, besides electing representatives of the beneficiaries to the Executive Committee.

• The JFMCs shall maintain a minutes book where in proceedings of the meetings of the Executive Committee held from time to time as well as the proceedings of the Annual General Meeting of the JFMCs will be recorded under the signature of the President of the Committee and such minutes duly attested shall be sent to the concerned Range Officer for record.

The SHGs are groups that come together under the Central government's selfemployment generation programme, which encourage the development of microentrepreneurship among low-income groups.

6.3 Livelihood Support Initiatives through Village Micro-plans supported by Tiger Conservation Foundation and Other Line Agencies:

JFMCs with the help of BTR shall prepare micro plans highlighting the problems and suggested solutions. Such micro plans shall be the guiding principles for executing community development programmes in each JFMCs

Once the village micro plan is ready, JFMCs would have to be conducted in order to;

- * Revisit the solutions of identified problems
- ❖ Prioritize the solutions: since resources will be limited the GS will have to prioritize the solutions using an acceptable criterion. This criterion can be working first with the households that have unsustainable dependence on natural resources of the area.
- ❖ Identify solution and strategies: On the basis of the PRA baseline data, the problems prioritized, the solutions and strategies will have to be listed
- ❖ Identification of resource base: the various sources of financial and human resources required to implement the plan will have to be listed against the resources available. The different ways to mobilize additional resources using the convergence route will also have to be debated and worked out.

The final village level micro-plan to be presented in the JFMCs for ratification. Such micro plans shall act as APOs for Buxa Tiger Conservation Foundation trust through which the micro plans shall be executed by JFMCs in their respective areas

6.4 Monitoring and Evaluation: The agency anchoring the process at the village level will have to set a time frame for periodic meetings with the JFMCs. In these meetings:

- The goal and objective of the micro-plan will be revisited
- The people present will run through the micro plan to see what took place as planned and what evolved during the implementation cycle
- Review what needs to be done less/more/ differently

The anchoring agency publicly acknowledges the contributions of the community and others. The agency also uses the media to publicize good practices

Monitoring and evaluation is an extremely important component for the successful implementation of the Eco-development programme. This will highlight the strengths & weakness of the system and suggest midterm corrective measures.

The following records have to be maintained for monitoring & evaluation.

- 1) Resolution of formation of JFMCs
- 2) Minutes of meetings in FPC/JFMCSs
- 3) Village register
- 4) Bimonthly account of JFMCs with Assets /Activity Register.
- 5) Annual audit register
- _6) Monitoring & evaluation remarks.

In addition to the self review of JFMCs the functioning of village Eco-development will be reviewed by the TR management (Chief Wildlife Warden, Field Director & Dy. Field Directors), the funding agency and an independent agency selected by them. Tiger Reserve management will carry out suitable monitoring & evaluation from time to time Indicators of Success:-

The following indicators are identified for monitoring the success of the scheme:

- 1 Reduction in Man animal Conflict
- 2 Restoration of corridor connectivity
- 3 Positive impact of the practices by JFMCs on wildlife Health and population
- 4 People becoming more aware of conservation needs
- 5 Increased cooperation among stake holder groups towards conservation.

Means of Verification: - The following means of verification is proposed:-

- 1) Sample survey of PA and the villages at an interval of 6 months with the involvement of JFMCS/FPCs, NGO and PA staff.
- 2) Interview with the villagers and field staff at a suitable interval.
- 3) Study of village register and forest records.
- 4) Offence register in Range office.

Other indicators, sampling tools, sampling intervals and assessment criteria for project activities relating to different P.A. values, disturbances, socio economies values etc. can be suitably chosen

CHAPTER 7: TIGER POPULATION AND HABITAT ASSESSMENT

Tiger is a territorial animal, which advertises its presence in an area and maintains a territory. It is a well known fact that partial overlaps of resident male territories in an area do occur. However, the degree of overlap increases lethal internecine combats. 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, periodically replacing old males by young adults from nearby forest areas

The ongoing studies 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 800-1000 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. Therefore, buffer areas with forest connectivity are imperative for tiger dynamics, since such areas foster sub adults, young adults, transients and old members of the population. The young adults periodically replace the resident ageing males and females from the source population area.

7.1 Day to Day Monitoring Protocol -

Procedure as described in Core is applicable to corridor areas also.

7.2 Tiger Population Estimation Framework (Phase I and II)

Procedure as described in Core is applicable to corridor areas also

7.3 Special study across the corridors needs to be undertaken to ascertain the Tiger presence and subsequent protection of the Corridors. Since the data related to use of these corridors is very minimal to arrive at any conclusions a study of presence and usage of corridors is proposed in addition to exchange of any genes between tigers of Buxa Tiger Reserve and Manas Tiger Reserve.

CHAPTER 8: ORGANIZATION, ADMINISTRATION AND BUDGET

8.1 Coordination Committee for effective implementation and management and Linkages with Tiger Steering Committee and Buxa Tiger Conservation Foundation.

Coordination Committee:

The Coordination Committee under the chairmanship of Field Director is proposed which will have to carry out the management of the Adjoining Area in association with Tiger Steering Committee and Buxa Tiger Conservation Foundation

The Coordination committee shall comprise executive committee of BTCFT, DFO of Jaldapara National Park, DFO of territorial division of Kachugaon, Assam, Bhutan Forest authorities. Field Director of Manas may also be part of the committee. APCCF, North Bengal may supervise the Functioning of coordination committee.

- 1. Implementation of forestry activities after mainstreaming wildlife concerns.
- 2. Implementation of eco-developmental activities for reducing resource dependency of local people on surrounding forests.
- 3. Coordination with governmental / non governmental production sectors in the landscape for mainstreaming conservation.
- 4. Habitat management and improvement activities will be carried out in the existing habitat of tiger and its prey species through active involvement of local communities. The existing Silviculture operations will be accordingly modified to promote conservation of the area and the management will be based on specific forest lands forming part of village level micro plans. Community will be involved in the overall management of the buffer area.
- 5. Site specific eco-development initiatives based on participatory village level micro plans will be carried out for the local communities for strengthening their livelihoods through a balanced approach of rationalization of resource use, biomass regeneration and alternatives, so that the ecological status of the area could be improved and maintained
- 6. Reciprocal commitments by the local people through specific measurable actions as per MoU for improving protection and conservation of the area will be implemented. This may include rationalization of resource use from the forest, participation in fire protection and anti-poaching efforts.
- 7. Ecotourism activities in the Buffer Area will be used as an important component of eco development for strengthening the livelihood of the local people and the protection of the area.
- 8. Capacity building of the field staff as well as eco-development committee member will be undertaken on a regular basis through the Buxa Tiger Conservation Foundation. Similarly intensive nature conservation awareness programme should be part of the

buffer area management plan with a focus on different stakeholders' particularly local communities.

8.2 JFMC Coordination.

Co-ordination with JFMCs is needed mainly for Eco-development and in doing so, Coordination with Revenue, Rural development, Agriculture, health, Veterinary, Horticulture, Zilla Parishad, Women and child development, PHED, Education, Tribal welfare, Tea garden authorities etc are also of utmost importance. 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 could be adopted:-

- Regular meetings with JFMC members
- Co-ordinating with District Collector and CEO, Zilla Parishad (ZP) for organizing special meetings with JFMCs as per requirement
- Knowing various schemes of line departments and identifying schemes suitable for the Reserve area and passing on to JFMCs.

8.3 Staff Deployment, Protection Strategy and Linkages with Tiger Cell and Buffer Zone Striking Force.

8.3.1 Staff Deployment

The Reserve is administered by the Field Director in the rank of Conservator of Forests. The Reserve is divided into 2 Divisions viz., BTR (East) & BTR (West) Divisions.

8.3.2 Protection strategy:-

Protection is discussed in detail in security plan.

8.3.3 Linkages with Tiger Cell and Buffer Zone Striking Force:-

No provision of Tiger Cell and Striking force for BTR during the present plan.

PART – FOUR

ECO TOURISM PLAN OF BUXA TIGER RESERVE

Since Ecotourism is common for both Core and Buffer therefore it is taken as separate part of Tiger Conservation Plan incorporating both core and buffer areas.

1.1 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, Hon'ble Supreme court has given directions in this regard and accordingly NTCA has laid down frame work guidelines on the selection planning, development, implementation and monitoring of ecotourism in Tiger Reserves and whereas Buxa Tiger Reserve comprises of 37 forest village and large number of villages on the periphery having dependent on forests for the livelihood, whereas proper ecotourism plan in consonance with the guidelines will help in generating awareness, education among visitors besides aiding in nature compatible local livelihood and greater income for large number of people living within or outside the Tiger Reserve, which will aid in better conservation of wildlife and forests and also make them stake holders in such conservation process ultimately leading communities towards save forests and save tiger phenomenon.

1.2 PRINCIPLES OF TOURISM IN AND AROUND TIGER RESERVES.

The following principles would be adopted:

- (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 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; but within the ambit of NTCA guidelines
- (c) Develop mechanisms to generate revenues from ecotourism for the welfare and economic up-liftment of local communities;
- (d) To highlight the biodiversity richness, their values and their ecological services to people through signages, publicity materials etc
 - (f) Highlight the heritage value of India's wilderness and tiger Reserves;
 - (g) Build environmental, cultural awareness and respect;
 - (h) Facilitate the sustainability of ecotourism 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.

1.3 Objectives

- 1. To move form wildlife tourism to ecotourism which is well defined as responsible travel to natural areas that conservers the environment and improves the well being of local people and is community driven
- 2. To have planned and regulated ecotourism so that such activity is responsible and compatible with fragile ecosystems and contributes to biodiversity conservation.
- 3. To generate awareness and educate visitors about conservation, its values and importance
- 4. To promote non consumptive use of forests for the benefit of local communities living in and around the ecosystem.
- 5. To ensure free participation of local communities in conservation and enhancing their stake in conservation efforts
- 6. To develop mechanism to generate revenues from ecotourism for the habitat improvement, mitigation of man animal conflicts and economic upliftment of local communities. The income earned from entry fee of visitors and vehicle shall be deposited to foundation Trust of Tiger Reserve and shall exclusively be used for the purpose of park. 50 % of the income generated from entry fee may be reserved as Park welfare fund and shall exclusively used for the welfare of the Tiger Reserve
- 7. Highlight heritage values and biodiversity richness of Tiger Reserve
- 8. To promote and provide livelihood opportunities to local people and reduce their dependence on fragile ecosystems.

1.4 Guiding principles for eco friendly tourism activities

- To abide by the planning restrictions, codes and standards prescribed by the authorities
- Implementation of desired environmental principles through regulation
- Conducting environmental audits on regular basis for eco-tourism projects
- Being sensitive to the conservation of endangered species and corridor value of the
- 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 and convenience of tourists
- To use local material and design as far as possible,

- The planning, architectural design and construction of tourist facilities should use ecofriendly techniques viz., solar energy, recycling of garbage, harvesting of rain water, natural cross-ventilation instead of AC, self-sufficiency in food through kitchen garden and farming
- Energy and water saving devices should be used apart from controlled sewage disposal
- Control of noise pollution, chemical pollution and air emissions
- Use of signages/ boards as per the standard prescriptions in the code
- Prohibiting use of environmentally 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 and local culture
- Ensuring proper marketing of eco-tourism products of local communities
- Ensuring training of staff on environmental issues
- Ensuring safety and security of visitors
- Respecting local inhabitants, culture and involving them in various activities and vocations as far as possible
- No new tourist farcicalities or infrastructure shall be set up within the core or critical tiger Habitat of tiger Reserves
- State level steering committee shall review the implementation of state level tourism and ecotourism strategy in Tiger Reserves
- Gate receipts form visitors shall be deposited to Buxa Tiger conservation foundation trust and shall be exclusively used for management of specific conservation purposes, local livelihood development and tackling human wild animal conflict and welfare measures of field staff
- State Govt to charge conservation fee from Tourism facilities/infrastructure operating within and around Tiger Reserve for eco development and local community development works. Conservation fee to be decided by sate govt based on the occupancy rate over a year (refer NTCA guidelines in this regard. Such fund shall be administered by Buxa Tiger conservation Foundation trust.
- A local advisory committee is constituted for the Tiger Reserve by state Govt which shall oversee tourism strategy, implementation of carrying capacity, advising state government, monitoring tourism facilities and encouraging local employment through ecotourism without causing disturbance to wildlife.

Local advisory committee's shall consist of

- 1. Divisional commissioner
- 2. MLA from Kumar gram, Alipurduar and Kalchini
- 3. District collector
- 4. Field Director as member secretary
- 5. Deputy Field Director East and west

- 6. Honorary wildlife warden
- 7. District tribal welfare officer
- 8. Tourism officer of the area
- 9. Sub divisional officer, Alipurduar
- 10. Two members of local panchayat nominated Zilla Parishad sabhadhipati
- 11. Wildlife scientists nominated by State
- 12. Social scientists nominated by State
- 13. Two local conservationists nominated by State
- 14. Two representatives from local civil society or NGO

Periodic training programmes on eco-tourism for tourism administration, planners, guides, tour operators and general public will be carried out. The curriculum for such trainings would include

- □ Lodge ownership/ management/hospitality
- 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 and disposal
- □ Forging partnerships with tourists and tourism industry
- □ Environmental management

At Rajabhatkhawa training centre a small module course incorporating above mentioned curriculum would be undertaken for guides and those who assist in various eco tourism activities. Such people would be selected from among the Joint Forest Management Committees

1.5 Eco-Tourism in BTR

1. Buxa Tiger Reserve- A Popular Eco Tourism Destination

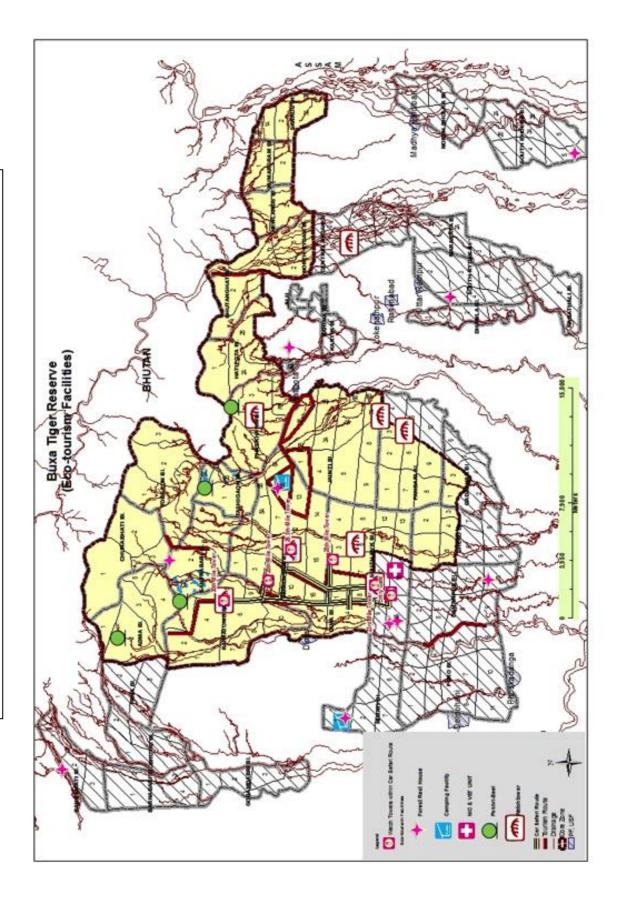
Buxa Tiger Reserve is located in Alipurduar Sub division of Jalpaiguri District. The tiger Reserve is in heart of Eastern Duars. The Reserve presently attracts more than 50,000 tourists in core area alone. The Reserve has huge potential for development of eco-tourism facilities, which will boost local economy and would reduce the dependence on forest. The boundaries of Tiger Reserve abut state of Assam on Eastern side and international boundary of Bhutan on Northern side. The Reserve head quarter is about 180 Kms from Siliguri by road and nearest Airport is at Bagdogra which is about 200 Kms. Alipurduar is well connected by rail and is located on Guwahati- Howrah and Guwahati- Delhi route. The current flow of tourists in the Reserve is about 50,000 per year. This consists of about 15,000 pilgrims rest picnickers, day time visitors and those availing rest house facilities. The Department of Tourism, Government of West Bengal has included Buxa Tiger Reserve

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within the tourist circuit of Dooars and is eager to promote eco tourism in this area. However, commercialization of tourism within the tiger Reserve is not compatible with its main objective of protecting bio-diversity of the area. But restricted tourism in the form of nature education tour and eco-tourism help the people appreciate the need for preserving wilderness values. An enlightened nature tourist is an ally in the cause of bio-diversity conservation. Potential tourism locations in Tourism Zone- Tourists usually visits are mentioned hereunder

- a) <u>Jainty Bazaar</u> The Jainty River and its surrounding hills present a breath taking scenic beauty. The tourists visit Jainty both as day visitor and as halting camp.
- b) <u>Buxa Duar</u> The ruins of Buxa Fort is major tourist attraction. The fort is about 3 Kms from the nearest road head. The trekking to fort passes through hills and is full of scenic beauty.
- c) <u>Rajabhatkhawa</u> The place is popular among tourists. The Nature Interpretation centres, Rescue centre, Vulture Breeding Centre, Forestry Training Centre are major attractions.
- d) <u>Poro South Eco Park</u> The place is very popular centre for picnicking, family gathering, boating and enjoying the natural beauty of Forests. The spot is located on the bank of Poro River.
- e) <u>Trek to Jainty Pokhri</u> This small wetland on high altitude is home to several species of fish and turtles. The trek passes through beautiful forest.
- f) <u>Sikiajhora</u> The place is on bank of a stream. Number birds visited the area every year. The place is already a popular spot for pick nicking.
- g) Narathali Beel- There is a natural wetland. Every year thousand of winter birds visit the area.
- h) <u>Garam Dima Observation Spot</u> The watch tower on the bank of Dima River and vast overlooking Grassland along with a very good view of Buxa Forest, Buxa & Bhutan Hills makes this spot picturesque.

Map 1: Showing Eco-tourism Facilities area in BTR



Nearby Places of Tourist Attraction -

- a) <u>Rajbari of Cooch-Behar</u> The old Palace of Cooch Behar rulers is a beautiful building.
- b) Kholta Eco Park This is small deer park, about 10 Kms from Alipurduar. Toy train and an Eco park add to the attraction.
- c) <u>Baneswar Temple</u>- This old temple is very popular among habitants of Alipurduar and Cooch Behar.
 - d) Jaldapara National park It's about 40 Kms from Damanpur.
 - e) Patlakhawa Wetlands It's about 25 Kms from Alipurduar and is a big attraction during winters due to advent of Himalayan Migratory Birds.
- f) Rasik Beel wetland and Rescue centre-it's about 25km from Alipurduar and is favourite destination for bird lovers and nature lovers.

In addition to existing tourist sites it is proposed to develop some sites with tourist amenities and develop them as centres of nature education. The details of such sites is mentioned in Table

Table 1.1 Identified Sites and Site specific proposals-

| Sl No. | Identified Sites | Site Specific Project Components |
|--------|-------------------------|--|
| 1. | Rajabhatkhawa | a) Development of accommodation by way of |
| | | renovation of Leo House and Tiger lodge |
| | | b) Development of camping facilities |
| | | c) Construction of Tourist reception centre |
| | | d) Construction of Public convenience |
| | | e) Improvement of Nature Interpretation centre |
| | | f) Development of Nature trails |
| | | g) Tourist amenities like – street lighting, |
| | | canopy walk |
| | | h) Signage's |
| | | i) Development of Parking spaces |
| | | j) Sale centre |
| | | k) Compound wall of Nature Interpretation Centre |
| | | 1) Improvement of Orchid Centre |
| | | m) Construction of Amphitheatre |

| Sl No. | Identified Sites | Site Specific Project Components |
|--------|-------------------------|---|
| 2. | Narathali beel | a) Construction of Observation Towers |
| | | b) Cleaning and development of lake |
| | | c) Land scaping of banks |
| | | d) Construction of Dormitory in Beat Office Complex |
| | | e) Signages |
| | | f) Nature trails |
| | | g) Improvement of approach road |
| 3. | Poro Eco spots | a) Construction of Observation towers |
| | | b) Development of bating facilities |
| | | c) development of river rafting facilities |
| | | d) Development of Approach road |
| | | e) street lighting |
| | | f) public conveniences |
| | | g) Bamboo bridges and resting places |
| | | h) Camping sites |
| | | i) Development of Parking spaces |
| | | j) Renovation of Cultural shows of Rava and other |
| | | tribal groups. |
| | | k) development of water sports |
| | | l) land scaping |
| 4. | Buxa Duars | a) Archaeological restoration of Buxa Fort |
| | | b) Development of Dormitory and Forest Rest House |
| | | c) Signages |
| | | d)Development of trekking routes- resting shades, |
| | | Signages etc. |
| 5. | Garam Tower | a) Development of Observation tower |
| | | b) Development of Grass land |
| | | c) Improvement of approach road |
| | | d) Development of Public convenience |
| | | e) Development of Parking space |
| | | f) Development of Nature trails |
| 6. | Damanpur | a) Development of Ban-Mayuri for accommodation |

| Sl No. | Identified Sites | Site Specific Project Components | |
|--------|-------------------------|--------------------------------------|--|
| | | b) Development of Camping facilities | |
| | | c) Construction of Compound wall | |
| | | d) Development of sale centre | |
| | | e) Signage/ cultural shows | |

In all the above sites, land belongs to Buxa Tiger Reserve under West Bengal Forest Department and Eco-tourism activities would be promoted jointly with West Bengal Forest Development Corporation actively involving Joint Forest Management Committees with aim of reducing dependence of fringe population on forest resources. Facilities shall be developed in Buffer areas strictly and as per the guide lines of National Tiger Conservation Authority.

Some cottages for tourist/visitors may be built at Rajabhatkawa, Nimati, Jainti, Buxaduar, Silbunglow etc.

1.6 The Strategies:

1.6.1 Set Up of Ecotourism Range

A new "Eco-tourism and Interpretation" Range comprising of following staff is proposed with H.Q. at Rajabhatkawa.

| S/L No. | Category of Staff | No. of Staff |
|---------|--|--------------|
| 1. | Range Officer – Eco-tourism and Interpretation | 1 |
| 2. | DR/Fr | 2 |
| 3. | FG/B.S. | 5 |
| 4. | Orderly/computer assistant | 1 |

This Range will look after NIC, tourist entry and accommodation, conducted and guided tourism, catering, and other things related to tourism. The entry fee generated from visitors shall be deposited to BTCFT account and shall be exclusively used for Habitat management and Tourism infrastructure and its maintenance.

1.6.2 Constitution of Tourism Zone in Core

Buxa Tiger Reserve comprises of 417.55 sqkm and buffer of 343.32 sq km. As per the recent guidelines issued by NTCA tourism zone have been identified comprising maximum area in Buffer and some areas in core area not exceeding 20% in consonance with the guidelines prescribed ay NTCA. In accordance with the guidelines provided by NTCA as to tourism in Core area to cater to the needs of environmental education and livelihood generation for people residing in or adjacent to core and ensuring the free and eco friendly visit by pilgrims to religious sites

located in core, tourism zone has been identified and shall be restricted to Jainti, NRD, Buxaduar, WRVK ranges. The total area of tourism zone in core is 7749.65ha which is around 19.8 % of the total core area. The details of compartments included in Tourism zone is given table 1.2

Table 1.2 Areas under Tourism Zone in core

| Sl. No | Block and Compartment | Area(ha) | Legal status |
|--------|-----------------------|----------|-----------------|
| 2 | Santarabari 3 | 423.71 | WLS |
| 4 | Santarabari 2a | 644.27 | NP |
| 5 | Santarabari 2b | 125.05 | WLS |
| 7 | Phashkawa 1 (Part) | 367.34 | NP |
| 8 | Tashigaon 1 (Part) | 509.56 | WLS |
| 11 | Jainti 1 | 250.29 | NP |
| 12 | Jainti 2a | 222.35 | NP |
| 13 | Jainti 2b | 322.79 | NP |
| 14 | Jainti 3a | 268.11 | NP |
| 15 | Jainti 4 | 386.79 | NP |
| 16 | NRVK 14 | 368.96 | NP |
| 17 | NRVK 12 | 278.64 | NP |
| 18 | NRVK 13 | 218.7 | NP |
| 19 | NRVK6a | 315.52 | NP |
| 20 | NRVK 6b | 40.46 | NP |
| 21 | NRVK 7 | 359.24 | NP |
| 22 | NRVK 5a | 424.85 | NP |
| 23 | NRVK 10 | 326.59 | RF |
| 24 | NRVK 16 | 242.42 | RF |
| 25 | NRVK 8 | 193.85 | RF |
| 26 | NRVK 11 | 382.44 | RF |
| 27 | SRVK 1 | 197.90 | RF |
| 28 | SRVK 2 | 333.07 | RF |
| 29 | SRVK 8 | 176.45 | RF |
| 30 | NRVK 9 | 370.3 | RF |
| | Total | 7749.65 | |

1.6.3 Management of Tourism in Core Zone.

The areas shall be closed for tourism from Jun 15th to Sep 15th for better monsoon patrolling and to provide breeding time for wildlife.

Potential tourism locations in Tourism Zone- Tourists usually visits-

- i) <u>Trek to Jainti Pokhri</u> This small wetland on high altitude is home to several species of fish and turtles. The trek passes through beautiful forest.
- j) <u>Trek to Mahakal Temple</u>- Mahakal temple is located in Bhutan which is visited by thousands of pilgrims especially during MahaShivaratri. Though it is located in Bhutan the approach passes through Core of BTR.
 - I. Jainti (150 ha of NRVK-6, NRVK 5b comptt), Buxaduar (150 ha of TBG-4 comptt) will be developed as satellite tourist spot.
 - II. Tourists will be permitted to go for a drive along Rajabhatkhawa Santarabari road (20 Km) with approved guide as per the following time table:

```
In winter - 6.00 A.M. to 11.00 A.M., 3.00 P.M. to 5.00 P.M. to summer - 6.00 A.M. to 11.00 A.M., 4.00 P.M. to 6.30 P.M.
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- III. Routes from Santarabari to Buxaduar (5 Km), Jainti to Pokhri Pahar (3 Km), will be developed as trekking routes for the trekkers.
- IV. Nature Education trip-Tourists may also be taken for nature education trip from the following routes.

1.6.4 Identified Safari routes in Core Tourism Zone

Table-1. 3: Identified Safari routes in Core Tourism Zone

| Route | Details of route | Distance- |
|---------|--|-----------|
| Route 1 | 23 mile temple- 25 th mile tower, 26.5 tower, 28 th tower, | 30 km |
| | Dima, 30 th Mile Tower, Shiakri road, Rajabhatkhawa | |
| Route 3 | Jainti-Sangai, NRVK 13, Bala, Jainti River-B basty, | 30 km |
| | Chunia Tower | |
| Route 4 | Jainto-Tashigaon tower, Pokhri, Mahakal | 9 km |

The proposed nature education trip should be strictly restricted to 20 % of core area and should accomplice with tourism guidelines of NTCA. Number of vehicles and persons permitted should be calculated on the basis of formula provided in tourism guidelines of NTCA. Filed Director may enforce any other restrictions as deemed fit necessary to regulate tourism considering the disturbance factors to wildlife.

There are two areas of pilgrimage within Buxa Tiger Reserve, one Pukhri Hills near Jainti and the other one "Mahakal Dham", the approach of which is through tiger Reserve area, though the actual shrine is in Bhutan, across the international boundary. People visit Mahakal Dham during Maha Shivaratri and the area is accessible only during December to March/April. Pukhri hills are believed to be a Buddhist shrine, where people visit during Buddha Purnima and also round the year.

It is proposed that pilgrims should be allowed under strict supervision of the local authorities and with restrictions and regulations to be prescribed by the Field Director depending upon the local situation.

1.6.5 Constitution of Tourism zone in Buffer

Table 1.4: Areas under Tourism Zone in Buffer

| | | | Legal |
|-------|-----------------------|----------|--------|
| Sl No | Block and Compartment | Area(ha) | status |
| 18 | SRVK 10 | 417.65 | RF |
| 19 | SRVK 15 | 379.61 | RF |
| 20 | SRVK 9 | 556.06 | RF |
| 21 | SRVK 16 | 599.36 | RF |
| 24 | Poro 2 | 178.47 | RF |
| 25 | Poro3 | 333.46 | RF |
| 26 | poro 4 | 283.68 | RF |
| 27 | poro 8 | 430.58 | RF |
| 28 | poro 7 | 335.49 | RF |
| 29 | poro10 | 383.24 | RF |
| 30 | poro 9 | 313.63 | RF |
| 31 | DPO 6 | 372.31 | RF |
| 32 | DPO 9 | 186.96 | RF |
| 35 | South Bholka 5 | 338.72 | RF |
| 36 | Narathali 2 | 720.34 | NP |
| | Total | 5,829.56 | |

1.6.6 Identified Safari routes in Buffer Tourism Zone

| Route | Details of route | Distance- |
|---------|--|-----------|
| Route 1 | Damanpur_Garam- Poro eco spot_ Garam watch Tower | 25km |

The recently developed eco parks at Poro South and Poro North are proving to be a very good addition for dispersal of tourist pressure from the core areas of the tiger Reserve. It is proposed that while these two areas should be maintained and more facilities to be provided to the visitors, new such areas, included in the buffer zone of the Reserve may be identified and developed for opening up to the tourists to avoid congregation of tourists at few locations within core and buffer so as to divert tourist pressure to fringe areas and to have local people as stake holder in such activities.

<u>Narathali Beel</u>- This is a natural wetland. Every year thousand of winter birds visit the area. 50 ha of Narathali-2 comptt containing Narathali wetland will be developed as a bird watching point.

MAP-2: ECO-TOURISM ZONE AND ROUTE IN BUXA TIGER Buxa Tiger Reserve (Ecotourism Zone and Route in BTR) BHUTAN Baro & Choto Mahakal Temple 8,000 4,000 CORE AREA OF BTR Eco-tourism Zone Block Boundary
PF, USF - Tourism Route Buffer Zone

1.7 Infrastructure Development:

1 Orientation Centre/Information Desk:

At present there is no information desk at NIC, Rajabhatkhawa. Visitors coming to NIC do not get enough information about the park in the form of brochures, handouts, guide map, etc.

There would be a regular information Desk at NIC manned by an experienced Forester well conversant with various tourist area/ sites in the Reserve. The tourists visiting BTR would be introduced to all relevant details about the park. All the information about the Reserve in the form of brochures, illustrated handouts and guide maps would be available at the Information Desk for supply to the tourists at a suitable price.

2 Nature Education trip

Presently there is no vehicular arrangement for the tourists in B.T.R. The National Tiger Conservation authority has also issued a guideline banning movement of tourists by diesel vehicle inside the forests. The nature education trip is proposed by involving the FPCs/EDCs in procuring petrol run vehicles from Rajabhatkhawa, Jainti and Santarabari, with local guides who will reduce the pollution load considerably as well as open up employment opportunity for the local people. The vehicles may start from Rajabhatkhawa for visitors and visitors can avail this facility for visiting Jainti and Santarabari after paying the requisite charge as fixed by the park authority from time to time. The routes for nature education trip mentioned above would be followed.

Every vehicle going inside the Reserve must be accompanied by one eco-guide.

2 Carrying capacity of Tourists and vehicles.

1. Calculation of Physical Carrying Capacity (PCC) in BTR

PCC = A*V/a*Rf

WHERE, A= available area for public use
V/a=one visitor/M²
Rf = rotation factor (number of visit per day)

In order to measure the PCC to Buxa Tiger Reserve the following criteria is taken into

- The required distance between two vehicles is at least 500mt(1/2km)
 - At least 3hours is required for a single park excursion
 - The PA is open to tourists for 9 months in a year and 9 hours per day
 - The linear road length within the tourism zone is

| Tourism zone in core | 69 kms |
|--------------------------|--------|
| Tourism zone in Buffer | 25 kms |
| Total linear road length | 94 kms |

Rotation factor= opening period/average time of one visit RF=9/3=3

Therefore, Physical Carrying Capacity = 94* 2 vehicle/km* 3 =564 / day

3. Calculation of Real Carrying Capacity (RCC)

$$RCC = PCC * \frac{100-Cf_1}{100} * \frac{100-Cf_2}{100} * \dots \dots \frac{100-Cf_N}{100}$$

$$Cf = \frac{M_{\underline{l}}}{M_{t}} * 100$$

where Cf = corrective factor

 M_1 = limiting magnitude of the variable

 M_t = total magnitude of the variable

i) Road erosion (Cf₁)

Total road length = 94 km (Mt)

Medium erosion risk = 15 km (weighting factor:2)

= 10 Km (weighting factor:3) High erosion risk

$$M_1 = 15*2 + 10*3$$

$$= 30 + 30$$

$$=60 \text{ Km}$$

$$Mt = 94 \text{ km}$$

$$Cf_1 = \underline{60}^* \ 100 = 64\%$$

ii) **Disturbance to wildlife** (Cf₂)

Corrective factor, in this case, will be as follow

12 month /year

a) Corrective factor for Tiger

$$Cfw_1 = 2*100 = 22.2 \%$$

b) Corrective factor for Sambar

$$Cfw_2 = \frac{1}{9} *100 = 11.1 \%$$

c) Corrective factor for Bison

$$Cfw_3 = \underline{2} * 100 = 22.2 \%$$

d) Corrective factor for Elephant

$$Cfw_4 = \frac{2}{9} * 100 = 22.2\%$$

Therefore, total corrective factor for disturbance of wildlife

in BTR = $Cfw_1+Cfw_2+Cfw_3+Cfw_4$

iii) Temporary closing of road (Cf₃)

$$Cf_t = \underline{limiting week/year} * 100$$

Total week/ year

If average value of 4 limiting week per year be considered as the limiting week in BTR then the corrective factor will be as follows;

$$Cf_t = 3 \underline{\text{week/year}} * 100 = 8.33\%$$

Therefore, computation of RCC in BTR
RCC =
$$564 * \frac{100-64}{100} * \frac{100-78}{100} * \frac{100-8.33}{100}$$

= $564 * (0.36 * 0.22* 0.916)$
= 40.91 or 41 visit / day

Finally, **Effective Permissible Carrying Capacity (ECC)** of Buxa Tiger Reserve for the vehicular movement if the management capacity (MC) is considered around 45 %.

Then, ECC in BTR owing to paucity of staff the management capacity is around 45-% Hence ECC Will be

=41*0.45

= 18.45 or 19 vehicles per day.

Thus the effective permissible carrying capacity on any single day is only 30 vehicles which should be allowed entry as below

Forenoon=10 vehicles Afternoon=9 vehicles.

4 Elephant ride:

Though there is heavy demand for providing elephant ride facility for the tourists at BTR, considering the density of the forest and presence of elephant herds, round the year, and the visibility factor, at present there is no elephant ride in Buxa Tiger Reserve. However it is proposed to introduce elephant ride initially with may be two elephants in the permitted zones for nature awareness and feel trip. The existing departmental elephants may be trained for such proposes and may be utilised for elephant ride and protection in grassland areas that are already created.

5 Improvement of Roads:

All the forest roads should be maintained regularly for easy movement of the visitors.

6 Catering:

Catering facility should be provided to the tourist at all forest rest houses/dormitories. Members of JFMCs should take up the onus of running these facilities which will double up their opportunity of regular income.

7 Check posts and Barriers:

The present check posts/ barriers at Rajabhatkhawa, Jainty and Mainabari should be maintained to regulate the movement of vehicles into the core area. A new barrier should be set up at Hatipota and the barrier in front of West Rajabhatkhawa Range Office should be revived to check the entry of vehicles to the National Park. New check posts may be needed once the nature education trips starts to regulate the movement of visitors. Field Director may install check post wherever necessary to regulate movement of persons into the Reserve.

8 Development of Interpretative media for tourist education:

Natural Interpretation is an educational activity which aims at revealing meaning and relationships of complex ecosystems. It is better done through experiencing wilderness, and / or through visual display of such relationships. Mere presentation of facts, figures, data, etc. becomes drab and uninteresting and fails to convince tourist. Following strategy for the development of interpretative media for tourist education in BTR is proposed.

9 Development of Nature Trail:

At present only one nature trail exists in the Reserve near NIC at Rajabhatkawa. It is desirable to develop a few more nature trails at suitable places, say near forest rest houses. Self-guided nature trails bring visitors in close contact with nature and give them a sensation of thrill and adventure. A sketch map should be drawn depicting significant natural features along the trail and should be placed at the starting point to help the visitors to orient themselves. Such nature trails may be developed at Poro, Narathali, Buxa Duar, Santarabari areas.

10 Improvement of Nature Interpretation Centre (N.I.C.), Rajabhatkawa:

The present NIC needs to be improved and enriched to make it more effective. The following steps are recommended:—

- **a)** Attempt should be made to add more exhibits, murals, dioramas, specimen of plants, trophies, photographs, animal signs, etc.
- **b)** Models of implements and artifacts used by the local tribal (baskets, tools, furniture, ornaments, carvings made of natural materials etc.) should be exhibited in the NIC with proper labels and description.
- c) An informative video film on forests and wildlife values of B.T.R. has been prepared and should regularly be shown to the visitors at the NIC auditorium.
- **d)** Brochures, pamphlets, handouts, posters and other informative materials should be prepared and made available to the visitors on payment.
- e) The library facility in the NIC should be improved by adding books, magazines and journals relating to environment, forestry and. A collection of reference materials like management plan, species list, research reports, and articles on BTR should be available in the Library.
- **f) Interpretative and Conservation education:** Coverage of themes at the NIC at present is inadequate. The following themes and messages should be developed and displayed.
 - i) History of conservation in B.T.R.
 - ii) Prey-predator relationship of tiger and other carnivores in BTR,
 - iii) Behaviour, social life, ecology and biology of Tiger, Leopard, Elephants and other important animals in BTR,
 - iv) Ecological processes and forces at work in BTR,
 - v) Role of local people in conservation of nature,
 - vi) Flora of BTR,
 - vii) Effects of illegal felling of trees, grazing and fire on ecology and economy.
 - viii) Man-Wildlife conflict,
 - ix) Habitat Utilization by different animals
 - x) Dos and Don'ts for visitors in a PA.

- g) The NIC should remain open for visitors preferably on all the days of the week at fixed hours. Special programme should be held at the NIC on week end and other holidays to cater to the needs of the students, of different age group and for local people and JFMC members including the peoples' representatives and officers and staff of other line departments including the police and judiciary.
- h) A new auditorium for screening documentaries on Buxa Tiger Reserve and wildlife conservation to create awareness among visitors should be created and operationalised.

11. Guided Tourism:

At present there is no guided tourism in BTR except a few eco-guides available at Jainti. Guided tourism is a specialised task to be manned by an experienced and well trained eco-guide. Initially it is required to identify the target groups like Students, School children, group of nature lovers, FPC-EDC members, foreigners, research fellow etc. who can be taken to various places, properly interpreting various animal signs and calls, biotic influences on the wilderness and adverse effect of human activity on the Reserve, on the zone of influence, identifying various birds, local cultures, phenomenon of changing river course, etc. The guided tourism has the noble role to play in transforming the peripheral nature lovers to the committed ones. They will be our messengers. They will take and spread the message in the society.

The Eco-guides will be selected from among local JFMCs educated youth. They can be trained properly to act as Eco-guide. The charges for Eco-guide can be fixed by the park authority.

12. Signages:

Signages are presently not adequate in B.T.R. Good signages help people to find their way, prevent tedious enquires and very often provide interesting information to the tourists. There are 4 different types of signages that should be installed in BTR.

- a) Directional Signages: These signages show the way to various places like Range Office, Rest House, Orientation Centre, NIC, Rescue Centre, Parking Site, etc.
- b) Cautioning Signages: These signages inform the tourist about the acts statutorily prohibited in the PA. These signages also inform the tourists about their responsibilities in preserving the serenity of PA.
- c) Orientation Signages: These signages mainly include Maps, location sketches, etc. which helps in orienting the tourists. A map of BTR showing various zones and places of tourist interest should be placed at RVK Tourist complex, Field Director and Deputy Directors' office and Railway Stations at Alipurduar.
- d) Interpretive signages: These are to be kept at certain strategic places like along a nature trail, at scenic view points, at places of historical and religious importance, etc. Brief and impressive interpretive signages must be installed at conspicuous places.

13. Audio-Visual programme:

VIDEO films and slide shows on Forests and Wildlife and other interesting features in BTR should be shown to tourists at NIC. Films/ Slides shows should also be held at regular interval in schools, tea gardens and villages in the vicinity of BTR.

14. Nature Camp:

The objective of organising nature camp is to introduce the participants with basic ecological principles through learning by personal experience. It encourages participants to discuss and analyze conservation issues in a constructive and problem solving manner. Students from schools and Colleges, Science and Nature Club and N.G.O's form the main target groups for nature camps.

Camp sites should be places of interest - away from sensitive and vulnerable habitat and safe for walking and halting overnight Raimatang (River bed), Jainti, Buxaduar, Narathali, Hatipota, Buxaduar, Dhumparaghat S. Rydak, Nimati and Kumargram are ideal places for camping. Camp accommodation will normally be in tents. Permanent camps should not be constructed. For organizing nature camps, help of experienced N.G.O's may be taken. Camps should be organized from November to February. A nature camp should be of 3-5 days duration. PA authorities should attend the camp and interact with the participants. Field Director may identify locations for nature education camps in buffer area.

15. Bird Watching Points:

Bird watching points should be developed at Narathali (beel), Guide and field staff should be given training in bird watching. Binoculars and books on bird watching available at rest houses should be utilized.

16. Use of media for publicity of PA:

Help of the print and electronic media should be taken to promote the tourist potential of BTR as well as spreading awareness of tourists and effects of regulated tourism. Publicity wing of Govt. of West Bengal and Tourist Department should be involved for ensuring proper publicity of tourist spots in BTR.

17. Involvement of local people:

Local villagers should be involved in the management of tourism in BTR so that they too have a stake in it. Local educated unemployed youth from FPC/ EDC can be engaged as eco-guide after proper training. They can be engaged to run the catering facilities in the tourist lodges. Local vehicles, if available, should be hired for use by tourists. It is also desirable to seek their suggestions from FPCs/ EDCs as to, how they can participate and get benefit directly/ indirectly from tourism. This is extremely necessary to ensure their support in favour of conservation based tourism.

18. Regulation of Tourism:

Unregulated tourism can pose threat to conservation and prove counterproductive to the aims and objectives of the PA management. The role of eco-tourism should be to maximise peoples' enjoyment through education and recreation, and to minimise the negative impact on habitat and wildlife. It should increase visitors' concern for conservation of nature. The following regulations on tourism should be maintained in the Buxa Tiger Reserve.

- a) Movement of tourists should be restricted within the tourism zone and tourist routes specified in this chapter.
- **b)** No tourist vehicle will be allowed to enter into the National Park area and core area of the Reserve.

- c) Core area should be strictly prohibited from any kind tourism.
- **d)** No permit will be issued after 3.00 P.M. for day visitors. All visitors must leave the Reserve by sunset.
- e) Entry will be restricted to certain hours of the day eg. 6.30 A.M. to 3.00 P.M. No night driving will be allowed.
- **f)** For conducted tour of tourists and school children only patrol driven vehicles will be allowed. Heavy vehicles should not be allowed in the Reserve.
- g) The Reserve will be closed for tourists from June to October (i.e., during rainy season) each year.
- h) Filed director may impose any other conditions and regulations as required.

DO's and Don'ts:

Apart from the statutory rules and regulations, several other restrictions are to be followed both from management point of view and for the safety of the tourists.

DO's

- 1. Obtain a permit before entering the park. Issue of a permit does not create any liability for the authority as to the safety of the tourists.
- 2. Park to remain open to visitors from 1st November to 31st May.
- 3. Excursions in the park to be permitted between sunrise and sunset.
- 4. Always take a guide for a trip.
- 5. Drive slowly (recommended speed is 25 Km/hr)
- **6.** Animals have the right of way. Please slow down deliberately at turns and bends.
- 7. Talk in whisper only (during excursions) and that too when absolutely necessary.
- **8.** Take water with you during excursions.
- **9.** Overlook inconvenience and relax in harmony with nature.
- **10.** Lookout for seeing an animal but don't get disappointed, if you cannot see any, because they have seen you

Don'ts

- 1. Don't blow horn and don't drive fast.
- 2. Don't chase the animals or tease them or feed them.
- 3. Don't smoke or lit fire during excursions. All these can start devastating fires.
- **4.** Don't throw empty canes, tins, boxes, plastic and poly-bags and similar wastes anywhere in the park.
- 5. Dogs and pets are not allowed in the park.
- **6.** No arms/ weapons are allowed to be carried in the Park.
- 7. Don't go on excursions in intoxicated condition.
- **8.** Don't blame the guide/ harass him if you fail to see any animal.
- **9.** Don't play radios, transistors, tape recorders and record players outside your rooms or in a vehicle.
- 10. Use of search light/ spot light is totally prohibited.

19. Monitoring and Evaluation:

Monitoring:

The Eco Tourism Range Officer in charge of the NIC should keep records about the tourists and submit periodic reports to the Field Director's Office. The analysis should

include the no. of visitors in each month during a year, the peak and lean months, the revenue through tourism, local employment through tourism, category of visitors (local/ foreigners, students, researchers etc). Buxa Tiger Conservation Foundation Trust shall be nodal agency for implementation and monitoring of Eco tourism its impact and remedial measures to be taken from time to time. Local advisory committee should be enlightened about the regular monitoring an evaluation

Visitor's feedback and its evaluation:

- (a) Visitors should be encouraged to record their comments/ observations in visitor's books at rest houses NIC etc. These comments/ observations should be periodically seen by the BTR officers for taking such remedial measures as may be necessary.
- (b) A questionnaire should be devised to get feedback from the tourists on various aspects of PA as to whether the existing facilities are sufficient or not, what are their expectations, what are their suggestions to improve the facilities, etc. The reply received from the visitors should be analyzed and submitted to the Field Director for suitable action.

PART – FIVE

SECURITY PLAN FOR STRENGTHENING FOREST PROTECTION IN

BUXA TIGER RESERVE

Buxa Tiger Reserve area is fringed by 34 tea gardens and 46 revenue villages on Western and Southern boundaries. There are more than 79 mouzas within two kilometres from the boundary having population of around 2.55 lakh. In addition 37 forest villages are settled inside the reserve having around 18 thousand population. In the north it shares 65km boundary with Bhutan and in the East 22km boundary with Assam. Buxa Tiger Reserve is the last remaining virgin forest of North Bengal comprising of valuable timber like Sal and its associates in addition to incomparable biodiversity and precious wildlife. In view of huge population sitting on the fringe and having porous border with Bhutan and Assam and with BTR full of valuable timber and wildlife, the pressure on protecting such treasure is insurmountable.

A. <u>Constraints for Forest Protection in BTR:</u>

Socio Economic and cultural factors exert strong influence on forest. There is around 3 lakhs population sitting just around the fringe of BTR. There are 34 tea gardens having another few thousand populations and most of them are unemployed. In addition migration from Bangladesh and Nepal has also led to steady increase in population over the years. Such huge population which is primarily poor and depends on forest for livelihood exerts tremendous pressure on forests of BTR. People residing in and around BTR are mostly very poor and are below poverty line. BTR geography is also very peculiar and is interspersed with tea gardens all along the boundary and tea gardens occupy crucial corridors of wildlife resulting in huge man animal conflict. Elephant, Bison and leopard depredation is a routine problem here because of tea gardens location and huge human habitations settlements in them. Further these tea gardens harbours thousands of unemployed youth for which BTR is soft target for livelihood. Besides this as many as 7-8 of mountain rivers criss cross BTR which act as transit routes and guarding such rivers requires huge manpower and resource for establishing checks by camps.

i) By Geography & Geo-Politics:

- Irregular shape of BTR with total perimeter of 330 km
- 65 km long Indo-Bhutan International Border in North
- 22 km long Inter-State Border with Assam in East
- Indo-Bangladesh International Border only 20 km to the South of the Reserve
- -By Natural Forces
 - » Floods
 - » Cyclones
 - » Shifting course of river
 - » Siltation of rivers

ii) Sensitive compartments

- » Total compartments-225
- » Sensitive compartments-33

| Range | Beat | Block | Compartments |
|-----------|----------------------|---------------|-------------------|
| Pana | Raimatang, Gangutia, | RTG, Pana | RTG, 3,4,5,8,9 |
| | Pana | | Pana 3,4 |
| WRVK | Dima, WRVK | Dima, SRVK | Dima1,2,3,4 |
| | | | SRVK 9 & 15 |
| Nimati | West Nimati | Nimati | Nimati 3, 4 |
| Buxaduar | Buxa road | NRVK | NRVK 1, 9, 3,8 |
| SRD | SRD | SRD | SRD 3,6,7 |
| Jainty | South Jainty | Jainty | Jainti 6a, 7a, 8, |
| ERVK | North Panbari | Panbari | Pan 3,4,5,6 |
| NRD | Tiamari | Central Rydak | CR 3, 4 |
| Kumargram | Sankosh | Sankosh | Sankosh 1, 2a |

iii) Factors Affecting Forest Protection

- 30% of vacancy unfilled at field level staff
- More than 70 % staff is 55 years of age
- Lack of employment opportunities for fringe village populations
- Tea gardens harbouring thousands of unemployed youth
- Unrelenting elephant depredation demands staff to devote duty for driving elephants and absence of elephant squad
- Presence of armed gangs operating across Assam and in the border with Bhutan.
- 330km of boundary length needs to be guarded.
- Tiger Reserve has 65km of international boundary with Bhutan

B. Protection Measures:

In order to effectively tackle and manage the protection problems the following steps have been undertaken and are proposed to be further strengthened

i) Protection Monitoring Protocol for Buxa Tiger Reserve.

The proper forest protection of a habitat ensures a good conservation of its natural resources and wild life. With this objective, a "Protection Monitoring Protocol for Buxa Tiger Reserve" has already been formed and initiated since 1st April' 2009 with following salient features.

- 1. Each Beat Officer shall maintain a map of his area showing the sensitive points, which needs to be provided special attention. This map shall be regularly updated.
- 2. Beat Officer concerned shall plan their patrolling duties in such a manner that each and every part of his jurisdiction is covered every week at least twice with special attention to sensitive areas.
- **3.** All the offences detected shall be plotted on map for the area with an index indicating nature of offence, which will be the "Offence Map" for the period over the jurisdiction. During dry months the incidences of fire should also be recorded on the map.
- **4.** The inspecting officers, i.e. Range Officers & above shall provide necessary guidance and support to the Beats so that they can perform their job amicably.

- 5. Each Range Officer shall visit all Beats and Camps within his jurisdiction once in week and check the duties performed over the period through record and discussions and note his observations in the form enclosed. One copy of this form shall be kept in the Beat and the second copy shall be kept in the Range Office. The third copy shall be submitted to the Field Director within 10th" of next month through the concerned Deputy Field Director. During his inspection, the Range Officer will take spot-decision for the matter which can be solved at his level which would include temporary redeployment of staff, joint patrolling with mobile squads etc.
- 6 For the problems, which are beyond his level he shall personally meet the concerned Deputy Field Director and appraise him about the situation.
- 7 The Asst. Deputy Field Directors of Buxa Tiger Reserve shall inspect all Beats of Buxa Tiger Reserve at least once in every month and also fill up the enclosed form. They shall give one copy of this form to the Beat concerned and the other copy of all the Beats shall be submitted to the Field Director by 10th of next month through the concerned Deputy Field Director who will mention the actions taken/suggested.
- 8 The Deputy Field Directors, Buxa Tiger Reserve, shall inspect at least one Beat randomly from any Range in a week and will ensure that they inspect all Beats at least once in six months. They shall also submit their report to the Field Director in a similar manner within 10 of next month about the visits made by them.
- Forms covers the compartments visited during the week, night patrolling, seizures, arrests, diary submission, offence map, night halt, maintenance of fire arms and other records including duty Register, Offence Register, Duty output as well as inspecting officer's note have been introduced. Hence, it is expected that this form shall provide necessary review of the protection duties performed, desired guidance to the subordinate staff and required inputs to superiors about the situation.
- 10 The duty chart and performance proforma of the Mobile Ranges would be prepared by the Deputy Field Directors' for a quarter as per protection and wild life depredation requirements and shall be revised regularly for every quarter. The quarterly duty charts and monthly performance proforma should be got approved by the Field Director. The performance proforma for each month should be submitted to the respective Deputy Field Director by 7^{th 1} of every succeeding month by the Range Officer through the concerned Asst Field Director.
- 11 It should be ensured by both the Deputy Field Directors that the entire R T network of HQ, Field and Vehicles of respective Divisions is effectively maintained with proper frequency and using codes as mentioned in the First Management cum Working Plan of BTR. The respective Assistant Divisional Forest Officer would personally check all the sets under their jurisdiction at least once in a month and ensure repair/maintenance of all tile sets under their jurisdictions. The RT sets of Field Director would be maintained by the Deputy Field Director BTR (West).
- 12 This Protection Monitoring Protocol of Buxa Tiger Reserve has come into effect from 1st April, 2009. The following form is to be maintained and submitted to the superior Officers periodically.

INSPECTION REPORT FORM

PROTECTION MONITORING PROTOCOL - BUXA TIGER RESERVE

| 1. Period | | |
|---|-----------------------|---|
| 2. Beat/Range | | |
| 3. Report by (Nan | ne) | |
| 4. Updated sensitive (For the period (Map to be prepared) |) - | : Available / Not Available incidences and other information) |
| 5. Duty Register (With offence of | 1 | : Available / Not Available |
| 6. Forest Compart | ments covered (with t | frequency) |

| | Compartments No. | Visit dates | Compartments No. | Visit dates | Compartments No. | Visit dates |
|---|------------------|----------------|------------------|----------------|------------------|----------------|
| | | | | | | |
| L | | | | | | |

- 8. Vehicle and fuel allotment (Range Use) Sufficient/Not sufficient (give reasons)
 - 9. Records
- a. Duty Register Maintained/Not Maintained
 - b. Wildlife Register Maintained/Not Maintained
- c. Arms Register Maintained/Not Maintained
 - d. Tiger Monitoring Register Maintained/Not Maintained
 e. RT Register Maintained/Not Maintained
 f Store Register Maintained/Not Maintained
 g FPC/EDC Register Maintained/Not Maintained
 h. Fire Register Maintained/Not Maintained

| 10. Duty | y output | |
|----------|-----------------------------|---|
| a. | Felling cases | |
| b. | Poaching cases | |
| c. | Cycle/thela /rickshaw s | eized |
| d. | Timber/firewood seize | d |
| e. | Other material | |
| f. | Person arrested/stump se | zizure |
| g. | Stump seizure | |
| h. | Cases compounded | |
| | | |
| 11. F | ire arms | |
| a | No of guns/Rifles | |
| | When last cleaned | |
| | No. of bullets/cartridges | |
| | Firing incident if any (gi | |
| u. | . Firmig meident if any (gr | ve details) |
| 12. Insp | ecting officers Note | |
| a.D | outies are | Sufficient/Not sufficient (Reasons) |
| b.D | Outy directives | |
| c.O | ther action taken by Inspe | ecting Officer |
| d. | . Actions suggested | |
| | | |
| No: | | Dated: /2012 |
| | | |
| | | |
| | | Signature of Inspecting Officer Name and Designation of the |

Inspecting Officer

Notes:

- 1. This form is to be filled in each Beat by Range Officer concerned in each week in triplicate. (One copy to be kept in the Beat and one in the Range Office. Range Officer must give one copy personally to DFD within 7th of next month).
- 2. All Beats to be inspected by ADFD once in a month and a report to be submitted to DFD by 7th of the reporting month.
- 3. DFD is to inspect at least one Beat in any territorial Range randomly every week and cover

all Beat locations within six months and submit report to FD by 10th of next month.

- 4. Object of the system is to institutionalize the monitoring with focus on "Protection" of forest and wildlife involving all. This will help to guide the local level staff, to attend their problems and in isolating the non-performers.
- 5. Use additional sheet if required. Matter of urgency should be communicated immediately to the concerned officers.
- 6. The monthly performance reports of the Mobile Ranges would be submitted by 7th of succeeding month by the Mobile Range Officer to the respective DFD who in turn with their comments submit the same to the FD by 10th of the month. The Mobile Ranges may also be utilized for elephant/other wild life depredation duty also by providing necessary training and equipment inputs.
- 7. Initially the Deputy Field Directors with help of Asst. Deputy Field Directors would conduct a workshop Range wise to explain the purpose and nature of this monitoring protocol and preparation of map. The forms may be translated to Bangla / local language as per field requirements.
- 8. All the field and mobile vehicles including that of Deputy Field Directors and Asst. Deputy Field Directors must carry a first aid box, a GPS, an axe, small hand saw, torch light, batons, helmet etc as per requirement.

ii) Protocol for Monsoon Duty.

The following instructions/guidelines are being followed strictly during monsoon to check rafting of illicit timber and wildlife crimes:

- 1. The Assistant Deputy Field Directors will coordinate special duty for "River Camps" at Poro, Dima, Gadadhar, Rydak I &II, Bala, Gholani and Sankosh. The departmental Speed Boats and Dingies may be checked and accordingly deployed at strategic locations. One inflatable boat during the peak of monsoon should be placed at Panbari complex by the Deputy Field Director, Buxa Tiger Reserve, East Division.
- 2. During the monsoons there would be no felling of trees in non forest areas. Already an order to this effect has been issued vide this office No. 664/28-22 dated 09/06/2009. During this period all the Saw Mills should be checked thoroughly with the help of Mobile Ranges and executive staff at HQ. Also except emergency cases related to embankments repair of rivers no boulder collection would be allowed during the monsoons.
- 3. The Departmental Elephants would be stationed at Checko, Ghoramara, South Rydak and Panbari. On alternate days they would patrol the areas where movement by foot gets hindered.
- 4. All the Beat Officers would conduct general meetings with the JFMCs and seek their cooperation in getting information about possible timber theft through rivers and poaching in vulnerable areas. All the Range Officers would coordinate with their Beat

Officers and review collection of information periodically and would confidentially brief their Deputy Field Directors. The Deputy Field Directors would oversee information collection and also devise their own net work for collection of information against poachers and timber smugglers.

- 5. The Deputy Field Directors would coordinate with SSB Units in their areas with the help of C.O., 34 Bn. and with ADM, Alipurduar and Addl. SP, Alipurduar so that in case of emergency their help could be seeked effectively.
- 6. All the wireless stations should be checked and necessary repair of RT sets should be made. All Beats, Range and Divisional Headquarters should have a first aid box including some medicine required during monsoon. For this advice may be taken from Sub Divisional Medical Officer.
- 7. On every Monday the field situation would be reviewed centrally by Field Director, Buxa Tiger Reserve and accordingly action required would be taken.
- 8. To tackle emergency cases like flash flood, malaria epidemic etc. 3 cells are proposed as follows:
 - (a) A Headquarters Cell would comprise of senior most Asst. Deputy Field Director, both the Head Clerks and all the Range Officers stationed at headquarters. They would be responsible for procurement of relief material and co-ordination with Sub-Divisional Administration.
 - (b) The Second Cell would be at Damanpur and would be headed by Range officer/Mobile Range. He would also coordinate with Mobile Units at Rajabhatkhawa and Kamakhyaguri so that any emergency in field could be tackled effectively.
 - (c) For Eastern part, Deputy Field Director, Buxa Tiger Reserve, East Division would establish a cell at Barobisha Headquarter.

Alongside local NGOs and Sub-Divisional Medical Office should be contacted specially for rendering help for anti malaria measures and prevention of water borne diseases.

- 9. Temporary spaces should be earmarked at the following Range headquarters to dump timber in case of emergency arising during heavy flood and cyclone etc.: Damanpur, Nimati, Rajabhatkhawa, Jainty, North Rydak, Kumargram and Barobisha.
- 10. The Deputy Field Director's are free to incorporate in any measure deemed fit for forest and wildlife protection in their action plan for the monsoons.
- 11. The temporary Wild Animal Relief Centre and Veterinary Care Units at Rajabhatkhawa should be checked and made ready with the repair of cages/enclosures, so that if any wild

animal is rescued then it can be kept there for treatment before subsequent release in the wild or shift to any rescue centre.

iii) Joint Patrolling by Buxa Tiger Reserve (West) & Buxa Tiger Reserve (East)

- Buxa Tiger Reserve (East) & Buxa Tiger Reserve (West) would utilize staff at Headquarter for conducting check and recovery patrols to prevent illegal timber and wild life articles trade in and around Alipurduar town area.
- This duty would be undertaken Division-wise. On even dates Buxa Tiger Reserve (East) would conduct it and on odd dates Buxa Tiger Reserve (West) would undertake it. The respective Gazetted assistants would coordinate and a Range Officer or a senior DR/Fr at headquarter would be the team leader. The staff of both the Divisions can be posted in this squad. Also a monthly brief about the performance of the teams should be intimated during monthly Protection Monitoring Protocol meetings in which the Deputy Field Directors of each Division would present a brief report.
- iv) Forest camps: Depending on the sensitivity and seasonally of offences persons in the camp may be shifted. New camps may be constructed as per the site-specific requirement for protection. Regular maintenance of building should be carried out. The provision of camp kit, medical kit, and drinking water and lighting facilities must be made at each camp site. All the patrolling staff should be provided with patrolling gear like hunter shoes, Gum boots, mosquito net, rain coats and other basic camp and patrolling requirement. Subject to provision of budget, uniform provision of dresses may be made. Seasonal Camps at Gangutia and Raimatang, Panbari may be established.
- v) Forest Protection Force: In BTR 3 forest protection force camps are being maintained at Hamiltonganj, North panbari, South Jainti and Marakata. They help the staff in protection. They shall be maintained as now. Such force may be shifted to sensitive locations based on the sensitivity of areas.
- vi) Mobile Squad: They are active in organizing raids in tea gardens, villages, trains, etc. apart from regular patrolling, anti poaching duty and helping out with depredation and wildlife rescue operations. There are three Mobile squads in Pana, Damanpur and Kamakhyaguri and one more at Samuktala, South Rydak Range is proposed.
- vii) Watch towers: They serve dual purpose i.e. protection and wildlife monitoring. Presently there are nine permanent watch towers at 23rd Mile, 22nd mile, 26.5 mile, 23.5 mile, PG Tower, 28th mile, Bhutiya Basti, 30th Mile, Tashigaon -1 compt. of Jainti (New), Chuniajhora of Hatipota (New), CR-4 compt. of North Rydak and Narathali-2 compt. of South Rydak. These towers are maintained throughout the year and are equipped with RT linked. The locations of these towers are in sensitive core areas. New towers may be proposed in sensitive areas like SRD, Chipra, Balapara etc. Efforts should be made to provide these camps with armed forest guard
- viii) Check posts: There are three check posts at Barobisha under Bholka range on NH 31, Damanpur and Rajabhatkhawa. These would be manned 24 hr basis by rotation of staff

ix) Monitoring of the camps-

- Daily monitoring of activities carried out by patrolling camps should be a part of the duties of the concerned Range Assistant.
- The concerned Range officer concerned, having his jurisdiction over various camps, should regularly report in brief the activities done in patrolling camps to ACF.
- All the patrolling schedules and actual patrolling must be monitored by ACFs
 concerned and should periodically report to Deputy Director and Field Director. The
 higher authority also must go on patrolling with some patrolling party to check the
 patrolling activities and provide the on spot knowledge for checking the fauna and
 flora.
- There should be surprise checking by higher authority like R.O., ACF and Deputy Director to insure the presence of staff and watcher in the camps. This should be specially carried out in the night with night patrolling by concerning authority.

x) On Foot Patrolling:

With the ever-increasing biotic pressure on the wildlife protected areas, the importance of regular on foot patrolling by officers in a Tiger Reserve is an undeniable and indisputable fact. Aside from inspiring the regular patrolling staff, this also lends a psychological restraint over the surrounding villages.

xi) Elephant Patrolling:

In BTR, elephants have proved to be very effective in ensuring habitat protection. The protection schedule for elephant during monsoon is as following-

- The PA should be divided into patrolling units, and at least 2 elephants should be deployed per 100 sq. km. of the sensitive habitat.
- Each elephant squad should comprise of 1 forest guards, equipped with a wireless handset and a firearm, apart from two field assistants (labourers)
- Temporary elephant camps (at least 2/ unit) should be created close to a permanent water source in the patrolling unit for elephant housekeeping and feeding.
- During movement, the elephant squad should communicate with the Range HQ/ squad-in-charge through wireless after every hour.
- After the patrolling work each day, the squad-in-charge should send a wireless report to the concerned RO/ PA manager highlighting the area covered and observations made
- The elephant squad should also keep a record of wild animals seen during the jungle excursion

Xii) Providing adequate patrolling staff in beats to combat the poachers and organized smugglers:

Present distribution of staff in field postings is lopsided. A re-distribution of staff as per specific protection needs of various locations is necessary. This must be done. Re-distribution of staff as well as re-organisation of Range and Beat jurisdiction should be done as proposed. The minimum basic facilities and amenities should be provided to the staff, particularly those posted in difficult locations (e.g., Balapara, 23rd mile-Panbari, Hatipota,

Bhutiabasti, Adma, Chunabhati, Buxaduar, and Bhutri). Incentives and rewards should be given to staff for good works to boost up the morale of the staff.

Xiii) Provision of sufficient sophisticated fire arms and ammunition for staff to tackle poachers and smugglers:

Fire arms are important to combat poachers and smugglers and for self protection by the staff. BTR maintains arms and ammunition such as Rifles, DBBL, SBBL tranquillization gun, action pump gun and HBBL guns etc Revolvers that are actively required in the discharge of field duty, protection and animal depredation problems.

It is proposed that there should be 1 Rifle with each ACF, 1 Rifle and 2 D.B.B.L guns at each Range H.Q., 2 D.B.B.L in each Beat and Camp and 5 D.B.B.L. guns with each Mobile Range. On the above basis, additional requirement of arms is as follows:—

Training/ Practice courses for field staff in handling fire arms should be conducted at regular intervals.

xiv) River camps

Timber smuggling through rafts is a major problem and threat to the forests of Buxa because of presence of big Rivers such as Rydak, Sankosh, Dima, Poro etc. To counter such smuggling seasonal and permanent camps shall be established at various locations such as Rydak, Gholani, Sankosh, Marakata, Gadadhar, Kalkut, Nonai, Poro, Dima, etc.

C.) Communication and InfoTech in Wildlife Protection and 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, wireless and fiber optic communication in networking, the PA/ Tiger Reserve HQ can be connected to the state HQ, Police HQ and PT Directorate to disseminate information for field action in apprehending the offenders.

10. Imperatives for Success:

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

- Good surveillance
- Timely reporting and 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 and updating
- Site-specific protection strategy
- Immediate action for apprehending the offenders based on effective networking and communication

Geographic Information System has the ability to manage both spatial and 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.

A 'Zonal Wildlife Crime Prevention Strategy' using the 'state of the art' technology is required, covering several important PAs of West Bengal, viz. BTR, Jaldapara WLS, Mahananda WLS, Gorumara WLS, Chapramari WLS and Manas Tiger Reserve of Assam.

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 PAs 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 updating of Range level crime data through wireless from Patrolling Camps
- Establishing external communication links, through 'satellite phone' between KCR and other government authorities, viz. State Chief Wildlife Warden, Police HQ (Tiger Cell), MOEF (NTCA), WWF (Traffic- India) 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 and 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 dynamic Vehicle Tracking application using map objects. 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

D) Publicity and Public relations to create awareness among people:

One important task of the BTR authorities is to improve the publicity of the management activities for propagating the cause of wildlife. This can be done through T.V., Radio, Video film, newspapers, magazines, distribution of brochure and handbills, etc. Publicity through Nature Interpretation Centre (NIC) at Rajabhatkhawa should be improved. Attempts should be made to equip the NIC with more models, trophies, maps, signages etc. Conducting talks and which competitions on nature conservation, etc. at the school and college level are effective publicity tools. Schools in the vicinity of P.A. should be made major targets of publicity campaigns. Help of the professional publicity personnel should be obtained for creating awareness among the various target groups in and around the Reserve.

E) Interagency Co-ordination like General Administration, Police, Railways, B.S.F/SSB, Intelligence and Enforcement Branches, etc:

Wildlife and forest offences of BTR have inter-district, inter-state and inter-national overtones. Inter- agency co-ordination is extremely useful for effectiveness of any control measure. A live co-ordination with general administration and the Police administration (including Intelligence Wing) of Jalpaiguri and Coochbehar districts, Railways, BSF and Assam forest department will prove effective. A sketchy and informal co-ordination does exist at present. BTR should make it more robust and live.

F) International Co-Operation to curb illegal trade on Wildlife articles:

BTR is in close proximity with routes of illicit traffic in wildlife articles. Closeness with Bhutan, Bangladesh and Nepal adds international character to it. International cooperation among Enforcement agencies in Bhutan, Bangladesh, Nepal and India is necessary to curb illicit traffic in wildlife products effectively. BTR officers maintain formal contacts with their counterparts in Bhutan. This should continue.

G) Control on Sawmills, Veneer Mills and Furniture shops:

It is very much essential to regulate illegal running of Sawmills and furniture shops to protect forest assets in BTR. The following strategy is being proposed for this purpose –

- i) No new license to wood based industries should be issued except in accordance with the High Level Expert Committee appointed under the order of the State Govt
- ii) Wood based industries having no proper license should be stopped from functioning and legal action initiated against them.
- iii) Regular and surprise checking of documents and stocks of wood-based industries should be carried out.
- **iv)** Adequate precautions should be taken while issuing Transit Permits to veneer mills and sawmills to stop misuse of T.P.
- v) Banks, Panchayat and Deptt of Industries should be taken into confidence to check the mushroom growth of wood based industries and furniture shops.

H) 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, such as the Indian Forest Act, 1927; the Indian Wildlife (Protection) Act, 1972 and the Forest Conservation Act, 1980, 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 has empowered the various ranks of field staff of forest department to take cognizance of offences relating to forest and wildlife. The frontline staff of BTR is always required to be kept well - prepared with necessary documents/ proforma prescribed under the above Acts for taking appropriate action and registering a forest/ wildlife offence. The Park Management should also ensure that the staff remains trained and updated on the latest amendments to the concerning Acts, and for this purpose easy Bengali and Hindi translation of the concerning Acts may be circulated down to the lowest level for a better understanding of the subject. Besides, periodic Legal Workshops and discussions should 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.

Taking cue from the above, the Park Management is now convinced that 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

I) 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, a Court Liaison Unit should be constituted for the BTR. Range Officer, Law Cell act as Court Liaison Unit for each Division.

To ensure the regular attendance on fixed dates in cause-listed cases, a special team of staff along with appointment of panel lawyer should be identified and earmarked for this purpose. The team should 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 would consist of

- i) One Range Officer, Law Cell
- ii) One Deputy Ranger
- iii) One Forest Guard
- iv) One Computer Assistant to maintain necessary records

J) Communication Strategies:

i) Telephone, Computers and Internet communication

For day-to-day communication telephone is one of the most efficient ways of the communication. In BTR all the range offices, sub divisions and head quarter have been provided with telephone communication. For some field staff and executive staff mobile facilities also have been provided. One instrument called PDA having the function of cell phone, camera, GPS and much digital software may be provided to field staff for assisting in detection, registration and reporting of offence. All the offices have been provided with computer and Internet connection to have proper office MIS and access to the Forest Offence Management System and other data base.

ii) Strengthening wireless networks for quick Communication:

Wireless network form the backbone of communication in the Reserve. Presently, there is a control room named Tiger Control that is common for both East and West Division. Control is open at one hourly interval throughout the day. Apart from these individual Ranges, patrolling vehicles are also fitted with RT Sets. There are 34 fixed stations, in BTR. These stations shall be maintained effectively for regular communications. All the new anti poaching camps shall be connected with RT network along with Walkie Talkie. Following suggestions may be adopted for proper upkeep.

- Improvement of existing wireless network, purchase of better equipments.
- Proper maintenance of equipments and facilities for the same
- Motivation of staff for timely and quick communication in case of an emergency situation.
- Maintenance of patrolling roads/ paths especially during monsoon.
- Construction of additional patrolling roads in sensitive areas with strategically located check posts
- Construction of trails/ bridle paths in northern hilly areas like Buxa duar range.
- Purchase of additional vehicles for areas like Pana, Adma, Hatipota, Santarabari, Sankosh, and Newlands blocks.

iii) Strengthening Road Network

Buxa Tiger Reserve has a good road network. Existing roads shall be maintained regularly. Roads shall be cleaned at least thrice in a year. The followings forest roads are relatively more important and are to be maintained meticulously for easy movement of patrolling party in the Reserve:-

- Boundary road → 23rd mile (Panbari) Beat to Gadadhar Beat via 20th mile Beat.
- Boundary road → Pana Beat to Gangutia Beat.
- Central road → Gudamdabri to Bhutri via Bharnabari.
- Panbari → Jainti road.
- Panbari → Gadadhar road.
- Newlands to Sankosh central road.
- Barobisha Beat to Gholani Central road.
- Rydak Beat to Chipra Beat.
- Shikari, Sanghai, Sikdar and Shebbeare Roads.

Patrolling track: The Reserve has 118 kms of metal roads, 381 kms of cast roads and 687 Km of patrolling path for effective movement inside the forest. Construction of new

patrolling path is not proposed. Maintenance of existing patrolling track will be done regularly by cleaning 3 m. wide strip, at least thrice a year.

Fire line: The mile roads are used as fire lines. At present, there are 807 Km. of fire line in BTR, some of which are also used as road for movement of vehicles. The existing fire lines will be maintained timely by cleaning at least 5 m. width thrice a year. Fire lines which are used as road will be repaired as and when required.

Vehicles: These are important means of movement. The vehicle status of BTR is currently as given in the following table:-

| No. of Patrolling Vehicles (Scorpio) | 2 no. |
|--------------------------------------|--------|
| No. of Patrolling Vehicles (Gypsy) | 5 nos. |
| No. of Patrolling Vehicles (Jeep) | 1 no. |
| No. of Mobile Van | 3 nos. |
| No. of truck (medium size) | 2 nos |
| No. of Motor Cycle | 25 nos |
| No. of boat (Country made) | 4 nos. |
| Inflatable Rubber Dinghi | 2 nos. |
| Mechanised speed boat | 1 no. |

Each Territorial and mobile Ranges (KG, NRD, JNT, BDR, EDPO, WDPO, ERVK, WRVK, NMT, HTG - 10 nos.) should have one Jeep/ mobile van. All interior beats, (K.gram, NLS, Changmari, Balapara, Barobisha, Chipra, S. Rydak, Mainabari, Hatipota, Teamari, S. Jainti, Buxa Road, Dima, Gangutia, RTG, Pana, Bhutri, N and S − Panbari, Gadadhar → 22 nos.) should have one motorcycle each. 3 Gypsy (petrol vehicles) are needed for used by the Field Director and the two Deputy Field Directors. One mobile van is needed for H.Q. mobile Range.

Elephants: Presently there are 9 deptt. Elephants engaged for effective antipoaching and anti-illicit operations. A large area of the Reserve becomes inaccessible during rainy season. All 9 elephants are engaged in patrolling.

Bridges and Culverts: There are numerous bridges and culverts in BTR. These are to be maintained as and when required. One suspension bridge on Dumrijhora near 23rd mile Beat, one suspension bridge on Gholani (for connecting Balapara Beat with Barobisha) and one bridge on Dhawla for connecting Chipra and South Rydak Beats with Samuktala is proposed.

K) Fire Protection:-

One of the important factors, which command 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 majors is to get reciprocal commitments regarding control of forest fire through regular meetings with local people of the surrounding villages.

In Buxa Tiger Reserve, man-made surface fires occur quite frequently. History of fire, causes of fire, extent of fire damage, etc. have been dealt in details in Part A of Plan.

i) Causes of fire in BTR:-

In Buxa Tiger Reserve the reason for forest fires is purely man-made either deliberately or accidentally. Following are the main reasons of forest fires in BTR:

iii) Fire due to grazers:

The cowboys or cattle grazers lit fire in forests. Sometimes these grazers deliberately fire the areas to get new flush of grasses. It is estimated that near about one lakh cattle graze in BTR every day. Lots of cowboys enter into the Reserve with those cattle. They are serious source of fire hazards.

ii) Fire due to pedestrians:

Large numbers of forest paths are used by local people for their day to day activities. While passing through knowingly or unknowingly they throw the burning butts of cigarette/ bidis, causing fires to forest.

v) Fire due to poachers:

Poachers who set fire in the forest areas, have two aims in their minds:

- c. To deviate attention of forest department staff from targeted timber felling areas to other areas, so that staff gets involved in fire fighting giving them access to targeted areas.
- d. To flush out wild animals from forest, for easy hunting.

vi) Fire due to NWFP collectors:

Fire is also being caused by forest produce collectors especially by people who collect "Phooljharu", as by fire clearing the area, they get, fresh/flush of Phooljharu and an increased growth of the same for their business.

iv) Fire protection measures:-

The management has to continue the all round prevention and protection strategy well in advance, involving the local people, before the fire season actually sets in. Depending on the probability of such fire accidents, the sensitive areas prone to occurrence of fire have to be classified into three categories: Ultra sensitive, very sensitive and sensitive for prioritizing zones of actions.

v) Protocol for Control of Fires in Buxa Tiger Reserve.

Fire in the winter month is quite serious problem in many parts of Buxa Tiger Reserve. Fire may be caused accidentally or deliberately but they cause immense harm to the plantation natural regeneration and also too many ground breeding birds, reptiles, small mammals and micro-fauna. Therefore, the following guiding principles may be adopted:

1. carrying out adequate publicity through meetings, miking, through posters etc. among the graziers, forest villagers, Joint Forest Management Committees (JFMCs), Tea Garden

- labourers, vehicle drivers, forest labourers and tourists-informing them about the harms of forest fire and the legal consequences of fire in National Park, Sanctuary and Reserve Forests. The P.W.D. and the Railway staff working in and around the Tiger Reserve should also be cautioned and advised to take preventive methods to control fire.
- 2. GIS cell Aranya Bhavan shall provide warnings based on the Satellite data and will relay it to field units immediately for effective control measures. DFDs on receiving such warnings to immediately deploy staff for control and take necessary steps in further spread of fires.
- **3.** To take steps for maintenance of existing fire-lines and creation of new fire-control belts around younger plantations and timber depots. Carry out control-burning in all sensitive areas at regular intervals.
- **4.** To engage fire watchers and provide them with all necessary fire-fighting equipments. Mobilization FPC/ EDC members for special patrolling for controlling fire.
- **5.** To check up existing fire-fighting equipments, water-reservoirs and fire extinguishers in offices, Timber Depots, Forest Rest House etc. and take immediate steps for repairing/refilling the same, if necessary.
- **6.** To use R.T. network to report incidences of fire and to mobilize staff for fire-fighting where necessary, RT stations may be kept open during the night hours and all incidents of fire during the previous day should be reported to the Field Director and Deputy Field Directors through the Buxa Control at 9 A.M. positively.
- 7. Range Officer shall also submit immediate report of any incidence of fire (mentioning date, time, location, cause, area in hectare, damage caused, action taken to control fire and apprehended culprits) to the Deputy Field Director and also maintain a register to record this information.
- **8.** All cases fire should be treated as "Offence" and recorded in the Offence Register as UDOR, COR and POR as the case may be. Suitable action for apprehending offenders should be taken.
- **9.** Punitive action should be taken against villagers who do not co-operate in fire-control measures. Grazing of cattle should be strictly denied .FPC/ EDCs should be warned that the implementation of their FDA works may be suspended, if they do not co-operative.
- **10.** The ADFOs/ AO should monitor the progress of fire-control measures and prepare periodic reports and maps to assess the efficacy of these measures as compared to the previous years.

11. The Deputy Field Directors may give further instructions/ guidelines to the field staff as may be necessary. They should ensure that the funds provided to them under the Non-Plan, the CSS, Project Tiger & CSS, Project Elephant, for fire-control measures are fully and effectively utilized.

The protection measures include the following steps:-

a) Preventive measures:

The following main activities are carried out in the field to control the situation -

- *i)* Preparation and maintenance of fire lines: The existing mile roads and forests roads are used as fire lines in BTR. Maintenance of these fire lines by cutting and control burning of grasses and debris should be done twice every year i.e., during the month of November/ December and March.
 - *ii)* Cutting and burning of strips along forest roads
 - *iii)* The existing patrolling paths should be cleaned each year before the fire season. Regular sweeping and removal of dry leaves from fire-lines through out the fire seasons should also be carried out
 - *iv)* Monitoring progress and occurrence of fire by watchers through round the clock wireless network
 - v) As most incidences of fire occur in between 2.00 P.M. and 6.00 P.M., extensive patrolling should be done during this period.
 - vi) Graziers and N.W.F.P. collectors often cause fire in the Reserve. Appropriate control should be exercised on such people within the Reserve.
 - vii) Fire lines should be cut up around younger plantations, depots and other strategic points.
 - viii) Appropriate signages explaining the damage caused by fire should be put up at strategic places for awareness generation among the local people. Similarly, distribution of leaflets, etc. should be done in fringe villages and local markets to increase the general awareness among the people about harmful effects of fires in the Reserve.

b) Combative Measures:-

i) Fire watch tower/ tree machan for fire detection:

Fire watch towers/ tree machan should be constructed at strategic points.

ii) Establishment of Fire Control Rooms:-

Control room at Division office shall double up as Fire control room.

iii) Fire fighting Squad:-

In fire prone areas special teams comprising of field staff and labourers should be engaged for fire control. This team will also clean the leaf litters over fire lines and on road and burn the same. Fire fighting squads should operate from December to March each year.

iv) Fire Camps -

During the fire seasons temporary fire camps are maintained at higher locations to keep strict watch on fires. These camps are manned thorough the fire seasons. Some permanent anti-poaching camps may be manned for fire surveillance activities.

v) Equipments and Tools:-

a) Fire extinguisher

Handy fire extinguisher should be kept in sufficient numbers at depots, rest houses, forest offices and NIC.

b) Modern fire fighting tools and equipment.

The fire-fighting squads should be provided with the following fire-fighting equipment:

- a) Fire beater, b) Fire rake, c) Brush hook, d) Fire shovel,
- e) McLEOD tools, f) PULASKI's tools

vi) Regular Patrolling of the beats: -

Regular patrolling must be ensured in the entire fire season. The BTR has experienced many incidences of fire hazards in the past and under the prevailing sensitive situation, constant-patrolling in-groups are resorted to from vantage points. This is in addition to the round the clock patrolling from the various patrolling camps.

Suppression of Fire: -

On getting information of occurrence of fire in an area, the control room In-charge would manage to send it immediately to the fire spots to control it. Usually the following three types of operations are done while extinguishing the fire.

(a) To create an inflammable-material free line -

A line generally up to a width of 1.5 to 2 meters is cleared off of the fallen leaves, twigs and other inflammable materials to restrict the further advancement of the flames of the fire. Depending upon the site, such instantly created fire lines should be in the shape of a circle or a semi circle to compel the flames to confine within that small area.

(b) Counter burning: -

This technique is also very effective. A fire of a small magnitude is lit in opposite direction of the advancement of the flames. The initial spread of such counter burning is very slow as the wind direction remains opposite to the advancing flame. However after a few minutes, when the advancing flame confluences with the flames of counter burning, the rage of the fire becomes cool down. Since the inflammable materials, near the "Counter burning" sites have already been burnt, the advancing flame ceases there only for want of any burning material. However, this should be the last option and used only when all other methods fail.

(c) Beating the fire -

Beating the advancing line of fire by a group of labours is also very effective. Generally a small twig with green leaves is used in most of the cases. Use of modern tools and fire- beaters can also help in extinguishing such fire.

viii) Active involvement of local people -

Active involvement of people in preventive and combative measures of fire protection should be preferred to tackle the situation in an effective way. The local people are the cause of almost every case of fire-occurrence, either intentionally or unintentionally. Educating such indigenous people regarding the harmful effects of fire would be really effective. For this, a series of meetings with the local people should be organized every year. A number of other matters require being convinced to

these indigenous people, who generally, intentionally or unintentionally cause the spread of fire in the PA.

3.2.1 Monitoring of Fire incidences:-

Monitoring of fire incidences in BTR is very essential to assets the impact of fire and to formulate future strategies. Following fire record must be maintained in each Range.

j) A Fire Register will be maintained in each Range Office to record the cases of forest fire in the following format.

| Case No. | Date of fire | Beat | Comptt | Specific location | Area burnt in (Ha) | Damage of fauna, flora and other properties | Probable cause of fire | Action taken | After effect of fire |
|-------------|--------------|------|--------|-------------------|--------------------------|---|------------------------------|-----------------|----------------------|
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| | | | | | | | | | |

ii) Map of Fire prone and vulnerable areas:

A map should be prepared from the fire data collected from past incidences. Fire prone areas should be identified. They should be classified by degree of burning intensity.

While there are no major instances of forest fires resulting into heavy losses in BTR, enhanced preventive measures need to be implemented which might include the following:iii) GIS cell located at PCCF office shall provide satellite warnings and data about fire occurrences to divisions through Fax or email and Divisions shall act accordingly in preventing and controlling fires. Early warning system in this regard through satellite data shall be made available to field units by GIS cell.

L) Intelligence Gathering and Coordination:

Strategies for Better Intelligence Gathering:

Intelligence gathering is most important step in prevention of crime. There should be a proper network of informers. Informers should be cultivated personally. The name of informer should not be disclosed. There should be proper system of payment to informers. Identify local person and imparting then the basics of wildlife crime detection so as to avail their services as and when required as informers. A local staff and watchers can provide valuable information, which should be systematically recorded and further investigation may be taken. Some key persons like shopkeeper, taxi drivers, hoteliers and some wildlife-oriented persons may provide valuable information.

Some general points in intelligence gathering are as follows:-

- Identification of problematic forest villages and other habitations.
- Establishing intelligence network by selection and deployment of informers.
- Motivation of informers through rewards/ remuneration and ensuring informer secrecy and safety
- Monitoring the activities of informers and ensuring their timely and periodical reporting.
- Identification of focal points such as check posts, road check points and establishing them

- Collaborating with other agencies like Police, SSB to ensure strict vigilance at these checkpoints, especially in areas like Jaigaon. Committees to be formed with roles of individuals/organizations clearly defined
- Providing basic training / material to personnel from other agencies for accurate identification of illegal material.
- Ensuring regular supply and sharing of information.
- Setting up of 24-hrs call-in number for reporting on fire/poaching/other wildlife crime etc. by general public

Strategies for Better Coordination:

There are many branches in Forest Department which are dealing with wildlife Crime and sister agencies directly and indirectly involve in crime detection and prosecution should have proper coordination. For proper coordination following measures may be taken –

- Supply and sharing of relevant information
- Conducting awareness generation meetings for people from other departments/agencies.
- Training or dissemination of information material in case of some collaborative measures
- Joint activities like joint patrolling with Army or SSB.
- Presenting a clear agenda highlighting the need for coordination and the resultant benefits for both sides

Specifically:-

- 1. **Meeting with S.P.** There should be a regular monthly meeting with S.P. of concerning district and sub ordinate staffs to review the crime against wildlife. The exchange of crime dossiers must be carried out at Range and Thana level by concerning range officer and I.C.
 - **Co-ordination with Police:** The Deputy Field Directors would ensure with help of Superintendent of Police of their jurisdiction that monthly "Crime Conference" at Police Station level for following Police Station is held every month involving Police, Forest, GRP, RPF and SSB.
 - Kalchini-Jaigaon Police Station.
 - Samuktala Police Station.
 - Kumargram Police Station.
 - Alipurduar Police Station.
- 2. **Meetings with District Judge** A periodical meeting with district judge to expedite to disposal of pending cases relating to wildlife cases must be carried out.
- 3. **Co-ordination with 10 SAP Commandant: The** Deputy Field Directors would ensure that the 10 SAP Camps stationed at North Panabari, Bhutri, and Marakata in field are properly utilized. They would coordinate with the 10 SAP Commandant every month so that proper coordination is established in the field.
- 4. **Co-ordination with SSB**: Already as per MoEF Memo No. 1-17/2005-PT DT. 02.8.2005, SSB is supposed to assist the Tiger Reserve in protection works. For this a coordination monthly meeting with Commandant of SSB stationed in Buxa

Tiger Reserve has been initiated from 21/06/2012 and this would be continued by Deputy Field Directors every month. A Protection Workshop may be held with SSB from time to time preferably every quarter.

Protection Review Meetings: Deputy Field Directors would ensure that a review meeting with Field Staff is held every month.

- A Quarterly meeting on Protection would be chaired by the Chief Conservator of Forests, Wild Life (North), West Bengal with all the officers and field staff.
- Principal Chief Conservator of Forests, Wild Life & Chief Wild Life Warden, West Bengal would chair such meeting twice in the financial year.
- An annual review meeting would be held in Mid May every year at Rajabhatkhawa, wherein all the related agencies and departments would participate. The arrangements would be made by Field Director, Buxa Tiger Reserve in consultation with Chief Conservator of Forests, Wild Life (North), West Bengal.
- 5. There should be a monthly meeting with neighboring district officials like Collector, DFO etc. for exchange of wildlife crime dossier to facilitate joint action.
- 6. There should be surprise raids jointly with the local police in Railway Station, Local trains; Bus Stop, Bus and Cafeteria may be organized.
- 7. A regular tri monthly inter state meeting with officer of the adjoining state must be organized. The inter state crime control coordination strategy may be developed.
- 8. Regular periodical meeting with other law enforcing agencies like narcotics, revenue and others through tiger cell and other bodies.

M) Staff & Infrastructure Requirement:

To overcome the constraints by effective protection measures as elucidated above the following staff structure is proposed.

I. Requirement of Staff for Protection purposes

| | 1. Ite different of Start for Frozenski parposes | | | | | | |
|-----------|--|---------------------|---|---|--|--|--|
| SL No. | Name of Post | Present Strength | Actually required as per current field requirements | Remarks | | | |
| 1 | Forest Ranger | 25 | 28 | Additional Ranges Required: 1. Research Range 2. Wild Life Squad under Buxa Tiger Reserve (East) 3. Wild Life Squad under Buxa Tiger Reserve (West) | | | |
| 2 | Deputy Ranger/Forester | 75 | 90 | For deployment in above Ranges/Squads & as Depot Officers & 3 for Rail Control Room | | | |

| 3 | Forest Guard | 233 | 400 | At present the sanctioned strength is 233 which are highly insufficient. Even at full strength one forest guard need to protect approximately 400 ha area which humanly impossible considering the protection pressures on forests. Even the sanctioned strength remains unfulfilled most of the time. 30 % of sanctioned forest guards are physically not fit to work in tough terrain. For effective protection of Buxa Forests and valuable wildlife including tiger, the sanctioned strength of forest guards must be increased to 400 Forest Guards. So that each Forest Guard can cover 200 ha area. |
|---|----------------------|-----|-----|--|
| 4 | Head Forest Guard | 28 | 40 | To head important camps and outposts. |

N) Implementation of MSTrIPES:

For proper monitoring and scientific management of the Reserve, MSTrIPES protocol will be followed. At present E-patrolling module is being implemented in 38 camps (Beat) and regular monitoring of staff movement along with their observation is being done from the office of the Field Director & Deputy Field Directors. PHASE-IV protocol including camera trap is also being followed regularly as per guidelines of NTCA.

Midterm review and Impact assessment of plan

It is proposed to have midterm review of prescriptions of the plan at 5th year during 2017-18 for core, buffer and corridors. The midterm review may be carried out by a team formed by Field director, Buxa Tiger Reserve duly approved by Chief Wildlife Warden. Field Director will be the chairman of such committee, comprising Deputy Field Directors, DFO monitoring, DFO Silviculture, scientist of the local area, reputed NGOs and technical experts as desired and recommended by the Field director. The committee shall study the impact of prescriptions on the goals and objectives set for the period and may suggest any modification or midterm alterations to achieve such goals. If necessary committee may hold stakeholders meeting to assess the impact and future needs.

Regular Monitoring of plantations shall be done by monitoring division every year and as per the prescription of monitoring division the midterm corrections may be included. The committee constitute for the review and impact assessment may follow the following criteria which is critical for the tiger reserve and its long term sustenance in assessing the impact.

Criteria of Review

- 1 Whether the plan prescriptions are followed or not?
- 2 If there are any deviations from plan prescriptions?
- 3 To review any violation of any acts /rules/guidelines and midterm corrections to rectify them
- 4 The changes in habitat improvement works and its impact on Herbivore and other ungulates
- 5 Impact of habitat changes on prey, tiger population etc
- 6 Changes in population dynamics of herbivores and carnivores
- Whether the prescriptions are helping the reserve in reducing the existing pressures on grazing, fuel wood etc.
- 8 Any other miscellaneous issues as the review committee deems fit.
- 9 Functioning of JFMCs and their role in Tiger Reserve management

After thorough review of the plan recommendations and for first five years and its impact assessment the committee may suggest midterm corrections based on the impact assessment and shall submit a report to Field Director, Buxa Tiger Reserve. Such midterm review may be incorporated in to the plan after due approval from Chief Wildlife Warden and NTCA for further five years of the plan period.



Annexure-1

Government of West Bengal Forests Department FOR Branch Writers' Building, Kolkata-700001

NOTIFICATION

No: 3051 - For / 11M-28/07Kolkata, the 6^{th} August, 2009

Dated,

In partial modification of this Departmetns' Notification No.6027-For, dated 18-12-2007 and in exercise of the power conferred by the paragraph (i) of the explanations following sub-sections (4) of Section 38 V of Wildlife (Protection) Act, 1972, the Governor is pleased hereby to declare, with effect from the date of issue of this Notification, the area described in the Schedule below to be the Core or Critical Tiger Habitat of Buxa Tiger Reserve.

Area Statement of Buxa Tiger Reserve A. CORE AREA:

| S/L No. | Block & Comptt. | Area (Ha.) | Legal Status |
|---------|--|------------|--------------|
| 1. | Tashigaon (1, 2) | 1254.70 | NP |
| 2. | North Rajabhatkhawa (5a, 6a(P), 7, 12, 13, 14) | 1975.21 | NP |
| 3(a). | South Rajabhatkhawa (3, 4, 5, 6, 11, 12, 13) | 2001.93 | NP |
| 3(b) | South Rajabhatkhawa (14) | 234.72 | WLS |
| 4. | Jainti (1- 9) | 4021.27 | NP |
| 5. | Panbari (1-3, 6-9) | 2065.52 | NP |
| 6(a). | Checko (1) | 394.98 | WLS |
| 6(b). | Checko (2) | 391.64 | NP |
| 7. | Chunabhati [1, 2, 3(P)] | 1990.25 | WLS |
| 8. | Tobgaon (1 - 4) | 3135.95 | WLS |
| 9. | Phaskhawa [1(P), 3(P)] | 1265.00 | WLS |
| 10. | Hatipota [1, 2(P)] | 767.80 | WLS |
| 11. | Bhutanghat [1, 2] | 1031.13 | WLS |
| 12. | Adma [4, 5(P)] | 695.13 | WLS |
| 13(a) | Pana (1, 2) | 627.08 | WLS |
| 13(b) | Pana (3,4) | 709.18 | WLS |
| 14. | Bharnabari (1-4) | 1685.44 | WLS |
| 15(a). | Santrabari [1, 2a, 3(P), 4(P)] | 2154.03 | WLS |
| 15(b) | Santrabari [2b] | 108.82 | WLS |
| 16. | Bhutri [1, 2, 3(P), 4] | 1132.77 | WLS |

| S/L No. | Block & Comptt. | Area (Ha.) | Legal Status |
|---------|---------------------|------------|--------------|
| 17 | . North Rydak (1-3) | 1538.23 | WLS |
| 18. | Marakhata (1-4) | 1352.24 | WLS |
| 19. | Narathali (1, 2) | 1288.12 | WLS |
| 20(a) | Newlands (1, 2b) | 819.51 | WLS |
| 20(b) | Newlands (2a) | 26.00 | WLS |

| S/L No. | Block & Comptt. | Area (Ha.) | Legal Status |
|-------------|------------------------|------------|--------------|
| 20(c) | Newlands I & II | 96.91 | WLS |
| 21. | Kumargram [1(P), 2(P)] | 990.37 | WLS |
| 22. | Sankosh [1, 2(P)] | 646.27 | WLS |
| 23. | Kartick PF | 558.78 | WLS |
| 24. | Rahimabad | 68.58 | WLS |
| 25. | Jainti-Hatipota-I & II | 489.22 | WLS |
| 26. | Phaskhawa | 248.80 | WLS |
| 27. | Chuniajhora- I & II | 180.79 | WLS |
| 28. | Kartick USF | 40.12 | WLS |
| 29. | Turturi | 114.67 | WLS |
| 30. | Rangamati (1-3) | 1008.49 | WLS |
| 31. | Central Rydak (1-4) | 1339.03 | WLS |
| 32. | Central Rydak (5,6) | 609.45 | WLS |
| TOTAL :: | | 39058.13 | |

By Order of the Governor

Sd/-(K. S. Rajendra Kumar) Additional Chief Secretary to the Govt. of West Bengal

Annexure 2

Government of West Bengal Forests Department FOR Branch Writers' Building, Kolkata-700001

NOTIFICATION

No: <u>3050 - For / 11M-28/07</u> Kolkata, the 6th August, 2009 Dated,

WHEREAS it has been established on the bsis of scientific and objective criteria that the area described in the Schedule below (hereinafter referred to as the said area) is required to ensure the integrity of the Core of Critical Tiger Habitat of Buxa Tiger Reserve with adequate dispersal for tiger species and which aim of promoting co-existence between wildlife and human activity with due recognition fot the live hood, developmental, social and cultural rights of the local people;

WHEREAS the State Government agrees with the recommendation of the expert committee set up vide P.C.C.F. (Wildlife), Govt. of West Bengal's Office Order No.12-M/8-2007, dated 04-11-2007 that the said area should be maintained as the Buffer or Peripheral Area of Buxa Tiger Reserve.

NOW, therefore, in exercise of the power conferred by paragraph (II) of the Explanation following sub-section (4) of Section 38 V of the Wildlife (Protection) Act, 1972, the Governor is pleased hereby to declare with effect from the date of issued of this Notification, the said area to be the Buffer or Peripheral Area of Buxa Tiger Reserve.

Area Statement of Buxa Tiger Reserve

1. BUFFER AREA

| S/L No. | Block & Comptt. | Area (Ha.) | Legal Status |
|------------|---|---------------|--------------|
| 1. | North Rajabhatkhawa [1, 2, 3, 4, 5b, 6a(P), 6b, 8, 9, 10, 11, 15, 16] | 3329.42 | RF |
| 2. | South Rajabhatkhawa [1, 2, 7, 8, 9, 10, 15, 16] | 3001.67 | RF |
| 3. | Panbari [4, 5, 10] | 1106.46 | RF |
| 4. | Phaskhawa [1(P), 2, 3(P)] | 1222.00 | RF |
| 5. | Hatipota [2(P)] | 647.00 | RF |
| 6. | Checko [3, 4, 5, 6-9] | 1761.12 | RF |
| 7. | Chunabhati [3(P)] | 11.33 | RF |
| 8 | Adma [1, 2, 3, 5(P)] | 1812.31 | RF |
| 9 | Santrabari [3(P), 4(P)] | 37.00 | RF |
| 10 | Kumargram [1(P), 2(P)] | 61.00 | RF |
| 11 | Sankosh [2(P), 3a, 3b] | 458.75 | RF |

| S/L No. | Block & Comptt. | Area (Ha.) | Legal Status |
|------------|----------------------------|---------------|--------------|
| 12 | Dima[1-4] | 1027.44 | RF |
| 13 | Gadadhar [1, 2, 3, 4-6] | 1433.86 | RF |
| 14 | Damanpur [1, 2, 3, 4, 5-9] | 2574.94 | RF |
| 15 | Poro [1-11] | 3620.29 | RF |
| 16 | Nimati [1-7] | 2359.69 | RF |

| S/L No. | Block & Comptt. | Area (Ha.) | Legal Status |
|-------------|---|---------------|---------------------|
| 17 | Raimatang [1, 2, 3, 4, 5, 6, 7, 8, 9, 10] | 3504.26 | RF |
| 18 | Dhawla [1-3] | 587.22 | RF |
| 19 | North Bholka [1-5] | 1422.46 | RF |
| 20 | South Bholka [1-6] | 2335.05 | RF |
| 21 | South Rydak [1, 2, 3, 4, 5, 6, 7] | 2397.84 | RF |
| 22 | Bhutri [3(P), 5] | 392.85 | RF |
| 23 | Gudamdabri [1-4] | 1613.42 | RF |
| 24 | Nimti-Domohani | 5.14 | RF |
| 25 | Lokenathpur | 7.07 | RF |
| 26 | Turturi khand | 2.66 | RF |
| 27 | Madhya Haldibari | 52.21 | RF |
| 28 | Uttar Rampur | 7.21 | USF |
| 29 | Turturi Khand | 11.13 | USF |
| 30 | Rydak | 127.29 | USF |
| 31 | Phoskadanga | 35.96 | USF |
| 32 | Dakshin Rampur | 9.00 | USF |
| 33 | Dima R. L. | 53.81 | USF |
| TOTA L:: | | 37028.86 | |

By Order of the Governor

Sd/-(K. S. Rajendra Kumar) Additional Chief Secretary to the Govt. of West Bengal

Annexure-2A

Zonation Status of Buxa Tiger Reserve

| | Proposed Core | | | Proposed Buffer | |
|--------------------------------|---------------|--------|------------------------|-----------------|--------|
| Block-Compartment | Area | Legal | Block- | Area | Legal |
| Biock-Compartment | (Ha) | Status | Compartment | (Ha) | Status |
| Tashigaon (1, 2) | 1,255 | NP | | | |
| North Rajabhatkhawa (1-16) | 5304.63 | NP+RF | | | |
| , , | | | South | | |
| South Rajabhatkhawa (1,2,3, 4, | | | Rajabhatkhawa(9,10,1 | | |
| 5, 6,7,8,11,12,13) | 3,051 | NP | 5,16) | 1953 | RF |
| South Rajabhatkhawa (14) | 235 | WLS | | | |
| • | | | | • | |
| Jainti (1-9) | 4,021 | NP | | | |
| Panbari (1-3, 6-9) | 2,066 | NP | Panbari(4,5,10) | 1107 | RF |
| Checko (1) | 395 | WLS | Checko(6,7,8,9) | 1122 | RF |
| Checko (2) | 392 | NP | | | |
| Checko (3,4,5) | 639 | RF | | | |
| Chunabhati [1, 2, 3] | 2,002 | WLS | | | |
| Tobgaon (1-4) | 3,136 | WLS | | | |
| Phaskhawa [1, 2,3] | 2,487 | WLS+RF | | | |
| Hatipota [1,2] | 1,415 | WLS+RF | | | |
| Bhutanghat (1, 2) | 1,031 | WLS | | | |
| Adma [1,2,3,4,5] | 2,507 | WLS | | | |
| Santrabari [1, 2a, 2b,3, 4] | 2,300 | WLS | | | |
| North Rydak (1,2,3) | 1538 | WLS | | | |
| Newlands (1, 2a,2b) | 846 | WLS | | | |
| Kumargram [1,2] | 1,051 | WLS+RF | | | |
| Sankosh [1,2,3] | 1,105 | WLS | Central Rydak(1-6) | 1,948 | WLS |
| | | | Kartick PF | 559 | WLS |
| | | | Rahimabad | 69 | WLS |
| | | | Jainti-Hatipota-I & II | 489 | WLS |
| | | | Phaskhawa | 249 | WLS |
| | | | Chuniajhora-I & II | 181 | WLS |
| | | | Kartick USF | 40 | WLS |
| | | | | 40 | |
| | | | Turturi | 115 | WLS |

| | Proposed Core | | | Proposed Core | |
|----------------------------------|---------------|-----------------|--|---------------|--------------|
| Block-Compartment | Area (Ha) | Legal Status | Block-Compartment | Area (Ha) | Legal Status |
| | | | Rangamati (1-3) | 1,008 | WLS |
| | | | Newlands -I & II | 97 | WLS |
| | | | Pana(1,2,3,4) | 1,336 | WLS |
| | | | Bharnabari(1-4) | 1,685 | WLS |
| | | | Bhutri (1,2,3,4,5) | 1526 | WLS+RF |
| | | | Marakata (1-4) | 1,352 | WLS |
| | 100= | | Narathali(1,2) | 1,288 | WLS |
| Dima(1,2,3,4) | 1027 | RF | G 1 11 (2.45.6) | 00.5 | DE |
| Gadadhar(1,3) | 448 | | Gadadhar(2,4,5,6) Damanpur(1,2,3,4,5,6,7,8,9) | 985 | RF RF |
| | | | Poro(1,2,3,4,5,6,7,8,9,10,11) | 2575 3620 | RF |
| | | | Nimati(1,2,3,4,5,6,7) | 2360 | RF |
| Raimatang (1,2,3,4,5,6,7,8,9,10) | 3504 | RF | INIIIati(1,2,3,4,3,0,7) | 2300 | KI |
| Rumatang (1,2,3,4,3,0,7,0,7,10) | 3304 | Ki | Dhawla(1,2,3) | 587 | RF |
| | | | North Bholka(1,2,3,4,5) | 1422 | RF |
| | | | South Bholka(1,2,3,4,5,6,) | 2335 | RF |
| | | | South Rydak(1,2,3,4,5,6,7) | 2398 | RF |
| | | | Godamdabri (1,2,3,4) | 1613 | RF |
| | | | Nimti Domohoni | 5 | RF |
| | | | Lokenathpur | 7 | RF |
| | | | Turturi Khand | 14 | RF |
| | | | Madhya Haldibari | 52 | RF |
| | | | Uttar Rampur | 7 | USF |
| | | | Rydak | 127 | USF |
| | | | Phoskadanga | 36 | USF |
| | | | Dakshin Rampur | 9 | USF |
| | | | Dima RL | 54 | USF |
| TOTAL :: | 41,755 | - | | 34,332 | |
| Synopsis | | | | | |
| Core: | 41,755 | | | | |
| Buffer Area | 34,332 | | | | |
| Total-BTR | 76,087 | | | | |

Annexure - 2B

Forest Villages & FD Holdings in Proposed Core Zone of Buxa Tiger Reserve

| S/L No. | Village Name | Total No. of family * |
|---------|----------------------------|--------------------------|
| 1 | PampuBasti | 41 |
| 3 | Raimatang | 81 |
| 4 | Gangutia | 68 |
| 5 | Adma | 64 |
| 6 | 28 th Mile | 51 |
| 7 | 29 th Mile | 25 |
| 8 | Sankosh | 98 |
| 9 | Kumargram | 56 |
| 10 | Newlands | 40 |
| 11 | Chunabhati | 70 |
| 13 | Lepchakhawa (Tashigaon) | 86 |
| 12 | Santrabari | 96 |
| 13 | BhutiaBasti | 72 |
| 14 | JAINTY FD Holding | 92 |
| 15 | BUXADUAR FD Holding | 79 |

^{*} As per official records

ANNEXURE-2C

Report of the Expert Committee for Realignment of Core Zone of Buxa Tiger Reserve held on 12.05.2015 at Kolkata, West Bengal.

(Vide Principal Chief Conservator of Forests, Wildlife & Chief Wildlife Warden, West Bengal Order No. 4-M/8-2015, dated 27-04-2015)

In pursuance to the Order No. 4-M/8-2015, dated 27-04-2015 by Principal Chief Conservator of Forests, Wildlife & Chief Wildlife Warden, West Bengal regarding Constitution of Expert Committee for Realignment of Core Zone of Buxa Tiger Reserve, the 1st meeting of the committee was held on 12.05.2015 in the Conference Room in the Office of PCCF, Wildlife & Chief Wildlife Warden, Bikash Bhawan, Kolkata. The necessity for realignment of core zone of Buxa Tiger Reserve has arisen after the State Board for Wildlife in its 9th meeting held on 10-02-2015 has approved the proposal for realignment of core zone of Buxa Tiger Reserve and in pursuance of the same u/s 38V of the Wildlife (Protection) Act, 1972, the Expert Committee has been constituted.

After having detailed discussion on the subject in the 1st meeting, the committee has considered all the aspects related to the existing core zone of Buxa Tiger Reserve in light of its habitat quality, habitat occupancy by major wildlife, availability of actual buffer to the existing core zone, the rights of Schedule Tribes and other forest dwellers mainly occupying the forest villages in Buxa Tiger Reserve, to ensure the availability of inviolate habitat for tigers and other wildlife. After detailed deliberation, the committee has unanimously concluded that:

- 1. The committee realigned core zone of Buxa Tiger Reserve for existing core zone with an area of 390.58 sq.km. to 417.55 sq.km. for proposed realigned core zone.
- 2. The details of existing core zone and buffer zone are annexed as <u>Annexure-1</u>, whereas the details of compartment wise proposed realigned core zone and buffer zone are annexed as Annexure-2.
- 3. The details of population of Schedule Tribes and other forest dwellers in existing core zone and realignment of proposed core zone are annexed as <u>Annexure-3</u>.
- 4. The map of Buxa Tiger Reserve with existing core zone and proposed realigned core zone along with buffer zone is annexed as <u>Annexure-4</u>.

The committee is of the view that the proposed realigned core zone of Buxa Tiger Reserve shall address the issue of conservation of tiger and other wildlife by providing inviolate space. The proposed realigned core zone will address the issue of rights of Schedule Tribes and other forest dwellers in accordance with rules and laws in vogue. Most importantly the proposed realigned core zone will address management issues rather than pressing them under the carpet, which is not in the interest of public and wildlife both. Overall committee is of the view that proposed core zone of Buxa Tiger Reserve will help in conservation of tiger and other wildlife in better way on sustainable manner.

Enclo.: Annexure 1 to Annexure 4

(Dr. Pradeep Vyas, IFS) APCCF & Director, Sundarban Biosphere Reserve West Bengal

> (Dr. Brij Raj Sharma, IFS) APCCF, Wildlife, West Bengal

(Shri S. Sundriyal, IFS) CCF & Field Director, Buxa Tiger Reserve

(Shri Animesh Bose) HNAF & Member, State Board for Wildlife, West Bengal

(Shri Biswajit Roy Chowdhury) NEWS & Member, State Board for Wildlife, West Bengal

Annexure -2D

GOVERNMENT OF WEST BENGAL

DIRECTORATE OF FORESTS

Office of the Principal Chief Conservator of Forests, Wildlife
& Chief Wildlife Warden, West Bengal
Bikash Bhawan, North Block, 3rd Floor, Saltlake City, Kolkata – 700 091.

Tel No. 033-2334-6900/2358-3208, Fax. 91-033-2334 5946

e-mail.wildlife@cal.vsnl.net.in

No. 47 62 /WL/2W-743/2015,

Dated. 63 ./6.2016

To, The Principal Secretary, Forest Department, Govt. of West Bengal.

Kind Attn: The OSD & Ex-Officio Jt. Secretary to the Govt. of West Bengal.

Sub: Minutes of 39th Meeting of standing Committee of NBWL.

Ref: MoEF&CC (WL Divn), GOI's letter No. 6-109/2016/WL (39th Meeting), dt. 19.09.16.

Kindly find enclosed herewith the extract of minutes of 39th Meeting of the Standing Committee of National Board for Wildlife, held on 23.08.2016 at New Delhi, where in, it is decided to recommend the proposal, in connection with Realignment of Core Zone of Buxa Tiger Reserve, West Bengal, based upon the recommendation of the Members of State Board for Wildlife in their 9th Meeting, held on 10.02.2015 at Nabbanna, Howrah as well as endorsement of the Forest Department, Govt. of West Bengal.

In this context, you are requested to issue necessary Resolution on this issue for taking appropriate action from our end.

Encl: As above,

Sd/- Dr. P. Vyas, IFS

Principal Chief Conservator of Forests, Wildlife & Chief Wildlife Warden, West Bengal.

No.9763(s)/WL/2W-743/2015, Copy along with enclosure forwarded for kind information to:-

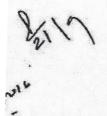
Dated. 63 -10-2016

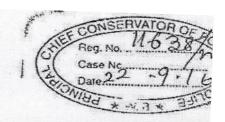
- 1. The P.S. to the Hon'ble MIC, Department of Forests, Govt. of West Bengal.
- 2. The Principal Chief Conservator of Forests (Head of Forest Force), West Bengal.
- 3. The Chief Conservator of Forests & Field Director, Buxa Tiger Reserve, West Bengal.
- 4. The Chief Conservator of Forests, Wildlife (North), West Bengal.

 The Scientist -'C', Deputy Director (Wildlife), MoEF&CC (Wildlife Division), Govt. of India, 6th Floor, Vayu Wings, Indira Paryavaran Bhawan, Jor Bag Road, Aliganj, New Delhi – 110 003, with reference to his letter quoted above.

Principal Chief Conservator of Forests, Wildlife & Chief Wildlife Warden, West Bengal.

Rabi\D:CFWL\letter1







Government of India Ministry of Environment, Forest and Climate Change (Wildlife Division)

6th Floor, Vayu Wing Indira Paryavaran Bhawan Jor Bag Road, Aliganj New Delhi-110003

F.No.6-109/2016 WL(39th Meeting) Dated:19th September 2016

To

All Members, '

Standing Committee of NBWL.

Sub: Minutes of 39th Meeting of Standing Committee of NBWL.

Sir/Madam,

Kindly find enclosed copy of the minutes of the 39th Meeting of the Standing Committee of National Board for Wildlife held on 23rd August 2016 at 11.00 AM in "Teesta", 1st Floor, Vayu Block, Indira Paryayaran Bhawan, Jor Bagh, New Delhi-110003 under the chairmanship of Hon'ble Minister of State (Independent Charge) for Environment, Forest and Climate Change.

Yours faithfully,

(Rajasekhar Ratti) Scientist 'C'/Deputy Director (WL)

Encl: As above

Distribution:

1. Secretary, MoEF & CC

2. Director General of Forests & Special Secretary, MoEF & CC.

3. Member Secretary, NTCA, New Delhi.

- 4. Additional Director General of Forests (FC), MoEF&CC,
- 5. Additional Director General of Forests (WL), MoEF&CC,

6. Director, Wildlife Institute of India, Dehradun.

7. Director, GEER Foundation, Gandhinagar, Gujarat.

8. Prof. R.Sukumar, Central for Ecological Sciences, Indian Institute of Science, Bangalore.

9. Dr. H.S. Singh, Gandhi Nagar, Gujarat.

10, Pr. Secretary (Forests), Government of Andhra Pradesh, Hyderabad.

Copy to:

1. PS to Hon'ble MOS (I/C) E&F.

2. PPS to DGF&SS, MoEF&CC.

3. PPS to Addl.DGF(WL) and Member Secretary, Standing Committee (NBWL).

4. PPS to IGF(WL)/PS to DIG(WL)/PS to JD(WL).

Minutes of 39th Meeting of the Standing Committee of NBWL held on 23th August 2016.

to the communities which in turn would be helpful for conservation of fish resources and habitats with the help of communities there.

After discussions, the Standing Committee decided to recommend the proposal along with the conditions stipulated by State Chief Wildlife Warden – including waste and sewage management and environmental monitoring.

38.2.1.2 Realignment of core zone of Buxa Tiger Reserve, West Bengal.

The Member Secretary briefed the Committee on the proposal. He mentioned that the proposal was deferred earlier due to non-receipt of endorsement of State Government.

The Chief Wildlife Warden, West Bengal stated that overall boundary of the Tiger Reserve has not been altered. Some areas of core area of the TR have been proposed to be re-designated as buffer while some areas of buffer have been proposed to be added in the core zone, based on the scientific and objective criteria following the due process of the law. The Core and Critical Tiger Habitat of the TR has been consolidated in this process. In the process, the core area of the TR has increased by 26.87 sq km. NTCA has recommended the proposal.

After discussions, the Standing Committee decided to recommend the proposal.

Annexure-3A

Registered No. WB/SC-247

No.219(I)

The





Gazette

EXTRAORDINARY

Published by Authority

VAISAKHA 23]

WEDNESDAY, MAY 13, 1987

[SAKA 1909

PART I -- Orders and notifications by the Governor of West Bengal, the High Court, Government Treasury, etc.

GOVERNMENT OF WEST BENGAL

FOREST DEPARTMENT

Forest

NOTIFICATION

No. 316-For./11B-1/86- 24th January 1986- Whereas the State Government considers that the area, the situation and limits of which are specified in the Schedule below (hereinafter referred to as the said area), is of adequate ecological, faunal, natural and zoological significance;

Now, therefore, in exercise of the power conferred by sub-section (I) of section 18 of the wild life (Protection) Act, 1972 (53 of 1972), the Governor is pleased hereby to declare, with effect from the data of publication of this notification in the official Gazette, the said area to be a sanctuary, to be known as Buxa Wild Life Sanctuary for the purpose of protecting, propagating and developing wild life and its environment.

The Schedule

Situation—

District:

Buxa Forest Division, Pana, Buxaduar, Jainti, East Rajabhatkhawa, West Rajabhatkhawa, East Damanpur, Rydak and North Bholka Ranges, Covering an area of 314.52 sq. km. and comprising the following forest blocks and compartments—

 Block
 Compartment

 Chunabhati
 ...
 1,2,3, (part)

 Tobgaon
 ...
 1,2,3,4,

 Tashigaon
 ...
 1, 2a (part), 2b (part)

Jalpaiguri

| North Rajabhatkhawa | | | 5a, 6a, (part),7,12,13,14 |
|----------------------------|-------|-------------|----------------------------------|
| Jainti | | | 1,2,3,4,5,6 (part), 7 (part) 8,9 |
| Phaskhawa | | | 1 (part), 3 (part) |
| South Rajabhatkhawa | | | 3,4,5,6,11,12,13,14 |
| Panbari | | | 1,2,3,6,7,8,9 |
| Checko | | | 1,2 |
| Hatipota | | | 1,2 (part) |
| Bhutanghat | | | 1,2 |
| Pana | | | 1,2,3 (part), 4 |
| Adma | | | 4,5 (part) |
| Santrabari | | | 1, 2a, 2b, 3(part), 4(part) |
| North Rydak | | | 1,2,3, |
| Central Rydak | | | 1,2,3,4,5 (part), 6 |
| Maarakata | | | 1,2,3,4 |
| Narathali | | | 1,2 |
| Newlands | | | 1,2 (part) |
| And | | | |
| Resumed Forests | | | |
| Of | | | |
| Jainti Hatipota | | | |
| I and II | | | |
| Phaskhawa | | • • • | |
| Chuniajhora | | • • • | |
| I and II | | | |
| Kartick Protected Forest | | • • • | |
| Turturi | | • • • • | |
| Rahimabad | | | |
| Newland | • • • | | |
| Kartick Unclassed State Fo | orest | | |
| | | | |

A. Limits—

North— International boundary with Bhutan.

East— Eastern boundary of Forests of Rydak range and Newland Block of North Bholka Range.

South—20-mile road.

West-

Road from Radharani Tea Estate to 30 miles and eastern boundaries of North Rajabhatklhawa 2,4,11, South Rajabhatkhawa 2,7,10,15 and Damanpur 3 compartments.

By order of the Governor R.N. MUKHERJEE Dy. Secy. to the Govt. of West Bengal.

Annexure-3B

Government of West Bengal Forests Department Forest Branch

No. 7588-For. 11B-24/90

Calcutta, the 6th October, 1990

NOTIFICATION

WHEREAS the area whose situation and boundaries are described in the Schedule below (hereinafter referred to as the said area) is considered to be of adequate ecological, faunal, natural and Zoological significance;

NOW, THEREFORE, in exercise of the power conferred by sub-section (1) of section 18 of the Wild Life (Protection) Act, 1972 (53 of 1972), and in supersession of such part of all previous notifications declaring the said area or part thereof to be a sanctuary as relates to such declaration, the Governor, in continuation of this department notification No. 316-For/11B-1/86, dated the 24th January, 1986, declaring the forest area of 314.52 sq. km. to be a sanctuary to be known as Buxa Wild Life Sanctuary, is pleased hereby to declare, with effect from the date of publication of this notification in the official Gazette, the said area to be a sanctuary to be known as Buxa Wild Life Sanctuary, for the purpose of protecting, propagating and developing wild Life and its environment.

The Schedule

A. Situation

District: Jalpaiguri:

Buxa Forest Division, Coooch Behar Forest Division North Bholka Range and Nilpara Range covering an area of 54.47* sq. km. and comprising the following blocks and compartments:-

| <u>Block</u> | Compartment |
|--------------|--------------------|
| Rangamati | 1a |
| | 1b |
| | 2a |
| | 2b |
| | 3a |
| | 3b |
| | Extension Block |
| Barnabari | 1a |
| | 1b |
| | 2a |
| | 2b |
| | 3a |
| | 3b |
| | 4a |
| | 4b |
| | |

['*' Area corrected vide notification no.12-For/11B-24/90, dt.01-01-91]

| Block | Compartment |
|-----------|--------------------|
| Bhutri | 1a |
| | 1b |
| | 2a |
| | 2b |
| | 3b (Part excluding |
| | Forest village) |
| | 4 |
| Kumargram | 1a (Part excluding |
| | Forest village) |
| | 1b |
| | 2 (Part excluding |
| | Forest village) |
| Sankosh | 1a |
| | 1b |
| | 2a (Part excluding |
| | Forest village) |
| | 2b |
| | 3b |

В. **Boundaries**

Extention in the North-East: (i)

International boundary with Bhutan.

Inter-State boundary with Assam. East

Newlands Tea Estate, Kumargram Tea Estate South -

and Sankash Tea Estate.

- Newlands Forest Block. West

(ii) Extention in the North-East:

> North - International boundary with Bhutan and Rangamati Tea Garden.

Pana Forest Block and Bhutri Forest Block (southern part). East

Godamdabri Forest Block. South -

Chhota Joygaon, Torsa Tea Garden, Dalsingpara Tea West Garden and Bharnobari Tea Garden.

By order of the Governor,

B. K. Mitra Jt. Secy. to the Govt. West Bengal

No. 7588/1-For.

Copy forwarded to the Collector, Jalpaiguri for information.

It is requested that necessary action as contemplated in section 9 to 25 of the Wild Life (Protection) Act, 1972.

Annexure-4

Registered No. WB/SC-247

No.WB/DTP/Pt.I/CPS/98/4049

The



Extraordinary Published by Authority

VAISAKHA 23]

WEDNESDAY, MAY 13, 1987

[SAKA 1909

PART I -- Orders and notifications by the Governor of West Bengal, the High Court, Government Treasury, etc.

GOVERNMENT OF WEST BENGAL

FOREST DEPARTMENT

Forest Branch

NOTIFICATION

No. 3403-For/11B-6/95

Calcutta, the 5th December, 1997

WHEREAS the area whose situation and boundaries are described in the Schedule below (hereinafter referred to as the said area) in considered to be of adequate ecological, faunal, geomorphological, natural and zoological significance for the purpose of protecting, propagating and developing wild life and its environment;

AND WHEREAS the events referred to in subsection (4) of section 35 of the said Act A. have occurred, Collector, Jalpaiguri, has since completed the proceedings under sections 19 and 25 of the Wildlife (Protection) Act. 1972 (53 of 1972), in respect of the said area;

AND WHEREAS by this department notification No. 85-For/11B-42/91, dated the 6th January, 1992, the Governor declared his intention to constitute the said area as a National

Park to be known as Buxa National Park for the said purpose;

NOW, THEREFORE, in exercise of the power conferred by sub-section (4) of section 35 of the wild life (Protection) Act, 1972 (53 of 1972), the Governor is pleased hereby to declare, with effect from the data of publication of this notification in the official Gazette, the said area to be a National Park to be known as Buxa National Park and to specify in the Schedule below the limits of the said area which shall be comprised within the said National Park.

The Schedule

A. Situation District:

Jalpaiguri- Land covering area 11,710.10 hectare or 117.10 square Kilometres comprising of the following Blocks and compartments:-

(2) THE CALCUTTA GAZETTE, EXTRA ORDINARY, JANUARY 7, 1998 [PART 1

| Block | Compartment | Compartment Area | Block | Remarks |
|---------------------|-------------|------------------|---------|-----------------|
| | | In (hactare) | Area | |
| Tashigaon | 1 | 804.74 | | |
| | 2 | 449.96 | 1254.70 | |
| North Rajabhatkhawa | 5a | 424.85 | | 11.5 hectare |
| | 6a (Part) | 324.65 | | (28.4 Acre) of |
| | 7 | 359.24 | | Jainti Location |
| | 12 | 278.64 | | in the |
| | 13 | 218.70 | | compartment 6a |
| | 14 | 368.96 | 1975.04 | to be excluded. |
| South Rajabhatkhawa | 3 | 247.86 | | |
| | 4 | 414.32 | | |
| | 5 | 322.79 | | |
| | 6 | 267.30 | | |
| | 11 | 240.98 | | |
| | 12 | 242.19 | | |
| | 13 | 266.49 | 2001.93 | |
| Jainti | 1 | 250.20 | | |
| | 2a | 222.35 | | |
| | 2b | 322.79 | | |
| | 3a | 268.11 | | |
| | 3b | 277.83 | | |
| | 4 | 392.45 | | |
| | 5 | 661.77 | | |
| | 6a | 494.91 | | |
| | 6b | 165.24 | | |
| | 7a | 182.66 | | |
| | 7b | 70.47 | | |
| | 8 | 360.05 | | |
| | 9 | 352.35 | 4021.27 | |
| Panbari | 1 | 381.92 | | |
| | 2 | 353.57 | | |
| | 3 | 210.60 | | |
| | 6 | 330.89 | | |
| | 7 | 267.71 | | |
| | 8 | 179.01 | | |
| | 9 | 341.82 | 2065.52 | |
| Chiko | 2 | 391.64 | 391.64 | |

Total 11,710.10 11,710.10 Hectare Or 117.10 Sq.km.

B. Boundaries

North → Tobgaon Block

East → Jainti Rivwer; Phaskhawa Block; Chuniajhora Tea Garden; Panbari 4,5,10.

South → 20th Mile Forest Road.

West → Santrabari 4, North Rajabhatkhawa-2,4,8,11,15; South Rajabhatkhawa 2,7,10,14; Chiko-1.

By order of the Governor,

S.M.Chaki
Dy. Secy to the Govt. of West Bengal.

 $\underline{Annexure-5}$ Average Monthly Temperature (2001-2010) in ^{o}C at different localities of BTR

| Month | Newlar | ds TE | Ryda | k T.E. | Chuapa | ara T.E. |
|-----------|--------|-------|-------|--------|--------|----------|
| | Max | Min | Max | Min | Max | Min |
| January | 19.27 | 11.10 | 24.82 | 10.45 | 22 | 8.3 |
| February | 20.75 | 12.89 | 28.27 | 12.91 | 24.5 | 11.1 |
| March | 24.43 | 17.01 | 31.91 | 15.36 | 28.6 | 15.6 |
| April | 26.64 | 20.28 | 32.09 | 18.36 | 30.6 | 19.8 |
| May | 28.88 | 22.15 | 33.36 | 20.82 | 32.9 | 22.5 |
| Jun | 30.53 | 25.93 | 34.36 | 23.55 | 32.8 | 24 |
| July | 30.24 | 26.24 | 34.73 | 24.00 | 32.4 | 24.6 |
| August | 31.36 | 25.65 | 35.27 | 24.00 | 33.3 | 24.7 |
| September | 31.21 | 25.41 | 34.73 | 22.73 | 32.7 | 23.9 |
| October | 29.01 | 22.27 | 33.36 | 20.82 | 30.6 | 20.6 |
| November | 24.89 | 18.23 | 31.36 | 17.45 | 28.1 | 16.2 |
| December | 21.35 | 12.73 | 28.00 | 13.45 | 23.8 | 11 |

 $\label{eq:Annexure-6} Annexure-6$ Average Monthly Rainfall (2000-2009) in cm. at different localities of BTR

| Month | Newlands T.E. | Rydak T.E. | Buxaduar | Chupara T.E. |
|-----------|------------------|---------------|----------|-----------------|
| January | 4.16 | 11.82 | 8.09 | 9.80 |
| February | 11.44 | 20.55 | 42.27 | 20.20 |
| March | 37.12 | 130.09 | 88.49 | 88.80 |
| April | 142.1 | 282.27 | 270.62 | 232.20 |
| May | 185.22 | 382.27 | 468.75 | 345.40 |
| June | 511.61 | 803.18 | 1010.44 | 783.10 |
| July | 588.05 | 1006.27 | 1311.09 | 1213.30 |
| August | 353.68 | 694.27 | 963.91 | 866.40 |
| September | 209.30 | 516.73 | 523.45 | 501.00 |
| October | 75.60 | 195.18 | 245.01 | 206.80 |
| November | 4.27 | 18.91 | 21.93 | 9.20 |
| December | 2.45 | 7.64 | 11.00 | 8.60 |

Annual Rainfall for 10 years in Centimetre at different localities of BTR

| YEAR | Newlands | Rydak | Buxaduar | Chupara |
|------|----------|-------|----------|---------|
| | T.E. | T.E. | | T.E. |
| 2001 | 269.73 | 4415 | 5878 | 4503 |
| 2002 | 192.21 | 3623 | 5854 | 4671 |
| 2003 | 182.05 | 4463 | 4243 | 5470 |
| 2004 | 153.10 | 4567 | 4638 | 5216 |
| 2005 | 158.24 | 5034 | 5237 | 4149 |
| 2006 | 169.68 | 4028 | 6032 | 4121 |
| 2007 | 221.20 | 3279 | 5706 | 3513 |
| 2008 | 128.33 | 3291 | 5521 | 3285 |
| 2009 | 117.66 | 4191 | 5456 | 3407 |
| 2010 | 178.82 | 3586 | 5771 | 4513 |

Annexure-7

List of Flora of Buxa Tiger Reserve

[Source: Mr. A. B. Choudhury, IFS (Retd.), Consultant for Forest Guideline]

A. LIST OF TREES

| SL No. | SCIENTIFIC NAME | FAMILY NAME | LOCAL NAME |
|--------|---------------------------------------|-----------------|------------------|
| 1 | Albizzia marginata/ Sny. A. Stipulata | MELIACEAE | Siris, Kalo |
| 2 | Acacia auriculiformis | MIMOSACEAE | Akashmoni |
| 3 | Acacia catechu | MIMOSACEAE | Khair |
| 4 | Acer sp. | AERACEAE | |
| 5 | Acronychia pedunculata | RUTACEAE | Puanle/ Tempor |
| 6 | Acropus fraxinifolius | MIMOSACEAE | Mandane |
| 7 | Actinodaphne angustifolia | LAURACEAE | |
| 8 | Actinodaphne obovata | LAURACEAE | Runche |
| 9 | Adina cordiflia | RUBIACEAE | Haldu/ Karam |
| 10 | Adinanthera pavonina | MIMOSACEAE | |
| 11 | Aegle marmelos | RUTACEAE | Bel |
| 12 | Aesculus punduana | HYPOCASTANACEAE | Satpate |
| 13 | Aesculus assamica | HYPOCASTANACEAE | |
| 14 | Aglaia edulis | MELIACEAE | |
| 15 | Aglaia hiernii | MELIACEAE | |
| 16 | Aglaia spectabilis | MELIACEAE | |
| 17 | Ailanthus grandis | SIMARUBACEAE | Gokul |
| 18 | Alangium chinense | ALANGIACEAE | Akhane |
| 19 | Alangium salvifolium | ALANGIACEAE | |
| 20 | Albizzia chinensis | MIMOSACEAE | |
| 21 | Albizzia lebbek/ Syn. A. gamblei | MIMOSACEAE | Harre/ Sirish |
| 22 | Albizzia lucida | MIMOSACEAE | Potka Siris |
| 23 | Albizzia odoratissima | MIMOSACEAE | Kankur Siris |
| 24 | Albizzia procera | MIMOSACEAE | Siris,Seto |
| 25 | Alnus nepalensis | BETULACEAE | |
| 26 | Alphonsea ventricosa | ANONACEAE | Katarpat |
| 27 | Alstonia scholaris | APOCYNACEAE | Chhatim |
| 28 | Amoora wallichii | MELIACEAE | Lali |
| 29 | Anacardium occidentale | ANACARDIACEAE | kaju |
| 30 | Anona reticulata | ANONACEAE | |
| 31 | Anona squamosa | ANONACEAE | |
| 32 | Anthocephalus chinensis | RUBIACEAE | kadam |
| 33 | Antidesma acuminatum | EUPHORBIACEAE | |
| 34 | Antidesma acidum | EUPHORBIACEAE | |
| 35 | Antidesma bunius | EUPHORBIACEAE | |
| 36 | Aphanamixis polystachae | MELIACEAE | Lahusune |
| 37 | Aporosa dioica | EUPHORBIACEAE | Barkaunli |
| 38 | Artocarpus chaplasha | MORACEAE | Chapalish/ Lator |
| 39 | Artocarpus heterophyllus | MORACEAE | Kanthal |
| 40 | Artocarpus lakoocha | MORACEAE | Barhr/ Dawa |
| 41 | Azadirachta indica | MELIACEAE | Neem |
| 42 | Baccaurea sapida | EUPHORBIACEAE | Kusum |
| 43 | Baliospermum sp. | EUPHORBIACEAE | |
| 44 | Bauhinia malabarica | CAESALPINIACEAE | Amlatanki |
| 45 | Bauhinia purpurea | CAESALPINIACEAE | Kanchan |
| 46 | Bauhinia variegata | CAESALPINIACEAE | Koiralo |
| 47 | Beilscaemeidia roxburghiona | LAURACEAE | Tarsing |
| 48 | Beilschmeidia assamica | LAURACEAE | |
| 49 | Beilschmeidia sikkimensis | LAURACEAE | |
| 50 | Betula alnoides | BETULACEAE | |

| SL No. | SCIENTIFIC NAME | FAMILY NAME | LOCAL NAME |
|----------|--|------------------------|--------------------|
| 51 | BischofBischofia javanica | EUPHORBIACEAE | Kainjal |
| 52 | Bombax ceiba | BOMBACACEAE | Simul |
| 53 | Brassiopsis glomerulata | ARALIACEAE | |
| 54 | Breynia vitis-idaea | EUPHORBIACEAE | |
| 55 | Bridelia assamica | EUPHORBIACEAE | |
| 56 | Bridelia pubescens | EUPHORBIACEAE | |
| 57 | Bridelia retusa | EUPHORBIACEAE | Gayo |
| 58 | Bridelia tomentosa | EUPHORBIACEAE | , |
| 59 | Bursera serrata | BURSERACEAE | |
| 60 | Butea monosperma | FABACEAE | Palas |
| 61 | Caesalpinia pulcherrima | CAESALPINIACEAE | Krishna chura |
| 62 | Callicarpa arborea | VERBENACEAE | Guenhlo |
| 63 | Callophyllum floribundum | GUTTIFERAE | |
| 64 | Canarium bengalense | BURSERACEAE | Gokuldhup |
| 65 | Canarium sikkimense | BURSERACEAE | Gokuldhup |
| 66 | Carallia integerrima | RHIZOPHORACEAE | Phalamkath |
| 67 | Careya arborea | LECYTHIDACEAE | Kumbhi |
| 68 | Casearia graveolens | SEMYDACEA | Barkaunle |
| 69 | Cassia fistula | CAESALPINIACEAE | Sonalu |
| 70 | Cassia nodosa | CAESALPINIACEAE | |
| 71 | Cassia siamea | CAESALPINIACEAE | Minjiri |
| 72 | Castanopsis indica | FAGACEAE | Katus,Dalne |
| 73 | Castanopsis hystrix | FAGACEAE | Katus, Bara |
| 74 | Castanopsis tribuloides | FAGACEAE | Katus,Musre |
| 75 | Cedrela microcarpa | MELIACEAE | |
| 76 | Cedrela febrifuga | MELIACEAE | |
| 77 | Cedrella toona | MELIACEAE | Tun |
| 78 | Celtis australis | ULMACEAE | *** |
| 79 | Celtis tetrandra | ULMACEAE | Khari |
| 80 | Cephalanthus occidentalis | RUBIACEAE | Kalikar |
| 81 | Chisocheton paniculatus Chukrassia tabularis | MELIACEAE | Bhadra Chikrasi |
| 82 83 | Cinamomum obtusifolium | MELIACEAE | Cnikrasi |
| 84 | Cinamomum obtustioitum Cinamomum tamala | LAURACEAE LAURACEAE | Tormet |
| 85 | Cinamomum cecidodaphne | LAURACEAE | Tezpat Malagiri |
| 86 | Cinamomun caudatum | LAURACEAE | Khorsane |
| 87 | Cinamomun sp. | LAURACEAE | Tezpat |
| 88 | Cipadessa fruticosa | MELIACEAE | ТСЕраі |
| 89 | Cleidion jaramicum | EUPHORBEACEAE | Bepari |
| 90 | Coffee arabica | RUBIACEAE | Берап |
| 91 | Cordia grandis | EHRETIACEAE | |
| 92 | Cordia obliqua | EHRETIACEAE | Bohori |
| 93 | Craetava unilocularis | CAPPARIDACEAE | Chiple |
| 94 | Croton joufra | EUPHORBIACEAE | 1 - |
| 95 | Croton oblongifolius | EUPHORBIACEAE | |
| 96 | Cryptocarya amygdalina | LAURACEAE | Panpasha |
| 97 | Cryptocarya floribunda | LAURACEAE | - |
| 98 | Dalbergia sissoo | FABACEAE | Sissoo |
| 99 | Dalbergia latifolia | FABACEAE | Satisal |
| 100 | Derris robusta | FABACEAE | |
| 101 | Dillenia indica | DILLENIACEAE | Chalta |
| 102 | Dillenia pentagyna | DILLENIACEAE | Tantari |
| 103 | Diospyros montana | EBENACEAE | |
| 104 | Diospyrus melanoxylon | EBENACEAE | |
| 105 | Dipterocarpus macrocarpus | DIPTEROCARPACEAE | Hollong |
| 106 | Diospyros pregrina | EBENACEAE | |
| 107 | Drimycarpus racemosus | ANACARDEACIA | |
| 108 | Drypetes assanmica | EUPHORBIACEAE | |
| 109 | Drypetes roxburghii | EUPHORBIACEAE | |
| 110 | Duabanga grandiflora | LECYTHIDACEAE | Lampate |
| 111 | Dysoxylum binectariferum | MELIACEAE | Lahasune |

| SL No. | SCIENTIFIC NAME | FAMILY NAME | LOCAL NAME |
|--------|-------------------------------|----------------|----------------|
| 112 | Dysoxylum hamiltonii | MELIACEAE | Katli-tun |
| 113 | Dysoxylum procerum | MELIACEAE | Lahssune |
| 114 | Echinocarpus sterculiaceous | ELAEOCARPACEAE | Gobre |
| 115 | Ehretia acuminata | EHRETIACEAE | Putli/ Boeri |
| 116 | Ehretia fragrantissima | EHRETIACEAE | |
| 117 | Elaeocarpus floribundus | ELAEOCARPACEAE | Jalpai |
| 118 | Elaeocarpus obtusus | ELAEOCARPACEAE | |
| 119 | Elaeocarpus prunifolia | ELAEOCARPACEAE | |
| 120 | Elaeocarpus robustus | ELAEOCARPACEAE | |
| 121 | Elaeocarpus varunua | ELAEOCARPACEAE | Bhadrase |
| 122 | Elaeocarpus aristatus | ELAEOCARPACEAE | Dalchiuri |
| 123 | Elaeocarpus ganitrus | ELAEOCARPACEAE | Rudraksha |
| 124 | Emblica officinalis | EUPHORBIACEAE | Amlaki |
| 125 | Endospermum chinensis | EUPHORBIACEAE | Setikath |
| 126 | Engelthardtia spicata | JUGLANDACEAE | neuwa |
| 127 | Engelthardtia coolebrachiana | JUGLANDACEAE | |
| 128 | Eriobotrya bengalensis | ROSACEAE | Maya |
| 129 | Eriobotrya bengalensis | ROSACEAE | |
| 130 | Eriobotrya Japonica | ROSACEAE | |
| 131 | Erythrina arborescens | FABACEAE | |
| 132 | Erythrina variegata | FABACEAE | |
| 133 | Erythrina indica | FABACEAE | Madar (Faledu) |
| 134 | Erythropsis colorata | STERCULIACEAE | Phirphire |
| 135 | Eucalyptus citriodora | MYRTACEAE | |
| 136 | Eugenia praecox | MYRTACEAE | |
| 137 | Eugenia formosa | MYRTACEAE | Amboke |
| 138 | Eurya acuminata | THEACEAE | Jhingani |
| 139 | Evodia luna-ankunda | ANACARDIACEAE | |
| 140 | Evodia fraxinifolia | ANACARDIACEAE | |
| 141 | Evodia meliaefolia | ANACARDIACEAE | Thulo-Khanakpa |
| 142 | Exbucklandia populnea | HAMAMELIDACEAE | |
| 143 | Ficus bengalensis | MORACEAE | Bat |
| 144 | Ficus hookeri | MORACEAE | |
| 145 | Ficus benjamina | MORACEAE | |
| 146 | Ficus calvata | MORACEAE | |
| 147 | Ficus cunea | MORACEAE | Jog-dumur |
| 148 | Ficus drupacea var. pubescens | MORACEAE | |
| 149 | Ficus elastica | MORACEAE | Labar |
| 150 | Ficus fistulosa | MORACEAE | |
| 151 | Ficus glomerata | MORACEAE | Dumur |
| 152 | Ficus hirta | MORACEAE | |
| 153 | Ficus hispida | MORACEAE | Koksa |
| 154 | Ficus infectoria | MORACEAE | |
| 155 | Ficus microcarpa | MORACEAE | |
| 156 | Ficus mysorensis | MORACEAE | P "" |
| 157 | Ficus nemoralis | MORACEAE | Dudila |
| 158 | Ficus racemosa | MORACEAE | D' 1 |
| 159 | Ficus religiosa | MORACEAE | Pipal |
| 160 | Ficus retusa | MORACEAE | |
| 161 | Ficus rumphi | MORACEAE | |
| 162 | Ficus sikkimensis | MORACEAE | |
| 163 | Ficus virens | MORACEAE | D1 ' 1 ' |
| 164 | Firmiana colorata | STERCULIACEAE | Phir-phire |
| 165 | Firmiana pallens | STERCULIACEAE | Labshi |
| 166 | Flacourtia jangomas | FLACOURTIACEAE | <u> </u> |
| 167 | Garcinia acuminata | GUTTIFERAE | V amb at |
| 168 | Garcinia cowa | GUTTIFERAE | Kaphal |
| 169 | Garcinia kydia | GUTTIFERAE | <u> </u> |
| 170 | Garcinia xanthochymus | GUTTIFERAE | |
| 171 | Garcinia pedunculata | GUTTIFERAE | |
| 172 | Gardenia coronaria | RUBIACEAE | |

| SL No. | SCIENTIFIC NAME | FAMILY NAME | LOCAL NAME |
|--------|-----------------------------|----------------|-----------------|
| 173 | Garuga gamblei | BURSERACEAE | Dabdabe |
| 174 | Garuga pinnata | BURSERACEAE | Dabdabe |
| 175 | Glochidion assamicum | EUPHORBIACEAE | |
| 176 | Glochidion heyneanum | EUPHORBIACEAE | |
| 177 | Glochidion lanceolarium | EUPHORBIACEAE | |
| 178 | Glochidion multiloculare | EUPHORBIACEAE | |
| 179 | Glochidion seuminatun | EUPHORBIACEAE | |
| 180 | Glochidion thomsoni | EUPHORBIACEAE | Latikath |
| 181 | Glochidion tomsonii | EUPHORBIACEAE | |
| 182 | Glycosmis arborea | RUTACEAE | |
| 183 | Gmelina arborea | VERBENACEAE | Gamar |
| 184 | Grewia microcos | TILIACEAE | |
| 185 | Grewia paniculata | TILIACEAE | |
| 186 | Grewia viminea | TILIACEAE | |
| 187 | Grewia laevigata | TILIACEAE | Dhamon |
| 188 | Grewia vestita | TILIACEAE | Phalsa |
| 189 | Gynocardia odorata | FLACOURTIACEAE | Banore/ Ramphal |
| 190 | Heteropanax fragrans | ARALIACEAE | Gai-thero |
| 191 | Holarr hena antidysenterica | APOCYNACEAE | Khirra/ kurchi |
| 192 | Horsfieldia kingii | MYRISTICACEAE | |
| 193 | Horsfieldia amygdalina | MYRISTICACEAE | |
| 194 | Hovenia dulcis | RHAMNACEAE | Bangi |
| 195 | Hymenodictyon excelsum | RUBIACEAE | Latikaram |
| 196 | Ilex umbellatus | AQUAFOLIACEAE | |
| 197 | Ilex umbellata | AQUIFOLIACEAE | |
| 198 | Ilex godajan | AQUIFOLIACEAE | |
| 199 | Ixora arborea | RUBIACEAE | |
| 200 | Ixora subsessillis | RUBIACEAE | |
| 201 | Knema angustifolia | MYRISTICACEAE | |
| 202 | Kydia calycina | MALVACEAE | kubinde |
| 203 | Litsaea panamunja | LAURACEAE | |
| 204 | Lagerstroemia parviflora | LYTHRACEAE | Sidha |
| 205 | Litsaea salicifolia | LAURACEAE | |
| 206 | Lagerstroemia speciosa | LYTHRACEAE | Jarul |
| 207 | Lannea coromandalica | ANACARDIACEAE | Jeol |
| 208 | Leucaena leucocephala | MIMOSACEAE | |
| 209 | Leucoceptrum canum | LAMIACEAE | |
| 210 | Lithocarpus spicata | FAGACEAE | |
| 211 | Litsaea cubeba | LAURACEAE | |
| 212 | Litsaea glutinosa | LAURACEAE | |
| 213 | Litsaea laeta | LAURACEAE | |
| 214 | Litsaea lancaefolia | LAURACEAE | TZ 4 |
| 215 | Litsaea monopetala | LAURACEAE | Kutmero |
| 216 | Lophopetalum fimbritum | CELASTRACEAE | Raktan |
| 217 | Macaranga denticulata | EUPHORBIACEAE | Malata |
| 218 | Macaranga pustulata | EUPHORBIACEAE | |
| 219 | Machilua kurzii | LAURACEAE | Kawla |
| 220 | Machilus villosa | LAURACEAE | Kawia |
| 221 | Machilus gimblei | LAURACEAE | |
| 222 | Magnolia pterocarpa | MAGNOLIACEAE | patpate |
| 223 | Mallotus philippinensis | EUPHORBIACEAE | Sindure |
| 224 | Mallotus rotundifolia | RUBIACEAE | |
| 225 | Mallotus roxburghianus | EUPHORBIACEAE | CI 1 |
| 226 | Mangifera sylvalica | ANACARDIACEAE | Chuche-am |
| 227 | Mangifera indica | ANACARDIACEAE | Aam |
| 228 | Melastoma malabathricum | MELASTOMACEAE | |
| 229 | Melia azedarach | MELIACEAE | Ghoranim |
| 230 | Meliosma simplicifolia | SABIACEAE | Chiwri |
| 231 | Memicylon umbellatum | MELASTOMACEAE | Buridukur |
| 232 | Mesua ferrea | GUTTIFERAE | Nagesuri |
| 233 | Meyna spinosa | RUBIACEAE | |

| SL No. | SCIENTIFIC NAME | FAMILY NAME | LOCAL NAME |
|---------------|--|------------------------------|----------------------|
| 234 | Michelia champaca | MAGNOLIACEAE | Champ |
| 235 | Michelia montana | MAGNOLIACEAE | |
| 236 | Michelia oblonga | MAGNOLIACEAE | Champ (teeta) |
| 237 | Micromelum integerrmum | RUTACEAE | |
| 238 | Miliusa longiflora | ANONACEAE | |
| 239 | Miliusa tomentosum | ANONACEAE | |
| 240 | Milliusa roxburghiana | ANONACEAE | |
| 241 | Mimusops elengi | SAPOTACEAE | |
| 242 | Mitragyna parviflora | RUBIACEAE | |
| 243 | Morinda angustifolia | RUBIACEAE | |
| 244 | Morinda tinctoria | RUBIACEAE | Sajna |
| 245 | Moringa oleifera | MORINGACEAE | |
| 246 | Morus indica | MORACEAE | Tut |
| 247 | Morus laevigata | MORACEAE | |
| 248 | Murraya koengii | RUTACEAE | |
| 249 | Murraya paniculata | RUTACEAE | |
| 250 | Myristica longifolia | MYRISTICACEAE | Ramgua |
| 251 | Nauclea sessillifolia | RUBIACEAE | |
| 252 | Neolitsaea zeylanica | LAURACEAE | |
| 253 | Neonauclea griffithii | RUBIACEAE | |
| 254 | Nyssa javanica | CORNACEAE | 77 1 1 |
| 255 | Olea dioica | OLEACEAE | Kyamuna,kalo |
| 256 | Oroxylum indicum | BIGNONIACEAE | Totola |
| 257 | Ostodes paniculata | EUPHORBIACEAE | |
| 258 259 | Persea villosa Persea lanceolata | LAURACEAE LAURACEAE | |
| 260 | Peltophorum pterocarpum | CAESALPINIACEAE | |
| 261 | Phoebe attenuata | | A m 2042 |
| 262 | Phoebe lanceolata | LAURACEAE LAURACEAE | Angare Jhakrikath |
| 263 | Phyllanthus acidus | EUPHORBIACEAE | JIIaki ikatii |
| 264 | Picrasma javanica | SIMARUBACEAE | |
| 265 | Pithecolobium dulce | MIMOSACEAE | |
| 266 | Pithecolobium heterophyllum | MIMOSACEAE | |
| 267 | Polyalthia semiarum | ANONACEAE | Khuntikath |
| 268 | Pongamia pinnata | FABACEAE | Karanja |
| 269 | Poupartia ascillaris | | Lapshi |
| 270 | Premna latifolia | VERBENACEAE | 1 |
| 271 | Premna bengalense | VERBENACEAE | Dhauli |
| 272 | Premna mucronata | VERBENACEAE | Gineri/ setiguenlo |
| 273 | Psidium guajava | MYRTACEAE | Guava |
| 274 | Psychotria sp. | RUBIACEAE | |
| 275 | Pterospermum acerifolium | STERCULIACEAE | Kanakchampa |
| 276 | Pterospermum lancaefolium | STERCULIACEAE | |
| 277 | Pygeum acuminatum | ROSACEAE | Dharani |
| 278 | Quercus spicata | FAGACEAE | |
| 279 | Quercus lanceofolia | FAGACEAE | Patle-Katus |
| 280 | Quercus spicata | FAGACEAE | Arkaula |
| 281 | R. succedanea | MELIACEAE | |
| 282 | Randia racemosa | RUBIACEAE | |
| 283 | Rhus semi-alata | MELIACEAE | |
| 284 | Rhus sp. | ANACARDIACEAE | |
| 285 | Saccopetalum tomentosum | ANONACEAE | P . |
| 286 | Salix tetrasperma | SALICACEAE | Bains |
| 287 | Samanea saman | MIMOSACEAE | Rain tree |
| 288 | Sapindus detergens | SAPINDACEAE | Ritha |
| 289 | Sapium eugenifolium | EUPHORBIACEAE | Pipalpate |
| 290 | Sapium insigne | EUPHORBIACEAE | Khirru |
| 290(a) 291 | Sapium baccata Saraca indica | EUPHORBIACEAE | Akataru |
| 291 | | CAESALPINIACEAE EBENACEAE | Ashok Kalikath |
| | Sarcosperma arboreum Saurauia roxburghii | | |
| 293 | Saurauia roxburgnii | SAURAURIACEAE | Gagun |

| SL No. | SCIENTIFIC NAME | FAMILY NAME | LOCAL NAME |
|------------|---|----------------------------|-------------------|
| 294 | Schefflera venulosa | ARALIACEAE | |
| 295 | Schima wallichii | THEACEAE | Chilaune |
| 296 | Semecarpus anacardium | ANACARDIACEAE | Bhalayo |
| 297 | Shorea robusta | DIPTEROCARPACEAE | Sal |
| 298 | Shorea assamica | DIPTEROCARPACEAE | |
| 299 | Sloanea sterculiaceus | ELAEOCARPACEAE | |
| 300 | Spathodia campanulata | BIGNONIACEAE | |
| 301 | Spondias pinnata | ANACARDIACEAE | |
| 302 | Spondias magnifera | ANACARDIACEAE | Amra |
| 303 | Spondixs axillaris | ANACARDIACEAE | |
| 304 | Sterculia alata | STERCULIACEAE | Aule Gobre |
| 305 | Sterculia coccinia | STERCULIACEAE | Labshi |
| 306 | Sterculia villosa | STERCULIACEAE | Odal |
| 307 | Sterculia kingii | STERCULIACEAE | |
| 308 | Sterculia lanceaefolia | STERCULIACEAE | |
| 309 | Stereospenmum chelonoides | BIGNONIACEAE | Pirrari |
| 310 | Streblus asper | MORACEAE | Sheora |
| 311 | Styrax serrulatum | STYRACEAE | |
| 312 | Swietenia macrophylla | MELIACEAE | Mahogony |
| 313 | Syimplocos racemosa | SYMPLOCACEAE | |
| 314 | Symplocos laurina | SYMPLOCACEAE | Kholme |
| 315 | Syzygium formosum | MYRTACEAE | |
| 316 | Syzygium fruticosum | MYRTACEAE | |
| 317 | Syzygium cuminii | MYRTACEAE | Jam |
| 318 | Syzygium jambos | MYRTACEAE | |
| 319 | Syzygium operculatum | MYRTACEAE | Piamuna |
| 320 | Syzygium polypetalum | MYRTACEAE | |
| 321 | Sesbania grandiflora | LEGUMINAECAE | Bakphul |
| 322 | Talauma hodgsoni | MAGNOLIACEAE | Bhalukath |
| 323 | Tamarinda indica | CAESALPINIACEAE | Imli (Tentul) |
| 324 | Tectona grandis | VERBENACEAE | Teak |
| 325 | Terminalia belerica | COMBRETACEAE | Bahera |
| 326 327 | Terminalia arjuna Terminalia chebula | COMBRETACEAE COMBRETACEAE | Arjun Haritaki |
| 328 | Terminalia chebula Terminalia chitrina | COMBRETACEAE | Pakasaj |
| 329 | Terminalia cintina Terminalia myriocarpa | COMBRETACEAE | Panisaj |
| 330 | Tetrameles nudiflora | DATISCACEAE | Panisaj Maina |
| 331 | Toona ciliata | MELIACEAE | Iviailia |
| 332 | Travesia palmata | ARALIACEAE | |
| 333 | Trema orientalis | ULMACEAE | |
| 334 | Trema orientalis var. amboiensis | ULMACEAE | Kuail |
| 335 | Trema politoria | ULMACEAE | 120011 |
| 336 | Trewia nudiflora | EUPHORBIACEAE | Pitali |
| 337 | Trichillia connerioides | MELIACEAE | |
| 338 | Turpinia pomifera | STAPHYLEACEAE | Thali |
| 339 | Vatica lancaefolia | DIPTEROCARPACEAE | Morshal |
| 340 | Vitex altissima | VERBENACEAE | |
| 341 | Vitex heterophylla | VERBENACEAE | Panchpate |
| 342 | Wallsura robusta | MELIACEAE | • |
| 343 | Walsura tabulata | MELIACEAE | Phalame |
| 344 | Wandlandia grandis | RUBIACEAE | |
| 345 | Wandlandia wallichii | RUBIACEAE | |
| 346 | Wandlandia puberula | RUBIACEAE | |
| 347 | Wandlandia tinctoria | RUBIACEAE | |
| 348 | Wandlandia exerta | RUBIACEAE | |
| 349 | Wrightia tomentosa | APOCYNACEAE | Dudhi |
| 350 | Xylosma logifolium | FLACOURTIACEAE | m' |
| 351 | Zanthoxylum budrunga | RUTACEAE | Timur |
| 352 | Zizyphus jujuba | RHAMNACEAE | Kul (Ber) |

B. LIST OF SHRUBS

| SL.NO. | SCIENTIFIC NAME | FAMILY NAME | LOCAL NAME |
|--------|--|-----------------|---------------|
| 1 | Abroma angusta | STERCULIACEAE | |
| 2 | Abutilon indicum | MALVACEAE | |
| 3 | Acalypha brachystachia | EUPHORBIACEAE | |
| 4 | Aeschynomene indica | FABCEAE | |
| 5 | Allophyllus zeylanica | SAPINDACEAE | |
| 6 | Allophythus cobbe | SAPINDACEAE | |
| 7 | Allophythus racemosa | SAPINDACEAE | |
| 8 | Allophythus serrata | SAPINDACEAE | |
| 9 | Antidesma aurminata | EUPHORBIACEAE | |
| 10 | Antidesma diandrum | EUPHORBIACEAE | Archal |
| 11 | Ardisia macrocarpa | MYRSINACEAE | |
| 12 | Ardisia solanacea | MYRSINACEAE | |
| 13 | Balliospermum calycinum | EUPHORBIACEAE | |
| 14 | Barleria cristata | APOCYNACEAE | |
| 15 | Boehmeria macrophylla | URTICACEAE | |
| 16 | Boehmeria nivea | URTICACEAE | |
| 17 | Boehmeria platyphylla | URTICACEAE | |
| 18 | Boehmeria sidaefolia | URTICACEAE | |
| 19 | Bridelia stipularis | EUPHORBIACEAE | |
| 20 | Bridelia tomentosa | EUPHORBIACEAE | |
| 21 | Caesalpinea digyna | CAESALPINIACEAE | |
| 22 | Caesalpinea mimusoides | CAESALPINIACEAE | |
| 23 | Callicarpa longifolia | VERBENACEAE | |
| 24 | Caltropis gigantea | ASCLEPIADACEAE | Akanda |
| 25 | Canthium angustifilium | RUBIACEAE | |
| 26 | Canthium dicoceum | RUBIACEAE | |
| 27 | Carissa sp. | APOCYNACEAE | |
| 28 | Carissa spinarum | APOCYNACEAE | |
| 29 | Cassia alata | CAESALPINIACEAE | |
| 30 | Cassia occidentalis | CAESALPINIACEAE | |
| 31 | Cassia sophera | CAESALPINIACEAE | |
| 32 | Cassia tora | CAESALPINIACEAE | |
| 33 | Celastrus monospermum | CELASTRACEAE | |
| 34 | Clausena pentaphylla | RUTACEAE | |
| 35 | Clerodendrum infortunatum | VERBENACEAE | Bhant |
| 36 | Clerodendrum viscosum | VERBENACEAE | Billin |
| 37 | Cnesmone javanica | EUPHORBIACEAE | |
| 38 | Cnesmone multiloculare | EUPHORBIACEAE | |
| 39 | Codiaeum variegatum | EUPHORBIACEAE | |
| 40 | Coffea bengalensis | RUBIACEAE | Tagar |
| 41 | Crotalaria juncea | FABCEAE | 1 4 5 4 1 |
| 42 | Crotalaria tetragona | FABCEAE | |
| 43 | Crotalaria verucosa,C. paliida | FABCEAE | |
| 44 | Crotalaria sericca | FABCEAE | |
| 45 | Crotalaria spectabilis | FABCEAE | |
| 46 | Datura Metal | SOLANACEAE | |
| 47 | Datura stramonium | SOLANACEAE | |
| 48 | Delbergia stipulacea | FABCEAE | |
| 49 | Delbergia volubilis | FABCEAE | |
| 50 | Dendrocnide sinuata | URTICACEAE | |
| 51 | Desmodium caudatus | FABCEAE | |
| 52 | Desmodium gangeticum | FABCEAE | |
| 53 | Desmodium heterocarpon | FABCEAE | |
| 54 | Desmodium neterocarpon Desmodium motorium | FABCEAE | |
| 55 | Desmodium motorium Desmodium pulchellum | FABCEAE | |

| 56 | Desmodium triquetrum | FABCEAE | |
|------------|--|-----------------|------------|
| 57 | Desmos chinensis | ANONACEAE | |
| 58 | Desmos dimosus | ANONACEAE | |
| 59 | Desmos longiflorus | ANONACEAE | |
| 60 | Dombeya mnastersii | STERCULIACEAE | |
| 61 | Elatostemma capillosum | URTICACEAE | |
| 62 | Elatostemma Lineolatum | URTICACEAE | |
| 63 | Elatostemma platiphyllum | URTICACEAE | |
| 64 | Elatostemma Rupestre | URTICACEAE | |
| 65 | Elsholtzia sp. | LAMIACEAE | |
| 66 | Erythropatum scandens | ERYTHROPALACEAE | |
| 67 | Eupatorium odoratum | ASTERACEAE | Assamlata |
| 68 | Flemingia fruticulosa | FABCEAE | Assaimata |
| 69 | Flemingia stricta | FABCEAE | |
| 70 | Flemingia stricta Flemingia strobilifera | | |
| | Glochidion multiloculare | FABCEAE | |
| 71 | | EUPHORBIACEAE | |
| 72 | Glycosmis arborea | RUTACEAE | |
| 73 | Glycosmis cymosa | RUTACEAE | |
| 74 | Glycosmis mauritiana | RUTACEAE | |
| 75 | Goniothalamus sesquipedalis | ANONACEAE | |
| 76 | Gossypium arboreum | MALVACEAE | |
| 77 | Grewia hirsuta | TILIACEAE | |
| 78 | Grewia sapida | TILIACEAE | |
| 79 | Grewia multiflora | TILIACEAE | |
| 80 | Hibiscus mutabilis | MALVACEAE | |
| 81 | Hibiscus rosasinensis | MALVACEAE | |
| 82 | Hibiscus sabdarifa | MALVACEAE | |
| 83 | Hibiscus syriacus | MALVACEAE | |
| 84 | Hyptianthea stricta | RUBIACEAE | |
| 85 | Hyptis suaveolens | LAMIACEAE | |
| 86 | Indigofera atropurpurea | FABCEAE | |
| 87 | Indigofera dosua | FABCEAE | |
| 88 | Indigofera trifoliata | FABCEAE | |
| 89 | Ixora sp. | RUBIACEAE | |
| 90 | Lantana camara | VERBENACEAE | |
| 91 | Laportia crenulata | URTICACEAE | Chotra |
| 92 | Lespideza gerardiana | FABCEAE | |
| 93 | Maesa chisia | MYRSINACEAE | |
| 94 | Maesa indica | MYRSINACEAE | |
| 95 | Maesa montana | MYRSINACEAE | Bilaune |
| 96 | Mallotus repundas | EUPHORBIACEAE | Dilaune |
| 97 | Malvaviscus arboreus | MALVACEAE | |
| 98 | Melastoma malabathricum | MELASTOMACEAE | |
| 99 | Micromelum integerimum | RUTACEAE | |
| 100 | Micromelum integerimum Micromelum pabescens | RUTACEAE | |
| | Morinda angustifolia | | Uandil41- |
| 101 | <u>e</u> | RUBIACEAE | Hardikath |
| 102 | Munronia pinnata | RUTACEAE | M1. ' |
| 103 | Murraya koenigii Osbeckia chinensis | RUTACEAE | Mechia sag |
| 104 | | MELASTOMACEAE | |
| 105 | Osbeckia nepalensis | MELASTOMACEAE | |
| 106 | Phlogocanthus thyrsiflorus | ACANTHACEAE | |
| 107 | Phogocanthus sp. | ACANTHACEAE | |
| 108 | Phyllanthus clarkii | EUPHORBIACEAE | |
| 109 | Phyllanthus urinaria | EUPHORBIACEAE | |
| 110 | Plectranthus turnifolious | LAMIACEAE | |
| 111 | Pogostemon sp. | LAMIACEAE | |
| 112 | Psychotria calocarpa | RUBIACEAE | |
| 113 | Psychotria denophylla | RUBIACEAE | |
| 114 | Day shotning or - ti | DUDIACEAE | |
| 114 | Psychotria eratica Psychotria fulva | RUBIACEAE | |
| 115 116 | • | RUBIACEAE | |
| 110 | Randia longiflora | RUBIACEAE | |

| 117 | Randia fasciculata | RUBIACEAE | |
|-----|-----------------------------|---------------|-------------|
| 118 | Rauwolfia serpentina | APOCYNACEAE | Sarpagandha |
| 119 | Rubus ellipticus | ROSACEAE | |
| 120 | Rubus hamiltonii | ROSACEAE | |
| 121 | Rubus niveus | ROSACEAE | |
| 122 | Rubus rosifolius | ROSACEAE | |
| 123 | Sauropus androgynous | EUPHORBIACEAE | |
| 124 | Sauropus stipulatus | EUPHORBIACEAE | |
| 125 | Sida cordata | MALVACEAE | |
| 126 | Sida cordifolia | MALVACEAE | |
| 127 | Sida rhombifolia | MALVACEAE | |
| 128 | Taberneamontausa divericata | APOCYNACEAE | Tagar |
| 129 | Tephrosia candida | FABCEAE | |
| 130 | Thespesia lampas | MALVACEAE | |
| 131 | Traggia involucrata | EUPHORBIACEAE | |
| 132 | Ventilego maderaspetana | RHAMNACEA | |
| 133 | Xeromphis spinosa | RUBIACEAE | |

C. LIST OF HERBS

| SL.NO. | SCIENTIFIC NAME | FAMILY NAME | LOCAL NAME |
|--------|----------------------------|------------------|------------|
| 1 | Achyranthes aspera | AMARANTHACEAE | |
| 2 | Adenosma sp. | SCROPHULARIACEAE | |
| 3 | Adhatoda vasica | ACANTHACEAE | Basak |
| 4 | Ageratum conyzoides | ASTERACEAE | |
| 5 | Alternanthera sessilis | AMARANTHACEAE | |
| 6 | Alysicarpus tetragonolobus | FABACEAE | |
| 7 | Alysicarpus vavaginalis | FABACEAE | |
| 8 | Amaranthus viridis | AMARANTHACEAE | |
| 9 | Amaranthus paniculatus | AMARANTHACEAE | |
| 10 | Amaranthus spinosus | AMARANTHACEAE | |
| 11 | Ammania baccifera | LYTHRACEAE | |
| 12 | Andrographis paniculata | ACANTHACEAE | |
| 13 | Angelonia sp. | SCROPHULARIACEAE | |
| 14 | Argemone nexicana | PAPAVARACEAE | |
| 15 | Asparagus racemosa | ASPAGACEAE | Satamuli |
| 16 | Atylosia scarabioides | FABACEAE | |
| 17 | Bacopa hamiltoniana | SCROPHULARIACEAE | |
| 18 | Bacopa monnieri | SCROPHULARIACEAE | |
| 19 | Barleria prioniculata | ACANTHACEAE | |
| 20 | Begonia barbata | BEGONIACEAE | |
| 21 | Begonia gigantea | BEGONIACEAE | |
| 22 | Bidens biternata | ASTERACEAE | |
| 23 | Biophytum sensitivtum | GERANIACEAE | |
| 24 | Blumea balsamifera | ASTERACEAE | |
| 25 | Blumea lacera | ASTERACEAE | |
| 26 | Blumea lanceolaria | ASTERACEAE | |
| 27 | Blumea lacinata | ASTERACEAE | |
| 28 | Boerhavia chinensis | NYCTAGINACEAE | |
| 29 | Boerhavia diffusa | NYCTAGINACEAE | |

| SL.NO. | SCIENTIFIC NAME | FAMILY NAME | LOCAL NAME |
|--------|--------------------------|-----------------|------------|
| 30 | Borreria articulata | RUBIACEAE | |
| 31 | Cannabis sativa | CANNABINACEAE | |
| 32 | Canscora sp. | GENTIANACEAE | |
| 33 | Carthemus tinctoria | ASTERACEAE | |
| 34 | Celosia argentica | POLYGONACEAE | |
| 35 | Centella asiatica | APIACEAE | |
| 36 | Cleome viscosa | CAPPARIDACEAR | |
| 37 | Coleus sp. | LAMIACEAE | |
| 38 | Conyza borariensis | ASTERACEAE | |
| 39 | Conyza Leucantha | ASTERACEAE | |
| 40 | Conyza Stricta | ASTERACEAE | |
| 41 | Cotula hemispherica | ASTERACEAE | |
| 42 | Crotolaria alata | FABACEAE | |
| 43 | Crotolaria albida | FABACEAE | |
| 44 | Crotolaria calycina | FABACEAE | |
| 45 | Crotolaria ferruginea | FABACEAE | |
| 46 | Crotolaria juncea | FABACEAE | |
| 47 | Crotolaria pallida | FABACEAE | |
| 48 | Crotolaria trifoliatum | FABACEAE | |
| 49 | Crotolaria humifusa | FABACEAE | |
| 50 | Crotolaria tetragona | FABACEAE | |
| 51 | Croton bonplandianum | Euphorbiaceae | |
| 52 | Curculigo orchioides | HYPOXIDACEAE | |
| 53 | Curculigo latifolia | HYPOXIDACEAE | |
| 54 | Cynoglossum sp. | BORAGINACEAE | |
| 55 | Desmodium gangeticum | FABACEAE | |
| 56 | Desmodium griffiithianum | FABACEAE | |
| 57 | Desmodium heterophyllum | FABACEAE | |
| 58 | Desmodium laxum | FABACEAE | |
| 59 | Desmodium triflorum | FABACEAE | |
| 60 | Desmodium triforrum | FABACEAE | |
| 61 | Dicliptera roxburghiana | ACANTHACEAE | |
| 62 | Drymaria cordata | CARYOPHYLLACEAE | |
| 63 | Dysophylla sp. | LAMIACEAE | |
| 64 | Echinops echinatus | ASTERACEAE | |
| 65 | Eclipta alba | ASTERACEAE | |
| 66 | Elatostoma platyphyllum | URTICACEAR | |
| 67 | Elatostoma lineolatum | URTICACEAR | |
| 68 | Elatostoma papillosum | URTICACEAR | |
| 69 | Elatostoma rupestre | URTICACEAR | |
| 70 | Emilia sonchifolia | ASTERACEAE | |
| 71 | Eplephantopus scaber | ASTERACEAE | |
| 72 | Eranthemum sp. | ACANTHACEAE | |
| 73 | Euphorbia hirta | Euphorbiaceae | |
| 74 | Euryale feerox | NYMPHAEACEAE | |
| 75 | Evolvulus alsenoides | CONVOLVULACEAE | |
| 76 | Evolvulus nummularius | CONVOLVULACEAE | |
| 77 | Gangrea maderaspetana | ASTERACEAE | |
| ' ' | Gerardiana palmata | URTICACEAR | 1 |

| SL.NO. | SCIENTIFIC NAME | FAMILY NAME | LOCAL NAME |
|--------|-----------------------|------------------|------------|
| 79 | Gnaphalium affine | ASTERACEAE | |
| 80 | Gnaphalium polycanlon | ASTERACEAE | |
| 81 | Gomphostemma sp. | LAMIACEAE | |
| 82 | Guizotia abyssinica | ASTERACEAE | |
| 83 | Hedyotis corymbosa | RUBIACEAE | |
| 84 | Hedyotis costata | RUBIACEAE | |
| 85 | Hedyotis diffusa | RUBIACEAE | |
| 86 | Hedyotis glabra | RUBIACEAE | |
| 87 | Hedyotis lineata | RUBIACEAE | |
| 88 | Hedyotis scandens | RUBIACEAE | |
| 89 | Hemigraphis sp. | ACANTHACEAE | |
| 90 | Holiotroplum sp. | BORAGINACEAE | |
| 91 | Hydrocotyle javanica | APIACEAE | |
| 92 | Hypoxis aurea | HYPOXIDACEAE | |
| 93 | Hyptis suaveolens | LAMIACEAE | |
| 94 | Impatiens balsamina | BALSAMINACEAE | |
| 95 | Impatiens balsamina | BALSAMINACEAE | |
| 96 | Impatiens sp. | BALSAMINACEAE | |
| 97 | Justicia gandarussa | ACANTHACEAE | |
| 98 | Laggere alata | ASTERACEAE | |
| 99 | Leonurus sibiricus | LAMIACEAE | |
| 100 | Lepidagathes sp. | ACANTHACEAE | |
| 101 | Leucanthus sp. | URTICACEAR | |
| 102 | Leuicas sp. | LAMIACEAE | |
| 103 | Limnophila sp. | SCROPHULARIACEAE | |
| 104 | Lindernia sp. | SCROPHULARIACEAE | |
| 105 | Ludwigia oclovalves | ONAGRACEAE | |
| 106 | Ludwigia perennis | ONAGRACEAE | |
| 107 | Ludwigia prostrata | ONAGRACEAE | |
| 108 | Ludwigia adscendens | ONAGRACEAE | |
| 109 | Malvaviscus arboreus | MALVACEAE | |
| 110 | Mecardonia sp. | SCROPHULARIACEAE | |
| 111 | Medicago lupulkina | FABACEAE | |
| 112 | Medicago polymorpha | FABACEAE | |
| 113 | Melilotus albus | FABACEAE | |
| 114 | Melissa sp. | LAMIACEAE | |
| 115 | Merremia emerginata | CONVOLVULACEAE | |
| 116 | Merremia hederaceae | CONVOLVULACEAE | |
| 117 | Merremia vitifolia | CONVOLVULACEAE | |
| 118 | Mismosa pudica | FABACEAE | Lajjabati |
| 119 | Mollineria recurvata | HYPOXIDACEAE | |
| 120 | Mollugo pentaphylla | MOLLUGINACEAE | |
| 121 | Musa acuminata | MUSACEAE | |
| 122 | Myriophyllum indicum | HOLORAGACEAE | |
| 123 | Nelsonia sp. | SCROPHULARIACEAE | |
| 124 | Nelumbo nucifera | NYMPHAEACEAE | |
| 125 | Nymphaea micrantha | NYMPHAEACEAE | |
| 126 | Nymphaea nauchelli | NYMPHAEACEAE | |
| 127 | Nymphaea pubescens | NYMPHAEACEAE | |

| SL.NO. | SCIENTIFIC NAME | FAMILY NAME | LOCAL NAME |
|--------|-------------------------|------------------|------------|
| 128 | Nymphoides indicum | MENYANTHACEAE | |
| 129 | Nymphoides cristata | MENYANTHACEAE | |
| 130 | Ocimum sp. | LAMIACEAE | |
| 131 | Ophiorrihiza rugosa | RUBIACEAE | |
| 132 | Ophiorrihiza tingens | RUBIACEAE | |
| 133 | Ophiorrihiza turida | RUBIACEAE | |
| 134 | Ophiorrihiza villosa | RUBIACEAE | |
| 135 | Orthosiphon incurvus | LAMIACEAE | |
| 136 | Oxalis corniculata | OXALIDACEAE | |
| 137 | Perilla frutescens | LAMIACEAE | |
| 138 | Phyllanthus clarkei | Euphorbiaceae | |
| 139 | Phyllanthus frateruns | Euphorbiaceae | |
| 140 | Phyllanthus virgatus | Euphorbiaceae | |
| 141 | Phyllanthus urinarius | Euphorbiaceae | |
| 142 | Pilea microphylla | URTICACEAR | |
| 143 | Pilea scripta | URTICACEAR | |
| 144 | Pilea glaberrima | URTICACEAR | |
| 145 | Plumbago zeylanica | PLUMBAGINANCEAE | |
| 146 | Polycarpon prostratum | CARYOPHYLLACEAE | |
| 147 | Polygonum sp. | POLYGONACEAE | |
| 148 | Portulaca oleraceae | PORTULACCACEAE | |
| 149 | Portulaca quadrifida | PORTULACCACEAE | |
| 150 | Pouzolzia viminea | URTICACEAR | |
| 151 | Pouzolzia zeylanica | URTICACEAR | |
| 152 | Psysalis minima | SOLANACEA | |
| 153 | Rotala densiflora | LYTHRACEAE | |
| 154 | Rotala Indica | LYTHRACEAE | |
| 155 | Ruellia sp. | ACANTHACEAE | |
| 156 | Rumex maritimus | POLYGONACEAE | |
| 157 | Rumex vesicarius | POLYGONACEAE | |
| 158 | Rungea sp. | ACANTHACEAE | |
| 159 | Salvia sp. | LAMIACEAE | |
| 160 | Scoparia dulcis | SCROPHULARIACEAE | |
| 161 | Sida Acuta | MALVACEAE | |
| 162 | Sida cordata | MALVACEAE | |
| 163 | Sida cordata | MALVACEAE | |
| 164 | Sida mysorensis | MALVACEAE | |
| 165 | Siegesbeckia orientalis | ASTERACEAE | |
| 166 | Smithis grandis | FABACEAE | |
| 167 | Solanum sp. | SOLANACEA | |
| 168 | Sonchus asper | ASTERACEAE | |
| 169 | Sonerella maculata | MELASTOMACEAE | |
| 170 | Spermacoce ocymoides | RUBIACEAE | |
| 171 | Spiradictis bifida | RUBIACEAE | |
| 172 | Strobilanthes sp. | ACANTHACEAE | |
| 173 | Tephrosia purpurea | FABACEAE | |
| 174 | Torenia sp. | SCROPHULARIACEAE | |
| 175 | Trapa nutans var. | ONAGRACEAE | |
| 176 | Triumfetta bartramina | TILIACEAE | |

| SL.NO. | SCIENTIFIC NAME | FAMILY NAME | LOCAL NAME |
|--------|-------------------|-------------|------------|
| 177 | Triumfetta pilosa | TILIACEAE | |
| 178 | Uraria lagopus | FABACEAE | |
| 179 | Uraria neglecta | FABACEAE | |
| 180 | Uraria rufesceus | FABACEAE | |
| 181 | Uraria sp. | FABACEAE | |
| 182 | Urdica dioica | URTICACEAR | |
| 183 | Urena lobata | MALVACEAE | |
| 184 | Urena Sinuata | MALVACEAE | |
| 185 | Vernonia cinera | ASTERACEAE | |
| 186 | Vicia hirsuta | FABACEAE | |
| 187 | Vinca acuminaata | APOCYNACEAE | |
| 188 | Viola tricolor | VIOLACEAE | |
| 189 | Zomea gibbosa | FABACEAE | |

D. LIST OF CLIMBERS

| SL.NO. | SCIENTIFIC NAME | FAMILY NAME | LOCAL NAME |
|--------|---------------------------|------------------|--------------|
| 1 | Abrus pulchellus | FABACEAE | |
| 2 | Abrus precatorius | ANONACEAE | |
| 3 | Acacia caesia | MIMOSACEAE | Ararekanta |
| 4 | Acacia pennata | MIMOSACEAE | Ararekanta |
| 5 | Aganosma cymosum | APOCYNACEAE | |
| 6 | Ampiloceissus barbatas | VITACEAE | |
| 7 | Ampiloceissus latifolium | VITACEAE | |
| 8 | Ampiloceissus sikkimensis | VITACEAE | |
| 9 | Argyreria argeantia | CONVOLVULACEAE | |
| 10 | Argyreria hookeri | CONVOLVULACEAE | |
| 11 | Argyreria capitata | CONVOLVULACEAE | |
| 12 | Aristolachia peltata | ARISTOLOCHEACEAE | |
| 13 | Artabotrys uncinalus | ANONACEAE | |
| 14 | Asparagus racemosus | LILIACEAE | |
| 15 | Aspidopterys elliptica | MALPHIGIACEAE | |
| 16 | Bauhinia vahalli | CAESALPINIACEAE | Bhorla |
| 17 | Berchemia floriburda | RHAMNACEAE | |
| 18 | Butea parviflora | FABACEAE | Debrelahara |
| 19 | Buttneria pilosa | STECRCULIACEAE | |
| 20 | Caesalpinia bonduc | CAESALPINIACEAE | |
| 21 | Cannarus paniculatus | FABACEAE | |
| 22 | Caparis acutifolia | CAPPRIDACEAE | |
| 23 | Caparis multiflora | CAPPRIDACEAE | |
| 24 | Caparis olacifolia | CAPPRIDACEAE | |
| 25 | Cayratia pedata | VITACEAE | |
| 26 | Celastrus monosperma | CELASTRACEAE | |
| 27 | Celastrus monosperma | VITACEAE | |
| 28 | Celastrus paniculatus | CELASTRACEAE | |
| 29 | Ceropegia macrantha | ASCLEPIADACEAE | |
| 30 | Cissampelos pariera | MENISPERMACEAE | |
| 31 | Cissus adanta | VITACEAE | Charchare |
| 32 | Cissus assamica | VITACEAE | |
| 33 | Cissus guadrangularis | VITACEAE | |
| 34 | Cissus javanica | VITACEAE | |
| 35 | Cissus repanda | VITACEAE | Panilahara |
| 36 | Clematis gouriana | RANUNCULACEAE | Kanasilahara |
| 37 | Clitoria ternatea | FABACEAE | |
| 38 | Coccinia grandis | CUCURBITACEAE | |
| 39 | Cocculus hirsutas | MENISPERMACEAE | |
| 40 | Cryptolepis sinensis | ASCLEPIADACEAE | |

| SL.NO. | SCIENTIFIC NAME | FAMILY NAME | LOCAL NAME |
|--------|--|-------------------------------|---------------|
| 41 | Crytolepis chinensis | PERIPLOCACEAE | |
| 42 | Cyclea peltata | MENISPERMACEAE | |
| 43 | Cyclea flagrocarpum | COMBRETACEAE | |
| 44 | Dalbergia stipulaceae | FABACEAE | Siris Lahara |
| 45 | Dalbergia volubilis | FABACEAE | |
| 46 | Derris robusta | FABACEAE | |
| 47 | Derris trifoliata | FABACEAE | |
| 48 | Desmos chinensis | ANONACEAE | |
| 49 | Desmos dumosus | ANONACEAE | |
| 50 | Dregia sanccolata | ASCLEPIADACEAE | |
| 51 | Entada phaseolodes | MIMOSACEAE | Pangra |
| 52 | Erycibe pegnensis | CONVOLVULACEAE | |
| 53 | Fissistigama palyanthum | ANONACEAE | |
| 54 | Fissistigama verucosum | ANONACEAE | |
| 55 | Gouania leptostachya | RHAMNACEAE | |
| 56 | Hedyotis scandens | RUBIACEAE | |
| 57 | Hemidesmus indicus | ASCLEPIADACEAE | |
| 58 | Hiptage bengalensis | RHAMNACEAE | |
| 59 | Hiptage bengalensis | MALPHIGIACEAE | |
| 60 | Hodgsonia macrocarpa | CUCURBITACEAE | |
| 61 | Hoya lanceolata | ASCLEPIADACEAE | |
| 62 | Hoya polyneura | ASCLEPIADACEAE | |
| 63 | Hymnema sp. | ASCLEPIADACEAE | |
| 64 | Ipomea eriocarpa | CONVOLVULACEAE | |
| 65 | Jasminun pubescens | CONVOLVULACEAE | |
| 66 | Jasminun sp. | OLEACEAE | |
| 67 | Melothria heterophylla | CUCURBITACEAE | |
| 68 | Melothria madaraspetana | CUCURBITACEAE | |
| 69 | Mezoneurum cuculatum | CAESALPINIACEAE | Bakshikanta |
| 70 | Mikania cordata | ASTERACEAE | |
| 71 | Miliusa macrocarpa | ANONACEAE | |
| 72 | Miliusa roxburghiana | ANONACEAE | |
| 73 | Millettia pashycarpa | FABACEAE | Kurkus lahare |
| 74 | Millettia auriculata | FABACEAE | Tarorrik |
| 75 | Mimosa himalayana | MIMOSACEAE | Ararekanta |
| 76 | Mucuna prurita | FABACEAE | Kowchu |
| 77 | Mucuna imbricata | FABACEAE | Kaoso |
| 78 | Naravelia zeylanica | RANUNCULACEAE | Rashgagri |
| 79 | Paederia foetida | RUBIACEAE | Biri lahara |
| 80 | Parabaena saggitata | MENISPERMACEAE | |
| 81 | Passiflora foetida | PASSIFLORACEAE | |
| 82 | Passiflora edulis | PASSIFLORACEAE | |
| 83 | Piper sp. | PIPERACEAE | Pipli |
| 84 | Porana paniculata | CONVOLVULACEAE | T |
| 85 | Pueraria tuberosa | FABACEAE | |
| 86 | Sabia lanceolata | SABIACEAE | |
| 87 | Schefflera venulosa | ARALIACEAE | |
| 88 | Shutena vestita | FABACEAE | |
| 89 | Shuteria vestita | FABACEAE | |
| 90 | Smilax zeylanica | LILIACEAE | |
| 91 | Stephania peltata | MENISPERMACEAE | |
| 92 | Stephania glabra | MENISPERMACEAE | |
| 93 | Stephania hernandifolia | MENISPERMACEAE | |
| 94 | Tetracera asiatica | DILLENIACEAE | |
| 95 | Tetrastima bractiolatum | VITACEAE | |
| 96 | Tetrastima bractionatum Tetrastima lanceolarium | VITACEAE | |
| 97 | Tetrastima serrulatum | VITACEAE | |
| 98 | Tetrastima thomsonianum | VITACEAE | |
| 99 | Thunbergia grandiflora | ACANTHACEAE | |
| | | | |
| 100 | Tinospora cordifolia Titiacora racemosa | MENISPERMACEAE MENISPERMACEAE | |
| 101 | rmacora racemosa | MENISPERMACEAE | |

| SL.NO. | SCIENTIFIC NAME | FAMILY NAME | LOCAL NAME |
|--------|-------------------------|----------------|------------|
| 102 | Toddalia asiatica | RUTACEAE | |
| 103 | Trichosanthes sp. | CUCURBITACEAE | |
| 104 | Tylophora hirsuta | ASCLEPIADACEAE | |
| 105 | Uncaria scandens | RUBIACEAE | |
| 106 | Uncaria sessilifractus | RUBIACEAE | |
| 107 | Ventilego maderaspetana | RHAMNACEAE | |
| 108 | Zizyphus oenoplia | RHAMNACEAE | |

E. LIST OF GRASSES (FAMILY - POACEAE)

| SL.NO. | SCIENTIFIC NAME | |
|--------|-------------------------|--|
| 1 | Apluda mutica | |
| 3 | Arundinella bengalensis | |
| 3 | Arundo donax | |
| 4 | Bothriochloa intermedia | |
| 5 | Chrysopogon auriculatus | |
| 6 | Chrysopogon aciculatus | |
| 7 | Cymbopogon jwarancussa | |
| 8 | Cymbopogon nardus | |
| 9 | Cynodon dactylon | |
| 10 | Dactylocteneum egyptium | |
| 11 | Desmostachia bibinnata | |
| 12 | Dichanthium annulatum | |
| 13 | Digitaria adscendens | |
| 14 | Echinochloa colonum | |
| 15 | Echinochloa crusgalli | |
| 16 | Eleusine indica | |
| 17 | Eragrostis tenella | |
| 18 | Eragrostis unioloides | |
| 19 | Imperata cylindrica | |
| 20 | Ischaemum indicum | |
| 21 | Leersia hexandra | |
| 22 | Microstegium ciliatum | |

| 23 Olismenus composites 24 Oryza rupipogon 25 Panicum indicum 26 Paspalidium punctatum 27 Paspalum conjugatum 28 Paspalum scrobiculatum 29 Pennisetum setosum 30 Phragmites karka 31 Pogonatherum sacchariodes 32 Saccharum arundinaceum 33 Saccharum spontaneum 34 Saccharum bengalensis 35 Saccharum procerum 36 Sclerostacys fusca 37 Setaria pallidifusca 38 Setaria verticillata 39 Setaria palmaefolia 40 Themeda arundinacea 41 Themeda caudate 42 Thysanolaena maxima 43 Vetiveria zizanioides | SL.NO. | SCIENTIFIC NAME | |
|--|--------|---------------------------|--|
| 25 Panicum indicum 26 Paspalidium punctatum 27 Paspalum conjugatum 28 Paspalum scrobiculatum 29 Pennisetum setosum 30 Phragmites karka 31 Pogonatherum sacchariodes 32 Saccharum arundinaceum 33 Saccharum spontaneum 34 Saccharum bengalensis 35 Saccharum procerum 36 Sclerostacys fusca 37 Setaria pallidifusca 38 Setaria verticillata 39 Setaria palmaefolia 40 Themeda arundinacea 41 Themeda caudate 42 Thysanolaena maxima | 23 | Olismenus composites | |
| 26Paspalidium punctatum27Paspalum conjugatum28Paspalum scrobiculatum29Pennisetum setosum30Phragmites karka31Pogonatherum sacchariodes32Saccharum arundinaceum33Saccharum spontaneum34Saccharum bengalensis35Saccharum procerum36Sclerostacys fusca37Setaria pallidifusca38Setaria verticillata39Setaria palmaefolia40Themeda arundinacea41Themeda caudate42Thysanolaena maxima | 24 | Oryza rupipogon | |
| 27Paspalum conjugatum28Paspalum scrobiculatum29Pennisetum setosum30Phragmites karka31Pogonatherum sacchariodes32Saccharum arundinaceum33Saccharum spontaneum34Saccharum bengalensis35Saccharum procerum36Sclerostacys fusca37Setaria pallidifusca38Setaria verticillata39Setaria palmaefolia40Themeda arundinacea41Themeda caudate42Thysanolaena maxima | 25 | Panicum indicum | |
| 28Paspalum scrobiculatum29Pennisetum setosum30Phragmites karka31Pogonatherum sacchariodes32Saccharum arundinaceum33Saccharum spontaneum34Saccharum bengalensis35Saccharum procerum36Sclerostacys fusca37Setaria pallidifusca38Setaria verticillata39Setaria palmaefolia40Themeda arundinacea41Themeda caudate42Thysanolaena maxima | 26 | Paspalidium punctatum | |
| 29Pennisetum setosum30Phragmites karka31Pogonatherum sacchariodes32Saccharum arundinaceum33Saccharum spontaneum34Saccharum bengalensis35Saccharum procerum36Sclerostacys fusca37Setaria pallidifusca38Setaria verticillata39Setaria palmaefolia40Themeda arundinacea41Themeda caudate42Thysanolaena maxima | 27 | Paspalum conjugatum | |
| 30 Phragmites karka 31 Pogonatherum sacchariodes 32 Saccharum arundinaceum 33 Saccharum spontaneum 34 Saccharum bengalensis 35 Saccharum procerum 36 Sclerostacys fusca 37 Setaria pallidifusca 38 Setaria verticillata 39 Setaria palmaefolia 40 Themeda arundinacea 41 Themeda caudate 42 Thysanolaena maxima | 28 | Paspalum scrobiculatum | |
| 31Pogonatherum sacchariodes32Saccharum arundinaceum33Saccharum spontaneum34Saccharum bengalensis35Saccharum procerum36Sclerostacys fusca37Setaria pallidifusca38Setaria verticillata39Setaria palmaefolia40Themeda arundinacea41Themeda caudate42Thysanolaena maxima | 29 | Pennisetum setosum | |
| 32Saccharum arundinaceum33Saccharum spontaneum34Saccharum bengalensis35Saccharum procerum36Sclerostacys fusca37Setaria pallidifusca38Setaria verticillata39Setaria palmaefolia40Themeda arundinacea41Themeda caudate42Thysanolaena maxima | 30 | Phragmites karka | |
| 33Saccharum spontaneum34Saccharum bengalensis35Saccharum procerum36Sclerostacys fusca37Setaria pallidifusca38Setaria verticillata39Setaria palmaefolia40Themeda arundinacea41Themeda caudate42Thysanolaena maxima | 31 | Pogonatherum sacchariodes | |
| 34Saccharum bengalensis35Saccharum procerum36Sclerostacys fusca37Setaria pallidifusca38Setaria verticillata39Setaria palmaefolia40Themeda arundinacea41Themeda caudate42Thysanolaena maxima | 32 | Saccharum arundinaceum | |
| 35 Saccharum procerum 36 Sclerostacys fusca 37 Setaria pallidifusca 38 Setaria verticillata 39 Setaria palmaefolia 40 Themeda arundinacea 41 Themeda caudate 42 Thysanolaena maxima | 33 | Saccharum spontaneum | |
| 36 Sclerostacys fusca 37 Setaria pallidifusca 38 Setaria verticillata 39 Setaria palmaefolia 40 Themeda arundinacea 41 Themeda caudate 42 Thysanolaena maxima | 34 | Saccharum bengalensis | |
| 37 Setaria pallidifusca 38 Setaria verticillata 39 Setaria palmaefolia 40 Themeda arundinacea 41 Themeda caudate 42 Thysanolaena maxima | 35 | Saccharum procerum | |
| 38 Setaria verticillata 39 Setaria palmaefolia 40 Themeda arundinacea 41 Themeda caudate 42 Thysanolaena maxima | 36 | Sclerostacys fusca | |
| 39 Setaria palmaefolia 40 Themeda arundinacea 41 Themeda caudate 42 Thysanolaena maxima | 37 | Setaria pallidifusca | |
| 40 Themeda arundinacea 41 Themeda caudate 42 Thysanolaena maxima | 38 | Setaria verticillata | |
| 41 Themeda caudate 42 Thysanolaena maxima | 39 | Setaria palmaefolia | |
| 42 Thysanolaena maxima | 40 | Themeda arundinacea | |
| 3 | 41 | Themeda caudate | |
| 43 Vetiveria zizanioides | 42 | Thysanolaena maxima | |
| | 43 | | |
| <u> </u> | | | |

LIST OF SEDGES (FAMILY – CYPERACEAE)

| SL.NO. | SCIENTIFIC NAME | |
|--------|----------------------|--|
| 1 | Carex indica | |
| 2 | Cyperus iria | |
| 3 | Cyperus cuspidatus | |
| 4 | Cyperus diffusus | |
| 5 | Cyperus haspans | |
| 6 | Cyperus killinga | |
| 7 | Eleocharis palustris | |
| 8 | Eleocharis sp. | |

| SL.NO. | SCIENTIFIC NAME | |
|--------|-----------------------|--|
| 9 | Eriophorum comosum | |
| 10 | Fimbrystylis flifolia | |
| 11 | Pycreus globosus | |
| 12 | Scirpus articulates | |
| 13 | Scirpus erectus | |
| 14 | Scirpus grossus | |
| 15 | Scleria elata | |
| 16 | Scleria hebecarpa | |

LIST OF CANES (Aricaceae)

| Sl. No. | SCIENTIFIC NAME | |
|---------|------------------------------------|--|
| 1 | Daemonorops jenkinsianus (Barobet) | |
| 2 | Calamus acanthospathus (Gouri bet) | |
| 3 | Calamus leptospadix (Murgi bet) | |
| 4 | Calamus tenuis (Pani bet) | |
| 5 | Calamus flagellum (Putli Bet) | |
| 6 | Calamus guruba (Singani bet) | |

LIST OF BAMBOOS (Poaceae)

| Sl. No. | SCIENTIFIC NAME |
|---------|----------------------------------|
| 1 | Bambusa polymorpha (Jaotha bans) |
| 2 | Bambusa tulda (Lathi bans) |
| 3 | Bambusa nutans (Makla bans) |
| 4 | Dendrocalamus hamiltonni (Choya |
| | bans) |
| | |
| | |

F. LIST OF ORCHIDS

| | | | 1 | T | <u> </u> |
|---------|---|---------------------|------------|---|-------------|
| Sl. No. | NAME (Scientific & Common) | ABUNDANCE | Sl. No. | ntific & Common) | ABUNDANCE |
| 1 | Acampe ochracea (Lindl.) | Scarce | 21 | Bulbophyllum guttulatum | Uncommon |
| | Hochr. | | | | |
| 2 | A 211 (T: 11) | W. C | | Wall ex Hook.f. | |
| 2 | Acampe papillosa (Lindl.) Lindl. | Very Common | 22 | Bulbophyllum gymnopus Hook.f. | Common |
| 3 | Aerides fieldingii Lodd, | Uncommon | 23 | Bulbophyllum leopardinum | Uncommon |
| 3 | Fox-brush orchid | Cheommon | 23 | (Wall.) Lindl. | Chedilinon |
| 4 | Aerides multiflorum | Very Common | | Leopard-skin Orchid | |
| | Roxb. | | 24 | Bulbophyllum | Scarce |
| 5 | Acerides odoratum Loyur. | Very Common | | omatissimum (Reichb.f.)J.J.Sm. | |
| 6 | Agrostophyllum | Scarce | | Tall Orchid | |
| _ | callosum Reichb.f. | | 25 | Bulbophyllum protractum | Uncommon |
| 7 | Agrostophyllum | Scarce | 26 | Hook.F. Bulbophyllum reptans | Scarce |
| 8 | Khasianum Griff Agrostophyllum | Scarce | 20 | Lindl. | Scarce |
| 0 | myrianthum King & Pantl. | Scarce | 27 | Bulbophyllum | Uncommon |
| 9 | Anoectochilus brevilabris | Scarce | | sarcophyllum (King & Pantl.) | Chechinich |
| | Lindl. | | | J.J.Sm. | |
| | Jewel Orchid, Kewe | | 28 | Bulbophyllum strjatum | Uncommon |
| 10 | Anoectochilus roxburghii | Scarce | | (Griff.) Rechb.f. | |
| | Lindl. | | 29 | Bulbophyllum umbellatum | Scarce |
| 11 | Jewel Orchid. | Uncommon | 30 | Lindl. Bulbophyllum yoksunense | Uncommon |
| 11 | Appendicula cornuta Bl. | Uncommon | 30 | J.J.Sm. | Uncommon |
| 12 | Arachnis cathcartii | Scarce | 31 | Calanthe biloba Lindl. | Scarce |
| 12 | (Lindl.) J.J.Sm. | Searce | | Culantile officea Email | Source |
| 13 | Arundina graminifolia | Scarce | 32 | Calanthe herbacea Lindl. | Scarce |
| | (D.Don) Hochr. | | | | |
| | Bamboo Orchid | | 33 | Calanthe masuca (D.Don.) | Scarce |
| 14 | Ascocentrum | Scarce | | Landl. | |
| | ampullaceum Lindl. Ex Wall | | 34 | Ceratostylis himalaica Hook.f. | Scarce |
| 15 | Wall Bulbophyllum affine | Uncommon | 35 | Hook.i. Ceratostylis teres | Scarce |
| 13 | Lindl. | Chechinon | | Reichb.f. | Scarce |
| 16 | Bulbophyllum andersonii | Uncommon | 36 | Chiloschista lunifera | Uncommon |
| | (Hook.f.) J.J.Sm. | | | (Reichb.f.) J.J.Sm. | |
| 17 | Bulbophyllum bisetum | Scarce | 37 | Cleisostoma filiforme | Very Common |
| | Lindl. | | | (Lindl.) Garay | |
| 18 | Bulbophyllum careyanum | Very Common | 38 | Cleisostoma racemiferum | Scarce |
| 19 | (Hook.f.) Spreng. Bulbophyllum cornu-cervi | I In a a manual and | 39 | (Lindl.) Garay Cleisostoma ramosum | Vary Camman |
| 19 | King & Pantl | Uncommon | 39 | Hook.f. | Very Common |
| 20 | Bulbophyllum gracilipes | Scarce | 40 | Coelogyne barbata | Uncommon |
| 20 | King & Pantl | | | Griff. | |
| 41 | Coelogyne cristata. | Scarce | 64 | Dendrobium densiflorum | Uncommon |

| Common C | Sl. No. | NAME (Scientific & Common) | ABUNDANCE | Sl. No. | ntific & Common) | ABUNDANCE |
|--|---------|--------------------------------|-------------|------------|----------------------------|-------------|
| Lindl. A | | Lindl. | | | Lindl. Ex Wall. | |
| 43 Coelegyane davida Wall ex Lindl. 44 Coelegyane ovalis Lindl. 45 Coelegyane ovalis Lindl. 46 Coelegyane evalis Lindl. 47 Cymbidium aloifolium (Lin) Sw 48 Cymbidium cochleare Lindl. 49 Cymbidium devonianum Paxt 49 Cymbidium eburneum Lindl. 50 Cymbidium esifolium (Lindl. Sw. Cymbidium gigantenum wall. Ex Lindl. 51 Cymbidium gigantenum wall. Ex Lindl. 52 Cymbidium mastersii Griff Ex Limdl. 53 Cymbidium mastersii Griff Ex Lindl. 54 Cymbidium aduncum Wall 55 Dendrobium aggregatum Roxb. ver. Jenkinsii King & Pantl. 56 Dendrobium amoenum Wall Ex Lindl. 57 Dendrobium amoenum Wall. Ex Lindl. 58 Dendrobium amoenum Wall. Ex Lindl. 59 Dendrobium amoenum Wall. Ex Lindl. 59 Dendrobium amoenum Wall. Ex Lindl. 50 Dendrobium amoenum Wall. Ex Lindl. 51 Cymbidium enartersii Griff Ex Lindl. 52 Cymbidium mastersii Griff Ex Lindl. 54 Cymbidium mastersii Cymbidium mastersii Griff Ex Lindl. 55 Dendrobium aduncum Wall 56 Dendrobium aduncum Wall 57 Dendrobium aduncum Wall 58 Dendrobium amoenum Scarce 59 Dendrobium amoenum Wall 50 Dendrobium amoenum Scarce 50 Dendrobium amoenum Wall 57 Dendrobium amoenum Scarce 58 Dendrobium amoenum Wall 59 Dendrobium amoenum Wall 50 Dendrobium amoenum Wall 51 Cymbidium erys Sw. 52 Cymbidium erys Sw. 54 Cymbidium erys Sw. 55 Dendrobium anceps Sw. 56 Dendrobium amoenum Wall 57 Dendrobium amoenum Wall 58 Dendrobium amoenum Wall 59 Dendrobium amoenum Wall 50 Dendrobium amoenum Wall 51 Cymbidium erys Santum 52 Dendrobium erys Santum 54 Cymbidium erys Santum 55 Dendrobium erys Santum 56 Dendrobium amoenum 57 Dendrobium erys Sw. 58 Dendrobium erys Santum 59 Dendrobium erys Santum 50 Dendrobium erys Santum 51 Dendrobium erys Santum 52 Dendrobium erys Santum 55 Dendrobium erys Santum | 42 | | Uncommon | | | |
| Lindl. Uncommon | 13 | | Uncommon | 65 | | Scarce |
| 45 Coelogyne ntitida (Wall.) Lindl. Kharsang (in Lepcha) Coelogyne ovalis Lindl. Uncommon (Lind) Var. Ocalatum Hook.f. Dendrobium fimbriatum Lindl. Var. Ocalatum Hook.f. Common (Lind) Var. Ocalatum Hook.f. Dendrobium fimbriatum Lindl. Var. Ocalatum Hook.f. Common Lindl. Common Lindl. Var. Ocalatum Hook.f. Common Lindl. Var. Ocalatum Hook.f. Common Lindl. | 73 | | Chedilinon | 66 | | Scarce |
| Wall.) Lindl. Kharsang (in Lepcha) Cologyne ovalis Lindl. Uncommon Cologyne ovalis Lindl. Cologyne ovalis | | Coelogyne ovalis Lindl. | | | Hook.f. | |
| Kharsang (in Lepcha) Coelegyne ovalis Lindl. Uncommon Lindl. Var. Oculatum Hook.f. | 45 | | Uncommon | 67 | | Common |
| 46 Coelogyne ovalis Lindl. Uncommon 69 Dendrobium firmbriatum Lindl. Var. Oculatum Hook.f. 48 Cymbidium cochleare Uncommon 70 Dendrobium firmbriatum Lindl. Var. Oculatum Hook.f. 49 Cymbidium devonianum Paxt Uncommon 71 Dendrobium firmbriatum Scarce Lindl. 50 Cymbidium devonianum Uncommon 72 Dendrobium moschatum Scarce Lindl. 51 Cymbidium eburncum Lindl. Sw. Dendrobium moschatum Scarce Topadrobium picardi Roxb. Very Common Very Commo | | | | 68 | | Scarce |
| 47 Cymbidium aloifolium (Lin) Sw | 46 | | Uncommon | | Lindl. | |
| Clin) Sw Cymbidium cochleare Uncommon To Dendrobium formosum Scarce Roxb ex Lindl. Scarce Indl. | 4.7 | G 1'1' 1'C1' | W. C | 69 | | Common |
| Assemblidium cochleare Lindl. 49 Cymbidium devonianum Paxt 50 Cymbidium devonianum 10 10 10 10 10 10 10 1 | 4/ | | Very Common | | | |
| 49 Cymbidium devonianum Paxt Cymbidium eburneum Uncommon 71 Dendrobium lituiflorum Scarce Lindl. 72 Dendrobium moschatum Very Comm Sw. Very Comm Common Very Comm Ve | 48 | | Uncommon | 70 | | Scarce |
| Paxt Cymbidium eburneum Lindl. 51 Cymbidium ensifolium Uncommon Clin.) Sw. 52 Cymbidium gigantenum Wall. Ex Lindl. X-mas orchid X-mas orchid Scarce Toymbidium mastersii Scarce Toymbidium munronianum Cymbidium munronianum Cymbidium aduncum Uncommon Wall. Ex Lindl. Toymbidium mastersii Scarce Toymbidium aduncum Uncommon Wall. Ex Lindl. Toymbidium terminal Scarce Par. & Reichb.f. Toymbidium terminal Par. & Reichb.f. Toymbidium termi | | | | | | |
| So | 49 | • | Uncommon | 71 | | Scarce |
| Lindl. Cymbidium ensifolium (Lin.) Sw. Sw. Dendrobium nobile Lindl. Noble orchid | 50 | | Unaamman | 72 | | Vary Common |
| S1 Cymbidium ensifolium (Lin.) Sw. Scarce T4 Dendrobium pierardi Roxb. ex Hook. X-mas orchid Scarce T5 Dendrobium pierardi Roxb. ex Hook. Ex Lindl. T5 Dendrobium pierardi Roxb. ex Hook. Ex Lindl. T6 Dendrobium pierardi Roxb. ex Hook. Ex Lindl. T6 Dendrobium pierardi Roxb. ex Hook. Ex Lindl. Uncommo Lindl. Uncommo Lindl. Dendrobium pulchellum Scarce Roxb. ex Lindl. T7 Dendrobium stuposum Uncommo Lindl. Dendrobium stuposum Uncommo Lindl. Dendrobium terminal Scarce Par. & Reichb.f. Dendrobium transparens Verycommo Wall. Ex Lindl. Dendrobium transparens Verycommo Wall. Ex Lindl. Dendrobium transparens Verycommo Wall. Ex Lindl. Dendrobium amoenum Scarce S1 Ephmerantha macraei (Lindl.) P.F. Hunt & Summerh Epigencium amphum (Lindl.) Scarce S2 Eria acervata Lindl. Common Eria carinata Gibs.ex Lindl. Common Cundl. Dendrobium chrysanthum Uncommon Roxb. Eria carinata Gibs.ex Lindl. Scarce Eria convallariodes Lindl. Scarce Eria convallariodes Lindl. Scarce Eria flava Lindl. Very common Roxb. Eria flava Lindl. Very common Eria paniculata Lindl. Uncommon Eria panic | 30 | | Uncommon | /2 | | Very Common |
| Clin.) Sw. Sw. Cymbidium gigantenum wall. Ex Lindl. X-mas orchid Scarce Tomoro Lindl. Scarce Tomoro Wall Ex Lindl. Tomoro Wall Ex L | 51 | | Uncommon | 73 | | Uncommon |
| wall. Ex Lindl. X-mas orchid 53 | | I - | | | Noble orchid | |
| X-mas orchid Cymbidium longifolium Scarce D. Don. Tool | 52 | Cymbidium gigantenum | Scarce | 74 | Dendrobium pierardi Roxb. | Verycommon |
| Scarce Lindl. Scarce Cymbidium longifolium D. Don. 76 Dendrobium pulchellum Scarce Roxb. ex Lindl. To Dendrobium stuposum Uncommon Lindl. Scarce Par. & Reichb.f. To Dendrobium terminal Scarce Par. & Reichb.f. Scarce To Dendrobium adjunctum Verycommon Wall Scarce Scarce Starce To Dendrobium terminal Scarce Par. & Reichb.f. Par. & Reichb.f. Verycommon Verycommo | | | | | | |
| D. Don. D. Don. D. Don. Cymbidium mastersii Griff. Ex Lindl. Cymidium munronianum King & Pantl. Dendrobium aduncum Wall Dendrobium aggregatum Roxb. ver. Jenkinsii King & Pantl. Dendrobium anceps Sw. Common Lindl. Dendrobium anceps Sw. Common Lindl. Dendrobium bicameratum Uncommon Lindl. Dendrobium crepidatum Lindl. Eria coronaria (Lindl.) Dendrobium cumulatum Lindl. Scarce Roxb. ex Lindl. Dendrobium stuposum Lindl. Par. & Reichb.f. Dendrobium transparens Wall. Ex Lindl. Dendrobium hirsuta (Lindl.) P.F. Hunt & Summerh Epigeneium amphum (Lindl.) Scarce Summerh Eria acervata Lindl. Common Lindl. Beria coronaria (Lindl.) Dendrobium crepidatum Lindl. Dendrobium cumulatum Lindl. Eria flava Lindl. Very common Roxb. ex Lindl. 77 Dendrobium stuposum Lindl. 78 Dendrobium terminal Scarce Wall. Ex Lindl. Dendrobium transparens Wall. Ex Lindl. Uncommon Roxb. Verycommon Verycommon Roxb. Ve | | | | 75 | _ | Uncommon |
| Searce Roxb. ex Lindl. To Dendrobium stuposum Uncommon Lindl. Scarce Roxb. ex Lindl. To Dendrobium stuposum Uncommon Lindl. To Dendrobium stuposum Uncommon Lindl. To Dendrobium stuposum Lindl. To Dendrobium terminal Scarce Par. & Reichb.f. Dendrobium transparens Verycommon Wall. Ex Lindl. Dendrobium hirsuta (Lindl.) Lindl. Lindl. Dendrobium amoenum Scarce Summerh Epigeneium amphum (Lindl.) Scarce Summerh Eria acervata Lindl. Common Lindl. Dendrobium chrysanthum Uncommon Scarce Searce Summerh Eria carinata Gibs.ex Lindl. Uncommon Lindl. Scarce Searce | 53 | | Scarce | 76 | | C |
| Criff. Ex Lindl. Cymidium munronianum King & Pantl. | 5.1 | | Scarce | /6 | _ | Scarce |
| Sociation Common | 34 | I - | Scarce | 1 77 | | Uncommon |
| King & Pantl. Dendrobium aduncum Uncommon Wall Par. & Reichb.f. Par. & Reichb.f. Verycommon Wall. Ex Lindl. Dendrobium and part Verycommon Wall. Ex Lindl. Dendrobium hirsuta (Lindl.) Lindl. Ephmerantha macraei (Lindl.) P.F. Hunt & Summerh Epigeneium amphum (Lindl.) Scarce Summerh Eria acervata Lindl. Common Eria carinata Gibs.ex Lindl. Uncommon Lindl. Scarce Searce S | 55 | | Uncommon | | | Chedimion |
| Wall Dendrobium aggregatum Roxb. ver. Jenkinsii King & Pantl. Scarce Wall. Ex Lindl. Dendrobium amoenum Scarce Wall. Ex Lindl. Dendrobium amoenum Wall. Ex Lindl. Dendrobium anceps Sw. Common Wall. Ex Lindl. Dendrobium anceps Sw. Common Wall. Ex Lindl. Dendrobium bicameratum Uncommon Wall. Ex Lindl. Dendrobium bicameratum Uncommon Wall. Ex Lindl. Scarce Summerh Epigeneium amphum (Lindl.) Scarce Summerh Eria acervata Lindl. Common Wall. Ex Wall. Common Wall. Ex Wall. Wincommon Wall. Ex Lindl. Wery common Wall. Wery common Wall. Wall. Wall. Wery common Wall. | | I - | | 78 | Dendrobium terminal | Scarce |
| Dendrobium aggregatum Roxb. Very Jenkinsii King & Pantl. Scarce Summerh Epigeneium amphum (Lindl.) Dendrobium bicameratum Uncommon Lindl. Ex Lindl. Dendrobium cumulatum Lindl. Searce Summerh Epigeneium amphum (Lindl.) Scarce Summerh Summerh Eria acervata Lindl. Common Summerh Eria acervata Lindl. Common Summerh Eria carinata Gibs.ex Lindl. Common Summerh Summerh Eria acervata Lindl. Common Summerh Summerh Summerh Summerh Summerh Eria acervata Lindl. Common Summerh | 56 | Dendrobium aduncum | Uncommon | | Par. & Reichb.f. | |
| Roxb. ver. Jenkinsii King & Pantl. 80 Dendrobium hirsuta (Lindl.) Lindl. | | | | 79 | - | Verycommon |
| ver. Jenkinsii King & Pantl. 58 Dendrobium amoenum Wall. Ex Lindl. 59 Dendrobium anceps Sw. Common Dendrobium bicameratum Lindl. Dendrobium chrysanthum Lindl. Ex Wall. Dendrobium crepidatum Lindl. Dendrobium crepidatum Lindl. Dendrobium cumulatum Lindl. Scarce 81 Ephmerantha macraei (Lindl.) P.F. Hunt & Summerh Epigeneium amphum (Lindl.) Scarce Summerh 82 Epigeneium amphum (Lindl.) Scarce Summerh Eria acervata Lindl. Common 84 Eria biflora Griff Uncommon 85 Eria carinata Gibs.ex Lindl. Scarce 87 Eria convallariodes Lindl. Reichb.f. 88 Eria flava Lindl. Very common Lindl. Very common Lindl. Very common Lindl. Very common Eria paniculata Lindl. | 57 | | Common | 00 | | |
| Searce Starce S | | | | 80 | | |
| Wall. Ex Lindl. Dendrobium anceps Sw. Common Base | | ver. Jehkhish King & Lahu. | | | (Ellidi.) Ellidi. | |
| Wall. Ex Lindl. Dendrobium anceps Sw. Common Base | 58 | Dendrobium amoenum | Scarce | 81 | Ephmerantha macraei | Uncommon |
| Summerh Eria acervata Lindl. Common | | | | | 1 - | |
| Dendrobium bicameratum Uncommon 83 Eria acervata Lindl. Common | 59 | Dendrobium anceps Sw. | Common | 82 | Epigeneium amphum (Lindl.) | Scarce |
| Lindl. Dendrobium chrysanthum Uncommon Lindl. Ex Wall. Dendrobium crepidatum Lindl. Dendrobium cumulatum Lindl. Lindl. Eria biflora Griff Eria carinata Gibs.ex Lindl. Beria convallariodes Lindl. Eria coronaria (Lindl.) Reichb.f. Beria flava Lindl. Very commulatum Lindl. Very commulatum Lindl. Very commulatum Lindl. Very commulatum Lindl. | | | | | | |
| Dendrobium chrysanthum Uncommon 85 Eria carinata Gibs.ex Lindl. Uncommon 86 Eria convallariodes Lindl. Scarce 87 Eria coronaria (Lindl.) Uncommon Eria flava Lindl. Scarce Uncommon 88 Eria flava Lindl. Very common 89 Eria paniculata Lindl. Uncommon Uncommon Eria paniculata Lindl. Uncommon Unco | 60 | Dendrobium bicameratum | Uncommon | 83 | Eria acervata Lindl. | Common |
| Dendrobium chrysanthum Uncommon 85 Eria carinata Gibs.ex Lindl. Uncommon 86 Eria convallariodes Lindl. Scarce 87 Eria coronaria (Lindl.) Uncommon Eria flava Lindl. Scarce Uncommon 88 Eria flava Lindl. Very common 89 Eria paniculata Lindl. Uncommon Uncommon Eria paniculata Lindl. Uncommon Unco | | T :41 | | 0.4 | Enic hiflana Cniff | I In common |
| Lindl. Ex Wall. 62 Dendrobium crepidatum Lindl. 63 Dendrobium cumulatum Lindl. 64 Eria convallariodes Lindl. 85 Eria coronaria (Lindl.) 86 Eria convallariodes Lindl. 87 Eria coronaria (Lindl.) 88 Eria flava Lindl. 89 Eria paniculata Lindl. Very comm Uncommo | 61 | | Uncommon | | | |
| 62 Dendrobium crepidatum Common 87 Eria coronaria (Lindl.) Uncommon Lindl. Seichb.f. Eria flava Lindl. Very common Eria paniculata Lindl. Uncommon Uncommon Eria paniculata Lindl. Uncommon Uncommon Eria paniculata Lindl. Uncommon Uncommon Uncommon Eria paniculata Lindl. Uncommon Uncom | 01 | Benarooram om ysammam | | | End carmata Groster Email | |
| Lindl. Dendrobium cumulatum Lindl. Uncommon Begiehb.f. Eria flava Lindl. Very comm Uncommon Uncommon Very comm Uncommon Very comm | | Lindl. Ex Wall. | | 86 | Eria convallariodes Lindl. | Scarce |
| 63 Dendrobium cumulatum Uncommon 88 Eria flava Lindl. Very comm Lindl. 89 Eria paniculata Lindl. Uncommo | 62 | Dendrobium crepidatum | Common | 87 | Eria coronaria (Lindl.) | Uncommon |
| Lindl. 89 Eria paniculata Lindl. Uncommo | | | | | | |
| | 63 | | Uncommon | 1 1 | | Very common |
| I 90 Eria viliala Lindi. Common L. 119 Panilionanthe feres I Very comm | 00 | | Comme | | _ | Uncommon |
| 91 Gastrochilus calceolaris Scarce (Roxb.) Schltr. | | | | 119 | _ | Very common |
| (Smith) D. Don. 120 Phaius maculatus Lindl. Scarce | 71 | | Scarce | 120 | | Scarce |
| 92 Gastrochilus dasypogon Scarce 121 Phaius nanus Hook.f. | 92 | | Scarce | | | |
| | | | | 1 1 | | Uncommon |
| 93 Gastrochilus inconspicuma Very common (Aiton) Bl. | 93 | Gastrochilus inconspicuma | Very common | | (Aiton) Bl. | |
| | | | | | | |

| Sl. No. | NAME (Scientific & Common) | ABUNDANCE |
|---------|--------------------------------|-------------|
| | (Hook.f.) Seidenf. | |
| 94 | Gastrochilus longiflora | |
| | Wall. | |
| 95 | Kingidium deliciosa | Uncommon |
| | (Reichb.f.) Sweet | |
| 0.6 | Moth orchid | |
| 96 | Kingidium taenialis | Scarce |
| 0.7 | (Lindl.) P.F. Hunt | |
| 97 | Liparis bootanensis Griff. | Scarce |
| 98 | Liparis duthiei Hook.f. | Scarce |
| 99 | Liparis longipes Lindl. | Common |
| 100 | Liparis plantaginea Lindl. | Scarce |
| 101 | Luisia brachystachys Bl. | |
| 102 | Luisia teretifolia Gaud | Very common |
| 103 | Luisia trichorhiza Bl. | Very common |
| 104 | Luisia volucris Lindl. | Very common |
| 105 | Micropera manii | Common |
| | (Hook.F.) Tang & Wang | |
| 106 | Micropera obtusa | Uncommon |
| | (Lindl.) Tang & Wang | |
| 107 | Micropera purpurea Lindl. | Uncommon |
| 108 | Nephelaphyllum pulchrum | Scarce |
| | ver. Sikkimensis Hook.f. | |
| 109 | Oberonia ensiformis | Uncommon |
| | (Sm.) Lindl. | |
| 110 | Oberonia iridifolia Lindl. | Uncommon |
| 111 | Oberonia obcordata Lindl. | Scarce |
| 112 | Oberonia pachyphylla | Uncommon |
| | King & Pantl. | |
| 113 | Ornithochilus fuscus | Uncommon |
| | Wall.ex Lindl. | |
| 114 | Moth orchid | *** |
| 114 | Otochilus alba Lindl. | Uncommon |
| 115 | Otochilus fusca Lindl. | Common |
| 116 | Panisea uniflora Lindil. | Scarce |
| 117 | Paphiopedilum fairieamum | Scarce |
| | (Lindl.) Pfitz. | |
| | Lost orchid, Lad's slipper | |
| | orchid | |
| 118 | Paphiopedilum venustum | Scarce |
| | (Wall.) Pfitz. | |
| | | |

| Ī | Sl. No. | ntific & Common) | ABUNDANCE |
|---|------------|---------------------------------------|-------------|
| ŀ | 123 | Phalaenopsis manrdi | Scarce |
| | 123 | Reichb.f. | Scarce |
| | | Moth Orchid | |
| | 124 | Phalaenopsis parishii | Scarce |
| | | ver. Lobii Reichb.f. | |
| | 125 | Phalaenopsis parishii Reichb.f. | Scarce |
| | 126 | Phelidata articulata Lindl. | Uncommon |
| | | ver.gritfithii(Hook.f.) King & Pantl | |
| | 127 | Pholidota imbricata (Roxb.) Lindl. | Very common |
| | 128 | Pholidota protracta Hook.f. | Uncommon |
| | 129 | Pholidota rubra Lindl. | Uncommon |
| | 130 | Pleione maculata | Scarce |
| | | (Lindl.) Lindl. | |
| | 131 | Podochilus khasianus | Uncommon |
| | | Hook.f. | |
| | 132 | Pleroceras suaveolens | Uncommon |
| | | (Roxb.) Holtt. | |
| | 133 | Rhynchostylis retusa | Very common |
| | | (Liun.) Bl. Fox-tail orchid | |
| | | (Kapau in Assamese) | |
| | 134 | Sarcanthus appendiculata | Scarce |
| | 134 | Hook.f. | Scarce |
| | 135 | Sarcanthus insectifolia | Very common |
| | | Hook.f. | J |
| | 136 | Sunitinadia miarantha | Very common |
| | | (Lindl.) Holtt. | - |
| | 137 | Sunipa andersoni | Scarce |
| | | (King & Pantl.) P.F.Hunt | |
| | 138 | Tainia laufolia | Scarce |
| | | Benth. Ex Hook.f. | |
| | 139 | Thelasis pygmea Lindl. | Scarce |
| | 140 | Thalia alba | Very common |
| | | (Lindl.) Reichb f. | |
| | 141 | Uncifera obtusifolia Lindl. | Scarce |
| | 141 | Vanda alpina Lindl. | Scarce |
| | 1 7 ∠ | vanda aipina Diitai. | Scarce |
| | 143 | Vanda cristata Lindl. | Uncommon |
| | 144 | Vanda purmila Hook.f. | Scarce |
| | | _ | |
| 1 | | | |

Annexure-8 List of Mammals of BTR

| Sl.no. | Common Name | Scientific Name |
|--------|--------------------------------|---------------------------------|
| 1 | Asian Elephant | Elephas maximus |
| 2 | Asiatic Jackal | Canis aureus |
| 3 | Babu Pipistrelle | Pipistrellus babu |
| 4 | Barking Deer | Muntiacus muntjack |
| 5 | Bay Bamboo Rat | Cannomys badius |
| 6 | Bhutan Duars House Rat | Rattus rattus |
| 7 | Brown Bellied Himalayan | Callosoiurus erythracus |
| | Squirrel | |
| 8 | Chinese Pangolin | Manis pentadactyla |
| 9 | Clouded Leopard | Neofelis nebulosa |
| 10 | Common Indian Hare | Lepus ruticaudatus |
| 11 | Common Mongoose | Herpestes edwardsi |
| 12 | Common Otter | Lutra lutra |
| 13 | Common Tree Shrew | Tupaia glis |
| 14 | Common Yellow Bat | Scotophilus kubli |
| 15 | Crabeating Mongoose | Herpestes urva |
| 16 | Cresstless Himalayan Porcupine | Hystrix hodgsoni |
| 17 | Dormer's Bat | Pipistrellus normsri |
| 18 | Eastern Barbastel | Barbastella leucomelas |
| 19 | Feret Badger | Melogale personata |
| 20 | Fishing Cat | Prionailurus viverrinus |
| 21 | Fulvous Fruit Bat | Rousettous lechenaultr |
| 22 | Great Himalayan Leafnosed Bat | Hipposideros armiger |
| 23 | Hairywinged Bat | Harpiocephalus harpia |
| 24 | Harlequin Bat | Scotomanes ornatus |
| 25 | Himallayan Black Bear | Ursus tibetanus |
| 26 | Hispid hare | Caprolagus hispidus |
| 27 | Hodgson's Browntoothed Shrew | Soriculus caudatus |
| 28 | Hog Badget | Arctonix collaris |
| 29 | House Mouse | Mus musculus urbanus |
| 30 | House Shrew | Suncus morinus |
| 31 | Indian Bison Or Gaur | Bos gaurus |
| 32 | Indian Bush Rat | Golunda elloti |
| 33 | Indian Flying Fox | Pteropus giganteus |
| 34 | Indian Fox | Vulpes bengalensis |
| 35 | Indian Longtailed Tree Mouse | Vendeleuria oleracea dumeticola |
| 36 | Indian Mole(?) Field rat | Bandicoota bengalensis |
| 37 | Indian Pipistrelle | Pipistrellus coromandra |
| 38 | Indian Pygmy Pipistrelle | Pipistorllus mimus |
| 39 | Jungle Cat | Felis chaus |
| 40 | Large Indian Civet | Viverra zibetha |
| 41 | Leopard Cat | Prionailurus bengalensis |
| 42 | Little Indian Field Mouse | Mus booduga |
| 43 | Malayan Giant Squirrel | Ratufa bicolor gigantea |
| 44 | Malayan Palm Civet or Toddy | Paradoxurus hermaphroditus |

| Sl.no. | Common Name | Scientific Name |
|--------|--------------------------------|-----------------------------|
| | cat | |
| 45 | Marbel Cat | Pardofelis marmorata |
| 46 | Northern Palm Squirrel | Funambulus pennanti |
| 47 | Orangebelly Himalayan Squirrel | Dremomys loknah |
| 48 | Oriental Smallclawed Otter | Aonyx Cinerea |
| 49 | Painted Bat | Kerivoula picta |
| 50 | Panther or Leopard | Panthera pardus |
| 51 | Particoloured Flying Squirrel | Hylopetes alboniger |
| 52 | Rhesus Macaque | Macaca mulatta |
| 53 | Sair's Pigmy Shrew | Suncus etruscus pygmaeoides |
| 54 | Sambar | Cervus unicolor |
| 55 | Short Tailed Mole | Talpa micrura |
| 56 | Sloth Bear | Melursus ursinus |
| 57 | Small Indian Civet | Viverricula indica |
| 58 | Small Indian Mongoose | Herpestes a. auropunctatus |
| 59 | Smoothcoated Indian Otter | Lutra perspicillata |
| 60 | Spotted Deer | Axis axis |
| 61 | Tickell's Bat | Hesperoptenus tickelli |
| 62 | Tiger | Panthera tigris |
| 63 | Tuiah Vamper Bat | Megaderma lyra |
| 64 | Wall Bat | Myolis mystacinus muricola |
| 65 | Wild Boar/Pig | Sus scrofa |
| 66 | Wild Dog/ Dhole | Cuon alpinus |
| 67 | Wroughton's Bat | Scotophilus temmincki |
| | | wroughtoni |
| 68 | Yellowthroated Marten | Martes flavigula |

A LIST OF BIRDS OF BUXA TIGER RESERVE

| Sl.no. | Common Name | Scientific Name |
|--------|-----------------------|------------------------------|
| 1 | Shikra | Accipiter badius |
| 2 | Crested Goshawt | Accipiter trivirgatus |
| 3 | Besra Sparrowhawk | Accipiter virgatus |
| 4 | Sparrow Hawk | Accipiter nisus melaschistos |
| 5 | Rufousnecked Hornbill | Aceros nipalensis |
| 6 | Jungle Myna | Acridotheres fuscus |
| 7 | Bank Myna | Acridotheres ginginianus |
| 8 | Common Myna | Acridotheres tristis |
| 9 | Spectacled Barwing | Actinodura egertoni |
| 10 | Common lora | Aegithina tiphia |
| 11 | Mrs. Gould's Sunbird | Aethopyga gouldiae |
| 12 | Blackbreasted Sunbird | Aethopyga saturata |
| 13 | Yellowbacked Sunbird | Aethopyga siparaja |
| 14 | Eastern Skylark | Alauda gulgula |
| 15 | Common Kingfisher | Alcedo meninting |
| 16 | Blueeared Kingfisher | Amaurornis phoenicurus |
| 17 | Whitebrasted Waterhen | Anas acuta |
| 18 | Pintail | Anas crecca |
| 19 | Common Teal | Anthus hodgsoni |

| Sl.no. | Common Name | Scientific Name |
|----------|---|--|
| 20 | Hodgson's Tree Pipit | Anthus godlewskii |
| 21 | Indian pied Hornbill | Anthracoceros malabaricus |
| 22 | Blyth's pipit | Apus affinis |
| 23 | Golden Eagle * | Aquila chrysaetos |
| 24 | House Swift | Arachnothera magna |
| 25 | Streaked Spiderhunter | Arborophila rufogulans |
| 26 | Rufousthroated Hill Partridge | Ardea purpureea |
| 27 | Purple heron | Ardeola grayii |
| 28 | Pond heron | Artamus fuscus |
| 29 | Ashy Swallow Shrke | Athene brama |
| 30 | Jerdon's Baza * | Aviceda jerdoni |
| 31 | Spotted Owlet | Aviceda leuphotes |
| 32 | Indian Black Crested Baza | Aythya tenna |
| 33 | Common Pochard | Aythya fuligula |
| 34 | Tulted Duck | Bradypterus thoracicus |
| 35 | Elantoled's Bush Warbler | Bradypterus thoracicus |
| 36 | Spotted Bush Barbler | Bubo nipatensis |
| 37 | Forest Eagleowl | Bubulcus ibis |
| 38 | Cattle Egret | Buceros bicornis |
| 39 | Little Green Heron | Butorides stnatus |
| 40 | Longtailed Nightjar | Caprimulgus macrurus |
| 41 | Common Rosefinch | Carpodacius erythrnns |
| 42 | Threetoed Kingfisher | Ceys erithacus |
| 43 | Whitecapped Redstart | Chaimatrornis leucocephalus |
| 44 | Emerald Dove | Chalcophaps indica |
| 45 | Goldfronted Choropsis | Chloropsis aunfrons |
| 46 | Whitenecked Stork | Ciconia episcopus |
| 40 47 | Black Stork | Cicenia nigra |
| 48 | Marsh Harrier * | Circus aeruginosus |
| 49 | Pied Harrier * | Circus melanoleucos |
| 50 | | Cissa chinensis |
| 51 | Green Magpie Blue Rock Pigeon | Columba livia |
| 52 | _ | |
| 53 | Ashy Wood Pigeon Shama | Columba pulchncollis |
| 53 54 | | Copsychus gaylatic |
| | Magpie Robin Or Dhyal Burmese Roller | Copsychus saulatis |
| 55 56 | | Coracias benghalensis affinis Coracina melaschistos |
| | Dark Grey CuckooShrike | |
| 57 59 | Jungle Crow | Corvas macrorhynehos |
| 58 | Common Indian House Crow | Corvus sptendens |
| 59 | Blackbreasted ouail | Coturnix coromandelica |
| 60 | Common Ouail | Coturnix coturnix |
| 61 | Whitothroated Bulbul | Criniger flaveolus |
| 62 | Cuckoo | Cuculus canorus |
| 63 | Indian Cuckoo | Cuculus micropterus |
| 64 | Common Hawk Cuckoo | Cuculus varius |
| 65 | Greyheaded Flycatcher | Culicicapa ceylonensis |
| 66 | Palm Switt | Cypsiurus parvus |
| 67 | Himalayan Tree Pie | Dondrocitta formasae |
| | | himalayiensis |

| Sl.no. | Common Name | Scientific Name |
|--------|-----------------------------|-------------------------------|
| 68 | Lesser Whistling Teal | Dendrocygna javanica |
| 69 | Large Whistling Teal | Dendrocygna biccler |
| 70 | Plaincolored Flowerpecker | Dicaeum concolor |
| 71 | Scarletbackrer Flowerpacker | Dicaeum cruentatum |
| 72 | Tickell's Flowerpecker | Dicaeum erythrothynchos |
| 73 | Haircrested Drongo | Dicrurus hottantottus |
| 74 | Northern Black Drongo | Dicrurus macrocercus |
| 75 | Greater Rackettailed Drongo | Dicrurus paradiseus grandis |
| 76 | Bronzed Drongo | Dicrurus aeneus |
| 77 | Himal Goldenbacked Bloed | Dinoprum shoni |
| , , | WP | 2 moprom snom |
| 78 | Lesser Rackettailed Drongo | Dircurus remifer tectirostris |
| 79 | Green Imperial Pigon | Ducula aenea |
| 80 | Large Egret | Egretta alba |
| 81 | Blackwinged Kite | Elanus caeruleus |
| 82 | Little Bunting | Emberiza pusilla |
| 83 | Blackbacked Forktail | Enicurus immaculatus |
| 84 | Spotted Forktail | Enicurus maculatus |
| 85 | Himalayan Rubythroat | Erithacus pectoralis |
| 86 | Bluethroat | Erithacus svecicus |
| 87 | Koel | Eudynamys scolopacea |
| 88 | Bengal Florican | Eupodotis bengalensis |
| 89 | Hobby | Falco rubbutec |
| 90 | Lesser Kestrel * | Falco naumanni |
| 91 | Oriental Hobby * | Falco severus |
| 92 | Saker/ Cherrug Falcon * | Falco biarmicus cherrug |
| 93 | Shaheen Falcon * | Falco peregrinus peregrinator |
| 94 | Black Partridge | Francolihus francolinus |
| 95 | Swamp Partridge, Kyah | Francolinus gularis |
| 96 | Grey Partridge | Francolinus pondicerianus |
| 97 | Fantail Snipe | Gallinago gallinago |
| 98 | Wood Snipe | Gallinago nemoricola |
| 99 | Pintail Snipe | Gallinago stenura |
| 100 | Red Junglefowl | Gallus gallus murghi |
| 101 | Himal.Whitecrested | Garrulax leucolophus |
| | Laugh.Thru | 1 |
| 102 | Necklaced Laughing Thrush | Garrulax monileger |
| 103 | Crimsonwingd Laughing | Garrulax phoeniceus |
| | Thrush | • |
| 104 | Rufousnecked Langhing | Garrulax ruficollis |
| | Thrush | |
| 105 | Jungle Owlet | Glaucidium radiatum |
| 106 | Crackle Or Hill Myna | Gracula religiosa |
| 107 | Tiger Bittern | Gorsachius melanolephus |
| 108 | Blacknecked Crane | Grus nigricollis |
| 109 | Grifon vulture * | Gyps fulvus |
| 110 | Indian Whitebacked Vulture | Gyps bengalensis |
| 111 | Indian Longbilled Vulture | Gyps indicus |
| 112 | Scarlet Finch | Haematospiza sipahi |

| Sl.no. | Common Name | Scientific Name |
|--------|----------------------------|--|
| 113 | Whitebreasted Kingfisher | Halcyon smyrnsis |
| 114 | Brahminy kite * | Haliastur indus |
| 115 | Longtailed Sibia | Heterophasia picaoides |
| 116 | Blacknaped Sibia | Heterophasia capistrata |
| 117 | Bonelli's Eagle * | Hieraaetus fasciatus |
| 118 | Rufous Bellied Eagle * | Hieraaetus kienerii |
| 119 | Sykes Striated Swallow | Hirundo daurica erythropygia |
| 120 | Himalayan Striated Swallow | Hirundo daurica nipalensis |
| 121 | Common Sowallow | Hirundo rustica |
| 122 | Blacknaped Flycatcher | Hypothymis azurea |
| 123 | Black Eagle * | Ictinaetus malayensis |
| 124 | Ibisbill | Ibidorhyncha struthersii |
| 125 | Chestnut Bittern | Ixobrychus cinnamomeus |
| 126 | Spotted Munia | Lonchura punctulata |
| 127 | Greater Adjutant Stork | **Loptoptilos dubius |
| 128 | Whitebacked Munia | Lonchura striata |
| 128 | Bertailed Cockoo Dove | Macropygie unchall |
| 130 | Bluethroted Barbet | 1.0 |
| 130 | Lineated Barbet | Megalaima asiatica |
| | | Megalaima lineata |
| 132 | Himalayan Great Barbet | Megalaima virens |
| 133 | Copper Smith Sultan Tit | Megalaima haumauphali Melanochlora sultanea |
| 134 | | |
| 135 | Merganset | Mergus castor |
| 136 | Chestnutheaded Beater | Merops leschenaulti |
| 137 | Small green Beeeater | Merops orientails |
| 138 | Bluetailed Beeeater | Merpos philippinus |
| 139 | Bronzewinged Jacana | Metopidius indicus |
| 140 | Redbreaseted Falconet | Microhierax caerulescens |
| 141 | Rufous Woodpecker | Micropternus brachyurus |
| 142 | Parish Or Black Kite | Milvus migrans govinda |
| 143 | Redtailed Minla | Minla ignotincta |
| 144 | Bush Lark | Mirafra assamica |
| 145 | Eastern Blue Rock Thrush | Monticola solitarius |
| 146 | Grey Wagtail | Motacilla caspica |
| 147 | Yellow Wagtail | Motacilla flava |
| 148 | Slaty Blue Flycatcher | Muscicapa ieucometanura |
| 149 | Small Nittava | Muscicapa macgngonae |
| 150 | Bluethroted Flychtcher | Muscicapa rubeculoides |
| 151 | Sooty Flycatcher | Muscicapa sibitica |
| 152 | Rufousbellied Niltava | Muscicapa sundara |
| 153 | Erditer Flycatcher | Muscicapa thalassina |
| 154 | Little Pied Flyactcher | Muscicapa westermanni |
| 155 | Blue Whistling Thrush | Mycrophonus caeruteus |
| | | temmincki |
| 156 | Puple Sunbird | Nectannra astatica |
| 157 | Cotton Teal | Nettapus coromandelianus |
| 158 | Night Heron | Nycticulau nycticorax |
| 159 | Maroon Oriole | Oriolus traillii |
| 160 | Blackheaded Oriole | Oriols xanthornus |

| Sl.no. | Common Name | Scientific Name |
|------------|-------------------------------------|--------------------------------|
| 161 | Tailor Bird | Orthotomus sutorius |
| 162 | Spotted Scops Owl | Otus spilocephalus |
| 163 | Osprey * | Pandion haliaetus |
| 164 | Indian Grey Tit | |
| 165 | Greenbacked Tit | Parus major Parus monticolus |
| 166 | | Passer domesticus indicus |
| | House Sparrow Moleyan Tree Sparrowy | Passer montanus malaccensis |
| 167 168 | Malayan Tree Sparrow Common Peafowl | Pavo cristatus |
| | | |
| 169 | Short Billed Minivet | Pericrocotus brevirostris |
| 170 | Longtailed Minivet | Pericrocotus ethologus |
| 171 | Scarlet Minivet | Pericrocotus flammeus |
| 172 | Rosy Minivet | Pericrocotus roseus |
| 173 | Yellowthroated Minivet | Pericrocotus solaris |
| 174 | Honey Buzzard * | Pernis ptilorhyncus |
| 175 | Ashy Minivet | Pericrocotus divaricatus |
| 176 | Cormorant | Phalacrocorax carbo |
| 177 | Little Or Pygmy Cormorant | Phalacrocorax niger |
| 178 | Black Redstart | Phoenicurus ochruros |
| 179 | Daurian Redstart | Phoenicurus auroreus |
| 180 | Plurnbeous Redstart | Phonicurus feliginosus |
| 181 | Blackbrowed Leaf Warbler | Phyleoscopus cantator |
| 182 | Brown Leaf Warbler | Phylloscopus collybita tristis |
| 183 | Smoky Leaf Warbler | Phylloscopus fuligiventer |
| 184 | Dull Green Leaf Warbler | Phylloscopus trochiloides |
| 185 | Speckled Piculet | Picumus innominatus |
| 186 | Plucknaped Green | Picus canus |
| | Woodpecker | |
| 187 | Large Yellownaped | Picus flavinucha |
| | Woodpacker | |
| 188 | Finn's Baya | Ploceus megathynchus |
| 189 | Baya | Ploceus philippinus |
| 190 | Grey Plover | Pluvialis squatarola |
| 191 | Brown Scalybreast | Pnoepyga Pusilla |
| | WrenBabbler | |
| 192 | Little Grebe | Podiceps ruficollis |
| 193 | Rustycheeked Scimitar Babbler | Pomatorhinus erythrogenys |
| 194 | Slafyheaded Scimitar Babbler | Pomatorhinus horsfieldi |
| 195 | Purple Moorhen | Porphyrio porphyrio |
| 196 | Yellowbellied Wren Warbir | Prinia flaviventris |
| 197 | Ashy Wren Warbler | Prinia socialis |
| 198 | Jungle Wren Warbler | Prinia sylvatica |
| 199 | Longtailed Broadbill | Psarisomus daihousiae |
| 200 | Redbreasted Parakeet | Psittacula alexandri |
| 201 | Blossomheaded Parakeet | Psittacula cyanocephala |
| 202 | Large Indian Parakeet | Psittacula eupatna |
| 203 | Roseringed Parakeet | Psittacula krameri |
| 204 | Blackheaded Yellow Bulbul | **Pycnontus melanieterus |
| 205 | Bengal Redvented Bulbul | Phenonotus cafer |
| 206 | Bengal Redwhiskered Bulbul | Phenonotus jocosus |
| _00 | 2 -115ai 110a ii iii bikorou Durour | 1 11 11 011 0 140 J 0 0 0 0 40 |

| Sl.no. | Common Name | Scientific Name |
|--------|-----------------------------|-------------------------------|
| 207 | Large Greenbilled Malkoha | Rhopodytes tristis |
| 208 | Wreathed Hornbill | Rhyticeros undulatus |
| 209 | Plunbours Redstsrt | Rhyaccrnis fuligssusus |
| 210 | Painted Snipe | Rostratula benghalensis |
| 211 | Pied Bush Chart | Saxicola caprata |
| 212 | Dark Grey Bush Chart | Saxicola ferracaprata |
| 213 | Stone Chart | Saxicola torquata |
| 214 | Woodcock | Scolopax rusticola |
| 215 | Black-browed Flycatcher | Seicercus burkii |
| | Warbler | |
| 216 | Hodgson's Broadbill | Serilophus lunatus |
| 217 | Cinnamonbellied Nuthatch | Sitta castanea cinnamoventris |
| 218 | Velvetfronted Nuthatch | Sitta frontalis |
| 219 | Ceylon Featherfoed | Spizaetus nipalensis |
| 220 | Changeable Hawk Eagle * | Spizaetus cirhatus |
| 221 | India River Tern | Sterna aurantia |
| 222 | Indian Ring Dove | Streptopelia decaocto |
| 223 | Red Turtle Dove | Streptopelia tranquelari |
| 224 | Pied Myna | Sturnus contra |
| 225 | Greyheaded Myna | Sturus malabaricus |
| 226 | Indian Starling | Sturnus vulgaris |
| 227 | Common Wood Shrike | Tephrodornis pondicenanus |
| 228 | Chestnutheaded Ground | Tesia castaneocoronata |
| | Warbler | |
| 229 | Paradise Flycatcher | Tespsiphone patadist |
| 230 | Wedgetailed Green Pigeon | Treon sphenura |
| 231 | Yellow legged Green Pigeon | Treron phoenicoptera |
| 232 | Pintailed Green Pigeon | Treron apicauda |
| 233 | Orangebreasted Green Pigeon | Treron bicincta |
| 234 | Wood Sandpiper | Tringa glareola |
| 235 | Common Sandpiper | Tringa hypoleucos |
| 236 | Green Sandpiper | Tringa ochropus |
| 237 | Striated Babbler | Turdoides earler |
| 238 | Jungle Babbler | Turdoides striatus |
| 239 | Redthroated Thrush | Turdus ruficollis |
| 240 | Yellow billed Blackbird | Turdus merula |
| 241 | Common Bustard Ouail | Turnix suscitator |
| 242 | Indian Hoopoe | Upupa epops |
| 243 | Sputwinged Lapwing | Vanellus spinosus |
| 244 | Yellownaped Yuhina | Yuhina flavicollis |
| 245 | Smalltailed Mountain Thrush | Zoothera dauma |
| 246 | Large Longbilled ground | Zoothera monticola |
| | Thrush | |

^{*} These raptors are reported by the Scientists of B.N.H.S. during 1999.

List of AMPHIBIANS

| Sl.no. | Common Name | Scientific Name |
|--------|--------------------|--------------------|
| 1 | Common Indian Toad | Bufo melanostictus |
| 2 | India Bull Frog | Rana tigrina |
| 3 | Indian Skipper | Rana cyanophlictis |
| 4 | Rice Field Frog | Rana limnocharis |

List of REPTILES

| Sl.no. | Common Name | Scientific Name |
|----------|------------------------------|------------------------|
| (a) Snak | es | |
| 1 | Banded Krait | Bungarus fasciatus |
| 2 | Black Krait | Bungarus niger |
| 3 | Buffstriped Keelback | Natrix stotata |
| 4 | Checkered Keelback | Natrix piscator |
| 5 | Cobra | Naja naja |
| 6 | Collared Dwarf Snake | Sibynophis collaris |
| 7 | Common Blind Snake | Typhlops braminus |
| 8 | Common Green Pit Viper | Trimeresurus gramineus |
| 9 | Common Groon Whip Snake | Dryophis nesutus |
| 10 | Common Krait | Bungarus cnoruleus |
| 11 | Common Wolf Snake | Lycodon aulicus |
| 12 | Diard's Blind Snake | Typhlops diardi |
| 13 | Eastern Gamma | Boiga gokool |
| 14 | Grey Cut Snake | Boiga ochracoa |
| 15 | Hooded Tree Snake | Pseudoxenodon macrops |
| 16 | Indian Bronzebacked Tree | Ahaetulla tristis |
| | Snake | |
| 17 | Indian Rat Snake | Ptyas mucosus |
| 18 | Indian Rock Python | Python molurus |
| 19 | Jordon's Blind Snake | Typhlops jerdoni |
| 20 | King Cobra | Ophiophagus hannah |
| 21 | Lesser Black Krait | Bungarus lividus |
| | | |
| 22 | Malayan Whip Snake | Dryophis prasinus |
| 23 | Mock Viper | Pasammodynastes |
| | | pulverulentus |
| 24 | Painted Bronzeback | Ahaetulla ahaetulla |
| 25 | Ringtailed Dhaman | Elaphe cantons |
| 26 | Russell's Viper | Vipera russelli |
| 27 | Schneider's Water Snake | Enhydris enhydris |
| 28 | Sloped Kukti Snake | Oligodon cyclurus |
| 29 | Trincket Snake | Elaphe helena |
| 30 | Twinspotted Wolf Snake | Lycodon jara |
| (b) Liza | rds | |
| 31 | Common Monitor Lizard | Varanus bengalensis |
| 32 | Garden Lizard (Blood Sucker) | Calotes versicolor |
| 33 | Gecko (Takkhak) | Gecko gecko |
| 34 | House Gecko | Hemidactylus brooki |
| 35 | Skink | Mabuya cannata |

| Sl.no. | Common Name | Scientific Name |
|---------|------------------------------|----------------------------|
| (c) Tur | tles & Tortoises | |
| 36 | | Geomyda tricarinata |
| 37 | | Geomyda trijuga |
| | | indopeninsularis |
| 38 | | Kachuga tectum tectum |
| 39 | | Testudo elongata |
| 40 | | Chitra indica |
| 41 | Gangetic soft shelled turtle | Lissemys punctata punctata |

List of Fishes

| Sl.no. | Common Name | Scientific Name |
|--------|--------------------------|--|
| 1 | Bacha | Eutropiichthys vacha |
| 2 | Bagara | Bagarius bagarius |
| 3 | Baim | Mastocembelus armatus |
| 4 | Baspata | Alia coila |
| 5 | Batasi | Pseudeutropius atherinoidea |
| 6 | Boraly | Barilius barila |
| 7 | Bowali | Wallago attu |
| 8 | Chela | Oxygaster gora/ Chela bacaila |
| 9 | Chepti | Semiplotus semiplotus |
| 10 | Chital | Notopterus chitala |
| 11 | Dankoni | Rasbora daniconius |
| 12 | Denkara | Labeo pangusia |
| 13 | Elanga | Danio dangila, D.aeguipinnatus & D.rerio |
| 14 | Kalbose | Labeo calbasu |
| 15 | Katla | Catla catla |
| 16 | Khorsola | Mystus menoda |
| 17 | Koi | Anabus testudineus |
| 18 | Koksha | Barilius shaera |
| 19 | Koochia | Amphipnous cuchia |
| 20 | Kursha(Chandan and Pani) | Labeo angra and Labeo gonius |
| 21 | Lata | Channa punctatus |
| 22 | Magur | Clarius batrachus |
| 23 | Mahseer | Barbus putitoora |
| 24 | Moh | Notopterus notopterus |
| 25 | Murrel | Channa marulius |
| 26 | Pabda | Ompok pabda |
| 27 | Puti | Puntius ticto |
| 28 | Rohu | Labeo rohita |
| 29 | Shol | Channa striatus |
| 30 | Singi | Heteropneustes fossilis |
| 31 | Tengra | Mystus seenghala |
| 32 | Tepa | Tetraodon cutcutia |
| 33 | Turi or Pakal | Mastacembelus pancalus |

List of Ornamental Fishes in BTR

| A. Barb | os and Minnows: | G. Knife | Fish | F. Eel: | |
|----------|--------------------------|----------|------------------------|---------|-----------------------------------|
| 1 . | Amblypharyngodon mola | 1 | Notopterus notopterus | 1 | Mastacembelus armatus |
| 2 . | Aspidoparia morar | | | 2 | Mastacembelus pancalus |
| 3 | Aspidoparia jaya | H. Puffe | r Fish | 3 | Macrognathus aculiatus |
| 4 | Barilius shacra | 1 | Tetraodon cutcutia | 4 | Monopterus cuchia |
| 5 | Barilius bola | | | | |
| 6 | Barilius tileo | I. Snake | e Head (Murrens): | Loac | hes: |
| 7 | Danio acquipinnatus | 1 | Channa punctatus | 1 | Botia rostrata |
| 8 | Danio(Brachydanio) rerio | 2 | Channa striatus | 2 | Acanthocobitis botia |
| 9 | Danio devario | 3 | Channa marulius | 3 | Lepidocephalus guntia |
| 10 | Crossocheilus latia | 4 | Channa orientalis | 4 | Lepidocephalus annandalai |
| 11 | Garra kempi | 5 | Channa stewartii | 5 | Nemachilus beavani |
| 12 | Garra gotyla | 6 | Channa amphibious | 6 | Nemachilus rupicola var. inglishi |
| 13 | Garra naganensis | | - | 7 | Schistura multifasciatus |
| 14 | Garra annandalei | J. Cat F | ish: | 8 | Schistura Savona |
| 15 | Puntius sarana | 1 | Olyra kempi | 9 | Somaleptus gangota |
| 16 | Puntius conchonius | 2 | Olyra longicaudata | 10 | Acanthopthalmus pangio |
| 17 | Puntius ticto | 3 | Bagarius bagarius | | |
| 18 | Puntius chagunio | 4 | Mistus vittatus | | |
| 19 | Oreichthys sp. | 5 | Ompok pabda | | |
| 20 | Puntius apogon | 6 | Clupisoma garua | | |
| 21 | Puntius sophori | 7 | Glyptothorax indicus | | |
| 22 | Puntius vittatus | 8 | Glyptothorax telchitta | | |
| 23 | Puntius phutuneo | 9 | Glyptothorax cavia | | |
| | | 10 | Nangra punctata | | |
| B. Gour | rami: | 11 | Hara jardoni | | |
| 1 | Colisa chuna/(sota) | 12 | Amblyceps mangois | | |
| 2 | Colisa labiosa | 13 | Amblyceps apangi | | |
| 3 | Colisa fasciata | 14 | Pseudolaguvia riberoi | | |
| | Ctenops nobolis | 15 | Pseudolaguvia shawi | | |
| | | 16 | Erythicthys pussilus | | |
| C. Glass | s Fish: | 17 | Chaka chaka | | |
| 1 | Chanda ranga | | | | |
| 2 | Chanda nama | K. Pipe | Fish: | | |
| | | 1 | Microphis deocata | | |
| D. Perc | h: | L. Bar E | yed Goby: | | |
| 1 | Badis blosyrus | 1 | Glossogobius giuris | | |
| 2 | Badis kanabos | | | | |
| 3 | Dario Dario | M. Mulle | et: | | |
| 4 | Nandus nandus | 1 | Rhinomugil corsula | | |

E. Needle Fish:

1 Xenentodon cancila

List of Medicinal Plants (and parts used) in BTR [Source: Mr. A. B. Choudhury, IFS (Retd.), Consultant for Forest Guideline]

| Sl. No. | Species | Medicinal Uses | Part (s) Used |
|---------|--|---|------------------------------|
| 1 | Abrus precatorius | as a purgative & tonic | Seed |
| 2 | Abutilon indicum | Expei worms | Whole plant |
| 3 | Acacia catechu | Stomachache | Bark |
| 4 | Acalypha indica | Nasal & Wounds | Leaf |
| 5 | Achyranthes aspera ver. Porphyristachya | Wounds, Ear, Cough, Asthma, Stomachache, Disorders of women & piles | Plant,Root,Leaf & Seed |
| 6 | Agave americana | Toothache | Stem & Leaf |
| 7 | Ageratum conyzoides | Eye, Wounds, Eczema & Fever | Leaf |
| 8 | Albizia lebbeck | Blood, Skin, Piles, Antidote & Fodder | Leaf & Bark |
| 9 | A. procera | Skin | Whole plant |
| 10 | Allium cepa | Malaria , Asthma, Ear, Eye, Menses, Child diseases & Skin | Bulb |
| 11 | A. sativum | Eye,Heart,Asthma,Ear Paralysis Pain & Rheumatism | Bulb & Clove |
| 12 | Ammannia baccifera | Fever & Child diseases | Whole plant |
| 13 | Andrographis paniculata | Stomachache, Fever, Skin diseases & Ulcer | Stem & Leaf |
| 14 | Argemone mexicana | Skin,Eye & Expel worms | Juice,Root & Seed |
| 15 | Asclepias curassavica | Leucoderma and astha | Latex & Root |
| 16 | Asparagus racemosus | Stomachache,Piles,Kidney, Liver, Urinary,Fever & Disorder of Women | Tuber, Root, Leaf & Pulp |
| 17 | Azadirachta indica | Toothache, Skin, Antidote, Eye, Diabetes, Urinary, Fever & insecticides | All parts of Plant |
| 18 | Baliospermum montanum | Pain, Skin, Piles, Wounds, Splen, Jaundice & Purgative | Root & Seed |
| 19 | Bauhinia purpurea | Fever, Headache, Diarrhoea, Rheumatism & Curative | Root,Leaf,Bark & Flower |
| 20 | B. racemosa | Diarrhoea & Dysentry | Leaf |
| 21 | B. variegata | Skin, Diarrhoea, Worms, Wounds & Tuberculosis | Root,Bud,Bark & Flower |
| 22 | Bergia ammannioides | Bone fracture & Menstrual Disorders | Whole plant |
| 23 | Biophytum sensitivum | Stomach ache | Plant & Seed |
| 24 | Boerhavia diffusa Bombax ceiba | Disorder of women,Liver,Blood, Antidote & Heart Diarrhoea & Disorders women | Root & Leaf |
| 25 | | | Resin,Gum & Flowers |
| 26 | Butea monosperma | Eye,Blood,Diarrhoea,Dysentry, Typhoid,Piles,Worms & Skin dieseases | Root,Bark,Leaf, Flower & Sec |
| 27 | Caesalpinia bonduc | Fever, Toothache, Diarrhoea, Ear & Bleeding | Bark, Leaf, Seed & Seedoil |
| 28 | C. pulcherrima | Wounds Febrifuge | Leaf & Flower |
| 29 | Calotropis gigantea | Wormicide,Fever,Cholera, Antidote,Cough & Cold | Root, Latex, Leaf & Flower |
| 30 | C. procera | Toothache, Antidote, Asthma & Cough | Root,Juice,Rhizome & Leaf |
| 31 | Cardiospermum helicacabum | Rheumatism | Whole plant |
| 32 | Careya arborea | Stomachache, Diarrhoea, Eye & Swellings | Bark, Dried calyz & Leaf |
| 33 | Cassia fistula | Wormsicide, Skin, Toothache & Fever | Leaf ,Fruit & Seed |
| 34 | C. tora | Antidot, Cuts, Skin, Wormicide & Cough | Root ,Leaf & Seed |
| 35 | Centella asistica | Leprosy, Brain tonic, Cholera, Boils & Cough | Whole plant & Leaf |
| 36 | Cissampelos pareira var. hirsuta | Skin, Wounds, Urinary, Sore, Diarhoea & Sinuses | Root & Leaf |
| 37 | Cissus guadrangularis | Scurvy, Disorder of women, Asthma, Stomachache & Bone fracture | Whole plant &Stem |
| 38 | Cleome gynandra | Wounds , Headache , Cough, Cholera & Fish poison | Root bark, Root |

| Sl. No. | Species | Medicinal Uses | Part (s) Used |
|---------|--------------------------|---|---------------------------------|
| 39 | Clerodendrum indica | Asthma ,Wrmicide & Swellings | Root & Leaf |
| 40 | Clitoria ternatea | Swelling & Leprosy | Root |
| 41 | Cordia dichotoma | Pain, As a tonic, Ulcers, Headache & Wormicide | Bark, Fruit, Leaf, Kernal |
| 42 | Curculigo orchioides | Asthma, Jaundice, Piles, Cuts & Wondes, Disorder of women | Rhizome & Root |
| 43 | Curcuma longa | Indigestion,Rheumatism,Fever & Disorder of women | Rhizome |
| 44 | Cuscuta reflexa | As a purgative, Fever, Body-ache & Stomach ache | Plant |
| 44 | Dalbergia sisoo | Eye,Blood,Diarrhoea,Dysentry, | Leaf |
| 45 | Datura metal | Antidote,Skin & Headache | Leaf,Fruit & Cholera |
| 46 | D.stramonium | Asthma, Women disorder, Teeth, Mounth & Skin | Leaf & Seed |
| 47 | Delonix regia | Pyorrhoea | Seed gum |
| 48 | Dioscorea bulbifera | Ulcer, Piles, Dysentry & Constipation | Tubers |
| 49 | Eclipta prostrata | Jaundice, Hair growth, Headache & Fever | Leaf |
| 50 | Ehretia laevis | Sex disorders & Fodder | Root,Leaf & Wood |
| 51 | Elephantopus scaber | Antidote, Heart & Urinary | Plant & Root |
| 52 | Embica officinais | Purgative, Hair growth, Eye, Scurvy, Diarrhoea, Dysentry, Antidore & As a Cool | Leaf , Fruit & Seed |
| 53 | Eurphorbia hirta | Asthma, Disorder of Women, Eye, Antidote, Burns & Pain | Plant, White juice, Latex& Leaf |
| 54 | Ficus bengalensis | Gonorrhoea, Liver, Dysentry, Diabetes, Pain, Skin, Piles, Toothache & Nasal | Root, Bark juice, & Fruit |
| 55 | F. hispida | Asthma & Constipation | Fruit |
| 56 | F. racemosa | Anticancer, Wounds, Piles, Diarrhoea & Dysentry | Plant,Bark,Leaf & Fruit Juice |
| 57 | F. religiosa | Bone fracture, Antidote, Asthma, Disorder of women , Toothache | Bark,Juice,Lead & Fruit |
| 58 | Flacourtia indica | Skin, Dysentry, Rheumatism & Spleen | Bark Root, Fruit & Seed |
| 59 | Gmelina arborea | Worm(expel),Gonorrhoea & Antidote | Leaf,Root & Bark |
| 60 | Gymnema sylvestra | Stomach ache, Urinary | Root & Leaf |
| 61 | Helicteres isora | Asthma, Urinary, Tonsils, Blood & Stomach ache | Whole plant, Root & Leaf |
| 62 | Hemidesmus indicus | Asthma, Urinary, Tonsils, Blood & Stomachache | Whole plant, Root & Leaf |
| 63 | Holarrhena pubescens | Diarrhoea, Stomachache, Dysentry & indigestion | Bark & Seed |
| 64 | Holoptelea integrifolia | Boils | Leaf |
| 65 | Hyptis suaveolens | Skin,Stomach ache & Cold | Whole plant & Leaf |
| 66 | Ichnocarpus frutescens | Urinary,Fever,Skin & Fractures | Whole plant & Root |
| 67 | Impomoea aquatica | Women disorder & Eye | Plant, Bud & Flower |
| 68 | Justica adhatoda | Toothache,Tuberculosis,Diarrhoea Dysentry,Cough,Asthma & Skin diseases | Whole plant & Leaf |
| 69 | Kydia calycina | Mouth | Bark & Leaf |
| 70 | Lagerstroemia parviflora | Purgative, Astringen & to induce Sleep | Bark , Leaf & Seed |
| 71 | Lannea coromandelica | Cuts, Mouth, Toothachre & Wounds | Stem bark & Fruit |
| 72 | Luffa acutangula | Eye diseases in children | Leaf |
| 73 | Mallotus Philippensis | Pain, Skin, Expel Worm, Cuts , Wounds & As a | Fruit & Seed |
| 74 | Mangifera indica | purgative Urinary,Purgative,Diarrhoea, Nasal Bleeding & Asthma | Kernel,Fruit & Seed |
| 75 | Mimosa pudica | Dysentry & Piles | Root & Leaf |
| 76 | Mitragyna parviflora | Fever,Pain & Diarrhoea | Bark |
| 77 | Moringa oleifera | Skin, Urinary, Pyorrhoea & Pain | Leaf, Flower & Seed |
| 78 | Mucuna pruriens | Dysentry, Urinary, Wormicide | Root ,Pod & Seed |
| 79 | Murraya koenigil | Cuts, Diarrhoea & Dysentry | Leaf |
| 80 | Nelumbo nucifera | Diarrhoea, Dysentry, Cholera & Eye | Root,Flower & Seed |

| Sl. No. | Species | Medicinal Uses | Part (s) Used |
|---------|--------------------------|---|--|
| 81 | Nyctanths abhortristis | Eye,Fracture,Fever,Hair growth, Skin & Cough | Bark, Leaf, Flower, inflorescence,Fruit & Seed |
| 82 | Nymphaea nouchali | Dysentry, Indigestion & Skin | Rhizome & Seed |
| 83 | Ocimum sanctum | Antidote , Fever , Cough , Cold, Earache,Headache & Skin | Root & Leaf |
| 84 | Ougeinia oojeinensis | Fish-Poison, Diarrhoea, Dysentry & Stomachache | Bark & Wood |
| 85 | Parthenium hysterophorus | As a tonic, Dysentry & Skin | Plant & Root |
| 86 | Pongamia pinnata | Skin | Seed & Oil |
| 87 | P. oleracea | Burns (Skin) | Stem |
| 88 | Pterospermus acerifolium | Wounds & As a purgative | Leaf |
| 89 | Ricinus communis | Women disorders,Pain,Jaundice, Worrmicide & As a purgative | Root,Leaf & Seed oil |
| 90 | Sida cordifolia | Cuts, Urinary, Boils & Gonorrhoea | Root,Stem & Leaf |
| 91 | S. rhombifolia | Fever, Heart, Burns & Piles | Root & lLeaf |
| 92 | Solanum nigrum | Dysentry, Skin, Eye, Kidney, Heart & Liver | Leaf & Berry |
| 93 | S. surattense | Cough,Cold,Eye,Asthma,Skin & Pyorrhoea | Root,Stem,Leaf,Fruit Seed |
| 94 | Stellaria media | | |
| 95 | Syzygium cumini | Diarrhoea, Urinary & Diabetes | Bark,Fruit & Seed |
| 96 | Tectona grandis | Pain, Headache, Eye, Skin & Expel the worms | Wood,Flower oil & Seed |
| 97 | Tephrosia purpurea | Asthma, Piles, Warts & Weakness | Whole plant & Root |
| 98 | T. arjuna | Antidote, Hear, Pain, Mouth & Earache | Bark,Twigs & Leaf |
| 99 | T. bellirica | Stomach ache,Rheumatism,Piles, Diarrhoea,Astringent,Kidney & Eye | Fruit |
| 100 | T.chebula | Purgative , Brain tonic, Asthma , Cough & Mouth | Fruit |
| 101 | Thespesia populnea | Heart,Skin & Syphilis | Wood,Root,Fruit & Seed |
| 102 | Tinospora cordifolia | Tonic,Eye & Fever | Whole plant & Stone |
| 103 | Tridax procumbens | Bleeding,Cold,Diarrhoea,Dysentry, Insecticcide & Wound | Whole plant & Leaf |
| 104 | Ventilago caliculata | Skin,Orinary & As coolant | Bark |
| 105 | Vernonia cinerea | Fever, Urinary, Skin & Insecticide | Plant ,Root & Seed |
| 106 | Vitex negundo | Fever, Headache, Ear, Wounds, Swelling & Asthma | Branches & Leaf |
| 107 | Woodfordia fruiticosa | Dysentry, Cough, Skin & Eye | Leaf & Flower |
| 108 | Wrightia tinctoria | Stomach ache,Fever,Piles,Skin, Fish-poison & Tooth ache | Bark,Leaf & Seed |
| 109 | Xanthium indicum | Eye,Headache & Smallpox | Root & Fruit |
| 110 | Zingiber officinalis | Cough, Stomachache, Eye, Expel worms & High blood pressure Purgative, Pain, Blood, Typhoid, | |
| 111 | Ziziphus imauritiana | Stomachache, Cuts & Wounds | Root,Bark lead,fruit & Seed |
| 112 | Z. oenopia | Wounds | Root |

Annexure – 9

Name of Site:: NARATHALI BEEL (Buxa Tiger Reserve)
Division :: Jalpaiguri Nearest Large Town:: Alipurduar
State :: West Bengal

| Name of Species Scientific name 29-01-08 (Nos.) 18-01-09 (Nos.) 09-01-11 (Nos.) GREBES Little Grebe Tachybaptus fuficollis : 20 20 20 CORMORANTS & DARTER Fhalacrocorax carbo : 30 15 Great Cormorant P. niger : 30 15 HERONS, EGRETS & BITTERNS : 30 15 Indian Pond Heron Ardeola grayii : 6 12 40 Cattle Egret Bubulcus ibis : 40 60 60 Little Egret E. garzetta : 20 16 Median (Intermediate) Egret Mesophoyx intermedia : 6 6 2 Large (Great) Egret Casmerodius albus : 2 2 STORKS : : 6 6 2 STORKS : : 4 6 6 2 STORKS : : 2 2 2 2 2 Asian Openbill Anastomus oscitans : 2 2 2 | Division :: Jaipaiguri | | State | | est Bengai | |
|--|----------------------------------|------------------------|-------|----------|------------|-----|
| GREBES Little Grebe | Name of Species | Scientific name | | 29-01-08 | 18-01-09 | |
| CORMORANTS & DARTER Great Cormorant | GREBES | | | | , | |
| CORMORANTS & DARTER Great Cormorant | | Tachybaptus fuficollis | : | 20 | 20 | 20 |
| Little Cormorant P. niger : 30 HERONS, EGRETS & BITTERNS : 6 12 40 Cattle Egret Bubulcus ibis : 40 60 Little Egret E. garzetta : 20 16 Median (Intermediate) Egret Mesophoyx intermedia : 6 6 2 Large (Great) Egret Casmerodius albus : 2 STORKS : 5 Asian Openbill Anastomus oscitans : 6 Lesser Adjutant Stork Leptoptilos javanicus : 2 2 GEESE & DUCKS : 20 GEESE & DUCKS : 2 2 | CORMORANTS & DARTER | V 1 V V | | | | |
| HERONS, EGRETS & BITTERNS Indian Pond Heron | Great Cormorant | Phalacrocorax carbo | : | | | 2 |
| Indian Pond Heron Ardeola grayii : 6 12 40 Cattle Egret Bubulcus ibis : 40 60 Little Egret E. garzetta : 20 16 Median (Intermediate) Egret Mesophoyx intermedia : 6 6 2 Large (Great) Egret Casmerodius albus : 2 STORKS Asian Openbill Anastomus oscitans : 6 Lesser Adjutant Stork Leptoptilos javanicus : 2 2 GEESE & DUCKS Large Whistling Duck (Lesser Tree | Little Cormorant | P. niger | : | 30 | | 15 |
| Indian Pond Heron Ardeola grayii : 6 12 40 Cattle Egret Bubulcus ibis : 40 60 Little Egret E. garzetta : 20 16 Median (Intermediate) Egret Mesophoyx intermedia : 6 6 2 Large (Great) Egret Casmerodius albus : 2 STORKS Asian Openbill Anastomus oscitans : 6 Lesser Adjutant Stork Leptoptilos javanicus : 2 2 GEESE & DUCKS Large Whistling Duck (Lesser Tree | HERONS, EGRETS & | | | | | |
| Cattle Egret Bubulcus ibis : 40 60 Little Egret E. garzetta : 20 16 Median (Intermediate) Egret Mesophoyx intermedia : 6 6 2 Large (Great) Egret Casmerodius albus : 2 STORKS : 2 Asian Openbill Anastomus oscitans : 6 Lesser Adjutant Stork Leptoptilos javanicus : 2 2 GEESE & DUCKS : 2 2 2 | | | : | | | |
| Cattle Egret Bubulcus ibis : 40 Little Egret E. garzetta : 20 Median (Intermediate) Egret Mesophoyx intermedia : 6 Large (Great) Egret Casmerodius albus : 2 STORKS Asian Openbill Anastomus oscitans Lesser Adjutant Stork Leptoptilos javanicus : 2 GEESE & DUCKS Large Whistling Duck (Lesser Tree | Indian Pond Heron | Ardeola grayii | : | 6 | 12 | 40 |
| Median (Intermediate) Egret Mesophoyx intermedia : 6 2 Large (Great) Egret Casmerodius albus : 2 STORKS : 2 Asian Openbill Anastomus oscitans : 6 Lesser Adjutant Stork Leptoptilos javanicus : 2 2 GEESE & DUCKS : 2 Large Whistling Duck (Lesser Tree | Cattle Egret | Bubulcus ibis | : | 40 | | 60 |
| Large (Great) Egret Casmerodius albus: 2 STORKS:: : : : : : : : : : : : : : : : : : : | Little Egret | E. garzetta | : | | 20 | 16 |
| STORKS Asian Openbill Anastomus oscitans Lesser Adjutant Stork Leptoptilos javanicus CEESE & DUCKS Large Whistling Duck (Lesser Tree | Median (Intermediate) Egret | Mesophoyx intermedia | : | 6 | 6 | 2 |
| Asian Openbill Lesser Adjutant Stork Leptoptilos javanicus CEESE & DUCKS Large Whistling Duck (Lesser Tree | Large (Great) Egret | Casmerodius albus | : | 2 | | |
| Lesser Adjutant Stork Leptoptilos javanicus : 2 2 2 GEESE & DUCKS : : : : : : : : : : : : : : : : : : : | STORKS | | : | | | |
| GEESE & DUCKS : Large Whistling Duck (Lesser Tree | Asian Openbill | Anastomus oscitans | : | | | 6 |
| Large Whistling Duck (Lesser Tree | Lesser Adjutant Stork | Leptoptilos javanicus | : | 2 | 2 | 2 |
| | GEESE & DUCKS | | : | | | |
| Duck) D invanica • 160 250 150 | Large Whistling Duck (Lesser Tre | ee | | | | |
| D. iuvunicu ; 100 250 150 | Duck) | D. iavanica | : | 160 | 250 | 150 |
| Gadwall <i>A. strepera</i> : 8 70 70 | Gadwall | A. strepera | : | 8 | 70 | 70 |
| Common (Green-winged) Teal A. crecca : 100 150 20 | Common (Green-winged) Teal | A. crecca | : | 100 | 150 | 20 |
| Spot-billed Duck A. poecilorhyncha : 6 5 | Spot-billed Duck | A. poecilorhyncha | : | | 6 | 5 |
| Northern Pintail A. acuta: 8 12 12 | Northern Pintail | A. acuta | : | 8 | 12 | |
| Red-crested Pochard Rhodonessa rufina : 6 2 | Red-crested Pochard | Rhodonessa rufina | : | | 6 | |
| Common Pochard Aythya ferina : 2 | Common Pochard | Aythya ferina | : | | | 2 |
| Feruginous Pochard A. nyroca : 20 68 50 | Feruginous Pochard | A. nyroca | : | 20 | 68 | 50 |
| RAILS, GALLINULES & | RAILS, GALLINULES & | | | | | |
| COOT : | COOT | | : | | | |
| White-breasted Waterhen A. phoenicurus : 10 4 | White-breasted Waterhen | A. phoenicurus | : | | 10 | 4 |
| Moorhen Gallinula chloropus 200 200 200 | Moorhen | Gallinula chloropus | | 200 | 200 | 200 |
| Purple Swamphen Porphyrio porphyrio : 2 6 | Purple Swamphen | Porphyrio porphyrio | : | | 2 | 6 |
| Common Coot Fulica atra : 2 20 4 | | Fulica atra | : | 2 | 20 | 4 |
| FINFOOT & JACANAS : | FINFOOT & JACANAS | | : | | | |
| Hydrophasianus | | Hydrophasianus | | | | |
| Pheasant-tailed Jacana chirurgus : 4 6 8 | | <u> </u> | : | | | |
| Bronze-winged Jacana Metopidius indicus : 12 20 30 | Č | Metopidius indicus | : | 12 | 20 | 30 |
| SHOREBIRDS - WADERS : | | | : | | | |
| Great Stone Plover Esacus recurvirostris: 4 2 | | | : | | 4 | 2 |
| Oriental Pratincole Glareola maldivarum: | | | : | | | |
| Red-wattled Lapwing V. indicus: 10 10 12 | ± • | V. indicus | : | 10 | | 12 |
| Marsh Sandpiper T. stagnatilis : 2 | | _ | : | | | |
| Terek Sandpiper Xenus cinereus : 4 | Terek Sandpiper | Xenus cinereus | : | | 4 | |

| Common Sandpiper | Actitis hypoleucos | : | 8 | | 2 |
|----------------------------|--------------------|---|---|---|---|
| Common Snipe | G. gallinago | : | 6 | | |
| OTHER WATER DEPENDENT | | | | | |
| BIRDS | | : | | | |
| HAWKS, EAGLES, OSPREY & F. | : | | | | |
| Greater spotted Eagle | Aquila clanga | : | | | 1 |
| Osprey | Pandion haliaetus | : | | 1 | |
| Peregrine Falcon | Falcon peregrinus | : | | 1 | |
| KINGFISHERS | | : | | | |
| Small Blue Kingfisher | A. atthis | : | | 2 | 4 |
| Stork-billed Kingfisher | Halcyon capensis | : | | 2 | 1 |
| White-breasted Kingfisher | H. smymensis | : | | 6 | 8 |
| WAGTAILS & PIPITS | • | : | | | |
| White wagtail | Motacilla alba | : | | 3 | 2 |
| Large Pied Wagtail | M. maderaspatensis | : | 4 | | |
| Citrine Wagtail | M. citreola | : | 6 | 2 | |
| Water Pipit | A. spinoletta | : | | 5 | |

Annexure - 10List of forest villages within the PA boundary with their composition,

| S/L | | Total | No. of | | | No. | of famil | y belon | gs to | | | Area (ha) |
|-----|----------------------------|---------------|---------------------|-------|----|-----|----------|---------|-------|----|--------|------------------------|
| No. | Village Name | No. of family | agreement holder | R | О | S | M | G | ОТ | N | В | leased out as per W.P. |
| 1 | Garo Basti | 216 | 71 | 87 | 93 | | | | | 36 | | 71.00 |
| 2 | Pumpu Basti | 41 | 14 | | 7 | | 2 | | | 32 | | 31.85 |
| 3 | Gadadhar | 257 | 71 | 187 | 27 | 33 | | | 10 | | | |
| 4 | Kalkut | 98 | 42 | | | | 30 | | 58 | | | |
| 5 | Panijhora | 41 | 21 | 13 | 2 | 2 | 13 | | 6 | 5 | | |
| 6 | Garam (E) | 110 | 33 | | | 10 | 61 | | 39 | | | |
| 7 | Garam (W) | 34 | 17 | | 18 | 5 | | | 11 | | | |
| 8 | Bamni Basti | 15 | 6 | | 1 | 5 | | | 2 | 7 | | |
| 9 | Poro (N) | 135 | 54 | 135 | | | | | | | | |
| 10 | Poro (S) | 78 | 27 | 78 | | | | | | | | |
| 11 | Pana | 86 | 41 | | | | | | | 86 | | |
| 12 | Nimati & Dabri | 115+15 | 30+5 | 85 | | | | | 45 | | | |
| 13 | Raimatang | 81 | 22 | | | | | | 1 | 80 | | |
| 14 | Gangutia | 68 | 23 | | | | | | | 68 | | |
| 15 | Adma | 64 | 13 | | | | | | | | 64 | 10.12 |
| 16 | Bhutri | 50 | 23 | | | | | | 1 | 49 | | 23.00 |
| 17 | Dalbadal | 45 | 19 | | | | | | 12 | 33 | | 19.00 |
| 18 | Gudamdabri | 142 | 71 | | | | 40 | | 90 | 12 | | 71.00 |
| 19 | 20 th Mile | 58 | 11 | 54 | | 3 | | | | 1 | | |
| 20 | 21 st Mile | 23 | 9 | | | 20 | | | 3 | | | 14.00 |
| 21 | 28 th Mile | 51 | 27 | | | | | | | | | |
| 22 | 29 th Mile | 25 | 10 | | | | | | | | | |
| 23 | Shiltong | 144 | 27 | 120 | 11 | | | | | 13 | | |
| 24 | Chipra | 44 | 14 | 44 | | | | | | | | |
| 25 | Sankosh | 98 | 44 | | | | | | | 30 | 68 | |
| 26 | Kumargram | 56 | 28 | | | | | | | 13 | 43 | |
| 27 | Newlands | 40 | 12 | | 12 | | | | | 17 | 11 | |
| 28 | Lapraguri | 52 | 11 | 45 | 7 | | | | | | | |
| 29 | Khutimari | 99 | 22 | | | | | | | | | |
| 30 | Bengdoba | 56 | 25 | 12 | | 17 | | | | 27 | | |
| 31 | Balapara | 40 | 17 | | | 3 | 32 | | | 5 | | |
| 32 | Indubasti | 37 | 10 | | | | 37 | | | | | |
| 33 | Chunabhati | 70 | 18 | | | | | | | 6 | 64 | |
| 34 | Lepchakhawa (Tashigaon) | 86 | 40(15+25) | | | | | | | 15 | 71 | |
| 35 | Santrabari | 96 | 20 | | 2 | | | | | 84 | 10 | |
| 36 | Tiamari | 34 | 10 | | 2 | 3 | | | 21 | 8 | | |
| 37 | BhutiaBasti | 72 | 31 | 24.24 | | | ОТ | 0/1 | 32 | 40 | . D. D | |

(Note: R=Rava, O=Oraon, S=Santhal, M=Mech, G=Garo, OT=Others, N=Nepali, B=Bhutia)

List of leases (F.D. holdings & Minings) and the Resource to which the lease relates indicating agency in BTR.

Annexure-11

| Sl. No. | Holding No. | Location | Block & Comptt. | Original Allottee | Area in Sqmt. | Propose of holding |
|------------|----------------|----------|-----------------|---------------------------|---------------------|---------------------------|
| 1 | D/3 | DPO | DPO-8 | Sri R.L.Dey | 1115.00 | Timber Depot. |
| 2 | D/5 | -do- | -do- | Sri B.N. Ghose | 1390.00 | Timber Depot. |
| 3 | D/6 | -do- | -do- | Sri N.G. Dhar | 1580.00 | Timber Depot. |
| 4 | D/7 | -do- | -do- | M/S Samaddar Bose & Co. | 1287.63 | Timber Depot. |
| 5 | D/12 | -do- | -do- | Sri S.C.Das | Sri S.C.Das 5066.80 | |
| 6 | D/13 | -do- | -do- | M/S K.K.Mukharjee & Brts. | 1784.00 | Timber Depot. |
| 7 | D/14 | -do- | -do- | Sri R.M. Bhattacharjee | 2945.00 | Timber Depot & M. R. Shop |
| 8 | D/15 | -do- | -do- | Sri A.K. Maulick | 2303.99 | Timber Depot |
| 9 | D/16 | -do- | -do- | Sri Sukumar Purakasthya | 2903.21 | Dwelling house |
| 10 | D/17 | -do- | -do- | Sri M. L.Dutta Roy | 3493.15 | Dwelling house |
| 11 | D/18 | -do- | -do- | See. Damanpur School | 2929.30 | School |
| 12 | D/19 | -do- | -do- | M/S K.K.Mukharjee & Brts. | 4873.73 | -do- |
| 13 | D/20 | -do- | -do- | M/S K.K.Mukharjee & Brts. | 4927.61 | Timber depot & house |
| 14 | D/21 | -do- | -do- | Sri K.D.Chakarboty | 3493.15 | Dwelling house |
| 15 | D/23 | -do- | -do- | Sri S.C.Das | 3460.00 | Timber Depot |
| 16 | D/24 | -do- | -do- | Sri K.K.Roy | 1300.00 | Timber Depot. |
| 17 | D/26 | -do- | -do- | Sri M.N.Das | 975.48 | Timber Depot. |
| 18 | D/27 | -do- | -do- | Sri R.L.Dey | 564.85 | Timber Depot. |
| 19 | D/30 | -do- | -do- | M/S Samaddar Bose & Co. | 1021.93 | Timber Depot. |
| 20 | D/31 | -do- | -do- | Sri J.C. Sarkar | 929.03 | Timber Depot |
| 21 | D/32 | -do- | -do- | Sri L.C. Sarkar | 1096.25 | Timber Depot. |
| 22 | D/34 | -do- | -do- | Sri J.N.Das | 6183.62 | Sawmill |
| 23 | D/36 | -do- | -do- | M/S Shivaji Sawmill | 4417.52 | Sawmill |
| 24 | D/38 | -do- | -do- | M/S Shivaji Sawmill | 1742.39 | Timber Depot |
| 25 | D/39 | -do- | -do- | Sri R.M. Bhattacharjee | 2738.04 | Dwelling house |
| 26 | D/40 | -do- | -do- | M/S Samaddar Bose & Co. | 1580.00 | Timber Depot. |
| 27 | D/41 | -do- | -do- | Sri Kalu Biswas | 347.27 | Timber Depot. |
| 28 | D/42 | -do- | -do- | Sri R.L.Dey | 1045.15 | Dwelling house |
| 29 | D/43 | -do- | -do- | School Hostle | 1250.00 | Block & Land |
| 30 | D/44 | -do- | -do- | Sri M.N.Das | 1947.24 | Timber Depot. |
| 31 | D/45 | -do- | -do- | Sri M.N.Das | 966.19 | Timber Depot. |
| 32 | D/46 | -do- | -do- | Sri M.M. Sarkar | 1290.00 | Timber Depot |
| 33 | D/49 | -do- | -do- | Sri B.N. Ghose | 2014.00 | Timber Depot. |

| Sl. No. | Name of the FD Holder | Holding No. | Forest Block & Comptt. | Particulars of land utilized | Total Land involved (m2) | Annual Rent.(Rs.) | Rent paid upto |
|------------|-----------------------|-------------|------------------------|------------------------------|-----------------------------------|----------------------|----------------------|
| | | und | er JAINTY FD H | olding | | | |
| 1 | Ajoy Kr. Banerjee | BD/116 | NRVK- 5b | Shop | 58.253 | 3.24 | 1993-94 |
| 2 | Jokiram Agarwalla | BD/117 | NRVK- 5b | House | 466.84 | 25.67 | 1993-94 |
| 3 | Ram Kr. Agarwalla | BD/118 | NRVK- 5b | | 3424 | 188.32 | 1993-94 |
| 4 | Kedar Das | BD/121 | NRVK- 5b | House | 186 | 9.3 | 1993-94 |
| 5 | Saila Lama | BD/122 | NRVK- 5b | House | 361.493 | 18.1 | 1993-94 |
| 6 | Kancha Lama | BD/123 | NRVK- 5b | House | 67.895 | 3.4 | 1993-94 |
| 7 | Makar Mongar | BD/125 | NRVK- 5b | | 276.98 | | |
| 8 | Ram Saran Dubey | BD/126 | NRVK- 5b | Shop | 400 | 20 | 1993-94 |
| 9 | Ram Saran Dubey | BD/127 | NRVK- 5b | House | 176 | 8.8 | 1993-94 |
| 10 | Dhan Bh. Lama | BD/128 | NRVK- 5b | House | 28 | 1.4 | 1993-94 |
| 11 | Buradu Ch. Dey | BD/129 | | Vacant | | | |
| 12 | Buradu Ch. Dey | BD/130 | NRVK- 5b | House | 102.11 | 5.61 | 1993-94 |
| 13 | Dakhina Singh | BD/131 | NRVK- 5b | House | 210.46 | 10.55 | 1993-94 |
| 14 | Provati Goalini | BD/132 | NRVK- 5b | House | 194.37 | 9.75 | 1993-94 |
| 15 | Fulmati Miri | BD/133 | NRVK- 5b | House | 108.74 | 5.45 | 1993-94 |
| 16 | Puniya mahato | BD/134 | NRVK- 5b | House | 108.74 | 5.45 | 1993-94 |
| 17 | Shyamal Dutta | BD/135 | NRVK- 5b | House | 121.55 | 6.1 | 1993-94 |
| 18 | Ayodhya Kania | BD/136 | | House | 76 | _ | |
| 19 | Kedar Prasad | BD/137 | NRVK- 5b | House | 185 | 9.25 | 1989-90 |
| 20 | Ram Dhari Nunia | BD/138 | NRVK- 5b | House | 283 | 14.15 | 1992-93 |
| 21 | Saila Ghishing | BD/139 | NRVK- 5b | House | 37.16 | 1.85 | 1993-94 |
| 22 | Maila Lama | BD/140,143 | NRVK- 5b | House | 28 & 39 | 3.35 | 1993-94 |
| 23 | Kanachi Sonami | BD/141 | NRVK- 5b | House | 111 | 5.55 | 1993-94 |
| 24 | Bhandari Chhettri | BD/142 | NRVK- 5b | House | 112.44 | 5.65 | 1993-94 |
| 25 | Phulmaya Lowani | BD/144 | NRVK- 5b | House | 151.54 | 7.6 | 1993-94 |
| 26 | , | BD/145*** | | Vacant | | | |
| 27 | Umesh Singh | BD/146 | NRVK- 5b | House | 174 | 8.7 | 1993-94 |
| 28 | Babulal Kurmi | BD/147 | NRVK- 5b | House | 100 | 5.5 | 1993-94 |
| 29 | Baijnath Goala | BD/148 | NRVK- 5b | House | 86.3 | 4.75 | 1993-94 |
| 30 | Nahari Saha | BD/149 | NRVK- 5b | House | 49.67 | 2.48 | 1993-94 |
| 31 | Rampajan Saha | BD/150 | NRVK- 5b | Shop | 2584 | 128 | 1993-94 |
| 32 | Badri Prasad | BD/151 | NRVK- 5b | House | 56 | 2.8 | 1993-94 |
| 33 | Gitu Hazam | BD/152 | NRVK- 5b | House | 50 | 2.5 | 1993-94 |
| 34 | | BD/153*** | | Vacant | | | |
| 35 | Ram Pada Pasi | BD/154 | NRVK- 5b | House | 45 | 2.25 | 1993-94 |
| 36 | Goliram Koiri | BD/155 | NRVK- 5b | House | 25 | 1.25 | 1993-94 |
| 37 | Goliram Koiri | BD/156 | NRVK- 5b | Shop | 160.33 | | |
| 38 | Misirial Gupta | BD/157 | NRVK- 5b | House | 182 | 9.1 | 1993-94 |
| 39 | Jokiram Agarwalla | BD/158 | NRVK- 5b | House | 207.22 | 10.35 | 1993-94 |
| 40 | Jokiram Agarwalla | BD/159 | NRVK- 5b | House | 593 | 29.65 | |
| 41 | Ramkumar Agarwalla | BD/160 | NRVK- 5b | House | 109 | 5.45 | 1993-94 |
| 42 | Ramkumar Agarwalla | BD/161 | NRVK- 5b | Godown | 37 | 2.04 | 1993-94 |
| 43 | Ramkumar Agarwalla | BD/162 | NRVK- 5b | Dharamsala | 139 | 6.95 | 1993-94 |
| 44 | Ramkumar Agarwalla | BD/163 | NRVK- 5b | Shop | 76 | 4.18 | 1993-94 |
| 45 | Ramkumar Agarwalla | BD/164 | NRVK- 5b | House | 118 | 5.9 | 1993-94 |

| 93 | R. Thapa | 1 /BD | Sadarbazar | | 100.5 | 5 | |
|----------|-----------------------------------|----------------------|----------------------|----------------|-------------|--------|--------------------|
| | | | BUXADUAR F | D Holding | | | |
| 74 | рира рикра | | | | // | | |
| 91 | Dupa Dukpa | BD/249 BD/266 | 1NK V K- 30 | nouse | 77 | | |
| 90 91 | Seth Ottanmal Hamda Dhobi | BD/24 BD/249 | NRVK- 5b NRVK- 5b | House House | 3345 113 | 167.25 | 1993-94 |
| 89 | Seth Ottanmal | BD/233 | NRVK- 5b | House | 839 | 41.95 | 1993-94 |
| 88 | M/s Bengal Line & Co. | BD/225 | NRVK- 5b | Labour shade | 7242 | 362.1 | 1991-92 |
| 37 | Ajit Bhattacharjee | BD/224 | | House | | | |
| 36 | Gorak Show | BD/209 | | Shop | | | |
| | Arjun Prasad | | INKVK- 3D | House | 50 | 2.5 | 1992-93 |
| 34 35 | Anjan Sing | BD/206 BD/207 | NRVK- 5b | House | 50 | 2.5 | 1992-93 |
| 33 | Anjan Sing | BD/205 | | Vacant | | | |
| 32 | Anjan Sing | BD/204 | | Vacant | | | |
| 31 | Anjan Sing | BD/203 | | Vacant | | | |
| 30 | Hazra Sing | BD/202 | | Vacant | | | |
| 79 | Hazra Sing | BD/201 | | Vacant | | | |
| 78 | A.T.Banerjee | BD/200 | | Cancelled | | | |
| 77 | M/S K.K.Mukherjee | BD/199 | | Cancelled | | | |
| 76 | Kedar Prasad | BD/198 | NRVK- 5b | Liquir shop | 95 | 20.9 | 1993-94 |
| 75 | R.K.Agarwalla (M.N.Ram) | BD/194 | | Cancelled | | | |
| 74 | Manager, Phaskowa TE | BD/193 | NRVK- 5b | Pipeline | 660 | 12 | 1993-94 |
| 73 | J.N.Roy Chowdhury | BD/192 | NRVK- 5b | Lime factory | 5575 | | 1976-77 |
| 72 | | BD/191*** | + | | | | |
| 71 | M/s Bengal Lime & Stone Co. | BD/190 | NRVK- 5b | Office | 244 | 12.2 | 1993-94 |
| 70 | Malay Ghosh | BD/189## | NRVK- 5b | Vacant | | | 1999-00 |
| 59 | Puspita Bose | BD/188 | NRVK- 5b | House | 373 | 18.65 | 1993-94 |
| 58 | B.N.Mukherjee | BD/187 | NRVK- 5b | House | 450 | 22.5 | 1993-94 |
| 57 | Mamraj Mahadeo Ram | BD/183 | NRVK- 5b | House | 652 | 35.85 | 1993-94 |
| 66 | Shibapada Chakraborty | BD/184 BD/185 | NRVK- 5b | House | 837 | 41.85 | 1993-94 |
| 55 | S.K.Majumder | BD/183 BD/184 | NRVK- 5b | Shop House | 117 1500 | 6.44 | 1993-94 |
| 3 | Baburam Kurmi Shippujan Mahato | BD/182 | NRVK- 5b | House | 159 | 8 | 1993-94 |
| 52 | Megnath Hazam | BD/181 | NRVK- 5b | House | 501 | 25.05 | 1993-94 |
| 51 | Ram Prosad Mistry | BD/180 | NRVK- 5b | Shop | 51 | | |
| 50 | Phudu Sharma | BD/179 | NRVK- 5b | House | 274 | 13.7 | 1993-94 |
| 59 | Saraswati Chowhan | BD/178 | NRVK- 5b | House | 133 | 6.65 | 1993-94 |
| | | | | _ | | | |
| 58 | Satyanarayan Mahato | BD/176**** BD/177 | NRVK- 5b | Shop | 106 | 5.83 | 1993-94 |
| 56 57 | Madan Sharma | BD/175 BD/176*** | NRVK- 5b | Shop | 61 | 3.36 | 1993-94 |
| 55 | Saju Misir Madan Sharma | BD/174 | NRVK-5b | House | 84 | 4.2 | 1993-94 1993-94 |
| 54 | Secretary.DBF Pry School | BD/173 | NRVK- 5b | Teachers Qtr. | 930 | 10 | 1992-93 |
| 53 | J.N.Roy Chowdhury | BD/172 | NRVK- 5b | House | 7668 | 10 | 1976-77 |
| 52 | Momraj Mahadeoram | BD/171 | NRVK- 5b | House | 400 | 20 | 1993-94 |
| 51 | Shival Pradhan | BD/170 | NRVK- 5b | House | 186 | 9.3 | 1990-91 |
| 50 | Ashutosh Banetee | BD/169 | NRVK- 5b | Shop | 96 | 5.28 | 1993-94 |
| 19 | Ananda Ch. Dey | BD/168 | NRVK- 5b | Shop | 65 | 3.25 | 1993-94 |
| 18 | Jokiram Agarwalla | BD/167 | NRVK- 5b | House | 67 & 14.01 | 8.04 | 1993-94 |
| 17 | | BD/166 | | Vacant | | | |
| 6 | Ramkumar Agarwalla | BD/165 | NRVK- 5b | Shop | 77 | 4.23 | 1993-94 |

| 94 | Sri Dhasrambir Theupn | 2, 3 /BD | Sadarbazar | | 457.083 & 147.329 | 27.9 & 7.40 | |
|------------|-------------------------------|------------------|---------------------------|------------------------------|-----------------------------------|----------------------|----------------------|
| 95 | Sri Dhammya Chancha | 7 /BD | Sadarbazar | | 35.303 | 1.8 | |
| 96 | Sri Kundal Singh | 9 /BD | Sadarbazar | | 34.745 | 1.75 | |
| 97 | Sri D. Dorjee | 12 /BD | Sadarbazar | | 41.426 | 5 | |
| 98 | Sri Lamether Thapa | 20 /BD | Sadarbazar | | | | |
| 99 | Sri Bal Bh. Dorjee | 22 /BD | Sadarbazar | | 68 | 3.4 | |
| 100 | Sri Pendey Bhutia | 26 /BD | Sadarbazar | | 71.071 | 3.6 | |
| 101 | Sri Penju Bhutia | 27 /BD | Lalbunglow | | | 1.95 | |
| 102 | Smt. Aujztu Maya Gurung | 29 /BD | Durugoan | | 29.729 | 1.5 | |
| 103 | Kul Bh. Bhutia | 30 /BD | Durugoan | | 20.81 | 1.05 | |
| 104 | Jhunk Gurung | 32 /BD | Durugoan | | 27.78 | 1.4 | |
| 105 | Sri Gotter Sommer | 34 /BD | Lalbunglow | | 33.876 | 1.7 | |
| 106 | Sri Gamchey Bhutia | 38 /BD | Lalbunglow | | 594.575 | 5.25 | |
| 107 | Sri Goshi | 40 /BD | Lalbunglow | | 278.789 | | |
| 108 | Dowshnee Bhutia | 42 /BD | Chunabhati | | 36.232 | 1.85 | |
| 109 | Garhap Bhutia | 43 /BD | Tashigaon | | 47.565 | 2.4 | |
| 110 | Phutdaja Bhutia | 45/BD | Chunabhati | | 29.915 | 1.5 | |
| 111 | Sri Goda Bhutia | 48, 49 /BD | Tashigaon | | 76.013 & 576.198 | | |
| 112 | Sri Panchey Bhutia | 50, 51 /BD | Tashigaon | | 45.987 & 92.931 | 2.30 & 5.58 | |
| 113 | Smt. Chicham | 52 /BD | Tashigaon | | 14.86 | 0.75 | |
| 114 | Sri Chichuni Bhutia | 52 /BD | Tashigaon | | 34.86 | 0.75 | |
| 115 | Sri Pashubhim Bhutia | 56 /BD | Tashigaon | | 26.013 & 576.198 | 1.44 | |
| 116 | Ongdi Bhutia | 57 /BD | Tashigaon | | 44.523 | 2.3 | |
| 117 | Smt. Salhatam Bhutia | 58 /BD | Chunabhati | | 37.629 | 1.9 | |
| 118 | Chuchin Bhutia | 62 /BD | Chunabhati | | 41.62 | 2.1 | |
| 119 | Gaskkhap Bhutia | 66 /BD | Chunabhati | | 36.609 | | |
| 120 | Rinchi Bhutia | 67,68 /BD | Chunabhati | | 24.154 & 56.40 | 1.25 & 2.82 | |
| Sl. No. | Name of the FD Holder | Holding No. | Forest Block & Comptt. | Particulars of land utilized | Total Land involved (m2) | Annual Rent.(Rs.) | Rent paid upto |
| 121 | Dowsm Bhutia | 70 /DD | Charach had: | | 50.450 | 2 | |
| 121 | | 70 /BD | Chunabhati | | 59.458 | 3 | |
| 122 | Sri Kumar Bhutia | 73/BD | Tashigaon | | 43.543 | 2.15 | |
| 123 | Sanchu Bhutia | 78,79/BD | Chunabhati | | 37.685 & 101.484 | 1.90 & 2 | |
| 124 | Nepa Dukpa | 80 /BD | Chunabhati | | 97.543 | 4.9 | |
| 125 | Gattim Bhutia | 80 /BD | Chunabhati | | 451.509 | 5 | |
| 126 | Sri Narmi Bhutia | 84 /BD | Durugoan | | 37.635 | 1.9 | |
| 127 | Sri Nangestri Dukpa | 86 /BD | Chunabhati | | 160 | 8 | |
| 128 | Rinchey Ngadi | 89/BD | Chunabhati | | 32.051 | 1.65 | |
| 129 | Phafpaji Dukpa | 90 /BD | Chunabhati | | 43.017 | 2.2 | |
| 130 | Ago Bhutia | 92 /BD | Chunabhati | | 42.263 | 2.15 | |
| 131 | Jetting Bhutia | 93/BD | Chunabhati | | 22.296 | 1.15 | |
| L | | | i | i e | 1 | | |
| 132 | Bangache Bhutia | 95 /BD | Chunabhati | | 22.38 | 1.15 | |
| 132 | Bangache Bhutia Jachum Bhutia | 95 /BD 96 /BD | Chunabhati Chunabhati | | 22.38 48.774 | 1.15 | |

| 135 | Don Bhutia | 98 /BD | Chunabhati | 53.512 | | |
|-------|--------------------------|--------------|-------------|-----------------------|------------------|--|
| 136 | Premdaji Bhutia | 99 /BD | Chunabhati | 29.729 | 1.5 | |
| 137 | M/s Himalayan Tranchers | 103,232 /BD | Chunabhati | 1950.166 & 785.385 | 97.85 & 39.05 | |
| 138 | Smt. Litim Bhutia | 104,105 /BD | Chunabhati | 98.477 & 0.08 | 4.95 & 2 | |
| 139 | Phufni Bhutia | 106 /BD | Chunabhati | 56.856 | 2.85 | |
| 140 | Buxaduar Primary School | 109 /BD | Buxaduar | | | |
| 141 | M/s Bhektaramai Chugedam | 112 /BD | Sadarbazar | 23.783 | | |
| 142 | Sri Manik Ch. Pandit | 114 /BD | Santrabari | 27.881 | | |
| 143 | Narbu Bhutia | 227 /BD | Chunabhati | 418.635 | 45 | |
| 144 | Chanda Dorjee | 231 /BD | Chunabhati | 31.215 | 1.65 | |
| 145 | Sri Ganesh Bh. Pradhan | 235 /BD | Sadarbazar | 102.657 | 5.15 | |
| 146 | Sri Ganesh Bh. Pradhan | 236 /BD | Santrabari | 90.487 | 4.55 | |
| 147 | Sri Changlow Lama | 238 /BD | Santrabari | 92.908 | 46.5 | |
| 148 | Sri Jnche Chand Bhowal | 239 /BD | Sadarbazar | 332.25 | | |
| 149 | Hotey Bhutia | 240 /BD | Tashigaon | 23.22 | 1.2 | |
| 150 | Sri Gopal Ram Kumar | 242 /BD | Sadarbazar | 52.8 | 17.11 | |
| 151 | Sri Gopal Ram Kumar | 243 /BD | Santrabari | 12.34 | 6.5 | |
| 152 | Sri Show Bhutia | 244 /BD | Lalbunglow | 23.416 | 1.2 | |
| 153 | Sri Dhan Bh. Thapa | 245, 276 /BD | Sadarbazar | 48.774 & 22.296 | | |
| 154 | Sri Gopal Bhutia | 247 /BD | Lalbunglow | 48.96 | 2.45 | |
| 155 | Kanchimoy Gurung | 248 /BD | Durugoan | 22.296 | 1.15 | |
| 156 | Sri Singalam Bhutia | 250 /BD | Tashigaon | 56.85 | 2.85 | |
| 157 | Sri Prem Bhutia | 251 /BD | Chunabhati | 36.01 | 1.8 | |
| 158 | Phuttem Bhutia | 252 /BD | Chunabhati | 47.38 | 2.4 | |
| 159 | Dow pem Bhutia | 253 /BD | Chunabhati | 27 | 1.35 | |
| 160 | Kanka Bhutia | 254 /BD | Chunabhati | 36 | 2 | |
| 161 | Jatty Bhutia | 255 /BD | Tashigaon | 25 | 1.4 | |
| 162 | Rovehey Bhutia | 256 /BD | Chunabhati | 35 | 1.75 | |
| 163 | Sri Chadu Kanchu | 257 /BD | Tashigaon | 62 | 3.1 | |
| 164 | Chatta Bhutia | 258 /BD | Chunabhati | 32 | 1.6 | |
| 165 | Smt. Nimuejan Bhutia | 260 /BD | Chunabhati | 805.73 | | |
| 166 | Phema Bhutia | 261 /BD | Chunabhati | 41.62 | | |
| 167 | Thaxer Bhutia | 263 /BD | Chunabhati | | | |
| 168 | Naupana Dukpa | 264 /BD | Lapchakhawa | 21 | | |
| 169 | Penga Bhutia | 265 /BD | Tashigaon | 67 | | |
| 170 | Kamasthus Bhutia | 293 /BD | Chunabhati | | 2.85 | |
| 171 | Nakchu Bhutia | 259/BD | Chunabhati | 30.18 | 1.75 | |
| *** N | | | | | | |
| | rrender and shifted | | | | | |
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Annexure – 12

Details of Department Elephant under Buxa Tiger Reserve

→ Buxa Tiger Reserve (East)

| Sl. No | Name of Elephant | Identification Transponder-ID | Sex | Date of Birth | Age in yr. | Source of origin | Beat | Shoulder Height (in mt.) | Right front foot girth (in mt.) | Remarks |
|--------|------------------|----------------------------------|---------------|---------------|---------------|--|--------------|--------------------------------|---------------------------------------|--------------------------------------|
| 1. | URMILA | Troven ID-100- 00064-D8C34 | Female | Unknown | 33 yrs. | Purchased from Sonpur mala,Bihar on 06.11.87 (Rs. 87000/-) | Chengmari | 2.65 | 1.40 | |
| 2. | CHAMPADEVI | Troven ID-100- 00064-839F5 | Female | Unknown | 55 yrs. | Seized 16.03.03 from Samuktala which was Rocky circus elephant | South Jainti | 2.42 | 1.11 | |
| 3. | CHANDRIMA | Troven ID-100- 00064-DB659 | Female | 30.5.01 | 10 yrs. | 2 nd calf of mother Champarani | Mainabari | 1.86 | 66.0 | |
| 4 | CHAMPA RANI | Troven ID-100- 00064-77931 | Female | Unknown | 48 yrs. | Purchased from Sonpur mala, Bihar on Nov'91 | Marakhata | 2.39 | 1.26 | |
| છ | DIGAMBAR | Troven ID - 00064 - DCF | Male (tusker) | 13.06.02 | 9 yrs. | Calf of Pramila | South Rydak | 1.85 | 0.95 | Training is being given at Jaldapara |

→ Buxa Tiger Reserve (West)

| SI. | Name of Elephant | Sex | Date of Birth | Age (years) | Shoulder Height (m) | Right front foot girth (m) | Range | Beat | Remarks |
|-----|------------------|-----|---------------|-------------|------------------------|----------------------------------|-------|-----------|---|
| 1. | 1. Nonai | M | Unknown | 17 | 2.48 | 1.25 | EDPO | Checko | |
| 2. | Chanchal | M | 20.09.98 | 12 | 2.0 | 1.03 | EDPO | Checko | Training is being giv en at Jaldapara |
| 3. | 3. Shingheswari | F | Unknown | 68 Retired | 2.50 | 1.10 | ERVK | S.Panbari | |

Annexure – 13
List of Plant species that serve as food to wild herbivores

| Name of Species | Parts Used | Name of Species | Parts Used |
|--------------------------|----------------|---------------------------|----------------|
| Acacia catechu | Root | Mallotus phillipinensis | Leaves & twigs |
| Acacia pinnata | Shoot | Microstegiam ciliatum | Shoots |
| Albizzia lucida | Leaves & twigs | Ophiopogon spp | Shoots |
| Alpimia allughas | Shoot | Oplismenus compositus | Shoots |
| Andropogan spp. | Shoot | Oryza spp. | Shoots |
| Artocarpus lacucha | Twigs & fruits | Panicum maxima | Shoots |
| Arundo donax | Shoot | Paspalidium punctatum | Shoots |
| Bridelia stipularis | Shoots | Phragmitis karka | Shoots |
| Calamus tenuis | Shoots | Saccharum arundineaceum | Shoots |
| Cayratia japonica | Shoots | Sacchirum spontaneum | Shoots |
| Daemonorops jenkinsianus | Shoots | Sateria glauca | Shoots |
| Dalbergia sissoo | Leaves & twigs | Smilax perfoliata | Shoots |
| Ficus hispida | Twigs & fruits | Stereospermum chelonoides | Shoots |
| Gmelina arborea | Twigs & bark | Themeda villosa | Shoots |
| Herdycium spp | Shoots | Thunbergia coccinea | Shoots |
| Imperata cylindrica | Shoots | Thysanolena spp. | Shoots |
| Lannea coromondalica | Twigs | Tinospora cordiffolia | Shoots |
| Laportea crenulata | Shoots | Vetiveria zizanoides | Shoots |

 $\frac{Annexure-14:}{\text{List of Joint Forest Management}}$

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|---|---------|------|---|
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| 1 | Range | Beat | Name of JFMC | Reg. No. | Date of Regn. | Total Area Protected in Ha. | Total Mem. No.s | SC Mem. No.s | ST Mem. Nos. |
|---|--------|-----------|---------------------------|----------|------------------|-----------------------------------|--------------------|-----------------|-----------------|
| | South | Marakata | Marakata JFMC | 05/F/S- | | | 178 | 81 | 62 |
| | Rydak | | | 4/BTR(E) | 06.06.97 | 588 | | | |
| | South | Marakata | Uttar Narathali JFMC | -S/4/90 | | 201.94 | 134 | 38 | 0 |
| | Rydak | | | 4/BTR(E) | 26.90.90 | | | | |
| | South | Marakata | Paschim Changmari JFMC | 07/F/S- | | 662 | 174 | 27 | 116 |
| | Rydak | |) | 4/BTR(E) | 26.90.90 | | | | |
| | South | Ryadk | Shiltong JFMC | 01/F/S- | | 686 | 144 | 2 | 142 |
| | Rydak | | , | 1/BTR(E) | 26.90.90 | | | | |
| | South | Ryadk | Uttar Rampur JFMC | 02/F/S- | | 856 | 193 | 9 | 159 |
| | Rydak | | | 1/BTR(E) | 06.06.97 | | | | |
| | South | Chipra | Chipra JFMC | 04/F/S- | | 888 | 43 | 0 | 43 |
| | Rydak | | | 2/BTR(E) | 76.90.90 | | | | |
| | South | Chipra | Chowkirbos JFMC | 08/F/S- | | 509.91 | 176 | 81 | 62 |
| | Rydak | | | 2/BTR(E) | 06.06.97 | | | | |
| | South | Narathali | Narathali JFMC | 03/F/S- | | 1287.11 | 184 | 126 | 38 |
| | Rydak | | | 3/BTR(E) | 06.06.97 | | | | |
| | Bholka | Barobisha | Purbasalbari Bholka | 9/F/V- | | 336.8 | 334 | 185 | 103 |
| | | | Lepragur- JFMC | 1/BTR(E) | 06.06.97 | | | | |
| | Bholka | Barobisha | Radhanagar-Barobisha JFMC | 8/F/V- | | 334.8 | 807 | 82 | 82 |
| | | | | 1/BTR(E) | 26.90.90 | | | | |
| | Bholka | Ghoramara | Khutimari-Bangdoba JFMC | 16/F/V- | | 120 | 155 | 2 | 72 |
| | | | | 3/BTR(E) | 26.90.90 | | | | |
| | Bholka | Ghoramara | Ghoramara JFMC | 11/F/V- | | 509 | 201 | 09 | 124 |
| | | | | 3/BTR(E) | 06.06.97 | | | | |
| | Bholka | Ghoramara | Ghaksapara-Indubusti JFMC | 17/F/V- | | 671 | 230 | 125 | 104 |
| | | | | 3/BTR(E) | 06.06.97 | | | | |
| | Bholka | Chengmari | Chengmari JFMC | 15/F/V- | | 337 | 448 | 292 | 101 |
| | | | | 2/BTR(E) | 06.06.97 | | | | |

| 15 | Bholka | Chengmari | Madhya Haldibari JFMC | 14/F/V- | | 571.6 | 322 | 260 | 52 |
|----|-----------|------------------|------------------------|---------------------|----------|---------|-----|-----|-----|
| | |) | | 2/BTR(E) | 06.06.97 | | | | |
| 16 | Bholka | Chengmari | Dakshin Haldibari JFMC | 13/F/V- 2/BTR(E) | 26.90.90 | 288.66 | 281 | 176 | 43 |
| 17 | Bholka | Chengmari | Balapara JFMC | 10/F/V- 4/BTR(E) | 76.90.90 | 332.27 | 38 | S | 31 |
| 18 | Buxaduar | Buxaroad | Buxaroad | 05/E/B- 1/BTR(E) | 76.90.90 | 1657.79 | 92 | 1 | ~ |
| 19 | Buxaduar | Santrabari | Santrabari | 06/E/B- 3/BTR(E) | 76.90.90 | 2273.2 | 70 | 7 | 18 |
| 20 | Buxaduar | Santrabari | Buxaduar | 07/E/B- 2/BTR(E) | 76.90.90 | 3099.58 | 158 | 24 | 111 |
| 21 | Buxaduar | Santrabari | Chunabhati | 08/E/B- 4/BTR(E) | 76.90.90 | 1978.4 | 69 | 0 | 65 |
| 22 | Kumargram | Sankosh | Sankosh | 02/E/K- 3/BTR(E) | 76.90.90 | 92.962 | 86 | 6 | 4 |
| 23 | Kumargram | Kumargram | Kumargram | 04/E/K- 1/BTR(E) | 76.90.90 | 1051.39 | 99 | 1 | 13 |
| 24 | Kumargram | Newlands | Newlands | 01/E/K- 2/BTR(E) | 76.90.90 | 1295.41 | 40 | 12 | 19 |
| 25 | Jainti | North Jainti | Jainty (F.D.holding) | 01/E/J- 3/BTR(E) | 12.07.00 | 2395.79 | 193 | 46 | 15 |
| 26 | Jainti | Bhutiya Basti | Bhutiabasti F.V. | 02/E/J- 2/BTR(E) | 31.03.99 | 1712.8 | 72 | 2 | ъ |
| 27 | Hatipota | Chunia | Nurpur | 03/E/J- 1/BTR(E) | 76.90.90 | 1613.6 | 264 | 81 | 127 |
| 28 | NRD | Karthika | Kartick | 01/E/N- 1/BTR(E) | 76.90.90 | 769.25 | 99 | S | 47 |
| 29 | NRD | Tiamari | Tiamari | 02/E/N- 3/BTR(E) | 76.90.90 | 1256 | 34 | 2 | ∞ |
| 30 | NRD | Karthika | Turturi Khand Shanti | 04/E/N- 2/BTR(E) | 76.90.90 | 1244 | 203 | 11 | 92 |
| 31 | NRD | Mainabari | Kanjalibasti (South) | 03/E/N- 2/BTR(E) | 76.90.90 | 2391 | 228 | 22 | 58 |

List of Joint Forest Management Committees

BTR(West) Division:

| ST Mem | 157 | 221 | 169 | 66 | 49 | 55 | 49 | 89 | 193 | 1 | 78 | 55 | 106 | 14 | 188 |
|-------------------|----------------------------|-------------------------------|--------------------------------|--------------------|--------------------|--|--------------------|----------------------------------|--------------------------|--------------------|-----------------------------|--------------------------------|--------------------------|--------------------------|--------------------------|
| SC Mem | 12 | 43 | 73 | 35 | 10 | 79 | 35 | | 4 | 2 | | | 69 | 25 | 19 |
| Total Mem. | 169 | 264 | 242 | 134 | 59 | 134 | 84 | 89 | 197 | 16 | 78 | 55 | 175 | 39 | 207 |
| Area Protected | 531.600 | 496.800 | 403.100 | 273.000 | 380.000 | 227.000 | 227.000 | 930.350 | 817.600 | 598.700 | 550.800 | 1345.60 | 720.000 | 900.909 | 989.240 |
| Compt. Protected | Gada-3 & 4 | Gada-1 & 2 | Gada-5 & 6 | Pana-3 | Pana-4 | Pana-10 | Pana-10 | Checko-3,4,7,8 | Checko-5,6,9 | DPO-7 & 8 | DPO-3 & 4 | Poro-3,4,8,9 | DPO- 1,5(P),6(P),9(P) | DPO- 2,5(P),6(P),9(P) | Poro-2,5(P),7 & 10 |
| Date of Regn. | 15-02- 97 | 16-02- 97 | 01-01- | 17-04- | 17-04- | 22-12- 96 | 25-01- 97 | 16-02- 97 | 16-02- 97 | 16-02- 97 | 16-02- 97 | 13-02- 97 | 13-02- 97 | 13-02- 97 | -09-07- 92 |
| Reg.No. | 16/FPC/EDPO/BTR(W) | 17/FPC/EDPO/BTR(W) | 24/FPC/EDPO/BTR(W) | 05/FPC/ERVK/BTR(W) | 06/FPC/ERVK/BTR(W) | 10/FPC/ERVK/BTR(W) | 11/FPC/ERVK/BTR(W) | 18/FPC/EDPO/BTR(W) | 19/FPC/EDPO/BTR(W) | 20/FPC/EDPO/BTR(W) | 21/FPC/EDPO/BTR(W) | 13/FPC/WDPO/BTR(W) | 14/FPC/WDPO/BTR(W) | 15/FPC/WDPO/BTR(W) | 01/FPC/WDPO/BTR(W) |
| Name of JFMC | Gadadhar Banabasti FV.JFMC | Uttar Dakshin Dhalkar RV.JFMC | Uttar Dakshin Sibkhata RV.JFMC | Panbari FV.JFMC | Dhamsibad RV.JFMC | Dakshin Panbari (20th mil)Banbasti FV.JFMC | Dangi RV,JFMC | Uttar Dakshin Panialguri RV.JFMC | Checko Banabasti FV.JFMC | Damanpur FD.JFMC | Panijhora Banabasti FV.JFMC | West Garam FV.& Satkodali JFMC | East Garam FV.JFMC | Uttar Jitpur RV.JFMC | Poro-Phoskadanga FV.JFMC |
| Beat | Gadadhar | Gadadhar | Gadadhar | Panbari-N | Panbari-N | Panbari-S | Panbari-S | Checko | Checko | Damanpur | Damanpur | W. Garam | East Garam | East Garam | East Poro |
| Name of Range | East RVK | East RVK | East RVK | East RVK | East RVK | East RVK | East RVK | East DPO | East DPO | East DPO | East DPO | West DPO | West DPO | West DPO | West DPO |
| SI. | 1 | 2 | 3 | 4 | 5 | 9 | 7 | ~ | 6 | 10 | 11 | 12 | 13 | 14 | 15 |

| 66 | 11 | 229 | 40 | 331 | 212 | 198 | 35 | 229 | | 59 | 99 | 12 | 33 | 21 | 69 | 58 |
|--|---------------------------------|-------------------------|-------------------------|--------------------------------|--------------------------|---------------|------------------------|------------------------|-------------------|-----------------------------|-------------------------|-------------------|--------------------------|---------------------|--------------------|-------------------------|
| 12 | 49 | 159 | 15 | 10 | 20 | 150 | 38 | 35 | | 55 | 12 | 25 | 12 | 6 | ~ | 5 |
| 111 | 09 | 388 | 55 | 341 | 232 | 348 | 73 | 264 | | 114 | 78 | 37 | 45 | 30 | 77 | 63 |
| 924.800 | 950.000 | 599.190 | 358.300 | 000.699 | 1011.20 | 364.370 | 881.300 | 1046.67 | 157.600 | 1072.36 | 908.220 | 1505.57 0 | 1337.21 | 1688.82 | 2481.47 | 1815.52 0 |
| SRVK-7,8,10 | SRVK-15,16 | Poro-1,5 | | Nimati-2,7 | Nimati-1 | Poro-11 | GD-2(P),GD-1a,BB-3a,3b | GD- 3a,3b,2a,2b,4b, | GD-4a | BB-1,2,4 | Ranga-1a,1b,2a,2b,3a,3b | Bhutri-3,4,5 | Pana-1a,1b,2a,2b,3,4a,4b | RTG-1,2,3,4,5(P) | Adma-1,2,3,4 &5 | RTG- 5(P),6,7,8,9,10 |
| 16-02- 97 | 24-02- 97 | 11-11- | 11-11- | 11-11- | 01-02- 97 | | 07-02- 96 | 13-02- 96 | 23-02- 96 | 96 -60-£0 | 10-02- 97 | 10-02- 97 | 10-02- 97 | 10-02- 97 | 10-02- 97 | 10-02- 97 |
| 22/FPC/WRVK/BTR(W) | 23/FPC/WRVK/BTR(W) | 07/FPC/NMT/BTR(W) | 08/FPC/NMT/BTR(W) | 09/FPC/NMT/BTR(W) | 12/FPC/NMT/BTR(W) | under Process | 02/FPC/HTG/BTR(W) | 03/FPC/HTG/BTR(W) | 04/FPC/HTG/BTR(W) | 01/EDC/HTG/BTR(W) | 02/EDC/HTG/BTR(W) | 03/EDC/HTG/BTR(W) | 04/EDC/PANA/BTR((W) | 05/EDC/PANA/BTR(W) | 06/EDC/PANA/BTR(W) | 07/EDC/PANA/BTR(W) |
| FD Holders (Merchanpara, B.S.Mill & Depot line) RV.JFMC | Garobasti & Pampu Basti FV.JFMC | Nimati-Domohani RV.JFMC | Uttar patkapara RV.JFMC | Uttar Dakshin latabari RV.JFMC | Nimati Banabasti FV.JFMC | Bhutia Bosit | Dalbadal FV.JFMC | Gudamdabri FV.JFMC | Latabari RV.JFMC | Gopal Bahadur basti RV.JFMC | Khokla Basti RV.JFMC | Bhutri FV. JFMC | Pana Forest Village,JFMC | Raimatang FV., JFMC | Adma FV.,JFMC | Gangutia FV,JFMC |
| West-RVK | West-RVK | West Poro | West Poro | Nimati-W | Wimati-W | W.Poro | Gudamdabr i | Gudamdabr i | Gudamdabr i | Bharnabari | Bhutri | Bhutri | Pana | Raimatang | Adma | Ganagutia |
| West RVK | West RVK | Nimati | Nimati | Nimati | Nimati | Nimati | HTG | HTG | HTG | HTG | HTG | HTG | Pana | Pana | Pana | Pana |
| 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 |

Annexure – 15: JFM Resolution

GOVERNMENT OF WEST BENGAL FOREST DEPARTMENT FOREST BRANCH

No. 5969-For

Dated 3.10.2008

RESOLUTION

Whereas the National Forest Policy, 1988 envisages it as one of the essentials of forest management that the forest communities should be motivated to identify themselves with the development and protection of forests from which they derive benefits. National Forest Policy 1988 also recognises the symbiotic relationship between the tribal people and forests, and implores to associate the tribal people closely in the protection, regeneration and development of forests.

Whereas the National Forest Policy, 1988 envisages people's involvement in the development and protection of forests and whereas the requirements of fuelwood, fodder and small timber such as house-building material, of the tribals and other villagers living in and near the forests, are to be treated as first charge on forest produce.

And whereas "The Scheduled Tribes And Other Traditional Forest Dwellers (Recognition of Forest Rights) Act 2006" also recognises the responsibility and authority of tribals in conservation of biodiversity and maintenance of ecological balance and thereby strengthening the conservation regime of forests.

And whereas State of West Bengal has been the pioneer in development of Joint Forest management which has now been acknowledged as tool for management of forest resources universally and implemented successfully in the different states of the country.

And whereas, the Forest Department has taken up a massive programme for resuscitation of the degraded forests of the State as a whole for converting the areas into productive forests.

And whereas, active participation and involvement of local people are vital for generation, maintenance and protection of aforesaid forests/ plantations and successful implementation of the program.

In supersession of this department's resolution No.2340-For dated 14th July 2004, 2731-For dated 16th August 2004 and 2756-For Dated 17th August 2004, the Governor has been pleased to decide that Joint Forest Management Committees shall be constituted for the purpose of development of degraded forests and forests prone to forces of degradation in the districts of Jalpaiguri, Coochbehar, Darjeeling (excluding areas under Darjeeling Gorkha Hill Council), Malda, Murshidabad, Nadia, Uttar Dinajpur, Dakhin Dinajpur, Hooghly and direct that the composition duties and functions, the usufructuary benefits and restrictive measure pertaining to such Joint Forest Management Committees shall be as following.

1. COMPOSITION

- i. The Divisional Forest Officer in consultation with "Bon-Bhumi Sanskar Sthayee Samiti" of concerned Panchayat Samiti shall select beneficiaries for constitution of the Joint Forest Management Committees(s), within their jurisdiction and within the frameworks of this resolution.
- ii. The beneficiaries ordinarily shall be economically backward people living in the vicinity of the forest concerned. Every family living in the vicinity of the forests shall, however, have the option of becoming a member of the Joint Forest Management Committee, if such family including the female members is interested in the work of protection.
- ii. There shall be normally a joint membership for each household (i.e. if husband is a member, wife automatically becomes a member and vice versa). Either of the two can exercise rights to represent household at any point.
- iii. Constitution of the Joint Forest Management Committee including the Executive Committee will be approved by the Divisional Forest Officer concerned on recommendation of the "Bon-O-Bhumi Sanskar Sthayee Samiti" of the concerned Panchayat Samiti.
- iv. The concerned Gram Panchayat(s) shall extend necessary support and help to such committees (s) to ensure their smooth and proper functioning.

2. EXECUTIVE COMMITTEE

- i. Each Joint Forest Management Committees shall have an Executive Committees to carry out the various activities assigned to the Committee.
- ii. The composition of the Executive Committee shall be as follows:
- a. Sabhapati or any member of the "Bon-O-Bhumi Sanskar Sthayee Samiti" of the Local Panchayat Samiti as may be nominated by the SabhapatiMember.

The members of the Executive Committee shall elect the President in each meeting.

- iii. The "Bon-O-Bhumi Sanskar Sthayee Samiti" of the respective Zilla Parishad will monitor, supervise and review functions of the Joint Forest Management Committees.
- iv. The Member Secretary shall convene the meetings of the Executive Committee as well as Joint Forest Management Committee, as per agreed procedure.
- v. The representatives of the beneficiaries to the Executive Committee shall be elected in each year in Annual General Meeting of the Committee, where the concerned Range Officer will be the observer.
- vi. No member of the Executive Committee shall be elected or nominated for more than three years in succession.
- vii. In order to ensure better coordination among the JFMCs and further consolidation of JFM practices, Coordination Committees of the JFMCs shall be constituted both at Beat & Range level. The composition and function of such coordination committees shall follow guideline to be prescribed by Principal Chief Conservator of Forests.

3. DUTIES OF EXECUTIVE COMMITTEE

- i. The Executive committee of Joint Forest Management Committee shall maintain a register showing the necessary particulars of beneficiaries who are members of the committee, i.e. name, father's name, address, age, number of family members, name of nominee, etc nomination forms duly filled in and approved by the Executive committee should be pasted in the Register. Such Register is also to be maintained in the concerned Range Office of the Forest Department for permanent record.
- ii. The Executive committee of Joint Forest Management Committee shall maintain a "Minute Book" wherein proceedings of the meeting of the Executive Committee held from time to time as well as the proceedings of the Annual General Meeting of the Joint Forest Management Committee will be recorded under the signature of the President of the Committee and such Minute duly attested by the member secretary shall be sent to concerned Range Officer for record.
- iii. The Executive committee of Joint Forest Management Committee shall hold an Annual General Meeting once in very year where activities of Committee as well as details of distribution of usufructuary benefits are to be discussed, besides electing representatives of the beneficiaries to the Executive Committee.
- vi. The Executive committee shall meet at least once every two months and discuss issues related to ongoing forestry works, preparation and implementation of microplan and other emergent works etc.

4. FUNCTIONS OF JOINT FOREST MANAGEMENT COMMITTEE/ EXECUTIVE COMMITTEE

A

- i. To ensure protection of forest (s)/ plantation(s)/wildlife through members of the committee.
- ii. To protect the said forest(s)/plantation(s) with the member of the Committee.
- iii. To inform forest personnel or any person or persons attempting trespass and willfully or maliciously, damaging the said forest(s) / plantation(s)/Wildlife or committing theft thereon.
- iv. To prevent such trespass, encroachment, grazing, fire, poaching, theft or damage.
- v. To apprehend or assist the forest personnel in apprehension of such person or persons committing any of the offence mentioned above.

В

- i. To ensure smooth and timely execution of all forestry and fringe area development works taken up in the area by extending necessary help to the officials of Forest Department.
- ii. To involve every member of the Committee in the matter of protection of forests(s)/plantations(s)/wildlife as well as other duties assigned to the Committee.
- iii. To assist the concerned Forest Officials in the mater of selection/engaging of labourers required for forestry worked.

\mathbf{C}

- i. To ensure smooth harvesting of the forest produce by the Forest Department.
- ii. To assist the concerned Forest Official in proper distribution of the earmarked portion of the net sale proceeds among the members of the Committee (as per list maintained by Sthayee Samiti).
- iii. To ensure that usufructuary rights allowed by the Govt, is not in any way misused by any of the members and forest/plantation sites are kept free from only encroachment whatsoever.

D

i. To prevent any activities in contravention of the provisions of Indian Forest Act, of 1927 and any Acts and Rules made there under and the Wildlife (Protection) Act, 1972 as amended from time to time.

- ii. To report about activities of particular member which are found prejudicial and detrimental to the interest of a particular plantation and or/forest wildlife to the concerned Beat Officer/Range Officer which may result in cancellation of membership of the erring member.
- iii. To assist the Forest Officials to take action or proceed under Indian Forest Act 1972 and the Wildlife (Protection) Act 1972 and any Acts and Rules made there under, against the offenders, including may erring members of the Committee found to be violating the Act or damaging the forest/plantation/wildlife.

5. USUFRUCTUARY BENEFITS

- i. The members will have to protect the forest and wildlife for at least 5 years to be eligible for sharing of usufructs under this programme.
- ii. The members shall be entitled to collect following items free of royalty without causing any damage to forest.
- a) Fallen twigs, grass, fruits (excluding cashew), flowers, mushroom, seeds, leaves and intercrops raised by JFMCs subject to any restriction imposed from time to time, Provided however such collection will be not allowed in Protected Areas
- b) Medicinal plants will be permitted to be collected by the JFMC members free strictly on the basis of approved micro-plans, except in Protected Areas
- c) Members of the JFMC will receive 25% of net sale proceeds of firewood and poles, which are harvested during thinning and cultural operations. The poles for the purpose of this order will be under 90 cm, gbh. For all species expect Teak. For Teak upper limited of gbh is 60 cm.
- d) Members of the JFMC will receive 15% of net sale proceeds of timber, which are harvested at the time of final felling. Share of JFMCs would be equally allocated to all the JFMCs in Forest Division proportionate to the strength of their members.
- iii. Entire Sal seeds as collected shall have to be deposited with the West Bengal Tribal Development Cooperative Corporation Ltd., through the local LAMPS (where LAMPS are functioning) and LAMPS will pay the members, in approved tariff, against their individual collection.
- iv. The concerned forest official will distribute to the eligible members their proportionate share of the usufructs from the harvesting after satisfactory performance of functions detailed herein before.

v. The usufruct sharing will be subject to restrictions imposed from time to time on account of Silvicultural and Management requirements and from preservation of wildlife point of view.

6. TERMINATION OF MEMBERSHIP DISSOLUTION OF COMMITTEE APPEALS ETC

- i. Failure to comply with any of the conditions laid down hereinbefore as well as contravention of provisions of the Indian Forest Act of 1972 Wildlife (Protection) Act or Acts and / or Rules made there under, may entail cancellation of individual membership and or/dissolution of the Executive/Joint Forest Management Committee, as the case may be by the Officers of the Forest Department as state below in (ii) and (iii) below.
- ii. The concerned Divisional Forest Officer shall be entitled to take appropriate action even dissolution of any Executive/Joint Forest Management Committee on the grounds stated above, on the recommendation of the Bon-O-Bhumi Sanskar Sthayee Samiti, Panchayat Samiti.
- iii. The concerned Range Officer may be authorized by the Divisional Forest Officer to take proper action, even termination of an individual membership, on the above mentioned grounds, on the recommendation of the Executive Committee of Joint Forest management Committee.
- iv. Appeal against any such penal action by the Range Officer may be preferred to the concerned Divisional forest Officer through local Panchayat Samiti.
- v. Appeal, against any such penal action by the Division Forest Officer may be preferred to the concerned Circle Conservator of Forests through the concerned Panchayat Samiti and the Zilla Parishad, whose decision shall be final.

ORDER

Ordered that the Resolution be published in the Calcutta Gazette and copy sent to all concerned.

By order of the Governor

(Smt. Shila Nag, IAS)
Joint Secretary to the
Government of West Bengal

Date:03.10.2008

No. 5969/1-For.

Copy forwarded to the Managing Director, Basumati Corporation Ltd., 166, B.B. Ganguli Street, Kolkata-12.

He is requested to publish it in the Kolkata Gazette for greater interest. 25 copies of the Gazette Notification may kindly be sent to this Department

Joint Secretary to the Government of West Bengal

No. 5969/2(6)-For. Dt. 03.10.2008 Copy forwarded for information to the: 7. P.C.C.F, (WL), West Bengal & C.W.L.W. 8. P.C.C.F., West Bengal. - All concerned may be informed accordingly. 9. Accountant General (A&E), West Bengal. 10. Finance Department of this Government. 11. Sabhadhipati

Joint Secretary to the Government of West Bengal

No. 5969/3-For. Date 03.10.2008.

12.

P.S. to M.I.C., Forests Department.

Copy forwarded for information to the Secretary to the Govt. of India, Ministry of Environment & Forests, National Wasteland Development Board, C.G.O. Complex, Lodhi Road, New Delhi 110 003.

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Joint Secretary to the Government of West Bengal

ANNEXURE-16

BUXA ECOSENSITIVE ZONES

WHEREAS, Buxa Tiger Reserve (B.T.R.) is situated in Alipurduar Sub-division of Jalpaiguri District, West Bengal. It comprises of the entire erstwhile Buxa Forest Division (702.44 km²), and a part of Cooch Behar Forest Division (58.43 km²). The Reserve lies between latitudes 26°30′ and 26°55′ N and longitudes 89°20′ and 89°55′ E. Those forests came under British rule in 1865 and the first reservations were made in 1879 according to the Indian Forest Act (Act VIII of 1878) and the process continued till 1940. Thus most of the forest areas of the Tiger Reserve enjoy the status of reserved forests under the provision of the Indian Forest Act (IFA), 1927 upto 1982. BTR was constituted in the Year 1983 in Jalpaiguri District vide Govt. of India's notification No. J-11025/18/B/FRY (PT) dated, 16th February, 1983 and became the 15th Tiger Reserve of the Country. Buxa wildlife sanctuary was first declared in the year of 1986 with an area of 314.52 sq. km, vide notification no. 316-For/118-1/86, dated 24.01.86. This area has been settled for rights and concessions u/s 19 to 25 of Indian Wildlife (Protection) Act, 1972 by the Collector, Jalpaiguri District An additional area of 54.47 sq km was added to the sanctuary vide memo no. 346(10)/ LR-C in 1989. An area of 117.10 km² of the Sanctuary was preliminarily declared as National Park under section 35(1) (2) of Wildlife (Protection) Act, 1972 vide notification No.85-For/11B-42/91 dt.06-01-92. It was finally constituted as Buxa National Park vide Notification no.3403-For/11B-6/95 dt.05-12-97. In accordance of Sub-section (4) of Section 38 V of the Wildlife (Protection) Act, 1972, an area of 390.58 km² has been notified as Core or Critical Tiger Habitat of Buxa Tiger Reserve vide Govt. of West Bengal's Notification no. 3051- For/ 11 M-28/07 dated Kolkata, the 6th August, 2009.

And Whereas, Buxa Tiger Reserve is biologically very rich, it is located in the confluence of 3 major Bio-geographic Zones viz. Lower Gangetic plains (7B), Central Himalayas (2C), and Brahmaputra valley (8A). The project site supports vital population of tiger (Panthera tigris). It is one of the world's most endangered carnivores and at the apexes of the food chain. BTR represents several elements of Bio-diversity of North-East India, one of the most biodiverse Indian Regions. Most of the floral endemic species of N-E India (about 60%) are encountered in BTR. The endemic Indo-Malayan species like Chinese Pangolin, Reticulated Python have been reported in Buxa Tiger Reserve. The rare Clouded Leopard, Marble Cat, Black-necked crane, etc. (some of the endemic species of North-East zone) are present in B.T.R. Moreover, the Reserve acts a carbon sink of the region. The mountain ranges intercept rain laden clouds and recharges ground water. It protects the catchment of several rivers and streams and thereby reduces soil erosion and maintains water regime. It sustains the economic prosperity of the region through downstream irrigation. More than 50% of the plant species of India are represented in North-East India. Of these 60% are endemic. BTR has many of those characteristics. The present check list shows 352 species of trees, 133 species of shrubs, 189 species of herbs, 108 species of climbers, 144 spp. of orchids, 46 species of grasses and reeds, 6 species of cane and 4 species of bamboo. Along with the floral diversity, the Buxa Tiger Reserve has a wide range of faunal diversity. There are 68 species of mammals, 41 species of reptiles, 246 species of birds, 4 species of Amphibians, 33 species of fishes identified within the Reserve. It will be worth noticing that there are 20 nos. of species of mammals which are endangered and are included in Schedule-I of (Wildlife Protection Act, 1972) 7 nos. of birds, 10 nos. of reptiles are also included within the endangered lists. Study on entomofauna of B.T.R. listed 500 species of insects belonging to 13 Orders, 65 families and 229 genera

AND WHEREAS, it is necessary to conserve and protect the area around the Buxa Tiger Reserve as Eco-sensitive Zone from ecological and environmental point of view, to protect, propagate or develop Wildlife therein or its environment.

1. Boundaries of Eco-sensitive Zone

The map of the said Eco-sensitive Zone is given at **Annexure A**. The Eco-sensitive zone includes one hundred and thirteen mouzas, 35 tea gardens falling within a distance of 5KM from Buxa Tiger Reserve out of which 49 mouzas, 24 tea gardens fall within 1KM of Buxa Tiger Reserve the detailed list is given in **Annexure - B**. The inventory of existing land use pattern and activities etc in those mouzas are shown in **Annexure - C**.

2. Zonal Master Plan for the Buxa Eco-sensitive Zone.

- (i) A Zonal Master Plan for the Buxa Eco-sensitive Zone shall be prepared by the State Government within a period of one year from the date of the notification and approved by the Central Government in the Ministry of Environment and Forests.
- (ii) The Zonal Master Plan shall be prepared in consultation with all concerned State Departments of Environment, Forest, Urban Development, Tourism, Municipal Department, Irrigation and PWD(Building & Roads) Department, Revenue Department and West Bengal Pollution Control Board for interpreting environment and ecological considerations into it.
- (iii)The Zonal Master Plan shall provide for restoration of denuded areas, conservation of existing water bodies, management of catchment areas, watershed management, groundwater management, soil and moisture conservation, needs of local community and such other aspects of the ecology and environment that need attention.
- (iv) The Zonal Master Plan shall demarcate all the existing and proposed urban settlements, village settlements, types and kinds of forests, agricultural areas, fertile lands, green areas, horticulture areas, orchards, lakes and other water bodies.
 - (v) It shall exempt all canals and drainage works.
- (vi) No change of land use from green uses such as orchards, tea gardens, horticulture areas, agriculture parks and others like places to non green uses shall be permitted in the Zonal Master Plan except that strictly limited conversion of agricultural lands may be permitted to meet the residential needs of the existing local residents together with natural growth of existing local populations, improvement of roads and bridges infrastructure, construction of public utility or community buildings without the prior approval of the State Government.
- (vii) The planned urbanization proposed in the development plans shall be approved by the State Government for the respective controlled areas.
- (viii) The zonal master plan shall be a reference document for the State Level Monitoring Committee for any decision to be taken by them including consideration for relaxation.
 - (ix) The zonal master plan shall indicate measures and lay down stipulations for regulation of traffic.
- (x) Pending the preparation of the zonal master plan for eco-sensitive zone and approval thereof by the Ministry of Environment and Forests all new constructions shall be allowed only after the proposals are scrutinized and approved by the Monitoring Committee.
 - (xi) There shall be no consequential reduction in Forest area, Green area and Agricultural area.
- (xii)The State Government shall prescribe additional measures, if necessary, in furtherance of the objectives and for giving effect to the provisions of this notification.

3. Prohibited, regulated and permitted activities in Eco-sensitive Zone –

All activities in the Buxa Eco-Sensitive Zone shall be governed by the provisions of the Wildlife (Protection) Act, 1972 (53 of 1972), the Forest (Conservation) Act, 1980 (69 of 1980) and the Environment (Protection) Act, 1986 (29 of 1986). Subject to the provisions of this paragraph, the activities in the Ecosensitive zone shall be regulated in accordance with tabular column given below.

| SI No | Activity | Prohibited | Regulated | Permitted | Remarks |
|----------|---|------------|-----------|-----------|--|
| 1 | Commercial Mining | Yes | | | |
| 2 | Commercial Quarrying | Yes | | | |
| 3 | Stone Quarrying and Crushers | Yes | | | collection of boulder shall continue as permitted by CWLW as per guidelines prescribed by CEC of Apex Court in order to avoid siltation of river beds Existing Stone Crusher unit to be shifted outside ESZ |
| 4 | Establishment of polluting | | | | |
| | Industries | Yes | | | |
| 5 | Establishment of Commercial Hotels and Resorts | | Yes | | Prohibited in the eco-sensitive zone except the already existing establishments. Expansion of the existing commercial tourism establishments are to be regulated strictly in accordance with "The guidelines for taking non forestry activities in Wildlife habitats" issued vide F.No.6-10/2011 WL dated 15-03-2011 by the Ministry of Environment and Forests (WL Division), New Delhi. Tourism activities shall be guided by NTCA guidelines and shall be monitored by Local advisory committee constituted for the purpose |
| 6 | Setting of saw mills | Yes | | | No saw mills within 2km radius of Forests can be established as per Saw Mill Rules |
| 7 | Commercial use of firewood | Yes | | | For Hotels and other business related establishments. |
| 8 | Drastic change in Land use pattern from Agriculture and Horticulture. | Yes | | | |
| 9 | Establishment of large-scale green houses and other commercial, agricultural and horticultural ventures by companies/firms/corporate houses, etc | Yes | | | |
| 10 | Commercial use of natural water resources including ground water harvesting for commercial mineral water plants, aerated drinks bottling plants, etc. | Yes | | | |

| SI No | Activity | Prohibited | Regulated | Permitted | Remarks |
|----------|---|------------|-----------|-----------|---|
| 11 | Establishment of Major Hydroelectric Projects | Yes | | | |
| 12 | Electric fencing, hotels/resorts, private home stays, private farms and large- scale commercial agricultural and horticultural ventures by firms, corporate houses, companies | | Yes | | |
| 13 | Erection of Electrical cables for housing, agricultural and other self underground cabling Subsistence purposes. | | | Yes | Promote underground cabling |
| 14 | Ongoing agriculture and horticulture practices by local communities. | | | Yes | However, excessive expansion of some of these activities should be regulated as per the master plan |
| 15 | Rain Water harvesting | | | Yes | Should be actively promoted |
| 16 | Organic Farming | | | Yes | Encouraged |
| 17 | Widening of roads | | Yes | | This should be done with proper EIA and mitigation measures |
| 18 | Movement of vehicular traffic during night | | Yes | | Restriction on the National Highway NH-31 between 9:00PM and 6:00PM Realignment of NH outside ESZ also to be explored |
| 19 | Introduction of exotic species | Yes | | | • |
| 20 | Establishment of large-scale commercial livestock and poultry farms by firms, corporate companies. | Yes | | | Initiatives on a small scale by the local farmers permitted |
| 21 | Use of Polythene bags by tourists, commercial hotels and resorts. | Yes | | | |
| 22 | Use of renewable Energy Sources. | | | Yes | Encouraged |
| 23 | Undertaking activities related to tourism like over- flying the National Park area by any Aircraft, Hot Air Balloons Helicopter, Gliders, Parasailing etc., | Yes | | | |
| 24 | Protection of hill slopes and river banks, villages by eroding rivers | | | Yes | Encouraged |

| SI No | Activity | Prohibited | Regulated | Permitted | Remarks |
|----------|---|------------|-----------|-----------|---|
| 25 | Discharge of effluents and solid waste including medical waste in natural water bodies or terrestrial area. | Yes | | | |
| 26 | Sign boards and hoardings within forest limits. | | Yes | | Permitted within village limits |
| 27 | Adoption of green technologies for all activities | | | Yes | Encouraged |
| 28 | Erection of High Tension Power Transmission Lines upto 11 kv. | Yes | | | This should be done with proper EIA and mitigation measures |
| 29 | Railways, underground pipelines and Rope ways | Yes | | | |
| 30 | Use of insecticides and other chemicals detrimental to wildlife in Tea Garden and within 1KM | | Yes | | |
| 31 | Disposal of Municipal Waste | yes | | | Scientific disposal after treatment may be permitted |

(1) Industrial Units:

No new establishment of any industrial unit shall be permitted in the eco-sensitive zone.

(2) In the non municipal areas, the following shall also be permitted:

Structures connected with small agro-based industries, activities related to the needs of the local village economy and processing or storage of local agro based products may be allowed subject to the permission to be obtained from the revenue authorities for alienation of land for non agricultural purposes.

(3) Quarrying and Mining:-

Commercial quarrying and mining activities shall be banned in the Ecosenstivity zone and no fresh mining lease shall be granted.

(4) Trees:

There shall be no felling of trees either on forest, Government, revenue or private lands, without the prior permission of the State Government. The felling of trees outside forest shall be regulated in accordance with the West Bengal Trees (Protection and conservation) Act 2006.

(5) Tourism:

Tourism activities shall be allowed in accordance with the Tourism Master Plan of Tiger Conservation plan prepared as per the guidelines provided by NTCA, with emphasis on eco-tourism, eco-education and eco-development. All the guidelines and advisories issued by MOEF in this regard shall be adhered to. State Government to incorporate this in Tourism policy in Consultation with the Ministry of Tourism, Government of India and approved by the Ministry of Environment and Forests which shall also form apart of the Zonal Master Plan.

(6) Use of plastics:

. The use of plastics laminates and tetra-packs within the Eco-sensitive zone shall be regulated as per the activities mentioned in this notification.

(7) Forest Areas under the control of Revenue Department:

Any non-forestry activities will be regulated in accordance with "The guidelines for taking non forestry activities in Wild life Habitats" issued vide F .No. 6-10/20 II WL dated 15-03-20 II by the Ministry of Environment and Forests (WL Division), New Delhi.

(8) Discharge of effluents:

- a) The discharge of any untreated effluent is prohibited within the Eco-Sensitive Zone.
- b) No effluent, either treated or untreated, shall be permitted to be discharged into any water body or water source within the Eco-sensitive zone.

(9) Solid Wastes:

- a). The local authorities shall draw up plans for the segregation of solid wastes into biodegradable and non-biodegradable components.
- b) The biodegradable material may be recycled preferably through composting or vermiculture and the inorganic material may be disposed of at environmentally acceptable locations.
- c) No burning or incineration of solid wastes shall be permitted. Explanation in this notification, "Solid wastes" shall include domestic, industrial, commercial & garden wastes.

(10) Natural springs:

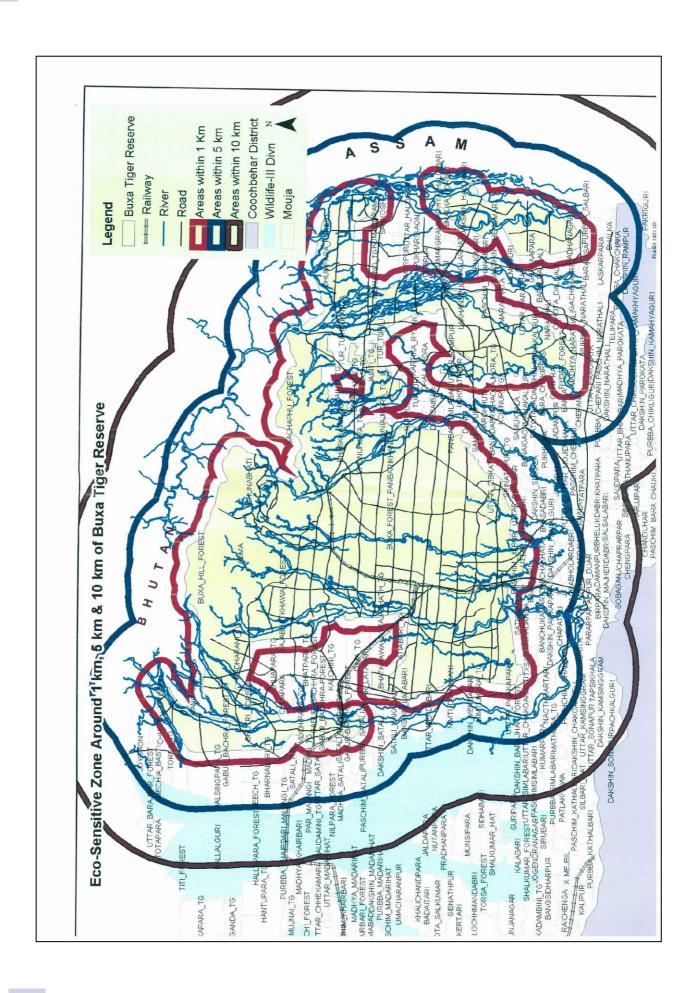
- a) The catchment area of all natural springs shall be identified and plans for their conservation and rejuvenation of those that have run dry in their natural setting shall be incorporated in the Zonal Master Plan
- b) Strict guidelines shall be drawn up by the State Government to ban development activities at or near these areas.

(11) Awareness:

The State Environment and Forests Department shall regularly carry out nature education and environmental awareness campaigns in each village falling in Eco-sensitive Zone, highlighting the importance and usefulness of the National Park and Tiger Reserve and Eco-sensitive.

4. Monitoring Committee.

(l) In exercise of the powers conferred by sub-section (3) of section 3 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government shall constitutes a committee to be called as the Buxa Eco-sensitive Zone Monitoring Committee to monitor the compliance of this notification.



NAME OF MOUZAS & TEA GARDENS IN 5 (FIVE) K.M. OF FOREST (BUXA TIGER RESERVE)

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| 1 | | | LI | LI | ALA | BARI | | | | INI | ANI BARI | ANI BARI | ANI BARI ARI | ANI BARI ARI | ANI BARI ARI | ANI BARI ARI | ANI BARI ARI | ANI BARI ARI | ANI BARI ARI | ANI BARI ARI ON | ANI BARI ARI ARI | | | | | | | | | | | |
| Name of MOUNAS | ~~ ~~ ~~ ~~ ~~ ~~ ~~ ~~ ~~ ~~ ~~ ~~ ~~ | MADHYA SATAL | PASCHIM SATAL | DAKHSIN SATAL | SATALI NAKADAI | UTTAR MENDABARI | TATE. | SIN | SIN | DAKHSIN MENDABARI NIMTI DOMOHANI | DAKHSIN MENDABARI NIMTI DOMOHANI DAKSHIN LATABARI | DAKHSIN MENDABARI NIMTI DOMOHANI DAKSHIN LATABA UTTAR LATABARI | DAKHSIN MENDABARI NIMTI DOMOHAI DAKSHIN LATAE UTTAR LATABAI PURBA SATALI | SIN ABARI DOMOHA HIN LATAE R LATABA A SATALI LI | DAKHSIN MENDABARI NIMTI DOMOHAI DAKSHIN LATAE UTTAR LATABAI PURBA SATALI SATALI | DAKHSIN MENDABARI NIMTI DOMOHAI DAKSHIN LATAE UTTAR LATABAI PURBA SATALI SATALI MANDALPARA | DAKHSIN MENDABARI NIMTI DOMOHAI DAKSHIN LATAE UTTAR LATABAI PURBA SATALI SATALI MANDALPARA UTTAR SATALI | SIN ABARI DOMOHA HIN LATAF R LATABA A SATALI LI OALPARA R SATALI IA BASTI | DAKHSIN MENDABARI NIMTI DOMOHAN DAKSHIN LATABA UTTAR LATABAR PURBA SATALI SATALI MANDALPARA UTTAR SATALI MECHIA BASTI JAYGAON CHOTA JAYGAON | DAKHSIN MENDABARI NIMTI DOMOHAI DAKSHIN LATAE UTTAR LATABAI PURBA SATALI SATALI MANDALPARA UTTAR SATALI MECHIA BASTI JAYGAON CHOTA JAYGAO | SIN ABARI DOMOHAI HIN LATAE R LATABAI A SATALI LI DALPARA R SATALI IIA BASTI AON A JAYGAO A JAYGAO A JAYGAO | SIN JABARI DOMOHAI HIN LATAF R LATABAI LI JALPARA R SATALI IA BASTI AON A JAYGAO A JAYGAO A JAYGAO A JAYGAO A JAYGAO A JAYGAO A JAYGAO | SIN JABARI DOMOHAI HIN LATAE R LATABAI A SATALI LI LI LI IA BASTI AON A JAYGAO A JAY | ABARI I DOMOHAN HIN LATABAR R LATABAR A SATALI LI LI IA BASTI AON A JAYGAON TALANGI PARA of TEA | SIN JABARI DOMOHAI HIN LATAF R LATABAI LI LI JALPARA R SATALI IA BASTI AON A JAYGAO TALANGI PARA Of TEA | SIN DOMOHAI DOMOHAI HIN LATAE R LATABAI A SATALI LI IA BASTI AON A JAYGAO A JAYGAO A JAYGAO ITEA ENS IHORA T.C | SIN JABARI DOMOHAI HIN LATABA R LATABA A SATALI LI OALPARA R SATALI IA BASTI AON A JAYGAO A JAYGAO A JAYGAO A JAYGAO IALANGI PARA Of TEA FINS IHORA T.C IUT.G. LIT.G. | DAKHSIN MENDABARI NIMTI DOMOHAI DAKSHIN LATAE UTTAR LATABAI PURBA SATALI SATALI MANDALPARA UTTAR SATALI MECHIA BASTI IAYGAON CHOTA JAYGAO CHOTA JAYGAO CHUAPARA CHUAPARA CHUAPARA MADHU T.G. SATALI T.G. MALNGI T.G. MALNGI T.G. | MENDABARI NIMTI DOMOHANI DAKSHIN LATABARI UTTAR LATABARI PURBA SATALI SATALI MANDALPARA UTTAR SATALI MECHIA BASTI JAYGAON CHOTA JAYGAON PAR MALANGI CHUAPARA Name of TEA GARDENS NIMTIJHORA T.G. MADHU T.G. MALNGI T.G. BHARNABARI T.G. BHARNABARI T.G. | SIN JABARI DOMOHAI HIN LATABAI R LATABAI A SATALI LI LI LI BASTI AON A JAYGAO A JAYGAO A JAYGAO A JAYGAO IALANGI PARA Of TEA ENS LITG. LITG. LITG. INGPARA I | DAKHSIN MENDABARI NIMTI DOMOHAN DAKSHIN LATABR UTTAR LATABRAR PURBA SATALI SATALI MECHIA BASTI JAYGAON CHOTA JAYGAON CHOTA JAYGAON CHUAPARA Name of TEA GARDENS NIMTIJHORA T.G. MADHU T.G. MADHU T.G. MALNGI T.G. MALNGI T.G. DALSINGPARA T.G. GOPIMOHAN T.G. | DAKHSIN MENDABARI NIMTI DOMOHAN DAKSHIN LATABAR PURBA SATALI SATALI MANDALPARA UTTAR SATALI MANDALPARA UTTAR SATALI JAYGAON CHOTA JAYGAON CHOTA JAYGAON CHOTA JAYGAON MADRIJHORA T.G. MADHU T.G. MALNGI T.G. MALNGI T.G. MALNGI T.G. MALNGI T.G. MALNGI T.G. DALSINGPARA T. TORSA T.G. GOPIMOHAN T.G. GOPIMOHAN T.G. |
| TO COME | Name or | MADHY | PASCHI | DAKHS | SATALI | UTTAR | DAKHSIN | | MENDABARI | MENDA NIMTI I | MENDA NIMTI I DAKSH | MENDA NIMTI I DAKSH UTTAR | MENDA NIMTI I DAKSH UTTAR PURBA | MENDA NIMTI I DAKSH UTTAR PURBA SATALI | MENDA NIMTI I DAKSH UTTAR PURBA SATALI MAND | MENDA NIMTI I DAKSH UTTAR PURBA SATALI MANDA | MENDA NIMTI I DAKSH UTTAR PURBA SATALI MANDA UTTAR | MENDABA NIMTI DOI DAKSHIN UTTAR LA PURBA SA SATALI MANDALF UTTAR SA MECHIA B JAYGAON | MENDA NIMTI I DAKSH UTTAR PURBA SATALI MANDA UTTAR MECHIL JAYGA | MENDA DAKSH UTTAR PURBA SATALI MANDA UTTAR MECHIL JAYGAC CHOTA | MENDABAF NIMTI DOM DAKSHIN L UTTAR LAT PURBA SAT SATALI MANDALPA UTTAR SAT UTTAR SAT MECHIA BA JAYGAON CHOTA JAY PAR MALAN PAR MALAN | MENDABAI NIMTI DOM DAKSHIN L UTTAR LAT PURBA SAT SATALI MANDALP UTTAR SAT MECHIA BA IAYGAON CHOTA JAY CHOTA JAY CHUAPARA | MENDABA NIMTI DO DAKSHIN UTTAR LA PURBA SA SATALI MANDALI UTTAR SA MECHIA E JAYGAON CHOTA JA CHOTA JA CHUAPAR Name of TE GARDENS | MENDABARI NIMTI DOMC DAKSHIN LA UTTAR LATA SATALI MANDALPAF UTTAR SATA MECHIA BAS JAYGAON CHOTA JAYC PAR MALANC CHUAPARA Name of TEA GARDENS | MENDABAR DAKSHIN LA UTTAR LAT PURBA SATA SATALI MANDALPA UTTAR SATA MECHIA BAS JAYGAON CHOTA JAY CHOTA JAY CHUAPARA Name of TEA GARDENS MADHU T.G | MENDABAR NIMTI DOMG DAKSHIN LA UTTAR LAT PURBA SATA SATALI MANDALPA UTTAR SATA UTTAR SATA MECHIA BAS IAYGAON CHOTA JAYG PAR MALAN CHUAPARA Name of TEA GARDENS NAMDHU T.G. SATALI T.G. | MENDABAR NIMTI DOMC DAKSHIN LA UTTAR LAT UTTAR LAT SATALI MANDALPA UTTAR SAT MECHIA BAS JAYGAON CHOTA JAYC PAR MALAN CHUAPARA Name of TEA GARDENS NIMTIJHORA MADHU T.G. SATALI MALNGI T.G. | MENDA DAKSH UTTAR PURBA SATALI MANDA UTTAR MECHIL JAYGA(CHOAP CHUAP CHUAP CHUAP CHUAP CHUAP Name of GARDEI MADHU SATALI | MENDA DAKSH UTTAR PURBA SATALI MANDA UTTAR MECHIL JAYGA(CHOTA PAR MA CHUAP CHUAP RAMBO Name of GARDEI NAMBO NAMBO SATALI MADHU SATALI BHARN DALSIN | MENDABAI NIMTI DOM DAKSHIN L UTTAR LA1 UTTAR LA1 PURBA SAT SATALI MANDALPA IAYGAON CHOTA JAY PAR MALAI CHUAPARA CHUAPARA Name of TEA GARDENS NIMTIJHOR MADHU T.G SATALI T.G BHARNABA DALSINGPA TORSA T.G. | MENDA DAKSH UTTAR DATAR DATAR MANDA UTTAR MECHIL JAYGA(CHOAP CHUAP CHUA | MENDA DAKSH UTTAR UTTAR MANDA UTTAR MECHIL JAYGA(CHOTA CHUTA DAR MA CHUTA DAR MA CHUTA DAR MA MADH(SATALI MADH(SATALI MALNC BHARN DALSIN TORSA GOPIM(RANGA |
| | • | | | | | | | | | | | | | | | 7. 8. 9. 110. 12. | | | | | | | | | | | | | | | O C C C C C C C C C C C C C C C C C C C | |

| 11. | CHUAPARA T.G. | 33 | 32. | PURBA SALBARI | 48 |
|-----|----------------|----|---------|---------------------|----------|
| 12. | METCHPARA T.G. | 35 | 33. | DAKSHIN RAMPUR | 51 |
| 13. | BHATPARA T.G. | 36 | 34. | BHALKA | 53 |
| 14. | KALCHINI T.G. | 37 | SI. No. | Name of TEA GARDENS | J.L. No. |
| 15. | DIMA T.G. | 39 | 1. | NEWLANDS T.G. | 31 |
| 16. | BHATKHAWA T.G. | 40 | 2. | KUMARGRAM T.G. | 33 |
| 17. | ATIABARI T.G. | 41 | 3. | SANKOSH T.G. | 34 |
| 18. | RAJABHAT T.G. | 42 | | | |

ALIPURDUAR BLOCK

| SI. No. | Name of MOUZAS | J.L. No. | Sl. No. | Name of MOUZAS | J.L. No. | SI. No. | Name of TEA GARDENS | J.L. No. |
|---------|----------------------|-------------|---------|----------------|----------|---------|-----------------------------|----------|
| 1. | PAKHURITALA | 32 | 32. | POTOTOLA | 101 | 1. | PAITKAPARA T.G. | 39 |
| 2. | PASCHIM SALBARI | 34 | 33. | SAMUKTALA | 102 | 2. | PASCHIM MAJHERDABRI T.G. | 48 |
| 33 | NAO THOARTORI | 35 | 34. | BANIAGAON | 103 | 3. | PURBA MAJHERDABRI T.G. | 58 |
| 4. | UTTAR CHAKUAKHETI | 36 | 35. | BANIADABRI | 104 | 4. | SRINATHPUR T.G. | 81 |
| 5. | MADHYA PAITKAPARA | 37 | 36. | JAYPUR | 105 | 5. | DHAWLAJHORA T.G. | 118 |
| 6. | UTTAR PAITKAPARA | 38 | 37. | PURBA JITPUR | 106 | 6. | KOHINUR T.G. | 120 |
| 7. | PHOSKADANGA | 40 | 38. | SAMBALPUR | 107 | 7. | MATHURA T.G. | 25 |
| 8. | SATKODALI | 41 | 39. | GAROKHOTA | 108 | 8. | PHASKHAWA T.G. | 2 |
| 9. | BANCHUKAMARI | 42 | 40. | DANGI | 109 | 9. | CHUNIAJHORA T.G. | 3 |
| 10. | CHAPATALI | 43 | 41. | PANBARI | 110 | 10. | JAYANTI T.G. | 9 |
| 11. | PASCHIM JITPUR | | 42. | SIMLABARI | 111 | 11. | RAHIMABAD T.G. | 5 |
| 12. | BAIRIGURI | 47 | 43. | DAMSIBAD | 112 | 12. | KARTIKA T.G. | 4 |
| 13. | GHAGRA | 46 | 44. | NURPUR | 113 | 13. | TURTURI T.G. | 6 |
| 14. | BHOLARDABRI | 99 | 45. | TURTURI | 114 | 14. | RYDAK T.G. | 10 |
| 15. | CHECHAKHATA | 57 | 46. | DHAWLAJHORA | 115 | | | |
| 16. | DAMANPUR | 51 | 47. | UTTAR RAMPUR | 116 | | | |
| 17. | UTTAR | 59 | 48. | LOKNATHPUR | 117 | | | |

| | PANIALGURI | | | | | |
|-----|-----------------|-----|-----|------------------|-----|--|
| 18. | DAKHSIN | 09 | 49. | UTTAR CHAKIRBOSH | 119 | |
| | PANIALGURI | | | | | |
| .61 | UTTAR | 61 | 50. | MAHAKALGURI | 121 | |
| | MAJHERDABRI | | | | | |
| 20. | PUTIMARI | 75 | 51. | DAKSHIN | 122 | |
| | | | | MAHAKALGURI | | |
| 21. | BHASHARDABRI | 92 | 52. | BARA CHAKIRBOSH | 123 | |
| 22. | DAKHSIN DALKAR | LL | 53. | CHOTO CHAKIRBOSH | 124 | |
| 23. | DAKHSIN SIBKATA | 78 | 54. | CHIPRA | 125 | |
| 24. | UTTAR DALKAR | 62 | 55. | BAKLA | 126 | |
| 25. | UTTAR SIBKATA | 80 | 56. | CHEPANI | 127 | |
| 26. | MADHYA SIBKATA | 82 | 57. | PASCHIM CHEPANI | 128 | |
| 27. | PUKHURIA | 83 | 58. | UTTAR PAROKATA | 129 | |
| 28. | JOSODANGA | 84 | 59. | MADHYA PAROKATA | 130 | |
| 29. | PASCHIM CHEPANI | 86 | .09 | PURBA | 131 | |
| | | | | KHALISHAMARI | | |
| 30. | TALESHWARGURI | 66 | 61. | UTTAR KAMSING | 30 | |
| | | | | GRAM | | |
| 31. | KADAMPUR | 100 | 62. | TAPSIKHATA | 31 | |

| | NAME OF MOUZA | S & TEA | A GARD | NAME OF MOUZAS & TEA GARDENS IN 1 (ONE) K.M. OF FOREST (BUXA TIGER RESERVE) | F FORES | r (BUXA | FIGER RESERVE) | |
|---------|----------------------------|---------|--------|---|-----------|----------|---------------------|-----------|
| | ALIPURDUAR BLOCK | | | KALCHINI BLOCK | | | KUMARGRAM BLOCK | |
| SN 13 | SATIOM 3. See SN | J.T. | SI. | SVEIDN 30 cmc N | II No | SN IS | SNAGG V ALF | N. |
| 31. NO. | St. 100. Inallie of MOUCAS | No. | No. | Name of MOCEAS | J.L. 170. | 31. INO. | Name of LEA GARDENS | J.L. 170. |
| 1. | UTTAR PAITKAPARA | 38 | 1. | UTTAR MENDABARI | 6 | 1. | MADHYA NARATHALI | 12 |
| 2. | PHOSKADANGA | 40 | 2. | NIMTI DOMOHANI | 12 | 2. | PASCHIM NARATHALI | 13 |
| 3. | SATKODALI | 41 | 3. | DAKSHIN LATABARI | 13 | 3. | NARATHALI | 23 |
| 4. | PASCHIM JITPUR | | 4. | UTTAR LATABARI | 14 | 4. | UTTAR NARATHALI | 24 |
| 5. | BAIRIGURI | 47 | 5. | PURBA SATALI | 1 | 5. | MARAKHATA | 25 |
| 6. | UTTAR PANIALGURI | 65 | 9. | SATALI MANDALPARA | 16 | .9 | PASCHIM CHENGMARI | 26 |
| 7. | DAKHSIN DALKAR | 77 | 7. | CHUAPARA | 34 | 7. | LALCHANDPUR | 27 |

| 8. | UTTAR DALKAR | 62 | | | | 8. | DANTALI | 28 |
|------|-------------------|-----|-----|------------------|----------|---------|---------------------|----------|
| 9. | UTTAR SIBKATA | 08 | SI. | Name of TEA | J.L. No. | 9. | JAYDEBPUR | 29 |
| | | | No. | GARDENS | | | | |
| 10. | PURBA JITPUR | 106 | 1. | NIMTIJHORA T.G. | 11 | 10. | AMARPUR | 30 |
| 11. | SAMBALPUR | 107 | 2. | MADHU T.G. | 18 | 11. | MADHYA HALDIBARI | 38 |
| 12. | DANGI | 109 | 3. | SATALI T.G. | 19 | 12. | DAKSHIN HALDIBARI | 39 |
| 13. | PANBARI | 110 | 4. | BHARNABARI T.G. | 22 | 13. | DAKSHIN CHENGMARI | 42 |
| 14. | DAMSIBAD | 112 | 5. | DALSINGPARA T.G. | 23 | 14. | HEMAGURI | 43 |
| 15. | NURPUR | 113 | .9 | TORSA T.G. | 24 | 15. | GHOKSA PARA | 45 |
| 16. | TURTURI | 114 | 7. | RADHARANI T.G. | 32 | 16. | RADHANAGAR | 46 |
| 17. | DHAWLAJHORA | 115 | 8. | CHUAPARA T.G. | 33 | 17. | BAROBISHA | 47 |
| 18. | UTTAR RAMPUR | 116 | 9. | METCHPARA T.G. | 35 | 18. | PURBA SALBARI | 48 |
| 19. | LOKNATHPUR | 117 | 10. | BHATPARA T.G. | 36 | | | |
| 20. | DAKSHIN | 122 | | | | SI. No. | Name of TEA GARDENS | J.L. No. |
| | MAHAKALGURI | | | | | | | |
| 21. | CHOTO CHAKIRBOSH | 124 | | | | 1. | NEWLANDS T.G. | 31 |
| 22. | CHIPRA | 125 | | | | 2. | KUMARGRAM T.G. | 33 |
| 23. | UTTAR PAROKATA | 129 | | | | 3. | SANKOSH T.G. | 34 |
| 24. | MADHYA PAROKATA | 130 | | | | | | |
| 1. | PAITKAPARA T.G. | 39 | | | | | | |
| 2. | PURBA MAJHERDABRI | 28 | | | | | | |
| | 1.G. | | | | | | | |
| 3. | SRINATHPUR T.G. | 81 | | | | | | |
| 4. | DHAWLAJHORA T.G. | 118 | | | | | | |
| 5. | KOHINUR T.G. | 120 | | | | | | |
| 6. | PHASKHAWA T.G. | 2 | | | | | | |
| 7. | CHUNIAJHORA T.G. | 3 | | | | | | |
| 8. | JAYANTI T.G. | 9 | | | | | | |
| 9. | KARTIKA T.G. | 4 | | | | | | |
| 10. | TURTURI T.G. | 6 | | | | | | |
| 111. | RYDAK T.G. | 10 | | | | | | |

Remarks INVENTORY OF EXISTING LAND USE PATTERN, ACTIVITIES ETC WITHIN 5 KM OF BUXA TIGER RESERVE Types and nos. of industries operating Tea Industries Z Nil Nil Nil Ē Activities performed Agricultural activities Tea Garden Tea Garden Tea Garden Agriculture Agriculture Agriculture Agriculture Agriculture Tea crop Tea crop Tea crop Tea crop Agriculture land Agriculture land Agriculture land Agricultural Agriculture land 14 | Agricultural Agricultural 21 | Agricultural 22 Agricultural pattern Agricultural 20 | Agricultural 10 | Agricultural 11 | Tea Garden Agricultural Agriculture 18 | Tea Garden 19 | Tea Garden Tea factory 5 | Tea factory 9 | Tea factory 10 Tea factory land 14 18 12 12 14 15 13 13 J S Paschim Narathali Dakshin Narathali Madhya Narathali Dakshin Latabari Nimti Domohani Purba Nararthali Nimtijhora TE Kamashyaguri Choto Daldali Uttar Latabari Uttar Latabari Turturikhand Mouza Purba Satali Rahimabad Gochomari Madhu TG Satali TG Telepara Kartick Rydak Rydak Uttar Range Nimati Nimati Nimati Nimati NRD HLG NRD NRD NRD SRD SRDSRD HTG HTG HTG SRD SRD SRD SRD SRD SRD BTR(W) BTR(W) BTR(W) BTR(W) BTR(W) BTR(W) BTR(W) Division BTR(W) BTR(E) BTR(E)

| Division | Range | Mouza | JL No. | Land use pattern | Activities performed | Types and nos. of industries operating | Remarks |
|----------|--------|----------------------|-----------|---------------------|--------------------------------------|--|---------|
| BTR(W) | HTG | Bharnabari TG | 22 | Tea Garden | Tea Garden | Tea Industries | |
| BTR(E) | SRD | Narathali | 23 | Agricultural | Agricultural activities | | |
| BTR(W) | HTG | Dalsingpara TG | 23 | Tea Garden | Tea Garden | Tea Industries | |
| BTR(E) | SRD | Uttar Nararthali | 24 | Agricultural | Agricultural activities | | |
| BTR(W) | HTG | Torsa TG | 24 | Tea Garden | Tea Garden | Tea Industries | |
| BTR(E) | SRD | Marakhata | 25 | Agricultural | Agricultural activities | | |
| BTR(E) | Bholka | Paschim Chengmari | 26 | Agricultural | Agricultural activities | Nil | |
| BTR(E) | SRD | Paschim Chengmari | 26 | Agricultural | Agricultural activities | | |
| BTR(E) | SRD | Joychandpur | 27 | Agricultural | Agricultural activities | | |
| BTR(E) | SRD | Dhantali | 28 | Agricultural | Agricultural activities | | |
| BTR(W) | HTG | Chhoto Joygaon | 28 | Agriculture land | Agriculture | Nil | |
| BTR(E) | SRD | Joydebpur | 29 | Agricultural | Agricultural activities | | |
| BTR(E) | KG | Jaydevpur | 29 | Agricultural | Agriculture | Nil | |
| BTR(E) | KG | Amarpur | 30 | Agricultural | Agriculture, sand, stone quarries at | Nil | |
| BTR(W) | HTG | Rangamati TG | 30 | Tea Garden | Tea Garden | Tea Industries | |
| BTR(E) | KG | Newlands TG | 31 | Tea cultivation | Agriculture | Tea Industries | |
| BTR(W) | ЕDРО | Tapsikhata | 31 | Agriculture land | Agriculture | Brick Factory | |
| BTR(W) | HTG | Radharani TG | 32 | Tea Garden | Tea Garden | Tea Industries | |
| BTR(E) | KG | Kumargram TG | 33 | Tea cultivation | Agriculture | Tea Industries | |
| BTR(W) | HTG | Chuapara TG | 33 | Tea Garden | Tea Garden | Tea Industries | |
| BTR(E) | KG | Sankosh TG | 34 | Tea cultivation | Agriculture | Tea Industries | |
| BTR(E) | Bholka | Uttar Haldibari | 35 | Agricultural | Agricultural activities | Nil | |
| BTR(E) | KG | Uttar Haldibari | 35 | Agricultural | | Nil | |

| Division | Range | Mouza | JL No. | Land use pattern | Activities performed | Types and nos. of industries operating | Remarks |
|----------|--------|----------------------|-----------|---------------------|-------------------------|--|---------|
| BTR(W) | HTG | Mechpara TG | 35 | Tea Garden | Tea Garden | Tea Industries | |
| BTR(E) | KG | Pukhrigaon | 36 | Agricultural | | Nil | |
| BTR(W) | Pana | Bhat Para TE | 36 | Tea plantation | Tea Garden | Tea Industries | |
| BTR(E) | KG | Kumargram | 37 | Agricultural | | Nil | |
| BTR(W) | Nimati | Madhya Patkapara | 37 | Agriculture land | Agriculture | Nil | |
| BTR(W) | HTG | Kalchini TG | 37 | Tea Garden | Tea Garden | Tea Industries | |
| BTR(E) | Bholka | Madhya Haldibari | 38 | Agricultural | Agricultural activities | Nil | |
| BTR(W) | Nimati | Uttar Patkapara | 38 | Agriculture land | Agriculture | Nil | |
| BTR(E) | Bholka | Dakshin Haldibari | 39 | Agricultural | Agricultural activities | Nil | |
| BTR(W) | Pana | Dima TE | 39 | Tea plantation | Tea Garden | Tea Industries | |
| BTR(W) | Nimati | Dima TE | 39 | Tea Garden | Tea Garden | Tea Industries | |
| BTR(W) | Nimati | Patkapara TE | 39 | Tea Garden | Tea Garden | Tea Industries | |
| BTR(E) | Bholka | Paglahat | 40 | Agricultural | Agricultural activities | Nil | |
| BTR(W) | WDPO | Phoskadanga | 40 | Agriculture land | Agriculture | Nil | |
| BTR(W) | Pana | Bhatkhawa TE | 40 | Tea plantation | Tea Garden | Tea Industries | |
| BTR(W) | Nimati | Bhatkhawa TE | 40 | Tea Garden | Tea Garden | Tea Industries | |
| BTR(E) | Bholka | Chengmary | 41 | Agricultural | Agricultural activities | Saraswati Batten Mill | |
| BTR(W) | WDPO | Satkodali | 41 | Agriculture land | Agriculture | Nil | |
| BTR(W) | Nimati | Atiabari TE | 41 | Tea Garden | Tea Garden | Tea Industries | |
| BTR(E) | Bholka | Dakshin Chengmari | 42 | Agricultural | Agricultural activities | Nil | |
| BTR(W) | WDPO | Banchukamari | 42 | Agriculture land | Agriculture | Nil | |

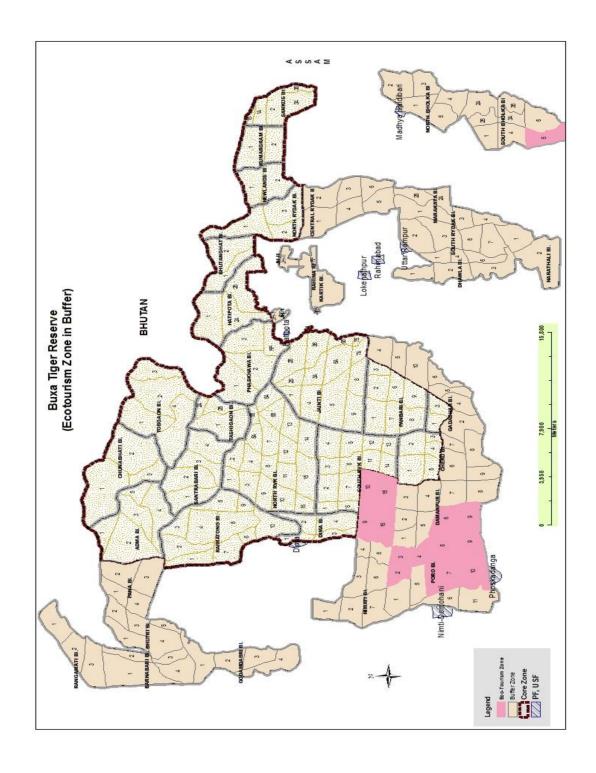
| Division | Range | Mouza | JL No. | Land use pattern | Activities performed | Types and nos. of industries operating | Remarks |
|----------|--------|----------------------|-----------|-------------------------|-------------------------|--|---------|
| BTR(W) | WRVK | Rajabhatkhawa | 42 | Tea Garden | Tea factory | Tea Industries | |
| BTR(W) | Pana | Rajabhat TE | 42 | Tea plantation | Tea Garden | Tea Industries | |
| BTR(E) | Bholka | Hemaguri | 43 | Agricultural | Agricultural activities | Nil | |
| BTR(W) | WDPO | Chapatali | 43 | Agriculture land | Agriculture | Nil | |
| BTR(E) | Bholka | Bara Daldali | 44 | Agricultural | Agricultural activities | Nil | |
| BTR(E) | Bholka | Ghaksapara | 45 | Agricultural | Agricultural activities | Nil | |
| BTR(E) | Bholka | Radhanagar | 46 | Agricultural | Agricultural activities | Furniture Unit | |
| BTR(W) | WDPO | Ghagra | 46 | Partly residential town | agriculture | Few commercial activities | |
| BTR(W) | ЕDРО | Bholardabri | 46 | Agriculture land | Agriculture | Saw Mill | |
| BTR(E) | Bholka | Barobisha | 47 | Agricultural | Agricultural activities | Furniture Unit | |
| BTR(W) | OdOM | Bairaguri | 47 | Agriculture land | Agriculture | Nil | |
| BTR(E) | Bholka | Purba Salbari | 48 | Agricultural | Agricultural activities | | |
| BTR(E) | Bholka | Dakshin Rampur | 51 | Agricultural | Agricultural activities | Rajkamal Saw Mill | |
| BTR(W) | EDPO | Damanpur | 51 | Residential | Residential | Saw Mill | |
| BTR(E) | Bholka | Laskarpara | 52 | Agricultural | Agricultural activities | Gour Hari Saw Mill | |
| BTR(E) | Bholka | Bholka | 53 | Agricultural | Agricultural activities | Nil | |
| BTR(W) | ЕDРО | Purba Majherdabri | 58 | Tea Garden | Tea Garden | Tea Industries | |
| BTR(W) | ЕDРО | Uttar Panialguri | 59 | Agriculture land | Agriculture | Nil | |
| BTR(W) | ЕDРО | Dakhin Panialguri | 09 | Agriculture land | Agriculture | Nil | |
| BTR(W) | ЕДРО | Uttar Majherdabri | 61 | Tea Garden | Tea Garden | Brick Factory | |

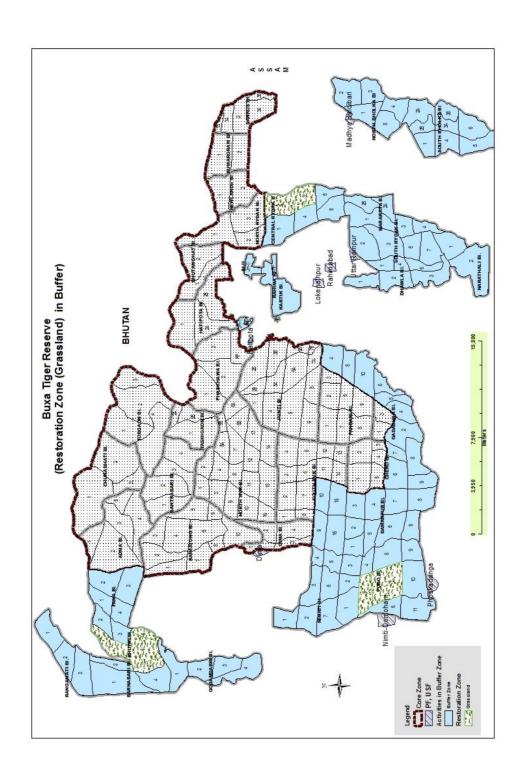
| Division | Range | Mouza | JL No. | Land use pattern | Activities performed | Types and nos. of industries operating | Remarks |
|----------|-------|------------------|-----------|---------------------|-------------------------|--|---------|
| BTR(W) | ERVK | Putimari | 75 | Agriculture land | Agriculture | | |
| BTR(W) | ERVK | Bhasardabri | 92 | Agriculture land | Agriculture | | |
| BTR(W) | ERVK | Dakshin Dhalkar | 77 | Agriculture land | Agriculture | | |
| BTR(W) | ERVK | Dakshin Shibkata | 78 | Agriculture land | Agriculture | | |
| BTR(W) | ERVK | Uttar Dhalkar | 62 | Agriculture land | Agriculture | Brick factory | |
| BTR(W) | ERVK | Uttar Shibkata | 80 | Agriculture land | Agriculture | | |
| BTR(W) | ERVK | Shreenathpur TE | 81 | Tea Garden | Agriculture | Tea Industries | |
| BTR(W) | ERVK | Madhya Shibkata | 82 | Agriculture land | Agriculture | Tea Industries | |
| BTR(E) | SRD | Pukhuria | 83 | Agricultural | Agricultural activities | Ply Mill | |
| BTR(E) | SRD | Jashodanga | 84 | Agricultural | Agricultural activities | Nil | |
| BTR(W) | ERVK | Josodanga | 84 | Agriculture land | Agriculture | | |
| BTR(E) | SRD | Paschim Chapani | 86 | Agricultural | Agricultural activities | Nil | |
| BTR(E) | SRD | Taleswar Guri | 66 | Agricultural | Agricultural activities | Nil | |
| BTR(E) | SRD | Kadampur | 100 | Agricultural | Agricultural activities | Nil | |
| BTR(E) | SRD | Pataltala | 101 | Agricultural | Agricultural activities | Nii | |
| BTR(E) | SRD | Samuktala | 102 | Agricultural | Agricultural activities | Nil | |
| BTR(E) | SRD | Baniagaon | 103 | Agricultural | Agricultural activities | Nil | |
| BTR(E) | SRD | Baniatari | 104 | Agricultural | Agricultural activities | Nil | |
| BTR(E) | SRD | Joypur | 105 | Agricultural | Agricultural activities | Nil | |
| BTR(E) | SRD | Purba Jitpur | 106 | Agricultural | Agricultural activities | | |

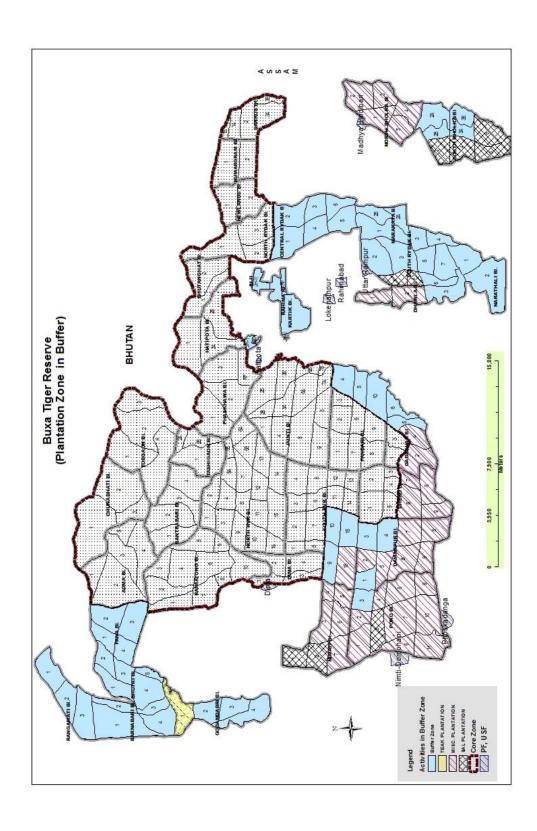
| Division | Range | Mouza | Jr | Land use | Activities performed | Types and nos. of industries | Remarks |
|----------|-------|------------------------|-----|---------------------|----------------------------|------------------------------|---------|
| | 9 | | No. | pattern | | operating | |
| BTR(E) | SRD | Saontalpur | 107 | Agricultural | Agricultural activities | Furniture unit | |
| BTR(E) | SRD | Garokhuta | 108 | Agricultural | Agricultural activities | | |
| BTR(E) | SRD | Dangi | 109 | Agricultural | Agricultural activities | | |
| BTR(W) | ERVK | Dangi | 109 | Agriculture land | Agriculture | | |
| BTR(W) | ERVK | Panbari | 110 | Agriculture land | Agriculture | | |
| BTR(E) | NRD | Simlabari | 111 | Agriculture land | Agriculture | Nil | |
| BTR(W) | ERVK | Shimlabari | 111 | Agriculture land | Agriculture | | |
| BTR(E) | NRD | Damsibad | 112 | Agriculture land | Agriculture | Nil | |
| BTR(W) | ERVK | Damsibad | 112 | Agriculture land | Agriculture | | |
| BTR(W) | ERVK | Noorpur | 113 | Agriculture land | Agriculture | | |
| BTR(E) | NRD | Turturi | 114 | Agriculture crop | Cultivating seasonal crops | Stone Crasher Industry | |
| BTR(E) | SRD | Dhawlajhora | 115 | Agricultural | Agricultural activities | | |
| BTR(E) | SRD | Uttar Rampur | 116 | Agricultural | Agricultural activities | | |
| BTR(E) | SRD | Loknathpur | 117 | Agricultural | Agricultural activities | | |
| BTR(E) | NRD | Loknathpur | 117 | Agriculture land | Cultivating | Nil | |
| BTR(E) | SRD | Uttar Choukirbos | 119 | Agricultural | Agricultural activities | | |
| BTR(E) | SRD | Dhawlajhora | 119 | Agricultural | Agricultural activities | Tea Industries | |
| BTR(E) | SRD | Kohinoor | 120 | Agricultural | Agricultural activities | Tea Industries | |
| BTR(E) | SRD | Mahakalguri | 121 | Agricultural | Agricultural activities | | |
| BTR(E) | SRD | Dakshin Mahakalguri | 122 | Agricultural | Agricultural activities | | |
| BTR(E) | SRD | Bara Choukirbos | 123 | Agricultural | Agricultural activities | | |

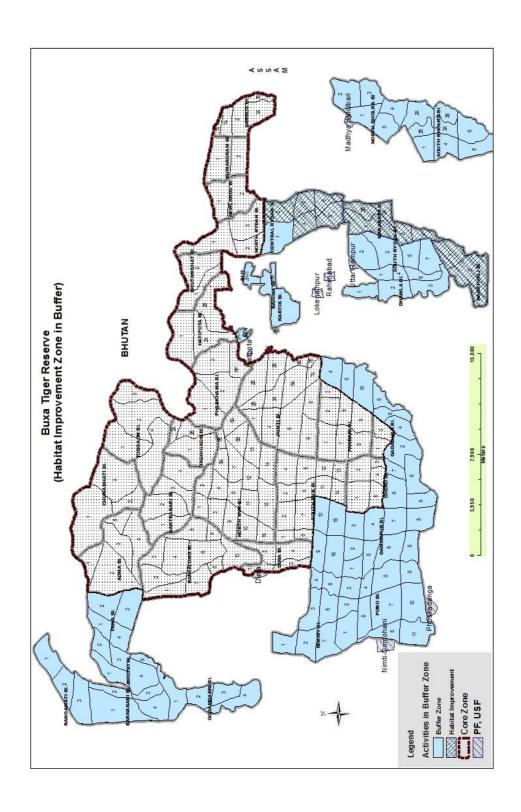
| Division | Range | Mouza | JL No. | Land use pattern | Activities performed | Types and nos. of industries operating | Remarks |
|----------|-----------------------------|----------------------------|-----------|---------------------|-------------------------|--|---------|
| BTR(E) | SRD | Chotto Choukirbos | 124 | Agricultural | Agricultural activities | | |
| BTR(E) | SRD | Chipra | 125 | Agricultural | Agricultural activities | | |
| BTR(E) | SRD | Bakla | 126 | Agricultural | Agricultural activities | | |
| BTR(E) | SRD | Chepani | 127 | Agricultural | Agricultural activities | | |
| BTR(E) | SRD | Paschim Chepani | 128 | Agricultural | Agricultural activities | | |
| BTR(E) | SRD | Uttar Parokata | 129 | Agricultural | Agricultural activities | Saw Mill | |
| BTR(E) | SRD | Madhya Parokata | 130 | Agricultural | Agricultural activities | | |
| BTR(E) | SRD | Uttar | 130 | Agricultural | Agricultural activities | | |
| | | Kamsinggram | | | | | |
| BTR(E) | SRD | Purba Khalsimari | 131 | Agricultural | Agricultural activities | | |
| BTR(W) | WDPO | BTR(W) WDPO Paschim Jitpur | | Agriculture land | Agriculture | Nil | |
| BTR(W) | BTR(W) WDPO Paschim Majherd | Paschim Majherdabri | | Tea Garden | Tea Garden | Tea Industries | |
| BTR(W) | ЕDРО | Chel | | Agriculture land | Agriculture | Nil | |

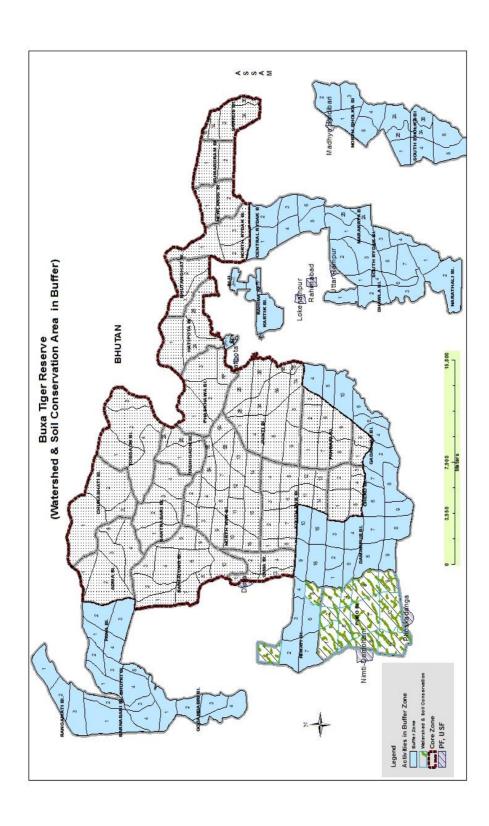
ANNEXURE – 17 Detailed maps showing zone plans of Buffer Zone

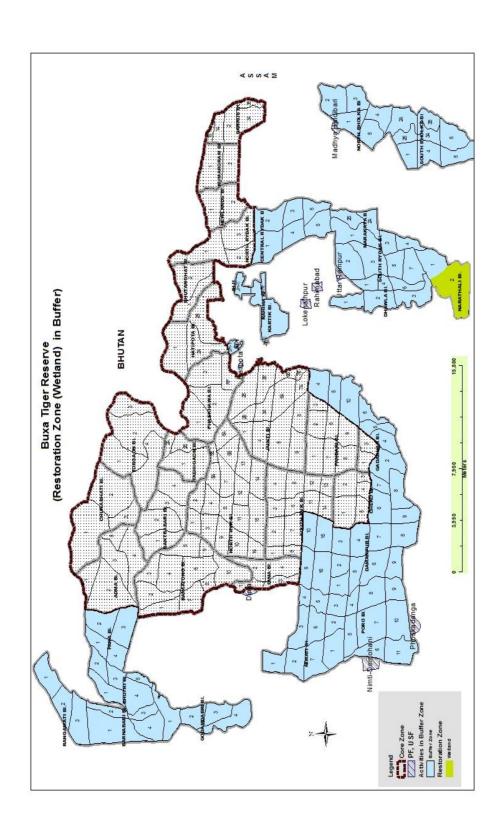


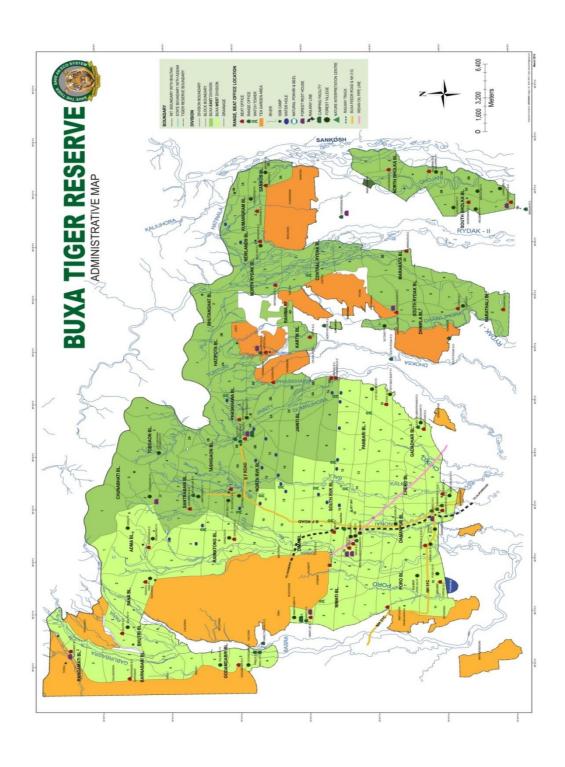












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