CONSERVATION REFERENCE SERIES NO. 7

BRINGING BACK MANAS

Conserving the forest and wildlife of the Bodoland Territorial Council

Eds: Vivek Menon, Rahul Kaul, Ritwick Dutta, NVK Ashraf and Prabal Sarkar

Wildlife Trust of India

10 Years in Service of Nature

Department of Environment & Forests, Government of Assam

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CONTENTS

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MESSAGE

It gives me immense pleasure to know that the Wildlife Trust of India is bringing out a volume called 'Biringing Back Manas' and that it is being released in a function being held aptly in Manas on 24th February, 2008.

The Manas National Park and Tiger Reserve is the pride of Assam with threatened species like the tiger, elephant, one-horned rhino, wild buffalo, pygmy hog, hispid hare, Bengal florican and now the recently re-discovered Manipur bush quail. In addition to the fauna, its unique grassland habitats was sufficient reasons for UNESCO to bring it under the ambit of the world heritage sites – a reason enough for people of Assam and more specifically for the people of this region to feel proud.

Manas suffered in times of strife but now the Assam Government is committed to bringing it back to its former glory. Several initiatives have taken to ensure that this happens but more much more needs to be done.

The compendium brought out by WTI will showcase the joint efforts taken by WTI and the Assam Government and the Bodo Territorial Council and is a welcome edition to the conservation efforts in the area. I congratulate all concerned and hope that this edition will prove useful in enhancing capacity of our managers, researchers and conservationist and boost further conservation efforts in the area.

Sri Kampa Borgoyari
Deputy Chief
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MESSAGE

Bringing back Manas is very close to my heart. This is a cherished treasure of the region and I on behalf of Bodoland Territorial Council invite people to help in its restoration.

The Wildlife Trust of India has been associated in the Bodo Territorial Council area for sometime now and I am extremely happy that they have brought rhino back to the Park among other initiatives in the region which have been compiled into a volume 'Bringing Back Manas'. I am sure that the experiences documented in this volume will go a long way in helping us to improve management in the Park.

The Bodoland Territorial Council is well aware of its responsibilities for the conservation of the forests and wildlife and other natural resources of the region so that our people can enjoy the benefits for much longer. We are striving hard to strike that balance and I am confident that our officers with support of Non-governmental organizations will make this happen.

I do hope that this volume is circulated to the national and international community so that people take note of our efforts and we receive due encouragement and support from all concerned.

10.02.08

Kampa Borgoyari

Preface

Manas National Park had all the epithets that a protected area can dream of. It was a National Park, a tiger reserve and a World Heritage Site as declared by UNESCO. However, it was almost completely stripped of its faunal and floral heritage during a period of civil unrest in the region in the late 80s and early 90s. The park lost almost all its 100 or so rhinos, most of its swamp deer and wild buffaloes and a large number of elephants and tigers along with myriad other creatures during the peak of the poaching period. I was one of the few biologists who visited the park just after the dark years and was struck by its resilience and stark beauty despite the years of damage done to it. To be therefore part of trying to bring back Manas is a dream come true.

The dream had two parts. One was to work with the political establishment of the Bodoland Territorial Council (BTC) to devise a management plan for Manas, for the expansion and resurrection of what was left. The District Council project funded by the British High Commission sought to do just that. The other was to try and re-stock Manas with some of its lost faunal attributes and the IFAW partnered project has succeeded in bringing back rhinos and elephants into the park. By doing this, the project has shown the willingness of the Bodo community to conserve megafauna of the park, demonstrated the ability of the conservation community in rehabilitating orphaned wildlife back into the wild and started the process of bringing Manas back to its former glory.

The crowning glory of the project is the confirmation of the political will to declare Greater Manas. By doing this, the protected area (albeit under two different systems of protection) will virtually double. In this era of degradation of forests and denotification of protected areas, any enhancement of protection is a welcome step. A doubling of a world heritage is nothing but euphoric in nature. This report catalogues over five years of effort by the Wildlife Trust of India in partnership with the Bodoland Territorial Council, the Assam Forest Department, the International Fund for Animal Welfare and the British High Commission to achieve some of these aims. The intent to declare Greater Manas is indeed a fitting end to Phase I of the project.

Vivek Menon
Executive Director

Acknowledgements

The effort to bring back Manas was made possible because of the belief and contribution of a large number of people and organizations. First and foremost, we express our sincere thanks to the Bodoland Territorial Council (BTC) for the necessary support and encouragement to our team. We would like to acknowledge our sincere gratitude to Mr. Hagrama Mohilary, Chief BTC and Mr. Kampa Borgoyari, Deputy Chief BTC for their personal interest and support to rehabilitate the Asian elephant and Greater One-horned rhinoceros in the Manas National Park.

We are thankful to the Ministry of Environment and Forest (MoEF), Government of India, Central Zoo Authority and State Forest Department for allowing us to carry out the conservation activities including the setting up of mobile veterinary service in BTC area. We extend our thanks to Mr. R. P. Katwal (former Addl DGF, MoEF), Dr. R. B. Lal (IGF, MoEF), Mr. Anmol Kumar (DIG Forest, MoEF), Mr. A. N. Prasad (IGF and Director Project Elephant), Dr. Rajesh Gopal (IGF and Director Project Tiger), Mr Pramod Krishnan (AIGF, Wildlife, MoEF), Mr. Dr. B.R. Sharma (Member Secretary CZA), Mr. S. Doley (PCCF, Assam), Mr. M.C. Malakar (Addl. PCCF and Chief Wildlife Warden, Assam), Mr. B.S. Bonal (CF, HQ Assam) and Dr. Gopal Chetry (Reasearch Officer, Assam) for helping us in this regard.

We are grateful to Mr. G.C. Basumatary (Head, Forest & Tourism Department, BTC), Mr. Abhijit Rabha (former Field Director, Manas Tiger Project), Mr. Ritesh Bhattacharjee (former Dy. Director, Manas Tiger Project), Mr. A. Swargiary (Field Director, Manas Tiger Project), Mr. C.R Bhobra (Dy Director, Manas Tiger Project), Mr. R. Boro (DFO, Kachugaon Division), Mr. R. Choudhury (DFO, Haltugaon), Mr. B.N. Patiri (DCF, Chirang), Mrs. Sonali Ghosh (DFO, Social Forestry Division and Wildlife Division, Kokrajhar), Mr. S. Momin (DFO, Mangaldoi Wildlife Division), Mr. H. K. Talukdar (DFO Dhansiri Division), Mr. Mohan Brahma, Mr. L. Ramchiary, Mr. R. Brahma, Mr. R. Brahma, Mr. G. Basumatary, Mr. Amiya Brahma, Mr. Jayanta Deka and other forest officials for their active support and cooperation in the successful implementation of the work.

We would also like to acknowledge the support received from Dr. Anwaruddin Choudhury (former Deputy Commissioner, Baksa District) in WTI's conservation and research efforts.

We would also like to extend our since thanks to Mr. Bishnu Narzary, Mr. Sanjib Brahma, Mr. Hareswar Brahma, Mr. Phulung Brahma and Mr. Subhash Brahma of Discovery Club (Kokrajhar) for successful completion of the forest survey in BTC area, Mr Chandra Kanta Basumatary, Mr Mahendra Basumatry and Mr Thwijangsav Narzary of Manas Maozigendri Ecotourism Society (Lakhwiazar) and ABSU (Lakhwiazar) for their support and assistance in our efforts to rehabilitate Asian elephant and rhino in Manas National Park.

Dr. P.C. Bhattacharjee (Trustee, WTI and Professor, Department of Zoology, Gauhati University, Assam) is the nucleus of all the conservation efforts in BTC and we are thankful to him for his guidance, help and encouragement in all spheres of work, especially during challenging and difficult moments.

Many other people have also contributed significantly in undertaking the conservation efforts in BTC. We express our sincere thanks to Dr. Hillol Jyoti Singha, Mr. N. K. Dey and Mr. Chatrapati Das for their kind help and sharing their information and assisting in undertaking our work. We also express our sincere thanks to Dr. Jihasuo Biswas, Dr. Buddhin Hazarika, Mr. Manna Singh Brahma, Mr. Ashok Bhoral, Mr. Rohen Narzary, Mr. Bimal Narzary, Mr. Ratneshwar Musahary, Mr. Mangal Singh, Mr. Kanak Narzary for their help and active participation in our effort towards reviving Manas.

Our thanks also go out to our present and former colleagues from Wildlife Trust of India, Dr. P.S. Easa (former Director), Mr. Sunil Subba Kyarong (Manager), Mr. Aniruddha Mookerjee (Senior Director), Dr. Joydeep Bose (Manager), Mr. John Kunju Kunju (Executive Assistant), Ms Kadambari Mainkar (Programme Officer), Dr. Prabhat Basumatary, Dr. Prasanta Boro, Dr. Anjan Talukdar, our animal keepers based at Doimari Camp in Manas and Centre for Wildlife Rehabilitation and Conservation (CWRC) for their constant support, advice, encouragement and assistance during the entire period of our conservation effort in BTC and preparation of this report. We are also thankful to Mr. Sudhir Mishra (former legal consultant) for assisting in legal training in Manas.

We wish to thank British High Commission, New Delhi, US Fish and Wildlife Services (USFWS), International Fund for Animal Welfare (IFAW), Oil India and GAIL (India) Limited for their financial support and their role in bringing us closer to the concept of Greater Manas.

Executive Summary

The forests and wildlife of the Bodoland Territorial Council was taken up for conservation. A multi-pronged strategy was put into place which ranged from baseline surveys of wildlife and forests, resource utilization and people's perception of wildlife conservation, to rehabilitation of rhinos and elephants and training frontline staff. All this effort was focussed to bring back Manas to its past glory. Some of the findings and activities were:

1. The Bodoland Territorial Council is an autonomous body created under the sixth schedule of the Indian constitution. It is different from other autonomous tribal councils under the sixth schedule in that the subjects transferred to it are more (40) with a higher degree of autonomy than other territorial councils. It is thus more powerful and thus has a greater responsibility. This needs to be conveyed to the masses through their leadership.

2. The matter of jurisdiction of wildlife is not specified anywhere in the accord but it is assumed that wildlife forms a part of the forest which is a transferred subject and for which the BTC executive has administrative, executive and financial control.

3. The total area of forest under BTC area is 2591 km^2 of which about 670 km^2 is under the Protected Areas and the rest under reserve forests and Unclassed State Forest. Within these, 13 forest types (Champion and Seth, 1968) are found, including the Eastern Sal Forests and Evergreen Forests.

4. About 35% of the total area of Bodoland Territorial Council (BTC) is under agriculture which is followed by grassland (24%). The total area under forest of BTC is 35% of which 14% is dense forest while 11% is open forest.

5. People extract several resources from the forest of which firewood is the major resource (98.84%) followed by timber (85.36%), bamboo (63.78%), grasses (52.22%), cane (1.93%) and medicinal plants (0.77%). Clearly, people's reliance on forest is very high and forest plays a major role to sustain the livelihood of the people of BTC area. This also imposes severe pressures on the forest as over 720,000 metric tonnes per year of firewood is required for the entire population of BTC.

6. Though the majority of people have access to alternate sources of energy (70% of the people have an access to kerosene followed by 38% to electricity, 32% to L.P.G), yet 98.84% of the total people fully depend on firewood. This is because of low price of fire wood, if purchased from the market, or as was observed during the survey extracted free of cost from the protected forest.

7. People were also dependent on the forests for meat. Although most people (84%) consumed fish, some also depended on reptiles (48%), mammals (34%) and birds (4.6%). A proportion of the sample also used the forests to extract honey (13.87%).

8. A survey of mammals and birds in the Ripu, Chirang and parts of Manas Reserve Forests indicated a rich faunal wealth. Over 24 species of mammals and 270 species of birds were recorded during the survey in the area.

9. Significant mammals found include Asian elephant, tiger, golden langur, gaur and the easternmost population of the spotted deer in addition to others. Amongst the birds, significant species were the greater adjutant, four species of hornbill and 12 species of woodpeckers.

10. Main threats to the wildlife of the area is from hunting. Hunters use firearms, arrows and a variety of traps to secure the quarry. Both individual hunters and hunting parties are seen killing wild animals frequently. Similarly, problem of timber extraction at local levels is also acute.

11. On the basis of the key animal and bird distributions in the reserve forests surveyed, two areas, one of 590 km^2 and within the Ripu and Chirang Reserve Forests and the other over 360 km^2 and extending to the easternmost part of the Manas RF are proposed for being candidate areas for increased level of protection of wildlife. This will provide a boost to wildlife conservation in the area by adding to the conservation efforts in Manas NP and also contribute to the concept of 'Greater

Manas' wherein lodged within the Manas landscape are several protected areas.

12. The survey also indicated a lack of awareness on part of the public of BTC area on matters concerning the administration and governance of the forests and wildlife within the area and the responsibilities of the BTC with regard to forest and wildlife conservation.

13. Most people of the BTC felt that human-elephant conflict was most common form of human-animal conflict and most felt that this was as a result of habitat fragmentation and loss.

14. People also felt that the tree felling ban was justified and should be continued although a majority felt that it had not been effective thus far. However, they felt that new laws were not required and better enforcement of the existing laws held the key.

15. Following the rehabilitation of a rhino in February 2006, two more rhino calves were moved from CWRC near Kaziranga National Park to the Rhino Rehabilitation Station in Manas National Park on the 28th of January 2007. All the three rhinos were rescued from the floods in Kaziranga National Park and hand-raised at the centre. This is an effort to bring the rhino back to the Manas National Park.

16. On 23rd February 2007, six Asian elephant (*Elephas maximus*) calves aged between two and a half to six years, were successfully moved from CWRC to the Elephant Reintegration Station in Doimari of Manas National Park. All the calves were orphaned after being swept away by floods or separated from their herd after being trapped in tea estate trenches.

17. In order to improve the standard of patrolling and crime detection, WTI has trained and equipped the staff of the Manas National Park, improving the capacity of the staff to detect and report wildlife related crime.

Fig.1 Rehabilitated elephants(*Elephas maximus*) at the Centre for Widlife Rehabilitation and Conservation, Assam

CHAPTER I

Introduction

Rahul Kaul and Sandeep Kumar Tiwari

The sixth schedule of the constitution provides tribal people of some parts of northeast India a role in designing the development of their land. This is to ensure that the development happened free of external influences or pressures and also in accordance with the local traditions and needs. Forests, being a "transferred" subject to the tribal councils, and bestows considerable responsibilities upon these councils to effect conservation of forests and wildlife within their areas.

Northeast India, comprising the states of Assam, Meghalaya, Manipur, Mizoram, Nagaland, Arunachal Pradesh, Tripura and Sikkim is regarded as one of the 25 Biodiversity Hotspots in the world (Myers *et.al.*, 2000). It is designated as one the important eco-regions i.e. Northeast India-Myanmar forests (Olson & Dinerstein, 1998) and has more than 50% forest cover (Forest Survey of India, 2001). These forests hold major wildlife species like tiger (*Panthera tigris*), Asian elephant (*Elephas maximus*), Greater One-horned rhinoceros (*Rhinoceros unicornis*), leopard, (*Panthera pardus*) clouded leopard (*Neofelis nebulosa*), Takin (*Budorcas taxicolor*), golden langur (*Trachypithecus geei*), slow loris (*Nycticebus bengalensis*) and Phayre's leaf monkey (*Trachypithecus phayeri*) which are on the IUCN Red list of Threatened Animals 2000 (IUCN, 2002).

Societies of this region are pre-dominantly agrarian and their dependence on forests for sustenance and livelihoods is heavy. Being relatively under-developed compared to other regions of the country, opportunities for alternative livelihoods are limited. People's dependence on forests and also on meat (Hilaluddin *et al.*,, 2005) is taking a heavy toll on these natural resources. This is apparently more so after a ban was imposed on the felling of trees, curtailing further, any opportunities to earn livelihoods through timber.

Northeast India also has a typical system of forest management, wherein the local communities manage large areas of forests. This is more so in the states under Schedule VI of the Constitution i.e. Tribal areas of Assam, Meghalaya, Mizoram and Tripura. By virtue of this schedule, the management of all forests other than government reserved forests and Protected Areas are under Autonomous District Councils. The District Councils are constitutional bodies with a large degree of functional autonomy which has its own administrative apparatus for the management of forests. For example in the state of Meghalaya the government controls only 1127. 23 Km^2 of the total of 9312.82 Km^2 forest area which includes the reserve forests, national parks, wildlife sanctuaries and protected areas. The rest is under the jurisdiction of the district councils. In addition, the local communities also have their traditional customary laws, which work in conjunction with the laws made by the district councils.

Although the district councils have laws to manage the forests, there appears to be no mechanism within the district councils for the protection of wildlife. The nature of forest management in the northeast India is quite different from the rest of the country and involves people down to the village levels in determining the land use. However, the status vis-à-vis wildlife conservation as a subject matter within the district councils appears vague and without any mention. The state is effecting wildlife protection within the national

parks, wildlife sanctuaries and reserve forests under their custody but who protect wildlife within the jurisdiction of the district council?. Further, do the present laws and also the resources at their disposal allow the district councils to take the steps necessary for initiating and achieving wildlife conservation and if they do, do the district councils have the capacity and the infrastructure to undertake all this? These are some of the questions we wanted answers to when we initiated this project.

It was imperative therefore that these doubts are cleared so that a roadmap for initiation of conservation activities in the district councils could be charted. A full review of the prevailing laws and their origins was conducted. This also involved meeting with members of the executive council in an effort to understand their views on the subject and also the constraints they faced in initiating wildlife conservation in their respective areas. There were also certain issues with the central laws on forests and wildlife and their applicability in the district councils. In the case of the Bodoland Territorial Council (BTC), the nomenclature used was different from that of an 'Autonomous District Council as in Garo Hills or the 'Autonomous Council' as in Karbi-Anglong. Was this a difference in nomenclature only or did this imply differences in the way each functioned and how these then translated to initiating and achieving conservation needed to be clarified.

We initiated work in the BTC with three pre-conceived activities. i) It was important to know the state of forests in Bodoland Territorial Council and thus maps were generated using satellite images which were then ground truthed. This provided us a distribution of the forest resources within the BTC and the extent of different types of forests available. ii) We also wanted to know how dependent the local people were on the forest resources and a questionnaire survey was conducted covering the whole of the BTC area to address issues of energy, wildmeat, incomes etc. iii) We studied peoples perception on the issues of wildlife conservation and governance so that these could be communicated to the community leaders and policymakers. For this also a questionnaire survey was undertaken.

However, as we got involved more with the project, it became apparent that there were more issues that required work. At the instance of the BTC, we undertook a wildlife survey with the purpose of identifying rich faunal areas to propose them for increased protection.

Following were the main activities undertaken in the BTC area:

- Meeting with the Executive committee members of the Bodo Territorial Council to apprise them about the purpose of the project.
- Surveys to collect data on resource utilization and peoples' perception.
- Meeting with the Members and the forest department of BTC to present findings of the surveys.
- Planning meetings for the wildlife survey.
- Exposure trips to wildlife sanctuaries managed for tourism in East Africa to explore possibility of replicating such models in BTC area.
- Equipping volunteers of Maozigandri and training them in crime detection.
- Presentation of the findings of the wildlife survey report and the proposals for consideration of creating additional sanctuaries in BTC.

This compilation comprises chapters dealing with all the above and additionally on the rescue and rehabilitation activities we have undertaken in the area. The second chapter deals in detail with trying to understand the powers of the BTC in the administration of its wildlife thereby bringing into discussion, provisions of all the central acts like the Wildlife (Protection) Act, the Forest Conservation Act and the Bio-diversity Act. This section also makes references to certain landmark decisions affecting forest conservation and their possible impacts on conservation in the region.

The next section deals with the surveys on forest availability through forest type and land use maps generated from satellite images. This section provides an insight into the extent of forests left and their distribution. This is well complemented by the chapter on wildlife surveys in three districts of BTC where in addition to the distribution of mammals, density values of each forest type are provided. The chapter also provides distribution on birds which is useful if eco-tourism activities need to be promoted in the region. (This chapter also makes recommendations for creation of two new protected areas and identified and maps the areas). The resource extraction chapter deals how forest resources are utilized by local people and how dependent they are on the forests. The concept of Greater Manas is discussed in Chapter VII.

The joint partnership between WTI, the Bodoland Territorial Council and the British High Commission, who provided financial assistance for this project, has made an effort to nurture the rich conservation traditions of the Bodos. This is a small step in achieving sustainable conservation practices in the region and many more steps need to be taken to make this happen.

Fig.2 Vivek Menon (centre left) Executive Director-WTI in a meeting with Shri Kampa Borgoyari, Deputy Chief, BTC and members of Bodoland Territorial Council

Fig.3 A wild Asian elephant (*Elephas maximus*) attempts to cross the Beki river

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CHAPTER II

Forest and wildlife conservation in Bodoland Territorial Council: A policy analysis

Ritwick Dutta

Introduction

In 1996, the Supreme Court of India suspended the felling of all trees from all forests across the country and specifically in the North East. The Supreme Court clarified that the order would be applicable to all forests irrespective of ownership and classification and that it would also apply to forests under the Control and management of the District Councils [hence it also includes Bodoland Territorial Council]. The Supreme Court's order had far reaching implications on the management of forests by the BTC and perhaps for the first time, attention was focused on the role played by the BTC in the management of forests. For many observers and even ecologists, it was a surprise that vast areas of forests were not under the control of the forest departments of the State Governments but rather vested with tribal bodies, communities as well as individuals.

The Supreme Court's order met with mixed reaction. It did, however, raise fundamental questions about the nature in which the forests were being managed by BTC. An offshoot of this order was that if there was lack of management of forests, what was the condition of 'wildlife' since even the Supreme Court order did not cover the crucial aspect of wildlife conservation, though one can argue that if forests are adequately protected, the wildlife will also be protected.

It is ironic that despite, large areas of forests being under the control of BTC, the Constitutional and Legal framework does not provide any role for the BTC in the protection and conservation of wildlife. Initially, the need might not have been felt since national parks and sanctuaries were outside the control of BTC. The situation changed with the signing of the Bodo accord wherein complete executive powers with respect to the subject entrusted were transferred to BTC. Thus even national parks and sanctuaries may be managed and controlled by the BTC.

However, despite this Constitutional reality, legal and administrative policies have failed to focus on this crucial role of BTC and seem to proceed with the assumption that all lands are managed by the State Governments. Different policies and action plans such as the National Wildlife Action Plan , 2002 also makes no mention of the role of BTC despite the fact that some of the most important wildlife sanctuaries, national parks as well as tiger reserves are under its control. Recent amendments in the Wildlife Act have provided greater space for NGOs, Communities and Members of legislature but unfortunately provide no direct role for BTC or other Councils.

The aim of the present work is to identify gaps in the existing conservation laws and policies in order to ensure a meaningful and effective role for BTC. The aim is to provide specific areas of concern which need to be addressed through policy, legal and administrative changes.

The present study aims at the following:

- Outline the gaps in existing laws with respect to the role and responsibility of the BTC in conservation of wildlife and forests.
- Share the experiences of the BTC in managing forests and wildlife.
- To identify as to whether there is any 'role' envisaged in law and policy for the BTC and especially in the Wildlife (Protection) Act, 1972, the Forest (Conservation) Act, 1980 and the Biological Diversity Act, 2002.
- To make recommendation for changes within the existing laws and policies or to make use of existing spaces so that the purpose of wildlife conservation is achieved.

The purpose of the study is not to make a wish list of all which is desirable but rather a realistic suggestion which is reasonably achievable within the existing political, administrative and constitutional framework.

A. From district councils to territorial council

The District Councils are a creation of the Constitution. It is peculiar to the Sixth Schedule of the Constitution and has no parallel in any other provisions including the Fifth Schedule which concerns the Tribal areas in regions excluding the North East. The Sixth Schedule has been termed as a "Constitution within a Constitution". There were lengthy debates in the Constituent Assembly when the question of providing a proper constitutional set up for the tribal areas of North East was debated. A Sub Committee headed by Shri Gopinath Bordoloi, the Premier of Assam was formed on 27th February, 1947. The Committee made field visits to different parts of Assam and once the report was laid before the Constituent Assembly, serious opinions were expressed both for and against the need for autonomous councils. According to Dr. Ambedkar, the Chairman of the Constituent Assembly, the tribal people of Assam differed from the tribals in other other areas. Their laws of inheritance, laws of marriages, custom etc were quite different from that of the Hindus. He felt that the position of the tribals in Assam was somewhat analogous to that of the Red Indians in the United States who are a Republic by themselves in that Country and were regarded as a separate and independent people. He agreed that Regional and District Councils have been created on the lines which were adopted by the United States for the purpose of the Red Indians.

Originally, the Constitution provided only for District Councils in the Tribal States of the North East. However, over time a need was felt for greater autonomy and this led to the change of the 'Bodo Autonomous Council' to 'Bodo Territorial Council. On 13.02.2002 State Cabinet formally approved the formation of the Bodoland Territorial Council (BTC) under the Sixth Schedule of the Constitution of India. Along with the change in name, the Bodo Territorial Council was also conferred additional powers on a range of subjects and was called "a Territorial Council" by virtue of the Constitutional (Amendment) Act, 2003. Thus at present the following situation exists with respect to the Sixth Schedule:

Fig.4 Vivek Menon, Executive Director and Kampa Borgoyari, Dy. Chief, BTC inspecting the guard of honor at Manas, NP

(Note: for a sake of uniformity, in this work a common word "Tribal Council" is being used for Autonomous Councils, Autonomous District Councils or Territorial Councils)

- Within the Bodo area of Assam, a "Territorial Council" was created with powers to make laws for forty subjects. By virtue of the accord, the territorial councils have executive, administrative and financial powers in respect of the subjects entrusted to it.

B. Conservation laws and Bodoland Territorial Council

The conservation laws of India are essentially a post independence development. Although there were a range of laws on forests as well as wildlife, there were none that dealt in a holistic way, with the issue of conservation and protection of the natural ecosystem. The enactment of the Wildlife (Protection) Act, 1972 ('Wildlife Act' for short) was the first important milestone in the development of conservation laws in India, when for the first time, a comprehensive law to provide for protection of wildlife on a national level was enacted. The enactment of the Wildlife Act reflected a strong commitment and willingness on the part of the political leadership to deal with a crisis which had emerged in the country after Independence due to lack of regulation of hunting as well as well as a breakdown of customary and traditional norms under the influence of both democracy as well as the growing level of industrialization.

From 1972 to the next two decades there were significant legal developments in the field of forests and wildlife. The Forest (Conservation) Act, 1980 was enacted which aimed to regulate the diversion of forest land for non forest activity. The Environment (Protection) Act, 1986 was enacted to deal with a range of environmental issues. In 2002, the Biological Diversity Act, 2002 was enacted which provided not just for conservation but also for sustainable use as well as benefit sharing of the biological resources. An interesting point that emerges after perusal of these laws, is that although Municipal bodies, Panchayats and even NGOs have important role in the implementation of these laws, the very mention of District Council is not evident. The legal regime seems to have been based on the model of Central, State as well as local bodies which are mostly confined to Panchayats. This omission in the original law as well as subsequent amendments seriously undermines the importance as well as powers and functions conferred on the Tribal Councils.

Since 1996, the Supreme Court has played a major role in ensuring that the laws enacted for the protection of forests and wildlife are implemented in letter and spirit. This was possible due to two significant cases *viz. The Centre for Environmental Law Vs Union of India (W.P (c) 202 of 1995* and the *T. N Godavarman Thirumulpad Vs Union of India. (W.P (c) No 202 of 1995)*.Significantly, the Supreme Court recognized the importance as well as the crucial role played by the Tribal Councils and clarified in its order that in respect of its orders passed with respect to the protection of forests the word 'State Government' will include 'District Councils'.[1]

A perusal of the provisions of the different Conservation as well as natural resources law vis-à-vis the role of the BTC will revel gap areas which need to be addressed and at the same time identify areas where the BTC can play a role in protecting forests and wildlife within the framework of the existing laws. This section also focuses on the role BTC in creation of Protected Areas.

Wildlife (Protection) Act, 1972

The Wildlife (Protection) Act, 1972 was enacted initially for the purpose of protecting wild animal and birds. The scope changed over time and is now much wider, ensuring the environmental and ecological security of the country. Unfortunately, despite the wider scope, the protection remains mostly concentrated in Protected Areas i.e. national parks and sanctuaries and its scope for protection of wildlife outside the Protected Areas remains extremely limited.

The Wildlife Act has been amended several times, the most recent being in 2006. New Authorities and Boards have been set up and new categories of Protected Areas such as Community Reserves and Conservation Reserves have been included. However, there is no direct mention of BTC in any of the recent amendments.

'Wildlife' occupies a rather anomalous position with respect to the BTC. Originally 'Wildlife' did not exist as a subject either in the state list or the concurrent list and therefore the lack of mention of 'Wildlife' in the list of subjects over which the BTC could make laws was understandable. However, the 42nd Amendment of the Constitution led to the insertion of 'Wildlife' as item 17 A in List III of the Constitution i.e a subject on which both the Centre and the State could legislate. Yet, no specific changes were made in the provisions of the Sixth

[1]Order dated 15-1-1998: T.N Godavarman Thirmulpad Vs Union of India

schedule to accommodate these changes and thus it came to be understood that the BTC had no role vis-à-vis wildlife. The subsequent amendments to the Sixth Schedule as well as changing nature of Autonomy of the Tribal Council in the case of Bodo Councils also focus on 'Forest' as subject on which the Tribal Councils have legislative, administrative and executive functions. 'Wildlife' does not find an exclusive mention in any of the accords signed nor were they issues in any memorandum of Settlement. A government clarification through a simple amendment on this aspect would greatly help in clearing the anomalous situation.

BTC has never enacted any laws to protect wildlife since they have been constitutionally given the power to make laws with regard to forests only. The non-entrustment of the power to make laws by BTC for the protection of wildlife in the Sixth Schedule by the Constitution makers can be explained by the fact that when the Constitution was enacted there was hardly any knowledge or awareness about the 'value' of wildlife. However, it is unfortunate that even after the enactment of the Wildlife (Protection) Act, 1972, no amendment has taken place to allow the District Council to make laws with regard to the protection of the wildlife. Also the various Government policies, projects and legislation with regard to wildlife have simply assumed that most of the forest lands and wildlife habitat in the country is under the control of the State Forest Department and has overlooked the unique circumstances prevailing in the North Eastern region.

The analysis of the Wildlife Act is being done vis-à-vis BTC in three respects:

- The Role of BTC in the different authorities and bodies such as the State Board for Wildlife and National Board for Wildlife;
- The BTC and its relation with the Chief Wildlife Warden;
- The role of BTC in the creation of Protected Areas viz. National Parks, Sanctuaries, Conservation Reserve and Community Reserve.

Authorities and boards

State Board For Wildlife

Sec. 6 of WPA, 1972, provides for the provision to constitute State Board for Wildlife with the following duties to perform:-

(a) In the selection and management of areas to be declared as protected areas;
(b) In formulation of the policy of protection and conservation of Wildlife and specified plants;
(c) In any matter relating to any schedule; In relation to the measures to be taken for harmonizing the needs of the tribals and other dwellers of the forest with the protection and conservation of wildlife; and
(d) In any matter that may be referred to it's by the state government

SCOPE: State Board of Wildlife has got crucial responsibilities regarding creation, management and protection with respect to protected areas. The State Board comprises over twenty members including members of Legislative Assembly as well as NGOs. However, no representation either in the form of elected members of the Tribal Councils or of officers of the Tribal councils are mentioned. Given, the pivotal role of the Tribal Councils in respect of Bodo Territorial Council specially in respect of administration of National Parks, Tiger Reserves and Sanctuaries under their control, the representatives from BTC should be included not only with a view to ensure representation in the board but also with a view to fulfill the Constitutional scheme.

Fig.5 An anti-poaching camp at Kuribeel, Manas NP, used as rhino rehabilitation station

National board for wildlife

The Indian Board for Wildlife (IBWL) was the predecessor of the National Board for Wildlife.

However, the crucial and most significant difference is the fact that while the NBWL is a statutory board, the IBWL was not. The NBWL headed by the Prime Minister has vast powers, the most significant being the power to alter the boundaries of National Parks and Sanctuaries. Like the SBWL, the NBWL also has wide representation from different sectors. Unfortunately, no mention is made of the BTC.

The chief wildlife warden

Under the provisions of the Wildlife Act, the Chief Wildlife Warden (CWLW) is a crucial authority. By virtue of Section 33, the 'Chief Wildlife Warden shall be the authority who shall control, manage and maintain all sanctuaries. A plain reading of this section seems to imply that the powers under Section 33 can be exercised only by the CWLW and nobody else. However, Section 5 allows for the delegation of all powers (except powers under Section 11 (1) (a) which deals with hunting of Schedule I Species) by the CWLW with the approval of the State Government. Thus, the authority to control and manage Sanctuaries and National Parks and other protected areas can be delegated by the CWLW to the concerned functionaries of the BTC. This is relevant because the 'Forest' as a whole is entrusted to the BTC. Further, sub section (3) of Section 5 provides that in situations wherein the powers of Chief Wildlife Warden are delegated, then the person so authorized will exercise those powers in the same manner and to the same effect as if they have been conferred the power directly and not by way of delegation.

One aspect on which the Chief Wildlife Warden will continue to exercise control over BTC areas is in the respect of permission for hunting under Section 11 (1) (a) of the Wildlife Act for species listed in Schedule I of the Act in exceptional circumstances i.e when the wild animal is diseased or disabled so as to be beyond recovery or has become a danger to human life. Thus despite the legal as well as Constitutional provision providing for delegation of administrative and executive functions, the role of the CWLW in Bodo Territorial Council is predominant.

Creating protected areas in Bodoland Territorial Council

Conservation Reserve

Purpose

Protection of landscapes, seascapes, flora and fauna and their habitat particularly:

(i) Those adjacent to National Parks and Sanctuaries. And;

(ii) Also areas that link one Protected Area with another.

"Protected area" has been defined in the Act to mean a National Park, a Sanctuary, a conservation reserve or a community reserve notified under Section 18, 35, 36 A and 36 C of the Act.

In the selection of an area as a Conservation Reserve, the choice is not to be exclusively limited to those areas which meet the above criteria but also other areas.

Statutory Provision

Section 36 A of the Wildlife (Protection) Act, 1972 as amended in 2002.

Power to declare conservation reserve

State Government has been vested with the power to declare areas as Conservation Reserves. [Section 36 A]. No corresponding power has been vested either on the Central Government (as is the case of National Parks or Sanctuaries) or any other authorities. However, if the land in question is owned by the Central Government, the prior *concurrence* of the Central government has to be obtained by the State Government before making any declaration. Since the executive power with respect to 'Forests' is vested with the BTC, in such a situation a declaration should be made by BTC since declaration of a Conservation Reserve is an executive function and not a legislative function. Even so by virtue of the Bodo accord signed, the executive function of the State stands delegated to the BTC. Thus, BTC are very much within their rights to declare Conservation Reserves.

Fig.6 Forest guard at Doimari, Manas NP, Assam

Criteria to be followed in declaring an area as Conservation Reserve

- The land proposed to be declared must be owned by either the State Government or the Central Government.
- A Single notification has to be issued specifying as nearly as possible the situation and limits of such area. It shall be sufficient to describe the area by road, rivers, ridges and other well know or readily intelligible boundaries.
- Unlike a Sanctuary (other than those created out of Reserve Forests and Territorial Waters) and a National Park, no detailed procedure is stipulated for the declaration of a Conservation Reserve.
- *Prior approval* of the Central Government will be required if the land in question is owned by the Central Government.
- In selection of areas as Conservation Reserve, priority has to be accorded to:
  (a) Areas adjacent to National Parks and Sanctuaries.
  (b) Areas that link one protected area with another.
- *Consultation* with local communities.
- Setting up of Conservation Reserve Management Committee (CRMC) for the respective Conservation Reserve for the purposes of advising the Chief Wildlife Warden for conservation, management and maintenance of that Conservation Reserve.

Rights of local communities

Since the land to be declared as Community reserve has to be Government owned land, the nature and extent of pre existing rights will be subject to the restrictions as are applicable to a Conservation Reserve. The WPA does not envisage the setting up of Conservation Reserve in private or community land.

Nature of restriction after declaration of an area as a conservation reserve

The nature of restrictions is similar to that of a Sanctuary. Every person shall, so long as he resides in Conservation Reserve be bound [as far as may be] abide by the following:

a) to prevent the commission, in the Conservation Reserve, of an offence against this Act;
b) where there is reason to believe that any such offence against this Act has been committed in such Conservation Reserve, to help in discovering and arresting the offender;
c) to report the death of any wild animal and to safeguard its remains until the Chief Wild Life Warden or the authorized officer takes charge thereof;
d) to extinguish any fire in such Conservation Reserve of which he has knowledge or information and to prevent from spreading, by any lawful means in his power, any fire within the vicinity of such Conservation Reserve of which he has knowledge or information;
e) to assist any Forest Officer, Chief Wildlife Warden, Wildlife Warden or Police Officer demanding his aid for preventing the commission of any offence against this Act or in the investigation of any such offence.
f) No person shall, with intent to cause damage to any boundary-mark of a Conservation Reserve or to cause wrongful gain as defined in the Indian Penal Code, 1860 (45 of 1860), alter, destroy, move or deface such boundary-mark.
g) No person shall tease or molest any wild animal or litter the grounds of Conservation Reserve.
h) Causing fire prohibited - No person shall set fire to a sanctuary, or kindle any fire, or leave any fire burning, in a sanctuary, in such manner as to endanger such sanctuary.
i) Ban on use of injurious substances. - No person shall use, in a Conservation reserve, chemicals, explosives or any other substances which may cause injury to or endanger, any wild life in such sanctuary.

Management and administration of conservation reserve

The management and administration of the Conservation Reserve vests in the Chief Wildlife Warden. A Conservation Reserve Management Committee (CRMC) has to be constituted for each Conservation Reserve. The task of the CRMC is to *advise* the Chief Wildlife Warden with respect to the following functions with respect to the Conservation Reserve:

- Conservation; Management; and Maintenance.

The function of the CRMC is thus *advisory* in nature.

Composition of the CRMC

- One representative of each Village Panchayat where the Conservation Reserve is located.
- Three representatives of NGOs working in the field of Wildlife Conservation.
- One representative from the Department of Agriculture.
- One representative from the Department of Animal Husbandry.

- One representative of the Forest or Wildlife Department.
- The representative of the Forest or Wildlife department shall function as the Member Secretary of the Committee.

Duties of the Chief Wildlife Warden (CWW)

The CWLW on the *advice* of the CRMC will conserve, manage and maintain the Conservation Reserve.

The CWLW (On the advice of the CRMC) shall take such steps to ensure the security of wild animals in the Conservation Reserve and the preservation of the sanctuary and wildlife, as he may consider necessary for the improvement of any habitat.

Procedure for alteration of boundaries

No procedure has been stipulated in the WPA. However, the provisions of the Forest (Conservation) Act, 1980, will be applicable if any non forest use is contemplated.

Comments and notes

Conservation Reserve has been introduced as a new category of protected area in the WPA, through the amendment in 2002. The statement of Objects and Reasons of the Amendment Act, 2002 states that "Conservation Reserve" would be an area, owned by the State Government adjacent to National Parks and Sanctuaries…." The statutory provision however does not restrict it only to these categories and includes wider categories of areas. Conservation Areas more or less follows the legal regimes as are applicable to National Parks and Sanctuaries. Although, a representative body in the form of a Conservation Reserve Management Committee is established under the WPA, it's role is essentially advisory and the final authority still rests with the Chief Wildlife Warden of the State Government. The WPA envisages declaration of only government owned areas as Conservation Reserves and this in terms restricts the applicability of this PA category.

The process of declaration is relatively simple, mainly due to the fact that the land in question is government owned. The WPA does not however provide for any system of inquiry and settlement nor compensation for those who depend on such government owned land and there is no procedure for the proclamation as is followed in the declaration of a sanctuary or national park. A single government notification results in the declaration of a Conservation Reserve and in that respect follows the procedure of declaration of sanctuary out of an area comprised of a reserve forests.

Conservation reserves and Bodoland Territorial Council

The moot question is whether the Conservation Reserve is a viable option for BTC? It can be stated that broadly, the problem is that there seems to an excessive emphasis on the role of the Chief Wildlife Warden which can be in conflict with the 'autonomous' character of BTC. However, the ease of declaration and simplicity of legal procedures in comparison to conventional national parks and sanctuaries are positive factors. The fact that the powers and functions of the CWLW can be delegated if the need is felt can help to resolve the issue with respect to any fear of usurpation of the powers of BTC. As on date, no Conservation Reserve have been declared by BTC and therefore remains an option that needs to be explored specially in context of reserved forests as well as other government owned areas which serve as important habitats of wildlife or even serve as corridors for wildlife.

Community Reserve (Section 36 (C))

Purpose

Protecting fauna, flora and the traditional or cultural conservation values and practices in situations where either an individual or the community has volunteered to conserve wildlife and its habitat in areas that are not within any category of protected areas or government owned land.

Statutory Provision

Section 36 C of the Wildlife (Protection) Act, 1972 as amended in 2003.

Power to declare community reserve

State government has been vested with the power to declare areas as Conservation Reserves. [Section 36 A]. Neither can the central government nor can any other authority including the local community by themselves declare an area as a community reserve. However, since in most instances by virtue of accords signed as well as the provisions of the Sixth Schedule, the executive power extends to the subjects entrusted, the Tribal Councils have power to declare Community Reserves.

Criteria to be followed in declaring an area as community reserve

- The land proposed to be declared must be either a community owned land or under private ownership.
- The land should not be a part of a national park, sanctuary or a conservation reserve.
- The community or an individual should have *volunteered to* conserve wildlife and its habitat.
- A notification has to be issued specifying as nearly as possible the situation and limits of such area. It shall be sufficient to describe the area by road, rivers, ridges and other well know or readily intelligible boundaries.
- A Community Reserve Management Committee has to be constituted by the State Government.

Management and administration of community reserve

CRMC shall be the authority that shall be responsible for conserving, maintaining and managing the community reserve. Unlike the conservation reserve, it is not the CWLW who manages the community reserve rather it is the CRMC. The role of the CRMC is thus not just advisory.

Composition of the CRMC

- Five Representatives nominated by the Village Panchayat
- In the situation where no Village Panchayat exists the five representatives are to be nominated by the Gram Sabha.
- One representative of the forest or wildlife department under whose jurisdiction the community reserve is located.

Function of CRMC

- CRMC shall be the authority that shall be responsible for conserving, maintaining and managing the community reserve.
- Preparation of management plan for the community reserve
- Implementation of the management plan for the Community Reserve.

Nature of restriction after declaration of an area as a community reserve

The nature of restrictions is similar to that of a sanctuary. It is stated that every person shall, so long as he resides in community reserve be bound [as far as may be] to follow the restrictions as stipulated for Sanctuaries under the Wildlife Act. It is pertinent to point out that it is clearly mentioned that the above

Fig.7 Golden langurs (*Trachypithecus geei*) at Ultapani, Greater Manas, Assam

provisions shall *"as far as may be apply to a community reserve as they apply in relation to a sanctuary"*. It is therefore important to remember that all these restrictions will not automatically extend to a community reserve.

Procedure for alteration of boundaries and other changes

After the issue of the notification constituting an area as a community reserve any change in the land use pattern of the reserve will require the following procedure

- A resolution to that effect has to be passed by the CRMC.
- The state government approval to the said resolution passed by the CRMC.

Notes and comments

The statement of objects and reasons of the Amendment Act, 2002 states that the state governments are empowered to declare areas which are under private or community ownership as community reserve provided the members of the community or individuals concerned are agreeable to offer such areas for protecting the wildlife together with the associated traditions, cultures and practices. The declaration of the community reserve involves one single notification. Unlike a conservation reserve, no change in land use is permitted once a notification has been issued under Section 36 C (1) of the WPA. However, similar to the case of conservation reserve, no legal provision exists for the denotification or alteration of the boundaries of the community reserve. Although, some restrictions as are applicable to sanctuaries are also applicable in a community reserve, the exact nature will depend on the guidelines and other working rules that will be prepared by the CRMC. Unfortunately, despite more than five years having passed since the amendment act has come into force, no guidelines have been issued thus rendering the provisions largely redundant. The community reserve has the potential to be more socially acceptable since it is not expected that the restrictions which are applicable to a sanctuary will also be applicable to a community reserve, since the essential purpose of community reserve is not just the protection of wild flora and fauna but also to preserve the traditional conservation values and practices. As such, community reserves are not envisaged as a "No-Use Zone" rather as stated in the "Objects and Reasons": areas which are to be managed on the principles of sustainable utilization of forest produce. The community reserve is a viable option for areas important from the viewpoint of wildlife and where the community is willing to part with its land such as the Nokma and Akhing land in the Garo hills of Meghalaya. However, a uniformly composed Community Reserve Management Committee may not be suited for all local cultural and political situations. It is thus of utmost importance that the Wildlife Act provides for spaces for local level indigenous institutions to function as basic units for wildlife governance rather than imposing a structure which might be out of tune with the ground realities.

Judicial orders and its implication

In addition to the statutory laws, decisions of the Supreme Court also determine the management and administration of protected areas. The most significant of all the orders related to national park and sanctuaries is the order dated 14/02/2000 in W.P 202 of 1995 wherein the Supreme Court restrained the state governments from ordering the removal of dead, deceased, dying or wind fallen trees, drift wood and grasses etc from any national park or sanctuary. It also stated that that if any order to the contrary had already been passed, the operation of the same would be stayed.

The Central Empowered Committee in its letter dated 2nd July 2004 explained that this provision includes:

- activities such as grazing
- and collection of NTFP from protected areas.

The MoEF through a circular issued to the State Governments further clarified that all rights, privileges and concessions in national parks & sanctuaries must also cease.

The Supreme Court by its order dated 25th November 2005 clarified that activities which are undertaken as per approved management plan and are consistent with the provisions of the Wildlife Protection Act, 1972 & The National Wildlife Action Plan as well as other such guidelines issued from time to time were permissible in respect of national park and sanctuaries. These restrictions come into play even if final notification for the national park and sanctuary has not taken place.

It has to be empirically checked as to the ground level situation with respect to protected areas in the State of Meghalaya and Assam specifically in the context of the pre and post 14/02/2000 order. Existing information does not reveal much difference in the situation although it needs to be more carefully verified.

Recently, Supreme Court by its order dated 14.9.2007 further clarified that the following activities are also permitted:-

(i) laying of underground drinking water pipelines up to inch diameter;
(ii) laying of 11 KV distribution lines for supply of electricity to rural areas;
(iii) laying of telephone lines or optical fiber for providing communication facilities in rural areas;
(iv) wells, hand pumps, small water tanks etc. for providing drinking water facilities to villagers, who are yet to be relocated from the protected area.

In addition to the above, the Anganwadis, government schools and government dispensaries which are essential for the inhabitants of people who are nearer to these forest areas shall continue and the government may carry out construction activities in the forest area for the said purposes without there being any cutting or falling of trees.

They further stated that following activities were expressly prohibited:-

(i) felling of trees and their removal;
(ii) removal of bamboo or grasses for any purpose whatsoever;
(iii) removal of corals and other living forms from marine national parks/sanctuaries;
(iv) construction of tourist complexes, hotels and restaurants, zoos and safari parks or any other building not for direct use for protection and management of wildlife and its habitat; and other non-forest activities.

Biological Diversity Act, 2002

The Biological Diversity Act, 2002 (the "BDA" for short) has been enacted with the objective of conservation of Biological Diversity, sustainable use of its components and fair and equitable sharing of the benefits arising out of the use of biological resources and knowledge. The BDA is unlike the Wildlife Act for it recognizes the important role of local bodies in the implementation of the Act.

BTC has wide scope in execution and implementation of various provisions of Biological Diversity Act, 2002. They come under the purview of the term 'local bodies'; which has a major role in implementation of the provisions of said Act.

Fig.8 Shiva worship, Ultapani, Greater Manas, Assam

According to Sec. 2(h) 'local bodies' means Panchayats and Municipalities, by whatever name called, within the meaning of clause (1) of article 243B and clause (1) of article 243Q of the Constitution and in the absence of any Panchayats or Municipalities, institutions of self-government. Since, BTC comes under the purview of 'institutions of self- government constituted under any other provision of the Constitution or any Central Act or State Act'; it fulfills the definition of 'local bodies' hence it can be covered under the Biological Diversity Act, 2002.

Unfortunately, the Biological Diversity Act, 2002 has not been implemented by any of the Tribal Council, whether of the Khasi, Garo, Karbi as well as Bodo, despite these areas being biodiversity hotspot.

National Biodiversity Fund

In chapter VII Finance, Accounts and Audit of National Biodiversity Authority, Sec. 27 deals with Constitution of National Biodiversity Fund.

As per Sec 27 (2), the fund shall be applied for:-

(a) channeling benefits to the benefit claimers;
(b) conservation and promotion of biological resources and development of areas from where such biological resources or knowledge associated thereto has been accessed;
(c) Socio-economic development of areas referred to in clause (b) in consultation with the local bodies concerned.

SCOPE: Sec 3(1) of the Sixth Schedule empowers BTC to make laws with respect to, the management of any forest apart from reserve forest. The management of forest also includes 'conservation and promotion of biological resources'. BTC is also responsible for the socio-economic development of the area, so the National Biodiversity Authority should disburse the National Biodiversity Fund in consultation with them.

State Biodiversity Fund

Similarly, in Chapter VIII Finance, Accounts and Audits of State Biodiversity Board, Sec 32 deals with the Constitution of State Biodiversity Fund.

As per Sec.32 (2) The State Biodiversity Fund shall be applied for-

(a) the management and conservation of heritage sites;
(b) compensating or rehabilitating any section of the people economically affected by notification under sub-section (1) of section 37;
(c) conservation and promotion of biological resources;
(d) socio-economic development of areas from where such biological resources or knowledge associated thereto has been accessed subject to any order made under section 24, in consultation with the local bodies concerned;
(e) meeting the expenses incurred for purposes authorized by this Act.

SCOPE:

BTC being a local body, here also State Biodiversity Board should disburse its State Biodiversity Fund in consultation with them.

Biodiversity Heritage Sites

The State Government, in consultation with the local bodies can notify in the official gazette, the areas of biodiversity importance as biodiversity heritage sites. (SEC.37 (1))

Purpose

Conservation and protection of areas of biodiversity importance. Biodiversity is defined as:

"Biological diversity means the variability among living organisms from all sources and the ecological complexes of which they are a part and includes diversity within species or between species and of ecosystems"

Statutory Provision

Section 37 of the Biological Diversity Act, 2002
Power to declare biodiversity heritage sites :

State Government has been vested with the power to declare areas as Biodiversity Heritage Sites.

Criteria to be followed in declaring an Area as Biodiversity Heritage Site

- The areas should be important in terms of biodiversity.
- Consultation with local bodies. Local bodies refers to Panchayat and Municipalities, by whatever name called, within the meaning of Clause (1) of article 243-B and clause (1) of article 243 Q of the Constitution and in the absence of any Panchayat or Municipalities, institutions of self government constituted under any other provision of the Constitution or any Central Act or State Act.
- After consultation, a Notification in the Official Gazette specifying the limits and extent of the area.

[2]Hills Syndicate v. North Cachar Hills Autonomous Council, AIR 2001 Gau 83.

Fig.9 Legal policy meeting in progress (from left: HK Talukdar, DFO Dhansiri FD Udalguri, Ritwick Dutta, WTI Legal Consultant, Rahul Kaul, Director Conservation, Sandeep Kumar Tiwari, Manager-Wild Lands, GC Basumatari, Head-Tourism & Forest, BTC, and R Choudhury, DFO Haltugaon)

Management and administration of the heritage sites

The management of the Biodiversity Heritage sites *may* be done as per rules framed by the State Government in consultation with the Central Government.

Notes and comments

The BDA, does not provide for an elaborate process for the declaration of an area as a Biodiversity Heritage Site. A notification is to be issued only after consultation with the local communities. Thus a Single Notification is required for designating the Biodiversity Heritage Site.

Power of central government to notify threatened species

Chapter IX deals with Duties of the Central and State Government. The Sec. 38 of the Act provides power to Central Government, to take all the necessary steps to preserve species by notifying them as a threatened species.

SCOPE: The Central Government takes steps in consultation with the concerned State Government. Since, the local bodies like BTC are involved in preservation and management of biological resources at both National and State level, they should also be included as a consulting body.

Biodiversity Management Committees

Chapter X deals with Biodiversity Management Committees

Section 41 states that every local body can constitute a Biodiversity Management Committee within its area. The purpose of such Committee is to promote conservation, sustainable use and documentation of biological diversity including preservation of habitats, conservation of land races, folk varieties and cultivars, domesticated stocks and breeds of animal and micro-organisms and chronicling of knowledge relating to biological diversity.

SCOPE: Here, BTC being a local body can constitute a Biodiversity Management Committees within its area and execute all the duties of the Committee stipulated in the Act.

Local Biodiversity Fund

Chapter XI deals with local biodiversity fund

According to Sec. 43 of the Act, a Local Biodiversity Fund can be constituted at every area notified by the State Government where any institution of self-government is functioning.

SCOPE: BTC is covered under the phrase 'any institution of self government', hence, a local biodiversity fund can be constituted in their area.

Forest (Conservation) Act, 1980

Of all the laws on natural resources, the law which seem to have had the maximum impact is the Forest (Conservation) Act, 1980 ['FCA' for short], which was enacted to check excessive deforestation throughout the country. Initially, the Tribal Councils took the position with the support of both the State as well as Central Government that they were beyond the scope of the Act. This changed in 1996, with the Supreme Court holding that the provisions of the Act would apply to forests under the management of the Tribal Councils also.

The statement of object and reason of the act states that, *'deforestation causes ecological imbalance and leads to environmental deterioration. Deforestation has been taking place on a large scale in the country and it has caused wide spread concern.'* The Forest (Conservation) Act, 1980 ('FCA' for short) extends to the whole of India except the State of Jammu & Kashmir. The FCA was amended in 1988. Section 2 of the FCA, forms the core and stipulates that no state Government or authority shall make, except with the prior approval of the Central Government, any order directing;

1. That any reserved forest (within the meaning of the expression "reserved forest" in any law for the time being in force in that state) or any portion thereof, shall cease to be reserved;
2. That any forest land or any portion may be used for any portion thereof may be used for any non-forest purpose;
3. That any forest land or any portion there of may be assigned by way of lease or otherwise to any private person or to any authority, corporation, agency or any other organization not owned, managed or controlled by the Government;
4. That any forest land or any portion thereof may be cleared of trees which have grown naturally in that land or portion, for the purpose of using it for reforestation.

Section 3(1) (b) of the sixth schedule deals with the power of District Council to make laws with respect to "the management of any forest not being a reserved forest"; whereas the executive power of the District Council in paragraph 6(2) extends to "any other matter to which the executive power of the State extends". It is pertinent to note that although the District Council cannot make a law on Reserve Forests it does not mean that the District Council cannot have any executive power with respect to the management of a reserved forest.

However, such executive power of the District Council is subject to the limitations indicated in Article 162 of the Constitution, namely, such power will be subject to the provisions of the Constitution and limited by the executive power expressly conferred by any law made by the Parliament upon the Union or authorities thereof. Such Executive power of the District Council is further subject to two other limitations;

- Firstly subject to the provisions of any existing law or any other law relating to reserved forest made either by Parliament or by the State Legislature or by both, and
- *Secondly* subject to the conditions, if any, imposed by the Governor while entrusting the executive function in relation to forest or Reserved Forest under paragraph 6(2) of the Sixth Schedule.

Thus the executive power of the District Council is subject to provisions of the Forest (Conservation) Act, 1980 and the Assam Forest Regulation, 1891.[2]

It was generally followed that the provisions of the Forest (Conservation) Act, 1980 was applied only in respect of the Reserved Forests declared by the State Government.

With respect to this, following were the shortcomings:-

- The saw mills and other wood based units were regulated under provisions of the respective Forest Act of the District Councils and the rules framed there under.
- The system of working plans did not exist for forests beyond the working plan.
- The easy process of obtaining approval has led to the large scale felling of trees in an unsustainable manner.
- The rules regarding transit were not strong enough to protect and conserve the forests.
- Mining activities in forest areas outside Reserve Forests also continued without approval from the Ministry of Environment and Forest.

Hence the end result was large scale destruction of forests which was repeatedly pointed out in different State of the Forest Reports. It became clear that as far as the management of forests was concerned, the pre 1980 situation and the post 1980 situation was not very different. Broadly, the situation vis-à-vis the FCA, can be summed up as follows:

- FCA was not applied to forest land other than government Reserved Forests.
- The District Councils and the forests within its control were also outside its scope.
- The forests were managed in accordance with customary practices as well as statutory laws.
- No working plan existed for forests which were under the control of the District Councils as well as privately held or jointly held by Clans and sub clans.
- No prior approvals for 'Non Forest use' of forest land were sought by the District Councils from the State Government who in turn had to seek clearance from the Central Government.

Through judicial intervention, Supreme Court of India passed various orders for the implementation of the Forest Conservation Act uniformly. The scope implications and meaning of forest, forestland and forest conservation were reinterpreted by the Apex Court. These have lead to significant changes in the manner in which the law was followed since its inception in 1980 and more importantly it fundamentally affects the operation of the various state laws on forest as well as other natural resources law. Of particular significance was its impact on the forest management systems in the Northeast specifically those under the control of the Autonomous District Councils. Although, the Supreme Courts order covered almost all the States of the Country, the North East received a special focus in view of the fact that it is a biodiversity hotspot and having a high rate of deforestation.

The changes in the interpretation, implementation and understanding of the FCA took place in view of the various orders passed by the Supreme Court in T.N.Godavarman v. UOI W.P. (C) No. 202 of 1995.

The most important order passed in the last 12 years since the commencement of the *Godavarman Case* is the order dated 12/12/1996 and in the context of Northeast it was followed by the order 15/01/1998. This order clarified that the provisions of the FCA for the conservation of forest must apply to all forests and therefore expanded vastly the scope of Forest Conservation Act. In view of this order the FCA was not to be limited to areas recognized/ declared/ classified as forest in Government records but also to include all areas so far as they satisfied the dictionary sense.

Fig.10 Maozigendri cadets line up for a guard of honour

[3]State of Assam in 1950 included the areas presently comprising in the States of Arunachal Pradesh, Meghalaya, Mizoram and Nagaland.

Further, the Court issued various directions specifically with respect to North East Region. The main highlights were:

- All non-forest activities within any forest in any state through the country without the prior approval of the Central Government must seize forthwith. Every State Government must promptly ensure cessation of all such activities forthwith.
- The felling of trees in all forest is to remain suspended except in accordance with the working plan of the State Government as approved by the Central Government.
- A complete ban on movement of cut trees and timber from any of the seven North Eastern States to any other State of the country.
- The provisions on the use of forestland for non- forest purpose applied uniformly to all areas, which can be regarded as forest.
- Further the Supreme Court made it mandatory to seek Central Government approvals for all working plans. In order to identify areas which can be regarded as forests the Court ordered for Constitution of expert committees with the specific task of identifying areas which are forest irrespective of whether they are so notified, recognized or classified under any law an irrespective of the ownership of the land of such forests. The Committee was also to identify areas, which were earlier forest but stand degraded, denuded or clear.

The Constitution of the Expert Committee was a very significant step in the sense that the criteria adopted in regarding an area as a forest would be differing from state to state as well with in the State. In addition to this expert committee the State Governments were also directed to file issues on issuing concerning sawmills, veneer mills and plywood mills operating within each state. It is interesting to note that Court took a realistic approach in directing that the particulars of the 'real ownerships of the sawmills be provided to the Court. This was mainly in recognition of the fact that in large parts in North Eastern India the legal owners were not the actual owners of saw mills, which were mainly operated and controlled by non-locals or non-tribals.

Despite the order clearly stating that the word forest would be applicable to all forest areas irrespective of ownership and classification there were still misconception regarding its applicability to the Autonomous District Councils. It was therefore clarified in a subsequent order dated 4.3.1997 that the order dated 12/12/1996 will apply to all Autonomous Hill Councils.

In order dated 15.1.1998, much emphasis was laid on the North Eastern States. By this order, it was clarified that the orders passed by Supreme Court in *Godavarman case* with respect to North Eastern States are also applicable to District Council. In this order, the Supreme Court stated that even though proliferation of wood based industries has been the main cause of degradation of forest in the North East, considering the extent of forest and the dependence of local people on the forest resources in the region it is neither feasible, nor desirable, to ban completely either the timber or running of wood based industries. It was emphasized that the number and capacities are to be regulated in relation to the sustainable availability of forest produce. Most significantly it emphasized that industrial requirement have to be subordinated to the maintenance of the environment and ecology as well as bonafide local needs.

The major highlight of the order with respect to the District Council was that the Forest under it should be worked in accordance with working schemes, which shall specify both the programme for regeneration and harvesting and whose period shall not be less than five years. It was however clarified that the plantation schemes raised on private and community holdings shall be excluded from these requirements but shall be regulated under respective state rules and regulations.

The Supreme Court by its order dated 8.1.2001 in I.A. No. 424 in T.N. Godavarman vs U.O.I W.P. (C). 202 of 1995 emphasized on the partnership of all the States to ensure the maintenance and improvement of the forest cover and providing forest compensation to the forest-rich States. The Court observed, "It is to be borne in mind that taking an overall view it is important for the country that in certain areas where natural forest exist, the same should be preserved. The political boundaries are drawn for various considerations but as far as the environment is concerned one has to, take a holistic view and in that

[4]By the State of Nagaland Act, 1962

[5]By the Assam Reorganization (Meghalaya) Act, 1969

[6]By the North Eastern Areas (Reorganization) Act, 1971

[7]Ibid

[8]By the Bodoland Autonomous Council Act, 1993 (Assam Act XI of 1993)

[9]By the Sixth Schedule to the Constitution (Amendment) Act, 2003

view of the matter one cannot overlook the fact that even though the national average of the forest cover is low, even that low figure is there because of the higher percentage of the forest cover in the Hill States and in the State of Madhya Pradesh and in North eastern States. Majority of the States in India fall short of national average as far as the forest cover is concerned. For the benefit of the said States also - nay for the benefit of the whole region, it is important that there should not be any further depletion of the forest cover in these sensitive areas of Madhya Pradesh and in the Himalayas and the other sensitive areas like the Western Ghats etc. In order to ensure the preservation and regeneration of forests in these areas, the Central Government should consider whether the deficient States should not be asked to contribute towards the preservation of the existing forest cover and compensation/incentive given to the forest-rich States to preserve and regenerate forest: In a sense, there should be a partnership of all the states to ensure the maintenance and improvement of the forest cover. This suggestion should be considered by a Committee of the Secretary (Finance) and Secretary, Ministry of Environment & Forests in consultation with the Chief Secretaries of all the states and a report submitted preferably within eight weeks. Although, most of the forest deficient states expressed their inability to 'compensate' the forest rich states, the Supreme Court directed that in the absence of the States willing to part with their money, the Central Government should devise a scheme to compensate the forest rich states.

This order was complied by the State and the Supreme Court by its order dated 26.9.2005 in T.N. Godavarman vs U.O.I W.P. (C). 202 of 1995, took notice of the compensation given to the forest rich states to preserve and regenerate forests and held,

> "It would also be useful to make a mention of the order dated 22nd September, 2000 passed by this Court which led to grant of sanction of rupees 1,000 crores for maintenance of forest under the 12th Finance Commission (2005-2010). The said order took note of the fact that felling of the trees is far in excess of what would be justified with reference to regeneration, and the main cause is non-availability of sufficient funds. It also notices that even with regard to the felling of trees as per working plans in the last three years, the corresponding prescription for regeneration has not been implemented. It further notices that there cannot be any felling without regeneration because that will, over a period of time, only result in forest vanishing. Further, the order says that the shortfall of regeneration which has resulted in depletion of forest cover has to be made up. The court took note of the suggestion that for regeneration there should be a joint venture between State of Madhya Pradesh, a state having a large forest area, and the Central Government whereby the working capital, in whole or substantially the whole, can be provided by the Central Government and the regeneration of degraded forests carried out. Taking an overall view, it is important for the nation that in certain areas where natural forest exists, the same should be preserved and at the same time the Central Government should consider whether the deficient States should not be asked to contribute towards the preservation of the existing forest cover and the compensation/incentive given to the forest rich States to preserve and regenerate forests. In a sense, there should be a partnership of all the States to ensure the maintenance and improvement of forest cover. It was observed that this suggestion should be considered by a Committee of Secretary (MOF) and the Secretary (MOEF) in consultation with the Chief Secretaries of all the States.

Para 14.25 of the 12th Finance Commission Report deals with maintenance of forest. Noticing that several States have represented that subsequent to the restrictions placed by this Court on exploitation of forest wealth, the forests have become a net liability for the States rather than a source of revenue and maintenance of forest has become a problem due to financial constraints, these States pleaded that separate grant should be provided for maintenance of forest. Recognizing that forest are a national wealth and the country as a whole has the responsibility in preserving the said national wealth, the Commission decided to recommend a grant of rupees 1000 crores spread over the award period 2005-2010 for maintenance of forest. This would be over and above what the States have been spending through their forest departments. The amount was distributed among the States based on their forest area, to be spent for preservation of forest wealth. In this light, it is not open to the State Government to contend that the amount of NPV paid by the user agency shall be handed over to them. Reference may also be made to report of the Planning Commission (Chapter IX) relating to forest environments in Tenth Five Year Plan (2002-2007) which has taken note of the fact that sustainability is not an option but imperative since without it environmental deterioration and

economic decline will be feeding each other leading to poverty, pollution, poor health, political upheaval and unrest. Environment cuts across all sectors of development. The rapid increase in green house gases in the atmosphere, land degradation, deteriorating conditions of fragile ecosystems, deforestation, loss of biodiversity and environmental pollution have become subjects of serious global concern. The overall impact of these phenomena is likely to result in depletion of ozone layer, change of climate, rise in sea-level loss of natural resources, reduction in their productivity ultimately leading to an ecological crisis affecting livelihood options for development and over-all deterioration in quality of life. From the above report, it follows that the deterioration and consequently preservation of ecosystems cannot be area or state specific and that utmost attention is required to be accorded to conservation of natural resources and for improvement of the status of our environments. The report notices the need to tackle the environmental degradation in a holistic manner in order to ensure both economic and environmental sustainability. Forests play an important role in environmental and economic sustainability. It takes note of the forests being consistently and seriously undervalued in economic and social terms. It recognizes that the economic value of the ecosystem services of the forests is vast though it is extremely difficult to quantify. It takes note of the fact that generally much of the land-use decision that presently drives forest change takes relatively little account of these values. The country's forest resource is under tremendous pressure. Note has been taken of the fact that India's biological diversity is reflected in the heterogeneity of its forest cover. It is one of the 12 'mega-diversity' countries of the world. India is also at the meeting zone of three major zone of three major bio-geographic realms, namely, the Indo-Malayan (the richest in the world), the Eurasian and Afro-tropical. India also has the two richest bio-diversity areas, one in the northeast and the other in the Western Ghats. The biological diversity is being conserved through a network of biosphere reserves, national parks and sanctuaries, however, the challenges for conservation emanate from population pressures, adverse impacts of industrialization and intensifying threat from illegal trade."

The decision of the Supreme Court and the subsequent implementation of the same through the Finance Commission allocation is a significant step in recognizing the need to compensate those states which are maintaining a high forest cover. However, the Finance Commission seems not to have recognized that within the Forest rich states of the North East, there are Tribal Councils which are more forest rich in comparison to other regions of the state and therefore system needs to be have been put in place which ensures that the allocation reaches the concerned Tribal Councils.

Fig.11 Translocated rhinos (*Rhinoceros unicornis*) at the *boma*

C. The sixth schedule and Bodoland Territorial Council

Like many other provisions of the Constitution, the Sixth Schedule of the Constitution has undergone many amendments mainly as a result of the changing aspirations as well as based on the practical experiences and difficulties. This is more so in the case of Assam than Meghalaya where students movements and agitation have led to significant amendments leading to more autonomy with respect to the Departments entrusted to them. It has also led to creation of new Councils such as the Bodo Territorial Council.

Assam

Unlike, Meghalaya, wherein the Autonomous District Councils have maintained their powers and functions in almost the same terms as was originally envisaged in Constitution, there have been significant changes so far as the state of Assam is concerned. This was a result of dissatisfaction with the existing nature of autonomy granted to the District Councils. These resulted in political and civil disturbances which ultimately led to different Accords being signed with the state as well as the central government. One outcome of these were to drop the word 'District' for the Councils and term it either as Autonomous Councils (as in the case of North Cachar Hills and Karbi Anglong) and Territorial Councils as in the case of the Bodo Territorial Council.

The Sixth Schedule, as originally framed, was applicable only to the tribal areas of the State of Assam[3] by virtue of Article 244(2) and 275(1) of the Constitution of India. Table appended to paragraph 20 of the Sixth Schedule defined the tribal areas of the State of Assam.

It contained two parts, namely Part A and Part B as follows:

PART A

1. The United Khasi-Jaintia Hills District.
2. The Garo Hills District
3. The Lushai Hills District.
4. The Naga Hills District.
5. The North Cachar Hills District.

PART B

1. North East Frontier Tract, including the Balipara Frontier Tract, the Tirap Frontier Tract, the Abor Hills District and the Mishmi Hills District.
2. The Naga Tribal Area

Paragraph 1 provided for an Autonomous District for the tribal area in each item of Part A of the table appended to the paragraph 20.

With regard to areas of Part B of the table, the Governor was authorized under paragraph 18(1) to apply all or any of provision of Sixth Schedule to the said area by issuing public notification subject to previous approval of the President.

The provisions of the Sixth Schedule were never extended to Part B areas and these areas continued to be administered by the Governor as the agent of the President under paragraph 18(2) till such time these areas were excluded from the purview of the Sixth Schedule.

The tribal areas of Assam thereafter came to be reduced from time to time with the creation of the following states:

- State of Nagaland[4] in 1962;
- State of Meghalaya[5] in 1969;
- Union Territory of Mizoram[6] in 1971;
- Union Territory of Arunachal Pradesh[7] also in 1971

Consequently, only two Hills Districts of Assam namely North Cachar Hills District and Mikir Hills District (subsequently renamed as Karbi Anglong District) remained the tribal area within the State of Assam.

Bodoland Territorial Council (BTC)

Since late 1980s, demands started coming from the Bodo Tribal community residing in geographical areas between river Sankosh and river Mazbat/ Pasnoi falling within the districts of Dhubri, Kokrajhar, Bongaigaon, Barpeta, Nalbari, Kamrup, Darrang and Sonitpur.

In 1993, Bodoland Autonomous Council was formed under the Bodoland Autonomous Council Act, 1993.[8] This was not under the Sixth Schedule of the Constitution. However, in 2003 Bodoland Territorial Council came to be set up under the Sixth Schedule instead of being governed by the Assam Act and Bodoland Territorial Areas District was added as item No. 3 of part I of the Table appended to paragraph 20.[9]

Under Article 371-B, inserted by the Constitution (22nd Amendment) Act, 1969, the President was authorized to provide for the constitution of a Committee of the Legislative Assembly of the State of Assam. The said committee was to consist of the

members of the tribal areas of Assam and such other members as may be specified. The President was also authorized to specify the function of such Committee.

The Bodo Accord 1993

On February 20, 1993, a Memorandum of Settlement was signed between the Government of India, Government of Assam and Bodo leaders (All Bodo Student's Union and Bodoland Autonomous Council Act, 1993 (Assam Act XI of 1993) paving the way for the establishment of Bodoland autonomous council. This was not under the Sixth Schedule of the Constitution. The Government of Assam vide notification dated 10.12.1993 issued under Section 3(1) of 1993 Act declared 2570 villages falling within the Districts of Dhubri, Kokrajhar, Bongaigaon, Barpeta, Nalbari, Kamrup, Darrang and Sonitpur to be the boundaries of the Bodoland autonomous council. Subsequently the Government of Assam issued another notification dated 18.09.1995 under Section 66 of the Bodoland Autonomous Council Act, 1993 including 90 more revenue villages within the purview of the Bodoland Autonomous Councils. However, by notification 02.04.1999, the Government of Assam superseded the notifications dated 10.12.1993 and 18.09.1993 and re-determined the boundaries of the Bodoland Autonomous Council to be 2941 villages named in the said notifications. By the notification dated 02.04.1999 347 villages which were earlier part of the Bodoland Autonomous Council were excluded from its purview and 602 new villages were included.

The highlights of the Accord were:

- The Bodo Autonomous Council (through the Bodo Executive Council) will be responsible for implementation of the laws on subjects which have been entrusted to them in Appendix 'A'. Item 3 of Appendix 'A' includes 'Forests'. (Note: This clearly includes all categories of forests whether Reserved, Protected or National Parks and Sanctuaries).
- The Bodo Autonomous Council can also receive grant–in–aid from time to time within the principles and policies enunciated by the Government of India.

The Bodo Accord 2003

In February 1996 All Bodo Student's Union revived the Statehood movement and demanded repeal of 1993 accord. Ethnic riots broke out. Thereafter many rounds of tripartite talks were held between parties and finally on 13.02.2002 State Cabinet formally approved the formation of the Bodoland Territorial Council (BTC) under the Sixth Schedule of the Constitution of India, with adequate and specific safeguards of the rights of the non-Bodos. Disputes arose about the areas to be included in the Bodoland Territorial Council and on 10.01.2003 an all party meeting chaired by the Chief Minister of Assam agreed that only those villages having 50 percent or more Bodo population be considered for inclusion in Bodoland Territorial Council. The meeting however, decided that for the sake of contiguity some villages with less Bodo population may also be included. Accordingly on 10.02.2003 an agreement for creation of a Bodoland Territorial Council was signed between the Union Government, the Assam Government and the Bodoland Liberation Tigers. The highlights of the accord were:

- The Council will have legislative powers with respect to subjects transferred to it.
- *The Territorial Council shall have executive, administrative and financial powers in respect to the subjects transferred to it.*
- 'Forest' is included as a subject entrusted to the Territorial Council.
- The offices of the Dy. Commissioner and Superintendent of Police will be outside the superintendence and control of BTC.
- The State Government would provide an amount, to be decided every year on population ratio for executing developmental works.
- The territorial council, shall prepare plan with the amount to be decided every year for the developmental activities.

The Sixth Schedule to the Constitution (Amendment) Act 2003, was passed by the Parliament on 07.09.2003 paving way for creation of a Bodoland Territorial Council within the Sixth Schedule to the Constitution and Bodoland Territorial Areas District was added at Serial No. 3 of Part I of the table appended to paragraph 20. Special provisions with regard to Bodoland Territorial Council have been made in the Sixth Schedule and the same are as under;-

1. The number of members of the Bodoland Territorial Council was increased to 46 instead of 30, of whom 30 were reserved for schedule tribes, 5 for non tribal and 5 open for all communities. (vide insertion of provioso to paragraph 2(1))
2. Additional power to make laws has been conferred to make laws on 40 subjects. (vide insertion of paragraph 3-B)
3. Special provisions provided in paragraph 4 for administration of justice in tribal area have been made non applicable to Bodoland

Territorial Council. (vide insertion of paragraph 4(6))

4. Power conferred on the District Council by paragraph 10 to make regulations for the control of money lending and trading by non-tribal has been made non-applicable to Bodoland Territorial Council. (vide insertion of paragraph 10(4))
5. Paragraph 17 providing for exclusion of area by the Governor from Autonomous District in forming constituency in such Districts has been made non-applicable to Bodoland Territorial Council. (vide insertion of paragraph 17)

Additional powers to Bodoland Territorial Council

It is pertinent to note that Sixth Schedule to the Constitution (Amendment) Act, 1995 inserted two special provisions in the Sixth Schedule granting more autonomy to the BTC.

Paragraph 20BA was also inserted in the Sixth Schedule to the Constitution (Amendment) Act authorizing the Governor of Assam to exercise his discretionary power on various matters while acting under the provisions of the Sixth Schedule.

The Sixth Schedule to the Constitution (Amendment) Act, 2003, also inserted paragraph 3B whereby powers were conferred on the Bodoland Territorial Council to make laws on forty additional subjects.

Thus, as on date, there are following three District Councils in the State of Assam:

1. North Cachar Hills Autnomous Council
2. Karbi Anglong Autonomous Council
3. Bodoland Territorial Council

It is pertinent to note that none of them use the term District Councils, but rather use either Autonomous Councils or Territorial Councils.

Autonomous Councils Functioning Under State Legislation. It may be noted apart from the aforesaid three autonomous councils functioning in the state of Assam under the provision of Sixth Schedule to the Constitution, there are three other autonomous councils which have been established with the plain tribes community under different legislations passed by the state legislature. They are:

1. Missing Autonomous Council
2. Rabha Hasong Autonomous Council
3. Lalung (Tiwa) Autonomous Council.

Recently two further bills constituting autonomous council for Deori and Sonowal plain tribes of Assam have been passed by the legislature and the assent of Governor is waited. They are;-

1. The Deori Autonomous Council Bill, 2005
2. The Sonowal Kachari Autonomous Bill, 2005.

Fig.12 WTI team with Maozigendri cadets at their camp in Manas National Park

CHAPTER III

Forest resources and management in Bodoland Territorial Council

Kiranmay Sarma[1]

Profile of Bodoland Territorial Council

The Bodoland Territorial Council (BTC) of Assam comprises the districts of Kokrajhar, Chirang, Baska and Udalguri. It is situated on the north bank of the Brahmaputra river along the foothills of Bhutan and Arunachal Pradesh and covers an area of 8,970[2] km (Fig. 1). The area is bounded in the north by Bhutan and Arunachal Pradesh, east by Sonitpur district of Assam, south by the districts of Dhubri, Bongaigaon, Barpeta, Nalbari, Kamrup, Darrang and Sonitpur whereas on the western side it is bordered by West Bengal. The administrative break-up of the Council is given in Table 1.

Demography

The demography of BTC is dominated by Bodos, an aboriginal tribal community of Assam. The Bodos in course of time have synthesized a vast amount of knowledge in respect of herbal medicines from the wild plants for healing and curing of ailments and they are culturally and socially related to forests around them. However, in recent years, it is noticed that a lot of erosion has taken place in maintaining this symbiotic relationship with forests. However, time has not yet run out to retrieve it, if works are done in this direction sincerely by the government, NGOs as well as other institutions and the public as a whole.

Table 1 Administrative break-up of Bodoland Territorial Council (BTC)

District	District Hq.	Subdivision	Subdivision Hq.
Kokrajhar	Kokrajhar	Kokrajhar	Kokrajhar
		Gossaigaon	Gossaigaon
		Parbatjhora	Kachigaon
Chirang	Kajalgaon	Chirang	Kajalgaon
		Bijni	Bijni
Baksa	Mushalpur	Salbari	Salbari
		Tamulpur	Tamulpur
Udalguri	Udalguri	Udalguri	Udalguri
		Bhergaon	Bhergaon

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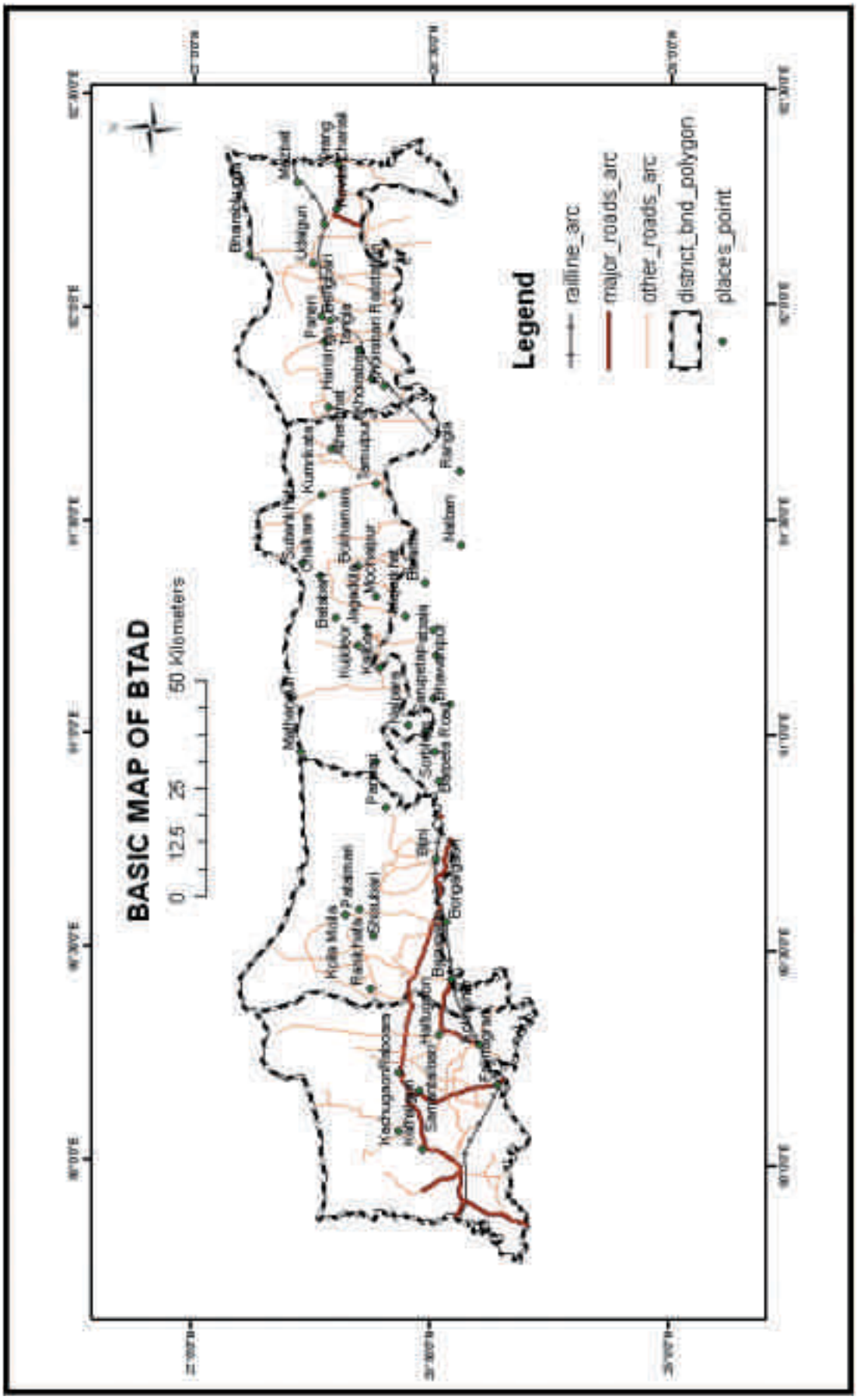

Fig.13 Map showing the Bodoland Territorial Council of Assam

Table 2 District wise population distribution in Bodoland Territorial Council

Districts	S.T.	S.C.	General	Total Population
Kokrajhar	5,28,774	32,609	3,37,608	8,98,991
Chirang	1,69,811	30,035	1,43,780	3,43,626
Baksa	3,38,630	45,967	3,33,045	7,17,642
Udalguri	3,17,412	28,923	3,24,685	6,71,030
Total	**13,54,627**	**1,37,544**	**11,39,118**	**26,31,289**

In BTC area, the tribal communities present are mainly Bodos followed by Rabhas, Garos, Misings etc. The other communities are Assamese Adibasi, Bengalis, Marwaris, Beharis, Nepalese and scheduled cast populations are also found. Table 2 (above) shows the distribution of population in BTC.

Fig.14 Bodo woman offers prayer at a forest temple in Ultapani, Greater Manas, Assam

Forest resources of Bodoland Territorial Council

The total recorded forest area in BTC is 3,53,995 ha of which most of the areas are located along the international boundary with Bhutan. The entire northern belt of forest is situated in Sub-Himalayan alluvial tract of a typical formation known as "Bhabar tract" characterized by low water table and deep bouldery deposits with an undulating layer of gravelly sand with varying degree of thickness of overlying sandy loams and humus varying from almost nil to 30 cm. The forest types available in BTC range from Semi-Deciduous Forests in the west with Sal as the dominant tree species to broad leaved Wet Evergreen Forests in the east including Khair-Sisso and Riparian Fringing Forests (riverine). The forest areas are under Reserved Forest (RF), Proposed Reserved Forest (PRF), Unclassed State Forests and Protected Areas. The area under each land category of the forests are given in Table 3. The protected forest areas in terms of Reserved Forest or Protected Forests of BTC are shown in Fig. 15.

Table 3 Areas under different forest lands

Type	Area	Number
Reserved Forests	2,59,128	43
Proposed Reserved Forests	27,408	19
Unclassed State Forests	422	5
Protected Areas	67,037	8

Forest Administration in BTC

For effective management and protection of forest in BTC, the Forest Department has been organized in following way:

1. Conservator of Forests, Western Assam Circle: All the Territorial Forest Divisions are under the control of the Conservator of Forests, Western Assam Circle (CF,WAC), Kokrajhar. The CF, WAC, has also been declared as the Council Head of the Department of Forest, BTC. The following are the Territorial Forest Divisions:

    i. Kachugaon Forest Division
    ii. Haltugaon Forest Division
    iii. Parbatjhora Forest Division (part of Dhubri Division)
    iv. Chirang Forest Division (part of Aie Valley Dision)
    v. Dhansiri Forest Division (part of Darrang and North Kamrup Division)

In addition to the above, two Social Forestry Divisions are also under the control of CF, WAC, Kokrajhar (Table 4). The Social Forestry are:

    vi. **Kokrajhar Social Forestry Division:** To cover the overlapping areas of whole present Kokrajhar and Chirang districts.
    vii. **Baska Social Forestry Division:** To cover the overlapping areas of whole Baska and Udalguri districts.

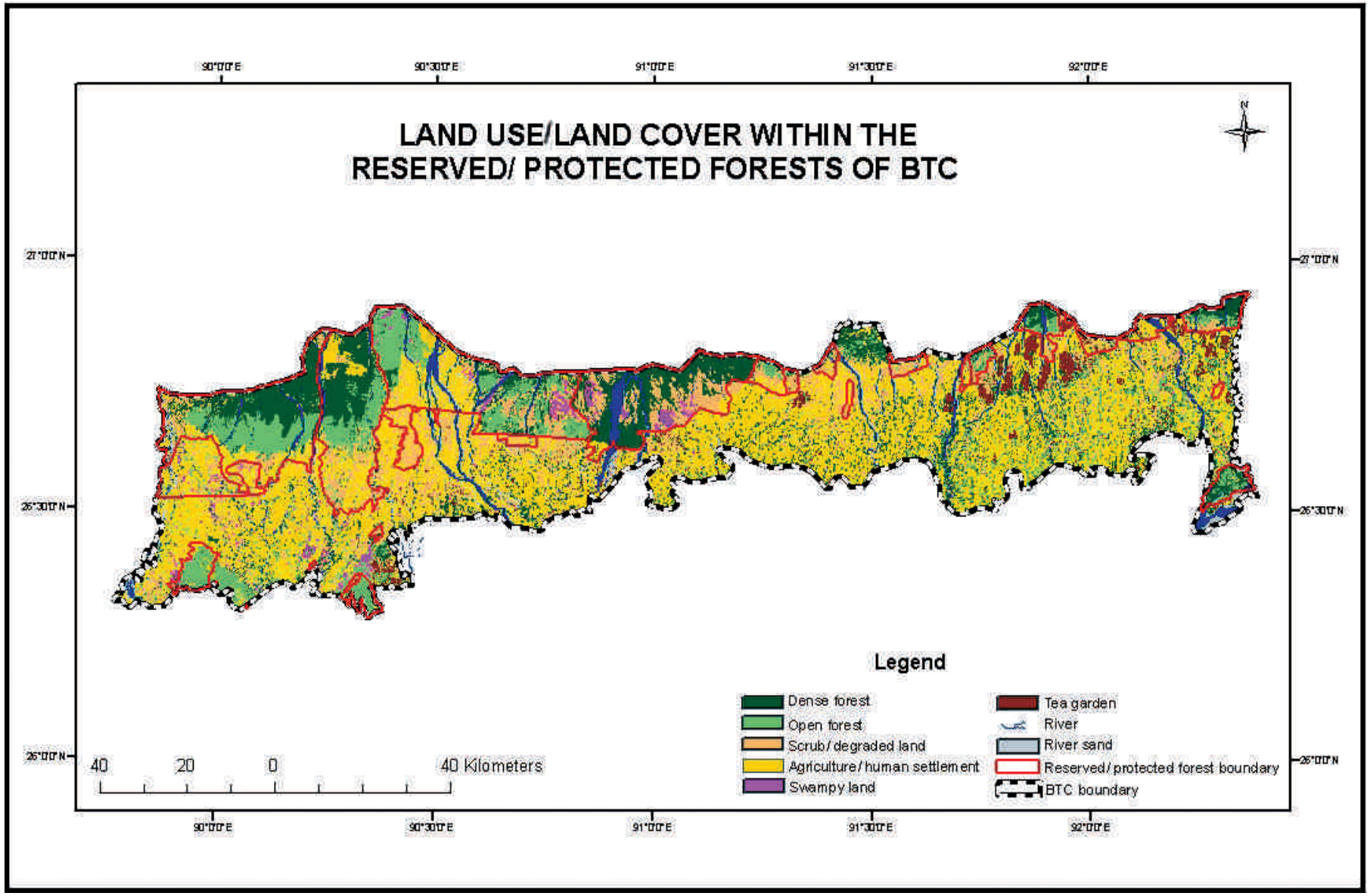

Fig. 15 Different land use/ land cover under reserved/ protected forest areas of BTC Forest Administration in BTC

Table 4 Social Forestry Divisions

Division			Ranges	
Kokrajhar	Social	Forestry	1	Parbatjhora
Division			2	Kokrajhar
			3	Gossaigaon
			4	Sapkjpur
Baska Social Forest Division			1	Udalguri
			2	Dhergaon
			3	Tamulpur
			4	Mushalpur
			5	Salbari

Field Director, Manas Tiger Project:

All the protected areas of BTC are under the control of the Field Director, Manas Tiger Project. The divisions under the Project are:

i. Manas National Park Hqr. - Barpeta
ii. Orang National Park Hqr. - Mangaldai

The details of RF, PRF, USF and PA along with administrative units of each division are as follows (Table 5 & 6; Fig. 15):

Table 5 Wildlife Division for Protected Area Social Forestry

Division	Ranges	Type and area	
		RF	Area (ha)
Orang Wild	1. Orang	1 Orang N.P.	7880
Life Division	2. Barnadi	2 Barnadi WLS	2622
Manas	1. Bhuyanpara	1. Manas N.P.	
National Park	2. Bashbari	a. Manas (P) R.F.	1200
	3. Panbari	b. North Kachiuga R.F.	27102
	4. Chakrashila	c. Panbari R.F.	1600
		d. Kachiuga R.F.	3486
		e. Kokilabari R.F.	6749
		2. Chakrashila W.S.	3068

BTC is rich in flora and fauna with maximum biodiversity. The major forest types available are:

1. East Himalayan Upper Bhabar Sal Forests
2. East Himalayan Lower Bhabar Sal Forests
3. Eastern Terrai Sal Forests
4. Eastern Heavy Alluvium Plain Sal Forests
5. Eastern Hill Sal Forests
6. Northern Secondary Moist Mixed Deciduous Forests
7. Evergreen Forests
8. Low Alluvium Savannah Woodland
9. Eastern Wet Alluvial Grassland (Terrai formation)
10. Riparian Fringing Forest
11. Khair Sisso Forests
12. Secondary Bamboo Brakes, and
13. Cane Brakes

Some of the above forests types are not prominent due to heavy biotic interference and extensive damages caused to the forests. Above forest types exist in unique mosaic in the forests of Bodoland Territorial council. Major species of plants in different types of forests are described below (Champion & Seth, 1968):

East Himalayan Upper Bhabar Sal Forests (*3C/C1b[i]*):

The major tree spp. found in East Hmalayan Upper Bhabar Sal Forests are *Shorea robusta, Lagerstroemia parviflora, Lagerstroemia speciosa, Terminalia bellerica, Schima wallichii, Adina cordifolia, Lannea coromadelica, Careya orbarea, Albizia procera, Sterculia villosa, Bauhinia* spp., *Bombax ceiba, Cassia fistula* etc.

The shrub and herbaceous species found in this type of forests are *Clerodendron* spp., *Morinda angustillia, Holorhena antidysentriea, Murraya kengii, Coffea bengalensis* etc.

East Himalayan Lower Bhabar Sal Forests (*3C/C1b[ii]*):

Major tree species recorded in this type of forests are *Shorea robusta, Schima wallichii, Terminalia tomentosa, Lagerstroemia parviflora, Lagerstroemia speciosa, Terminalia belerica, Careya orbarea, Albzia procera, Bauhinia spp., Bombax ceiba,* etc.

Shrub and herbaceous species available are *Clerodendron indicum, Clerodendron infortunatum, Morinda angustifolia, Bauhinia vehlii, Bauhinia purpurea, Murraya exotica, Coffea bengalensis, Eupatorium odotorium* etc.

Among the climbers *Mellreunum enallatum, Paederia foetida, Entada phaseoloides, Entada scandens, Milletia auriculata, Aecacia pinnata, Curcuma amarissima* are available.

Eastern Terrai Sal Forests (*3C/C1c*)
Prominent tree species are *Shorea robista, Michelia champaca, Castonopsis indica, Bombax ceiba, Tetramales nudifolia, Gmelina arborea, Lagerstroemia speciosa,*

Table. 6 Administrative set-up of the Forest Department and area under each land type

Division	Ranges	Type and area		Type and area		Type and area	
		RF	Area (ha)	PRF	Area (ha)	USF	Area (ha)
Kokrajhar Forest Division	1. Western 2. Sanjan 3. Central 4. Eastern 5. Srirampur 6. Protection 7. Gossaigaon	1. Ripu 2. Kachugaon 3. Elasijhar	60,52 7 2144 3 226	1. Mugurmari	213	1. Srirampur	12
Hallugaon Forest Division	1. Dharbari 2. Gaurang 3. Dhapani 4. Nayekgaon 5. Protection 6. Kukrajhar	1. Chirang 2. Manas 3. Bengjol 4. Nadangiri Hill 5. Sarbhendi 6. Phukagaon 7. Buzamara	39254 2962 1071 1019 275 161 137	1. Anguri (pt I) 2. Anguri (pt II) 3. Nayekgaon (pt I) 4. Nayekgaon (pt II) 5. Bangaldava	82 35 774 1383 653	1. Annajuli 2. Haringuri 3. Henabil 4. Badlangmari	48 46 21 294
Parbatjhora Forest Division	1. Rupshi 2. Khoraghat 3. Gima 4. Salkocha	1. Mahamaya 2. Tipkai 3. Bholakuba 4. Chilkikhata 5. Dudumari 6. Parotra 7. Katrigasha 8. Bammijhora 9. Mangaljhora 10. Atharokota 11. Rupshi 12. Gima 13. Salkati 14. Tilapara	9018 216 1726 174 50 305 707 246 4620 967 125 6944 23 117	1. Phulkumari 2. Kajapara 3. Parvatijhora 4. Mushalijhora 5. Pablijhora 6. Kalpani 7. Damodarpur 8. Ammurani 9. Salmal	4636 20 11566 454 1109 335 90 106 41		
Chirang Forest Division	1. Runikhata 2. Antaka 3. Kuldung	1. Manas (Pt-I) 2. Manas (Pt-II) 3. Bengjol 4. Kanisundari 5. Katribari 6. Raktalthalera 7. Sissobari 8. Digbari 9. Kuldung 10. Tekla	18569 29068 6883 49 94 107 589 65 1469 113				
Dhansiri Forest Division	1. Mazgaon 2. Nunai 3. Kumrikata 4. Batabari	1. Bamiabkunda 2. Khalingdhar 3. Kawla 4. Batabari 5. Subankata 6. Morapaydia 7. Darrang 8. Sukanguli	2411 7053 7712 3121 2337 1138 4637 1315	1. Newtao 2. Kundor Hill 3. Bhoirabkunda 4. Labra 5. Dimra	568 592 2543 265 617		

Terminalia bellerica, Schima wallichii, Chukrassia tabularis, Morus lavigata, Adina cordifolia, Albizia lucida, Dillenia pentagyna, Dellenia indica, Stereospermum acerifolium, Biscofia javonica etc.

Shrub and herbaceous species are *Adhatoda vasica, Costus species Phryrium indicum, Flemingia bractaeta, Spilanthus acmela, Alpinia alughus, Eupatorium odoratum, Melastoma malabatricum, Curcuma amarissina* etc. Among the climbers *Lygodium japonicum, Merrimia vitifolia, Entana scandens, Paederia foetida, Milletia auriculata* etc. are available.

Eastern Heavy Alluvium Plain Sal Forests (*3C/C2b[iii]*)

The dominant species is *Shorea robusta,* followed by its accessories like *Terminalia tomentosa, Dillenia pentogyna, Lagerstroemia parviflora, Schima wallichii, Lagerstroemia speciosa, Terminalia belerica, Gmelina arborea* etc.

Among shrubs and herbaceous species *Holorhena antidysentrica, Moringa angustifolia, Clerodendron infortunatum, Clerodendron indicum, Solanum spp., Murraya kaengii, Coffea bengalensis, Eupatorium odoratum, Spilanthus acmela, Curkuma amarissima* etc. are the important. Climbers and grasses are as in case of other Sal forests. Besides ferns epiphytes and parasites etc. are available in plenty.

Eastern Hill Sal Forests (*3C/C1a*)

The dominant tree species is *Shorea robusta*. It is associated with *Schima wallichii, Karzea arborea, Stereospermum personatum, Emblica officinalis* etc. The important shrub and herbaceous species are *Dendrocalamus hamiltonii, Desmodium species, Imperata cylindriea, Holorhena antidysetrica, Murraya koengii* etc.

Northern Secondary Moist Mixed Deciduous Forests (*3C/C32s1*)

The prominent species occurring are *Terminalia belerica, Sterospermum chelonoides, Pterospermum personatum, Amoora wallichii, Tetramales nudiflora, Talauma hadgsonii, Syzigyum* spp., *Lagerstroemia parviflora, Premna bengalensis, Dillenia pentagyna, Careya arbrea* etc.

Shrubs species are:- *Murraya exotica, Litsea species, Malastoma malabathricum* etc.
Herbs are:- *Kukurma montana, Caronaria species* etc.
Grasses:- I*mperata arundinacea*.
Climbers:-*Paederia foetida, Millenia seandens* etc.

Fig.16 Manas National Park landscape

Evergreen Forests (*1B/C1 and2B/C1*)

The dominant species are *Chikrassia tabularis, Tetramales nudiflora, Cinnamomum ciciodaphne, Mansonia dipikae, Phoebe goalparensis, Michelia champaca, Amoora wallichii, Canarium resiniferum, Duabanga sonnerotoides, Gmelina arborea*, etc. followed by *Stereospermum personatum, Dillenia pentagyna, Mesua ferea, Artocarpus chaplasa, Talauma hodgsonii, Macaranga denticulata* etc.

Shrubs species are *Moninda angstifolia, Leea* spp, *Litsea* species, *Laportea crenulata, Alpinia allughus, Clerodendron infortunatum, Murraya exotica, Murraya kaengii, Piper longum, Adotoda basica* etc.

Among grass species *Phragmites karka, Saccharum procerum, Eupatorium pdoratum etc. Climbers* and *Epiphytes* are very conspicuous. Species found are *Entada scandens, Acacia pinnata* etc.

Low Alluvium Savannah Woodland (*31S1*)

The main species are *Imperata arundinacea, Saccharum spontaneum, Sacharum arundinaceum, Arundo donax, Phragmites karka, Erianthus ravanae* etc.

The tree species are scattered and they are *Bombax ceiba, Albizia procera, Emblica officinalis, Dillenia pentagyna, Butea monosperma* etc. Rare species like *Reinwardtia indica, Desmondium motorum, Pueraria subspicata* and *Priden pilosa,* etc. are also found specially in Manas National Park.

Eastern Wet Alluvial Grassland (Terrai formation)

This type of forest is found in Manas National Park especially on badly drained and low lying locations with little change of composition. The grass spp. found are *Saccharum spontaneum, Saccharum procerum, Alpuda aristata, Phragmites karka, Erianthus* spp., *Eicchioria* spp., *Myupriodes* species, *Vessia* species, *Vessia* species, *Polygonum* species etc.

Among tree species, *Albizia procera, Bischofia javanica, Dillenia indica, Trewia nudiflora, Bombax ceiba* etc. are found.

Riparian Fringing Forest (*4E/RS1*)

The species found are *Acacia catechu, Bombax ceiba, Dalbergia sissoo, Albizia procera, Lagerstroemia speciosa, Terminalia myriocarpa, Bischofia javanica,* etc. In this

Fig.17 Beki river

type of forest, grasses like *Imperata cylindrical, Saccharum* species etc. are also seen.

Khair Sisso Forests (*5/1s2*)

Mainly *Acacia catechu* and *Dalbergia sissoo* with other associates like *Bombax ceiba, Albizia procera, Bridela retusa,* the under growth being *Eupatorium odoratum* and *Imperata cylindrica* are found.

Secondary Bamboo Brakes (*2/2s1*)

The main species is *Dendrocalamus hamiltonii*, followed by *Teinostachyum dulloca, Dinochloa madellandii, Psuedostachyum oosa, Pallida polymorphum, Bamboosa tulda* and *Bambusa pallida.*

Cane Brakes (*1/E1*)

In evergreen patches in Chirang and other reserve forests, the canes are found along the nallahs, streams etc. in very limited extent. Species found are mainly *Calamus latifolius, Calamus tennuis.* Other cane species found in BTC area are *Calamus tennuis, Calamus floribundus, Calamus latifolia, Calamus laptospadix* etc.

Wildlife

The entire forest landscape along the Indo-Bhutan boundary is almost continuous and its biography has Indo-Tibetan, Indo-Malayan and Indo-Gangetic influences. The rich biodiversity of this area is attributed to this factor. The alluvial grassland habitat for herbivores like the greater Indian One-horned rhinoceros is within the administrative boundary of Bodoland Territorial Council. There are four protected areas under the Council area. They are:

1. Manas National Park (519 sq. km)
2. Barnadi Wildlife Sanctuary (26.21 sq. km)
3. Orang National Park (78. sq. km)
4. Chakrasila Wildlife Sanctuary (45.58 sq.km)

Manas National Park

The diverse associations of grassland ecosystems and tree land ecosystems form the mosaic of habitat giving rise to faunal diversity in Manas. The river Dang-Me-Chu becomes the picturesque Manas river before entering the Indian side of Manas National Park and drains into the Brahmatutra after giving rise to Beki river and rejoining with it. This river system with stunning natural views, biodiversity, and geomorphology earned Manas inscription in the list of World Heritage Sites. Earlier, an area of 2837 sq. km landscape along the Indo-Bhutan tract came under Project Tiger Reserve with Manas, then a wildlife sanctuary, as a core zone; this was one of the first nine important Project Tiger Reserves in the country.

Twenty-one faunal species of Schedule I of the Wildlife (Protection) Act 1972 are supported by the grassland ecosystem of Manas NP alone. Important

Fig.18 A tiger pug mark in Manas National Park

Fig.19 Sal forests in Manas National Park

Fig.20 Capped langur (*Trachypithecus pileatus*), one of the primate species found in Manas National Park

mammalian species include Tiger, Asian elephant, Greater One-horned rhinoceros, Golden langur, Golden cat, Hispid hare, Swamp deer, Indian bison, Clouded leopard etc. According to the latest census, there are 65 tigers, 657 elephants, 200 wild Asiatic Wild Water Buffalo (*Bubalus bubalis*) in the Manas NP. The last known population of the smallest wild pig Pygmy hog, is present in its last and only home in Manas National Park.

Barnadi Wildlife Sanctuary The Barnadi Wildlife Sanctuary is within the buffer of the Manas Tiger Reserve and is located in newly created Udalguri district of BTC. This sanctuary was declared as a reserve forest in 1942 and Wildlife Sanctuary in 1980. The spectacular landscape of this small but important protected area is unique. Pygmy Hog, Elephant, Gaur or Indian bison, Slow loris, Tiger, Leopard, Capped langur, Sambar, Barking deer, Hog deer, Dhole, Peacock, Hispid hare and four species of hornbills are the main attraction of this wildlife sanctuary.

Orang National Park The Orang National Park was declared as Game Reserve during 1951, a wildlife sanctuary in 1998 and national park in 1999. The park is situated in the northern bank of Brahmaputra and the landscape consists of Brahmaputra valley alluvial grassland and oxbow lake. The biological attributes of the park include the tiger, Greater One-horned Rhinoceros, avifauna of wetlands and Bengal florican, to name a few.

Chakrashila Wildlife Sanctuary This is a newly declared Wildlife Sanctuary in Lower Assam falling under BTC with an area of about 46 sq. km. It was declared as Chakrashila Hill Reserve Forest in 1966 and was declared a Wildlife Sanctuary in 1994. The Sanctuary is a hilly tract and runs north-south. The lower reaches are covered with Sal coppice regeneration while middle and upper reaches are covered with mixed deciduous forests. The Sanctuary is well known for existence of Golden langur. It is segregated habitat from main Indo-Bhutan habitat in the north.

Reference:

Champion, H.G. & Seth, S.K. 1968. ***Forest Types of India.*** Ministry of Environment and Forests, Government of India, New Delhi, India.

CHAPTER IV

Land use/land cover in Bodoland Territorial Council

Kiranmay Sarma, Hilaluddin and Sandeep Kumar Tiwari

Introduction

Land use and land cover information is essential for a number of planning and management activities. The information on the existing land use patterns becomes a crucial input in understanding and making plans on land use development and its management. Moreover, the increased awareness of environmental issues and the need to strive for sustainable management of natural resources has focussed attention on the need to study and monitor land use and land cover pattern. The term land use is used in the way, as human beings engage the land and its resources with its maximum level of utility. The term land cover, on the other hand, originally referred to the kind and state of vegetation (such as forest or grass cover), but it has broadened in subsequent usage to include human structures such as buildings or pavement and other aspects of the natural environment, such as soil type, biodiversity, and surface and ground waters. Land cover is affected by natural events, including climate variation flooding, vegetation succession, forest degradation and fire, all of which can sometimes be affected in character and magnitude by human activities.

The land resources in India are on a decline due to increasing population that has led to land degradation including land conversions from virgin vegetation coverage to other human development activities. For success of any planning activity, detailed and accurate information regarding the land cover and the associated land use is of paramount importance. Today, the availability of information on land use/land cover in the form of thematic maps, records and statistical figures is limited and has not covered many parts of the country.

Remote sensing has provided a major technological breakthrough in the method of acquiring information on natural resources. Because of its unique characteristics of synoptic view, repetitive coverage and reliability, it has opened immense possibilities for resource monitoring, mapping, targeting and management for optimal utilization including conservation. This technology combined with GIS provides a base for storage, manipulation and analysis for geographic information excelling of its wider application. Natural resource managers require, both in terms of fauna and flora quantitative information on the spatial distribution of land use types and their conditions. The forest wealth of Bodoland Territorial Council (BTC) of Assam is rich in terms of species biodiversity but many areas are yet to be explored and possibly many species yet to be identified, especially those having medicinal and commercial value. Here an attempt has been made to classify the lands of BTC into different land use and land cover classes both in the forests as well as non-forests areas. Relevant satellite imageries covering the entire council areas have been used for the purpose.

Methods

Supervised classification was carried out to delineate different land uses viz., dense forests, open forests, scrub/degraded land/grassland,

agriculture/human settlement area, swampy land, degraded land and rivers/river sand. In this type of classification, spectral signatures are developed from specified locations in the image. These specific locations are given a generic name 'training sites' and are defined. These training sites help in developing the outline areas. Multiple polygons are created for each land category to delineate relevant land use type. These signatures are then used to classify all pixels in the scene.

Sufficient Ground Controlled Points (GCP) were taken to confirm the different land use types. Nearest Neighbour Analysis was done for post classification smoothening. To delineate different cultural features like different roads, rivers, railway tracts, tea gardens visual interpretation technique was used (Garg *et al*., 1988; SAC, 1999). Detailed species composition study was carried out in Kokrajhar and part of Chirang districts (following Mishra, 1968). Based on the findings the forest area of Kokrajhar district could be delineated as evergreen forest, miscellaneous deciduous forest, sal forest, scrub/degraded/ grassland and swampy land.

Bodoland Territorial Council consists of four districts namely, Kokrajhar, Chirang, Baska and Udalguri (Fig.23). The total area of the council is 8,970 sq. km out of which 2,562.3 sq. km is delineated as forest area (28.6%), while non-forest area is 6407.7 sq. km (Table.7). Kokrajhar district has the maximum forest areas (40%) followed by Chirang with 28.2 percent. District wise break-up of the forest areas of Bodoland Territorial Council is given in Table 8.

Table 7 District wise forest and non-forest areas in Bodoland Territorial Council

District	Forest area (sq. km)	Non-forest area (sq. km)	Total area (sq. km)
Kokrajhar	1,027.2	1,549.1	2,576.3
Chirang	721.6	1,307.6	2,029.2
Baska	596.2	1,721.1	2,317.3
Udalguri	217.3	1,829.9	2,047.2
Total	**2,562.3**	**6,407.7**	**8,970**

Table 8 District wise forest areas and its percentage to the total forest areas in Bodoland Territorial Council

District	Forest area (in sq. km)	Percentage of forest area
Kokrajhar	1,027.2	40.0
Chirang	721.6	28.2
Baska	596.2	23.3
Udalguri	217.3	8.5
Total	**2,562.3**	**100**

The forest area has been classified into six broad groups viz., dense forest, open forest, scrub/degraded/grass land, agriculture/ human settlement area, swampy area and river/river sand (Fig.24,25,26 and 27). The district wise break-up of different land uses within the forest areas are given in Table 9,10,11 and 12.

Fig.21 Dr MK Ranjitsinh, Chairman WTI in Manas National Park

Fig.22 Scrubland forest, Manas National Park

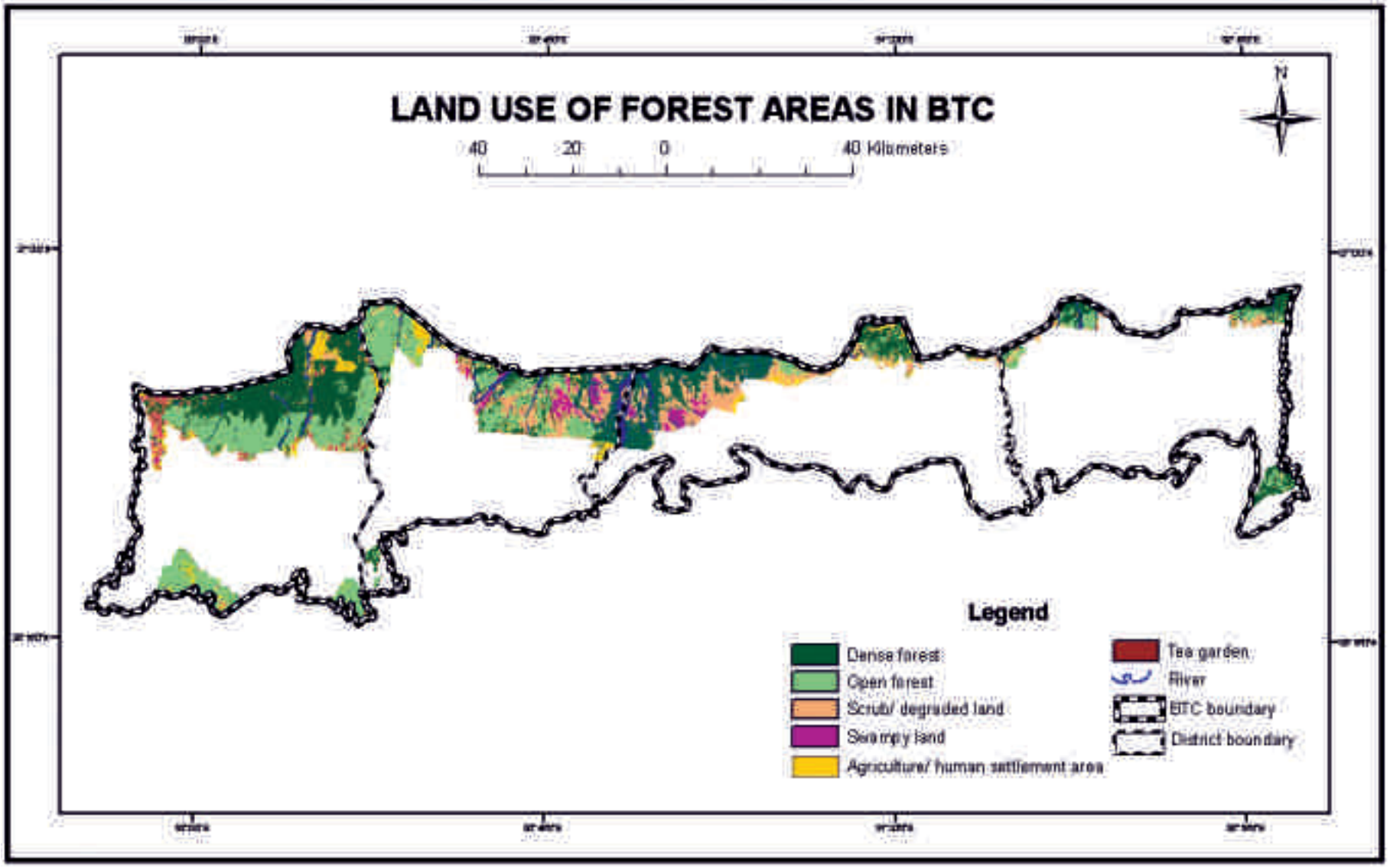

Fig.23 Break up of the forest areas under different land uses within Bodoland Territorial Council, Assam

Table. 9 Land use and land cover and its percentage to the total forest areas in the forest areas of Kokrajhar district

Land use/Land cover	Forest area (in sq. km)	Percentage of forest area
Dense forest	462.4	45
Open forest	338.9	33
Scrub/degraded/grass land	92.4	9
Agriculture/human settlement area	92.4	9
River/ river sand	41.1	4
Total	**1,027.2**	**100**

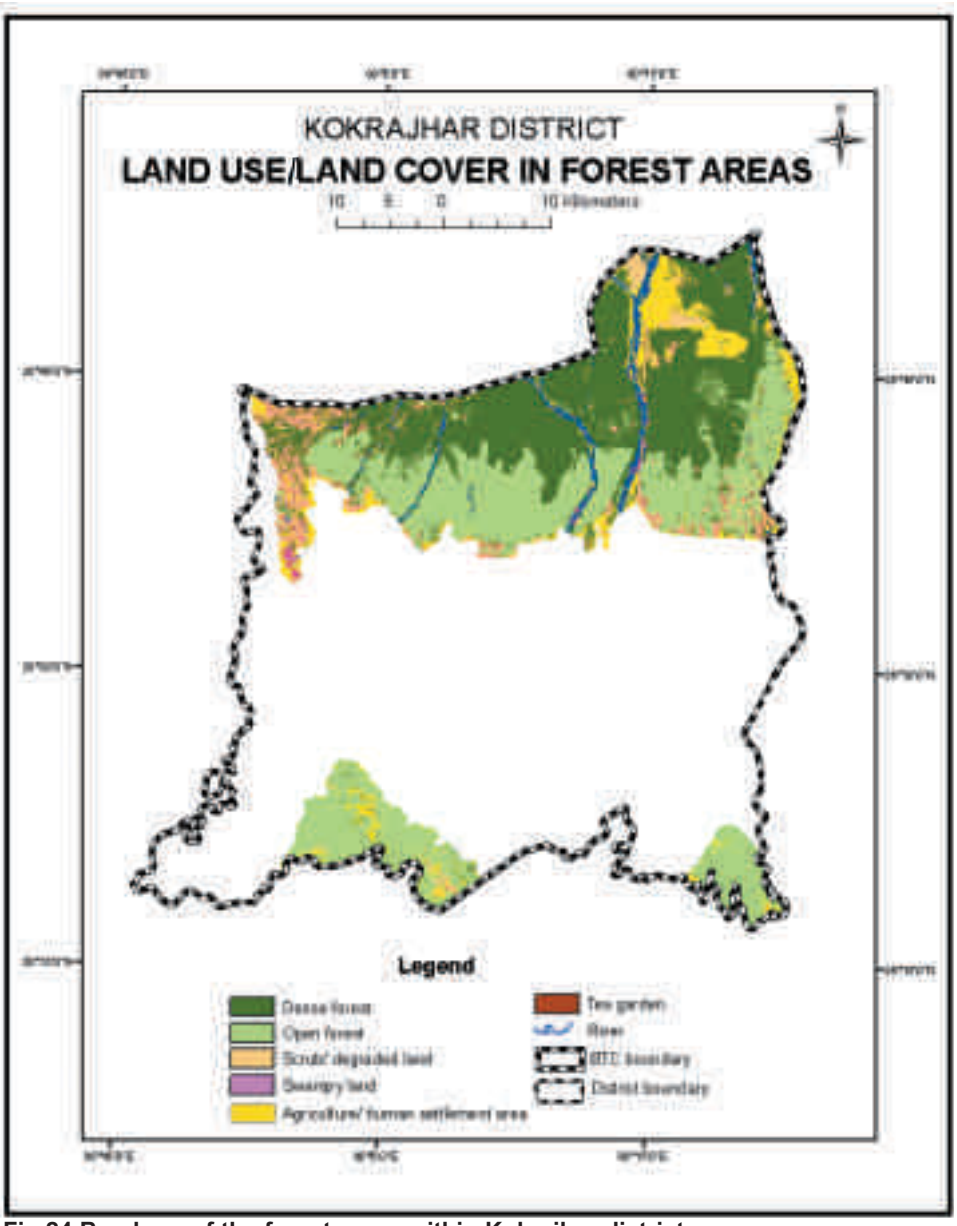

Fig.24 Break-up of the forest areas within Kokrajhar district

Table.10 Land use and land cover and its percentage to the total forest areas in the forest areas of Chirang district

Land use /Land cover	Forest area (in sq. km)	Percentage of forest area
Dense forest	129.9	18
Open forest	324.7	45
Scrub/degraded/grass land	101.1	14
Agriculture/ human settlement area	64.9	9
Swampy area	57.7	6
River/ river sand	43.3	8
Total	**721.6**	**100**

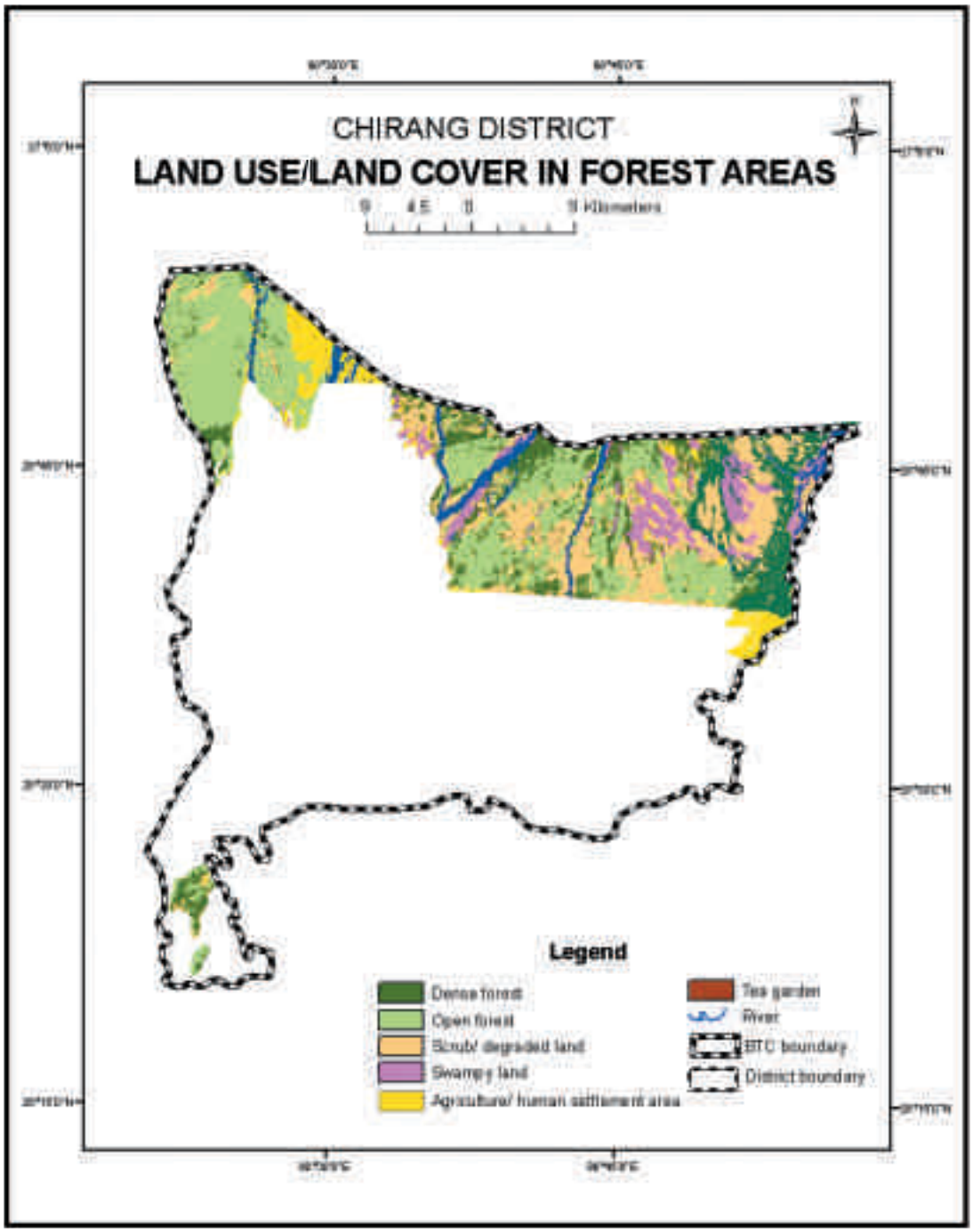

Fig.25 Break-up of the forest areas within Chirang district

Table.11 Land use and land cover and its percentage to the total forest areas in the forest areas of Baska district

Land use / Land cover	Forest area (in sq. km)	Percentage of forest area
Dense forest	280.2	47
Open forest	95.4	16
Scrub/degraded/grass land	119.3	20
Agriculture/human settlement area	47.7	8
Swampy area	23.8	4
River/ river sand	29.8	5
Total	**596.2**	**100**

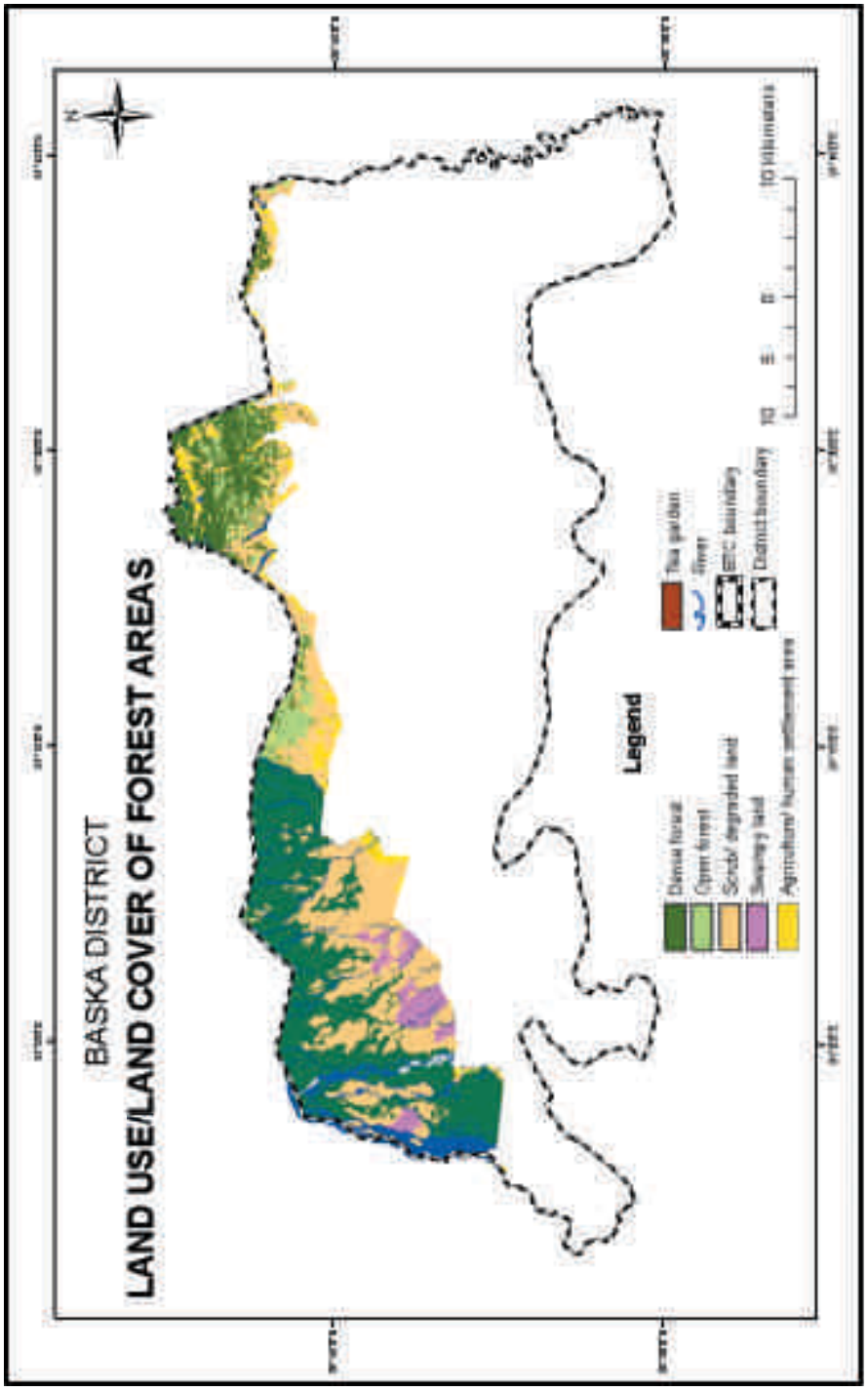

Fig. 26 Break-up of the forest areas within Baska district

Table.12 Land use land cover and its percentage to the total forest areas in the forest areas of Udalguri district

Land use / Land cover	Forest area (in sq. km)	Percentage of forest area
Dense forest	97.8	2
Open forest	65.2	16
Scrub/degraded/grass land	34.7	45
Agriculture/human settlement area	4.5	30
Swampy area	4.3	5
River/ river sand	10.8	2
Total	**217.3**	**100**

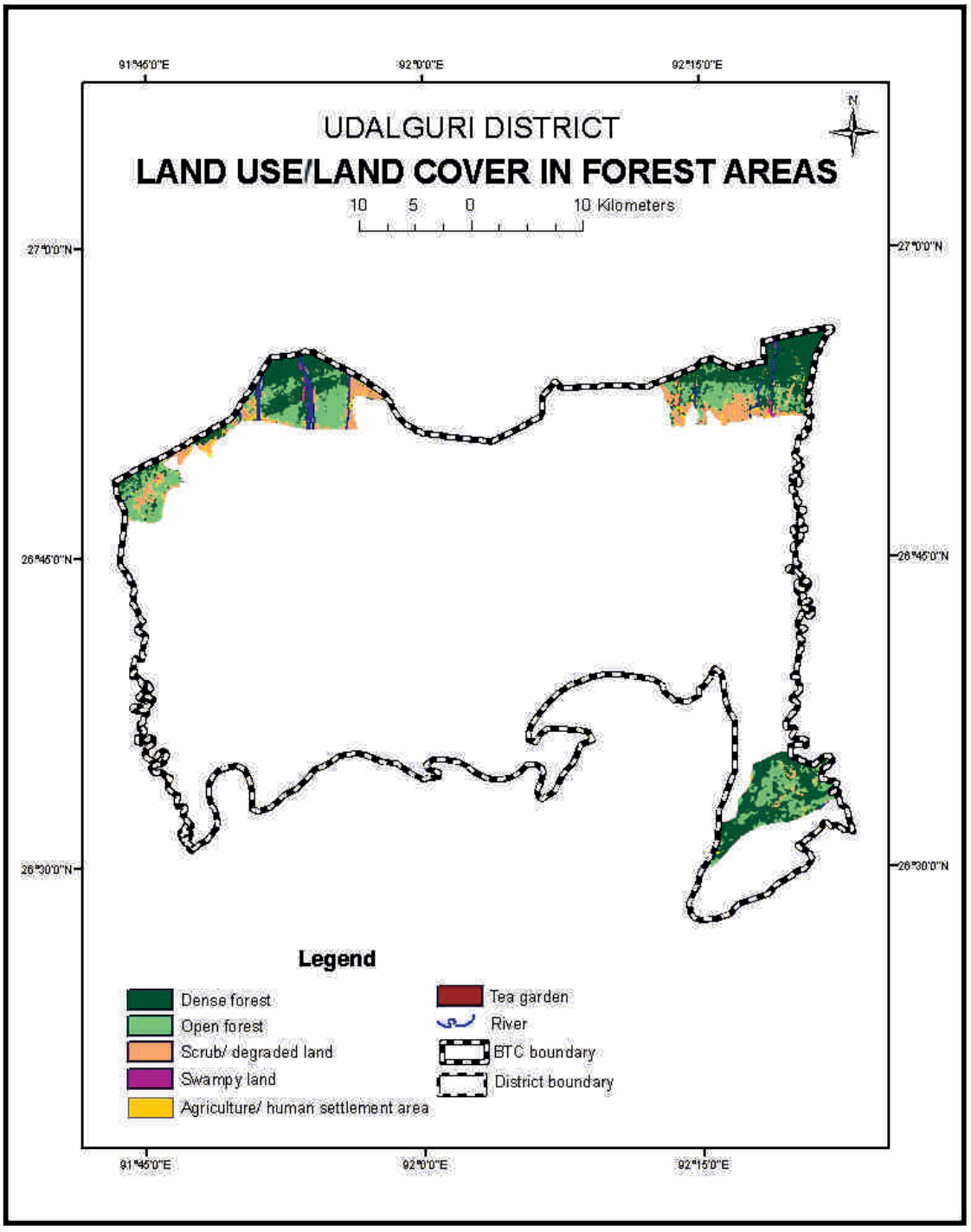

Fig. 27 Break-up of the forest areas within Udalguri district

Out of the total 8,970 sq. km area of Bodoland Territorial Council 6407.7 sq. km area falls under non-forest (71.4%). Non-forest areas include agriculture/ human settlement areas, degraded forest/scrub land/grass land, river/ river bed, swampy area and tea garden. It is found that more than 45 percent of the total non-forest area is under agriculture and human settlement which is followed by degraded forest/scrub land /grass land (Fig 28). The break-up of non- forest areas of BTC is given in Table 13. The land use/land cover in the non-forest areas of BTC are given in Table .14-17 and Fig. 29 - 32 show the areas in the non-forest areas as well as in the forest areas of different districts.

Table 13 Land use and land cover and its percentage to the total non-forest areas of Bodoland Territorial Council

Land use / Land cover	Forest area (in sq. km)	Percentage of forest area
Dense forest	97.8	2
Scrub/degraded/grass land	2,255.5	45.7
Agriculture/human settlement area	2,928.4	5.0
Swampy area	358.8	5.6
River/ river sand	320.4	8.5
Tea garden	544.6	35.2
Total	**6,407.7**	**100**

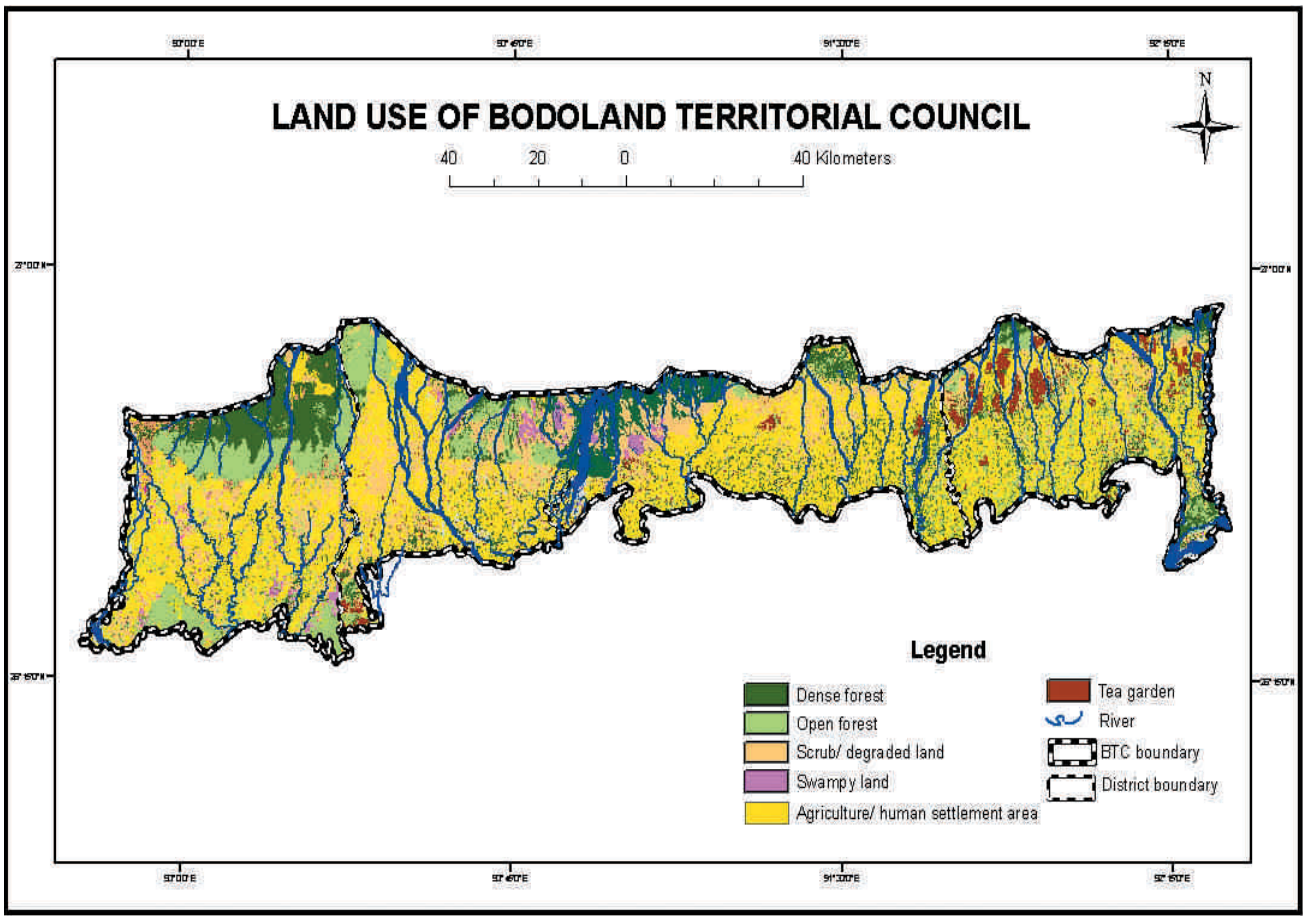

Fig.28 Different land use and land cover in both non-forest and forest areas of Bodoland Territorial Council, Assam

Table 14 Land use and land cover and its percentage to the total non-forest areas in Baska district of BTC

Land use/Land cover	Forest area (in sq. km)	Percentage of forest area
Scrub/degraded/grass land	927.7	53.9
Agriculture/ human settlement area	146.3	8.5
River/ river sand	65.4	3.8
Tea garden	581.7	33.8
Total	**1,721.1**	**100**

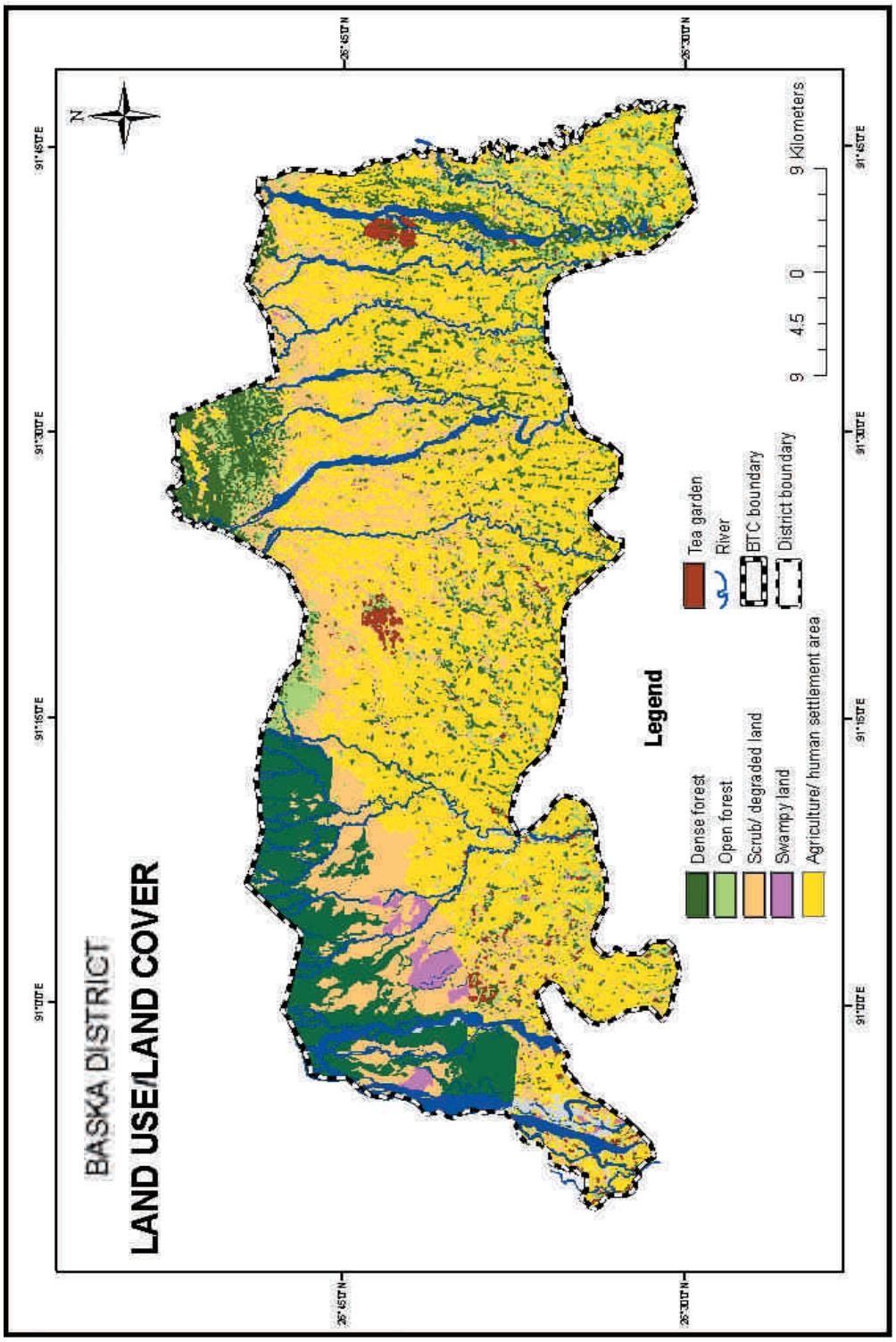

Fig.29 Different land use and land cover in both non-forest and forest areas of Baska district of BTC.

Table .15 Land use and land cover and its percentage to the total non-forest areas in Chirang district of BTC

Land use / Land cover	Forest area (in sq. km)	Percentage of forest area
Scrub/degraded/grass land	723.2	55.3
Agriculture/ human settlement area	400.1	30.6
River/ river sand	113.7	8.7
Tea garden	70.6	5.4
Total	**1,307.6**	**100**

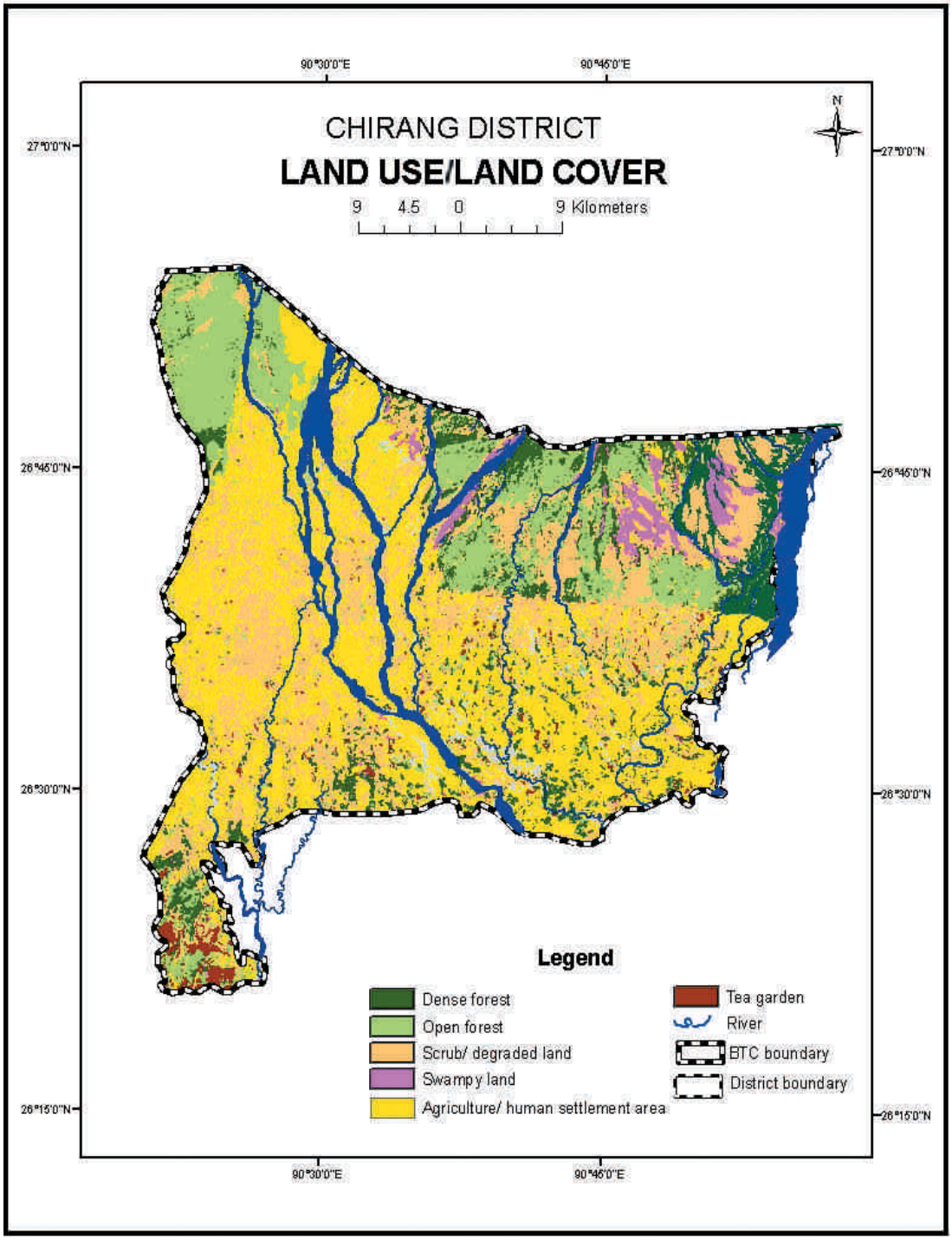

Fig.30 Different land use and land cover in both non-forest and forest areas of Chirang district of BTC

Table 16 Land use and land cover and its percentage to the total non-forest areas in Kokrajhar district of BTC

Land use / Land cover	Forest area (in sq. km)	Percentage of forest area
Scrub/degraded/grass land	279.3	17.9
Agriculture/ human settlement area	1,105.3	71.4
River/ river sand	73.3	4.6
Tea garden	60.8	3.8
Swampy land	30.4	4.6
Total	**1,549.1**	**100**

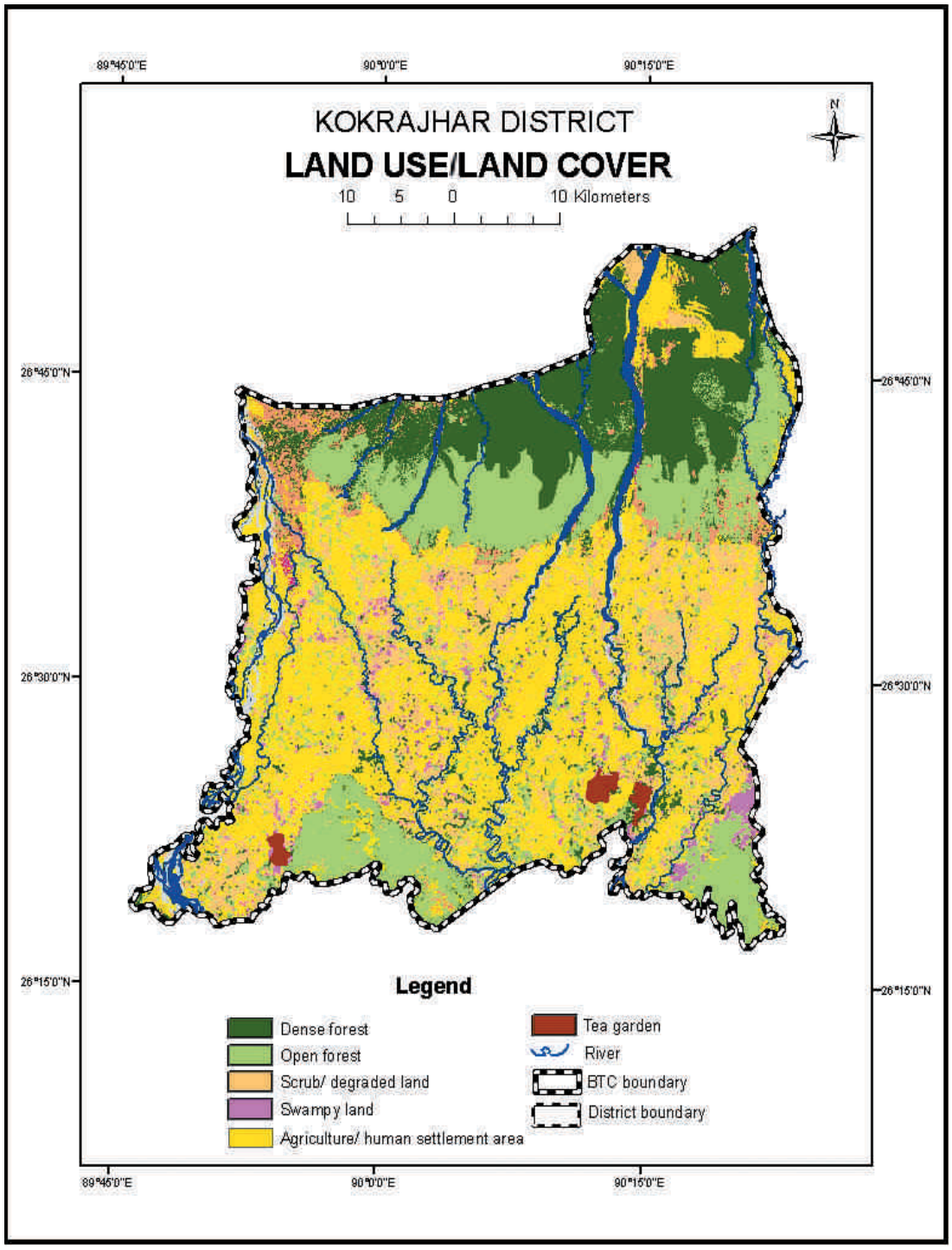

Fig 31 Different land use and land cover in both non-forest and forest areas of Kokrajhar district of BTC

Table 17 Land use and land cover and its percentage to the total non-forest areas in Udalguri district of BTC

Land use / Land cover	Forest area (in sq. km)	Percentage of forest area
Scrub/degraded/grass land	483.1	26.4
Agriculture/ human settlement area	918.6	50.2
River/ river sand	144.6	7.9
Tea garden	263.5	14.4
Swampy land	20.1	1.1
Total	**1,829.9**	**100**

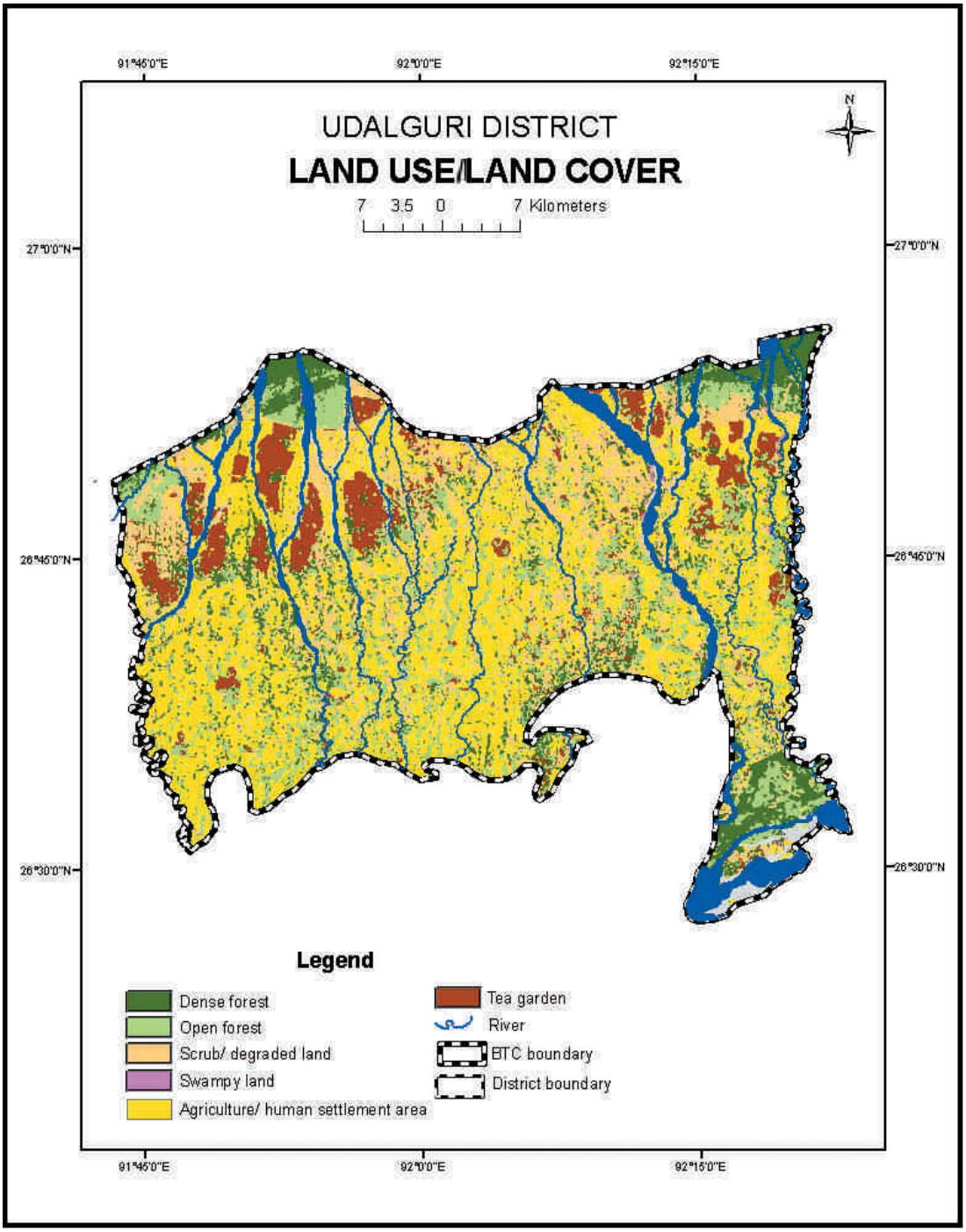

Fig.32 Different land use and land cover in both non-forest and forest areas of Udalguri district of BTC

The land use characteristics and species composition study carried out in forest areas of Kokrajhar and part of Chirang districts revealed that the forest types of the district could be delineated as evergreen forest, miscellaneous deciduous forest, sal forest, scrub/degraded/ grassland and swampy land Fig.33. The break-up of different land use land cover are given in Table 18.

Table 18 Land use and land cover and its percentage to the total forest areas in the forest areas of Kokrajhar district

Land use / Land cover	Forest area (in sq. km)	Percentage of forest area
Evergreen forest	245.5	23.9
Miscellaneous deciduous forest	412.4	40.1
Sal forest	143.4	13.9
Scrub/degraded/grass land	92.4	8.8
Agriculture/ human settlement area	92.4	9.2
River/ river sand	41.1	4.0
Total	**1,027.2**	**100**

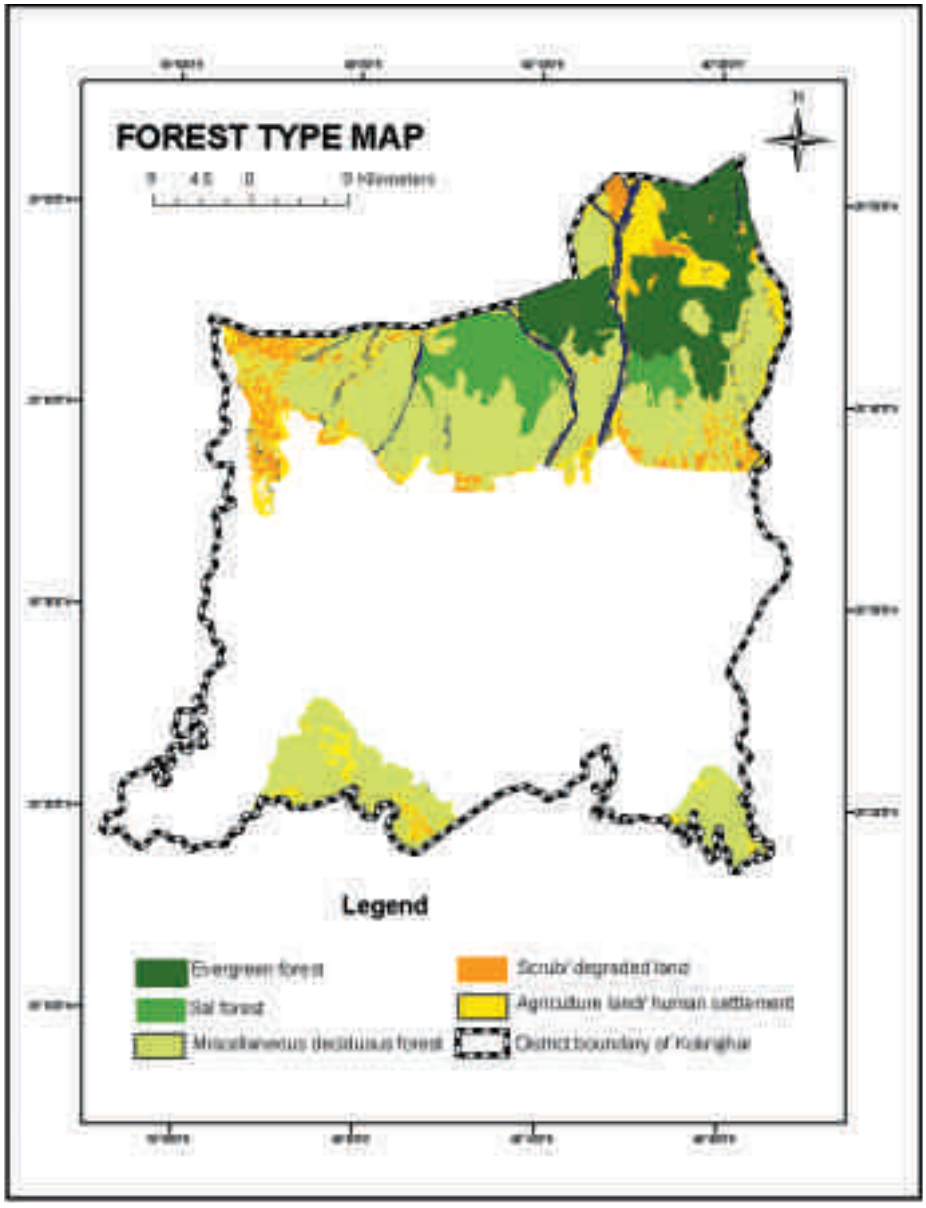

Fig.33 Forest type map of Kokrajhar district

CHAPTER V

Resource extraction and utilisation in Bodoland Territorial Council area

Prabal Sarkar, Rahul Kaul and Sandeep Kumar Tiwari

Introduction

The northeastern region of India is ecologically important because it represents the "transition zone" between Indian, Indo-Malayan and Indo-Chinese bio-geographical regions, and is thus India's richest biodiversity zone. Ironically, this is also amongst the world's most threatened regions. Of the two-biodiversity "hotspots" in India, the eastern Himalayan, where the BTC area is located, is in greater danger than the Western Ghats (Forest Survey of India, 1997). Today, biodiversity is under threat from over exploitation of forest resources and also the need to meet this demand.

Over exploitation of forest resources adversely affects biodiversity as well as ecosystem function (Forester and Machlis, 1996; Kerr and Currie, 1995; Mckinney, 2001; Wakermagel *et al.*, 2002; Harcourt and Parks, 2003). Benefits accruing to people from forests have seldom been estimated, and in most cases partially. This is essential for demonstrating the actual contribution of forests to the society and also for planning sustainability of such extracts. Therefore, there is an urgent need to assess tangible and non-tangible benefits society derived from the forests. The perceived importance of any sector amongst the policy makers and planners is the key to making decisions on investments in any sectoral planning process, and therefore forestry sector should not be an exception.

Policy makers, planners and foresters at the national and international levels are trying to conserve ever-depleting natural resources within the existing socio-political milieu. Solutions to such problems can't be found until studies quantify current level of exploitations and sustainabilities of such extractions. Unfortunately, quantitative data on forest biomass removals by local communities remained fragmentary (Hedge *et al.,* 1996) despite millions of people extracting forests products throughout tropics (Malhotra *et al.,* 1991). Further, the sustainability of these removals has hardly been attempted. Such information is particularly lacking from the north east.

Livelihood patterns of different ethnic groups play a major role in the utilization of their resources and any variations therein. We therefore initiated a study to find out how dependent the local communities were on the forest resources around their settlements. The information obtained as a result could therefore fed into the analysis of the policy on forest and wildlife conservation in the sixth schedule states.

Methodology

Selection of villages

A stratified two-stage design was followed for the survey. Selection of the villages (as per 2001 census) was the first stage while within each village certain households were selected for the questionnaire survey.

From within the four districts of the BTC area, a total of 50 villages (11 in Kokrajhar, 12 in Chirang, 17 in Baksa and 9 in Udalguri districts) were selected at random the number of villages selected from each village corresponding with the size of the district. Within these 50 villages, 519 households were selected in an obligatory random fashion for a detailed enquiry.

Tippet's random number series were consulted for the random selection.

Survey

A pre-formatted questionnaire was prepared and used for the survey after each respondent was apprised of the purpose of the survey. The questionnaire sought to obtain details about the following:

a) Socio-economic status
b) Land holding and resource availability
c) Animal wastes and resource utilization
d) Forest resource and its utilization

Composition of the sample

A total of 519 families were interviewed during this study of which approximately 87% belonged to local tribes and 13% non-tribal (Nepali, *Adibashi*, Bengali, Assamese, Naga and other communities) (Fig.34).

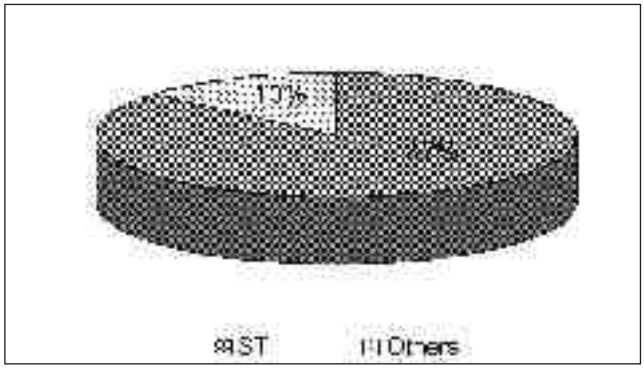

Fig.34 Composition of the sample

Number of people interviewed in different districts varied, depending on the population size of district and location with respect to the forest. In Kokrajhar district, 171 households were interviewed followed by 164 in Baksa, 95 in Chirang and 89 in Udalguri (Fig 35).

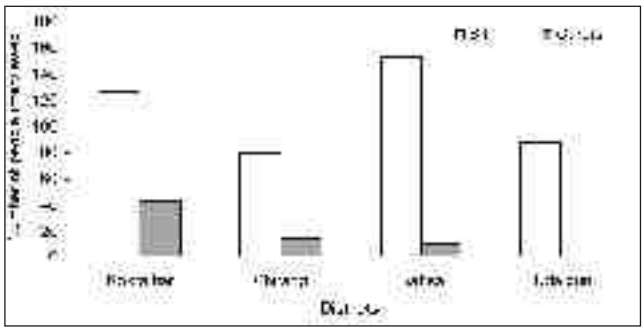

Fig. 35 Sampling effort in different districts of Bodoland Territorial Council

Age-sex composition of the people interviewed

Out of a total of 519 people interviewed, 417 respondents were male and 102 females. A wide range of age classes were selected for interview which varied between ages of 10-20 and to as high as 70 - 80 years. Most of the people interviewed belonged to 31-40 and 41-50 years age classes. Among males, most of the people interviewed belonged to 31-40 age class while in female most belonged to 21-30 age class (Fig. 36).

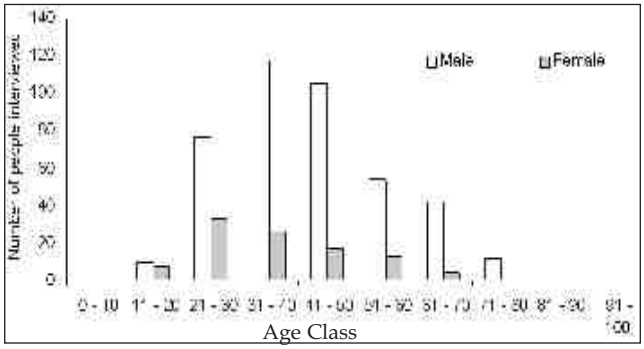

Fig. 36 Age-sex variation among the people interviewed

Age-sex classes of people selected for interview varied in different districts. Highest numbers of males and females interviewed belonged to age classes of 31-40 and 21-30 respectively, except in Kokrajhar district (male : 41-50 years; female: 31-40).

Result

Population (age-sex composition) status

The survey found almost equal sex composition (male: 50.7%; female: 49.3%) in BTC area. Majority of the population within BTC seems to be formed of the 18-50 years age class, followed by the less than 18 years age class (Fig. 37). A similar trend was seen in

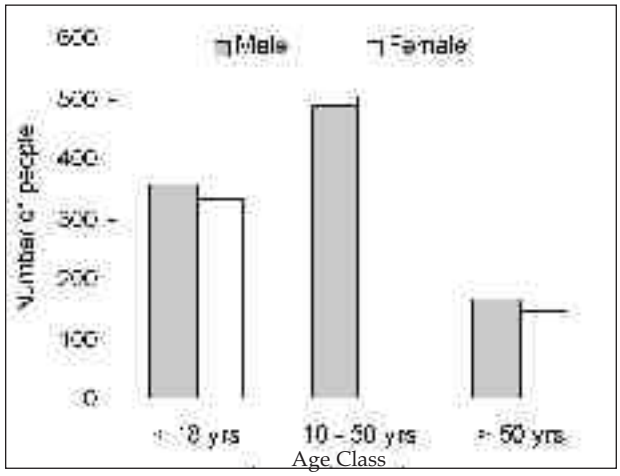

Fig. 37 Age-sex distribution

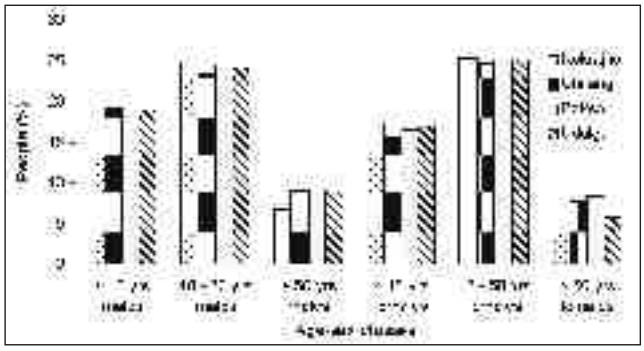

Fig.38 Age-sex distribution in different districts

different districts also. (Fig. 38).

Education status

Most of the people of BTC area had low levels of formal education. A very small proportion of the population was of graduate levels and above (Fig 39).

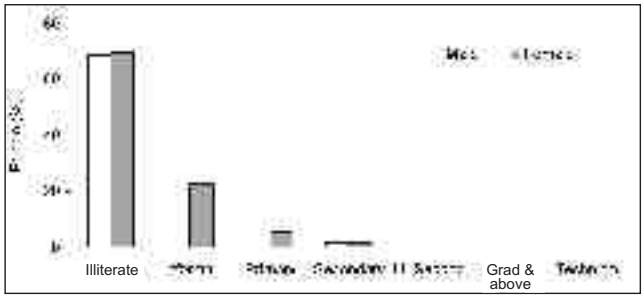

Fig. 39 Education levels across the sample in BTC area

District wise variation in education level among males also showed similar trend. More than 60% of the males were illiterate in all districts of BTC (Fig.40) and about 20% of males had some form of education. During the survey, no people were found to be graduate or with technical qualifications.

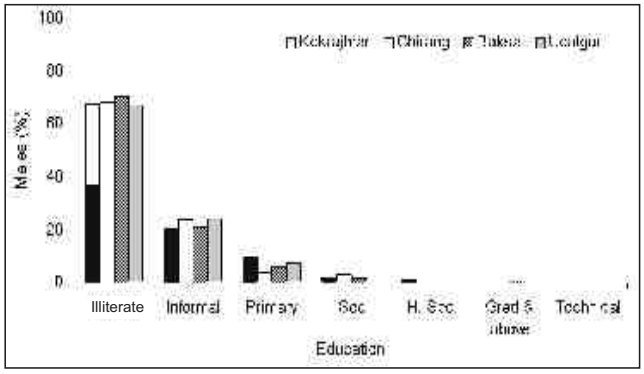

Fig. 40 Education level among males in different districts

Education levels of females in BTC area also showed similar trends as males. More than 60% of the females were illiterate and about 20% of them had informal education (Fig. 41).

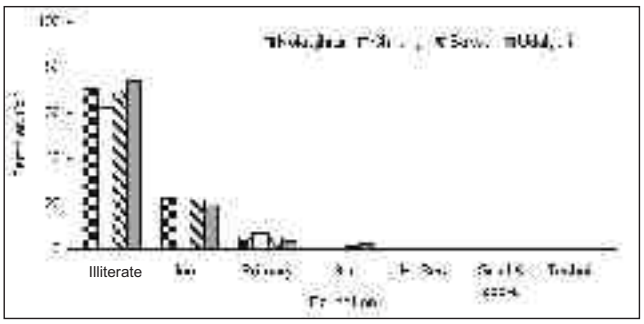

Fig. 41 Education level among females in different districts

Principal occupation

Interestingly, only 4.7% of the total people interviewed were on wages of some form or were salaried. Majority of the people were self employed in agriculture (35.8%) or were students (34.1%) (Fig. 42). About 16.3% were engaged in domestic activities, 4.7% in other economic activity and rest 4.3% of people were engaged in activities with very little earnings.

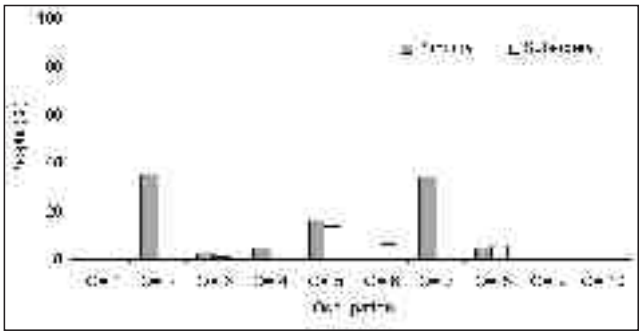

Fig. 42 Occupational distribution

1 : Engaged in forest resource collection,
2 : Self employed in agriculture
3 : Self employed in non-agriculture
4 : Wage and salaried employment
5 : Engaged in domestic duty
6 : Engaged in domestic and other economic activity
7 : Student
8 : Other economic activity
9 : Other non-economic activity
10 : Other

District wise variations in selection of principal occupation also showed similar trends (Fig. 43). Agriculture was the principal occupation (>35%) in every district of BTC followed by domestic work (> 10%). Student constituted of > 10% of the total people interviewed and rest (<10%) were involved in other occupations in every district.

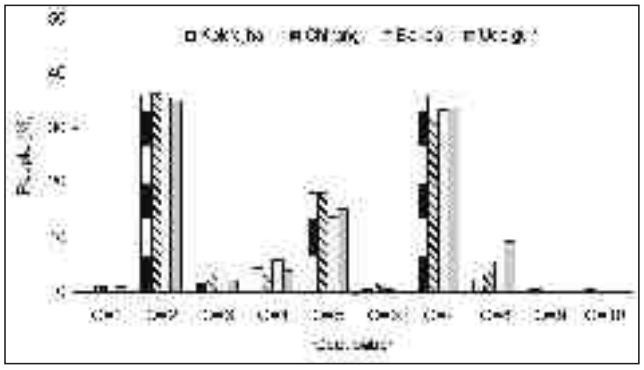

Fig. 43 Occupational distribution by district

1 :Engaged in forest resource collection
2: Self employed in agriculture
3: Self employed in non-agriculture
4: Wage and salaried employment
5: Engaged in domestic duty
6: Engaged in domestic and other economic activity
7: Student
8: Other economic activity
9: Other non-economic activity
10: Other

About 43.9% of the total males were self employed in agriculture followed by 34.2% who were students and rest 21.9% were employed in various other activities (Fig.44). However, occupations in the case of female were split almost equally between home making, agriculture and studies. A highest number (34.02%) of female involved in studies followed by 32.93% engaged in

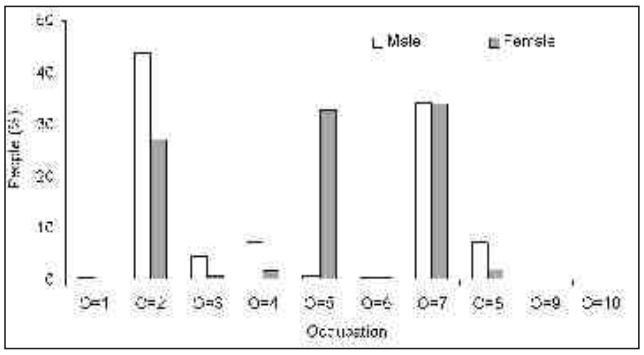

Fig.44 Variation in occupation by gender

1: Engaged in forest resource collection
2: Self employed in agriculture
3: Self employed in non-agriculture
4: Wage and salaried employment
5: Engaged in domestic duty
6: Engaged in domestic and other economic activity
7: Student
8: Other economic activity
9: Other non-economic activity
10: Other

domestic activity, 27.14% self employed in agriculture and 5.91% in other activities. Interestingly, less than 1% of people of both sexes (male - 0.6% and female - 0.24%) depended on collection and sale of forest produce as their principal occupation.

Among males, district wise distribution of principal occupation also showed similar trends (Fig 45).

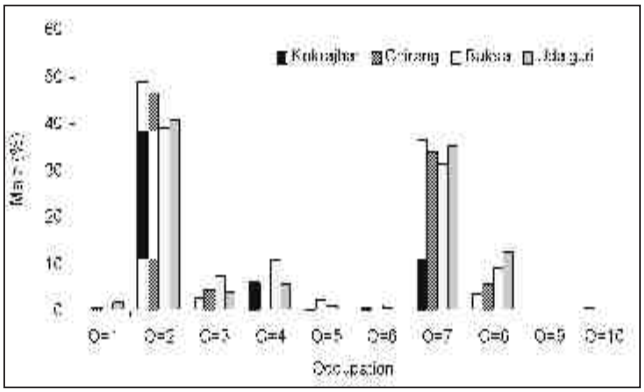

Fig. 45 District wise distribution of principal occupation : Male

1: Engaged in forest resource collection
2: Self employed in agriculture
3: Self employed in non-agriculture
4: Wage and salaried employment
5: Engaged in domestic duty
6: Engaged in domestic and other economic activity
7: Student
8: Other economic activity
9: Other non-economic activity
10: Other

The survey also showed that males and females varied in their choice of occupation.

In females however, the district wise distribution of principal occupation was different when compared to males (Fig. 46). Females were mostly engaged in domestic activities, followed by agriculture.

A majority of the sample (72%) that did not practice agriculture as their primary occupation were involved with agriculture.

Land holding status of the people

On an average, each family of BTC area possessed about 27.9 bighas (1 bigha=1337.8m^2 or 14400 sq.ft) of land of which 26.77 bighas were owned by them. On an average and within a given year, about 38.60% of the land possessed by each

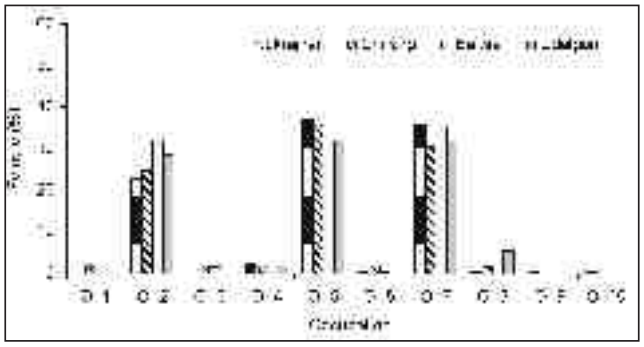

Fig.46 District wise spread of occupation in females

1: Engaged in forest resource collection
2: Self employed in agriculture
3: Self employed in non-agriculture
4: Wage and salaried employment
5: Engaged in domestic duty
6: Engaged in domestic and other economic activity
7: Student
8: Other economic activity
9: Other non-economic activity
10: Other

family was cultivated and about 21.45% left fallow (Fig. 47). Almost similar quantities of land were owned and possessed by each family suggesting possible encroachment or land extensions.

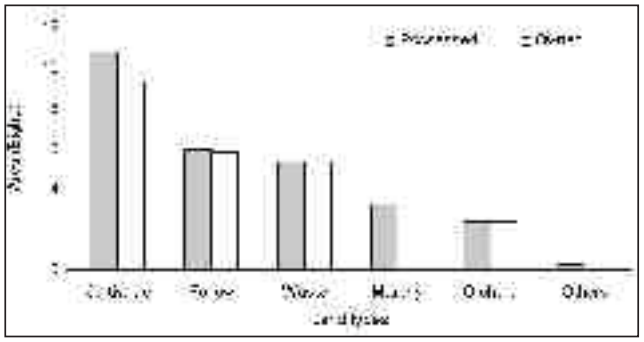

Fig. 47 Land holding per family in BTC area

Similar trend was witnessed for each district in terms of land holdings except in the case of Udalguri district where land holdings for waste and marshy categories were higher than averages (Fig. 48)

Resource from agricultural residue

Extraction of agricultural residue

(A) Types of agricultural residues

Rice bran and straw were the two agricultural residues that were used commonly by the people of the BTC area with theuse of rice bran being more prevalent. (Fig. 49).

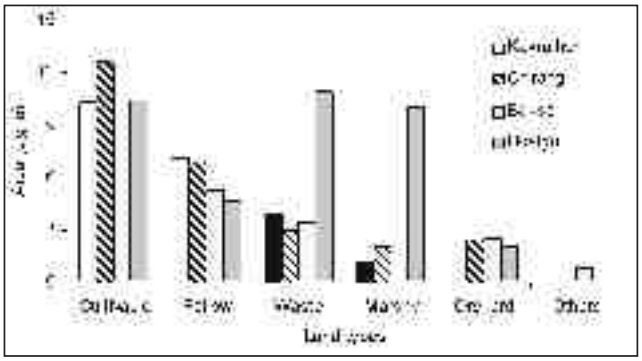

Fig. 48 Land possessed per family in different districts of BTC area

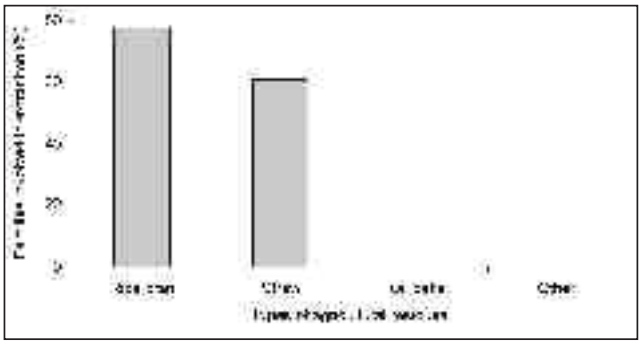

Fig. 49 Use of agricultural residues by people of BTC

Districtwise variation in use of these agriculture by-products was also seen. Though the rice bran was the first choice in every district of BTC, the frequency of use varied in Udalguri district (64.04%) as compared to other districts (about 80%). The dependency on straw, however varied from district to district with a highest of 71.35% in Kokrajhar district and lowest of 43.82% in Udalguri district (Fig.50).

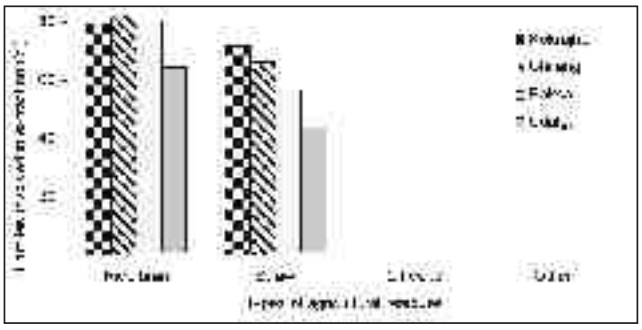

Fig. 50 District wise extraction of agricultural residues

(B) Mode of collection of agricultural residues

About 71% of the people in the sample collected rice bran from their own paddy fields and only about 10.67% of the people purchased it from market. Most people (96.85%) collected straw from their own paddy fields. A negligible proportion of people either

purchased (1.89%) or collected freely from agricultural land of others (0.32%). This indicates that straw is used extensively by people to feed their cattle or construction of houses and is thus consumed almost fully.

(C) Value of agricultural residues

On an average, each family in BTC area collected 676.2 kg of rice bran throughout the year which as per the market, was valued at Rs 2028.60. Similarly, a mean of 11.33 *thela*s (hand cart) of straw worth Rs 1133 were collected by each family in a year. A family thus generated an income (in kind) of about Rs 3100 per year from agricultural residues which mostly supported the family in feeding its cattle.

Some variation in the revenues generated between various districts was observed and this would be expected due to local variations in productivity.

Consumption and sale of agricultural residue

People of BTC collect the agricultural residues (rice bran and straw) mainly for domestic use. A negligible amount of such resource is sold.

Resource extraction from the forest

Kinds of resources extracted

People extracted several types of resources from the forest of which firewood was the major resource (98.84%) followed by timber (85.36%), bamboo (63.78%), grasses (52.22%), cane (1.93%) and medicinal plants (0.77%) (Fig. 51). Clearly, people's reliance on forest is very high and forest plays a major role to sustain the livelihood of the people of BTC area.

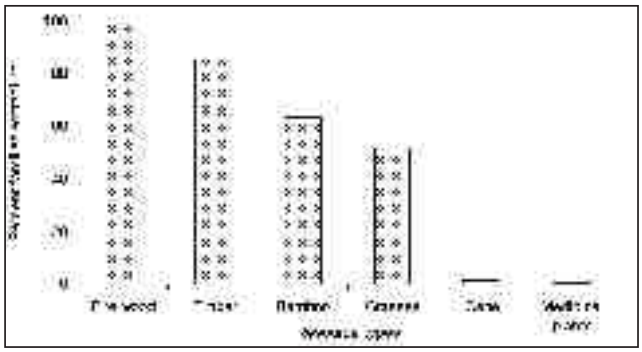

Fig. 51 Types and proportions of forest biomass extracted by people of BTC

People were also dependent on the forests for meat. Although most people (84%) consumed fish, some also depended on reptiles (48%), mammals (34%) and birds (4.6%) (Fig 52). A proportion of the sample also used the forests to extract honey (13.87%). In addition

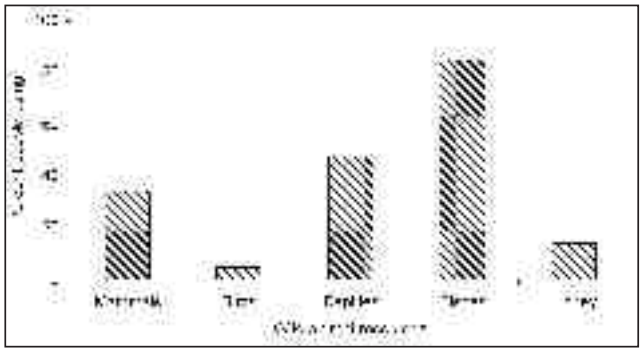

Fig. 52 Animal resources extracted by people in the BTC

to the forest biomass that people get from the forests, in terms of meeting protein requirements of the local people, the forests play an important role and this aspect must not be undermined as it often gets.

Mode of extraction

(i) Plant resources

Almost 48.58% of the people of BTC area collected the plant resources as a free resource from the forest for their own use while 20.87% of the people purchased it from those who collected these resources from the forest. Only 16.87% of the people depended upon the resources grown at home (Fig. 53). The rest (15.20%) depended upon combination of free collection, purchase and home grown resource.

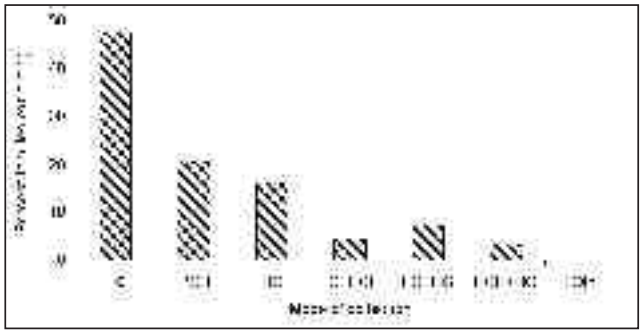

Fig. 53 Extraction of plant resources

(a) Fire wood

On an average approximately 1.37 quintals of fuel wood was used per family every month. Most of the fuel wood need was met by collections from the forest free of cost (69%) and also in some cases, purchase from the market (7.8%).

District-wise mode of collection of fuel-wood also varied. In Kokrajhar, most (98.8%) of the fuel wood collection was done freely from the forest and rest purchased from the market. In Chirang too, a major part of the fuel wood requirement (86%) was freely collected from the forest and only 7.5% of the fuel

wood was purchased from the market. However, relatively less people collected fuel wood freely in Baksa and Udalguri, being 36.2% and 56.2% respectively. In Baksa, about 26.4% of the fuel wood requirement was met from trees grown by the people and 11% people purchased the firewood from the market. About 13.5% of the people met their fuel wood requirement partially by freely collecting from forest and partially by purchasing. In Udalguri, however, about 56.2% of the people met their fuel wood requirement by solely collecting it freely from forest while 14.6% purchased from market. About 9% people met their fuel wood requirement from trees grown locally and 12.4% by partially purchasing and partially growing it.

Thus a major part of the population still appears to be dependent on forest for fuel wood requirement and is collect it free of cost from the forests.

Fig.54 A local Bodo woman carries firewood collected from the forest

(b) Timber

Timber was also extracted by the people for local use and trade. On an average, about 2.16 cft of timber was used per family per month. About 47.2% of the people freely collected the timber from the forest and 37% people purchased it from the market. Rest of the requirement was either extracted from trees grown by the people.

District-wise variation in collection of timber was also observed. Most of the timber in Kokrajhar (64.5%) and Chirang (62.8%) was collected from forest free of cost whereas the corresponding extraction in Baksa and Udalguri district was 24.5% and 38.1% respectively. Most of the timber was purchased in Baksa (49%) and Udalguri (49.2%) from the market.

Fig.55 Illegal timber seized by the Forest Department

(c) Bamboo

Bamboo was also used by local people as poles, for construction of houses and local crafts. Each family used, on an average, 4.6 bamboos per month (approx 55 bamboos per year). Of these, majority (48.6%) grew them in their private land and only about 6% collected them from the forest. The rest collected it from all these sources.

Some variation was, however, seen district wise and about 81% of the people in Chirang district met their demand of bamboo by growing it on their land. In Udalguri district only 33.3% of the people grew bamboo and about 20.8% of the people collected it freely from the forest. Similarly in Baksa, about 43.4% people grew it locally and 28.3% purchased it from the market. Thus most of the bamboo requirement was met from locally grown bamboo in most places except Udalguri.

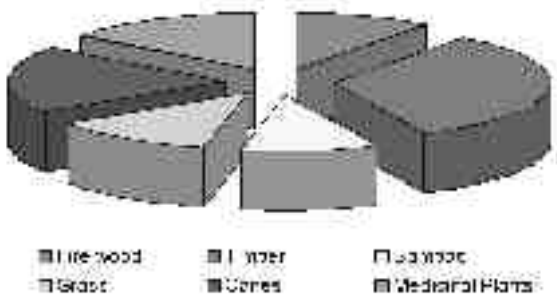

Fig. 56 Value of forest resources per family per month

(d) Grasses, Cane and medicinal plants

Grasses, canes and medicinal plants were also used by the locals but in very small quantities. Cane was collected and used only by the people of Kokrajhar district because of its availability in the district.

(e) Value of extracted forest resources

The total value derived from forest produce averaged Rs 1322 per family/month excluding the value of wildmeat which accounted for Rs 432/-.

Sources of energy

Most of the energy needs for cooking are met by fuel wood. About 96% of the people used fuel wood as major source of energy along with other sources. The other major sources of energy used are kerosene oil (70%), electricity (38%) and LPG (32%). Bio-gas or cow dung was hardly used by people for this purpose. In Udalguri, Baksa and Chirang districts, almost all people used fuel wood. Along with fuelwood, kerosene was reported to be used by 100% of the people in Udalguri, 66.7% in Baksa and Chirang each and 54.5% of people in Kokrajhar.

Conclusion

Large-scale deforestation is the most common problem throughout India. The extent of forest cover in India has more or less stabilized after 1980 due to ban on clear felling. However, forest degradation and small-scale deforestations at local levels still continue. The BTC area is not exception. Large-scale destruction of the forested area has occurred especially in the southern parts of the region, where major settlements lie. Most of the forest cover is now left in the northern areas adjacent to the international border with Bhutan. Most protected areas in the region also lie in the northern parts.

Though majority of the people have access to alternate sources of energy (70% of the people have an access to kerosene followed by 38% to electricity, 32% to L.P.G and only 2% to bio-gas), 98.84% of the total people fully depend on firewood. This is because of low price of fire wood, if purchased from the market, or as was observed during the survey extracted free of cost from the protected forest. Fire wood still seems to be the only choice for cooking because it is a free or a very cheap resource. On an average every month, each household in BTC required about 137 kg of fire wood, most which comes from the forest. This translates to over 720,000 metric tonnes per year of firewood requirement for the entire population of BTC. These are conservative estimates because the suggested requirement of 137 kg of fire wood per family every month, appears rather low. Therefore even with these estimates and considering that this is only for firewood, there is immense pressure on the forests. Steps need to be taken now to secure the remaining forest patches, found mainly in the Kokrajhar district.

Besides fire wood, large-scale destruction of the forest area is going because of over exploitation of timber. About 85.36% of the total people in BTC area was involved in extraction of timber from the forest and in an average 2.16 cft amount of timber are extracted by each family. Almost 50% of the total people extract timber directly from the forest.

Fig.57& 58 Forest resources extraction by residents of fringe villages, Manas National Park

Grass is another commodity which has been extracted from the forest area in very large quantity. Most of the people in BTC depend upon forest for grasses which is either freely extracted from the forest (55.4%) or purchased from other people who also collect from the forest. Similarly, cane and medicinal plants are other commodities which are being extracted from the forest. Therefore, the people's dependency on forests for meeting the requirements of energy and fodder is almost complete and if the forests are to be protected, alternatives must be found and provided.

Large-scale dependency on forest can be related with the socio-economic status and the ethno-behaviour of the people in BTC area. Survey found that most of the people in BTC area have low formal educational levels. Because of this, most of the people may still be unaware about the importance of forest for future environment protection.

Most people in the Bolodand Territorial Council are self employed in agriculture. However, it seems that the agricultural yields are low for there is very little surplus harvest for sale. Thus incomes from agriculture in cash are limited and point towards a forest dependent lifestyle.

Like other tribal states, the Bodo people also hunt wild animals for meat. Less than 10% of the total people admitted to extracting wildmeat from the forest. This again appears to be an underestimate from the wildmeat available in the markets. Obviously, enforcement needs to improve to reduce killing of wild animals.

The population growth rate along with the poor economy of the BTC area is perhaps linked directly to sustainable use of resources. Plans therefore need to be drawn carefully to link conservation of natural resources and their dependency on forests.

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CHAPTER VI

Survey of three divisions of Bodoland Territorial Council for addition into protected area network

Hilaluddin and Kiranmay Sarma

Anecdotal surveys conducted by amateur wildlife lovers have recorded over 200 species of birds from Bodoland Territorial Council (BTC) area. The important avifauna includes globally threatened White-backed vulture (*Gyps bengalensis*) and genetically threatened red junglefowl (*Gallus gallus*). The area harbours several species of primates and ungulates and also the globally threatened Asian elephant (*Elephas maximus*), Indian Bison (*Bos gaurus*), Assamese macaque (*Macaca assamensis*) and golden langur (*Trachypithecus geei*). The forests of BTC area also support a small population of globally threatened flagship species of the ecosystem, the Royal Bangalore Tiger (*Panthera tigris*) and Leopard (*Panthera pardus*).

The forest types available in BTC area ranges from semi deciduous forest in the west with sal as dominant tree species to broad left wet evergreen forest in the east including Khair, Sisso and Riverine Fringing Forests. Champion & Seth (1968) have classified forests of the region into 13 broad categories. Predominately, dry deciduous miscellaneous, moist deciduous miscellaneous and evergreen vegetation are characteristic of the region. Most of the tract was *Shorea robusta, Terminalia* sp. and *Pterospermum* sp. and the whole tract is scattered with low bushes of *Dodonaea viscosa*, *Adhatoda vasica, Jasminum pubesens, Mimosa hamata*, *Eupatorum odoratum* and *Lantana camara*. Though there is no

Fig.59,60&61 Some faunal species found in Manas National Park; Golden langur (*Trachypithecus geei*), Chinese pangolin (*Mauis pentadactyla*), Peacock/Peafowl (*Pavo cristatus*)

study exclusively dealing with biodiversity of the BTC area or for that matter any other related study, there have been some general surveys targeting taxonomical status of vegetation species in this region by Botanical Survey of India. Over 200 species of plants have been recorded.

Most of the research till date has been confined to national parks and wildlife sanctuaries in the BTC area and very little literature exists on wildlife ecology from outside-protected area network. Therefore, the proposed study was designed to document faunal and floral wealth that is found in the forest outside the protected areas in BTC area so that areas with rich biological attributes may be identified for initiating conservation action (if required).

Objectives

Specifically, the objectives of the proposed study were to:

- prepare checklists of tree, shrub and herb species occurring in the forest area under jurisdiction of the BTC government.
- quantify populations of tree, shrub and herb species in the region.
- confirm presence of common bird and mammal species found in the forests of BTC Territory.
- assess populations of bird species and generate encounter rates for most commonly occurring mammal species in the study area.
- prepare distribution maps of primates, elephant and tiger for the BTC landscape.
- identify biologically important areas in need of conservation.

Study area and methods

The study was conducted in the protected forests between the Sankosh river in the west and the Aie river in the the east. The study area was predominantly of plain topography with undulations towards the northern areas close to the international border with Bhutan.

The basic approach in the present study was to visit the area in question and prepare lists of avian and floral communities with their abundances, besides generating mammalian encounter rates and documenting status and distributions of most commonly occurring species and habitats within the area under Bodo Territorial Council. From this, areas containing important faunal and floral assemblages could be identified for future protection.

Design

The geo-referenced land use/land cover maps developed from LISS III satellite image were used to identify major habitats/vegetation types occurring within the study area. The entire study area was divided into 9 km^2 (3 km long and 3 km wide) grids. Over all, the survey team carried out the mammalian presence pilot survey within each grid for generating distribution maps of commonly occurring mammalian species. Representative grids were also selected randomly for subsequent monitoring of avian and floral communities within each major habitat type during the course of study. In all, 36 grids covering major habitats within the BTC area were marked for intensive sampling. The major habitats identified in the study area for our purpose were evergreen forest, dry deciduous miscellaneous forest, moist deciduous miscellaneous forest, sal forest, scrub forest, riverine, plantation and encroached agriculture fallow within the forest boundaries.

Bird observations

Open-width/variable-width point transects were used to collect data on avian communities. Open-width/variable-width point counts have been recommended for collection of data on bird communities in area with homogenous fine grained habitats, where large amount of data area to be collected over a short period of time and where sufficient sample sizes are required for statistical analysis (Bibby *et al.,* 1992). Further, data collected using open-width/variable-width transects have been found to be generally more than those obtained using fixed-width transects. However, probability of a bird that is present, specifically small-bodied ones declines with distance from the observer according to a curve whose shape is not known. A total of 261 such

Fig.62 A white throated kingfisher (*Halcyon symrnensis*), Manas National Park

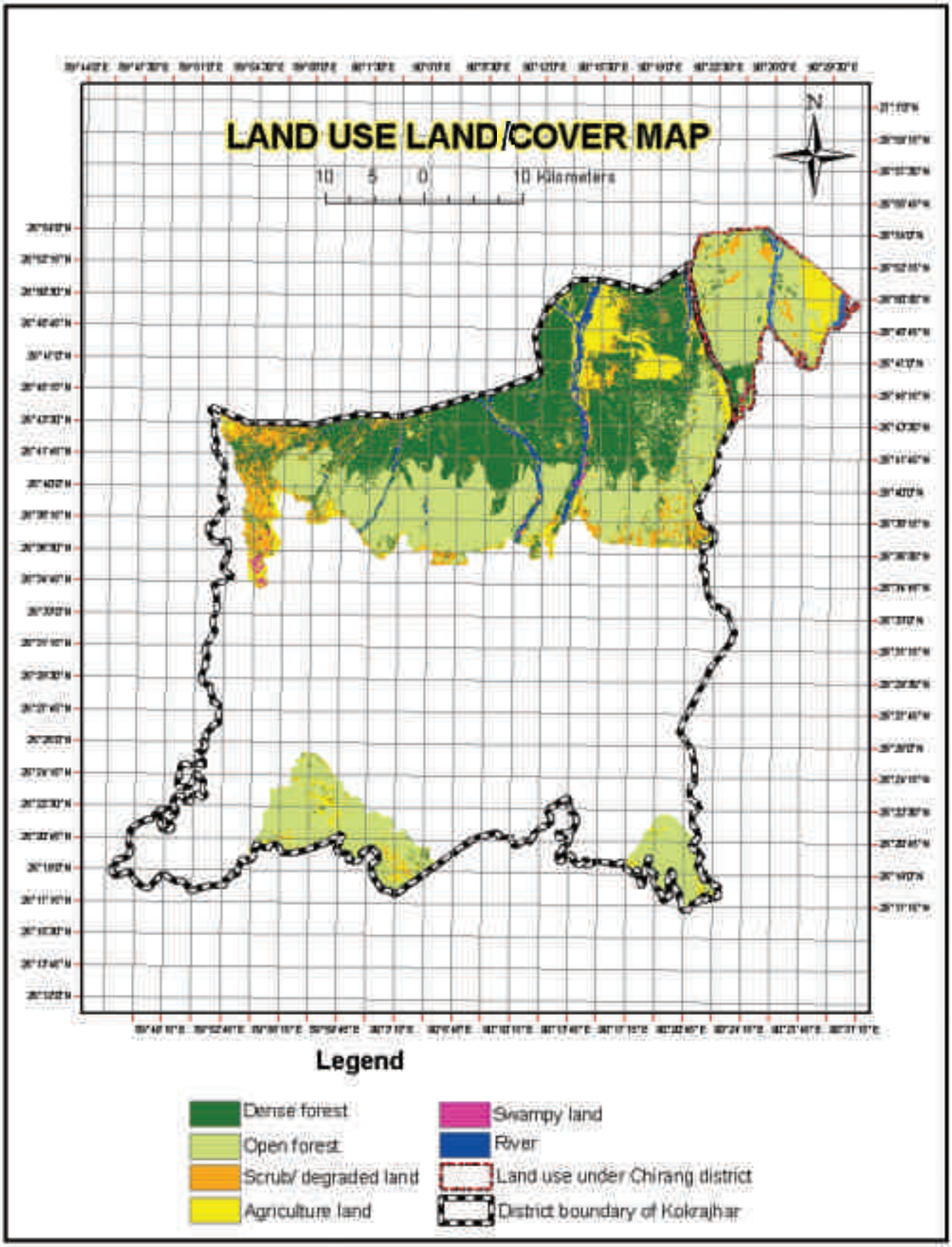

Fig. 63 Map showing land use and land cover of the study area of Kokrajhar and part of Chirang district and 9 km^2 grid overlaid for sampling

transects were covered for sampling during the period of bird survey. At each point/site, birds spotted along with its distance from the observer were identified to species level and their numbers were recorded. Calling birds were also recorded. Birds were identified using Ali & Ripley (1995) and Grimmett *et al.*,(1998). However, nomenclature follows Ali & Ripley (1995). Birds observed to be flying over the area of point transects or soaring overheads were not considered. However, flying birds were recorded if they were flushed out by the observer or observed to be flying into or out of the transect area during the ten-minute duration of the count. Counts were started 15 minutes after the sunrise and continued for three and half hours after that, approximately between 4.45 and 8.15 hours, each morning. Bird observations were made between April and May 2007.

Mammalian survey

The mammalian species seen along with their numbers were recorded during transect walks for bird and vegetation counts. Wherever a mammal species was seen, its numbers were recorded. In some cases, individuals were identified and the sexes and population structure of the group was also recorded. At each sighting, geographical co-ordinates of the point were also recorded. It was thus possible to place the location of the animal on the appropriate grid on the map.

Vegetation characteristics

Vegetation composition of trees, shrubs and herbs within each major forest type was assessed. For the purpose, sample points along prominent trails/transects within selected grids were selected at 500 m regular distance. The plots were located at 15 m distance on either side of transect/trail to avoid the

Fig.64 Assamese macaque (*Macaca assamensis*), a common mammalian species of BTC

relatively disturbed vegetation found there. The circular plots of various sizes were laid at each sample point to quantify perennial woody species (tree & shrub) populations, whereas annual herbaceous vegetation (herbs & grasses) were enumerated in square plots within each point transect. The layout of sample plots was according to systematic sampling strategy with random start method (Muller-Dombois & Ellenberg, 1974; Causton, 1988). At each sample point a 10 meter radius circle was established. Within 10 meters radius of the central point of each point transect, all trees having a basal girth of 31 cm or above were identified to species and their numbers

Table .19 Tree species richness in various habitats under BTC forest area
NB: Values in parenthesis are the sample sizes in each forest type

Habitat	Species richness		Species equity	
	Mean	SE	Mean	SE
Dry Deciduous Mixed Jungle Forest (63)	4.37	0.13	0.16	0.01
Evergreen Forest (18)	6.03	0.34	0.09	0.01
Moist Deciduous Miscellaneous forest (34)	3.06	0.29	0.11	0.01
Sal Forest (31)	5.16	1.16	0.12	0.12
Scrub (11)	1.89	0.36	0.38	0.04
Overall	1.76	0.16	0.27	0.0[illegible]

Table 20 Shrub species diversities in various habitats under BTC forest area
NB: Values in parenthesis are the sample sizes in each forest type

Habitat	Species richness		Species equity	
	Mean	SE	Mean	SE
Dry Deciduous Miscellaneous Forest (63)	1.8	0.11	0.18	0.02
Evergreen Forest (18)	2.33	0.25	0.38	0.06
Moist Deciduous Miscellaneous Forest (34)	2.12	0.22	0.36	0.06
Sal Forest (31)	1.9	0.18	0.31	0.02
Scrub (11)	1.64	0.28	0.42	0.03

were counted. After tree enumeration, another circle of 3 meters radius at the central point of the same sample point was established. Within this circle, all shrub species were identified to species and their numbers were counted. A square plot of 1 m^2 area was also established at the same point. Herbaceous annual plants falling within this plot were identified to species and their numbers were counted.

Data analysis

Bird density on a given transect was calculated as a cumulative number of individual birds of each species that were seen at a given site. Bird species richness was calculated as the cumulative number of bird species seen in a point (Ludwig & Reynolds, 1988), whereas general bird diversities and bird equities were calculated in accordance to Shannon-Wiener (1963) and Hill's modified ratio (Hill, 1973), respectively. Diversity indices take into account both number of species present in a given site, as well as their relative proportions in a community. More diverse communities exhibit greater evenness of abundance across species and harbour greater number of species. The mammalian encounter rates were generated as number(s) of animals of a particular species seen per km walk of transect.

Species composition of a community indicates the identity of a species and their relative abundance in the community. In such cases, the identity of individuals becomes important rather than simply number of species. In order to study the variations in bird species composition across various habitats in BTC area, a series of non-parametric tests were used to examine quantitative differences of bird densities, diversities, equities and richness among various habitats following (Sokal & Rohlf, 1995).

While vegetation densities of each plant bio-morph at each sample unit was calculated following Curtis & Mcltonish (1950), their general diversity (H') was computed in accordance to Shannon-Wiener (1963). Species richness of each plant bio-morph was calculated as total number of species of that life-form occurring in a sample unit (Ludwig & Reynolds,

Table 21 Herb species diversities in various habitats under BTC forest area
NB: Values in parenthesis are the sample sizes in each habitat

Habitat	Species richness		Species equity	
	Mean	SE	Mean	SE
Dry Deciduous Miscellaneous Forest (63)	4.06	0.24	0.3	0.04
Evergreen Forest (18)	2.78	0.24	0.33	0.0[illegible]
Moist Deciduous Miscellaneous Forest (34)	3.56	0.3	0.32	0.07
Sal Forest (31)	4.32	0.36	0.29	0.05
Scrub (11)	1.83	0.28	0.34	0.05

1988), whereas their equities are presented as Hill's modified ratio (Hill 1973). Means ± standard errors are presented throughout.

Results

Vegetation structure and composition

A total of 136 tree species (annexure 6), 53 shrub species (annexure 13) and 61 herb species (annexure 19) were recorded during survey. Tree species along with their densities in dry deciduous miscellaneous forest, moist deciduous miscellaneous forest, evergreen forest, sal forest and scrub forest are given in annexures 7, 8, 9, 10 and 11 respectively.

Maximum tree species were recorded from dry deciduous miscellaneous forest and moist deciduous miscellaneous forest (71 species from each forest type) and mainly represented by *Dillenia pentagyna*, *Lagerstroemia parvilora, Castanopsis indica.* Minimum species richness (12) was observed in scrub forests where the most common tree species was *Moringa angustifolia.* Fifty-two and forty species were recorded from evergreen forest and sal forest, respectively. The sal forests mostly had species like *Shorea robusta* associated with *Albizia amara, Dillenia pentagyna* and *Terminalia arjuna.* The evergreen forests mainly had lapchey, *Mesua ferea and Moringa angustifolia.*

Average tree species richness, diversities and equities in various forests types in the study area are given in table 22. Species effort curves for tree species for dry deciduous miscellaneous forest, sal forest, moist deciduous miscellaneous forest, evergreen forest and scrub forest (annexure 34) seem to tend upright, implying that tree inventorisation in the study area is still incomplete and requires further investigations.

It is obvious from the table 19 that species richness was highest in the evergreen forests followed by sal forests. Scrub forests were the most impoverished in terms of richness.

Shrub species with their densities recorded from dry deciduous miscellaneous forest, moist deciduous miscellaneous forest, evergreen forest, sal forest and scrub forest are given in annexures 16-20. Species effort curves for shrubs in dry deciduous miscellaneous forest, moist deciduous miscellaneous forest, sal forest, evergreen forest and scrub forest (annexure 34) are tending upright. Average shrub species richness, diversities and equities in various forests types in the study area are given in table 20.

Shrub richness was highest in the evergreen forests followed by the moist deciduous miscellaneous type. Scrub forest, surprisingly had the least shrub richness. Herb species with their densities recorded from dry deciduous miscellaneous forest, moist deciduous miscellaneous forest, evergreen forest, sal forest and scrub forest are given in appendices 19-23. Average herb species richness, diversities and equities in various forests types in the study area are given in table 21. Species effort curves for herbs in dry deciduous miscellaneous forest, moist deciduous miscellaneous forest, sal forest, evergreen forest and scrub forest (annexure 34) are tending upright.

Highest herb richness was recorded from sal forests followed by the dry deciduous forests.

Bird communities

A total of 270 birds were recorded during the course of present study (annexure 24) from the study area under the jurisdiction of BTC. Of these, 246 were recorded on transects during point counts and the rest outside the point transects. The latter category includes species such as blue rock thrush (*Monticola solitarius*), blue-eared bee-eater (*Nyctyornis athertoni*), crested serpent eagle (*Spilornis cheela*), Gadwall (*Anas strepera*), Himalayan tree creeper (*Certhia himalayana*), Indian river tern (*Sterna aurantia*), kaleej pheasant (*Lophura leucomelana*), koel (*Eudynamys scolopacea*), Indian jungle nightjar (*Caprimulgus indicus*), marsh sandpiper (*Tringa stagnatilis*), moorhen (*Gallinula chloropus*), pheasant-tailed jacana (*Hydrophasianus chirurgus*), red-breasted falconet (*Microhierax caerulescens*), shikra (*Acipiter badius*), spoonbill (*Platalea leucorodia*), spotted-winged grosbeak (*Cocothraustes melanozanthos*), tree sparrow

Fig.65 Great Indian hornbill(*Buceros bicornis*) Ultapani, Greater Manas, Assam

Table 22 Bird species diversities in various habitats under BTC forest area
NB: Values in parenthesis are the sample sizes in each habitat

Habitat	Species richness		Species diversity		Species equity	
	Mean	SE	Mean	SE	Mean	SE
Dry Deciduous Miscellaneous (57)	8.36	0.37	0.93	0.02	0.34	0.005
Plantation and Agriculture Fallow (3)	10.40	1.50	0.99	0.02	0.38	0.02
Evergreen Forest (26)	7.31	0.51	0.81	0.03	0.26	0.008
Moist Deciduous Miscellaneous (16)	8.75	0.15	0.92	0.02	0.35	0.002
Plantation (9)	9.33	1.47	0.84	0.05	0.34	0.005
Riverine (28)	8.53	0.57	0.89	0.01	0.37	0.02
Sal Forest (50)	8.52	0.41	0.9	0.02	0.35	0.005
Scrub (39)	8.51	0.54	0.89	0.03	0.37	0.01
Overall	8.52	0.19	0.9	0.01	0.36	0.003

(*Passer montanus*), wedge-tailed green pigeon (*Treron sphenura*), white-breasted waterhen (*Amaurornis phoenicurus*), yellow-winged fantail flycatcher (*Rhipidura hypoxantha)* and rufous owlet.

A total of 136 bird species were recorded from dry deciduous miscellaneous forest (annexure 25). Highest mean densities were recorded for species like the Great hornbill (*Buceros bicornis*) (Fig.65). Ashy drongo (*Dicrurus adsimilis*), blue-eared barbet (*Megalaima australis*), red-breasted parakeet (*Psittacula alexandri*) and hill myna (*Gracula religiosa*). However, most of these species were not distributed uniformly as if evident from the large standard errors associated with the mean density values.

The moist deciduous miscellaneous forest revealed 104 species with maximum mean for Fire-tailed sunbird (*Aethopyga ignicanda*), followed by ashy prinia (*Prinia socialis*), red-vented bulbul (*Pycnonotus cafer*), yellow bellied-flowerpecker (*Dicaeum lanoxarithum*) and Hill Myna (*Gracula religiosa*) (annexure 26).

Sixty seven species were recorded from the evergreen forests where the blue-eared barbet had the highest density followed by the red-breasted parakeet, the scarlet minivet (*Pericrocotus roseus*), and the dusky leaf warbler (*Phylloscopus furcatus*) (annexure 27).

From riverine habitat 83 species were recorded (annexure 28), and showed high densities for Great hornbill, red-breasted parakeet and white-cheeked bulbul. We recorded 92 species from sal forest (annexure 29), and red-breasted parakeet, pygmy woodpecker, yellow backed sunbird and blue-throated barbet recorded the highest densities. Ninety one species were reported from the scrub forest (annexure 30), where most densely distributed species

Table 23 Distribution of hornbill across different habitat types in the study area (shaded area indicates presence).

Species	Dry deciduous	moist deciduous	evergreen	riverine	sal forest	scrub forest	plantations	jhum fallow
Common Grey Hornbill								
Great Pied Hornbill								
Indian Pied Hornbill								
Wreathed Hornbill								

was the common myna followed by the red-breasted parakeet. Habitat types like plantations and encroached areas within the forests were also surveyed. Thirty six species were reported from plantation (annexure 31) and 27 from encroached agriculture fallow habitat (annexure 32).

Bird density

Comprehensive lists of bird species, with their densities, recorded from dry deciduous miscellaneous forest, moist deciduous miscellaneous forest, evergreen forest, riverine habitat, sal forest, scrub forest, plantation and encroached agriculture fallow habitat under BTC Territorial Forest Divisions are given in annexures 25, 26, 27, 28, 29, 30, 31 and 32 respectively. Statistically significant variations (x^2 7 = 16.86, p = 0.02, Kruskal-Wallis) in bird densities were observed among these habitats. Bird densities were higher in dry deciduous miscellaneous forest (467.45 mean ± 108.96 SE) as compared to encroached agriculture fallow habitat (386.17 mean ± 93.83 SE), evergreen forest (302.13 mean ± 44.0 SE), sal forest (276.01 mean ± 37.79 SE), scrub (262.55 mean ± 32.16 SE) and riverine habitat (237.58 mean ± 44.04 SE). Surprisingly, lower densities of birds were recorded from moist deciduous miscellaneous forest (211.9 mean ± 34.38 SE) than plantation (233.54 mean ± 47.98 SE).

Although the bird richness lists did not asymptote in most cases, the survey does reflect a bird distribution trend and we believe that the lists may not have been dramatically different from the present ones.

Bird densities showed variations between various forest types and this is expected because of the difference in the vegetation composition of each forest type. Thus we found more hornbills in riverine forests and more barbets in the evergreen forest type.

Table 24 Distribution of various species of woodpeckers across forest types in the study area.

Species	Dry deciduous	Moist deciduous	Evergreen	Riverine	Sal forest	Scrub forest	Planta tions	Thani fallow
Great Slaty Woodpecker				■				
Grey crowned Pigmy Woodpecker	■	■		■	■			
Indian Golden-backed Three toed Woodpecker			■					
Large Golden-backed Woodpecker	■	■	■	■	■			
Large Yellow-naped Green Woodpecker	■	■	■	■	■	■		
Lesser Golden backed Woodpecker	■		■	■	■		■	■
Lesser Yellow naped Green Woodpecker		■						
Lesser Yellow-naped Green Woodpecker	■							
Pale headed Woodpecker	■							
Pigmy Woodpecker		■		■				
Red eared Bay Woodpecker			■					
Rufous Woodpecker	■	■	■	■	■	■		

Bird diversity

Mean species richness, equities and diversities in dry deciduous miscellaneous forest, moist deciduous miscellaneous forest, evergreen forest, sal forest, scrub forest, riverine habitat, plantations and encroached agriculture fallow habitat are given in Table 22. The most important groups in terms of species richness were Charadridae, Columbidae, Capitonidae, Picidae, Muscicapidae, Nectarinidae and Ploceidae. The species effort curves (appendix 28) revealed that the present species detection efforts are inadequate and more such efforts are required in each habitat as most of the curves are tending upwards. Kruskal-Wallis test revealed that species richness (x^2 7 = 10.91, p = 0.14), equities (x^2 7 = 7.19, p = 0.41) and diversities (x^2 7 = 10.37, p = 0.17) did not show statistically significant variations in dry deciduous miscellaneous forest, moist deciduous miscellaneous forest, evergreen forest, sal forest, scrub forest, riverine habitat, plantation and encroached agriculture fallow habitat. A perusal of table 24 revealed that species richness and diversity were higher in encroached agriculture fallow habitats as compared to others. This could have been a result of low sample sizes in agriculture fallows and plantations. However, more equitable distribution of species was observed in scrub forest, evergreen forest and riverine habitats as compared to dry deciduous miscellaneous forest, moist deciduous miscellaneous forest, sal forest and plantation.

Distribution of flagship species

Although very few threatened species were seen during this survey and the distribution was largely

Table 25 List of mammal species seen with their encounter rates in the BTC forests
NB: *denotes indirect sightings of species

Species		Animals seen per km walk
Common Name	Scientific name	
Asian Elephant	*Elephas maximus*	0.21
Assamese Macaque	*Macaca assamensis*	0.31
Barking Deer	*Muntiacus muntjak*	0.13
Black-naped Hare*	*Lepus nigricollis*	
Cheetal or Spotted Deer	*Axis axis*	0.07
Eastern Common Giant Flying Squirrel	*Petaurista philippensis*	
Five-striped Squirrel	*Funambulus pennanti*	
Fulvous Fruit Bat	*Rousettus leschenaulti*	
Gaur*	*Bos gaurus*	
Golden Langur	*Trachypithecus geei*	1.42
Grizzled Giant Squirrel	*Ratufa macroura*	
Himalayan Palm Civet	*Paguma larvata*	
Hoary-bellied Squirrel	*Callosciurus pygerythrus*	0.16
House Mouse	*Rattus rattus*	
Indian Flying Fox	*Pteropus giganteus*	
Indian Jackal	*Canis aureus*	
Indian Leopard*	*Panthera pardus*	
Indian Porcupine	*Histrix indica*	
Indian Tiger*	*Panthera tigris*	
Indian Wildboar	*Sus scrofa*	
Leopard Cat	*Felis bengalensis*	
Rhesus Macaque	*Macaca mulatta*	0.76
Small Indian Mongoose	*Herpestes auropunctatus*	
Yellow-throated Martin	*Martes flavigula*	

uniform with several species overlapping between forest types and cover categories, distribution of species like hornbills, pheasants and woodpeckers must be assessed to afford appropriate protection to such areas. Four species of hornbill were recorded and these were – the common grey (*Tokus birostris*), the Great pied (*Buceros bicornis*), the Indian pied (*Anthracoceros malabaricus*) and the wreathed (*Rhyticeros undulatus*). Of these the least common was the common grey which was found in the riverine forests.

The wreathed hornbill was found in most forest types. The great pied hornbill was also distributed across all types with good tree density (Table 23). However large variances in their mean density values indicate that this species had clumped distribution, perhaps due to their communal roosting behaviour.

This survey also recorded as many as 12 species of woodpeckers. The most commonly distributed woodpeckers were the large golden-backed, large yellow naped, lesser golden backed and the rufous woodpecker, all occurring in six of the eight categories of forest. The richest forest type in terms of the woodpecker richness were the dry deciduous and the riverine forests, which had seven of the 12 species found. The plantations and the agriculture fallows had the least (1) species (Table 24).

The two species of pheasants – the Indian peafowl (*Pavo cristatus*) and the red junglefowl (*Gallus gallus*) were found in all forest types except agricultural fallows. However a third type – the kalij pheasant was seen but not during systematic observations.

Seven bird species – blue throated barbet, crimson breasted barbet, red vented bulbul, red turtle dove, red breasted parakeet, Indian roller and large cuckoo shrike occurred in all forest types whereas there were 120 species that were found present in only one forest type, suggesting some pattern of rarity in about half of the species detected.

Therefore, each forest type showed some peculiarities in terms of bird distributions and needs to be preserved. However, the more important forest types from the point of view of important species appear to be the riverine forests, the dry and moist deciduous forests and the sal forests. The miscellaneous deciduous forests extend from almost the Sankosh river in the west to Simlaguri and Bhur areas, east of Longu river in the east in a band of approximately 20 km width. The north-western parts of the Chirang District, bordering the Kokrajhar district in the northwest also have this forest type. The sal forests are confined to areas north of Kachugaon, between Phekhua river in the west and Singhi river in the east. A smaller patch of Sal also exists east of river Saral Bhanga northeast of Amguri settlement in Haltugaon division. The evergreen forests are found pre-dominantly in the north, bordering Bhutan.

Status and distribution of mammals

The survey was conducted to obtain information on the distribution of a few key mammalian species of this region. The species were primates, elephant, tiger. During the course of the survey, presence of at least 24 mammalian species in Haltugaon, Aie Valley and Gossaigaon Territorial Forest Divisions was confirmed (Table 25). The list is prepared on the basis of direct and indirect sightings.

Primates

The forests of these divisions harbour three species of primates. The golden langur (*Trachypithecus geei*) is the most commonly occurring species in all major forest types found in the study area. Assamese macaque (*Macaca assamensis*) and rhesus macaque (*Macaca mulatta*) were seen living together in the same troop in the region. Interestingly, a male of latter species was observed mating with the female of the former species in one occasion.

The golden langur was the most frequently encountered mammal, and was seen in 32% of the grids surveyed followed by the rhesus macaque, being sighted in 24% of the grids surveyed. In terms of its distribution, the golden langur was distributed across the survey area in contrast to the Assamese macaque which was confined to the eastern part of the survey area, east of the Saral Bhanga river (Figs 66 & 67). The rhesus macaque was distributed all over the area.

Elephant

One of the most commonly encountered mammals found in the BTC area was Asian elephant (*Elephas maximus*). Although it was sighted in only 7% of the grids, evidence in the form of dung was found in almost all the grids suggesting the use of all habitats (Fig 68).

Ungulates

Four species of ungulates were found in the area. The most widespread was the Barking Deer (*Muntiacus muntjak*), the most primitive among Asian deer. This species seemed to occupy areas in close proximity to human habitations (Fig 69). Chital (*Axis axis*), apparently has a restricted distribution in the study area. A small population of this deer species was found in dry deciduous forests of eastern part of Gossaigaon and western part of Aie Valley Forest Divisions making these perhaps the eastern most limits of the cheetal distribution.

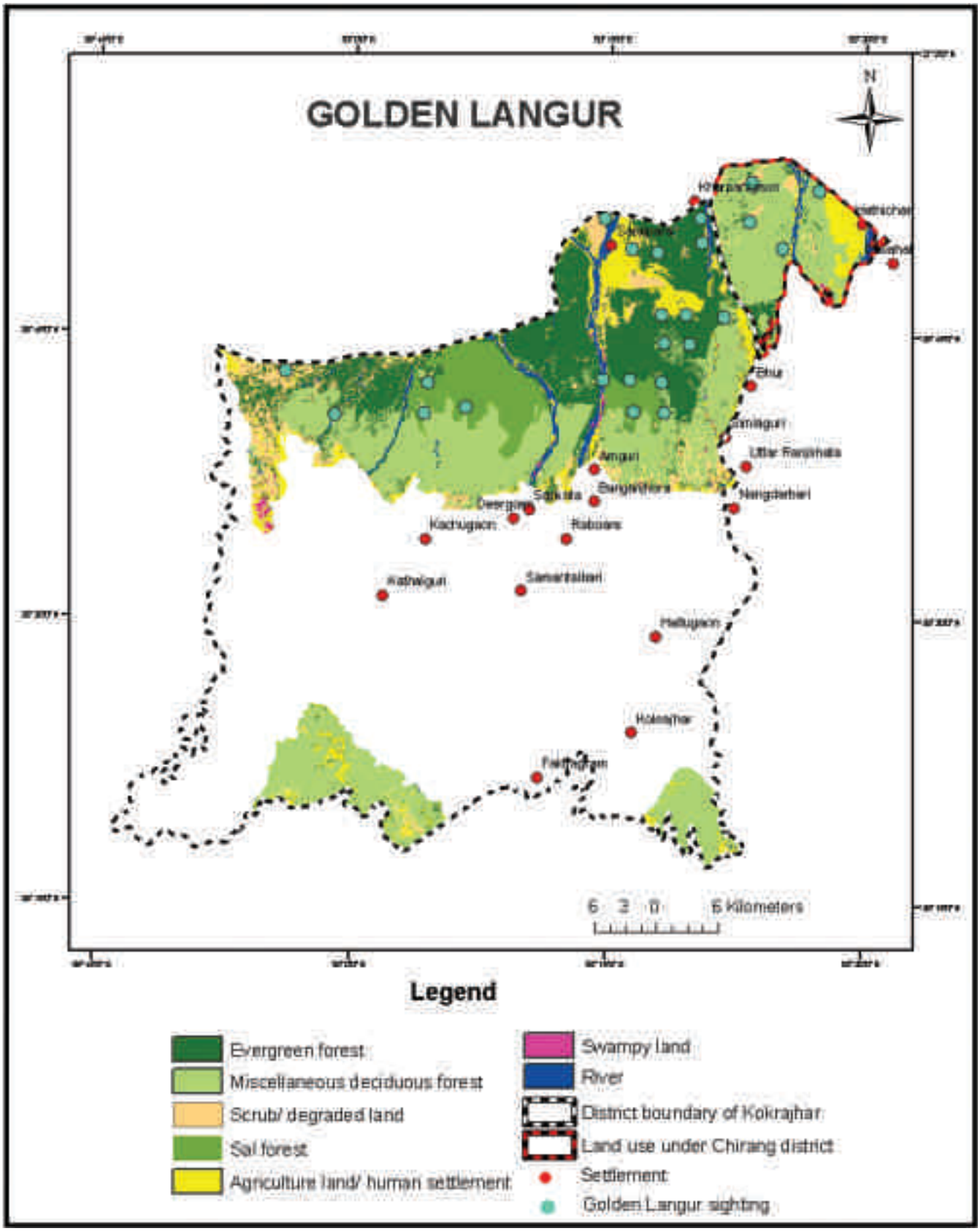

Fig.66 Map of the study area showing locations of golden langur sightings

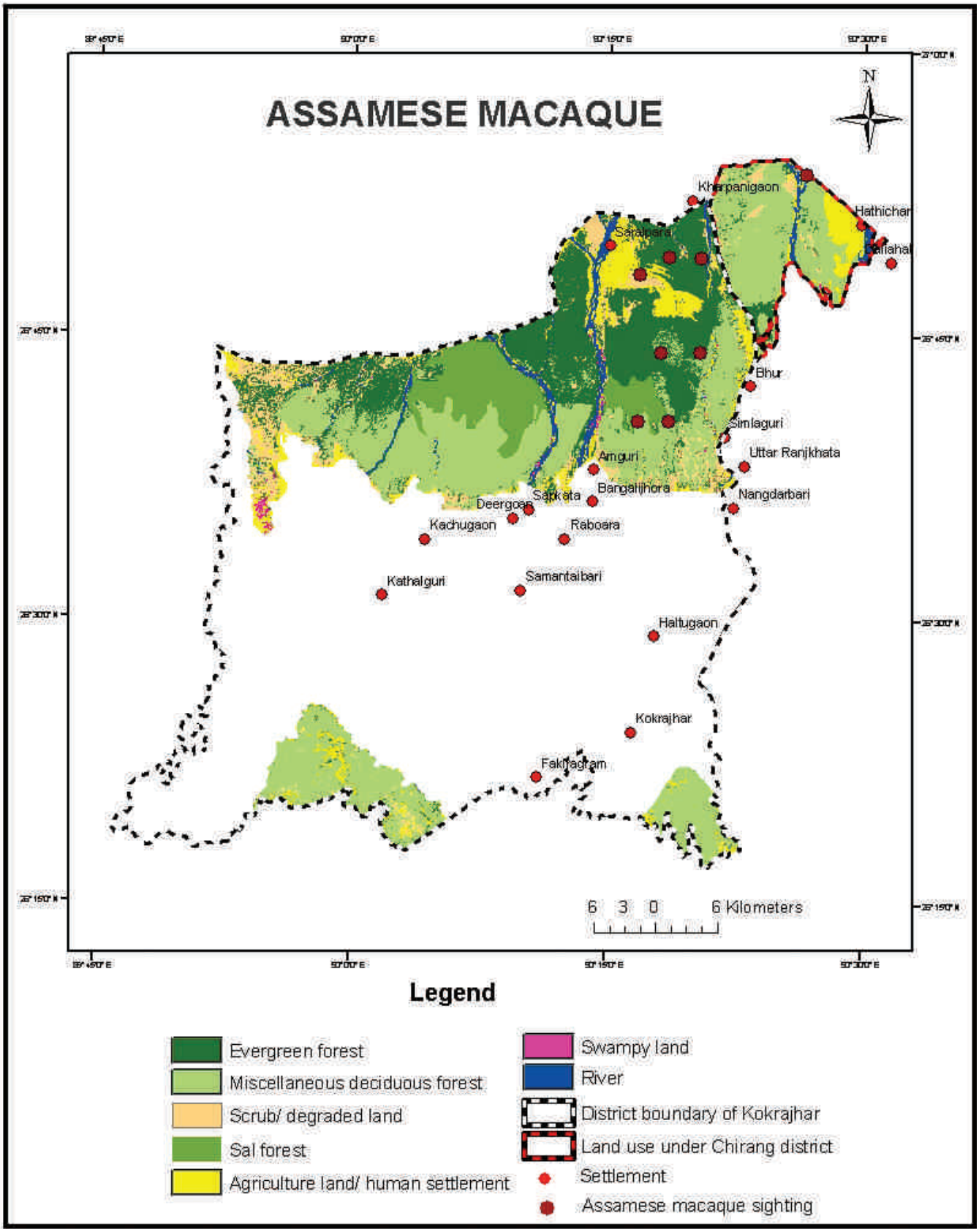

Fig.67 Map of the study area showing locations of Assamese macaque

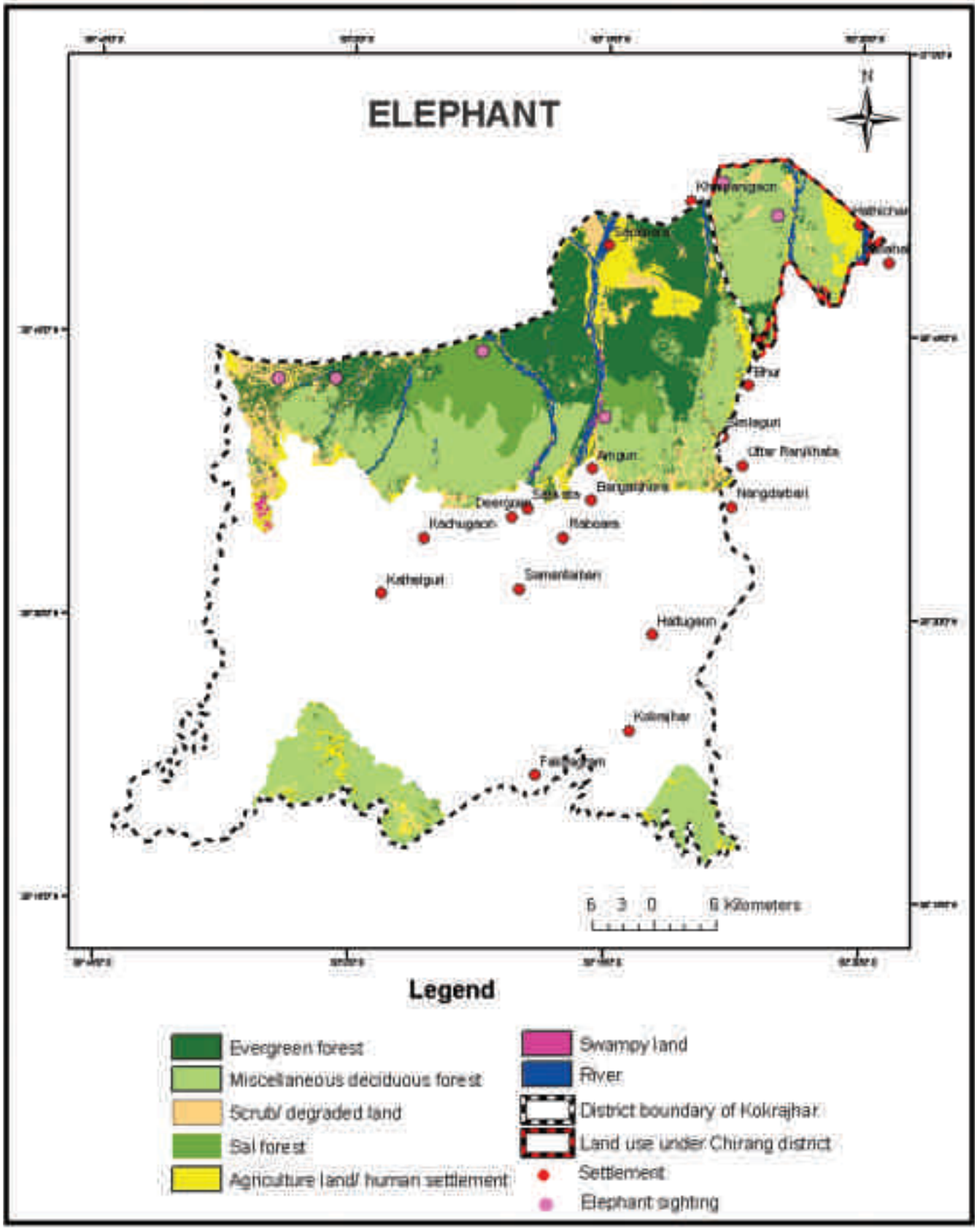

Fig 68 Map of study area showing locations of elephant sightings

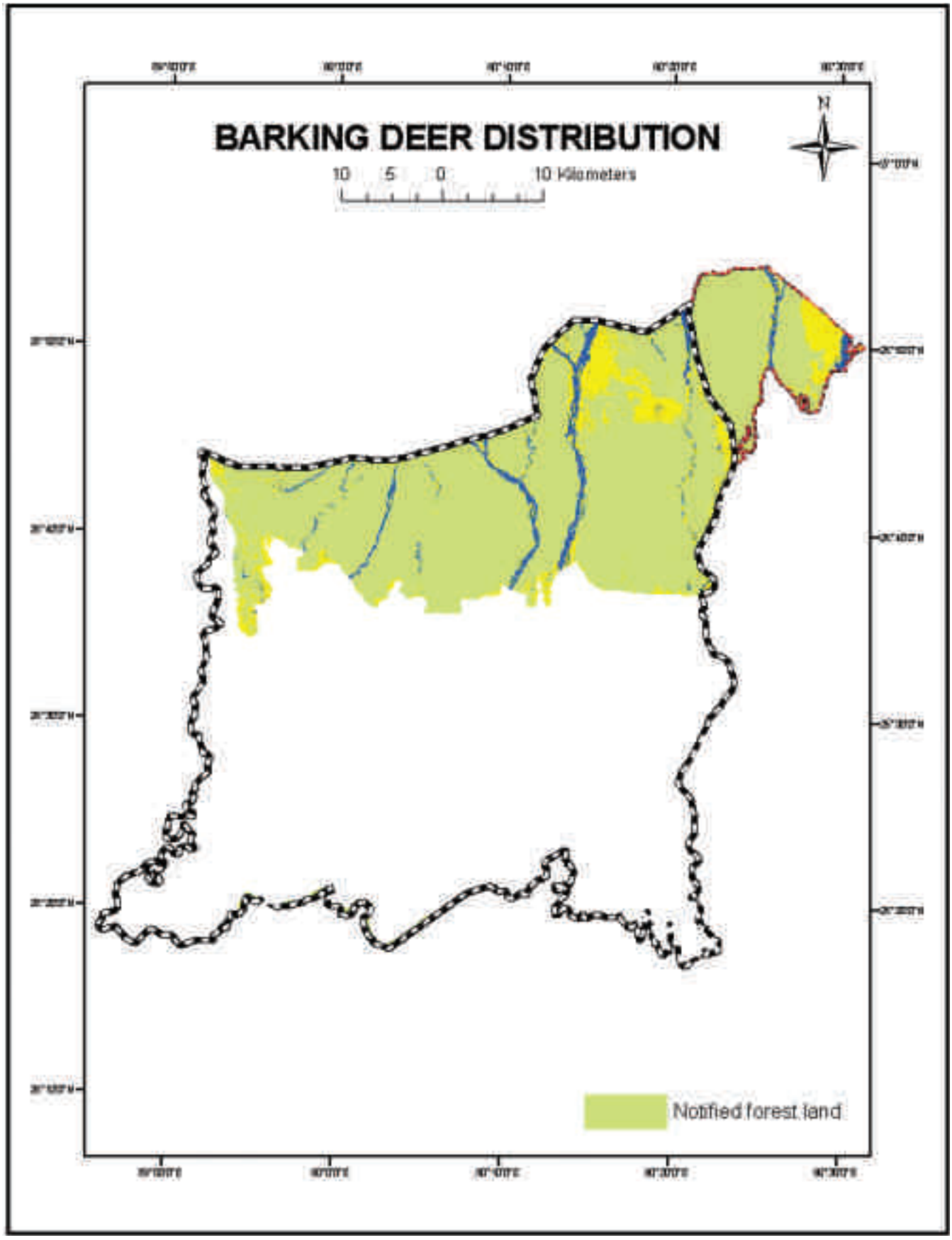

Fig. 69 Map of the study area showing locations of barking deer sightings

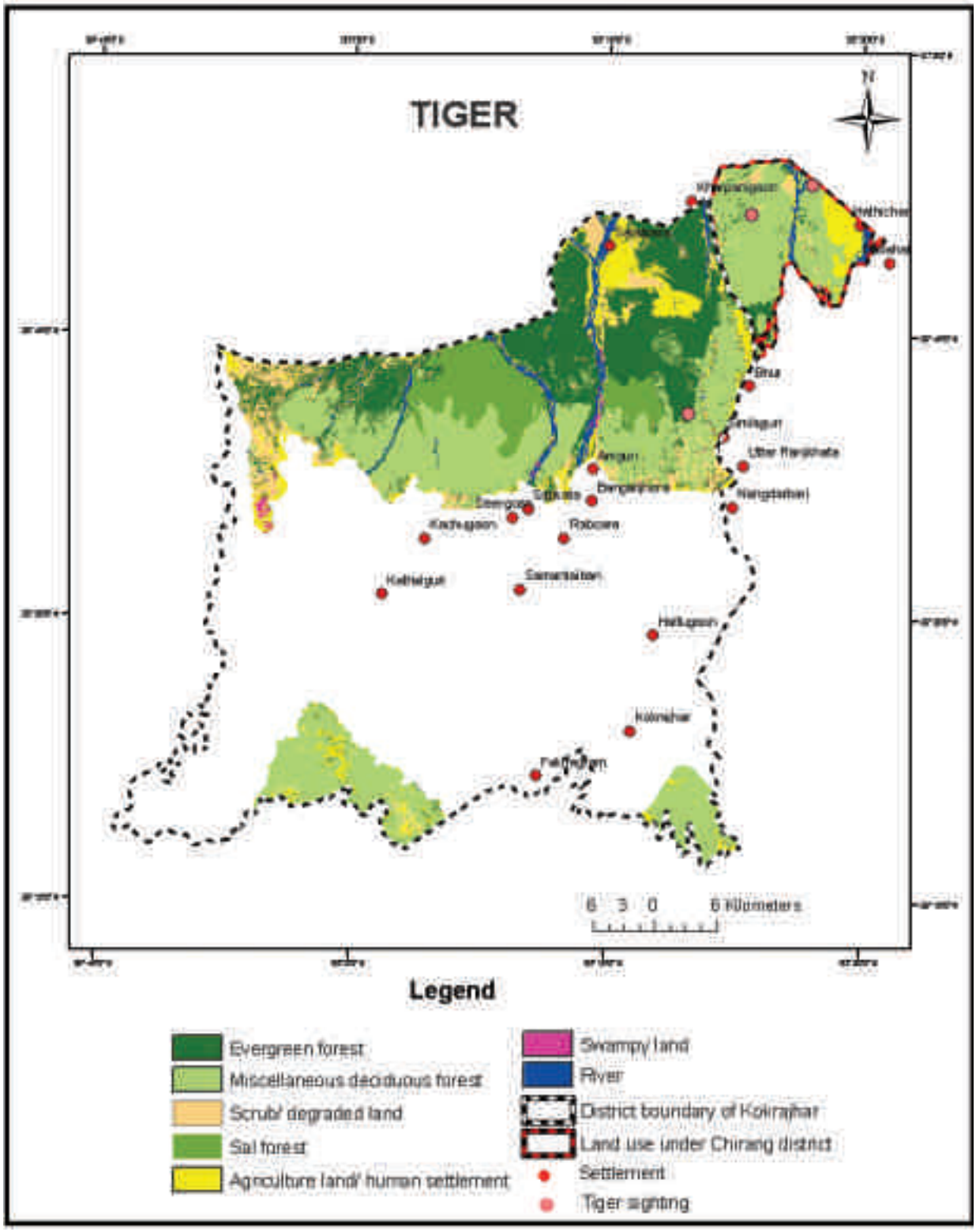

Fig 70 Map of the study area showing locations of tiger evidences

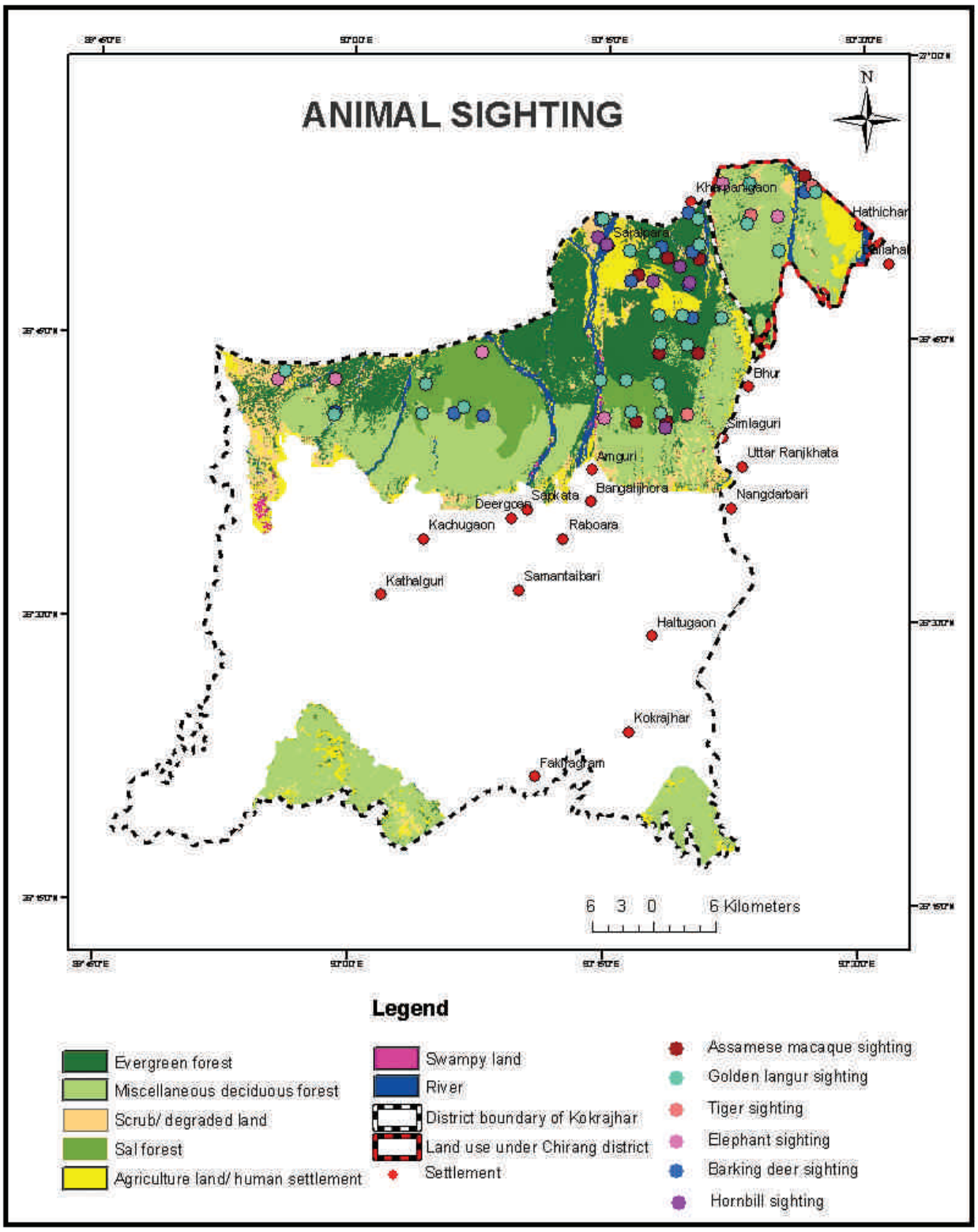

Fig.71 Map showing location of all animal sigtings/evidences (tiger)

The other ungulate of conservation concern is Indian Bison or Gaur (*Bos gaurus*). A small population of this species was found in the forests across Saral Bhanga river near Ultapani village. Several herds of the species also venture into Indian Territory from across the Indo-Bhutan boarder. The present survey could not confirm occurrence of Wild Buffalo (*Bubalus bubalis*). However, locals told the survey party that some individuals of this species occasionally venture into Indian Territory from across the Indo-Bhutan Border. Though hog deer is also reported from the area, none was seen during the survey.

Carnivores

Among carnivores occurring in the study area, Indian Leopard (*Panthera pardus*) and Indian Tiger (*Panthera tigris*) may be considered as flag ship species for the conservation of ecosystem in BTC area. No tigers were seen but evidences in the form of scats and pugmarks were encountered in 3.8% of all grids surveyed. All tiger evidences were restricted to the eastern and northern parts of the survey area (Fig 70). Evidences were obtained from the miscellaneous deciduous forests on either side of the Bhur river in the north-western part of the Bhur river and about 15 km south of Ultapani village. Indian Jackal (*Canis aureus*) and leopard cat (*Felis bengalensis*) can be easily sighted in the vicinities of human settlements specifically during night hours.

Rodents contributed 25% to the recorded mammalian species during the course of present study. Among rodents, Hoary-bellied Squirrel (*Callosciurus pygerythrus*) and Small Indian Mongoose (*Herpestes auropunctatus*) are most commonly occurring species in the region.

Putting all the sigtings together, the area between the Saral Bhanga river and the Lehu Pani river seem the most species rich (Fig 71).

Discussion

The mammalian resources of BTC include a variety of primates, ungulates, carnivores and bats, including a large number of globally threatened species. Species, specifically Asian Elephant, Gaur or Indian Bison, golden langur, Assamese macaque, Leopard, Indian tiger and rhesus macaque are listed in Red Data List of IUCN 2004 (IUCN 2004). While tiger, golden langur and Asian elephant are listed as Endangered in the Red Data List, Indian bison, Leopard and Assamese macaque are categorized as Vulnerable. Although, rhesus macaque is widespread and has become the cause of conflict with humans, its range is restricted globally and has been listed near threatened in the IUCN Red Data List 2004.

Among noticeable birds, three species of pheasants namely Indian peafowl (*Pavo cristatus*) red junglefowl and kalij pheasant, four species of hornbills namely Great Pied Hornbill, Common Grey Hornbill, Indian Pied Hornbill, Wreathed Hornbill, and 12 species of woodpeckers were recorded from the study area. These species are indicators of pristine habitats. Two bird species - White-backed Vulture (*Gyps bengalensis*) and Greater Adjutant (*Leptoptilos dubius*) recorded here are globally threatened. The red junglefowl is a genetically threatened bird. Thus, in terms of important threatened fauna, this region is important and deserves conservation.

The present survey observed large number of roosting and nesting of hornbills, specifically Great Pied Hornbill, Indian Pied Hornbill, Wreathed Hornbill and Common Grey Hornbill in this area. This indicates that survey area may be an important breeding refuge for these birds specifically for the Great Pied Hornbill of which large assemblages were seen in certain areas.

The survey area appears to have heavy populations of woodpeckers specifically, Grey-crowned Pigmy Woodpecker (*Picoides canicapillus*), Great Slaty Woodpecker (*Mulleripicus pulverulentus*), Indian Golden-backed Three-toed Woodpecker (*Dinopium javanense*), Large Golden-backed Woodpecker (*Chrysocolaptes lucidus*), Large Yellow-naped Green Woodpecker (*Picus flavinucha*), Lesser Golden-backed Woodpecker (*Dinopium benghalense*), Lesser Yellow-naped Green Woodpecker (*Picus chlorolophus*), Stripe-breasted Pied Woodpecker (*Picoides atratus*), Pale-headed Woodpecker (*Gecinulus gruntia*), Pigmy Woodpecker (*Picoides nanus*), Red-eared Bay Woodpecker (*Blythipicus pyrrhotis*), Rufous Woodpecker (*Micropternus brachyurus*) and Yellow-fronted Pied Woodpecker (*Picoides maharattensis*). The presence of continuous pristine habitat accentuated by tall trees in the region is ideal for roosting and nesting of these birds.

The region also harbours relict populations of White-backed vulture and Egyptian Vulture (*Neophron percnopterus*). This is significant in view of the large-scale declines of vulture in the Indian sub-continent. Other raptor species specifically, Black-winged Kite (*Elanus caeruleus*), Bonali's Eagle (*Hieraaetus fasciatus*), Booted Hawk Eagle (*Hieraaetus pennatus*), Hen Harrier (*Circus cyaneus*), Honey Buzzard (*Pernis ptilorhyncus*), Pariah Kite (*Milvus migrans govinda*) and Sparrow Hawk (*Acipiter nisus*) were also sighted and thus the area is rich in raptors also. The presence of open scrub woodlands and patches of tall forests are ideal for nesting and

hunting of many of these raptor species. Such species having larger area requirement are likely to disappear with further clearance of pristine habitat in the region.

The present study is perhaps the first that systematically estimated populations of bird species, examined vegetation structure & composition, and quantified animal encounter rates for most commonly occurring mammal species in the region. However, assessing impact of forest use on wildlife of the region was beyond the scope of this study and therefore it remained unclear whether forest use by locals for grazing, fuel wood and timber is adversely affecting vegetation structure & composition, which in-turn ultimately affect animals populations. This needs immediate investigation.

The checklists of birds, trees, shrubs and herbs presented in the report may be conservative because of two reasons. First, sufficient data on these groups could not be collected as a result of the scope and duration of the present study. Several species of birds are migratory and appear only during winter. Therefore, it is likely that the checklist of birds is likely to increase with passage and winter migrants, if further observations are made during winter and rainy season. Similarly, several species of annual herbs and grasses appear during rainy season and are properly identified only while flowering. Also, herbs and grasses that existed during the course of the present study were in deformed shapes as a result of trampling. Consequently, it was difficult to identify them. Second, species effort curves for birds, trees, shrubs and herbs suggested that present sampling efforts are inadequate even for summer season and therefore more such efforts are required during survey season. It would be appropriate, if a long-term study envisaging biodiversity quantification is planned for the region.

However, hunting of wildlife appears to be a problem in the region. Hunters use firearms, arrows and a variety of traps to secure the animals. Both individual hunters and hunting parties are seen killing wild animals

Fig.72 A Bodoman readies his weapon for a hunt

frequently. Similarly, problem of timber smuggling in the region is acute. The territorial forests are also fragmented by several hundred people daily who venture into forest areas and axe timber trees. Species, specifically *Shorea robusta, Pterospermum personatum, Terminalia* sp, *Schliochera oleosa*, *Diptereocarpus* sp. are heavily targeted. *Shorea robusta* has already become locally extinct from many parts of the region.

Fig.73 A tricarinate hill turtle (*Melanochelys tricarinata*), Greater Manas, Assam

Fig.74 A Burmese rock python (*Python molurus bivittalus*) released in the wild in Manas National Park

It does appear that exotic weed such as *Lantana camara* and *Eupatorum odoratum*, and shrubs (e.g. *Adhatoda vasica* and *Dodonaea viscosa*) are dominating at the cost of trees (saplings) as a result of continuing biotic interference in the form of illicit tree felling. All of them are indicators of degraded condition of the ecosystem. The quantification of regeneration status & patterns was beyond the scope of present study and needs immediate management interventions.

Fig. 75,76&77 Faunal diversity of Manas National Park; Palm civet (*Paradoxurus hermaphroditus*), butterflies at a salt lick and a Twin-spotted tree frog (*Rhacophorus bipunctatus*)

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CHAPTER VII

The concept and creation of Greater Manas

Vivek Menon and Rahul Kaul

According to Diamond (1986) there are several reasons why protected areas designed to protect large vertebrates are likely to protect other species also. The distributions of terrestrial vertebrates depend on vegetation and thus there is often an overlap between distributions of vertebrates, plants and invertebrates. The other reason he suggests is that large bodied vertebrates tend to occur at low population densities and any reserves large enough to contain self-sustaining populations of large vertebrates is likely to contain self–sustaining populations of other species also. The purpose of a reserve system is thus to protect species against the risk of extinction.

The most important area for wildlife conservation within the Bodoland Territorial Council is the Manas National Park and Tiger Reserve. Manas is also a world heritage site by virtue of its biological attributes and uniqueness of its habitats. It is amongst the richest areas in this region biologically, with several threatened animal species and ecosystems. Amongst the important mammals found here are the tiger, the Asian elephant, the one horned rhino, the wild buffalo, the pygmy hog and the hispid hare among others. The area also has threatened species of birds, notably the Bengal florican and the recently found Manipur bush quail and the swamp francolin. Amongst the unique habitats are the grasslands, the lowland evergreen forests and the riverine ecosystems. All these have contributed to Manas being as unique as it is.

However, there are large and relatively unexplored areas west of Manas upto the Sankosh river, further west near the state boundary with West

Fig.78 A greater one horned rhinoceros (*Rhinoceros unicornis*) in its habitat

Fig.79 Relocated elephant calves in Manas National Park

Bengal. This area, with the exception of the one immediately west of Manas was surveyed to find out its biological wealth and consequently its importance. The results of the survey are provided in the preceding pages.

It is clear from the report that the three divisions surveyed are under extremely good forest cover, more so towards the northern parts. Apart from the western most areas of the Kuchugaon division which has some grasslands and scrublands, the rest of the area is under forest cover, pre-dominantly under evergreen, miscellaneous deciduous and some Sal forests. All the three forest types have a fairly high tree density in most parts and provide some last remnants of the various sub-types of the Eastern Sal Forests. In addition, the small patches of evergreen forests present in this area are also important.

In terms of the wildlife of the area, presence of tiger, elephant and gaur has been confirmed by the survey. Important primate species like the golden langur and Assamese macaque are also distributed in (Fig. 1) significant numbers. Thus the area does seem to support on its own, the tiger and the elephant. The area also has the more common species like the barking deer, the civets, squirrels, pangolins etc. The area is the last stronghold of the golden langur and the westernmost population of the chital (*Axis axis*)

Among birds, the report did not reveal any globally threatened species other than the greater adjutant but in the Indian context, there are some important species like the hornbills (4 species) and the red-junglefowl under genetic endangerment.

The area also holds 12 species of woodpeckers and generally a fairly robust birdlife.

Clearly, the attributes of the area justify enhanced legal protection to it. In the wake of demands on the forests, as is evident from the resource extraction chapter, and the shrinking forest cover in the southern parts of the three forest divisions of Kachugaon, Haltugaon and the Aie Valley. It is thus fairly germane to assume that before long, this area too will succumb to peoples' needs. Therefore, just to protect the remaining forest resources of BTC, additional protection to these forests is imperative. The presence of 12 species of woodpeckers and the four species of hornbill suggests that this is a mature forest and therefore should be conserved.

The survey has revealed that elephants use the whole stretch of forests from Sankosh river eastwards to the Chirang district. Elephant is a nomadic animal that requires large home ranges. Any further shrinkage of this habitat may result in escalation of human-elephant conflict, a problem which has already caused problems in Assam and other parts of the country.

The area deserves to be protected solely for the tiger, evidences of which were found at three locations. Protecting the tiger will also imply protecting the prey base and therefore as a result gets protection. The ungulate population is dwindling as a result of hunting and thus to secure the future of tiger, it is important to provide adequate protection to it.

The last remaining and substantial population of the golden langur presently inhabits the forests of the three territorial divisions. As most forest living primate species, presence of good canopy is essential for their survival. Therefore the survival of the last stronghold of its population depends on the conservation of these forests.

These forests are bound to throw up more surprises if longer term surveys are conducted in the area for mammals, birds, plants and also other groups of animals like the amphibians and the lepidoptera.

Two stretches of forests are suggested for conservation in this area. The first is the stretch of forest covering the protected forests from Sankosh river in the west to the Aie River in the east covering the existing Ripu Reserve Forest and Chirang Reserve Forest. The second is the forest immediately adjacent and west of the Manas NP in the eastern part of the existing Manas Reserve Forest.

The whole landscape may therefore be considered as one of three main conservation areas – the existing Manas National Park and TR and the two new protected areas as under the District council. This larger area for conservation agrees well with the concept of 'Greater Manas' (Fig. 82).

The limits and boundaries of the area suggested as below:

From Jangduar along Jamduar-Dynamari bund road upto ride line VI and long ride line VI eastwards to Pekhua river down south to ride line V in the west and along the ride line V eastwards to river Saralbanga and across into Chirang RF along parallel III to the RF boundary in the east. Along the east the limit is suggested as the eastern boundary of the Chirang RF going up to the Indo-Bhutan border in the north (Fig. 83).

For the other area adjacent to Manas National Park, the eastern boundary of the proposed reserve would coincide with the western boundary of the Manas National Park. The northern boundary is suggested to be along the Indo-Bhutanese border whereas the western boundary is suggested to be along the Sukantekhal river in the west(Fig. 83).

Both the suggested areas are existing reserve forests and thus their upgradation into a wildlife sanctuary is the logical next step. With these two additional areas in place, the whole northern area of the BTC will become one large conservation unit, conceptualized as Greater Manas.

Fig.80 Beki river at dusk, Manas National Park, Assam

Fig. 81 Grassland habitat, Manas National Park, Assam

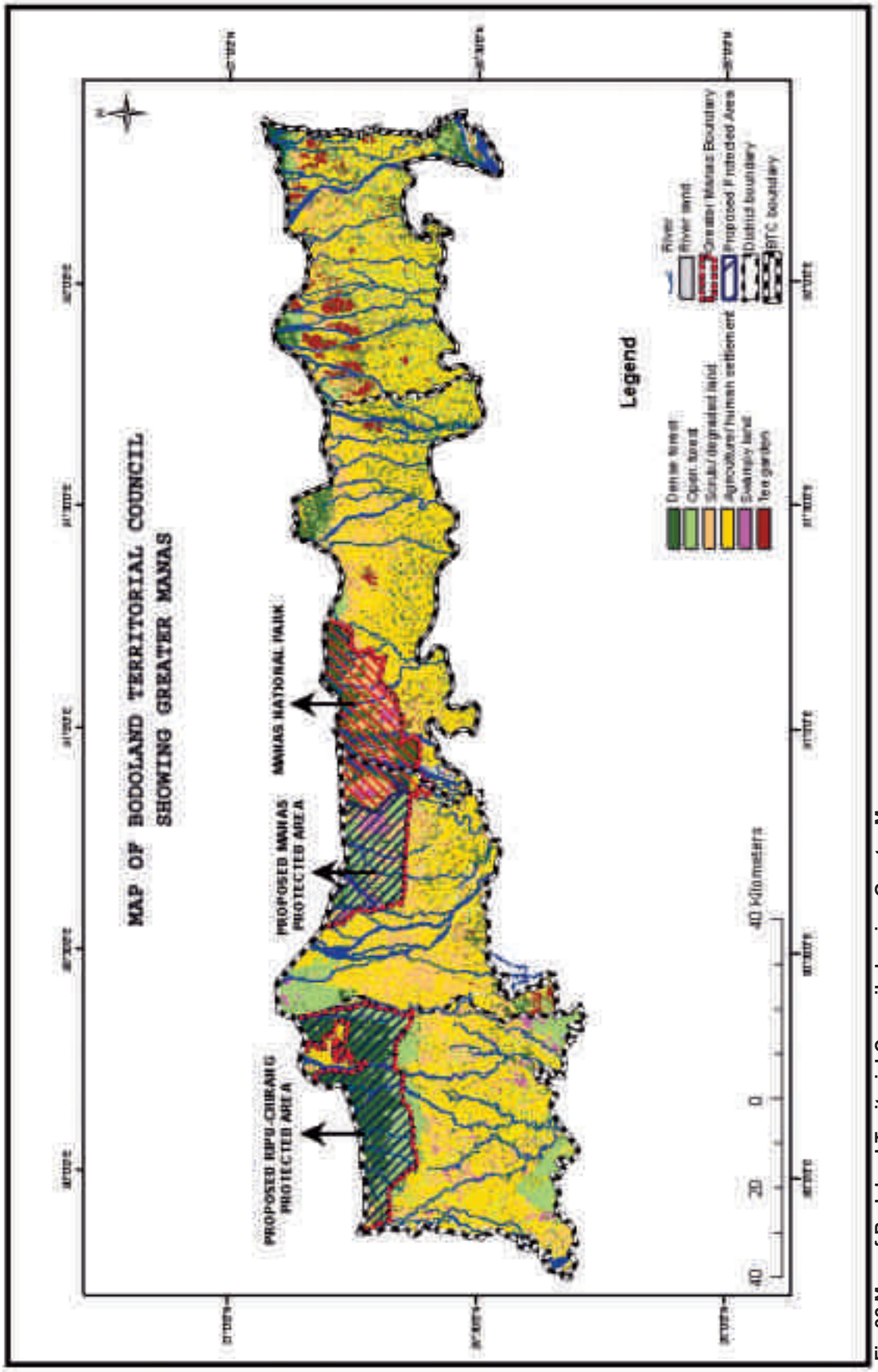

Fig.82 Map of Bodoland Territorial Council showing Greater Manas

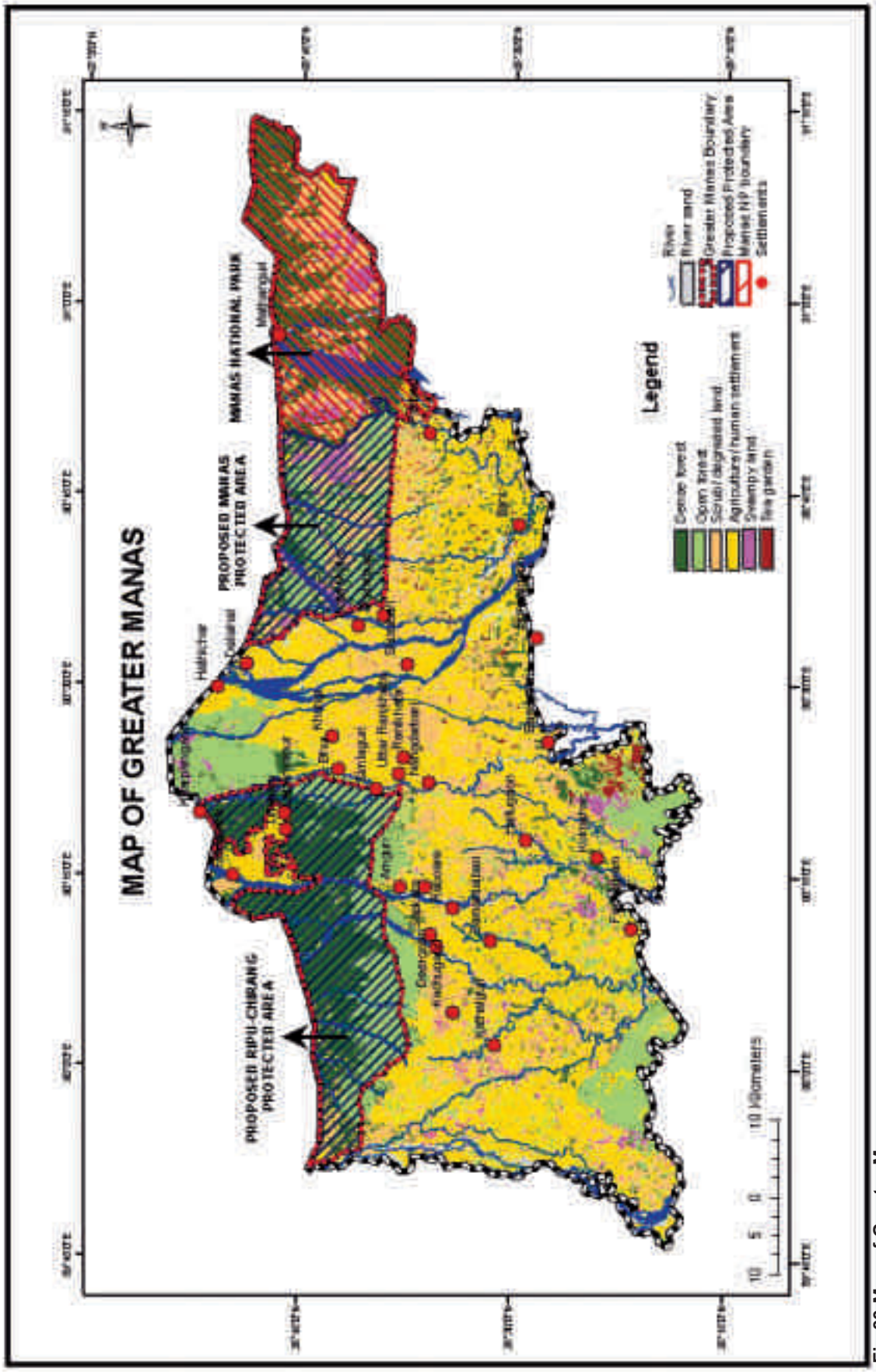

Fig.83 Map of Greater Manas

CHAPTER VIII

People's perception of forest management and conservation

Prabal Sarkar, Rahul Kaul and Sandeep Kumar Tiwari

Introduction

Forest resources play an important role in providing livelihoods to a high proportion of human population around the world (Pimental *et al.*, 1997). However, people's dependency on forest varies depending upon the availability of resources in different regions that leads to varying ethnological use patterns. A number of earlier studies have covered ethnological use of different flora (Arora, 1980; Haridasan *et al.*, 1990) and fauna (Borang, 1996; Solanki, 2002; Solanki and Chutia, 2004; Kumar and Solanki, 2004) by different ethnic groups of people in northeast India.

Role of the people in natural resource conservation can not be undermined. More so, when communities are directly dependent upon the forest resources for sustenance and livelihoods. Thus any policies aimed at conserving forest resources must take into account the people who are reliant on the resources and their perception of policies and also of the resources available because often the use is determined by their perception. For instance, forest resources are often considered infinite and thus people may utilize the resources unsustainably. But when they are made aware of the increasing efforts each individual or a family has to put in to get the same amount of resources in a resource depleted landscape do they realize the limited nature of resources available.

It is also very important to know if people are aware of their rights for only then can benefits of conservation percolate down to the grassroots. They must be aware of the policies, rules and laws and it is only then can effective enforcement happen.

For this study, we felt a need to conduct such a study, mainly to help the policy makers know where the concerned peoples' mindsets needed to be changed and where there was need for increased awareness on issues relating to conservation.

Methodology

Data were collected through questionnaire survey and recorded on a pre-formatted data sheet. A set of questions were asked to the target group to generate answers to their general perceptions on forest resources, causes of depletion, governance etc.

A total of 254 people from 50 villages from BTC area were interviewed. Among these, 86 were interviewed from 11 villages in Kokrajhar, 45 from 12 villages in Chirang, 88 from 17 villages in Baksa and 35 from 9 villages in Udalguri districts of BTC, Assam. The selection of villages was based on its proximity from the forest and efforts were made to select villages on fringe and areas slightly away from the forest.

Profile of the Sample

Community composition of people interviewed

Out of the total of 254 respondents, 220 people (86.61%) were Bodo while the remaining 34 people (13.39%) were from non-Bodo community (Rajbanshi, Adibashi, Assamese, Gorkha, Bengali and other communities).

Age-sex composition of the people interviewed

Among 254 people interviewed, 221 (87%) were male and 33 (13%) were female. People interviewed were

of varied age-sex classes. Males of age classes from 11-20 to 71-80 years were interviewed while females of 11-20 to 61-70 years age classes were interviewed during the survey. However, most of the males interviewed were between 21-70 years and female of 21-40 years age class (Fig. 84).

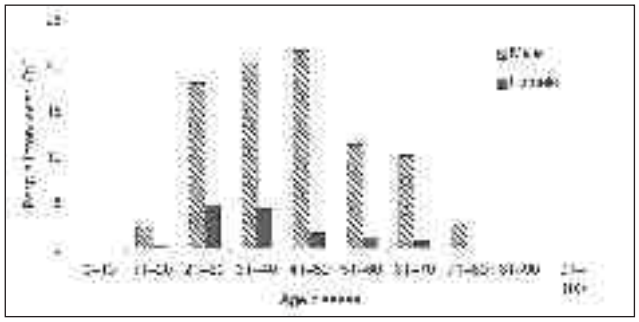

Fig.84 Age-sex composition of the people interviewed in BTC area

Education status of the people interviewed

Almost 30% of the total people interviewed were illiterate. In the literate category (about 70%), 25.20% had primary level education, 18.11% had informal or below primary level and another 18.11% had secondary level education. Remaining 3.54% had higher secondary and technical levels education each and rest 1.57% were graduate and above (Fig.85).

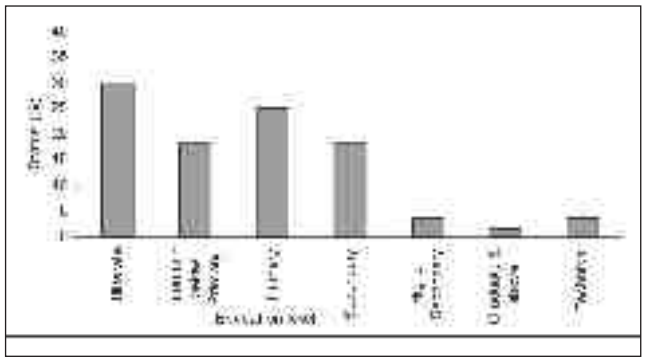

Fig. 85 Educational status of people interviewed in BTC area

Kokrajhar district had most literate people. 27.91% had studied till primary level (Fig. 86). Very few number of people had a graduate or a technical degree.

Occupation status of the people interviewed

Most of the people (69.69%) interviewed were self employed in agriculture. People involved in other occupation were also interviewed during the survey (Fig.87).

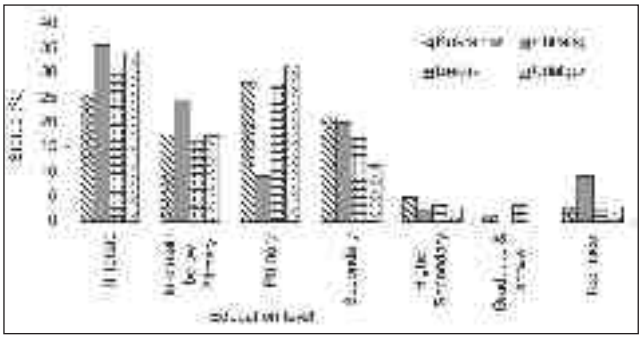

Fig.86 Educational status of the people interviewed in different districts

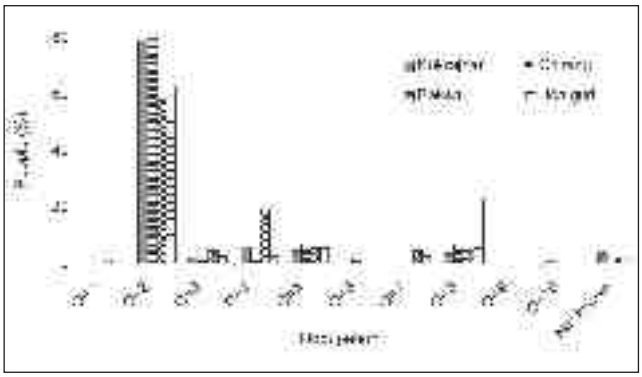

Fig.87 District wise variation of occupations of the people interviewed in BTC

1 : Engaged in forest resource collection
2: Self employed in agriculture
3 : Self employed in non-agriculture
4 : Wage and salaried employment
5 : Engaged in domestic duty
6 : Engaged in domestic and other economic activity
7 : Student
8 : Other economic activity
9 : Other non-economic activity
10 : Other

Study period

The survey was conducted in the month of July to September 2006.

People's perception towards forest resources

Our survey found a wide range of perceptions amongst respondents towards forest ownership, forest categories, management, impact on different laws, ban of tree felling and hunting which are given below.

Forest ownership and its protection category

Ownership of the forest

All the forested area belongs to the state and

people do not own any forest area. About 89.76% of the total people interviewed stated that the forest land belonged to the government while 10.24% of people had no idea about the ownership of the forest land (Fig. 88).

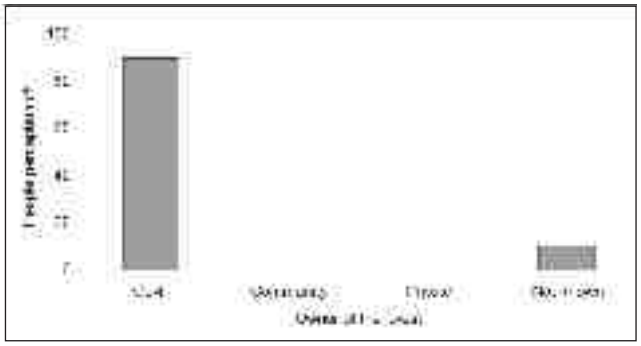

Fig. 88 People's perception about the ownership of the forest in BTC

People's perception on ownership of the forest land varied in different districts. About 95% of the total people interviewed clearly indicated that the forest land belonged to government except in Baksa district where fewer people (79.55%) believed that forests are government property (Fig. 89).

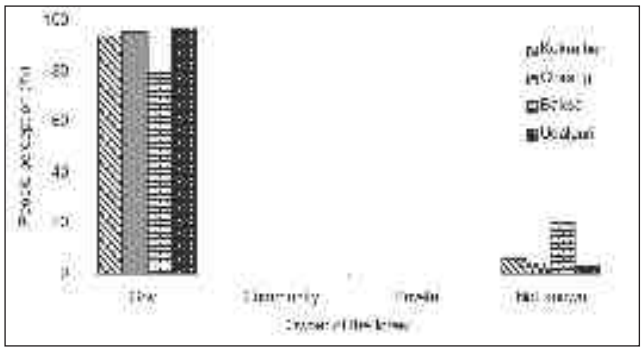

Fig. 89 People's perception about the ownership of the forest in different districts of BTC

Decision makers in forest conservation

The territorial council takes care of all the administrative work within the BTC area. However, 58.66% of the total people interviewed thought that the state forest department managed the forests within BTC area while 32.28% thought that both the state forest department and the BTC officials decided on the management of the forests (Fig. 90).

Although the response on the authority responsible for management of the forests varied across districts they lived in, yet most people irrespective of district believed that the state forest department was responsible for decisions on forest conservation (Fig.91).

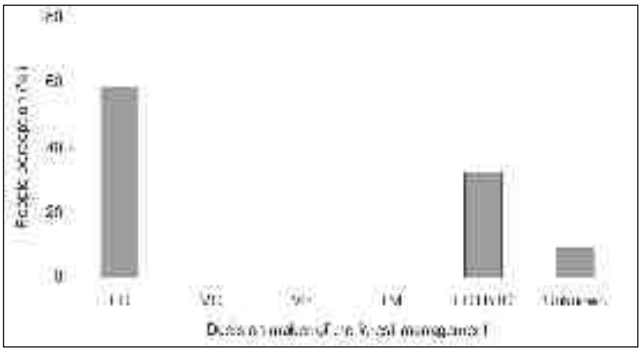

Fig 90 People's perception on decision maker of the forest management

FD = Forest department
VC = Village community
VH = Village head
Pvt = Private individual
FD+BTC = Both FD and BTC

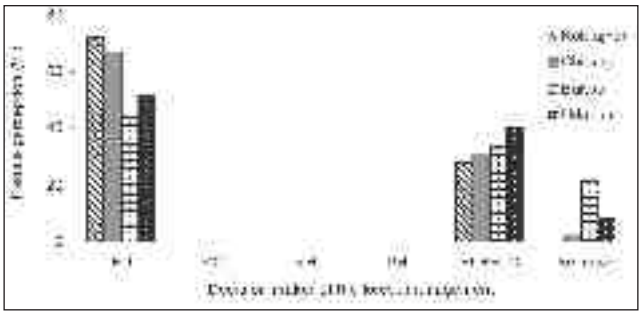

Fig.91 District wise variation of people's perception on decision maker of the forest management

Forest conservation initiatives

Though the forests in BTC area belong to the state government, the land use is determined by the BTC. Only in the case of an area being declared a wildlife sanctuary and a national park may the responsibility lie with the state forest department. People were also interviewed to know the initiatives taken by different agencies (government, BTC and private agencies) for the conservation of forest resources in BTC area. The general people believe that forest is still under the control of forest department and are responsible for protecting and managing it. The BTC on the other hand is mainly responsible for undertaking eco-development, plantation and awareness activities. Based on this perception, about 26% of all respondents were of the opinion that no agencies were taking proper initiatives to conserve the forest and only 15% of the respondents thought otherwise. Interestingly, about 60% of the sample failed to give proper answer on this issue (Fig.92).

(a) Initiative of the government agency

Only 9% of the total people interviewed said that the government agency (forest department) took

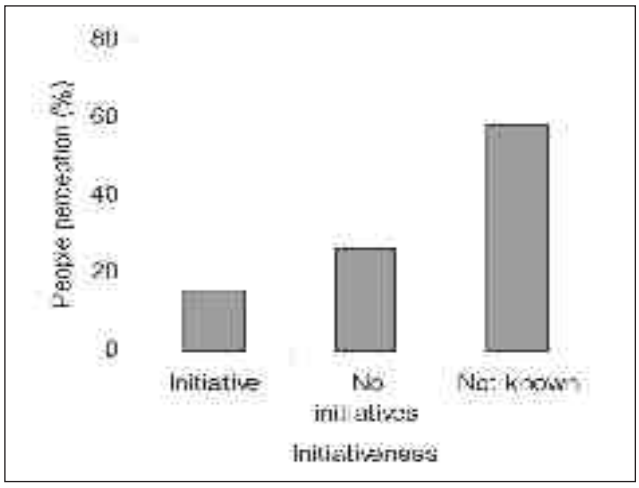

Fig. 92 People's perception on initiative of forest conservation in BTC area

initiatives for forest conservation while 27.56% of the people thought that no proper initiative was taken by the government agency on forest conservation (Fig 93). However, 63.39% of the people did not comment on this issue.

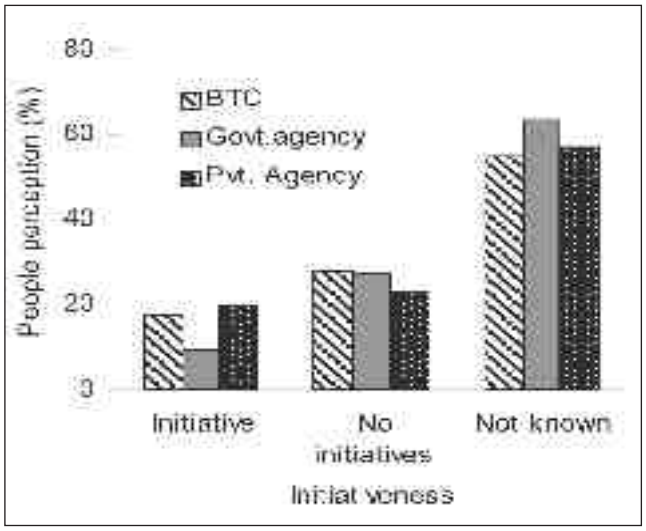

Fig.93 People's perception on initiative of forest conservation by different agencies

Districtwise, 15.56% of the total people in Chirang district thought positively on initiatives of the government followed by 13.95% in Kokrajhar district and 4.55% in Baksa district. Interestingly, no respondents indicated about the government initiative on conservation of forest resource in Udalguri district. However, a lowest (17.78%) and a highest (35.23%) proportion of the people indicated government initiatives in Chirang and Baksa districts respectively (Fig.94).

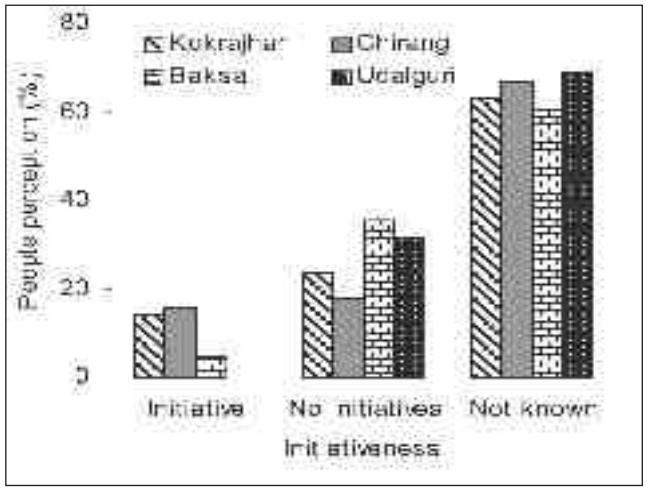

Fig.94 People's perception on initiative of the govt. agency on forest conservation

(b) Initiative of BTC

About 17.32% people surveyed believed that the BTC had taken more initiatives for conservation of forest resources as compared to the government agencies. However almost 28% felt that the BTC too did not take proper initiatives for the conservation of forest resources like the government agencies (Fig 92). However, 54.72% of the total people failed to give a comment on this issue.

A highest of 27.91% of the total people in Kokrajhar district opined positively about the BTC initiatives for conservation of forest resource followed by 22.86% in Udalguri district, 15.56% in Chirang district and 5.68% in Baksa district. On the other hand, a lowest of 19.77% of people interviewed in Kokrajhar district and a highest of 36.36% in Baksa district felt that the BTC took no proper initiative for the conservation of the forest resource. However, about 40-60% of the total people of different districts failed to give proper opinion on this aspect (Fig 95).

(c) Initiative of non-government agencies

Of the people, interviewed, 19.69% revealed that private agencies took proper initiative on conservation of the forest resource as compared to the government agency or BTC (Fig. 93). However, 23.23% thought that private enterprises including NGOs showed no proper initiatives on conservation of forest resources (Fig. 96). However, 57.09% of the total people failed to give response on this issue.

People of Baksa district (34.09%) thought highly of initiatives of private agencies for the conservation of forest resource as compared to other districts. Interestingly, only 2.86% of the total people interviewed in Udalguri district responded positively on the initiatives undertaken by the private agencies on

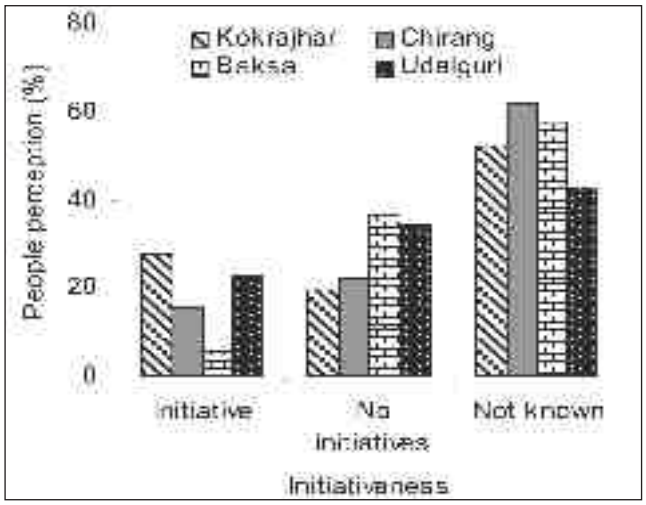

Fig. 95 People's perception on initiative of BTC in forest conservation

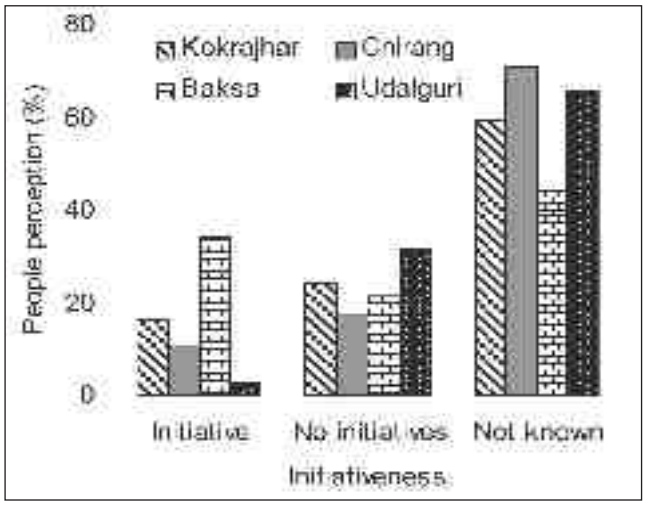

Fig. 96 People's perception on initiative of the private agencies on forest conservation

forest conservation. About 20% of the total people interviewed opined that no proper initiatives were being taken by the private agencies for the conservation of forest resource. Number of people failed to give proper response were between 44.32-71.11% in different districts .

Status of the forest

About 60% of the total people interviewed reported that forests were degraded (Fig.97). People's perception on the status of forests varied indifferent districts as given below :

(a) Kokrajhar district

Most respondents of Kokrajhar district felt that the condition of forests was far from satisfactory (Fig 98). No one thought that the forests were in excellent condition while a small proportion felt that they were excellent.

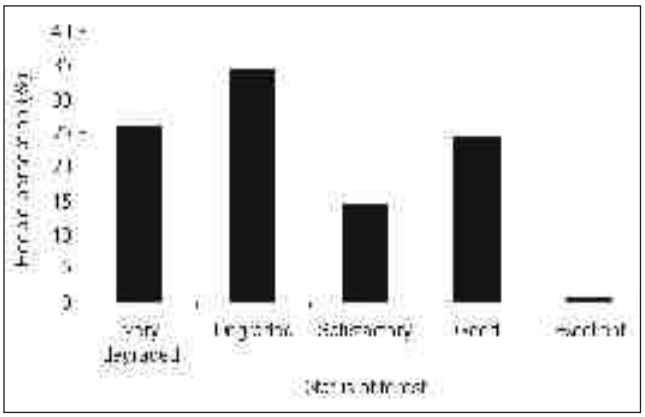

Fig. 97 People's perception. on status of the forest in BTC

(b) Chirang district

According to the people, a few good patches of forest exist in Chirang district (e.g. Ultapani). However most felt that forests are degraded in this district.

(c) Baksa district

Majority of people were felt that forests were good in Baksa district. This could be because of Manas National Park which is located in this district.

(d) Udalguri district

People's perception on the state of forests in Udalguri district varied from very degraded to good (Fig. 98).

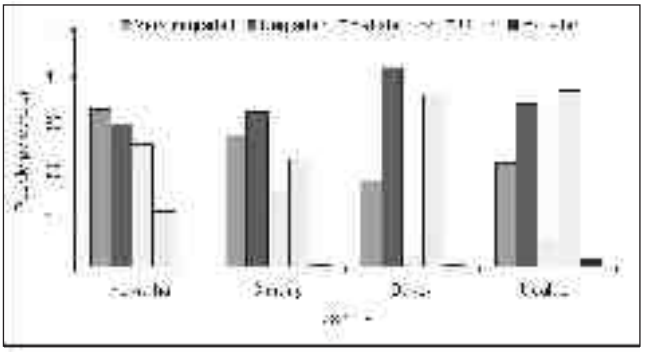

Fig. 98 People's perception on status of forest in various districts of BTC area.

Cause of forest destruction

Majority of people (60%) felt that illegal cutting and removal by contractors was the main reason for destruction of forests followed by encroachment (37.5%) (Fig.99). Interestingly, as per the respondents, community work (eg. play ground, temples, markets etc.) as well as grazing contributed little to destruction of the forest.

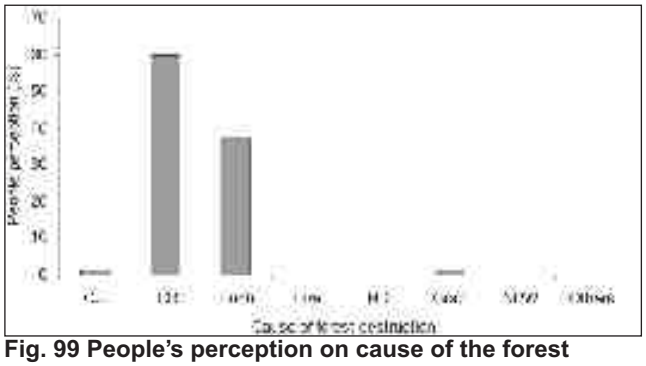

Fig. 99 People's perception on cause of the forest destruction

CU = Community work
ICR = Illegal cutting and removal by contractors
Ench = Encroachment
ND = Natural disaster
Graz = Grazing
NPW = No preservation work

Almost same number of people of all the districts of BTC suggested illegal cutting and removal by contractors (range 56.25 – 64.29%) and encroachment (31.25 – 42.86%) were the main reasons of forest destruction (Fig.100). A negligible number of people of Udalguri district thought community development work and grazing as the other reasons of forest destruction.

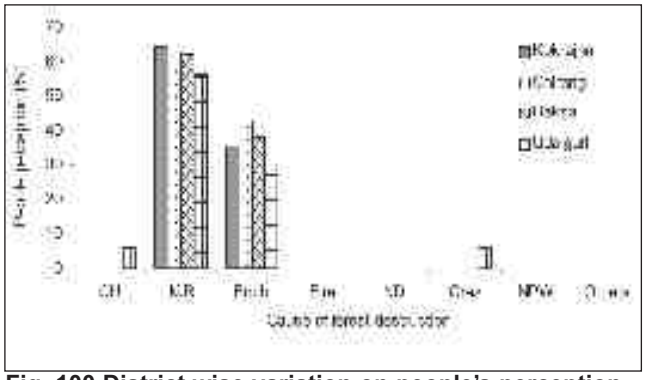

Fig. 100 District wise variation on people's perception on the cause of forest destruction

Cause of reduction of fauna

About 87.5% of the total people interviewed revealed that hunting was the main reason for reduction of the fauna in BTC area (Fig.101). Another 12.5% of the people revealed natural death as the cause for reduction of fauna.

All the people of Udalguri district interviewed revealed that hunting was the only reason for reduction for fauna in BTC area. About 83 – 89% of the people of other districts also revealed hunting as the major threat contributing to reduction of fauna (Fig.102).

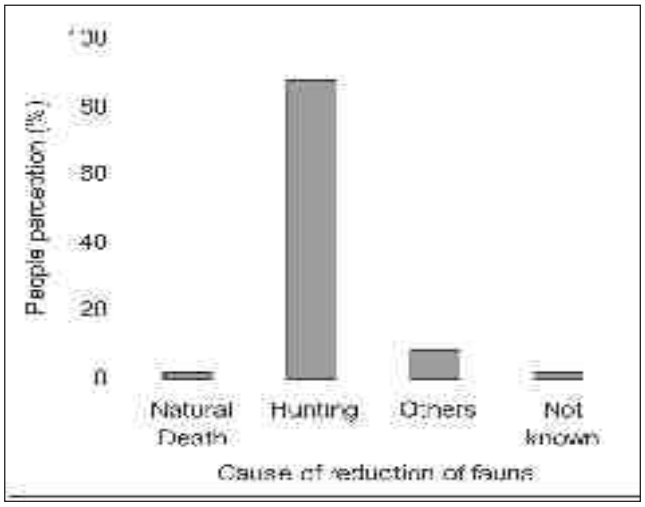

Fig. 101 Causes of reduction of fauna

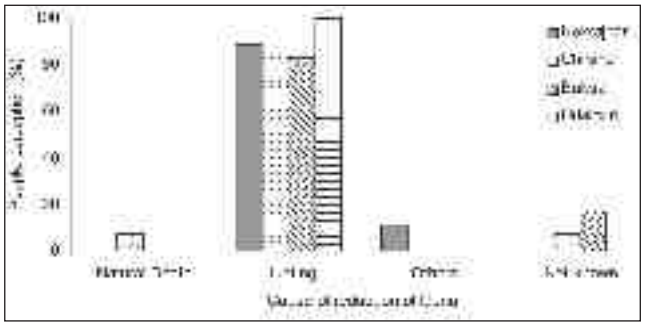

Fig.102 District wise variation on people's perception about the cause of reduction of fauna

Status of human-animal conflict

(a) Status of conflict

About 84.21% of the total people interviewed reported of human-animal conflict in BTC area. Among them, elephant was the most common (64.91%) animal creating conflict followed by wild boar (12.28%) and rhesus macaque (7.02%) (Fig .103).

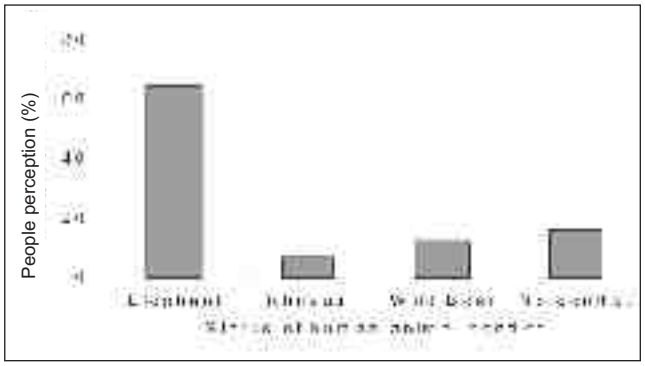

Fig. 103 People's perception on status of human-animal conflict

District wise variation of human-wild animal conflict also showed almost similar trend. Elephant

was responsible for conflict in all the districts with a highest incidence of 75.0% in Kokrajhar district and lowest of 58.33% in Baksa district (Fig. 104). Though less in number compared to elephant, rhesus macaque was also responsible for human-animal conflict in Kokrajhar and Baksa districts of BTC. No respondents indicated about the presence of human-wild boar conflict in Udalguri district.

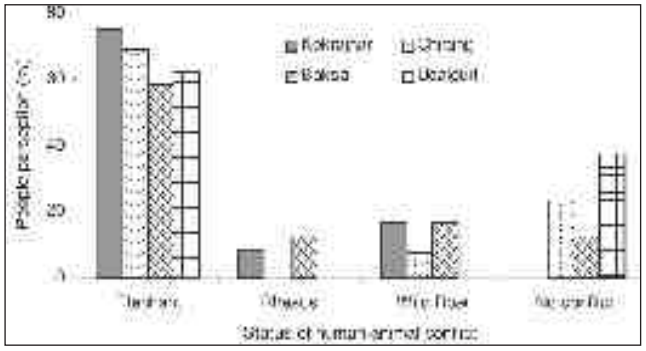

Fig. 104 District wise variation of people's perception on the status of human-animal conflict

(b) Cause of conflict

About 43% of the total people stated that habitat loss was the main cause of human-animal conflict followed by 34% of the people who opined shortage for food for animal as the cause and 22.86% of the people thought both – a combination of forest destruction and food crisis as the cause of conflict (Fig.105).

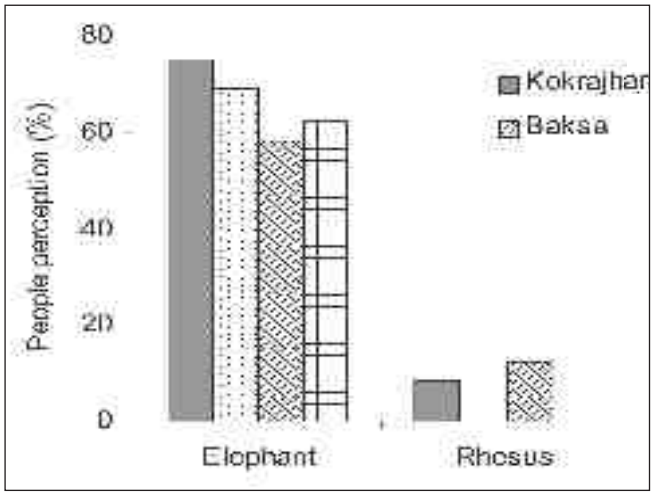

Fig. 105 People's perception on the cause of human-animal conflict

The people perception on the cause of conflict varied in different districts. People identified food crisis as the main reason of conflict in Kokrajhar district (44.44%) and Udalguri district (60%) as compared to habitat loss in Chirang district (50.0%) and Baksa district (53.85%) (Fig. 106).

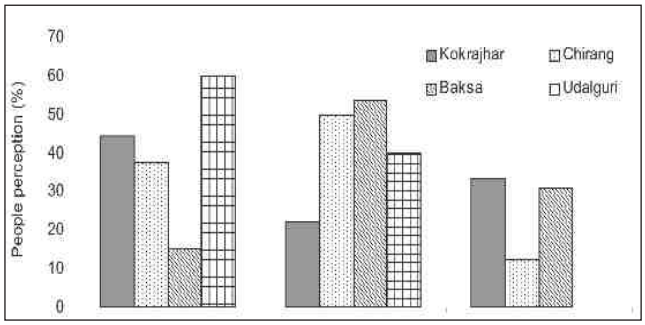

Fig.106 District wise variation of people's perception on cause of human-animal conflict

Implementation of law

Implementation of Customary and Federal Laws.

About 82% of the total people interviewed showed faith in the central laws pertaining to conservation of forests and wildlife. Very less number of people showed faith on customary laws on various issues (Fig.107).

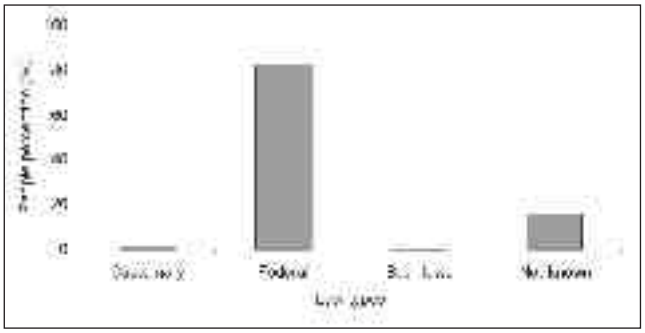

Fig. 107 People's suggestion on implementation of different laws

District wise variation on the use of law also showed a similar trend (Fig.108). Less than 5% of people showed faith in the customary laws.

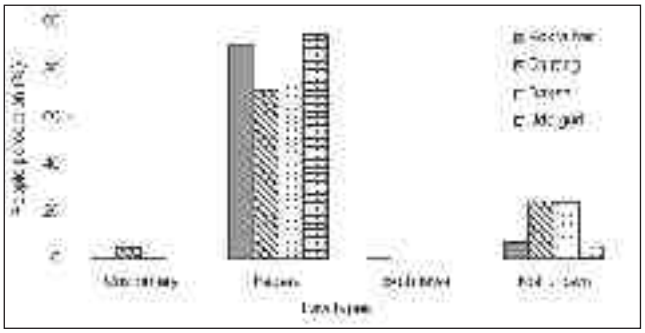

Fig. 108 District wise variation of suggestions on implementation of different laws

Implementation of Forest Act

Though the people of BTC had least faith on customary laws, about 28.74% of people showed faith on customary law on forest related issues inspite of having a major role of the forest laws (43.31%).(Fig. 109)

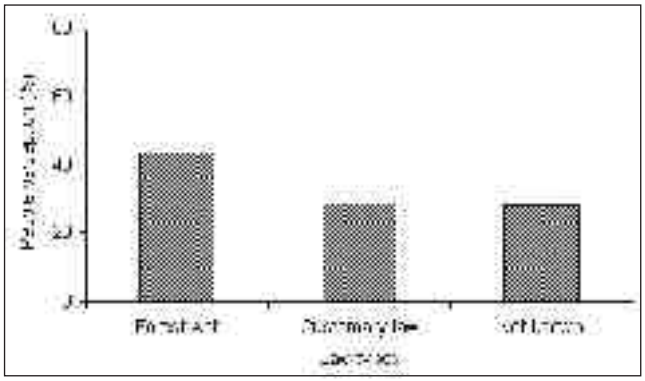

Fig.109 People's perception on implementation of different forest laws in BTC area.

People perception on use of the forest law varied in different districts. More number of people of Kokrajhar (72.09%) and Chirang (40.0%) districts showed faith in forest laws as compared to Baksa (31.82%) and Udalguri (42.86%) district on customary laws in solving forest related issues (Fig 110).

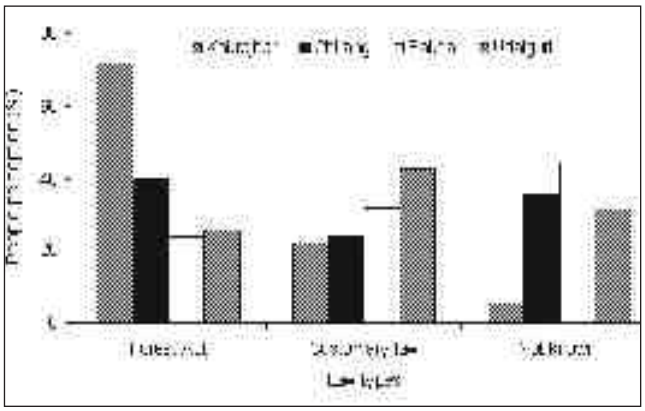

Fig.110 People's perception on implementation of different forest laws in different districts of BTC area

Ban of tree felling

Response on tree felling ban

About 99% of the total people interviewed irrespective to community knew about the ban of tree felling. However, they did not know who imposed such a ban.

All the people of different districts of BTC interviewed knew about the ban of tree felling except in Udalguri where 5.71% did not have knowledge of such ban (Fig. 111).

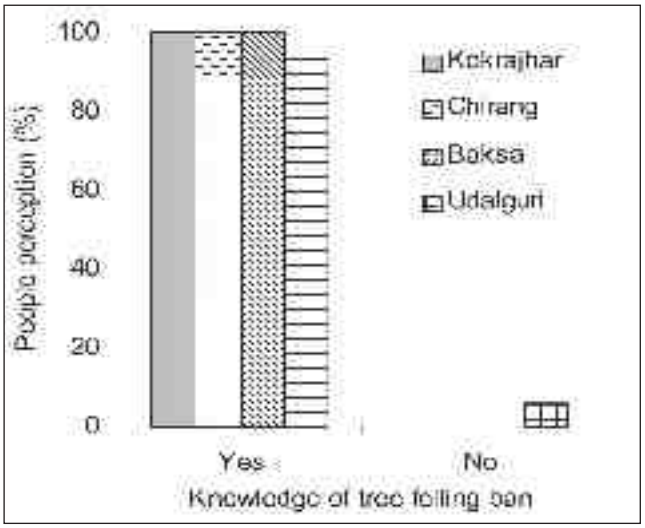

Fig. 111People's knowledge of tree felling ban

Impact of tree felling ban

(a) Impact on forest

About 88% of the total people interviewed stated that the ban of tree felling had no impact on the forest (Fig.112). This suggests a lack of enforcement in the area.

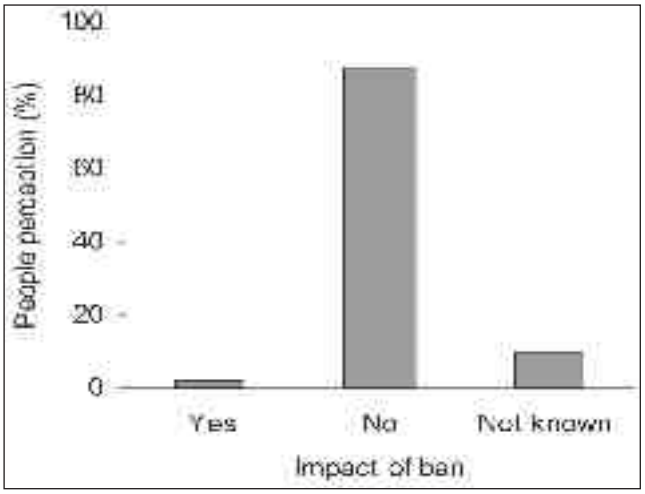

Fig. 112 People's perception on impact of ban on forest

District wise variation on impact on ban of tree felling on forest also showed similar trend. Most of the people stated that such ban could not save forest from illegal felling. However, less than 5% of total people of Kokrajhar and Baksa districts thought that ban had some impact on the forest (Fig. 113).

(b) Impact on livelihood

Like forest, the ban had also no impact on livelihood. About 95% of the total people interviewed stated that such ban had no impact on livelihood of the fringe villagers. However, a negligible number of

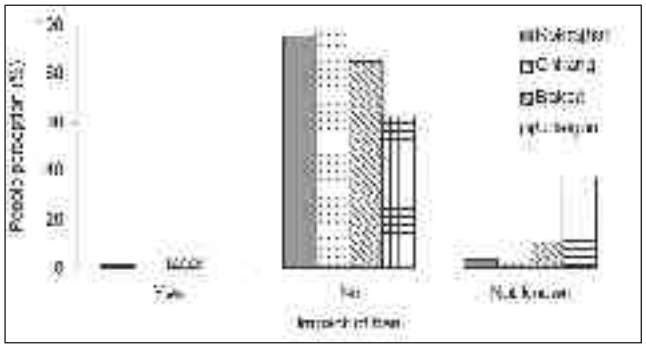

Fig.113 District wise variation on impact of ban on forest in BTC area

people thought that such ban definitely had an effect on livelihood (Fig. 114).

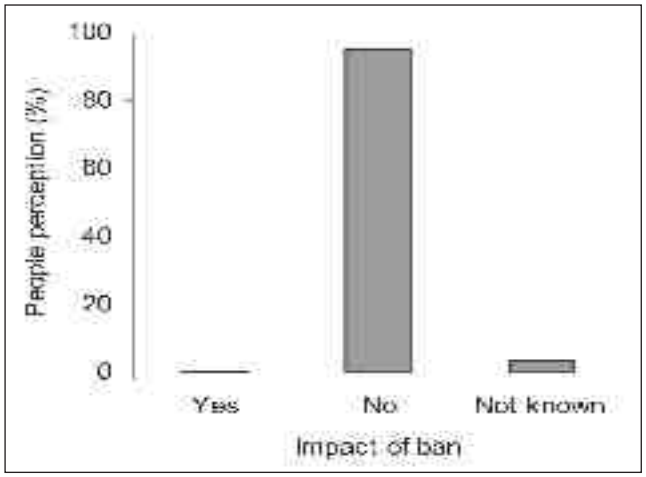

Fig. 114 People's perception on impact of ban on livelihood

Districtwise variation in the impact of ban on livelihood also showed similar trends. Most of the people interviewed in different districts stated that such ban had no impact on livelihoods. However, a negligible number of people (2.33%) of Kokrajhar district thought that such ban had some impact on livelihood (Fig.115).

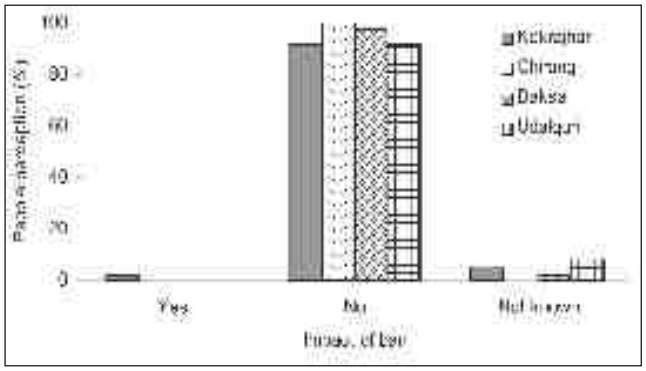

Fig.115 District wise variation on impact of ban on livelihood

Justification of ban

Though according to people, there was no impact of ban on forest and livelihoods in the fringe villages, about 92% of the total people interviewed thought that there should be such ban on tree felling for in absence of such regulation the entire forest cover would be eliminated (Fig.116).

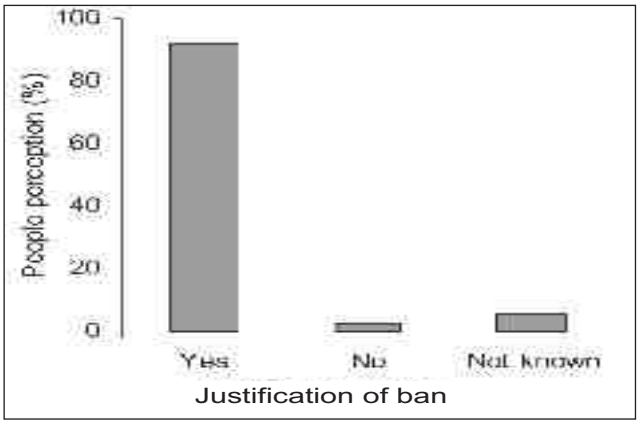

Fig. 116 People's perception on justification of ban

Districtwise variation also showed similar trend. Most of the people (range 88.57 – 100%) interviewed irrespective of district strongly stated that there should be a ban on tree felling (Fig. 117). However, a small number of people in Kokrajhar, Baksa and Udalguri districts of BTC stated of having no justification of such ban.

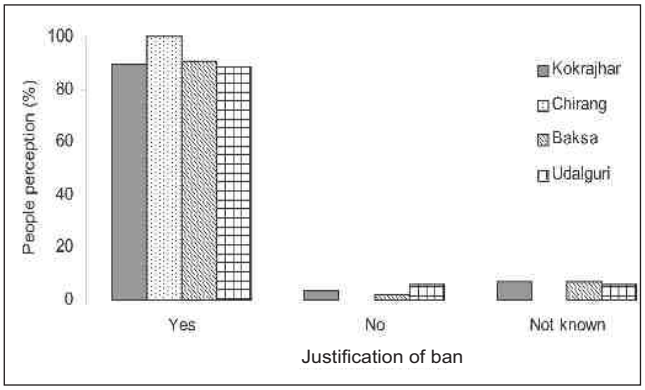

Fig. 117 District wise variation on justification of ban in BTC area

Resource sustainability

A majority (85%) of people were pessimistic about the future of the forests and felt that at the present rate of extraction, the forests would not last more than 10 years. Only a small proportion (7%) thought that they would last longer (Fig. 118).

Districtwise variation in people's perception on how long the forest resource would last also showed

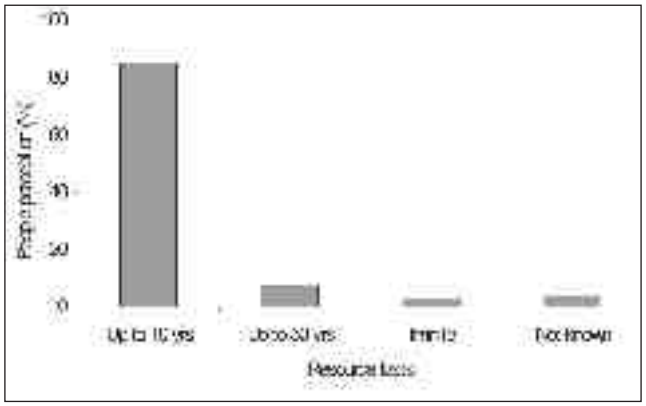

Fig. 118 People's perception on resource lasting in BTC area

similar trends. Most of the people of all the districts stated that the forest resource would last up to another 10 years if the destruction continued at present rate. However, 4.44 – 10.47% of the total people of all the districts stated that the forest resource would last up to another 50 years, and another 5.68% people in Baksa and 8.57% in Udalguri districts stated that forest will last for infinite years (Fig. 119). This clearly indicates that majority of the people of BTC think that the forest will disappear very soon if proper management steps are not taken very soon.

Suggestions for better management

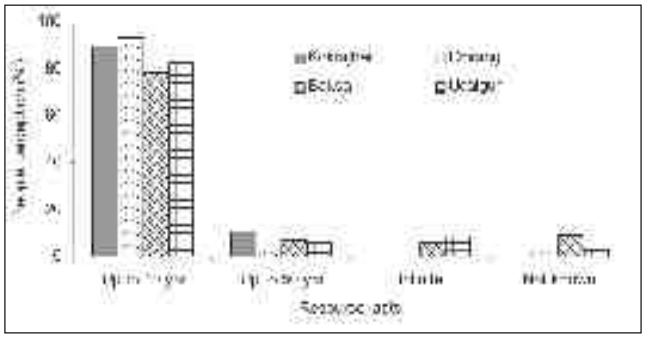

Fig.119 Districtwise variation of people's perception on the duration of resources in BTC

About 18% of the total people interviewed were satisfied with the existing laws to protect the forest followed by 22% of the people who felt that present laws were inadequate. But the highest proportion of people (39.37%) thought that instead of more laws proper enforcement is required for better management of forest in BTC area (Fig 120).

District wise variation also showed similar trend. Highest number of people of all the districts of BTC stated about the requirement of better enforcement for the management of the forest (Fig. 121). This clearly indicates that there is an urgent need for improvement

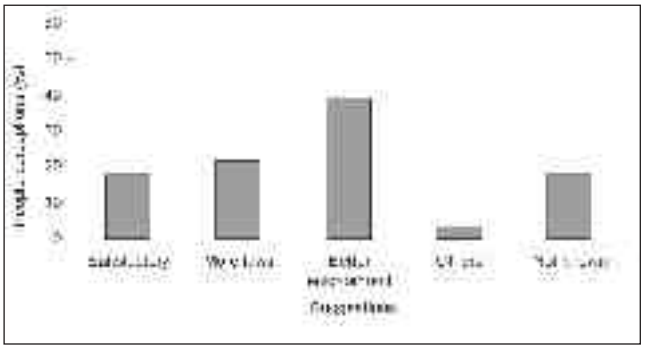

Fig.120 People's suggestions on management of forest

of the present enforcement system for the conservation of forest resource.

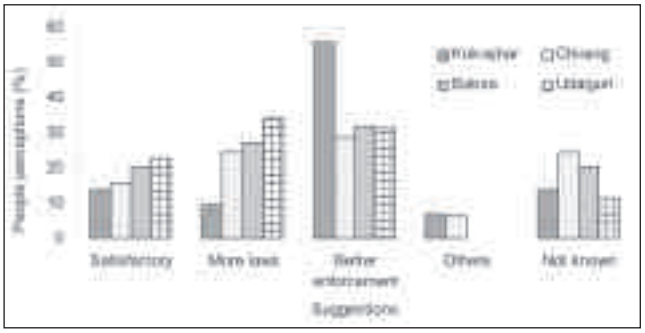

Fig. 121 District wise variation of people's suggestions on management of forest

Relationship of people with the forest department

Relationship with the forest department

Overall people relationship with the forest department was good. About 82.68% of the total people interviewed stated that they had good relations with the forest department. (Fig. 122).

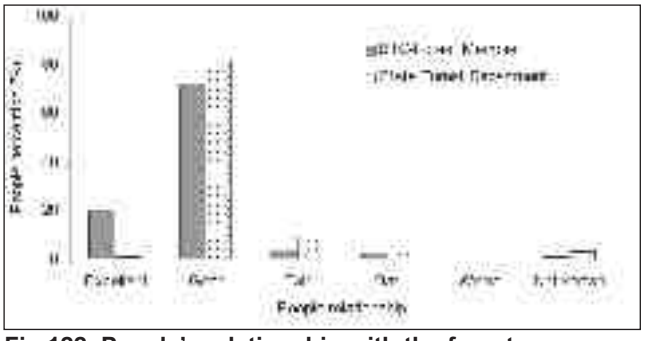

Fig.122 People's relationship with the forest department and BTC officials

District wise variation of people's relationship with the forest department also showed similar trend. Highest number of people of all the districts of BTC stated of having good relationship with the forest

department. However, 14.29% of people in Udalguri district and 4.55% in Baksa district has a bad relationship, but nobody reported of having worst relationship with the forest department. (Fig. 122).

Relationship with the BTC forest official

People of BTC have a very good relationship with the BTC forest officials. About 92.91% of the total people interviewed stated that they share good relationship (combination of good and excellent relationships) with them. Only 2.36% of the people stated not having good relationship with the BTC forest officials (Fig 121). This clearly indicates that overall relationship of the people was good with the BTC forest officials.

Districtwise variation on people's relationship with the BTC forest officials also showed similar trends. Highest number of people interviewed in all the districts of BTC stated of having good relationship (both good and excellent relationships) with the BTC forest officials (Fig 123). However, no individuals of Udalguri stated of having bad relationship with the BTC forest officials.

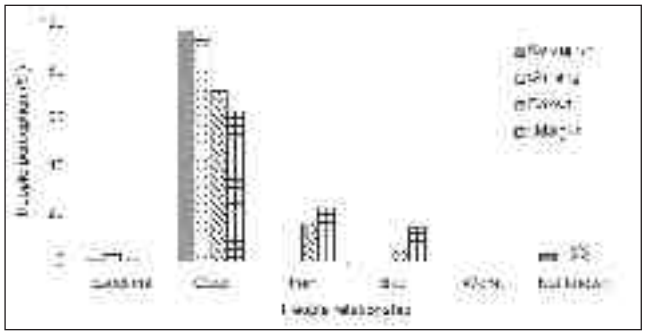

Fig.123 District wise variation on people's relationship with the forest department

Conclusion

The long-term sustenance of forest area depends on how well planned conservation measures are and the success of such conservation measure depends upon how aware the people are to laws and policies. In BTC area, all the forest land belongs to the government, unlike in other district councils where a major proportion of forest are under private or clan ownership. The Bodoland Territorial Council is the custodian of this land and has administrative responsibility for its use and upkeep.

The survey was remarkable in bringing out a few important perceptions which would have a bearing on the overall conservation scenario of the region. People felt that there were no good forests in BTC area while our mapping exercises of the region and the subsequent wildlife survey did reveal the territorial forests in Kuchagaon, Haltugaon and Chirang districts were indeed in a good shape albeit under constant felling and encroachment pressure. It is however correct that much of the forest in the southern parts of these three reserve forests has disappeared. Therefore although around the immediate habitations the forests have disappeared, all is not lost and it is important to communicate this to the local populace.

The people also thought that over exploitation and encroachments were the reasons behind the destruction of forests. The people thus do attribute the reasons for this depletion correctly and this needs to be built on if awareness is to be generated, especially about the ill effects of such loss.

From the survey it was evident that people were not clear as to who was responsible for the administration of the forests in BTC. Most were still under the impression that the state forest department is still the administrator of the forests and thought that primary role of the Territorial Council was to initiate projects. Thus the people are still unaware about the forest control being with the Territorial Council and not with the government in Guwahati. This perception too needs to be corrected because although the sixth schedule provides for devolution of power, which infact has been transferred to the Territorial Council, the people still feel that the control is centralized.

People support the tree felling ban but probably because it secures the forests for their use as at a local level, they continue to subsist on it. Surprisingly however, they opted for central laws rather than local level or customary laws which may be an indication of a greater confidence on central policies.

Human-animal conflict appears to be a big problem in the area. People have identified human-elephant interaction as the major cause of conflict in BTC area. Since Asian elephant is a wide ranging animal and requires large areas for its sustainance. The fragmented habitats, especially in the southern part of the reserve forests may be a reason for increased conflict. As such protection of the existing forest is imperative if further escalation in conflict is to be stopped.

A positive finding of the survey is the faith people have in the Territorial Council which can actually be translated into meaningful conservation initiatives. Since people do not own forests here, it is vital that the utility of forests to local communities is made apparent and the linkages between conservation and dependency and livelihoods are established.

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Fig. 124 Porcupine meat for sale in Jharbari market in the BTC area, Manas

CHAPTER IX

Bringing back rhinos (*Rhinoceros unicornis*) to Manas National Park

Rathin Barman, Anjan Talukdar, Murali Pai, NVK Ashraf, Bhaskar Chaudhury and Vivek Menon

While the Greater Manas concept was being conceptualized, groundtruthed and prepared for protection, it was important that the biodiversity resources of Manas National Park that had been in the past laid waste by poaching be restocked. Of these, the greater one horned rhino (*Rhinoceros unicornis*) being an endagered species was a prime candidate for restocking. The species was once found in large numbers in Manas but had, in the recent past been extirpated.

The population of rhinos has seen a seesaw scenario in the park. The famous naturalist E.P. Gee estimated 15 rhinos in 1966 (Spillett, 1966). This grew to 40 in ten years time in 1976 (Laurie, 1978). However, Sanjoy Debroy, the veteran forest officer estimated 75 rhinos in 1977 and the official number fluctuated from that to 100, till the early 1990s. Although 100 was the upper estimate in 1990, the lower estimate was between 80 and 85 animals. At the peak of their distribution, they were found in Gurchara, Rahang, Gudabil, Sarpuli, Lathajhar, Biati, Panbarijhar, Raisinghlazhar (all under Bansbari range), Sinkangandha, Bilattari, Makibaha, Sanmari nallah, Koraibarizhar, Bansbari nallah (all under Bhuyanpara range) and Sadan nallah and Gabharukhunda nallah (all under Panbari range).

Poaching then hit the park and although only 40 odd numbers were recorded as poached in the first few years of the 1990s, by 1995 the forest department estimated that as few as 12 animals could be left (Menon, 1996). The sharp fall in rhino numbers is attributed to civil unrest in Bodoland (see previous chapter). Most of the recorded poaching was only from the Bansbari range and no records were kept in the other two ranges due to the absence of forest personnel for many years. Several biologists reported that no rhino was left in Manas although local reports of few surviving rhinos persisted. Recent reports from park authorities are that a few rhinos had survived the massacre in the Bhutan foothills and are slowly showing signs of returning to the park. Even the most optimistic official will however not put a number at more than six and it is a fact than there is no recorded proof of rhino sighting in Manas for the last 10 years.

In 2006, the Wildlife Trust of India (WTI) and the International Fund for Animal Welfare (IFAW) in collaboration with the Assam Forest Department and the Bodoland Territorial Council started a rehabilitation and reintroduction project with three orphaned rhino calves. If one is to learn from the lessons of Jaldapara, it is easy to surmise that even a small population of rhinos in Manas, or in the future in Laokhawa would take several decades to reach its past numbers. The only known method to shortcut this is to reintroduce large numbers of rhinos from other viable populations in Assam. Rhinos have been successfully reintroduced into the Dudhwa National Park in 1984 (Sale and Singh, 1987). Given that Dudhwa has taken 20 years to reach 20 rhinos and Jaldapara stayed in the 20s for over 20 years (but has since then shown a dramatic upswing), it can be theorized that a founding population for restocking should be minimum of 30 odd (three dozen) animals. However, the first step towards such a restocking was to test the area to see if the factors that let to the extirpation of the animal have disappeared in the first place and see if the situation now is favourable to restocking. The use of orphaned and rehabilitated calves in preparing the ground is therefore a careful strategic step in bringing back the rhino to Manas. These rhinos, it was strategised, would test the local will to preserve the species, anti-poaching readiness and also habitat suitability. Therefore the governing

council of the Centre for Widlife Rehabilitation and Conservation (CWRC), chaired by the Forest Commissioner of Assam and having as members the Chief Wildlife Warden of Assam and the two park directors as well as representatives of WTI, recommended that orphan calves from the centre in Kaziranga be used for this purpose. The Deputy Chief Executive Member of BTC, Sri Kampa Borgoyari, welcomed this move.

The CWRC was established in 2002 in Panbari reserve forest near Kaziranga National Park with the objective of rehabilitating wildlife that get displaced especially during floods. The greater one horned rhino is one of the several species of wildlife that get displaced due to floods.

Two major reasons for the displacement of rhino calves in Kaziranga National Park have been the floods and injuries caused due to unsuccessful predation. While five of the 13 cases brought to CWRC were injured due to predation, four cases could solely be attributed to the floods. Since most of the calves that withstood predation were seriously injured, none of them survived in spite of medical care.

As per the rhino rehabilitation protocol developed by WTI in consultation with experts on this subject (Ashraf *et al*, 2005) the calves are milk-fed till they are 18 to 20 months of age and subsequently moved to the release site for acclimatization in a confinement (*boma*). As per the WTI protocol on the rehabilitation of rhino, prepared under the IUCN guidelines on reintroduction, the rhino would spend at least two years in the enclosure before being let out to the wild (Annexure 35). The animals graduate into adulthood in the very same place they are going spend the rest of their lives.

A site selection team headed by the Chief Wildlife Warden of Assam identified the Kuribeel area in Bansbari Range of Manas National Park as the ideal location for establishing the rehab station. The presence of few watchtowers nearby ensured that security to the rhinos could be in place 24 hours. Since the plan was to move the rhinos in trucks, it was also important that the *boma* is located along an existing forest camp road.

1. Construction of "*boma*" at the release site

The construction of the enclosure (*boma*) at Kuribeel area in Manas National Park began in November 2005 with vegetation clearance and demarcation of the area for grouting poles for power fencing. The *boma* is a twin-paddock of roughly 25,000 sq.m. each, connected by a narrow strip of corridor that would facilitate the transfer of the rhino from one section to another (Fig.124). The

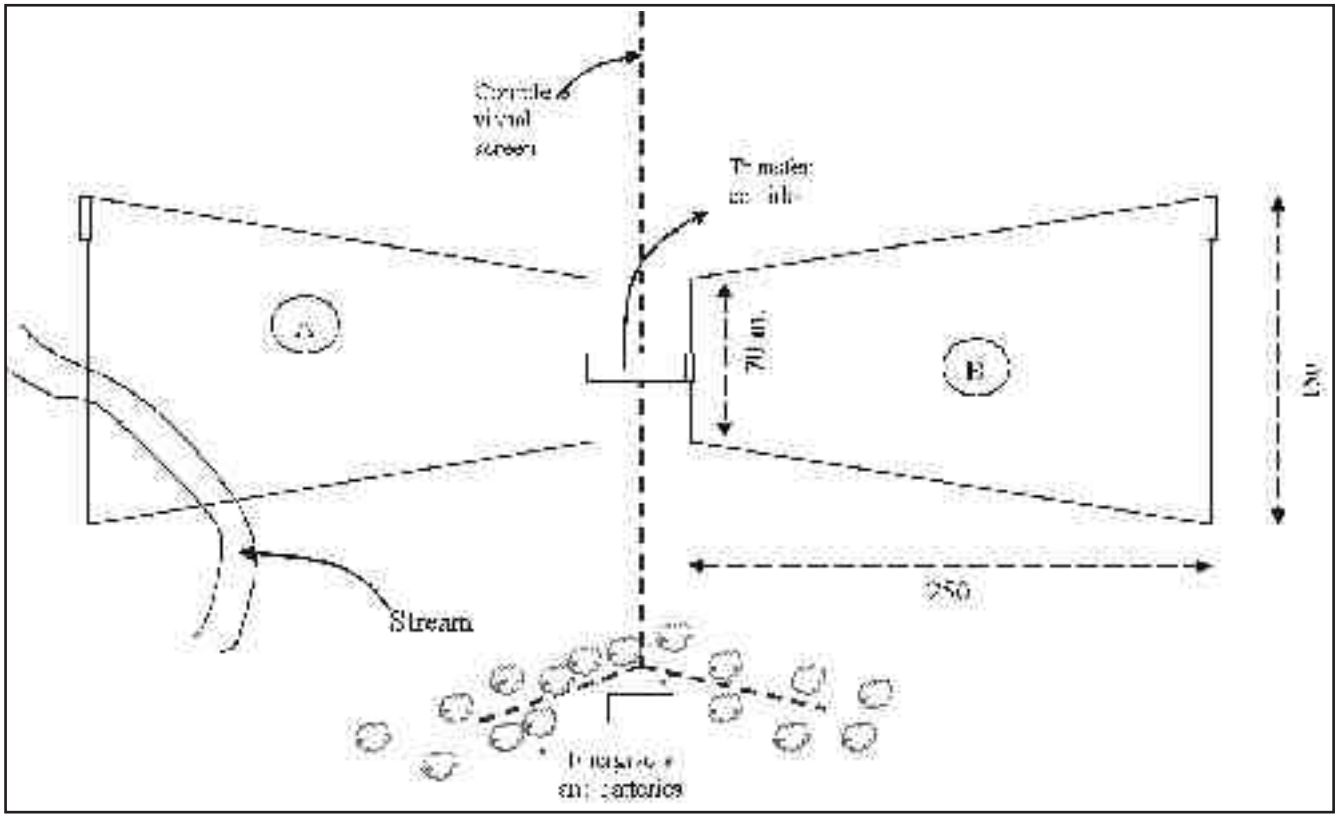

Fig.124 Draft layout of the proposed Rhino *boma* in Manas National Park

twin paddocks were deemed essential as a backup option if anything went wrong with one paddock. Wild elephants are known to damage power fences and a standby enclosure was considered essential to deal with all possible emergencies. Moreover, the rhino could be moved to the other paddock if one zone gets overgrazed.

The power fence, run entirely by solar power, was installed by Suraksha Energizers, Bangalore. All activities including grouting of poles and installation of the power fence was completed on the 15th of January 2006. Since the beel (water body) passed through only Zone "A", the idea was to house the rhino here during the summers and move the animal to Zone"B" during monsoons when water for wallowing is not a must. This would also allow any repair works to be carried out in Zone "A".

2. Relocation of the first rhino

A hand-raised three and a half year old female rhino calf, undergoing rehabilitation at CWRC was relocated (Fig.125) from the centre to the Rhino Rehabilitation Station in Manas National Park in February 2006 for eventual reintroduction to the wild. The calf was barely three to four months old when rescued from floods in 2002.

Rhinos have been translocated worldwide, from wild to wild and from captivity to wild (Sale and Singh 1987; Morkel & Kennedy-Benson, 2007). Successful wild to wild translocations of the greater one-horned rhinoceros has been carried out in Nepal and India for the purpose of reintroduction and the species' range extension. Though rhinos under rehabilitation have been quite commonly translocated to wilderness areas in Africa, this was the first time that a greater one-horned rhinoceros was rehabilitated in a protected area.

Design and fabrication of the crate

Literatures are available on the crate specifications for different species of rhinos (Suwal and Shakya, 2000; Morkel and Kennedy-Benson, 2007). Rhinos in India have been moved to far away locations in the past by road, and Guwahati zoo itself has done it few times in the past. The Guwahati zoo authorities recently shipped a rhino to Trivandrum Zoo in Kerala by road.

Fig.125 The rhino calf at CWRC, a few months before its relocation to Manas National Park

Considering the fact that local expertise was available in Assam itself, the Assam State Zoo was contacted for inputs on rhino crate design and fabrication. The zoo authorities provided an illustration, based on which a crate was made at the CWRC campus. The crate dimension (9x4x5.5 feet) was decided based on the morphometrics of the rhino calf. The crate was built on a strong foundation of six wooden frames firmly secured by nuts and bolts. The crate had a sliding door in the rear and a vertical folding door in the front that can also be used as a ramp when opened and laid down to ground level (Fig.126).

The rhino was radio-collared on the 20th of January 2006, almost a month before the actual relocation day. She was chemically restrained with Meditomidine hydrochloride, the drug of choice for such minor operations like radio-collaring in captive rhinos. Blood samples were also collected for screening against tuberculosis (Fig. 127). The entire operation lasted for about 40 minutes. Dr. Sharma and Dr. Dutta from Guwahati Veterinary College conducted the immobilization operation.

Preparations for crating

Soon after collaring, preparations began to habituate the rhino to the crate. Habituation began with both the doors open in the beginning and subsequently with the front door closed (Fig.128). The animal was fed inside the crate especially the concentrate mix, morning and evening. Soon the rhino got so habituated to the crate that it even began sleeping inside it. Habituation period which began after collaring on the 20th of January lasted until the day of the crating on the 20th of February.

Crating the rhino

In spite of a long period of habitation to the crate, the rhino felt suspicious of something and hesitated to enter into the crate on the scheduled day (20th of February, 2006). Every time the animal entered the crate, she would retreat back immediately. The team of veterinarians from Guwahati Veterinary College was ready to tranquilize and load the animal into the crate, should all the efforts to crate the rhino fail. A strong wooden sledge was already in place to drag the

Fig 126 The crate with the sliding door on the rear.

Fig. 127 Blood collection after radio-collaring

tranquilized animal into the crate (Fig. 129). Such sledge-like platforms are essential to move the rhino to the crate once the animal is tranquilized. In "wild to wild" translocations, captured rhinos are secured to such wooden sledges and dragged to loading sites using tractors (Sale and Singh, 1987; Suwal and Shakya, 2000).

Though crating exercise began the previous night itself, it could be achieved only on the 20th morning. The crating process itself was not without any setbacks. Soon after the door slid down, the rhino managed to kick the door off the sliding channel. The keepers managed to restrain the animal physically by inserting MS pipes through horizontal slits of the crate. Meanwhile veterinarians from Guwahati

Fig. 128 The rhino inspecting the crate and entering inside for food.

Fig 129 A wooden sledge was in place to move the rhino to the crate after darting.

Veterinary College stepped in and administered a long-acting tranquilizer (*Azaperon)* and the animal keepers simultaneously reinforced the sliding door with supporting poles of bamboo. By the time the drug could take its full effect, the rhino had managed to knock off a few wooden planks on the roof. Such damages to crates have happened during rhino translocation in the past and rhinos have been translocated at times with a nearly barren top. The firm front door, the crucial one in any rhino crate, bore the brunt of the onslaught. There was a small slit door on top meant for dropping fodder and placing buckets of water. This got damaged as it came directly in the firing line of the horn.

Though the basic frame of six vertical supporting frames was well secured by nuts and bolts, it was still decided to reinforce the crate by securing it with three L-angles around. This process took about three to four hours. The entire crate was then wrapped around with a netting to minimize visual contact with people around.

Loading the crate into the truck

Since no cranes were available locally, a recovery van was employed to drag the crate into the truck. The truck was already placed in a trench to bring the truck floor to the ground level. The crate had to be dragged for a distance of about 20 meters, but the process took a long time due to delays at different stages of the exercise (Fig.130). It took about 45 minutes to bring the crate near the truck. It then had to be turned 180^{o} to ensure that the crate is loaded with the front side of the animal (i.e. the side with the ramp-door) facing the rear side of the truck. This took almost an hour since the recovery van had to position itself in the opposite side to turn it around. The space available in the premises was also not adequate to accomplish this task in quick time. The last hindrance came while actually loading the crate into the truck. The crate could not be pushed as the truck floor was about three to four inches above the ground level. The crate had to be lifted and dragged, for which the recovery van had to be placed on the other side of the truck. This process again took an hour and as a result the entire loading operation took three hours. During the entire operation, the rhino was lying on the floor due to the effects of the long-acting tranquilizer. The effects of Azaperon is known to last for up to eight hours and in fact no additional dose was required during the entire transportation.

Fig. 130 The crate being lifted by the recovery van into the truck.

With the Chief Wildlife Warden of Assam Mr. M.C. Malakar flagging off the transportation, the truck left CWRC premises at about 7.00 PM, about two hours later than the scheduled time of departure.

Transportation of the rhino

An armed guard from the Forest Department, a veterinarian and two animal keepers of WTI traveled in the truck. A convoy of four vehicles comprising a team of veterinarians from Guwahati Veterinary College, WTI staff and personnel from the Forest Department also accompanied the truck. The CWRC project leader Mr. N.K. Vasu and WTI Trustee Prof. P.C. Bhattacharjee, also traveled with the team. The vehicle would stop every two hours to facilitate a detailed inspection of the animal. The animal was sometimes seen standing up and eating the fodder dropped through the trap door.

The truck traveled via Tejpur and Mangaldai, and reached Manas on the 21st morning around 9.30 AM. The last 22 km stretch from Barpeta road to Bansbari took nearly two hours because of the poor condition of the road. The truck also had to negotiate a riverbed and a stream-bed at two places (Fig.131). These stretches could be negotiated without any major hiccup as it was the right season to travel along that route. Any incidence of heavy showers the previous days would have made the task impossible.

Release of the rhino into *boma*

The only smooth part of the entire translocation operation was the release. Manas National Park authorities, headed by Director Mr. Abhajit Rabha and Mr. Ritesh Bhattacharjee, were already there at the release site in Kuribeel to receive the rhino. Mr. Kampa Borgoyari, Executive Member, Department of Environment and Forests , Bodoland Territorial Council flagged off the release of the rhino from the crate.

The truck was reversed into a trench dug close to the enclosure (*boma*) gate. The rhino, resigned to its fate inside the crate, showed no interest in getting up when the front ramp-door was opened. The animal appeared to be dull but got up soon after a dart of medicine was fired at her. She took nearly 30 minutes to come out as she kept exploring the surroundings by sniffing in the air (Fig. 132). To facilitate a smooth release and make the rhino feel "at home", four to five gunny bags of the rhino's dung, brought on the previous day from CWRC, were already placed in piles inside the boma.

There were large groups of onlookers, especially people from the media to witness and document the event. There was that remote possibility of the rhino getting excited and running amuck and breaking open the power fence. Armed forest guards with at least six elephants were lined on the two sides of the *boma* to discourage the rhino from

Fig 131 The truck carrying the rhino negotiating a stream bed before reaching *Kuribeel*.

Fig. 132 Release of the rhino into the boma in Manas National Park

darting off towards the power fence. The veterinary team was ready to face the emergency should the animal break open the fence. However, nothing of that sort happened as the animal, soon after getting out of the crate, rushed to the middle of the enclosure.

Lessons from the first translocation

There is scope for improvement in every undertaking, especially in such rare activities like wildlife relocation. Several lessons were learnt during this first translocation exercise:

- Reinforcing of the crate with L-angles wouldn't have been necessary if the horizontal planks had been nailed to the basic frames from inside.
- The channel for the sliding door should be deeper (at least an inch) and also padded with a thin metal lining to facilitate a smooth sliding of the door once the trigger is released.
- The roof height of the crate should be increased by at least six inches to make it beyond the reach of the rhino.
- More attention to be paid during the habituation process. No alterations are to be made to the crate during the last few days.
- At least two hours could have been saved if a crane had been employed for the purpose of lifting and placing the crate. The limited space within the CWRC premises also made maneuvering of the vehicles rather difficult. Cranes that can lift 3 tons of weight should be employed for loading large rhino calves in future.

3. **Relocating two more rhinos**

Following the transfer of a rhino in February 2006, two more rhino calves were moved from CWRC to the Rhino Rehabilitation Station in Manas National Park on the 28th of January 2007.

The operation was conducted in the presence of the Chief Wildlife Warden and Directors of Kaziranga and Manas National parks. As per the directive of the Ministry of Environment & Forests, Dr. Parag Nigam of Wildlife Institute of India was also present to take part in the operation.

Fig 133 WTI Veterinarian recording the pulse of the rhino

Radio-collaring & disease investigation:

One month before the day of transfer, both the rhinos were chemically restrained at CWRC for radio-collaring and collection of clinical samples for disease screening. The anaesthetic procedure was conducted under the supervision of Dr. Bupen Sharma and Dr. Bijoy Dutta of Guwahati Veterinary College. Ketamine-Meditomidine-Ditomidine combination was used for the procedure. The operation was conducted on the 28th of December 2006 (Fig. 133).

Crates: The crates used this time were slightly different from the one used for the previous relocation operation. Three major modifications were done to the old crate: (i) the height was increased by eight inches to keep the horn away from striking distance, (ii) the sliding door channel was not only made deeper (1 inch) but also reinforced with a lining of GI plates to prevent the door from slipping out, and (iii) a one meter long channel of L-angle above the sliding channel was also in place to retain the sliding door in vertical position and guide it along the channel while crating (this jutting angle was subsequently cut once the crating was completed).

Since even well-planned schemes can go awry when there is imperfection in the division of labour, different teams were assigned the following tasks:

(i) Crating the rhinos
(ii) Loading and unloading
(iii) Tranquilization and health monitoring
(iv) Media relations

During the crating of the first rhino, two people had to be on top of the crate to guide the door through the channel and two behind the crate to unleash the rope (Fig. 134). Last minute changes were also made to crate in the first instance. These were probably the reasons why the rhino hesitated to enter the crate. This time the entire trapping operation was "remotely" controlled with no one standing near the

Crating: The rhinos were sharing the same paddock till they were separated to facilitate crating them individually. Soon after their separation, they were habituated to their respective crates for more than two and half months. During the first rhino move, the habituation period was not more than a month. Like in the earlier occasion, the rhinos were invariably fed inside the crate, be it fodder or concentrate. The rhinos became so habituated that they often slept inside the crate.

Fig 134(a & b) Crating techniques employed in 2006 and 2007

crate. A long MS pipe, hooked on to the sliding door on one side and to a long rope on the other and supported in the middle by a wooden hinge/fulcrum, acted as the release mechanism (Fig. 134).

As soon as the concentrate mix was placed inside the crate, the rhinos walked in without much ado. They had been starved off fodder and concentrate the previous day evening. The keepers moved to a nearby location behind the crate and took their positions near the rope that is connected to the sliding door. The rope was severed with a dagger at one stroke and the door automatically came down the channel without any hindrance.

None of the untoward incidents experienced during the previous year's crating happened this time. The rhinos did become frantic and began knocking the front door and violently shaking the entire crate. Soon after crating, both rhinos were given a shot of the long-acting sedative, Azaperon and the animals calmed down within ten minutes of administration of the drug. The crating operation began at 8.30 AM and was completed by 9.30 AM. The animals remained in the crate until they were loaded into the truck at about 2.30 PM. The rhinos readily consumed the fodder given to them during this time.

Like the crating and loading operation at CWRC, the unloading and release process at the release site in Manas National Park was also uneventful. Both the rhinos quietly walked out of the crate within minutes of the door being opened. Earlier, dung samples of both the rhinos were scattered insite the *boma* in the vicinity of the crate to encourage the rhinos to come out without any apprehension. During the first release, the rhino not only took nearly 30 minutes to come out of the crate but also darted into the grasslands in the middle.

Loading: In the first rhino relocation exercise, the loading process took nearly three hours as a recovery van was employed to drag the crate on the to truck. This time the crates were lifted and loaded into the respective trucks using a crane (Fig.135). The entire operation was over in 45 minutes. Loading began at about 2.30 PM and was over by 3.15. Both the crates were loaded with the ramp side of the crate towards the rear side of the truck. i.e. the rhino facing the rear, so as to facilitate easy release into the *boma* upon reaching the release site in Manas National Park.

Fig. 135 A crane used to load the crate with rhino for relocation into Manas NP

Release: Two days before the arrival of the rhinos, the older rhino had been confined to section-B of the twin *boma* . Slight modifications had to be done to the *boma* to facilitate this transfer and confinement. The plan was to release the two new arrivals into Section-A, and mingle all the three after three to four days of habituation. One by one, the trucks were reversed into a trench dug close the enclosure gate (Fig. 136). Unlike the first rhino last year, these two rhinos were up on their feet even before the door was opened.

Fig 136 Rhino walked out of the crate in no time

Post-release: Soon after release, both the rhinos were seen nibbling blades of grass. The day after the release, both were seen together, moving around and exploring every part of their new home (Fig. 137). One animal keeper from CWRC was stationed at the rehab station for a month to train the incumbent keeper on the husbandry practices to be followed. The animals received the concentrate mix every day for a period of 30 days. Thereafter, the rhinos were left on their own with only salt-licks being given as supplement.

Fig 137 Released rhinos exploring the habitat inside the *boma*

4 Relocating the fourth rhino

As per the discussion and decision taken in the governing council of CWRC on 8th of November 2007, chaired by the Commissioner and Secretary, Environment and Forest, Government of Assam and subsequent permissions from Chief Wildlife Warden, Assam and Ministry of Environment and Forest, Government of India, a female rhino calf of about two years of age was relocated on 23rd February 2008 from CWRC to Manas National Park. This was the third such translocation of rhino calves from CWRC, Kaziranga to Manas National Park since January 2006.

To facilitate the accomodation of the fourth rhino in Manas, Governing Council advised the project management to increase the area of the *boma* before its translocation. In January 2008, about 19 acres of grass land was added towards the northern side of existing *boma,* thereby increasing the total area of the pre-release site to 33.35 ha. The three sub-adult/adult rhinos were confined to Zones B & C so that Zone A could be reserved "exclusively" for the fourth rhino (Fig. 138).

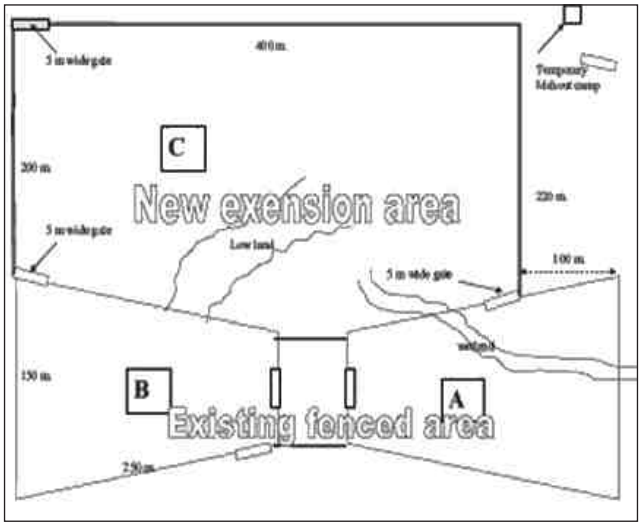

Fig. 138 Schematic diagram of modified pre-release site at Manas National Park.

Sledging and Crating

Unlike the three rhinos moved in 2006 and 2007, the crating of this calf was different in many ways. Since she was wild caught and not hand-raised at the CWRC, the question of habituating the rhino calf to a crate did not arise. The animal, housed in a paddock, was darted and drugged to the crate.

In January 2008, a month before the relocation day, the animal was chemically retrained for carrying out disease screening procedures for Tuberculosis and other minor infectious diseases. The animal was also radio-collared at the same time. This was done with the help and expertise of the College of Veterinary Science, Khanapara, Guwahati. A VHF collar was fitted on the animal for post-release monitoring at Manas (Fig. 139).

Fig. 139 The fourth rhino calf under sedation at CWRC

On the day of relocation, on the 23rd of February, 2008 the calf was chemically restrained by firing a dart from a distance of about five meter, with a combination of 25 mg Meditomedine hydrochloride and 200 mg Ketamine hydrochloride. The tranquilization team was led by Dr. B. Sarma and Dr. B. Dutta of the College of Veterinary Sciences, Khanapara, Guwahati. WTI veterinarians Dr. Anjan Talukdar, and Dr. B. Choudhury assisted the experts during the process. Once sedated and secured to the sledge, the calf was dragged in the crate and then loaded into the truck using a crane (Fig. 140). The exercise was witnessed by senior forest department

Fig. 140 Calf being sledged to the transport crate

officials and representatives from IFAW. The truck reached Manas on the early morning of 24th February and the calf was released into the pre-release site by the Field Director of Manas National Park. Unlike the last relocation, this calf was released into a separate stabilization zone created with wooden poles inside the electric fenced *boma* (Fig 141). The plan is to hold the calf at this stabilization zone for two months and later release it into Zone-A of the *boma*. The calf was provided concentrates in the stabilization zone on a daily basis. She will spend another two years in the pre-release enclosure before being considered for release.

Fig. 141 The rhino calf being directed to the stabilization zone within the *boma.*

All the four rhinos moved to Manas have been females. The fifth rhino calf rescued is a male and he will be moved only in 2009. The first rhino is almost five years of age, and considering the fact that rhinos reach sexual maturity at this age, it is important to socialize her with a male at the time of her release from the *boma*. She has already undergone two years of *in-situ* acclimatization and and is ready for release along with the other two females.

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CHAPTER X

Rehabilitating elephants (*Elephas maximus*) in Manas National Park

Bhaskar Chaudhury, Rathin Barman and Anjan Talukdar

1. Introduction

About half of the Asian elephant (*Elephas maximus*) population in India is in the north-eastern states of Assam, Arunachal Pradesh and Meghalaya (Sukumar, 1989). The rapid rise and spread in human population has meant the gradual elimination of the elephant in many areas, the principal reason being habitat loss. Added to the well known issues of poaching for tusks and poisoning in retaliation to crop raiding is the problem of elephant calves ending up in captivity due to various reasons.

"Rescuing" a displaced elephant calf in India has traditionally meant saving it from injury, predation or death due to starvation (Menon *et al*, 2005). Attempts are rarely made to rehabilitate and reintegrate such calves with wild elephant herds. Even in the few attempts that have been made, the success is difficult to measure as there have been no post-release monitoring of the calves with radio telemetry or other marking methods. With the decline in wild elephant populations, it has become necessary to reintegrate the orphaned elephant calves back to their natural habitat to maintain the populations in the wild (Jayawarden, 2005). Since its inception in 2002, one of the key species that are permanently displaced and hand raised at the Centre for Wildlife Rehabilitation and Conservation (CWRC) is the Asian elephant. As on 31st March 2008, ten elephant calves have been hand-raised at CWRC. Of the 33 cases of elephant calf displacement attended by the rescue team, five were reunited with natal herds at the very place of displacement itself. The remaining calves had to be brought to the centre for hand-raising. The ultimate aim is to enable these elephant calves to re-integrate into wild elephant herds.

2. Site selection in Manas

Like all other species 'rescued' from Kaziranga National Park, the elephants were also originally planned to be rehabilitated in Kaziranga itself. Unlike rhinos and wild buffalos, elephants are not held in a *boma* till they are released one day. Elephant rehabilitation is a gradual reintegration process and it demands the constant presence of rehabilitators in the field for facilitating the process. Due to this reason, many sites in Kaziranga National Park (KNP) were not considered ideal because regular patrolling on foot would mean moving amidst wild rhinos. Manas National Park was subsequently considered a better place for following the gradual release option prescribed by the elephant rehabilitation protocol (Ashraf *et al*, 2005).

The Manas site selection committee comprised of the Director and Deputy Director of Manas NP, Range Officer of Bansbari range, WTI Wild Rescue Programme Director, Rhino Rehabilitation Project Manager and others. Three sites in Manas were short-listed for a detailed evaluation, namely Uchila, Doimari and Panbari. The team selected Doimari as it had all the ingredients of making it the ideal location for initiating the project.

3. Relocation

Since translocation of living organisms carries the threat of transferring micro and macro organisms to

the release area, a thorough disease screening of all the elephant calves was made before their relocation. A protocol for relocation was prepared in consultation with experts from the Forest Department and the College of Veterinary Science, Guwahati. On 19th February 2007, a team from the College of Veterinary Sciences, Guwahati comprising experts on veterinary pathology and microbiology, visited CWRC to evaluate the health condition of the elephants and collect clinical materials for disease screening.

Six of the ten elephant calves were selected for moving to Doimari in 2007. The rest were considered too young or weak to be moved for acclimatization and release. All the selected calves were fitted with radio-collars and microchips on 22nd February 2007 (Table 26). At the release site, the road from Kokilabari to Doimari was made motorable. A night stockade with a power fence as a barrier was built. These preparations were completed by 17th February, 2007.

The trucks were parked at the designated loading area next to the elephant stockade in CWRC the night before, so that the calves would not panic the next morning while loading. The loading process on 23rd February began at 6 AM and continued till 2 PM (Fig. 142&143). Two calves were loaded into each truck and restrained with soft jute ropes to prevent them from moving inside the truck. Four of the calves had to be administered mild sedatives as they showed signs of nervousness. Once loaded, the trucks left CWRC with two keepers in each truck. All the calves were observed for signs of bloat, injuries and other abnormalities usually associated with such long journeys.

The team arrived at Doimari on 24th February and preparation for unloading the calves began at once. The ropes were untied and the calves walked out of the truck without any hesitation. However, the stress of long transportation was evident in all the calves. They were seen shaking their legs due to stiffness developed during the long period of restraint. Soon after unloading they were busy grazing near the stockade (Fig. 144). All the six calves were then guided by the keepers to the night stockade located about 50 meters from the unloading site. Two more calves were moved to the rehabilitation site in Manas on the 23rd of February 2008 (Table 26). One of these calves was a milk dependent calf and was expected to be milk-fed for another six months at least.

4. Reintegration process

Like all rehabilitation protocols, the one on elephants has been an evolving document. It was last reviewed and updated during the international consultation workshop on wildlife rehabilitation (Mainkar *et. al*, 2005) held in Kaziranga National Park during its Centenary Year in 2006. As per the protocol, all the calves were taken for daily incursions into the Panbari Reserve forest near CWRC soon after they were stabilized (Annexure 36). Later, the process of habituation to the forest was continued at the release site in Doimari.

Since the plan was to gradually reintegrate the elephants into wild elephant herds, reintegration could occur at any time and therefore, no time limit was fixed for the elephants to be with the caretakers. The elephants were regularly taken for long walks in the forest from 8 AM to 4 PM and left alone to graze during the day and interact with wild herds. By night, they were brought back by their keepers to the stockade. For the first two months, they were also given a concentrate diet in the evening after their return to the stockade.

Table 26: Elephants moved to Doimari for rehabilitation in 2007 and 2008

Sl. No.	Name of the calf	Transponder Chip Number	Place of origin	Approximate Age
1.	Pinku (P)	00065-DF098	Numaligarh	One week	5 years
2.	Mohan (M)	00065-DA577	Digboi	One year	6 years
3.	Rupa (R)	00065-8C29D	Balipara	Two months	2.5 years
4.	Pari (Pa)	00065-8EB72	Bokakhat	Two month	2 years
5.	Numal (N)	00065-8D959	Numaligarh	10 months	3 years
6.	Babu (B)	00065-8CDBC	Tezpur	One month	3.5 years
7.	Anjan	00065-D9DOA	Hawrah	1½ month	3 years
8.	Sangeeta	Yet to be chipped	Lokhojan	Two months	18 months


Fig.142&143 The elephant calves being loaded onto the trucks using bananas as bait

Fig. 144 The elephants begin grazing soon after unloadingat Manas National Park

A daily record of the progress of acclimatization was maintained by noting down the distance traveled from stockade, duration spent in the wild, habitats covered, GPS locations of the areas visited and incidents of interaction with wild herds. Once the elephants became independent, they were radio-tracked on foot, elephant back and vehicle every week. However, more than 60% of the tracking was done on foot as the monsoon rains made vehicular movement impossible.

The results were analyzed only for the period 2007-08 for all the six Asian elephant calves. Based on the dependence of the elephants on caretakers, the whole project period was divided into two periods:

Period A: From 25th Feb 2007 till 31st August 2007 when the calves were guided by the keepers in the forest.

Period B: From 1st September to 31st March 2008, when the calves were on their own, with only their movement pattern, habitat use and behavior being monitored.

Period A: 'Hands-on' period

For the first six months of their acclimatization period in Doimari, the elephants' movements were determined by keepers who guided them. Within four to five months of their acclimatization, the elephant calves showed tendencies to be on their own. The number of days the elephants were missing from the stockade area increased as the day progressed. Given an opportunity, they preferred to be left alone rather than being confined to the stockade at night.

Stabilization period:

The elephants spent the first month of their time in Doimari exploring the new environment that provided them plenty of opportunities to forage. They had to also get used to the nuisance of biting flies that were conspicuously missing in the earlier acclimatization site at Panbari, near CWRC. The body condition of all the calves was below average upon arrival.

The pre-monsoon rains brought the much required relief to all the elephant calves from biting flies and shortage of water for bathing The elephants were attracted to the luxurious growth of tender shoots of different grass species in the park. The radius of acclimatization was increased from 2 km to 5 km. Once or twice a week, they were taken to the nearest beel (*swamp*) which is a favorite spot for wild elephants (Fig.145). This swamp (*Makhibaha*) also used to attract many wild rhinos in the early 80's.

Beginning of independence:

The calves showed increasing tendency to be independent of the keepers. The luxuriant vegetation and rainy season hampered the ability of the keepers to maintain visual contact with the grazing elephants.

Fig. 145 The elephants enjoying a dip in the Makhibaha swamp, near Doimari, Manas National Park

The inclement weather also hampered radio-tracking them. The elephants would frequently disappear from the grazing area, only to reappear elsewhere in totally new areas (Table 27).

As the calves were confined to the stockade at night, they had no opportunity to graze at night unlike their wild counterparts. They had to graze within the time span given to them between 6 AM and 4 PM during the day. This could possibly one of the reasons that triggered them to frequently go off on their own during the day and not get back to the stockade by evening.

Group formation:

The elephant calves continued to stay away from the keepers as well as the night stockade, resulting in frequent loss of visual contact during the grazing time. On 14th July three male calves, Nomal, Pinku and Babu went in a different direction and remained untraceable throughout the day. Meanwhile Mohan, the eldest of the group, had broken the night stockade fence seven times and left along with the two female calves.

By now the calves had virtually divided into two groups and lived like a social unit (three male calves together in one group and Mohan and two females in the other) (Fig. 146&147). No interaction with wild herds was noticed during the month, though the keepers encountered them during their routine walks and tracking sessions in the forest.

Period B: 'Hands-off' period when elephants were on their own

Preliminary analysis on "losing visual contacts with the calves" and feeding behaviour of Rupa (calf with the missing finger tip on the trunk) revealed the following:

a) There were 29 cases of losing visual and subsequent radio contact with the calves since the beginning of the project. Most of these cases of losing contact (69%) happened when they were given the choice of staying back in the forest. Rain and thunderstorms proved to be major reason for losing visual contact on the remaining occasions.

Table 27 : Incidents of losing visual contacts with the elephants during acclimatization in May 2007

Date of losing contact	Area	Distance from acclimatization area	Elephant name(s)	Date found	Located at	Distance from acclimatization area
10th	Sikarinala	1 km	Pinku, Babu	18th May	Panda camp	15 km
10th	Sikarinala	1 km	Rupa	30th May	Makhibaha	5 km
25th	Machan	500 m	Pinku, Rupa, Nomal, Babu	27th May	Panda camp	15 km

Fig. 146&147 Two social groups, one led by Pinku. the eldest (left) and the other led by Mohan, the eldest (right)

b) Whenever visual contact was lost, only on 34% of the occasions (n=29) did they return to the stockade area on their own. On all the remaining occasions, they had to be traced and brought back.

c) The period of losing contact varied from just four hours to 56 days (this record is held by Pinku who has been in the wild since 17th July 2007).

After observing the increasing tendency among the calves to avoid the stockade and stay in the wild, it was decided to stop guiding them back to stockade from the 1st of September, 2007. The stockade door was kept open to give the elephants a choice of coming back when they felt like.

The frequency of sighting of the elephant calves in the wild by the keepers and other reliable sources of the forest department has been presented in Fig. 148.

It is evident from the graph that P, N and B were the least sighted, either by the forest department staff during their regular patrolling or by WTI staff during their tracking forays in the forest. This was a clear indication of the fact that these elephants completely avoided humans and as a result were occupying remote areas of the park. Since they have not been seen at all near the stockade area in recent times and only tracked by radio-tracking, these elephants can be considered to have become wild. However, there is no evidence yet for them to have been accepted by any wild herd. The oldest of this all male group 'Pinku' has been leading a solitary life 'on and off' with very negligible association with N and B. On the contrary, the second group of M, R, Pa were found to be easily traceable as they were found staying close to anti-poaching camps inside the forest. It was evident that this was due to the leader of the group 'Mohan' who seemed to have developed an affinity to people.

Conclusion

It is evident from six months of acclimatization (March to August 2007) and seven months of post-release monitoring (September 2007 to March 2008) that three of the elephants (N, Pa and P) have been successfully integrated into the new habitat in Manas National Park. They rarely visit the stockade area in Doimari, but are regularly tracked by the monitoring team and occasionally sighted by the patrolling forest department staff. While all these calves are males, the other group headed by the seven year old Mohan has two female calves. These females Rupa and Pari are the youngest of the lot and may require an extended period of acclimatization before they become independent. Mohan, the oldest of the six elephant calves relocated in February 2007, has been frequenting forest camps and proving to be a cause of concern. His movements are being monitored closely and his rehabilitation prospects will be reviewed after two more months of close observation.

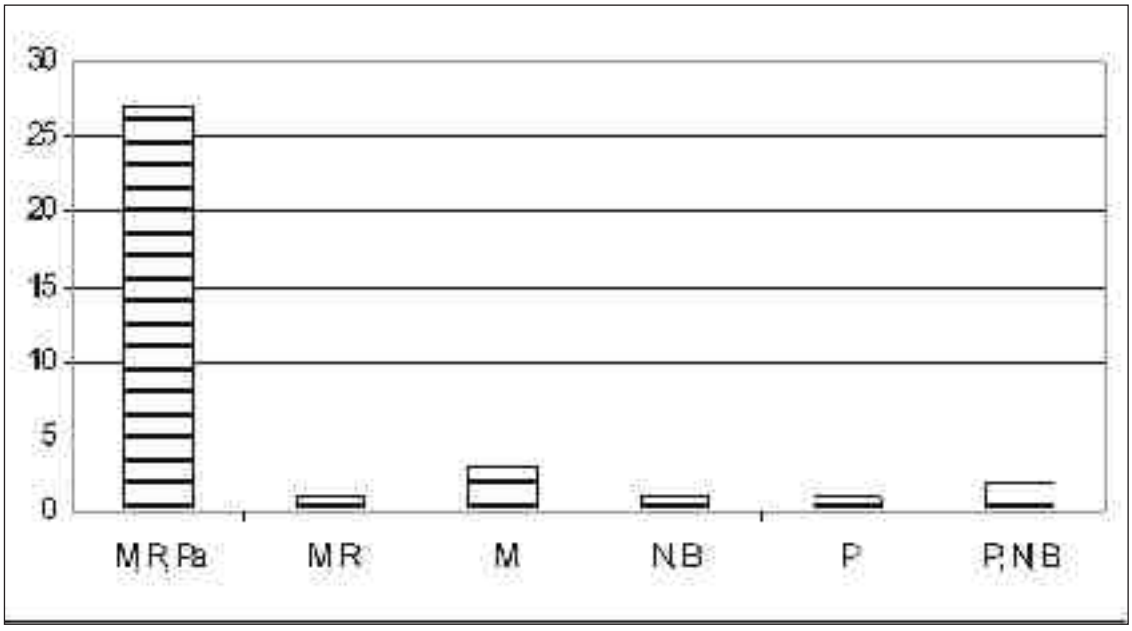

Fig. 148 Number of sighting records of the elephants in the wild (Sept 2007 to March 2008) (M=Mohan, R=Rupa, Pa=Pari, P=Pinku, N=Nomal, B=Babu)

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Fig. 149 The released elephant calves in the wild

CHAPTER XI

Training and equipping the frontline staff of Manas National Park

Rakesh Kumar Singh and Vivek Menon

The need for training frontline forest staff

Despite strong national legislation that increasingly prohibited hunting since 1972, poaching continues to remain a problem in the rhino areas of India. Poaching, for various purposes, has been identified as a threat to populations of many wild species (WCS and TRAFFIC, 2004; Dey, 1996). Approximately 4.7% of the country's geographical area is protected under the Wildlife (Protection) Act, 1972 and affords suitable habitat for potentially viable populations. Protection for the animals and their habitat is, thus, of prime concern in the protected area network and anti-poaching activites are one of the most important duties of the frontline forest staff. Training of frontline forest staff for this duty and ensuring that they are adequately equipped for carrying out their duty efficiently has been one of the recommendations of various forest and species conservation committees at a national level (Narain *et. al*., 2005; Subramainian *et al*., 1994; CAG Report, 2006; Kirpal *et al*., 2006).

Recognizing the need to fulfill these twin objectives, the Wildlife Trust of India (WTI) started the Van Rakshak Division in the year 2000 with the goal of assisting the government to create a strong, well-equipped and motivated force of front-line field staff, to curb poaching and habitat degradation in wildlife areas. The programme has a multi-pronged strategy with four focus areas abbreviated as TEAM, which stands for Training, Equipping, Awareness and Morale boosting of frontline staff of the protected area network in the country. India has a protected area network of around 578 (Rodgers *et al*., 2002) national parks and wildlife sanctuaries. It is, therefore extremely difficult to ensure that all of them are trained at one go. WTI therefore divided the PA network into three categories: peninsular and north-eastern region, Himalayan (*montane*) region and marine region (including coastal and islands). The categorisation was based on different types of equipping needs of the staff in these areas. WTI started with protected areas in peninsular and north-eastern India. Even in this, it prioritized areas with the presence of tiger (*Panthera tigris*), Asian elephants (*Elephas maximus*), rhinoceros (*Rhinoceros unicornis*) and sloth bear (*Melursus ursinus*), which afforded protection to the habitat as well as a host of species which are present in the same habitat.

Van Rakshak is currently the largest such programme run by any non-government agency in the country, having trained and equipped over 6000 frontline forest staff till date. The Protected Area Staff status (PASS) database has details of over 16,500 staff across 77 protected areas (PAs) all over the country. The project objectives of the division are:

1. To create a strong, motivated and well-equipped field force of forest guards.
2. To boost field staff morale for effective anti-poaching operations.

Wildlife crime prevention training in Manas TR was conducted twice. The first training was conducted between 6-18 December 2002 at Bansbari and Barpeta Road. A total of 183 staff of the ranks of Forester and Watcher attended this training.

The 2nd phase of training was conducted at Kokilabari on 26th February 2006 in which 35 conservation volunteers from the Manas Maozigendri Ecotourism Society attended the training.

A graphical representation of the number of staff trained and equipped is given below:

It is evident from Fig. 150 that more staff were equipped as compared to number of staff trained. This discrepancy is because of early supply of kits to the first lot of trainees who did not attend the training in full after the receipt of kits. Due to this, the module was changed such that kit distribution takes place now only after the training is complete.

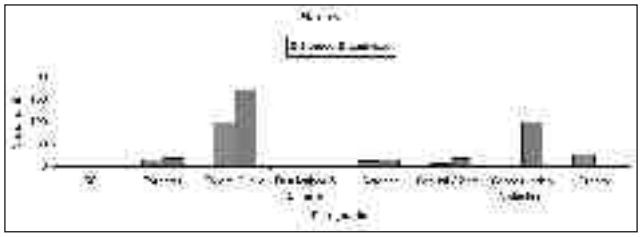

Fig.150 No. of staff trained and equipped in Manas TR

In the first phase, training was imparted in two modules i.e. Module – A and Module – B.

Module – A was deisgned for foresters and above, i.e. those who are supposed to draw up prosecution reports in case of any offence taking place. Therefore, more emphasis was given in Module – A to criminal procedures, court craft and various provision of the Wildlife (Protection) Act, 1972. Before the training, an assessment of the current knowledge of staff on Criminal Procedures Code (CrPC), the Wildlife (Protection) Act, 1972 (WPA) and overall knowledge of wildlife prosecution was made. Graphical representation of the pre-training knowledge of Manas staff on various topics is given in Fig. 151.

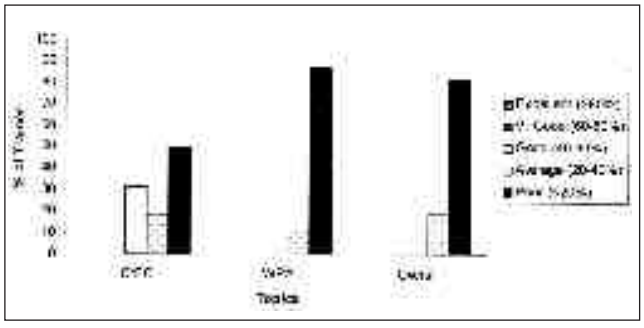

Fig.151 Knowledge of trainees before training

It is clear from Figure 151 that about 90% of the staff of Manas have poor knowledge about criminal procedure that is essential for successful conviction of any offenders in wildlife cases. When a comparison is made between the staff of Manas with national and state averages, it is noticed that the staff of Manas are much below the national average (Fig.152). The national average of knowledge amongst forest staff about CrPC, WPA and overall is 33.00%, 15.55% and 19.05% respectively whereas the state average of knowledge in Assam forest staff about CrPC, WPA and overall is 36.00%, 11.12% and 16.09% respectively.

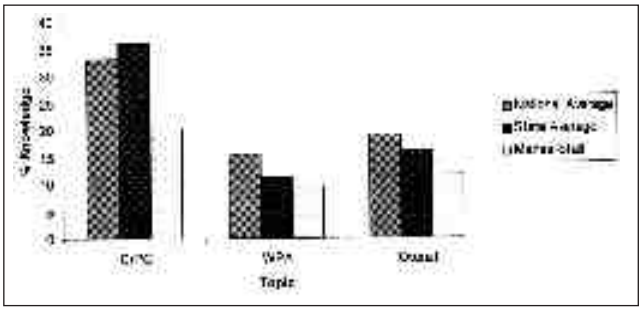

Fig.152 Comparison of National and state average of knowledge with Manas staff on criminal procedure

Module – B training was designed for all the staff of Manas including Casual Workers and this, in the first round, was conducted at two place i.e. Bansbari and Barpeta Road. The second round of Module –B training was conducted on 26th February 2006 at Kokilabari specifically for conservation volunteers of MMES. As almost all the conservation volunteers were unable to write, pre-training assessment was made only during the first round of training. Assessment was made on the general knowledge of staff about the state's wildlife (State PA), essential items required for patrolling (Patrolling Need), detailed knowledge about their own PA (Own PA), general provision about the Wildlife (Protection) Act, 1972 (WPA) and overall knowledge about prevention of wildlife crime (overall).

Pre-training assessment on these parameters also suggest that the knowledge of the staff of Manas is much below (about 50%) the average knowledge level of forest staff at national and state level (Fig. 153). The

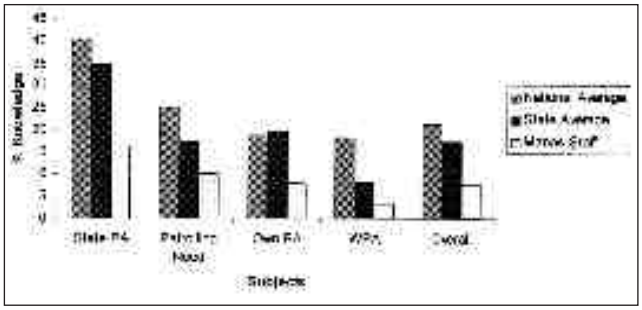

Fig. 153 Comparison of national and state average with Manas staff in Wildlife Crime Prevention

national average on state PAs is 40.35%, Patrolling Need is 25.14% Own PA is 18.68%, WPA is 18.24% and overall is 21.28%. However, the state average in Assam forest staff on State PA is 34.75%, Patrolling Need is 17.47%, Own PA is 19.458%, WPA is 8.37% and overall is 17.28%.

Further analysis suggests that about 80-90% staff of Manas have poor knowledge about various subjects that are essential for effective control of wildlife crime (Fig. 154).

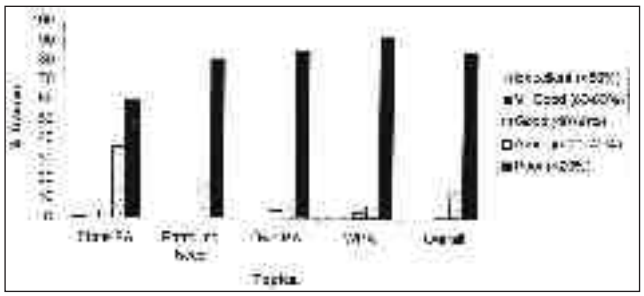

Fig. 154 Knowledge of trainees in effective wildlife crime in prevention before training

During the training, feedback was obtained from the staff about the various problems that they observed that are challenges to the conservation of wildlife in Manas. Analysis shows that about 70% of the staff believe that wildlife crime (Poaching/Felling etc.) and poor management and infrastructure existing in Manas are major reasons whereas only 4% staff believed that poor habitat management is a major issue (Fig. 155).

When staff were interviewed to identify the items that they need for regular patrolling, surprisingly 24% staff demanded weapons followed by torch (24%) and uniform (19%) (Fig.156).

This training and equipping conducted by the Wildlife Trust of India in partnership with the

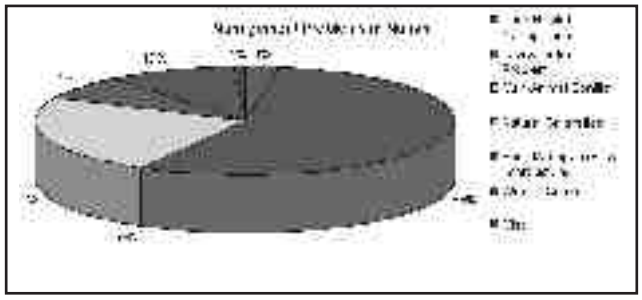

Fig. 155 Potential problems for conservation of wildlife in Manas

International Fund for Animal Welfare and the US Fish and Wildlife Service is only to complement the park's own anti-poaching measures. Currently, according to park sources, there are 31 anti-poaching camps (including range headquarters) spread all over the park at strategic locations. These camps have been

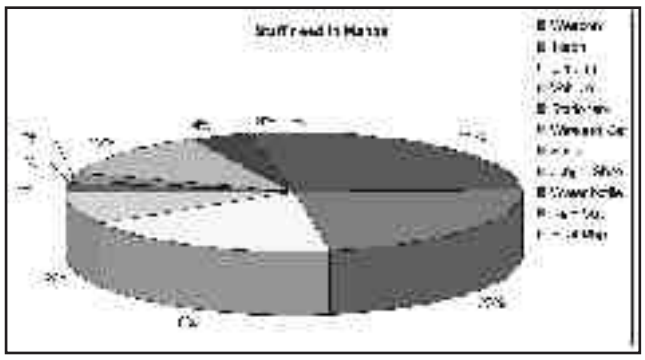

Fig. 156 Items identified by staff as priority

revived fully by posting regular forest personnel equipped with rifle and wireless set. The following is the list of infrastructure available in Manas National Park as of January 2008 (see table 28).

In the financial year 2007-2008, as a first phase measure, recruitment procedure has been completed for 28 nos. of frontline forest staff during October 2007. The following is the current staff position as of January 2008 at Manas National Park (see table 29).

Table 28: List of infrastructure available in Manas National Park as of January 2008

Sl. No.	Items	Availability	Comments
1	Anti poaching camps	31 Nos.	Additional 7 new camps are planned to be constructed in 2008
2 3	Wireless Handsets Wireless Base-station	70 Nos. 28 Nos.	
4.	Boats	10 Nos.	
5. 7. 8. 9. 10	Arms Captive Elephants Cycles Motor Cycles Vehicles	23 Nos. 27 Nos. 30 Nos. 5 Nos. 9 Nos.	About 60 additional are available with the armed home guards & Assam Forest Protection Force (AFPF) 30 new are being purchased in 2008 Includes one animal rescue van from Wildlife Trust of India and two (02) patrol vehicles supported by Aaranyak. Another three (03) proposed vehicles under Indian Rhino Vision 2020 (IRV 2020)
11	Patrolling Roads/ Paths	Approx. 13-kms motorable Approx. 100kms foot trails (path)	

Table 29: Staff position at Manas National Park as of January 2008

Sl. No.	Items	Availability	Comments
1	Regular Frontline staff	252	
2	Casual Frontline staff	70	
3	Conservation worker (BTC supported)	90	Local youth engaged supported by Bodoland Territorial Council and Wildlife Trust of India
4	Conservation worker (IRV supported)	30	Local youth engaged supported by Indian Rhino Vision 2020 programme.
5	Armed Home Guards	50	On deputation from Ministry of Home, Govt. of Assam
6	Assam Forest Protection Force	11	
	Total	523	

Fig. 157&158 Wildlife crime prevention training and anti-poaching kit distribution in Assam

CHAPTER XII

Building a veterinary core and rescue capacity in Bodoland Territorial Council

Prabhat Basumatari, NVK Ashraf, Rathin Barman and Bhaskar Choudhury

1. Introduction

Urbanization and encroachments into forest lands have not only reduced the space for wildlife but also increased the pressure from outside on forest resources. As wild animals are confined to restricted localities, they are forced to share their habitat with domestic animals and man. Consequence of such forced confinement of wildlife are manifold: (i) the disruption in the free movement of animals from one site to another, (ii) population reduction in the case of habitat specialists as they fail to adjust to the modified environment, (iii) the increase in local overabundance of habitat generalists that manage to take advantage of the modified environment available to them and (iv) the resultant increase in the incidents of man-wildlife conflict. The increase in local abundance and range of opportunistic taxa claim the intervention of wildlife veterinarians (Lanfranchi *et al*, 2003) not only because diseases have become important in such disturbed situations (May, 1988), but also because veterinarians have the key responsibilities with respect to rescue, treatment, rehabilitation and release of wildlife (Vogelnest, 2008).

There are more than 35 veterinary educational institutions in the country and the Northeastern part of India has three of them. Since the veterinary curricula often fail in providing adequate practical skill in wildife medicine at both undergraduate and graduate levels, an essential component of environmental management should be able to address issues on wildlife diseases (Lanfranchi *et al*, 2003). Keeping this in mind, Wildlife Trust of India has been engaged in the imparting skills on wildlife health and rehabilitation to select number of veterinarians every year.

Since the inception of Bodoland Territorial Council (BTC) in 2004, WTI has oriented all the veterinarians of the region's Animal Husbandry Department on their role as veterinarians in wildlife conservation. Since subsistence hunting and trade in wildlife is rampant in this landscape, many species of wildlife are confiscated from traders and poachers. Realizing the need for stabilizing these confiscated animals before providing them a suitable placement option, WTI also instituted a MVS unit near Manas National Park to address the rehabilitation needs of the region.

2. Orientation for BTC veterinarians on wildlife rehabilitation

In order to encourage wildlife rehabilitation efforts in an organized and scientific manner, the Wild Rescue programme of Wildlife Trust of India (WTI) has been conducting annual training workshops on wildlife rehabilitation in different regions of the country. The workshops attempt to train wildlife rehabilitators to address the problem of compromised wildlife in areas where WTI does not have a physical presence.

WTI had already conducted five such workshops in different regions of the country, the first being in Bangalore in 2001. In 2002, a set of twin workshops were held in Guwahati, Assam and Itanagar, Arunachal Pradesh on chemical restraint and wildlife rehabilitation. The third workshop was held in Pune, Western India in 2003, the fourth one for the northern region in Delhi in 2004 and the fifth one in Vishakapatnam to address wildlife rehabilitation issues in the Eastern Ghats in 2005.

The workshops in Bodoland was conducted in 2006 on special request by the BTC as the region has a high incidence of wildlife displacement. Bodoland has the Manas National Park, Chakrashila Wildlife

Sanctuary and several reserve forests, and wild animals are often displaced due to conflict with humans as well as poaching and illegal trade.

Registration

The Workshop was held in the Bansabri range of the Manas National Park on the 8th and 9th of October 2006. The registration process recorded 61 participants (See Annexure 37) and distribution of resource material to all participants. All participants were given a copy of a compendium specially designed for the workshop. This compendium is a collection of articles by various experts in the field of wildlife rehabilitation. The articles touch upon principles and techniques for different taxa, care, husbandry, protocols, handling and restraint in wildlife rehabilitation. A copy of "Back to the Wild: Studies on Wildlife Rehabilitation" a conservation reference series publication of WTI was also given to the participants.

Contents of the course material:

(I) Principles of wildlife rehabilitation

1. *Wildlife rehabilitation: Theories and realities*
2. *Standards for wildlife rehabilitation- RSPCA*
3. *The ethics of wildlife rehabilitation*
4. *Basic requirements of housing wild animals in rehabilitation*
5. *Hand-raising techniques for wildlife orphans*
6. *Nutrition*
7. *Release criteria for rehabilitated animals*

(II) Rehabilitation and care of different species

1. *Handling injured birds*
2. *How to gavage feed avian patients*
3. *Captive bird diets*
4. *Emergency treatment and handling of poisoned birds*
5. *Hand-raising of orphaned carnivores*
6. *Hand-raising of orphaned ungulates*

(III) Principles of veterinary care

1. *Preventive medicine for rehabilitation purposes*
2. *Emergency situations and treatments*
3. *Minimizing the disease risks associated with raptor rehabilitation*
4. *Necropsy procedures in different species of wild animals*
5. *Limb immobilization*
6. *Supportive treatment of wildlife casualty*

(IV) Chemical capture

1. *Restraint*
2. *Anesthesia of exotic animals*
3. *Planning operation*

Inaugural function

The Bodoland workshop was the first such workshop in the area specifically targeting veterinarians of the Bodoland Territorial Council. Therefore the workshop was a big event for the people of Bodoland and the Forest Department. It was inaugurated by the Executive Member, Shri B. Narzari of the Bodoland Territorial Council. The Field Director and the Deputy Director of Manas National Park were also present on the occasion. The Honorable Executive Member delivered the keynote address. Mr. Abhijit Rabha, Field Director of Manas also addressed the gathering.

Workshop Sessions

The two day workshop was completed in six sessions with 15 presentations and practical sessions with the help of seven resource persons (See Annexure. 38)(Fig. 159).

Fig.159 A demonstration in progress during the workshop

As the workshop was conducted in the Manas National Park, the participants had the opportunity to visit the rhino rehabilitation project site of WTI at Kuribeel. They were also taken in batches to the elephant camp in Bansbari range to familiarise them on basic elephant husbandry. There was also a demo on collection of blood samples and micro chipping of elephants. This was benefical for the veterinarians as they are often called upon by the Forest Department for treatment of both wild and captive elephants.

3. Mobile Veterinary support in Lower Assam

A wildlife veterinarian's responsibilities include not only rescue and rehabilitation but also animal welfare, disease risk assessment and management, human health protection and provision of euthanasia and appropriate legal advice (Vogelnest, 2008) especially when we consider the inextricable linkage between human and ecosystem health (MacDonald and Laurenson, 2006). The Wildlife (Protection) Act 1972, the act that extends legal protection to forests and wildlife in India, stipulates that every National Park and Tiger Reserve shall be manned by a veterinarian. However, qualified and experienced wildlife veterinarians are few in number and the necessary skills and means are usually not available to the forest departments when they need it the most. The Mobile Veterinary Service (MVS) project envisages the placement of trained wildlife veterinarians in important National Parks and Wildlife Sanctuaries of India to ensure that 24-hour quality veterinary service is made available to the threatened wildlife of that region in times of emergency.

The objectives of the MVS units are to (i) swiftly respond to wildlife emergencies due to calamities, both natural and man-made, (ii) assist the respective state Forest Departments in conflict animal management, (iii) provide an appropriate placement option for wildlife displaced due to various reasons, (iv) provide wildlife health support to captive elephants of the park, (v) take part in disease investigation and control operations during epidemics and sporadic deaths and (vi) protect wildlife from livestock diseases by mass immunization of livestock living around protected areas.

Soon after the formation of the BTC in 2004, Wildlife Trust of India realized the need to institute an MVS unit in Lower Assam based at Manas National Park. WTI soon signed a Memorandum of Understanding (MoU) with BTC on various conservation activities being taken up by WTI to bring Manas National Park back to its original glory. This MoU also included the placement and running of the MVS unit. The unit was commissioned in September 2005 with the ambulance purchased with the support of the Animal Welfare Division, Government of India (Fig. 160). The unit has been running since then with

Fig.160 A vulture, Himalayan Griffon (*Gyps himalayensis*) about to be rescued by the MVS-Lower Assam unit near Manas National Park

the assistance received from Oil India Limited (OIL) and Gas Authority of India Limited (GAIL).

The ambulance based its operation from Bansbari range of Manas National Park during the first year. It was later moved to Soraikhola in Kokrajhar near Chakrashila WLS as per the request of BTC.

Methods

Most of the emergency relief operations are carried out in the field and the animals are released after stress alleviation *in-situ* . Upon receipt of information on a wildlife emergency, the veterinarian and the caretaker would rush in to provide relief to the animal in distress. In case of information on wildlife trade, the Forest Department would confiscate the animals and hand them over to the MVS unit for further care and rehabilitation. On many occasions, the public themselves surrendered the animals to the MVS veterinary unit for further care.

The health condition of every animal is assessed upon admission and accordingly the proposed treatment is decided. In cases where prolonged medical care and supervision are required, the animal is transported to the nearest wildlife rehabilitation centre where treatment is rendered and the scope of releasing the animal back to the wild is assessed based on the progress made. International guidelines on rehabilitation and reintroduction are followed before taking a decision on placement options (Verdoorn, 1995; Miller, 2000; IUCN, 1998; Ashraf et al, 2005; Trendler, 2005). For placement of confiscated animals, IUCN guideline on the placement of confiscated animals is referred to (IUCN, 2002). The species identity of every animal is established, and information on their site of 'rescue' and circumstances of rescue are recorded from the presenter on a rescue datasheet. The datasheet also records information on the circumstances of 'rescue', the cause of displacement, age and sex of the animal and the condition of the animal on arrival. The outcomes of every case (Release, Pending, Death, Transfer, Euthanasia) are also noted down.

Depending on the species, wildlife orphans are hand-raised and subjected to a long-term rehabilitation program either at the basic facility of the field camp or at a rehabilitation centre which has better facilities. Non-releasable animals and confiscated animals of exotic origin, if any, are transferred to lifetime care centres of the state. All information, including those on housing, husbandry and veterinary care, are entered in the online rescue software to facilitate a detailed analysis. All hand-raised animals that undergo a long term rehabilitation program are subjected to a thorough veterinary screening following prescribed norms (Woodford, 2001), before they are moved to the release site.

As disease transmission from a domestic animal reservoir to wildlife can directly threaten population viability, control strategies must be in place to minimize the damage that pathogens and parasites can cause to wildlife populations. As part of the health monitoring support to the protected areas in BTC area, the MVS-Lower Assam veterinarian is called for carrying out immunization of livestock that live in the fringe areas of the protected areas, carryout disease investigation operations to determine the cause of death and provide health support to captive elephants used in the regular patrolling of the protected areas. While faecal samples collected from suspected free ranging and captive wildlife are examined for parasite oval at the base camp itself, other clinical samples are sent to the nearest pathological laboratory for diagnosis.

Results and Discussion

Wildlife rehabilitation:

A record number of 111 'rescue' cases belonging to 38 species were handled by the Lower Assam MVS unit in the span of just over two years (Dec 2005 to March 2008). Of these 111 cases, 50 were mammals, 23 birds and 38 were reptiles (See Annexure 39). Species wise, 20 were mammalian species followed by birds (10) and reptiles (8) respectively. Raptors (owls, vultures and eagles) appear to be the most commonly displaced species of bird in this part of Assam (Fig. 161). Among reptiles the species most commonly

Fig. 161 Raptors form the major group of birds being rescued in Lower Assam

encountered was the Burmese rock python (*Python molurus bivittatus*) with 73% of the reptilian cases attended by the MVS veterinarian being pythons. No other MVS unit stationed in Assam has handled these many pythons during such a short duration. Contrary to the usual cause of 'rescue' of snakes in the urban settings, the pythons in the BTC area were 'rescued' because residents didn't want them (see Shine and Koenig, 2001). Many of them were cases of being stumbled upon during the routine ventures into the suburbs and forest and cases of straying into the human settlements for food.

Among mammals, no particular species appear to be often 'rescued'. The most commonly handled species are the barking deer (*Muntiacus muntjak*), leopard cat (*Prionailurus bengalensis*), rhesus macaque (*Macaca mulatta*) and five-striped palm squirrels (*Funambulus pennantii*). The two Asiatic black bears (*Ursus thibetanus*) confiscated this year, now being hand-raised, will be moved to a rehab site in Manas National Park for an 'assisted release' program later this year.

When compared to the two other MVS units in Assam, a very high percentage (69%) of the animals attended in Lower Assam are released back to the wild (Fig. 162). In comparison, the release percentage of the Upper Assam MVS unit stationed near Dibru-Saikhowa National Park for the corresponding year was 53%. The high release percentage in Lower Assam could be attributed to the reason for displacement. More than one third of the animals received for rehabilitation are confiscated from people who catch them for meat or trade. The survival prospects of such animals are high as their condition on arrival is generally good with minimum injuries.

Since most animals do not require long-term care, 60% of the 77 releases occurred within two days of their admission, 29% within a month and the remaining within six months of their arrival. Reptiles spent less time in captivity than any other vertebrate class as 86% of them were released within two days of their admission (Table 1). Most of the animals that required more than a month in care were chicks of birds, kittens of jungle cats and injured animals needing a prolonged care.

The most common cause of displacement of wildlife in Lower Assam was found to be capture for food and trade (Fig. 163). Sometimes traps and snares

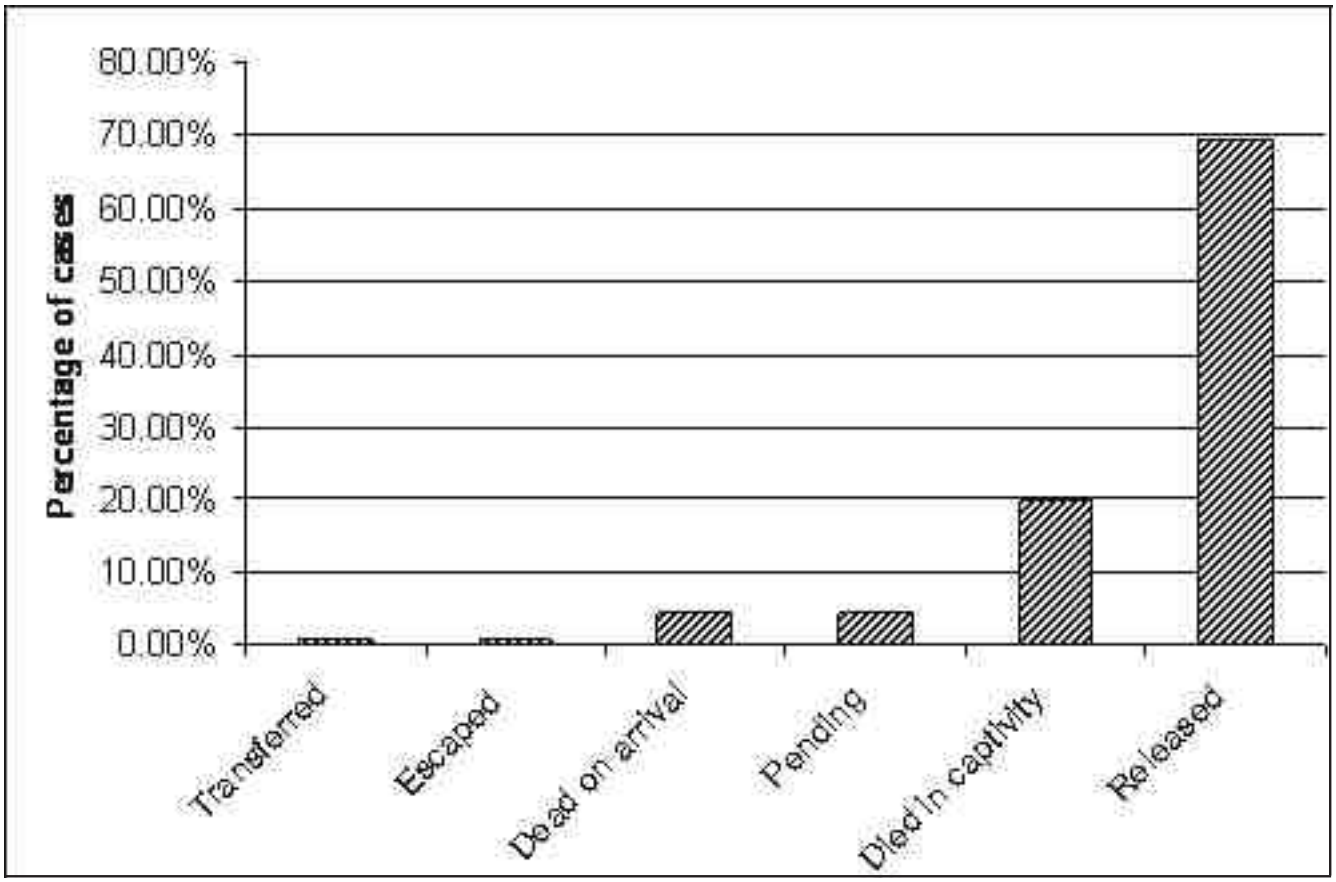

Fig.162 Outcome of cases handled from December 2005 to March 2008

Table: 1 Percentage of mammalian, avian and reptilian cases retained in captivity before their release.

Class	Days in captivity before release			Number released
	0-2 days	*3-30 days*	*31-180 days*	
Mammals	*33%*	*46%*	*21%*	*26*
Birds	*43%*	*43%*	*14%*	*14*
Reptiles	*86%*	*14%*	*0%*	*37*
All classes	*60%*	*29%*	*11%*	*77*

are laid to capture wildlife, some of which get confiscated, either at the source of capture itself or in the local market. The next most common reason was found to be indiscriminate capture of wildlife that requires no intervention. With the increasing amount of awareness being created by the MVS unit, this cause of displacement will predictably show a decline in future. All these cases of wildlife displacement only go on to show that human-wildlife conflict is high in the BTC region.

Wildlife health support

Captive elephant care: Assam is the home to more than 1,200 captive elephants, a fraction of which are stationed in the National Parks and Wildlife Sanctuaries. Like providing wildlife health support to free living wildlife, captive elephant care is also a mandate of all MVS units of Assam. Since 2000, MVS vets have been called for attending to more than 300 cases of captive elephants in and around Kaziranga, Dibru-Saikhowa and Manas National Parks. Elephants are treated largely for wounds and abscesses including those caused due to podo-dermatitis and cutaneous filariasis.

Manas National Park has 27 captive elephants that need constant medical attention. Apart from these, there are hundreds of privately owned captive elephants in Lower Assam that depend on the forests for grazing and browsing. The service of the MVS veterinarian is called upon whenever these elephants

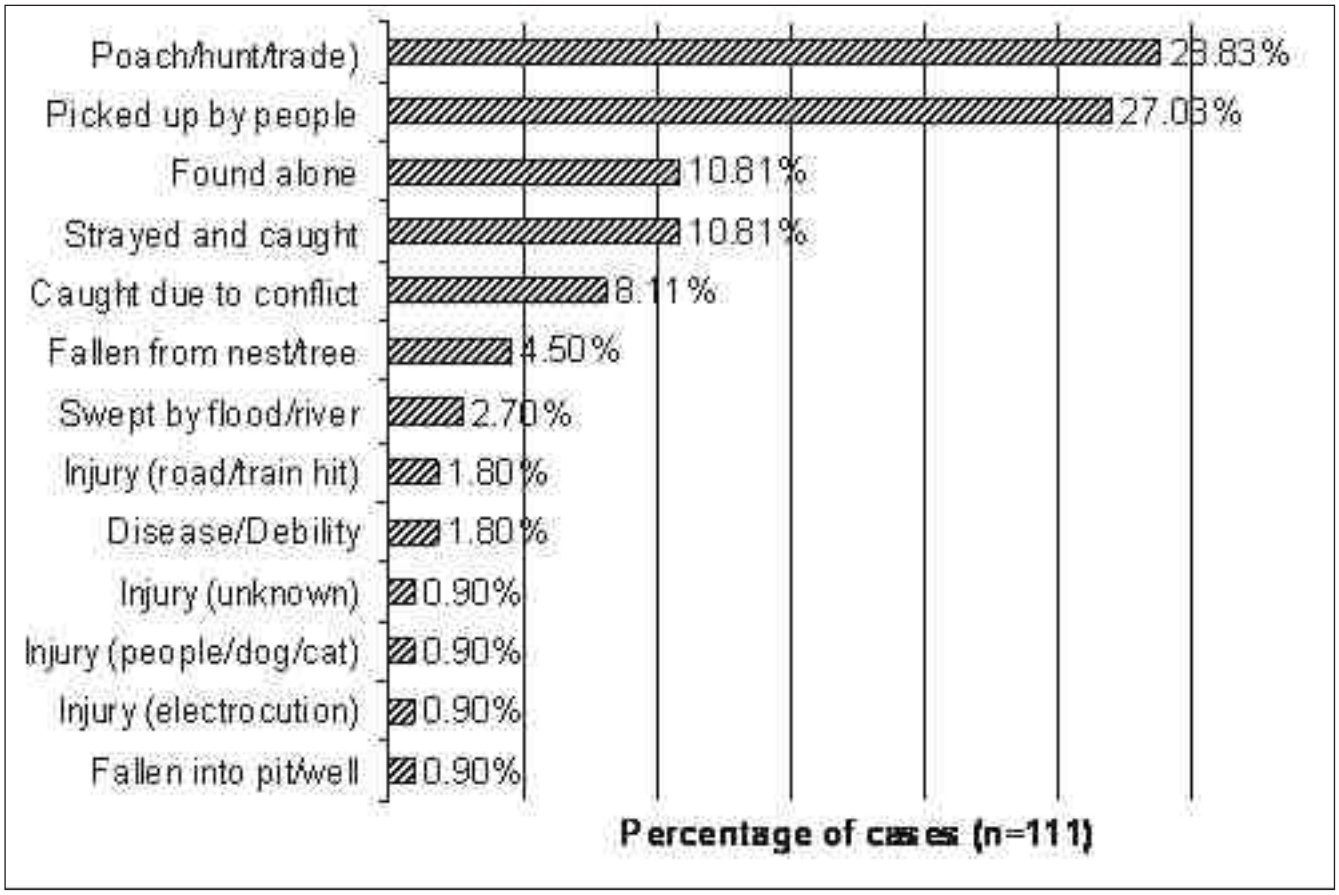

Fig.163 Cause of displacement of wildlife admitted to MVS, Lower Assam

fall sick. Very often, small health camps are organized within the Manas NP so that all the department elephants can be examined at a stretch in one place. Elephants are also routinely dewormed by the attending veterinarian after a periodical check-up on the prevalence of parasitic infection through faecal sample examination.

Disease control through immunization: The role of livestock and wild ungulates in the maintenance and spread of infection between them becomes important to conservation, in areas where they are sympatric (Morgan *et al*, 2006). In Manas National Park, village livestock come in frequent contact with wild ungulates and share their habitat especially along the peripheral areas of the park. Since livestock are kept in higher densities, the possibility of them transmitting infectious diseases to wild ungulates is always considered a possibility. In such a scenario, disease prevention is mainly achieved through immunization of livestock living in villages around the protected areas. During the period from 01.04.2007 to 31.03.2008, a special vaccination program was undertaken for the livestock of fringe villages of Manas National Park during the floods. A team of veterinarians vaccinated 3931 cattle, 625 buffalo, 340 goats and treated and dewormed 4894 cattle, 428 buffalos, 103 goats and 84 swine. The program was undertaken in Bansbari Range and Bhuyapara Range of Manas National Park, covering 22 fringe villages (Fig. 164).

Awareness created by MVS unit: One of the major accomplishments of the MVS unit last year has been the awareness on wildlife conservation created among the locals when the ambulance goes through the settlements and marginal habitats to attend to "rescue" animals. Even poachers were moved by the efforts being taken to save every individual animal. On the 25th of February 2008, 61 poachers living in and around Manas National Park, gave up their weapons before the deputy chief of the Bodoland

Fig.164 Immunization of livestock near Manas National Park

Territorial Council, at the Bansbari range of the park. Poachers surrendered some 26 country-made weapons and pledged not to return to hunting in future (Fig 165).

With the surrender of these poachers and possibly more in the future, the percentage of wildlife species confiscated from trade and individuals, which is 33.3% at present, is likely to go down.

Fig.165 Poachers surrendering their arms to the Deputy Chief of Bodoland, Kampa Borgiari

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Fig. 166 Back to the wild, a herd of six elephants, hand—raised at CWRC, Kaziranga released in the Manas National Park

ANNEXURE 1

BODO ACCORD DATED 20.2.1993 BETWEEN GOVERNMENT OF INDIA, GOVERNMENT OF ASSAM AND ALL BODO STUDENTS UNION[1]

[20TH February, 1993]

The Memorandum of Settlement (MoS) on the fixed 'Bodoland' issue was signed. And with the signing of this MoS, the six-year old movement for a separate 'Bodoland' which started on March 2, 1987, also came to an end.

MEMORANDUM OF SETTLEMENT (BODO ACCORD)

1. **Preamble:** (i) Both the Government of India and the Government of Assam have been making earnest efforts to bring about an amicable solution to the problems of the Bodos and other Plains Tribals living in the north bank of river Brahmaputra within Assam.

   (ii) Towards this end, the Government of India held a series of meetings with the State Government as well as with leaders of All Bodo Students' Union (ABSU) and Bodo People's Action Committee (BPAC). The State Government has also separately held discussions with the Bodo leaders. As a result, it has been considered necessary to set-up as administrative authority within the State of Assam under a scheme, the details of which are outlined in the succeeding paragraphs.

2. **Objective:** The objective of this scheme is to provide maximum autonomy within the framework of the Constitution to the Bodos for social, economic, educational, ethnic and cultural advancement.

3. **(a) Name:** Bodoland Autonomous Council (BAC).- There shall be formed, by an Act of Assam Legislative Assembly a Bodoland Autonomous Council (BAC) within the State of Assam comprising contiguous geographical areas between river Sankosh and Mazbat/river Pasnoi. The land records authority of the State will scrutinize the list of villages furnished by ABSU/ BPAC having 10 percent and more of tribal population which shall be included in the BAC. For the purpose of providing a contiguous area, even the villages having less than 50 percent tribal population shall be included, BAC will also include Reserve Forests as per the guidelines laid by Ministry of Defense and Ministry of Environment and Forests, Government of India, not otherwise required by the Government for manning the international border and tea gardens located completely within the BAC contiguous area.

   (b) Powers: The BAC will comprise of a General Council comprising 40 members, 35 elected on the basis of adult suffrage and having a life of five years. The Government will have powers to nominate five members to the Council particularly from groups which could not otherwise be represented. This Council will have powers to make bye-laws, rules and orders for application within the BAC area on the subjects enumerated in Schedule 'A'.

   (c) The Executive authority of the BAC would be exercised in its Executive Body to be known as Bodoland Executive Council (BEC). The BEC will be responsible for implementation within the BAC area of the laws on subject enumerated in Schedule 'A'.

   (d) The General Council and the BEC will hold office during the pleasure of the Governor of Assam. Consultation with the State Law Department of Government of Assam would be necessary if the Governor proposed to dissolve either the General Council or the BEC before the expiry of its terms in accordance with the provisions of law. The executive authority of the BEC will be exercised by the party enjoying a simple majority in the General Council. On completion of elections, the Governor would invite the leader of the majority party to constitute the BEC.

4. **Finances:** (i) (a) The finances for the BAC will be earmarked under a separate sub-head within the State budget, in keeping with the guidelines laid down by the Government of India from time to time. The Government of Assam would have no powers to divert this earmarked allocation to other heads/areas except in exigencies when there is unavoided overall Budget cut.

   (b) The provisions made in 4 (i) (a) regarding allocation of funds should be in line with

[1]Referred in the objects and reasons of the Sixth Schedule to the Constitution (Amendment) Act, 2003 (44 of 2003)

spirit of the Constitution (seventy second and seventy third) amendment.

(ii) The BAC would also receive grant-in laid from time to time within the principles and policies enunciated by the Government of India.

(iii) The General Council will have powers to raise finances from levies/fees/taxes etc. on subjects mentioned in Schedule 'A' subject to Constitutional amendment mentioned above.

(iv) The finances for the BAC will be managed exclusively by its General Council and the statements of its annual audited accounts will be laid on the table of the State Assembly.

5. **Powers of Appointments:** The Bodoland Executive Committee would have powers to appoint Class III and Class IV staff within its jurisdiction for implementation of schemes connected with the subjects enumerated in Schedule 'A'.

6. **Reservation of Seats:** The Election Commission of India will be requested by the BAC to consider seat reservation and delimitation of constituencies, both Lok Sabha and State Assembly within the BAC area to the extent permitted by the Constitution and the law.

7. **Special Provisions for the BAC Area:** The General Council shall be consulted and its views shall be given due regard before any law made on the following subjects, is implemented in the BAC area:

   (i) for religious or social practice of the Bodos,
   (ii) the Bodo customary laws and procedures, and
   (iii) the ownership and transfer of land within the BAC.

8. **Special Status for the Bodoland Autonomous Council:** The BAC shall, within the laws of the land, take steps to protect the demographic complexion of the areas falling within its jurisdiction.

9. **Special Courts:** Action will be taken in consultation with the Gauhati High Court to set up within BAC area Special Courts as specified below to try suits and cases between parties all of whom belong to Scheduled tribe or Tribes in accordance with the tribal customary laws and procedure, if any:

   (a) Village Courts,
   (b) Subordinate District Customary Law Courts within a civil Sub-Divisional Territory, and
   (c) District Customary Law Court.

10. **Appointment in the Central Bodies.-** The claims of the Bodos shall be considered for appointment to the North-Eastern Council.

11. **Official Language:** The General Council can lay down policy with regard to use of Bodo language as medium of official correspondence within the BAC area. However, while correspondence will have to be in bilingual form in accordance with the Article 345 of the Constitution and the provision of law in this behalf.

12. **Changes in Geographical Boundary:** The geographical area of the Bodoland Autonomous Council as agreed upon can be changed with the mutual consent of the BAC and the Government of Assam.

13. **Revision of List of Scheduled Castes and Scheduled Tribes:** The scheduling and rescheduling of Scheduled Castes and Scheduled Tribes residing within the Bodo areas will be done as per the Commission appointed by the Government of India under the Constitution.

14. **Trade and Commerce:** The General Council will have powers to regulate trade and commerce within its jurisdiction in accordance with the existing law. For this purpose it can issue permits and licenses to individuals within the BAC area. The Government of Assam and the Union Government while considering allotment of permits to people residing within the BAC area will give preference to the Bodos.

15. **Employment Opportunities:** The BAC have powers to reserve jobs for Scheduled Tribes within its jurisdiction. However, exercise of such powers shall be in accordance with the existing constitutional and legal provisions.

16. **Civil and Police Services:** (i) The Government of Assam may from time to time post officers of the rank of Class II and above to posts within the BAC in accordance with the exigencies. While making these postings due regard will be given to the views of BAC about officers being so posted.

    (ii) The officers posted to the BAC area will be accountable to the BAC for their performance and the assessment of their work recorded by the BAC authorities, will be incorporated to their ACRs by the State Government.

(iii) The Central Government while making recruitments from the State of Assam to the Army, para-military forces and police units will hold special recruitment drives within the BAC area.

17. **Appointment of Interim Bodoland Executive Council:** The Government of Assam will take steps for the formation of an Interim Bodoland Executive Council for the BAC from amongst the leaders of the present Bodoland movement who are signatories to this settlement, during the transition period, i.e., prior to the holding of elections. Such Interim Council would be formed before a prescribed date mutually agreed between the Central and State Governments.

18. **Relief and Rehabilitation:** (i) ABSU-BPAC leaders will take immediate steps to bring overground and deposit with the District authorities all arms, ammunition and explosives in the possession of their own supporters and will cooperate with the administration in bringing overground all Bodo militants along with their arms and ammunitions etc., within one month of the formation of the Interim BEC. In order to ensure the smooth return to civil life of the cadre and to assist in the quick restoration of peace and normalcy, such surrenders made voluntarily will not attract prosecution.

(ii) The Government of Assam will consider sympathetically the withdrawal of all cases against persons connected with the Bodoland Movement excluding those related to heinous crimes.

(iii) The Government of India will initiate steps for review of action against the Bodo employees of Government of India and subordinate offices as well as in respect of Central Government Undertakings. Similar action would be taken by the Government of Assam.

(iv) The Government of Assam will initiate immediate steps for suitable rehabilitation of the Bodo militants coming overground as a result of this settlement. Similarly, the Government will organize ex-gratia payments as per rules to next of the kins killed during the Bodo agitation.

19. **Share in Collection of Excise Duty on the Tea:** The Government of Assam will deposit in the BAC Fund revenue collected from the tea gardens falling within the BAC area.

20. **Protection of rights of Non-Tribals:** The Government of Assam and the BAC will jointly ensure that all rights and interests of the non-tribals as on date living in BAC area in matters pertaining to land as well as their language are protected.

21. ***Ad hoc* Central Grant for Launching the BAC:** After the signing of this settlement, an *ad-hoc* Budget on reasonable basis will be prepared by Interim BEC and discussed with the State and Central Governments for necessary financial support.

Sd/-
S.K. Bwiswamutiary
President, ABSU

Sd/-
Rabi Ram Brahma
General Secretary, ABSU

Sd/-
Subhash Basumatari
Chairman, BPAC

Sd/-
(K.S. Rao)
Addl. Chief Secretary to the
Government of Assam

In the presence of

Sd/-
Rajesh Pilot
Minister of State (Internal Security)
Ministry of Home Affairs
Government of India

Sd/-
Hiteswar Saikia
Chief Minister of Assam
State of Govt. of Assam

APPENDIX 'A'

LIST OF SUBJECTS AND DEPARTMENTS OVER WHICH BAC WILL HAVE CONTROL WITHIN THE BAC AREA

1. Cottage Industry
2. Animal Husbandry and Veterinary
3. Forests
4. Agriculture
5. P.W.D.
6. Sericulture
7. Education
   (a) Adult Education
   (b) Primary Education
   (c) Upto Higher Secondary including Vocational Training
8. Cultural Affairs
9. Soil Conservation
10. Co-operation
11. Fisheries
12. Panchayat and Rural Development
13. Handloom and Textiles
14. Health and Family Welfare
15. Public Health Engineering
16. Irrigation
17. Social Welfare
18. Flood Control schemes for protection of villages (not of highly technical in nature)
19. Sports and Youth Welfare
20. Weights and Measures
21. Museums and Archaeology
22. Urban Development- Town and Country Planning
23. Tribal research Institute
24. College Education (General)
25. Land and revenue
26. Publicity/Public Relations
27. Printing and Stationery
28. Tourism
29. Transport
30. Any other matter connected with development
31. Municipal Corporation, Improvement Trusts, District Boards and other local authorities
32. Tribal Welfare
33. Markets and pairs
34. Lotteries, Theatres, Dramatic performances and Cinemas
35. Vital Statistics including registration of births and deaths
36. Food and Civil Supply
37. Intoxicating liquors, opium and derivatives etc.

ANNEXURE 2

BODO ACCORD DATED 10.2.2003 BETWEEN GOVERNMENT OF INDIA, GOVERNMENT OF ASSAM AND BODO LIBERATION TIGERS[2]

1. The Government of India and the Government of Assam have been making concerted efforts to fulfil the aspirations of the Bodo people relating to their cultural identity, language, education and economic development. Towards this end, a series of talks were held between Government of India, Government of Assam and Bodo Liberation Tigers (BLT) since March, 2000. As a result, it is agreed to create a self-governing body for the Bodo Areas in the State of Assam as follows:

2. Objectives

The objectives of the agreement are: to create an Autonomous self governing body to be known as Bodoland Territorial Council (BTC) within the State of Assam and to provide constitutional protection under Sixth Schedule to the said Autonomous Body; to fulfil economic, educational and linguistic aspirations and the preservation of land-rights, socio-cultural and ethnic identity of the Bodos; and speed up the infrastructure development in BTC area.

3. Area

3.1. The area of proposed BTC shall comprise all the 3082 villages and areas to be so notified by the State Government. The above mentioned villages and areas shall be divided into 4 contiguous districts after reorganization of the existing districts of Assam within a period of 6 months of the signing of the agreement on the lines of the proposal given by BLT subject to clearance of the Delimitation Commission.

3.2 A committee comprising one representative each from Governments of India & Assam and BLT will decide by consensus on the inclusion of additional villages and areas in the BTC from out of 95 villages and areas on the basis of the criteria of tribal population being not less than 50%, contiguity or any other agreed relevant criteria within a period of three months of signing of this MoS.

4. Status of Bodoland Territorial Council

The provision of the Sixth schedule and other relevant Articles of the Constitution of India will apply to BTC, mutatis mutandis in terms of this agreement. The safeguards/modifications for the non-tribals in BTC area, inter-alia, will include the following:

4.1. Provision of para1(2) of Sixth Schedule regarding Autonomous Regions will not be applicable to BTC.

4.2. A provision will be made in para 2(1) of the Sixth Schedule for increasing the number of members for BTC up to 46 out of which 30 will be reserved for Scheduled Tribes, 5 for non-tribal communities, 5 open for all communities and 6 to be nominated by Governor of Assam from the unrepresented communities for BTC area of which atleast two should be women. Nominated members will have the same rights and privileges as other members, including voting rights. Election from the 40 constituencies of BTC shall be on the basis of adult franchise. The term of the elected members of BTC shall be for 5 years.

4.3. Safeguards for the settlement rights, transfer and inheritance of property etc. of non-tribals will be suitably incorporated in para 3 of the Sixth Schedule. Any such law as may be made by the BTC in this regard will not, in particular:

(a) Extinguish the rights and privileges enjoyed by an citizen of India in respect of their land at the commencement of BTC, and

(b) Bar any citizen from acquiring land either by way of inheritance, allotment, settlement or by way of transfer if such citizens were eligible for such bonafide acquisition of land within the BTC area.

4.4. Provision will be added in para 6 of Sixth Schedule that in BTC area, language and

[2]Referred in the objects and reasons of the Sixth Schedule to the Constitution (Amendment) Act, 2003 (44 of 2003).

medium of instruction in educational institutions will not be changed without approval of the State Government.

4.5. Provision of para 8 of Sixth Schedule regarding power to assess and collect land revenue and impose taxes shall be applicable to BTC.

4.6. Para 10 of the Sixth Schedule will not be applicable to BTC area.

4.7. Provision of Article 332(6) of the Constitution will be so modified that the existing status of representation of BTC area in the State Assembly is kept intact. After the creation of BTC, the Parliamentary & Assembly Constituencies shall be delimited by the Delimitation Commission in accordance with the provisions of the Constitution.

4.8. In the event, Panchayati Raj system ceases to be in force in the council area, the powers of the Panchayati Raj Institutions in such matters shall be vested with the Council. The Amendments to the Sixth Schedule shall include provisions in such a manner that non-tribals are not disadvantaged in relation to the rights enjoyed by them at the commencement of BTC and their rights and privileges including land rights are fully protected.

5. Power and functions

5.1. The Council shall have legislative powers in respect to subjects transferred to it as enumerated below. All laws made under this paragraph shall be submitted forthwith to the Governor and until assented to by him, shall have no effect. The BTC shall have executive, administrative and financial powers in respect of subjects transferred to it.

Subjects to be entrusted to BTC by Assam Government

1. Small, Cottage and Rural Industry; 2. Animal Husbandry & Veterinary; 3. Forest; 4. Agriculture;5. PWD; 6. Sericulture; 7. Education (Primary Education, Higher Secondary Including vocational training, Adult Education, College Education (General); 8. Cultural Affairs; 9. Soil Conservation; 10. Co-operation; 11. Fisheries; 12. Panchayat and Rural Development; 13. Handloom and Textile; 14. Health & Family Welfare; 15. Public Health Engineering; 16. Irrigation; 17. Social Welfare; 18. Flood Control; 19. Sports & Youth Welfare; 20. Weights and Measures; 21. Library Services; 22. Museum & Archaeology; 23. Urban Development – Town and Country Planning; 24. Tribal Research Institute; 25. Land & Revenue; 26. Publicity/Public Relations; 27. Printing & Stationery; 28. Tourism; 29. Transport; 30. Planning and Development; 31. Municipal Corporation, Improvement Trust, District Boards and other local authorities; 32. Welfare of Plan Tribes and Backward Classes; 33. Markets and fairs; 34. Lotteries, Theatres, Dramatic performance and cinema; 35. Statistics; 36. Food and Civil supply; 37. Intoxicating liquors, opium and derivatives etc.; 38. Labour and employment; 39. Relief and Rehabilitation; 40. Registration of Births and Deaths.

5.2. There shall be an Executive Council comprising of not more than 12 Executive Members, one of whom shall be the Chief and another one the Deputy Chief of the said Executive Council. There shall be adequate representation for the non-tribal members in the Executive Council. The Chief and the Deputy Chief of the Council shall have the status equivalent to the Cabinet Minister and the other Executive Members equivalent to the Minister of the State of Assam for protocol purposes in BTC area.

5.3. The BTC shall have the full control over the officers and staff connected with the delegated subjects working in the BTC area and shall be competent to transfer officers and staff within the BTC area. ACRs of these officers shall also be written by the appropriated BTC authority.

5.4. BTC shall also be competent to make appointments for all posts under its control in accordance with the rules of appointment followed by the Government of Assam. However, the posts, where recruitment is made on the recommendation of APSC, shall not be covered under this provision. The Council may constitute a Selection Board for appointments to be made by it and may also make rules, with the approval of the Governor of Assam to regulate appointments and to ensure adequate representation for all communities living in the Council area.

5.5. No posts shall be created by BTC without concurrence of the Government of Assam and it shall also abide by the decision of the Government of Assam in respect of abolition of/temporarily keeping vacant any post.

5.6. Development functions and bodies within the competence of BTC shall be transferred to BTC. In respect of DRDA, concurrence of Government of India will be obtained.

5.7. The offices of the Dy. Commissioner and Superintendent of Police will be outside the superintendence and control of BTC.

5.8. The State Government would provide an amount, to be decided every year on population ratio basis, as grants-in-aid in two equal instalments to the BTC for executing development works. The proportionate share for the BTC shall be calculated on the basis of the plan funds available after setting aside the funds required for earmarked sectors and the salary. This amount may be reduced proportionately if the state plan allocation is reduced or there is plan cut due to resource problem. In addition, the Council will be paid a suitable amount of plan funds and non-plan funds to cover the office expenses and the salaries of the staff working under their control. The BTC shall disburse the salaries of the staff under their control and would ensure strict economy in the matter.

5.9. BTC authority shall prepare a plan with the amounts likely to be available for development works, both under State share and Central share, covering any or all the activities of the departments under their control. The Council shall have full discretion in selecting the activities and choosing the amount for the investment under the same in any year covering all groups of people in a fair and equitable manner. This plan will be a sub set of the State plan and would be treated as its integral part. Once the plan of the State, including BTC plan, gets the approval of the Planning Commission the BTC authority will start execution of their plan in the BTC area. Modifications, if any, made by the Planning Commission in the BTC proposal, shall be binding on the BTC authority. The State Government shall not divert the funds allocated to the BTC to other heads and also ensure its timely release. BTC may have Planning Department to prepare the plans for BTC area to be submitted to Planning Commission through the Government of Assam.

5.10. The executive functions of the BTC shall be exercised through its Principal Secretary who shall be an officer of the rank not below of Commissioner/ Secretary to Government of Assam. The sanctioning powers of the Government of Assam shall be vested with the Principal Secretary of BTC and sanctioning powers of head(s) of the Department(s) including for technical sanction shall be conferred on the senior most officer of that Department preferably not below the rank of Additional Director, who may be designated as Director of BTC for that department. The Principal Secretary and other officers shall exercise their powers under the overall guidance and supervision of BTC.

6. Law and order

To strengthen the Police Administration, Government of Assam shall appoint an IGP for 4 districts of BTC and the jurisdiction of the DIG Kokrajhar shall also be modified to cover these 4 districts.

7. Revision of list of ST

Consequent to the inclusion of BTC area into the Sixth Schedule, the list of ST for the State of Assam shall be so modified so as to ensure that the tribal status of Bodos and other tribals living outside the BTC does not get affected adversely.

8. Grant of ST status of Bodo Kacharis of Karbi Anglong and NC Hills districts

The Government of India agrees to consider sympathetically the inclusion of the Bodo Kacharis living in Karbi Anglong and NC Hills Autonomous Council area in the ST (Hill) List of State of Assam.

9. Development of Bodo language

9.1. The Government of India agrees to consider favourably the inclusion of Bodo Language in Devnagri Script in the Eighth Schedule of the Constitution.

9.2. Bodo language shall be the official language of BTC subject to the condition that Assamese and English shall also continue to be used for official purpose.

10. Additional development package for BTC

10.1. The State Government, within the limitation of financial and other constraints, may offer or allow the Council to offer, possible and sustainable additional incentives for attracting private investment in the Council area and would also support projects for external funding.

10.2. In order to accelerate the development of the region and to meet the aspirations of the people, the Government of India will provide financial assistance of Rs 100 crores per annum for 5 years for projects to develop the socio-economic infrastructure in BTC areas over and above the normal plan assistance to the State of Assam. The size of the Corpus will be reviewed after a period of 5 years. Suitable mechanism will be built in the system to ensure that the funds are transferred to BTC in time and at regular intervals. An illustrative list of projects which may be considered to be taken up in BTC given below:

List of projects

1. To establish a centre for development and research of Bodo language; 2. Upgradation of existing educational infrastructure by way of renovation/addition of buildings, providing modern facilities for teaching such as computers, science laboratories etc. from primary level to college level in BTC area; 3. A cultural complex to be established at Kokrajhar to promote and develop Bodo tradition and cultural heritage; 4. To establish a super-speciality hospital with all modern facilities at Kokrajhar. Government Hospitals shall be established in all district, sub-divisional and block headquarter; 5. To establish sports complexes in all the district headquarters; 6. Food processing plants and clod storage facilities at Kokrajhar, Kajolgaon, Udalguri and Tamulpur; 7. Construction of a bridge over river Aai to connect Koilamoila, Amguri etc. with the rest of the district; 8. To build a Bodoland Bhawan in Delhi; 9. To set up integrated agro-processing park and textile-cum-apparel park; 10. Revitalisation of Kokilabari Agricultural Farm; 11. To develop adequate infrastructure to promote Manas sanctuary as an international tourist spot; 12. To complete Champa, Suklai and Dhansiri irrigation projects; 13. To construct a highway on the Indo-Bhutan border from Jamduar to Bhairabkunda to connect remote places located adjacent to the border; 14. To set up model dairy, fishery, horticulture and poultry farms/training centres at different places in all the 4 districts to encourage youth for self-employment; 15. To enhance the existing facilities in veterinary hospitals in BTC area.

10.3. Government of India will provide necessary one time financial assistance required for development of administrative infrastructure in the newly created district headquarters, sub divisional headquarters and book headquarters, besides the BTC Secretariat Complex at Kokrajhar.

11. Centrally funded university

11.1. A centrally funded Central Institute of Technology (CIT) will be set up to impact education in various technological/vocational disciplines such as Information Technology, Bio-Technology, Food Processing, Rural Industries, Business Management, etc.

11.2. The CIT will be subsequently upgraded to a centrally funded State University with technical and non-technical disciplines to be run by the BTC.

12. Relief & rehabilitation

12.1. The BLT would join the national mainstream and shun the path of violence in the interest of peace and development. After the formation of the interim council of BTC, BLT will dissolve itself as an organization and surrender with arms within a week of swearing-in of the interim council. The State Government would provide full support to relief and rehabilitation of the members of BLT who would surrender with arms in this process in accordance with the existing policy of the State. Financial support in such cases, however shall be limited to be provisions of the scheme prepared and funded by the Government of India. Withdrawal of cases against such persons and those related to overground Bodo movement since 1987 shall be considered according to the existing policy of the State of Assam.

12.2. The Government of India will initiate steps for review of action against the Bodo

employees of Government of India and subordinate officers as well as in respect of Central Government Undertakings. Similar action would be taken by the Government of Assam.

12.3. Bodo youth will be considered for recruitment in Police, Army and Paramilitary forces to increase their representation in these forces.

13. Special rehabilitation programme for the people affected by ethnic disturbances

The Special Rehabilitation Programme (SRP) for the people affected by ethnic disturbances in Assam, who are at present living at relief camps in Kokrajhar, Bongaigaon etc. shall be completed by the Government of Assam with active support of BTC. Necessary funds for their rehabilitation shall be provided by the Government of India and lands which are free from all encumbrances required for such rehabilitation shall be made available by the BTC.

14. Interim council

Immediately after signing of the agreement, Interim Executive Council for BTC shall be formed by Governor of Assam from amongst the leaders of the present Bodo movement, including the signatories to this settlement, and shall include adequate representation to the non-tribal communities in BTC area. The Interim Council shall not continue for a period beyond 6 months during which period election to the Council shall be held. Government of Assam shall dissolve the Bodoland Autonomous Council (BAC) and repeal the BAC Act.

15. Government of Assam will consider inclusion of all tribals including Bodos in RHAC/MAC/LAC in consultation with leaders of these Councils.

16. The Implementation of the provision of the Memorandum of Settlement shall be periodically reviewed by a Committee comprising representatives of Government of India, Government of Assam and BTC.

(Hagrama Mohilary)
Chairman
Bodo Liberation Tigers

(R. C. A. Jain)
Secretary (BM)
Ministry of Home Affairs

Government of India
(P K Dutta)
Chief Secretary
Govt. of Assam

Signed on 10th February, 2003 at New Delhi in the presence of Shri L. K. Advani, Deputy Prime Minister of India and Shri Tarun Gogoi, Chief Minister of Assam

ANNEXURE 3

REPORT OF NATIONAL COMMISSION TO REVIEW THE WORKING OF THE CONSTITUTION

Chapter: 9 Decentralization and Devolution
D. Institutions in North East India

Background and Objective

9.22.1 The North Eastern region of India is one of its richest regions in terms of natural resources. It is also one of the most beautiful parts of India. However, a sense of alienation, misgovernance, corruption and under development are pervasive features of the region. To tackle the problems of this unique area and to preserve the democratic traditions and cultural diversity of its people, the framers of the Constitution conceived of the instrument of tribal self-rule. This stands embodied in the Sixth Schedule to the Constitution. The drafting of this Schedule was done by a Sub-Committee on North East Frontier (Assam Tribal and excluded areas) of the Constituent Assembly headed by Shri Gopinath Bardoloi, the then Premier of Assam. The effort was to accommodate the collective aspirations of tribal communities within the broader framework of a democratic political system.

9.22.2 The provisions of the Sixth Schedule are applicable to the administration of the tribal areas in the States of Assam, Meghalaya, Tripura and Mizoram. Arunachal Pradesh (earlier known as North Eastern Frontier Agency) was also part of the Sixth Schedule and was administered by the Governor of Assam. Assam (barring two districts covered by the Sixth Schedule), Arunachal Pradesh, Manipur and Sikkim have passed legislation bringing the local bodies under the provisions of the 73rd and 74th Amendments to the Constitution.

9.22.3 The North Eastern part of India with its large number of tribal communities and emerging educated elites has self-governing village councils and organized tribal chiefdoms. Efforts are to be made to give all the States in this region the opportunities provided under the 73rd and 74th Constitution Amendments. However, this should be done with due regard to the unique traditions of the region and the genius of the people without tampering with their essential rights and giving to each State the chance to use its own nomenclature for systems of governance which will have local acceptance.

9.22.4 The Commission feels that our efforts must be to develop those instruments of political government to bring self-governance to the region and to calm the passions of divisive trends. The future of the North Eastern States hinges on choosing self-governance. During the last few decades, the system of local-governance promoted under the provisions of the Sixth Schedule has been seeking to guarantee political dominance for backward groups, better local governance at the community level, better economic development and ethnic security for those who feel threatened by large scale influx of illegal migrants and even settlers from other parts of India.

9.22.5 The other regions of the country where there are large population of tribals are covered by the provisions of the Fifth Schedule. This is totally different from the Sixth Schedule States where the emphasis

[3]Report submitted on 31.3.2002 to the Government of India by Hon'ble Sri M.N. Venkatchaliah, former Chief Justice of India

is on self-rule because many of the communities inhabiting these areas had ruled themselves until the British subjugated them in the 19th century. The issues of emotional, physical and political distance and alienation still remain.

General Recommendations

9.23 After carefully studying the existing position of local self- governance in the various North-eastern States, the Commission makes the following general recommendations:-

(i) Careful steps should be taken to devolve political powers through the intermediate and local-Ievel traditional political organisations, provided their traditional practices carried out in a modern world do not deny legitimate democratic rights to any section in their contemporary society. The details of state-wise steps to devolve such powers will have to be carefully considered in a proper representative meeting of traditional leaders of each community, opinion builders of the respective communities and leaders of state and national stature from these very groups. A hasty decision could have serious repercussions, unforeseen and unfortunate, which could further complicate and worsen the situation. To begin with, the subjects given under the Sixth Schedule and those mentioned in the Eleventh Schedule could be entrusted to the Autonomous District Councils (ADCs). The system of in-built safeguards in the Sixth Schedule, should be maintained and strengthened for the minority and micro-minority groups while empowering them with greater responsibilities and opportunities, for example, through the process of Central funding for Plan expenditure instead of routing all funds through the State Governments. The North Eastern Council can play a central role here by developing a process of public education on the proposed changes, which would assure communities about protection of their traditions and also bring in gender representation and give voice to other ethnic groups.

(ii) Traditional forms of governance must be associated with self-governance because of the present dissatisfaction. However, positive democratic elements like gender justice and adult franchise should be built into these institutions to make them broader based and capable of dealing with a changing world.

(iii) The implementation of centrally funded projects from various departments of the Union Government should be entrusted to the ADCs and to revived village councils with strict audit by the Comptroller and Auditor-General of India.

(iv) The process of protection of identity and the process of development and change are extremely sensitive. These twin processes need to be understood in the framework of a changing world and the role of all communities, small and large, in that world. Therefore, the North Eastern Council should be mandated to conduct an intensive programme of public awareness, sensitization and education through non-government organizations, State Governments, and its own structure to help bring about such an understanding of the proposals given below.

(v) The provisions of the Anti-Defection Law in the proposed revised form as now recommended by the Commission, vide paragraph 4.18.2 shall be made applicable to all the Sixth Schedule areas.

(vi) Given the demographic imbalance which is taking place in the North-East as a result of illegal migration from across the borders, urgent legal steps are necessary for preventing such groups from entering electoral rolls and citizenship rolls of the country. The recommendations of this Commission for issuance of multi-purpose identity cards to all Indian citizens be made mandatory for all Indian residents in the North East on a *high-priority basis* and the Citizenship

Act should be reviewed to plug the loopholes which enable illegal settlers to become 'virtual' citizens in a short span of time, using a network of touts, politicians and officials.

(vii) A National Immigration Council be set up under law to examine and report on a range of issues including Work Permits for legal migrants, Identity Cards for all residents and the enactment of a National Migration Law and a National Refugee Law, review of the Citizenship Act, the Illegal Migrants Determination by Tribunal Act and the Foreigners Act.

(viii) Local communities be involved in the monitoring of our borders, in association with the local police and the Border Security Force.

Specific State-wise Recommendations

9.24 In addition to the above, some specific reforms are recommended by the Commission in regard to individual States in the North Eastern region of India.

9.25 ***Nagaland***: The case of Nagaland is quite different from the position of other North Eastern States in view of the provisions of article 371A of the Constitution inserted by the Constitution (Thirteenth Amendment) Act, 1962 and the Nagaland Tribe, Area, Range and Village Council Act, 1966. Article 371A specifically provides that no Act of Parliament in respect of (i) religious or social practices of the Nagas, (ii) Naga customary law and procedure, (iii) administration of civil and criminal justice involving decisions according to Naga customary law; and (iv) ownership and transfer of land and its resources shall apply to the State unless the Legislative Assembly by a resolution so decides. In addition, the Governor of Nagaland has special powers to act with regard to internal disturbances, powers which are virtually unchallengeable. The Nagaland Tribe, Area, Range and Village Council Act, 1966 provides for the creation of a tribal council for each tribe, an Area Council for Kohima and Dimapur, a Range Council where there is a recognized range in the Mokukchung and Kohima Districts and Village Councils for one or more villages in Kohima and Mokukchung, wherever they may be deemed necessary by the Deputy Commissioner. The Village Development Board scheme was started in 1970s to enable village councils to function effectively and with autonomy. The Village Development Boards are now receiving central funds and about 1000 village development boards are functioning with assets totaling about twenty crores of rupees. The Commission elicited views of the State Government and the general public as to how a long term settlement of the political issues of the Naga leadership could be arrived at and as to how much autonomy could be given to the local communities to promote self-governance and a sense of ownership. The Commission notices the efforts being made by the Government to arrive at a political solution. It is to be hoped that this process would contribute to peace and stability.

The Commission recommends that in Nagaland:

(1) Naga Councils be replaced by elected representatives of various Naga society groups with an intermediary tier at the district level.

(2) Village Development Boards be less dependent on State and receive more Centrally-sponsored funds.

9.26 ***Assam***: The division of the composite State of Assam led to the drawing of new boundaries. The North Cachar hills sub-division of the United Mikir and Cachar Hills District was upgraded to a district in 1970. The Mikir Hills District section was renamed as Karbi Anglong in 1976. Both the districts have Autonomous Councils. For each autonomous district, the Sixth Schedule provides for a District Council consisting of not more than 30 members for a term of five years. The Governor nominates not more than four members to the Council while the others are elected on the basis of adult suffrage. The Chief Executive Member (CEM), the chairman and the deputy chairman (equivalent to Speaker and the deputy Speaker) are elected from among the Members and the CEM selects the other executive members.

9.27 There are different internal rules for different Autonomous District Councils. In some Councils like Mara in Mizoram, the

electorate are eligible adults and in certain others like Karbi Anglong right to access to traditional lands and length of stay in the region are regarded as qualifying criteria for being included in the voters' list for the ADCs.

9.28 As regards Assam, the Commission recommends that (1) the Sixth Schedule should be extended to the Bodoland Autonomous Council with protection for non-tribal, non-Bodo groups, (2) other Autonomous Councils be upgraded to Autonomous Development Councils with more Central funds for infrastructure development; within the purview of the 73rd Amendment but also using traditional governing systems at the village level.

9.29 ***Meghalaya***: In Meghalaya, the District Councils are dominated by the tribal communities. The major tribes of the State are Khasi, Jaintia and Garo. Besides District Councils, there are traditional ruling systems, namely, the Syiems (rajas) of the Khasi Hills, the Dolois of the Jaintia and the Nokmas of the Garos. Of these three, the Khasi traditional polity was regulated under a three tier system with the Durbar Shnong *i.e.,* Village Council presided by the Rangbah Shnong (headman) at the base, the Durbar Hima *i.e.,* State Assembly presided by the Syiem or the equivalent of a king at the apex. The Dolois of the Jaintia Hills and the Nokmas or traditional headmen of the Garos are not as well organized as the Syiemships. There are at present competing systems of authority each of which is seeking to serve or represent the same constituency and the system therefore requires streamlining as per the aspirations of the people. Trends towards militancy in the State can be discouraged through measures leading to self-governance. For this to happen, the traditional systems of governance will have to be included and given specific roles and opportunities instead of being marginalized.

As regards Meghalaya, the Commission makes the following recommendations:-

(1) A tier of village governance to be created for a village or a group of villages in the Autonomous District Councils, comprising of elected persons from the traditional systems plus from existing village councils with not more than 15 persons at each village unit.

(2) At present, each of the Autonomous District Councils in Meghalaya consists of 30 seats. It is recommended that this number may be increased by 10 seats, i.e., to a total number of 40 seats. Of the 10 additional seats, having regard to the non-representation of women and non-tribals, the Governor may nominate up to five members from these categories to each of the ADCs. The other five may be elected as follows:-

- By Syiems and Myntris, from among themselves to the Khasi Autonomous Council.
- By Dolois from among themselves to the Jaintia Autonomous District Council; and
- By Nokmas from among themselves to the Garo Autonomous District Council.

9.30 ***Tripura***: In Tripura, the Tripura Tribal Areas Autonomous District Councils were formed in 1985 and every such Council has 28 elected members and two members nominated on the basis of the Chief Executive Member's recommendation by the Governor from among the Tribals.

As regards Tripura, the Commission makes the following recommendations:-

(1) The recommendations made by the Commission for other Autonomous Councils should also apply in respect of the Autonomous District Council(s) in Tripura.

(2) The number of elected members in the Council should be increased from 28 to 32.

(3) The number of nominated members should be increased to six from the current two. The existing non-tribal seats (currently, they have three elected seats) be converted to tribal seats. Three non-tribals may be nominated by the Governor and three tribal women may be nominated by the Chief Executive Member.

9.31 ***Mizoram***: In Mizoram, there are three Autonomous District Councils (ADCs), namely, the Lai, Mara and Chakma. The Chakma ADC has 13 elected members and 3 nominated members. The Lai ADC has 23 elected and 4 nominated members. The Mara ADC has 19 elected and 4 nominated members.

As regards Mizoram, the Commission makes the following recommendations:-

(1) An intermediary elected 30-member tier be developed at the district level in areas not covered by the Sixth Schedule, *i.e.*,excluding the Chakma, Lai and Mara District Autonomous Councils. There would thus be two tiers below the State Legislature: the District and the Village.

(2) Village Councils in non-Scheduled areas be given more administrative and judicial powers; two or more villages be combined to form one village council, given the small population in the State.

(3) Consideration be given to groups seeking Sixth Schedule status, depending on viability of the demand, including size of population, territorial and ethnic contiguity.

(4) Central funding as outlined in general recommendations be provided to the ADCs.

(5) Nominated seats for women, non-tribals and Sixth Schedule tribes in non-scheduled area (not to exceed six over and above the size of the Councils, making a total of 36 members); current size of ADCs be increased to 30 with a similar provision for women and non-scheduled tribes.

9.32 ***Manipur:*** Manipur has been seeking Sixth Schedule status for its hill areas and this request needs serious consideration. The 73rd and 74th Amendments are applicable to only those areas of Manipur which are in plains and these provisions are yet to be fully implemented.

As regards Manipur, the Commission recommends that the provisions of the Sixth Schedule be extended to hill districts of the State. Also, the 73rd Amendment be implemented vigorously in the areas of the plains where, despite elections, the system is virtually non-existent.

9.33 ***Arunachal Pradesh***: Since the Government of Arunachal Pradesh has already implemented the provisions of the Constitution 73rd Amendment *in toto*, the Commission does not propose to make any recommendation in this regard.

ANNEXURE 4

T.N. GODAVARMAN THIRUMULPAD

VERSUS

UNION OF INDIA & ORS.

ENVIRONMENT AWARENESS FORUM

VERSUS

STATE OF J & K & ORS.

Chief Justice, A S Anand and B.N. Kirpal, JJ.

(WP (C) No. 202/95 with WP (C) No. 171/96)

(Decided on 15.01.1998)

North Eastern States - Transportation of Timber outside the State - Not feasible - Ban on Timber Trade - Neither feasible nor desirable in view of dependence of local people- Number to be regulated according to sustainability

Saw Mills to be relocated in specified industrial zones - industrial requirement have to be subordinated to maintenance of ecology and bonafide local needs - No fresh felling in Government, District Councils and Regional Councils - Fool proof institutional arrangements to be put in place under supervision of North-Eastern Council - Satellite office of Forest Survey of India to be set up at Shillong

Disposal of felled timber - Report of High Powered Committee consider - Directions issued - Pricing of timber - existing royalty to be revised upwardly - Licensing - Licenses given to wood based industries suspended - Wood based industries cleared by High Powered Committee to shift to industrialistics - complete moratorium on issue of new licenses for wood based industries - number of wood based industries to be determined on quantity of timber that can be sustainably harvested

Forest Protection - Action Plan for intensive patrolling to be prepared by PCCF - Report to be submitted to Central Government - State Government to provide all facilities to strictly enforce forest protection measures - Chief Secretary to review the same every six month

Scientific Management of Forest - Working Plans for all Forest Divisions shall be prepared by State Government and approved District Regional and Village Councils working schemes specified Ecologically sensitive area - States to identify in consultation with ICFRE, WII, NERIST, NEHU and NGOs - areas to be totally excluded from exploitation - minimum extent to be 10% of total forest area in the State.

Action against Officials - State Government's to identify forest divisions where significant illegal felling have taken place - initiation of disciplinary/ criminal proceedings against guilty Timber Extraction - Except in private plantations - to be done only by State agencies Local Laws and Customs relating to forest - Concerned State Government to apply for modification of Court's order

Arunachal Pradesh - Permit System abolished Proceeds from seize timber to be shade between State Government and Tribal Populations Wildlife and Biodiversity - States to ensure sufficient budgetary provisions Ministry of Environmental Forest to have liberty in issuing suitable directions consisting with order.

Clarification - term 'State Government to include District Councils'

ORDER

Learned Attorney General submits that the perception of the Ministry of Environment and Forests is as under:

1. It has been estimated by the HPC that about 1.20 lakhs cubic meters of illicitly felled seized timber, belonging to the State Governments is lying in the forests and depots for varying periods of time between 1 to 2 years and is thereby getting degraded on account of decay and rotting of the wood. It is necessary to dispose it off at the earliest to minimise any further loss in it monetary value. There is, in addition, considerable quantity of Timber claimed by the private industry and local people.

List the matter on 20th January , 1998 before a Bench consisting of Hon'ble Dr. Justice A.S. Anand, Hon'ble Mr Justice B N Kirpal and Hon'ble Mr Justice V S Khare.

In view of the approaching monsoon season (April 98) all such timber needs to be disposed off with urgency to save further loss in quality, as also in value, albeit with, proper checks and balances.

North Eastern States

2. Given the weak infrastructure in the North-eastern region, it does not seem feasible to transport such huge quantities of timber for auction in markets outside the region in a short time. Moreover, there would be uncertainty of the response in timber markets far away from the source of timber which has been subject to elements of degradation in varying degrees. There is also the likelihood of local resentment, in an otherwise sensitive area, that all such material is removed from the region without processing and value addition, which could be conceived as creating an adverse effect on the region's economy.

3. *Even though the proliferation of wood-based industries has been the main cause of* degradation of forests in the North-Eastern States, considering the extent of forests (64% of the geographical area) and the dependence of the local people on the forest resources in the region it is neither feasible, nor desirable, to ban completely either the timber trade or running of the wood based industries. However, their numbers and capacities were to be regulated the sustainable availability of forest produce and they are also required to be relocated in specified industrial zones. *Moreover, the industrial requirements have to be subordinated to the maintenance of environment and ecology as well as bonafide local needs.*

4. There shall be no fresh fellings in the forests belonging to the Government, District and Regional Councils till the disposal of their existing stocks of legal and illegal timber.

5. In view of the multi-dimensional issues impinging upon forest protection, foolproof institutional arrangements need to be put in place, and made functional under the strict supervision of the North-East Council (NEC). Technical back stopping in the forestry matter will be provided by MoEF by opening a separate Cell in the Ministry under an officer of the rank of CCF and starting a satellite office of the Forest Survey of India at Shillong.

We appreciate the perception of MoEF as reflected by the learned Attorney General.

We have heard the Amicus Curiae, the Learned Attorney General and learned counsel for North Eastern states. In view of the report of the High Power Committee and taking into account the factors which require an order to be made by the Court for disposal of the felled timber and ancillary matters which are lying in the North-Eastern States, we consider it appropriate to make the following order:-

1. *Disposal of timber shall commence only after the concerned Principal Chief Conservator of Forests irrevocably certifies that investigations of all felled timber in the State has been completed.*

2. As a first measure all inventories timber, including seized timber lying in the forest should be immediately transported to specified forest depots.

3. All illegal/illicit timber found in possession of an offender or abandoned in the forest shall be confiscated to the State Government and shall be disposed off in accordance with the procedure to be adopted for disposal of Government timber.

4. Out of the seized timber, logs found suitable for manufacture of veneer and plywood shall be processed by the State Governments within their own factories and by hiring such facilities. The finished product can be marketed freely.

5. The remaining timber belonging to Government and District Councils shall be first offered for sale to Government Departments for their bonafide official use and the rest shall be sold in public auction or through sealed tenders after fixing floor price by an Expert Committee with a representative from the MoEF. Private timber owners whose stocks have been cleared by HPC shall have the option of selling the timber either in the auctions organized by the State Forest Departments/Forest Development Corporations or directly.

6. *The State Governments shall formally notify industrial estates for locating the wood based industries units in consultation with the Ministry of Environment and Forests.*

7. Timber as per inventory cleared by HPC may be allowed to

(a) be converted/utilized if the unit is located within the notified industrial estate. As the relocation in proposed industrial estates may take some time, existing units with only legal stocks may convert this timber, as one time exception, notwithstanding anything contained in para 12 hereunder, till such stocks last subject to the maximum period as per the norms prescribed by the High Power Committee (Vide their III report) or six months whichever is less. Any stock remaining thereafter shall rest in the State Government. However, fresh trees/timber will be allotted to these units only when they start functioning within the designated industrial estates. The territorial Deputy Conservator of Forests/Divisional Forest Officer shall be responsible for ensuring that such units process the legal stocks only and will closely monitor the various transit permits (inward and outward) and maintenance of the prescribed records. All such records shall be countersigned (with date) by an officer not less than the rank of an Assistant Conservator of Forests.

(b) allowed to be sold to other units which are located in these industrial estates subject to the condition that such transactions are routed through an authority notified/ constituted by the Principal Chief Conservator of Forests.

(c) The State Governments shall ensure disposal of illegal timber before permitting the conversion/disposal of legal/authorized timber available with the wood based industries.

8. Transportation of auctioned timber (as well as legal timber) including sawn timber outside the North Eastern Region shall only be done through railways under the strict supervision of the Forest Department. The Railway Board shall give priority for providing rakes/wagons for such transportation.

9. Modalities for transportation of timber/timber products and alternative modes in case of difficulties in

transportation by Railways will be worked out by the State Governments in concurrence of the Ministry of Environment and Forests.

10. *Existing inventoried stock of timber originating from plantations in private and community* holdings in the States of Meghalaya, Mizoram, Tripura, Manipur and Nagaland may be disposed of by their owners under the relevant State laws and rules. In States where such laws and rules do not exist, the necessary laws and rules may be framed within six months.

Pricing of Timber

11. The State Governments shall ensure that timber/forest produce is supplied to industries including Government Undertakings, at full market rate. The existing royalty shall be reviewed and revised upwardly by a Committee constituted under the Chairmanship of Principal Chief Conservator of Forests with representatives from the concerned Departments and shall also include a representative of Ministry of Environment and Forest. The prices of timber for which royalty has not been realized in full shall also be reviewed by this Committee and the concerned industry shall be required to pay the revised price or the royalty (including surcharge, fee etc.) which ever is higher after deducting the part royalty already paid.

Licensing

12. Licensing given to all wood based industries shall stand suspended.

13. Wood based industries which have been cleared by the High Power Committee without any penalty shall have the option to shift to industrial estates which shall be identified by the States within 45 days and developed within six months thereafter.

14. Units which have been penalized because they were found to exceed normal recovery norms, but were within 15% of the said norms will have right to approach the High Power Committee on or before 9th February, 1998. The High Power Committee shall examine all relevant material in particular the income tax and excise records for the proceeding three years. The High Power Committee shall dispose of all such applications within 45 days thereafter and such mills may be granted licence if the High Power Committee finds that it is not against public interest to do so.

15. Units which have not furnished details/information to the High Power Committee so far or which have not been cleared by the High Power Committee, shall not be granted any licence and the stocks in their custody if any, shall be confiscated to the State Government. In case of leased mills belonging to corporations/trusts/cooperative societies owned/controlled/managed by the State Government and where the lessees have been penalized by the High Power Committee, the leases shall stand revoked. Such mills shall, however, be eligible for relicencing subject to the condition that these mills are not leased out in future except to a entity fully owned by the Government.

16. *Units who do not want to shift to the designated industrial estates shall be allowed to wind up as per law.*

17. *Henceforth, licenses of units shall be renewed annually only in those cases where no irregularity is detected.*

18. There shall be a complete moratorium on the issue of new licenses by the State Governments or any other authority for the establishment of any new wood based industry for the next five years after which the situation shall be reviewed with the concurrence of Ministry of Environment and Forests.

19. Number of wood based industries shall be determined strictly within the quantity of timber which can be felled annually on sustainable basis as determined by the approved working plans from time to time. If it is found that units after relocation in industrial estate have excess capacity then their capacities shall be

reduced pro rata to remain within the sustainable levels.

Forest Protection

20. An action plan shall be prepared by the Principal Chief Conservator of Forests/Chief Forest Officer for intensive patrolling and other necessary protective measure to be undertaken in identified vulnerable areas and quarterly report shall be submitted to the Central Government for approval. The approved plan together with the modifications, if any, shall be acted upon.

21. To ensure protection of the forest wealth the forest officers in the North Eastern States may be empowered with authority to investigate prosecute and confiscate on the lines of the powers conferred on the forest officers in many other States in the country.

22. The State Governments shall be responsible for providing all facilities including security and police force to strictly enforce forest protection measures to stop illicit felling, removal and utilizations of such timber. The Chief Secretary shall review the various matters concerning forest protection and development in his State at least once every six months with senior forest officers up to the rank of Conservator of Forests, Regional Chief Conservator of Forests of MoEF shall be invited to all such meetings.

Scientific Management of Forest

23. *Working Plans for all forest divisions shall be prepared by the State Governments and got approved from the Government of India. Forest working shall be carried out strictly in accordance with the approved prescriptions of the working plans. The working plans should be prepared within a period of two years. During the interregnum the forests shall be worked according to an annual felling programme approved by the MoEF which shall be incorporated in the concerned working plan. In case a working plan is not prepared within this time frame, future fellings will remain suspended till the regular working plan is prepared and got approved.*

24. **The forests under the District, Regional and Village Councils shall be worked in accordance with working schemes which shall specify both the programme for regeneration and harvesting and whose period shall not be less than 5 years.**

25. The maximum permissible annual yield in the ad interim measures suggested above, shall not exceed the annual harvestable yield determined by Ministry of Environment and Forests. *The plantations schemes raised on private and community holdings shall be excluded from these requirements but shall be regulated under respective State rules and regulations.*

26. The States shall identify ecologically sensitive areas in consultation with leading institutions like the Indian Council of Forestry Research and Education, Wildlife Institute of India, North Eastern Hill University, North Eastern Regional Institute of Science and Technology, leading NGOs, etc. and ensure that such areas are totally excluded from any kind of exploitation: The minimum extent of such areas shall be 10% of the total forest area in the state.

Action against officials

27. The State Government shall identify within 15 days all those forest divisions where significant illegal felling has taken place and initiate disciplinary/criminal proceedings against those found responsible. The first Action Taken Report (ATR) in this regard shall be submitted to the Central Government within three months which shall be followed by quarterly reports (Qrs.) till the culmination of the matter.

28. Timber extracting in forests irrespective of ownership except in private plantations, shall be carried out by a State agency only. The States shall endeavour to adopt

pattern obtaining in the State of Himachal Pradesh as described in para 2, 5, 3 of the Rajamani Committee Report.

If there be any local laws/customs relating to the forest in any State, the concerned State Government may apply to this Court for the needed modification, if any, with alternative proposal.

29. The penalties levied on the wood based industries as ordered by the High Power Committee shall constitute the revolving fund to meet the expenses involved in collection and transportation of seized illegal timber. These can be augmented by utilizing the funds generated by the initial sales of illegal timber already available in the forest depots.

30. Each State shall constitute a State level Expert Committee for matters concerning the preparation of Working plans, their implementation, development of Industrial estates, shifting of industrial units to these estates, rules and regulations regarding the grant and renewal of licenses to wood based industry and other ancillary matters, under the chairmanship of Principal Chief Conservator of Forests and with a nominee of Ministry of Environment and Forests as one of its members. Any decision of this Committee which is not acceptable to the State Government shall be referred to the Central Government.

31. *The existing permit system in Arunachal Pradesh shall stand abolished. The State Government may provide financial assistance in cash or kind in the form of timber only for the bonafide use of the local tribals alone*. Such concessional timber shall not be bartered or sold. Felling of trees for such purpose shall be carried out only by a Government agency.

32. The total sale proceeds from the sale of seized timber, as well as timber products manufactured and disposed by the State Government (Vide para-1) and penalties would be credited to the State Revenues. *Out of this, the State shall utilize one half of the amount for raising forest plantations by local tribal population and as assistance to the tribals. The remaining one half of the total sale proceeds, after deduction of the expense therefrom, would go to the State coffers for other developmental activities in the State.*

33. The States shall ensure that sufficient budgetary provisions are made for the preservation of biodiversity and protection of wildlife.

34. To ensure that timber/forest produce smuggled across the border may not be used as a cover for trade in illegal timber, *it is directed that all such timber seized by customs/Border Security Force should not be redeemed in favor of individuals who are smuggling it but should be confiscated and handed over to the concerned State Forest Department along with offenders, vehicles, tools and implements for prosecution under the relevant acts.*

35. For the proper and effective implementation of these orders, Ministry of Environment and Forests will have the liberty to issue suitable directions consistent with this order.

36. Action taken report be filed by each State Government and the Ministry of Environment and Forests every two months.

37. Liberty to apply for modification/clarification in case of need.

Note: In this order the term "State Government" would include District Council also except where the context implies otherwise

ANNEXURE 5

SIXTH SCHEDULE

[Articles 244(2) and 275(1)]

Provisions as to the Administration of Tribal Areas in the States of Assam, Meghalaya, Tripura and Mizoram

1. Autonomous districts and autonomous regions

(1) Subject to the provisions of this paragraph, the tribal areas in each item of Parts I, II and IIA and in Part III of the table appended to paragraph 20 of this Schedule shall be an autonomous district.

(2) If there are different Scheduled Tribes in an autonomous district, the Governor may, by public notification, divide the area or areas inhabited by them into autonomous regions.

(3) The Governor may, by public notification,

(a) include any area in any of the Parts of the said table,
(b) exclude any area from any of the Parts of the said table,
(c) create a new autonomous district,
(d) increase the area of any autonomous district,
(e) diminish the area of any autonomous district,
(f) unite two or more autonomous districts or parts thereof so as to form one autonomous district,
(ff) alter the name of any autonomous district,
(g) define the boundaries of any autonomous district:

Provided that no order shall be made by the Governor under clauses (c), (d), (e) and (f) of this sub-paragraph except after consideration of the report of a Commission appointed under sub-paragraph (1) of paragraph 14 of this Schedule:

Provided further that any order made by the Governor under this sub-paragraph may contain such incidental and consequential provisions (including any amendment of paragraph 20 and of any item in any of the Parts of the said table) as appear to the Governor to be necessary for giving effect to the provisions of the order.

2. Constitution of District Councils and Regional Councils

(1) There shall be a District Council for each autonomous district consisting of not more than thirty members, of whom not more than four persons shall be nominated by the Governor and the rest shall be elected on the basis of adult suffrage.

(2) There shall be a separate Regional Council for each area constituted an autonomous region under sub-paragraph (2) of paragraph 1 of this Schedule.

(3) Each District Council and each Regional Council shall be a body corporate by the name respectively of "the District Council of (name of district)" and "the Regional Council of (name of region)", shall have perpetual succession and a common seal and shall by the said name sue and be sued.

(4) Subject to the provisions of this Schedule, the administration of an autonomous district shall, in so far as it is not vested under this Schedule in any Regional Council within such district, be vested in the District Council for such district and the administration of an autonomous region shall be vested in the Regional Council for such region.

(5) In an autonomous district with Regional Councils, the District Council shall have only such powers with respect to the areas under the authority of the Regional Council as may be delegated to it by the Regional Council in addition to the powers conferred on it by this Schedule with respect to such areas.

(6) The Governor shall make rules for the first constitution of District Councils and Regional Councils in consultation with the existing tribal Councils or other representative tribal organisations within the autonomous

districts or regions concerned, and such rules shall provide for

(a) the composition of the District Councils and Regional Councils and the allocation of seats therein;
(b) the delimitation of territorial constituencies for the purpose of elections to those Councils;
(c) the qualifications for voting at such elections and the preparation of electoral rolls therefor;
(d) the qualifications for being elected at such elections as members of such Councils;
(e) the term of office of members of Regional Councils;
(f) any other matter relating to or connected with elections or nominations to such Councils;
(g) the procedure and the conduct of business (including the power to act notwithstanding any vacancy) in the District and Regional Councils;
(h) the appointment of officers and staff of the District and Regional Councils.

(6A) The elected members of the District Council shall hold office for a term of five years from the date appointed for the first meeting of the Council after the general elections to the Council, unless the District Council is sooner dissolved under paragraph 16 and a nominated member shall hold office at the pleasure of the Governor:

Provided that the said period of five years may, while a Proclamation of Emergency is in operation or if circumstances exist which, in the opinion of the Governor, render the holding of elections impracticable, be extended by the Governor for a period not exceeding one year at a time and in any case where a Proclamation of Emergency is in operation not extending beyond a period of six months after the Proclamation has ceased to operate:

Provided further that a member elected to fill a casual vacancy shall hold office only for the remainder of the term of office of the member whom he replaces.

(7) The District or the Regional Council may after its first constitution make rules with the approval of the Governor with regard to the matters specified in sub-paragraph (6) of this paragraph and may also make rules with like approval regulating

(a) the formation of subordinate local Councils or Boards and their procedure and the conduct of their business; and generally all matters relating to the transaction of business pertaining to the administration of the district or region, as the case may be:

(b) Provided that until rules are made by the District or the Regional Council under this sub-paragraph the rules made by the Governor under sub-paragraph (6) of this paragraph shall have effect in respect of elections to, the officers and staff of, and the procedure and the conduct of business in, each such Council.

3. Powers of the District Councils and Regional Councils to make laws

(1) The Regional Council for an autonomous region in respect of all areas within such region and the District Council for an autonomous district in respect of all areas within the district except those which are under the authority of Regional Councils, if any, within the district shall have power to make laws with respect to

(a) the allotment, occupation or use, or the setting apart, of land, other than any land which is a reserved forest for the purposes of agriculture or grazing or for residential or other non-agricultural purposes or for any other purpose likely to promote the interests of the inhabitants of any village or town:

Provided that nothing in such laws shall prevent the compulsory acquisition of any land, whether occupied or unoccupied, for public purposes by the Government of the State concerned in accordance with the law for the time being in force authorising such acquisition;

(b) the management of any forest not being a reserved forest;

(c) the use of any canal or water-course for the purpose of agriculture;
(d) the regulation of the practice of jhum or other forms of shifting cultivation;
(e) the establishment of village or town committees or councils and their powers;
(f) any other matter relating to village or town administration, including village or town police and public health and sanitation;
(g) the appointment or succession of Chiefs or Headmen;
(h) the inheritance of property;
(i) marriage and divorce;
(j) social customs.

(2) In this paragraph, a "reserved forest" means any area which is a reserved forest under the Assam Forest Regulation, 1891, or under any other law for the time being in force in the area in question.

(3) All laws made under this paragraph shall be submitted forthwith to the Governor and, until assented to by him, shall have no effect.

4. Administration of justice in autonomous districts and autonomous regions

(1) The Regional Council for an autonomous region in respect of areas within such region and the District Council for an autonomous district in respect of areas within the district other than those which are under the authority of the Regional Councils, if any, within the district may constitute village councils or courts for the trial of suits and cases between the parties all of whom belong to Scheduled Tribes within such areas, other than suits and cases to which the provisions of sub-paragraph (1) of paragraph 5 of this Schedule apply, to the exclusion of any court in the State, and may appoint suitable persons to be members of such village councils or presiding officers of such courts, and may also appoint such officers as may be necessary for the administration of the laws made under paragraph 3 of this Schedule.

(2) Notwithstanding anything in this Constitution, the Regional Council for an autonomous region or any court constituted in that behalf by the Regional Council or, if in respect of any area within an autonomous district there is no Regional Council, the District Council for such district, or any court constituted in that behalf by the District Council, shall exercise the powers of a court of appeal in respect of all suits and cases triable by a village council or court constituted under sub-paragraph (1) of this paragraph within such region or area, as the case may be, other than those to which the provisions of sub-paragraph (1) of paragraph 5 of this Schedule apply, and no other court except the High Court and the Supreme Court shall have jurisdiction over such suits or cases.

(3) The High Court shall have and exercise such jurisdiction over the suits and cases to which the provisions of sub-paragraph (2) of this paragraph apply as the Governor may from time to time by order specify.

(4) A Regional Council or District Council, as the case may be, may with the previous approval of the Governor make rules regulating

(a) the constitution of village councils and courts and the powers to be exercised by them under this paragraph;
(b) the procedure to be followed by village councils or courts in the trial of suits and cases under sub-paragraph (1) of this paragraph;
(c) the procedure to be followed by the Regional or District Council or any court constituted by such Council in appeals and other proceedings under sub-paragraph (2) of this paragraph;
(d) the enforcement of decisions and orders of such councils and courts;
(e) all other ancillary matters for the carrying out of the provisions of sub-paragraphs (1) and (2) of this paragraph.

(5) On and from such date as the President may, after consulting the Government of the State concerned, by notification appoint in this behalf, this paragraph shall have effect in relation to such autonomous district or region as may be specified in the notification, as if

(i) in sub-paragraph (1), for the words "between the parties all of whom belong to Scheduled Tribes within such areas, other than suits and cases to which the provisions of sub-paragraph (1) of paragraph 5 of this Schedule apply,", the words "not being suits and

cases of the nature referred to in sub-paragraph (1) of paragraph (5) of this Schedule, which the Governor may specify in this behalf," had been substituted;

(ii) sub-paragraphs (2) and (3) had been omitted;

(iii) in sub-paragraph (4)

(a) for the words "A Regional Council or District Council, as the case may be, may with the previous approval of the Governor make rules regulating", the words "the Governor may make rules regulating" had been substituted; and

(b) for clause (a), the following clause had been substituted, namely: "(a) the constitution of village councils and courts, the powers to be exercised by them under this paragraph and the courts to which appeals from the decisions of village councils and courts shall lie;";

(c) for clause (c), the following clause had been substituted, namely: "(c) the transfer of appeals and other proceedings pending before the Regional or District Council or any court constituted by such Council immediately before the date appointed by the President under sub-paragraph (5);"; and

(d) in clause (e), for the words, brackets and figures "sub-paragraphs (1) and (2)", the word, brackets and figure "sub-paragraph (1)" had been substituted.

5. Conferment of powers under the Code of Civil Procedure, 1908, and the Code of Criminal Procedure, 18981, on the Regional and District Councils and on certain courts and officers for the trial of certain suits, cases and offences

(1) The Governor may, for the trial of suits or cases arising out of any law in force in any autonomous district or region being a law specified in that behalf by the Governor, or for the trial of offences punishable with death, transportation for life, or imprisonment for a term of not less than five years under the Indian Penal Code or under any other law for the time being applicable to such district or region, confer on the District Council or the Regional Council having authority over such district or region or on courts constituted by such District Council or on any officer appointed in that behalf by the Governor, such powers under the Code of Civil Procedure, 1908, or, as the case may be, the Code of Criminal Procedure, 18981, as he deems appropriate, and thereupon the said Council, court or officer shall try the suits, cases or offences in exercise of the powers so conferred.

(2) The Governor may withdraw or modify any of the powers conferred on a District Council, Regional Council, court or officer under sub-paragraph (1) of this paragraph.

(3) Save as expressly provided in this paragraph, the Code of Civil Procedure, 1908, and the Code of Criminal Procedure, 18981, shall not apply to the trial of any suits, cases or offences in an autonomous district or in any autonomous region to which the provisions of this paragraph apply.

(4) On and from the date appointed by the President under sub-paragraph (5) of paragraph 4 in relation to any autonomous district or autonomous region, nothing contained in this paragraph shall, in its application to that district or region, be deemed to authorise the Governor to confer on the District Council or Regional Council or on courts constituted by the District Council any of the powers referred to in sub-paragraph (1) of this paragraph.

6. Powers of the District Council to establish primary schools, etc

(1) The District Council for an autonomous district may establish, construct, or manage primary schools, dispensaries, markets, cattle pounds, ferries, fisheries, roads, road transport and waterways in the district and may, with the previous approval of the Governor, make regulations for the regulation and control thereof and, in particular, may prescribe the language and the manner in which primary education shall be imparted in the primary schools in the district.

(2) The Governor may, with the consent of any District Council, entrust either conditionally or unconditionally to that Council or to its officers functions in relation to agriculture, animal husbandry, community projects, co-operative societies, social welfare, village planning or any other matter to which the executive power of the State extends.

7. District and Regional Funds

(1) There shall be constituted for each autonomous district, a District Fund and for each autonomous region, a Regional Fund to which shall be credited all moneys received respectively by the District Council for that district and the Regional Council for that region in the course of the administration of such district or region, as the case may be, in accordance with the provisions of this Constitution.

(2) The Governor may make rules for the management of the District Fund, or, as the case may be, the Regional Fund and for the procedure to be followed in respect of payment of money into the said Fund, the withdrawal of moneys therefrom, the custody of moneys therein and any other matter connected with or ancillary to the matters aforesaid.

(3) The accounts of the District Council or, as the case may be, the Regional Council shall be kept in such form as the Comptroller and Auditor-General of India may, with the approval of the President, prescribe.

(4) The Comptroller and Auditor-General shall cause the accounts of the District and Regional Councils to be audited in such manner as he may think fit, and the reports of the Comptroller and Auditor-General relating to such accounts shall be submitted to the Governor who shall cause them to be laid before the Council.

8. Powers to assess and collect land revenue and to impose taxes

(1) Regional Council for an autonomous region in respect of all lands within such region and the District Council for an autonomous district in respect of all lands within the district except those which are in the areas under the authority of Regional Councils, if any, within the district, shall have the power to assess and collect revenue in respect of such lands in accordance with the principles for the time being followed by the Government of the State in assessing lands for the purpose of land revenue in the State generally.

(2) The Regional Council for an autonomous region in respect of areas within such region and the District Council for an autonomous district in respect of all areas in the district except those which are under the authority of Regional Councils, if any, within the district, shall have power to levy and collect taxes on lands and buildings, and tolls on persons resident within such areas.

(3) The District Council for an autonomous district shall have the power to levy and collect all or any of the following taxes within such district, that is to say —

(a) taxes on professions, trades, callings and employments;
(b) taxes on animals, vehicles and boats;
(c) taxes on the entry of goods into a market for sale therein, and tolls on passengers and goods carried in ferries; and
(d) taxes for the maintenance of schools, dispensaries or roads.

(4) A Regional Council or District Council, as the case may be, may make regulations to provide for the levy and collection of any of the taxes specified in sub-paragraphs (2) and (3) of this paragraph and every such regulation shall be submitted forthwith to the Governor and, until assented to by him, shall have no effect.

9. Licences or leases for the purpose of prospecting for, or extraction of, minerals

(1) Such share of the royalties accruing each year from licences or leases for the purpose of prospecting for, or the extraction of, minerals granted by the Government of the State in respect of any area within an autonomous district as may be agreed upon between the Government of the State and the District Council of such district shall be made over to that District Council.

(2) If any dispute arises as to the share of such royalties to be made over to a District Council, it shall be referred to the Governor for determination and the amount determined by the Governor in his discretion shall be deemed to be the amount payable under sub-paragraph (1) of this paragraph to the District Council and the decision of the Governor shall be final.

10. Power of District Council to make regulations for the control of money-lending and trading by non-tribals

(1) The District Council of an autonomous district may make regulations for the regulation and control of money-lending or trading within the district by persons other than Scheduled Tribes resident in the district.

(2) In particular and without prejudice to the generality of the foregoing power, such regulations may—

(a) prescribe that no one except the holder of a licence issued in that behalf shall carry on the business of money-lending;

(b) prescribe the maximum rate of interest which may be charged or be recovered by a money-lender;

(c) provide for the maintenance of accounts by money-lenders and for the inspection of such accounts by officers appointed in that behalf by the District Council;

(d) prescribe that no person who is not a member of the Scheduled Tribes resident in the district shall carry on wholesale or retail business in any commodity except under a licence issued in that behalf by the District Council :

Provided that no regulations may be made under this paragraph unless they are passed by a majority of not less than three-fourths of the total membership of the District Council:

Provided further that it shall not be competent under any such regulations to refuse the grant of a licence to a money-lender or a trader who has been carrying on business within the district since before the time of the making of such regulations.

(3) All regulations made under this paragraph shall be submitted forthwith to the Governor and, until assented to by him, shall have no effect.

11. Publication of laws, rules and regulations made under the Schedule.—All laws, rules and regulations made under this Schedule by a District Council or a Regional Council shall be published forthwith in the Official Gazette of the State and shall on such publication have the force of law.

12. Application of Acts of Parliament and of the Legislature of the State of Assam to autonomous districts and autonomous regions in the State of Assam. —(1) Notwithstanding anything in this Constitution

(a) no Act of the Legislature of the State of Assam in respect of any of the matters specified in paragraph 3 of this Schedule as matters with respect to which a District Council or a Regional Council may make laws, and no Act of the Legislature of the State of Assam prohibiting or restricting the consumption of any non-distilled alcoholic liquor shall apply to any autonomous district or autonomous region in that State unless in either case the District Council for such district or having jurisdiction over such region by public notification so directs, and the District Council in giving such direction with respect to any Act may direct that the Act shall in its application to such district or region or any part thereof have effect subject to such exceptions or modifications as it thinks fit;

(b) the Governor may, by public notification, direct that any Act of Parliament or of the Legislature of the State of Assam to which the provisions of clause (a) of this sub-paragraph do not apply shall not apply to an autonomous district or an autonomous region in that State, or shall apply to such district or region or any part thereof subject to such exceptions or modifications as he may specify in the notification.

(2) Any direction given under sub-paragraph (1) of this paragraph may be given so as to have retrospective effect.

12A. Application of Acts of Parliament and of the Legislature of the State of Meghalaya to autonomous districts and autonomous regions in the State of Meghalaya.—Notwithstanding anything in this Constitution,

(a) if any provision of a law made by a District or Regional Council in the State of Meghalaya with respect to any matter specified in sub-paragraph (1) of paragraph 3 of this Schedule or if any provision of any regulation made by a District Council or a Regional Council in that State under paragraph 8 or paragraph 10 of this Schedule, is repugnant to any provision of a law made by the Legislature of the State of Meghalaya with respect to that matter, then, the law or regulation made by the District Council or, as the case may be, the Regional Council whether made before or after the law made by the Legislature of the State of Meghalaya, shall, to the extent of repugnancy, be void and the law made by the Legislature of the State of Meghalaya shall prevail;

(b) the President may, with respect to any Act of Parliament, by notification, direct that it shall not apply to an autonomous district or an autonomous region in the State of Meghalaya, or shall apply to such district or region or any part thereof subject to such exceptions or modifications as he may specify in the notification and any such direction may be given so as to have retrospective effect.

12AA. Application of Acts of Parliament and of the Legislature of the State of Tripura to the autonomous districts and autonomous regions in the State of Tripura.— Notwithstanding anything in this Constitution,—

(a) no Act of the Legislature of the State of Tripura in respect of any of the matters specified in paragraph 3 of this Schedule as matters with respect to which a District Council or a Regional Council may make laws, and no Act of the Legislature of the State of Tripura prohibiting or restricting the consumption of any non-distilled alcoholic liquor shall apply to the autonomous district or an autonomous region in that State unless, in either case, the District Council for that district or having jurisdiction over such region by public notification so directs, and the District Council in giving such direction with respect to any Act may direct that the Act shall, in its application to that district or such region or any part thereof, have effect subject to such exceptions or modifications as it thinks fit;

(b) the Governor may, by public notification, direct that any Act of the Legislature of the State of Tripura to which the provisions of clause (a) of this sub-paragraph do not apply, shall not apply to the autonomous district or any autonomous region in that State, or shall apply to that district or such region, or any part thereof, subject to such exceptions or modifications, as he may specify in the notification;

(c) the President may, with respect to any Act of Parliament, by notification, direct that it shall not apply to the autonomous district or an autonomous region in the State of Tripura, or shall apply to such district or region or any part thereof, subject to such exceptions or modifications as he may specify in the notification and any such direction may be given so as to have retrospective effect.

12B. Application of Acts of Parliament and of the Legislature of the State of Mizoram to autonomous districts and autonomous regions in the State of Mizoram.— Notwithstanding anything in this Constitution,

(a) no Act of the Legislature of the State of Mizoram in respect of any of the matters specified in paragraph 3 of this Schedule as matters with respect to which a District Council or a Regional Council may make laws, and no Act of the Legislature of the State of Mizoram prohibiting or restricting the consumption of any non-distilled alcoholic liquor shall apply to any autonomous district or autonomous region in that State unless, in either case, the District Council for such district or having jurisdiction over such region, by public notification, so directs, and the District Council, in giving such direction with respect to any Act, may direct that the Act shall, in its application to such district or region or any part thereof, have effect subject to such exceptions or modifications as it thinks fit;

(b) the Governor may, by public notification, direct that any Act of the Legislature of the State of Mizoram to which the provisions of clause (a) of this sub-paragraph do not apply, shall not apply to an autonomous district or an autonomous region in that State, or shall apply to such district or region, or any part thereof, subject to such exceptions or modifications, as he may specify in the notification;

(c) the President may, with respect to any Act of Parliament, by notification, direct that it shall not apply to an autonomous district or an autonomous region in the State of Mizoram, or shall apply to such district or region or any part thereof, subject to such exceptions or modifications as he may specify in the notification and any such direction may be given so as to have retrospective effect.

13. Estimated receipts and expenditure pertaining to autonomous districts to be shown separately in the annual financial statement.—The estimated receipts and expenditure pertaining to an autonomous district which are to be credited to, or is to be made from, the Consolidated Fund of the State shall be first placed before the District Council for discussion and then after such discussion be shown separately in the annual financial statement of the State to be laid before the Legislature of the State under article 202.

14. Appointment of Commission to inquire into and report on the administration of autonomous districts and autonomous regions

(1) The Governor may at any time appoint a Commission to examine and report on any matter specified by him relating to the administration of the autonomous districts and autonomous regions in the State, including matters specified in clauses (c), (d), (e) and (f) of sub-paragraph (3) of paragraph 1 of this Schedule, or may appoint a Commission to inquire into and report from time to time on the administration of autonomous districts and autonomous regions in the State generally and in particular on—

(a) the provision of educational and medical facilities and communications in such districts and regions;

(b) the need for any new or special legislation in respect of such districts and regions; and

(c) the administration of the laws, rules and regulations made by the District and Regional Councils; and define the procedure to be followed by such Commission.

(2) The report of every such Commission with the recommendations of the Governor with respect thereto shall be laid before the Legislature of the State by the Minister concerned together with an explanatory memorandum regarding the action proposed to be taken thereon by the Government of the State.

(3) In allocating the business of the Government of the State among his Ministers the Governor may place one of his Ministers specially in charge of the welfare of the autonomous districts and autonomous regions in the State.

15. Annulment or suspension of acts and resolutions of District and Regional Councils

(1) If at any time the Governor is satisfied that an act or resolution of a District or a Regional Council is likely to endanger the safety of India or is likely to be prejudicial to public order, he may annul or suspend such act or resolution and take such steps as he may consider necessary (including the suspension of the Council and the assumption to himself of all or any of the powers vested in or exercisable by the Council) to prevent the commission or continuance of such act, or the giving of effect to such resolution.

(2) Any order made by the Governor under sub-paragraph (1) of this paragraph together with the reasons therefor shall be laid before the Legislature of the State as soon as possible and the order shall, unless revoked by the Legislature of the State, continue in force for a period of twelve months from the date on which it was so made:

Provided that if and so often as a resolution approving the continuance in force of such order is passed by the Legislature of the State, the order shall unless cancelled by the Governor continue in force for a further period of twelve months from the date on which under this paragraph it would otherwise have ceased to operate.

16. Dissolution of a District or a Regional Council

(1) The Governor may on the recommendation of a Commission appointed under paragraph 14 of this Schedule by public notification order the dissolution of a District or a Regional Council, and

(a) direct that a fresh general election shall be held immediately for the reconstitution of the Council, or

(b) subject to the previous approval of the Legislature of the State assume the administration of the area under the authority of such Council himself or place the administration of such area under the Commission appointed under the said paragraph or any other body considered suitable by him for a period not exceeding twelve months:

Provided that when an order under clause (a) of this paragraph has been made, the Governor may take the action referred to in clause (b) of this paragraph with regard to the administration of the area in question pending the reconstitution of the Council on fresh general election:

Provided further that no action shall be taken under clause (b) of this paragraph without giving the District or the Regional Council, as the case may be, an opportunity of placing its views before the Legislature of the State.

(2) If at any time the Governor is satisfied that a situation has arisen in which the administration of an autonomous district or region cannot be carried on in accordance with the provisions of this Schedule, he may, by public notification, assume to himself all or any of the functions or powers vested in or exercisable by the District Council or, as the case may be, the Regional Council and declare that such functions or powers shall be exercisable by such person or authority as he may specify in this behalf, for a period not exceeding six months:

Provided that the Governor may by a further order or orders extend the operation of the initial order by a period not exceeding six months on each occasion.

(3) Every order made under sub-paragraph (2) of this paragraph with the reasons therefor shall be laid before the Legislature of the State and shall cease to operate at the expiration of thirty days from the date on which the State Legislature first sits after the issue of the order, unless, before the expiry of that period it has been approved by that State Legislature.

17. Exclusion of areas from autonomous districts in forming constituencies in such districts.—For the purposes of elections to the Legislative Assembly of Assam or Meghalaya or Tripura or Mizoram, the Governor may by order declare that any area within an autonomous district in the State of Assam or Meghalaya or Tripura or Mizoram, as the case may be, shall not form part of any constituency to fill a seat or seats in the Assembly reserved for any such district but shall form part of a constituency to fill a seat or seats in the Assembly not so reserved to be specified in the order.

19. Transitional provisions

(1) As soon as possible after the commencement of this Constitution the Governor shall take steps for the constitution of a District Council for each autonomous district in the State under this Schedule and, until a District Council is so constituted for an autonomous district, the administration of such district shall be vested in the Governor and the following provisions shall apply to the administration of the areas within such district instead of the foregoing provisions of this Schedule, namely:

(a) no Act of Parliament or of the Legislature of the State shall apply to any such area unless the Governor by public notification so directs; and the Governor in giving such a direction with respect to any Act may direct that the Act shall, in its application to the area or to any specified part thereof, have effect subject to such exceptions or modifications as he thinks fit;

(b) the Governor may make regulations for the peace and good government of any such area and any regulations so made may repeal or amend any Act of Parliament or of the Legislature of the State or any existing law which is for the time being applicable to such area.

(2) Any direction given by the Governor under clause (a) of sub-paragraph (1) of this paragraph may be given so as to have retrospective effect.

(3) All regulations made under clause (b) of sub-paragraph (1) of this paragraph shall be submitted forthwith to the President and, until assented to by him, shall have no effect.

20. Tribal areas

(1) The areas specified in Parts I, II, IIA and III of the table below shall respectively be the tribal areas within the State of Assam, the State of Meghalaya, the State of Tripura and the State of Mizoram.

(2) Any reference in Part I, Part II or Part III of the table below to any district shall be construed as a reference to the territories comprised within the autonomous district of that name existing immediately before the day appointed under clause (b) of section 2 of the North-Eastern Areas (Reorganisation) Act, 1971:

Provided that for the purposes of clauses (e) and (f) of sub-paragraph (1) of paragraph 3, paragraph 4, paragraph 5, paragraph 6, sub-paragraph (2), clauses (a), (b) and (d) of sub-paragraph

(3) and sub-paragraph (4) of paragraph 8 and clause (d) of sub-paragraph (2) of paragraph 10 of this Schedule, no part of the area comprised within the municipality of Shillong shall be deemed to be within the Khasi Hills District.

(3) The reference in Part IIA in the table below to the "Tripura Tribal Areas District" shall be construed as a reference to the territory comprising the tribal areas specified in the First Schedule to the Tripura Tribal Areas Autonomous District Council Act, 1979.

TABLE

PART I

1. The North Cachar Hills District.
2. The Karbi Anglong District.
3. The Bodoland Territorial Areas District.

PART II

1. Khasi Hills District.
2. Jaintia Hills District.
3. The Garo Hills District.

PART IIA

Tripura Tribal Areas District

PART III

1. The Chakma District.
2. The Mara District.
3. The Lai District.

20A. Dissolution of the Mizo District Council

(1) Notwithstanding anything in this Schedule, the District Council of the Mizo District existing immediately before the prescribed date (hereinafter referred to as the Mizo District Council) shall stand dissolved and cease to exist.

(2) The Administrator of the Union territory of Mizoram may, by one or more orders, provide for all or any of the following matters, namely:—

(a) the transfer, in whole or in part, of the assets, rights and liabilities of the Mizo District Council (including the rights and liabilities under any contract made by it) to the Union or to any other authority;

(b) the substitution of the Union or any other authority for the Mizo District Council, or the addition of the Union or any other authority, as a party to any legal proceedings to which the Mizo District Council is a party;

(c) the transfer or re-employment of any employees of the Mizo District Council to or by the Union or any other authority, the terms and conditions of service applicable to such employees after such transfer or re-employment;

(d) the continuance of any laws, made by the Mizo District Council and in force immediately before its dissolution, subject to such adaptations and modifications, whether by way of repeal or amendment, as the Administrator may make in this behalf, until such laws are altered, repealed or amended by a competent Legislature or other competent authority;

(e) such incidental, consequential and supplementary matters as the Administrator considers necessary.

Explanation: In this paragraph and in paragraph 20B of this Schedule, the expression "prescribed date" means the date on which the Legislative Assembly of the Union territory of Mizoram is duly constituted under and in accordance with the provisions of the Government of Union Territories Act, 1963.

20B. Autonomous regions in the Union territory of Mizoram to be autonomous districts and transitory provisions consequent thereto

(1) Notwithstanding anything in this Schedule,

(a) every autonomous region existing immediately before the prescribed date in the Union territory of Mizoram shall, on and from that date, be an autonomous district in that Union territory (hereafter referred to as the corresponding new district) and the Administrator thereof may, by one or more orders, direct that such consequential amendments as are necessary to give effect to the provisions of this clause shall be made in paragraph 20 of this Schedule (including Part III of the table appended to that paragraph) and thereupon the said paragraph and the said Part III shall be deemed to have been amended accordingly;

(b) every Regional Council of an autonomous region in the Union territory of Mizoram existing immediately before the prescribed date

(hereafter referred to as the existing Regional Council) shall, on and from that date and until a District Council is duly constituted for the corresponding new district, be deemed to be the District Council of that district (hereafter referred to as the corresponding new District Council).

(2) Every member whether elected or nominated of an existing Regional Council shall be deemed to have been elected or, as the case may be, nominated to the corresponding new District Council and shall hold office until a District Council is duly constituted for the corresponding new district under this Schedule.

(3) Until rules are made under sub-paragraph (7) of paragraph 2 and sub-paragraph (4) of paragraph 4 of this Schedule by the corresponding new District Council, the rules made under the said provisions by the existing Regional Council and in force immediately before the prescribed date shall have effect in relation to the corresponding new District Council subject to such adaptations and modifications as may be made therein by the Administrator of the Union territory of Mizoram.

(4) The Administrator of the Union territory of Mizoram may, by one or more orders, provide for all or any of the following matters, namely:—

(a) the transfer in whole or in part of the assets, rights and liabilities of the existing Regional Council (including the rights and liabilities under any contract made by it) to the corresponding new District Council;

(b) the substitution of the corresponding new District Council for the existing Regional Council as a party to the legal proceedings to which the existing Regional Council is a party;

(c) the transfer or re-employment of any employees of the existing Regional Council to or by the corresponding new District Council, the terms and conditions of service applicable to such employees after such transfer or re-employment;

(d) the continuance of any laws made by the existing Regional Council and in force immediately before the prescribed date, subject to such adaptations and modifications, whether by way of repeal or amendment, as the Administrator may make in this behalf until such laws are altered, repealed or amended by a competent Legislature or other competent authority;

(e) such incidental, consequential and supplementary matters as the Administrator considers necessary.

20C. Interpretation: Subject to any provision made in this behalf, the provisions of this Schedule shall, in their application to the Union territory of Mizoram, have effect:

(1) as if references to the Governor and Government of the State were references to the Administrator of the Union territory appointed under article 239, references to State (except in the expression "Government of the State") were references to the Union territory of Mizoram and references to the State Legislature were references to the Legislative Assembly of the Union territory of Mizoram; have effect:

(1) as if references to the Governor and Government of the State were references to the Administrator of the Union territory appointed under article 239, references to State (except in the expression "Government of the State") were references to the Union territory of Mizoram and references to the State Legislature were references to the Legislative Assembly of the Union territory of Mizoram;

(2) as if

(a) in sub-paragraph (5) of paragraph 4, the provision for consultation with the Government of the State concerned had been omitted;

(b) in sub-paragraph (2) of paragraph 6, for the words "to which the executive power of the State extends", the words "with respect to which the Legislative Assembly of the Union territory of Mizoram has power to make laws" had been substituted;

(c) in paragraph 13, the words and figures "under article 202" had been omitted.

21. Amendment of the Schedule

(1) Parliament may from time to time by law amend by way of addition, variation or repeal any of the provisions of this Schedule and, when the Schedule is so amended, any reference to this Schedule in this Constitution shall be construed as a reference to such Schedule as so amended.

(2) No such law as is mentioned in sub-paragraph (1) of this paragraph shall be deemed to be an amendment of this Constitution for the purposes of artic:

Endnotes

(1) Paragraph 1 has been amended in its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 2003 (44 of 2003),s. 2 , so as to insert the following proviso after sub-paragraph (2), namely: "Provided that nothing in this sub-paragraph shall apply to the Bodoland Territorial Areas District."

(2) Paragraph 2 has been amended in its application to the State of Assam by s. 2,ibid., so as to insert the following proviso after sub-paragraph (1), namely: - "Provided that the Bodoland Territorial Council shall consist of not more than forty-six members of whom forty shall be elected on the basis of adult suffrage, of whom thirty shall be reserved for the Scheduled Tribes, five for non-tribal communities, five open for all communities and the remaining six shall be nominated by the Governor having same rights and privileges as other members, including voting rights, from amongst the un-represented communities of the Bodoland Territorial Areas District, of which at least two shall be women." *Paragraph 2 has been amended in its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 1995 (42 of 1995), s.2 so as to insert the following proviso after sub-paragraph (3), namely,- "Provided that the District Council constituted for the North Cachar Hills District shall be called as the North Cachar Hills Autonomous Council and the District Council constituted for the Karbi Anglong District shall be called as the Karbi Anglong Autonomous Council." *Paragraph 2 has been amended in its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 2003 (44 of 2003)s. 2 , so as to insert the following proviso after the proviso in sub-paragraph (3), namely: - "Provided further that the District Council constituted for the Bodoland Territorial Areas District shall be called the Bodoland Territorial Council."

(3) Paragraph 3 has been amended in its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 2003 (44 of 2003), s. 2 , so as to substitute sub-paragraph (3) as under, "(3) Save as otherwise provided in sub-paragraph (2) of paragraph 3A or sub-paragraph (2) of paragraph 3B , all laws made under this paragraph or sub-paragraph (1) of paragraph 3A or sub-paragraph (1) of paragraph 3B shall be submitted forthwith to the Governor and, until assented to by him, shall have no effect." After paragraph 3, the following paragraph has been inserted in its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 1995 (42 of 1995), s.2 , namely:

"3A. Additional powers of the North Cachar Hills Autonomous Council and the Karbi Anglong Autonomous Council to make laws.-(1) Without prejudice to the provisions of paragraph 3, the North Cachar Hills Autonomous Council and the Karbi Anglong Autonomous Council within their respective districts, shall have power to make laws with respect to-

(a) industries, subject to the provisions of entries 7 and 52 of List I of the Seventh Schedule;
(b) communications, that is to say, roads, bridges, ferries and other means of communication not specified in List I of the Seventh Schedule; municipal tramways, ropeways, inland waterways and traffic thereon subject to the provisions of List I and List III of the Seventh Schedule with regard to such waterways; vehicles other than mechanically propelled vehicles;
(c) preservation, protection and improvement of stock and prevention of animal diseases; veterinary training and practice; cattle pounds;
(d) primary and secondary education;
(e) agriculture, including agricultural

education and research, protection against pests and prevention of plant diseases;

(f) fisheries;

(g) water, that is to say, water supplies, irrigation and canals, drainage and embankments, water storage and water power subject to the provisions of entry 56 of List I of the Seventh Schedule;

(h) social security and social insurance; employment and unemployment;

(i) flood control schemes for protection of villages, paddy fields, markets, towns, etc. (not of technical nature);

(j) theatre and dramatic performances, cinemas subject to the provisions of entry 60 of List I of the Seventh Schedule; sports entertainments and amusements;

(k) public health and sanitation, hospitals and dispensaries;

(l) minor irrigation;

(m) trade and commerce in, and the production supply and distribution of, food stuffs, cattle fodder, raw cotton and raw jute;

(n) libraries, museums and other similar Institutions controlled or financed by the State; ancient and historical monuments and records other than those declared by or under any law made by Parliament to be of national importance; and

(o) alienation of land.

(2) All laws made by the North Cachar Hills Autonomous Council and the Karbi Anglong Autonomous Council under paragraph 3 or under this paragraph shall, in so far as they relate to matters specified in List III of the Seventh Schedule, be submitted forthwith to the Governor who shall reserve the same for the consideration of the President.

(3) When a law is reserved for the consideration of the President, the President shall declare either that he assents to the said law or that he withholds assent therefrom:

Provided that the President may direct the Governor to return the law to the North Cachar Hills Autonomous Council or the Karbi Anglong Autonomous Council, as the case may be, together with a message requesting that the said Council will reconsider the law or any specified provisions thereof and, in particular, will, consider the desirability of introducing any such amendments as he may recommend in his message and, when the law is so returned, the said Council shall consider the law accordingly within a period of six months from the date of receipt of such message and, if the law is again passed by the said Council with or without amendment it shall be presented again to the President for his consideration.".

*After paragraph 3A, the following paragraph has been inserted in its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 2003, (44 0f 2003), s. 2 , namely: -

"3B. Additional powers of the Bodoland Territorial Council to make laws.-(1) Without prejudice to the provisions of paragraph 3, the Bodoland Territorial Council within its areas shall have power to make laws with respect to :- (i) Agriculture, including agricultural education and research, protection against pests and prevention of plant diseases; (ii) Animal husbandry and veterinary, that is to say, preservation, protection and improvement of stock and prevention of animal diseases, veterinary training and practice, cattle pounds; (iii) Co-operation; (iv) Cultural affairs; (v) Education, that is to say, primary education, higher secondary including vocational training, adult education, college education (general); (vi) Fisheries; (vii) Flood control for protection of village, paddy fields, markets and towns (not of technical nature); (viii) Food and civil supply; (ix) Forests (other than reserved forests); (x) Handloom and textile; (xi) Health and family welfare, (xii) Intoxicating liquors, opium and derivatives, subject to the provisions of entry 84 of List I of the Seventh Schedule; (xiii) Irrigation; (xiv) Labour and employment; (xv) Land and Revenue; (xvi) Library services (financed and controlled by the State Government); (xvii) Lotteries (subject to the provisions of entry 40 of List I of the Seventh Schedule), theatres, dramatic performances and cinemas (subject to the provisions of entry 60 of List I of the Seventh Schedule); (xviii) Markets and fairs; (xix) Municipal corporation, improvement trust, district boards and other local authorities; (xx) Museum and archaeology institutions controlled or financed by the State, ancient and historical monuments and records other than those declared by or under

any law made by Parliament to be of national importance; (xxi) Panchayat and rural development; (xxii) Planning and development; (xxiii) Printing and stationery; (xxiv) Pubic health engineering; (xxv) Public works department; (xxvi) Publicity and public relations; (xxvii) Registration of births and deaths; (xxviii) Relief and rehabilitation; (xxix) Sericulture; (xxx) Small, cottage and rural industry subject to the provisions of entries 7 and 52 of List I of the Seventh Schedule; (xxxi) Social Welfare; (xxxii) Soil conservation; (xxxiii) Sports and youth welfare; (xxxiv) Statistics; (xxxv) Tourism; (xxxvi) Transport (roads, bridges, ferries and other means of communications not specified in List I of the Seventh Schedule, municipal tramways, ropeways, inland waterways and traffic thereon subject to the provision of List I and List III of the Seventh Schedule with regard to such waterways, vehicles other than mechanically propelled vehicles); (xxxvii) Tribal research institute controlled and financed by the State Government; (xxxviii) Urban development-town and country planning; (xxxix) Weights and measures subject to the provisions of entry 50 of List I of the Seventh Schedule; and (xl) Welfare of plain tribes and backward classes:

Provided that nothing in such laws shall—-

(a) extinguish or modify the existing rights and privileges of any citizen in respect of his land at the date of commencement of this Act; and

(b) disallow and citizen from acquiring land either by way of inheritance, allotment, settlement or by any other way of transfer if such citizen is otherwise eligible for such acquisition of land within the Bodoland Territorial Areas District.

(2) All laws made under paragraph 3 or under this paragraph shall in so far as they relate to matters specified in List III of the Seventh Schedule, be submitted forthwith to the Governor who shall reserve the same for the consideration of the President.

(3) When a law is reserved for the consideration of the President, the President shall declare either that he assents to the said law or that he withholds assent therefrom:

Provided that the President may direct the Governor to return the law to the Bodoland Territorial Council, together with the message requesting that the said Council will reconsider the law or any specified provisions thereof and, in particular, will consider the desirability of introducing any such amendments as he may recommend in his message and, when the law is so returned, the said Council shall consider the law accordingly within a period of six month from the date of receipt of such message and, if the law is again passéd by the said Council with or without amendments it shall be presented again to the President for his consideration."

(4) Paragraph 4 has been amended in its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 2003 (44 of 2003), s. 2 , so as to insert the following sub-paragraph after sub-paragraph (5), namely: - "(6) Nothing in this paragraph shall apply to the Bodoland Territorial Council constituted under the proviso to sub-paragraph (3) of paragraph 2 of this Schedule."

(5) See now the Code of Criminal Procedure, 1973 (Act 2 of 1974).

(6) Paragraph 9 has been amended in its application to the States of Tripura and Mizoram by the Sixth Schedule to the Constitution (Amendment) Act, 1988 (67 of 1988), s.2, so as to insert the following sub-paragraph after sub-paragraph (2), namely:- "(3) The Governor may, by order, direct that the share of royalties to be made over to a District Council under this paragraph shall be made over to that Council within a period of one year from the date of any agreement under sub-paragraph (1) or, as the case may be, of any determination under sub-paragraph (2).".

(7) Prragraph 10 has been amended in its application to the States of Tripura and Mizoram by the Sixth Schedule to the Constitution (Amendment) Act, 1988 (67 of 1988), s.2, as under-

(a) in the heading, the words "by non-tribals" shall be omitted;

(b) in sub-paragraph (1), the words "other than Scheduled Tribes" shall be omitted;

(c) in sub-paragraph (2), for clause (d), the following clause shall be substituted, namely:-

(d) prescribe that no person resident in the district shall carry on any trade, whether wholesale or retail, except under a licence issued in that behalf by the District Council".

*Paragraph 10 has been amended in its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 2003 (44 of 2003), s. 2 , so as to insert the following sub-paragraph after sub-paragraph (3), namely: "(4) Nothing in this paragraph shall apply to the Bodoland Territorial Council constituted under the proviso to sub-paragraph (3) of paragraph 2 of this Schedule."

(7) Paragraph 12 has been amended to its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 1995 (42 of 1995), s.2, as under,- 'in paragraph 12, in sub-paragraph (1), for the words and figure "matters specified in paragraph 3 of this Schedule", the words, figures and letter "matters specified in paragraph 3 or paragraph 3A of this Schedule" shall be substituted.'; Paragraph 12 has been amended in its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 2003 (44 of 2003), s. 2, as under, - in paragraph 12, in sub-paragraph (1), in clause (a), for the words, figures and letter "matters specified in paragraph 3 or paragraph 3A of this Schedule", the words, figures and letter "matters specified in paragraph 3 or paragraph 3A or paragraph 3B of this Schedule" shall be substituted.

(8) Prragraph 14 has been amended in its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 1995 (42 of 1995) , s. 2, as under,- In paragraph 14 , in sub-paragraph (2), the words "with the recommendations of the Governor with respect thereto" shall be omitted.

(9) Paragraph 15 has been amended in its application to the States of Tripura and Mizoram by the Sixth Schedule to the Constitution (Amendment) Act, 1988 (67 of 1988), s. 2, as under,-

(a) in the opening paragraph, for the words "by the Legislature of the State", the words "by him" shall be substituted;

(b) the proviso shall be omitted.

(10) Paragraph 16 has been amended in its application to the States of Tripura and Mizoram by s. 2, ibid., as under,-

(a) in sub-paragraph (1), the words "subject to the previous approval of the Legislature of the State" occurring in clause (b), and the second proviso shall be omitted;

(b) for sub-paragraph (3), the following sub-graph shall be substituted, namely:

"(3) Every order made under sub-paragraph (1) or sub-paragraph (2) of this paragraph, along with the reasons therefor shall be laid before the Legislature of the State."'.

(11) Paragraph 17 has been amended in its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 2003 (44 of 2003), s. 2 , so as to insert the following proviso, namely: - "Provided that nothing in this paragraph shall apply to the Bodoland Territorial Areas District."

(12) Paragraph 19 has been amended in its application to the State of Assam by s. 2 , ibid., so as to insert the following sub-paragraph after sub-paragraph (3), namely: - "(4) As soon as possible after the commencement of this Act, and Interim Executive Council for Bodoland Territorial Areas District in Assam shall be formed by the Governor from amongst leaders of the Bodo movement, including the signatories to the Memorandum of Settlement, and shall provide adequate representation to the non-tribal communities in that area: Provided that Interim Council shall be for a period of six months during which endeavour to hold the election to the Council shall be made. Explanation.—-For the purposes of this sub-paragraph, the expression "Memorandum of Settlement" means the Memorandum signed on the 10th day of February, 2003 between Government of India, Government of Assam and Bodo Liberation Tigres."

(13) After paragraph 20B, the following paragraph has been inserted in its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 1995 (42 of 1995), s. 2, namely:-

"20BA. Exercise of discretionary powers by the Governor in the discharge of his functions.- The Governor in the discharge of his functions under sub-paragraphs (2) and (3) of paragraph 1, sub-paragraphs (1), (6), sub-paragraph (6A) excluding the first

proviso and sub-paragraph (7) of paragraph 2, sub-paragraph (3) of paragraph 3, sub-paragraph (4) of paragraph 4, paragraph 5, sub-paragraph (1) of paragraph 6, sub-paragraph (2) of paragraph 7, sub-paragraph (4) of paragraph 8, sub-paragraph (3) of paragraph 9, sub-paragraph (3) of paragraph 10, sub-paragraph (1) of paragraph 14, sub-paragraph (1) of paragraph 15 and sub-paragraphs (1) and (2) of paragraph 16 of this Schedule, shall, after consulting the Council of Ministers and the North Cachar Hills Autonomous Council or the Karbi Anglong Autonomous Council, as the case may be, take such action as he considers necessary in his discretion."

(14) After paragraph 20B, the following paragraph has been inserted in its application to the States of Tripura and Mizoram, by the Sixth Schedule to the Constitution (Amendment) Act, 1988 (67 of 1988), s. 2, namely:-

"20BB. Exercise of discretionary powers by the Governor in the discharge of his functions.- The Governor, in the discharge of his functions under sub-paragraphs (2) and (3) of paragraph 1, sub-paragraphs (1) and (7) of paragraph 2, sub-paragraph (3) of paragraph 3, sub-paragraph (4) of paragraph 4, paragraph 5, sub-paragraph (1) of paragraph 6, sub-paragraph (2) of paragraph 7, sub-paragraph (3) of paragraph 9, sub-paragraph (1) of paragraph 14, sub-paragraph (1) of paragraph 15 and sub-paragraphs (1) and (2) of paragraph 16 of this Schedule, shall, after consulting the Council of Ministers, and if he thinks it necessary, the District Council or the Regional Council concerned, take such action as he considers necessary in his discretion."

(1) Paragraph 1 has been amended in its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 2003 (44 of 2003),s. 2 , so as to insert the following proviso after sub-paragraph (2), namely: "Provided that nothing in this sub-paragraph shall apply to the Bodoland Territorial Areas District."

(2) Paragraph 2 has been amended in its application to the State of Assam by s. 2,ibid., so as to insert the following proviso after sub-paragraph (1), namely: - "Provided that the Bodoland Territorial Council shall consist of not more than forty-six members of whom forty shall be elected on the basis of adult suffrage, of whom thirty shall be reserved for the Scheduled Tribes, five for non-tribal communities, five open for all communities and the remaining six shall be nominated by the Governor having same rights and privileges as other members, including voting rights, from amongst the un-represented communities of the Bodoland Territorial Areas District, of which at least two shall be women." *Paragraph 2 has been amended in its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 1995 (42 of 1995), s.2 so as to insert the following proviso after sub-paragraph (3), namely,- "Provided that the District Council constituted for the North Cachar Hills District shall be called as the North Cachar Hills Autonomous Council and the District Council constituted for the Karbi Anglong District shall be called as the Karbi Anglong Autonomous Council." *Paragraph 2 has been amended in its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 2003 (44 of 2003)s. 2 , so as to insert the following proviso after the proviso in sub-paragraph (3), namely: - "Provided further that the District Council constituted for the Bodoland Territorial Areas District shall be called the Bodoland Territorial Council."

(3) Paragraph 3 has been amended in its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 2003 (44 of 2003), s. 2 , so as to substitute sub-paragraph (3) as under, "(3) Save as otherwise provided in sub-paragraph (2) of paragraph 3A or sub-paragraph (2) of paragraph 3B , all laws made under this paragraph or sub-paragraph (1) of paragraph 3A or sub-paragraph (1) of paragraph 3B shall be submitted forthwith to the Governor and, until assented to by him, shall have no effect." After paragraph 3, the following paragraph has been inserted in its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 1995 (42 of 1995), s.2 , namely:

"3A. Additional powers of the North Cachar Hills Autonomous Council and the Karbi Anglong Autonomous Council to make laws.-(1) Without prejudice to the provisions of paragraph 3, the North Cachar Hills Autonomous Council and the Karbi Anglong Autonomous Council within their

respective districts, shall have power to make laws with respect to-

(a) industries, subject to the provisions of entries 7 and 52 of List I of the Seventh Schedule;
(b) communications, that is to say, roads, bridges, ferries and other means of communication not specified in List I of the Seventh Schedule; municipal tramways, ropeways, inland waterways and traffic thereon subject to the provisions of List I and List III of the Seventh Schedule with regard to such waterways; vehicles other than mechanically propelled vehicles;
(c) preservation, protection and improvement of stock and prevention of animal diseases; veterinary training and practice; cattle pounds;
(d) primary and secondary education;
(e) agriculture, including agricultural education and research, protection against pests and prevention of plant diseases;
(f) fisheries;
(g) water, that is to say, water supplies, irrigation and canals, drainage and embankments, water storage and water power subject to the provisions of entry 56 of List I of the Seventh Schedule;
(h) social security and social insurance; employment and unemployment;
(i) flood control schemes for protection of villages, paddy fields, markets, towns, etc. (not of technical nature);
(j) theatre and dramatic performances, cinemas subject to the provisions of entry 60 of List I of the Seventh Schedule; sports entertainments and amusements;
(k) public health and sanitation, hospitals and dispensaries;
(l) minor irrigation;
(m) trade and commerce in, and the production supply and distribution of, food stuffs, cattle fodder, raw cotton and raw jute;
(n) libraries, museums and other similar Institutions controlled or financed by the State; ancient and historical monuments and records other than those declared by or under any law made by Parliament to be of national importance; and
(o) alienation of land.

(2) All laws made by the North Cachar Hills Autonomous Council and the Karbi Anglong Autonomous Council under paragraph 3 or under this paragraph shall, in so far as they relate to matters specified in List III of the Seventh Schedule, be submitted forthwith to the Governor who shall reserve the same for the consideration of the President.

(3) When a law is reserved for the consideration of the President, the President shall declare either that he assents to the said law or that he withholds assent therefrom: Provided that the President may direct the Governor to return the law to the North Cachar Hills Autonomous Council or the Karbi Anglong Autonomous Council, as the case may be, together with a message requesting that the said Council will reconsider the law or any specified provisions thereof and, in particular, will, consider the desirability of introducing any such amendments as he may recommend in his message and, when the law is so returned, the said Council shall consider the law accordingly within a period of six months from the date of receipt of such message and, if the law is again passed by the said Council with or without amendment it shall be presented again to the President for his consideration.".

*After paragraph 3A, the following paragraph has been inserted in its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 2003, (44 0f 2003), s. 2 , namely: -

"3B. Additional powers of the Bodoland Territorial Council to make laws.-(1) Without prejudice to the provisions of paragraph 3, the Bodoland Territorial Council within its areas shall have power to make laws with respect to :- (i) Agriculture, including agricultural education and research, protection against pests and prevention of plant diseases; (ii) Animal husbandry and veterinary, that is to say, preservation, protection and improvement of stock and prevention of animal diseases, veterinary training and practice, cattle pounds; (iii) Co-operation; (iv) Cultural affairs; (v) Education, that is to say, primary education, higher secondary including vocational training, adult education, college education (general); (vi) Fisheries; (vii) Flood control for protection of

village, paddy fields, markets and towns (not of technical nature); (viii) Food and civil supply; (ix) Forests (other than reserved forests); (x) Handloom and textile; (xi) Health and family welfare, (xii) Intoxicating liquors, opium and derivatives, subject to the provisions of entry 84 of List I of the Seventh Schedule; (xiii) Irrigation; (xiv) Labour and employment; (xv) Land and Revenue; (xvi) Library services (financed and controlled by the State Government); (xvii) Lotteries (subject to the provisions of entry 40 of List I of the Seventh Schedule), theatres, dramatic performances and cinemas (subject to the provisions of entry 60 of List I of the Seventh Schedule); (xviii) Markets and fairs; (xix) Municipal corporation, improvement trust, district boards and other local authorities; (xx) Museum and archaeology institutions controlled or financed by the State, ancient and historical monuments and records other than those declared by or under any law made by Parliament to be of national importance; (xxi) Panchayat and rural development; (xxii) Planning and development; (xxiii) Printing and stationery; (xxiv) Pubic health engineering; (xxv) Public works department; (xxvi) Publicity and public relations; (xxvii) Registration of births and deaths; (xxviii) Relief and rehabilitation; (xxix) Sericulture; (xxx) Small, cottage and rural industry subject to the provisions of entries 7 and 52 of List I of the Seventh Schedule; (xxxi) Social Welfare; (xxxii) Soil conservation; (xxxiii) Sports and youth welfare; (xxxiv) Statistics; (xxxv) Tourism; (xxxvi) Transport (roads, bridges, ferries and other means of communications not specified in List I of the Seventh Schedule, municipal tramways, ropeways, inland waterways and traffic thereon subject to the provision of List I and List III of the Seventh Schedule with regard to such waterways, vehicles other than mechanically propelled vehicles); (xxxvii) Tribal research institute controlled and financed by the State Government; (xxxviii) Urban development-town and country planning; (xxxix) Weights and measures subject to the provisions of entry 50 of List I of the Seventh Schedule; and (xl) Welfare of plain tribes and backward classes:

Provided that nothing in such laws shall—-

(a) extinguish or modify the existing rights and privileges of any citizen in respect of his land at the date of commencement of this Act; and

(b) disallow and citizen from acquiring land either by way of inheritance, allotment, settlement or by any other way of transfer if such citizen is otherwise eligible for such acquisition of land within the Bodoland Territorial Areas District.

(2) All laws made under paragraph 3 or under this paragraph shall in so far as they relate to matters specified in List III of the Seventh Schedule, be submitted forthwith to the Governor who shall reserve the same for the consideration of the President.

(3) When a law is reserved for the consideration of the President, the President shall declare either that he assents to the said law or that he withholds assent therefrom:

Provided that the President may direct the Governor to return the law to the Bodoland Territorial Council, together with the message requesting that the said Council will reconsider the law or any specified provisions thereof and, in particular, will consider the desirability of introducing any such amendments as he may recommend in his message and, when the law is so returned, the said Council shall consider the law accordingly within a period of six month from the date of receipt of such message and, if the law is again passéd by the said Council with or without amendments it shall be presented again to the President for his consideration."

(4) Paragraph 4 has been amended in its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 2003 (44 of 2003), s. 2 , so as to insert the following sub-paragraph after sub-paragraph (5), namely: - "(6) Nothing in this paragraph shall apply to the Bodoland Territorial Council constituted under the proviso to sub-paragraph (3) of paragraph 2 of this Schedule."

(5) See now the Code of Criminal Procedure, 1973 (Act 2 of 1974).

(6) Paragraph 9 has been amended in its application to the States of Tripura and Mizoram by the Sixth Schedule to the Constitution (Amendment) Act, 1988 (67 of 1988), s.2, so as to insert the following sub-paragraph after sub-paragraph (2), namely:-

"(3) The Governor may, by order, direct that the share of royalties to be made over to a District Council under this paragraph shall be made over to that Council within a period of one year from the date of any agreement under sub-paragraph (1) or, as the case may be, of any determination under sub-paragraph (2).".

(7) Paragraph 10 has been amended in its application to the States of Tripura and Mizoram by the Sixth Schedule to the Constitution (Amendment) Act, 1988 (67 of 1988), s.2, as under-

(a) in the heading, the words "by non-tribals" shall be omitted;
(b) in sub-paragraph (1), the words "other than Scheduled Tribes" shall be omitted;
(c) in sub-paragraph (2), for clause (d), the following clause shall be substituted, namely:-
(d) prescribe that no person resident in the district shall carry on any trade, whether wholesale or retail, except under a licence issued in that behalf by the District Council.".

*Paragraph 10 has been amended in its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 2003 (44 of 2003), s. 2 , so as to insert the following sub-paragraph after sub-paragraph (3), namely:

"(4) Nothing in this paragraph shall apply to the Bodoland Territorial Council constituted under the proviso to sub-paragraph (3) of paragraph 2 of this Schedule."

(7) Paragraph 12 has been amended to its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 1995 (42 of 1995), s.2, as under,- 'in paragraph 12, in sub-paragraph (1), for the words and figure "matters specified in paragraph 3 of this Schedule", the words, figures and letter "matters specified in paragraph 3 or paragraph 3A of this Schedule" shall be substituted.'; Paragraph 12 has been amended in its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 2003 (44 of 2003), s. 2, as under, - in paragraph 12, in sub-paragraph (1), in clause (a), for the words, figures and letter "matters specified in paragraph 3 or paragraph 3A of this Schedule", the words, figures and letter "matters specified in paragraph 3 or paragraph 3A or paragraph 3B of this Schedule" shall be substituted.

(8) Paragraph 14 has been amended in its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 1995 (42 of 1995) , s. 2, as under,- In paragraph 14 , in sub-paragraph (2), the words "with the recommendations of the Governor with respect thereto" shall be omitted.

(9) Paragraph 15 has been amended in its application to the States of Tripura and Mizoram by the Sixth Schedule to the Constitution (Amendment) Act, 1988 (67 of 1988), s. 2, as under,-
(a) in the opening paragraph, for the words "by the Legislature of the State", the words "by him" shall be substituted;
(b) the proviso shall be omitted.

(10) Paragraph 16 has been amended in its application to the States of Tripura and Mizoram by s. 2, ibid., as under,-
(a) in sub-paragraph (1), the words "subject to the previous approval of the Legislature of the State" occurring in clause (b), and the second proviso shall be omitted;
(b) for sub-paragraph (3), the following sub-graph shall be substituted, namely:

"(3) Every order made under sub-paragraph (1) or sub-paragraph (2) of this paragraph, along with the reasons therefor shall be laid before the Legislature of the State."'.

(11) Paragraph 17 has been amended in its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 2003 (44 of 2003), s. 2 , so as to insert the following proviso, namely: -

"Provided that nothing in this paragraph shall apply to the Bodoland Territorial Areas District."

(12) Paragraph 19 has been amended in its application to the State of Assam by s. 2 , ibid., so as to insert the following sub-paragraph after sub-paragraph (3), namely: - "(4) As soon as possible after the commencement of this Act, and Interim Executive Council for Bodoland Territorial Areas District in Assam shall be formed by the Governor from amongst leaders of the Bodo movement, including the signatories to the Memorandum of Settlement, and shall provide adequate representation to the non-tribal communities in that area:

Provided that Interim Council shall be for a period of six months during which endeavour to hold the election to the Council shall be made.

Explanation.—-For the purposes of this sub-paragraph, the expression "Memorandum of Settlement" means the Memorandum signed on the 10th day of February, 2003 between

Government of India, Government of Assam and Bodo Liberation Tigres."

(13) After paragraph 20B, the following paragraph has been inserted in its application to the State of Assam by the Sixth Schedule to the Constitution (Amendment) Act, 1995 (42 of 1995), s. 2, namely:-

"20BA. Exercise of discretionary powers by the Governor in the discharge of his functions.- The Governor in the discharge of his functions under sub-paragraphs (2) and (3) of paragraph 1, sub-paragraphs (1), (6), sub-paragraph (6A) excluding the first proviso and sub-paragraph (7) of paragraph 2, sub-paragraph (3) of paragraph 3, sub-paragraph (4) of paragraph 4, paragraph 5, sub-paragraph (1) of paragraph 6, sub-paragraph (2) of paragraph 7, sub-paragraph (4) of paragraph 8, sub-paragraph (3) of paragraph 9, sub-paragraph (3) of paragraph 10, sub-paragraph (1) of paragraph 14, sub-paragraph (1) of paragraph 15 and sub-paragraphs (1) and (2) of paragraph 16 of this Schedule, shall, after consulting the Council of Ministers and the North Cachar Hills Autonomous Council or the Karbi Anglong Autonomous Council, as the case may be, take such action as he considers necessary in his discretion."

(14) After paragraph 20B, the following paragraph has been inserted in its application to the States of Tripura and Mizoram, by the Sixth Schedule to the Constitution (Amendment) Act, 1988 (67 of 1988), s. 2, namely:-

"20BB. Exercise of discretionary powers by the Governor in the discharge of his functions.- The Governor, in the discharge of his functions under sub-paragraphs (2) and (3) of paragraph 1, sub-paragraphs (1) and (7) of paragraph 2, sub-paragraph (3) of paragraph 3, sub-paragraph (4) of paragraph 4, paragraph 5, sub-paragraph (1) of paragraph 6, sub-paragraph (2) of paragraph 7, sub-paragraph (3) of paragraph 9, sub-paragraph (1) of paragraph 14, sub-paragraph (1) of paragraph 15 and sub-paragraphs (1) and (2) of paragraph 16 of this Schedule, shall, after consulting the Council of Ministers, and if he thinks it necessary, the District Council or the Regional Council concerned, take such action as he considers necessary in his discretion."

ANNEXURE 6

LIST OF TREE SPECIES WITH THEIR DENSITIES IN THE FORESTS OF BTC AREA

Species	Plants/ha	
	Mean	SE
Acassia sp	0.191082803	0.191079
Adina cordifolia	2.420382166	1.502326
Aegle marmelos	0.382165605	0.382158
Albizia amara	4.649681529	1.937093
Albizia lebbeck	4.267515924	1.226432
Albizia lucida	5.732484076	1.385851
Albizia procera	3.821656051	2.077453
Amoora sp	14.77707006	2.629237
Amoora wallichii	0.191082803	0.191079
Anthocephalus chinensus	1.847133758	1.312054
Anthocephalus kadamba	0.573248408	0.32883
Anthocephalus sp	1.847133758	1.393542
Bahuinia vareigata	3.757961783	1.545231
Bakmala or Kao Loo	0.636942675	0.63693
Balam Hajra	0.191082803	0.191079
Ban Beorealey	0.382165605	0.269359
Ban Daukiol	0.191082803	0.191079
Ban Loki	1.464968153	1.286899
Bangala	2.929936306	2.573799
Barai Burai	0.191082803	0.191079
Bargon	0.191082803	0.191079
Beg Mela or Lahu Beg	0.191082803	0.191079
Bhadrai	0.382165605	0.382158
Bhalkhar	0.191082803	0.191079
Bheta Kali	0.191082803	0.191079
Bombax ceiba	1.78343949	0.825745
Canarium resiniferum	0.573248408	0.426169
Careya arberea	6.242038217	1.622562
Cassia fistula	2.101910828	0.818437
Castanopsis indica	4.840764331	2.287123
Chaap	1.592356688	0.892314
Champa	0.382165605	0.382158
Chartion	0.191082803	0.191079
Chikrasia tabularis	1.464968153	0.916269

Species	Plants/ha	
	Mean	SE
Chisocheton paniculatus	1.337579618	0.626681
Cinna momam	0.382165605	0.382158
Cinnamonum cicicodaphne	1.847133758	1.339768
Clerondendron indicum	0.191082803	0.191079
Crocus sp	0.191082803	0.191079
*Curcuma amarissim*a	0.191082803	0.191079
Dak Nala	0.191082803	0.191079
Dao Phenda	1.210191083	0.763295
Delonia indica	0.192307692	0.19169
Delonia sp	0.382165605	0.269359
*Dhakri or Dookr*i	2.420382166	1.452585
Dillenia indica	0.382165605	0.269359
Dillenia pentagyna	17.38853503	4.198898
Dingdinga	2.675159236	0.953679
Diptereocarpus sp	0.191082803	0.191079
Disoxylum binactiferom	0.382165605	0.382158
Dobu Kari	8.025477707	3.704296
Doopri or Dookri	0.955414013	0.501364
Dormai or Dumri	1.52866242	1.528632
Duabanga sonnerotoides	2.101910828	0.862166
Emblica officinalis	0.955414013	0.686904
Ficus benghalensis	0.191082803	0.191079
Ficus benjamina	1.146496815	0.599188
Ficus recemosa	0.191082803	0.191079
Geedri	4.649681529	3.426119
Gindari	2.611464968	1.411951
Gmelinia arborea	1.52866242	0.756931
Gmelinia sp	0.191082803	0.191079
Guwali Gar	0.191082803	0.191079
Hai Lado	6.496815287	2.390572
Harrey or Harra	1.719745223	0.824137
Hathi Piyali	0.573248408	0.573237
Higua	0.382165605	0.269359
Holorhena antidysentrica	2.484076433	0.855626
Jiya	2.420382166	0.900928
Jiya Poma	5.987261146	1.445424
Kaijal	0.573248408	0.32883

Species	Plants/ha	
	Mean	SE
Kali Kuthai or Kaath	1.337579618	*0.73465*
Kandau or Khandau	1.146496815	0.599188
Kankri Kolaol	0.191082803	0.191079
Kapro	0.76433121	0.465539
Katu	0.191082803	0.191079
Kerepa	0.382165605	0.382158
Khajao	0.76433121	0.465539
Kharo Khomda	0.382165605	0.269359
Kheeley	0.382165605	0.382158
Khormai	0.382165605	0.269359
Kirra or Khirra	10.76433121	2.18101
Kojung	0.76433121	0.603082
Kut Mira	0.382165605	0.382158
Lagerstroemia parviflora	14.52229299	2.754903
Lagerstroemia sp	0.955414013	0.686904
Lagerstroemia speciosa	4.840764331	2.071686
Lai Dolat	0.191082803	0.191079
Lam Pati	0.382165605	0.382158
Lannea coromandelica	0.382165605	0.382158
Lapchey	7.197452229	2.151406
Mansonia dipikae	0.191082803	0.191079
Mesua ferea	2.611464968	1.463074
Michallia champaca	1.01910828	0.689285
Michallia sp	0.191082803	0.191079
Mooga Song	0.573248408	0.32883
Moringa angustifolia	6.050955414	1.939683
Murraya koenigii	2.547770701	2.54772
Oroxylum indicum	0.828025478	0.6638
Paanch Phuley	3.184713376	1.517568
Padam	0.191082803	0.191079
Para Rey	8.917197452	2.978688
Pat Patey	0.191082803	0.191079
Pera Ri	1.847133758	1.339768
Pheela Doot or Pheela Dau	0.955414013	0.631147
Phoebe goalparensis	1.52866242	0.706721
Piper longum	0.573248408	0.426169
Polyalthia sp	0.191082803	0.191079

Species	Plants/ha	
	Mean	SE
Premna bengalensis	0.191082803	0.191079
Pterospermum personatum	0.636942675	0.63693
Radam	6.242038217	2.564507
Ram Betha or Bhel Kur	1.52866242	0.804012
Sankari	1.146496815	0.599188
Sati Kaath	0.76433121	0.465539
Satyun or Sataona	6.878980892	4.642845
Schima wallichii	3.248407643	1.035115
Schliochera oleosa	2.229299363	1.363261
Serpang	1.146496815	0.711342
Shorea robusta	20.63694268	4.789007
Seta Laali	0.191082803	0.191079
Simoh	5.350318471	1.561303
Sindoor	0.191082803	0.191079
Solanum sp	6.114649682	1.808742
Sterculia villosa	2.101910828	0.818437
Stereospermum acerifolium	0.382165605	0.382158
Swami	4.649681529	1.898776
Syzygium cumini	0.191082803	0.191079
Taluama hodgsonii	0.191082803	0.191079
Tamarindus indica	0.191082803	0.191079
Teba Kari	0.955414013	0.501364
Terminalia arjuna	9.108280255	1.566126
Terminalia belerica	0.191082803	0.191079
Terminalia tomentosa	0.191082803	0.191079
Tetramales nudiflora	0.573248408	0.32883
Thaisol	0.191082803	0.191079
UI	1.210191083	0.537268

ANNEXURE 7

LIST OF TREE SPECIES WITH THEIR DENSITIES IN DRY DECIDUOUS MISCELLANEOUS FORESTS UNDER BTC AREA

Species	Plants/ha	
	Mean	SE
Adina cordifolia	5.9375	3.657646
Aegle marmelos	0.9375	0.937481
Albizia amara	0.9375	0.657617
Albizia lebbeck	6.71875	2.539856
Albizia lucida	7.5	2.409012
Albizia procera	7.96875	4.875232
Amoora sp	15	4.213933
Amoora wallichii	0.46875	0.468741
Anthocephalus chinensus	3.59375	3.152531
Anthocephalus kadamba	0.46875	0.468741
Bahuinia vareigata	1.875	1.132886
Bakmala or Kao Loo	1.5625	1.562469
Bombax ceiba	2.96875	1.859085
Careya arborea	7.8125	3.475103
Cassia fistula	1.40625	0.798892
Castanopsis indica	11.40625	5.513524
Chikrasia tabularis	3.59375	2.231218
Chisocheton paniculatus	0.9375	0.657617
Cinna momam	0.9375	0.937481
Cinnamonum cicicodaphne	3.125	3.124938
Delonia sp	0.9375	0.657617
Dillenia indica	0.9375	0.657617
Dillenia pentagyna	27.03125	7.77483
Dingdinga	2.8125	1.731855
Dobu Kari	16.875	8.919312
Doopri or Dookri	0.46875	0.468741
Duabanga sonnerotoides	3.75	1.829776
Emblica officinalis	2.34375	1.677641
Ficus recemosa	0.46875	0.468741
Geedri	8.28125	7.818964
Gindari	5.46875	3.317828
Gmelinia arborea	1.40625	1.406222
Hai Lado	5.46875	3.317828

Species	Plants/ha	
	Mean	SE
Harrey or Harra	1.40625	1.406222
Higua	0.9375	0.657617
Holorhena antidysentrica	0.46875	0.468741
Jiya	2.8125	1.451379
Jiya Poma	7.5	2.409012
Khajao	1.875	1.132886
Kharo Khomda	0.9375	0.657617
Kirra or Khirra	14.53125	4.369551
Kojung	1.875	1.475213
Lagerstroemia parviflora	20.625	5.958881
Lagerstroemia sp	2.34375	1.677641
Lagerstroemia speciosa	11.875	4.974415
Lai Dolat	0.46875	0.468741
Lapchey	2.8125	1.451379
Michallia champaca	0.46875	0.468741
Mooga Song	0.46875	0.468741
Moringa angustifolia	4.0625	2.364527
Murraya koenigii	6.25	6.249876
Paanch Phuley	7.8125	3.662728
Para Rey	9.375	5.325945
Phoebe goalparensis	0.46875	0.468741
Pterospermum personatum	1.5625	1.562469
Radam	14.375	6.143315
Ram Betha or Bhel Kur	1.40625	1.04146
Sati Kaath	1.40625	1.04146
Satyun or Sataona	12.34375	10.94414
Schima wallichii	0.46875	0.468741
Simoh	0.9375	0.937481
Solanum sp	10.78125	4.126539
Sterculia villosa	3.75	1.703429
Stereospermum acerifolium	0.9375	0.937481
Swami	7.1875	4.412134
Tamarindus indica	0.46875	0.468741
Terminalia arjuna	10	2.314504
Terminalia belerica	0.46875	0.468741
Tetramales nudiflora	1.40625	0.798892
UI	0.46875	0.468741

ANNEXURE 8

LIST OF TREE SPECIES WITH THEIR DENSITIES IN MOIST DECIDUOUS MISCELLANEOUS FORESTS UNDER BTC AREA

Species	Plants/ha	
	Mean	SE
Albizia lebbeck	2.647058824	1.948901
Albizia lucida	0.882352941	0.882335
Amoora sp	32.94117647	7.582189
Anthocephalus chinensus	0.882352941	0.882335
Anthocephalus sp	8.529411765	6.376809
Bahuinia vareigata	12.05882353	6.578333
Balam Hajra	0.882352941	0.882335
Ban Beorealey	1.764705882	1.228759
Ban Daukiol	0.882352941	0.882335
Ban Loki	6.764705882	5.921543
Bangala	13.52941176	11.84309
Barai Burai	0.882352941	0.882335
Bhalkhar	0.882352941	0.882335
Bombax ceiba	1.764705882	1.228759
Canarium resiniferum	1.764705882	1.764671
Careya arberea	7.058823529	2.848761
Cassia fistula	0.882352941	0.882335
Castanopsis indica	0.882352941	0.882335
Chisocheton paniculatus	3.529411765	2.457518
Crocus sp	0.882352941	0.882335
Dao Phenda	4.705882353	3.383739
Delonia indica	0.909090909	0.895604
Dhakri or Dookri	5.294117647	3.221833
Dillenia pentagyna	4.411764706	2.869389
Dingdinga	3.529411765	2.457518
Dobu Kari	1.764705882	1.228759
Doopri or Dookri	0.882352941	0.882335
Ficus benghalensis	0.882352941	0.882335
Ficus benjamina	4.411764706	2.574719
Geedri	5.882352941	5.882236
Gindari	1.764705882	1.764671
Gmelinia sp	0.882352941	0.882335
Guwali Gar	0.882352941	0.882335

Species	Plants/ha	
	Mean	SE
Hai Lado	18.82352941	8.823354
Harrey or Harra	3.529411765	2.457518
Holorhena antidysentrica	7.941176471	3.424167
Jiya	0.882352941	0.882335
Jiya Poma	8.235294118	4.25285
Kaijal	0.882352941	0.882335
Kandau or Khandau	5.294117647	2.678018
Kerepa	1.764705882	1.764671
Kheeley	1.764705882	1.764671
Khormai	1.764705882	1.228759
Kirra or Khirra	2.647058824	1.948901
Kut Mira	1.764705882	1.764671
Lagerstroemia parviflora	12.35294118	4.028756
Lannea coromandelica	1.764705882	1.764671
Lapchey	4.411764706	2.241644
Michallia champaca	2.941176471	2.941118
Michallia sp	0.882352941	0.882335
Moringa angustifolia	5.588235294	3.896792
Para Rey	13.82352941	6.833965
Pat Patey	0.882352941	0.882335
Pera Ri	5.882352941	5.882236
Pheela Doot or Pheela Dau	2.647058824	2.647006
Piper longum	2.647058824	1.948901
Polyalthia sp	0.882352941	0.882335
Premna bengalensis	0.882352941	0.882335
Radam	0.882352941	0.882335
Ram Betha or Bhel Kur	4.411764706	3.136496
Sankari	0.882352941	0.882335
Sati Kaath	0.882352941	0.882335
Satyun or Sataona	0.882352941	0.882335
Schima wallichii	13.23529412	4.237104
Schliochera oleosa	1.764705882	1.228759
Simoh	20.29411765	6.125208
Solanum sp	2.647058824	1.481215
Swami	4.411764706	2.241644
Taluama hodgsonii	0.882352941	0.882335
Terminalia arjuna	5.294117647	3.221833
Thaisol	0.882352941	0.882335

ANNEXURE 9

LIST OF TREE SPECIES WITH THEIR DENSITIES IN EVERGREEN FORESTS UNDER BTC AREA

Species	Plants/ha	
	Mean	SE
Albizia lebbeck	1.666666667	1.666634
Albizia lucida	3.333333333	3.333267
Albizia procera	1.666666667	1.666634
Amoora sp	11.66666667	6.480108
Bhadrai	3.333333333	3.333267
Bheta Kali	1.666666667	1.666634
Canarium resiniferum	1.666666667	1.666634
Cassia fistula	11.66666667	6.009133
Chaap	7.222222222	5.70538
Champa	3.333333333	3.333267
Chartion	1.666666667	1.666634
Cinnamonum cicicodaphne	5	3.637962
Dhakri or Dookri	11.11111111	11.11089
Dillenia pentagyna	1.666666667	1.666634
Dingdinga	1.666666667	1.666634
Disoxylum binactiferom	3.333333333	3.333267
Doopri or Dookri	1.666666667	1.666634
Dormai or Dumri	13.33333333	13.33307
Duabanga sonnerotoides	1.666666667	1.666634
Ficus benjamina	1.666666667	1.666634
Hai Lado	11.11111111	11.11089
Harrey or Harra	3.333333333	2.286602
Hathi Piyali	5	4.999901
Jiya	7.777777778	5.396306
Kaijal	3.333333333	2.286602
Kali Kuthai or Kaath	11.66666667	6.009133
Kapro	3.333333333	2.286602
Katu	1.666666667	1.666634
Kirra or Khirra	8.333333333	4.062341
Lagerstroemia parviflora	1.666666667	1.666634
Lam Pati	3.333333333	3.333267
Lapchey	47.77777778	14.98457

Species	Plants/ha	
	Mean	SE
Mansonia dipikae	1.666666667	1.666634
Mesua ferea	22.77777778	12.01298
Moringa angustifolia	17.22222222	6.457656
Oroxylum indicum	7.222222222	5.70538
Padam	1.666666667	1.666634
Para Rey	18.33333333	12.10631
Phoebe goalparensis	1.666666667	1.666634
Ram Betha or Bhel Kur	1.666666667	1.666634
Sankari	8.333333333	4.731251
Satyun or Sataona	14.44444444	11.15004
Schliochera oleosa	16.11111111	11.40837
Serpang	10	5.940767
Seta Laali	1.666666667	1.666634
Sindoor	1.666666667	1.666634
Solanum sp	5	3.637962
Swami	12.77777778	11.13782
Syzygium cumini	1.666666667	1.666634
Teba Kari	8.333333333	4.062341
Terminalia tomentosa	1.666666667	1.666634
UI	8.888888889	4.033188

ANNEXURE 10

LIST OF TREE SPECIES WITH THEIR DENSITIES IN SAL FORESTS UNDER BTC AREA

Species	Plants/ha	
	Mean	SE
Acassia sp	0.967741935	0.967723
Albizia amara	22.58064516	9.192706
Albizia lebbeck	2.903225806	2.134847
Albizia lucida	10.64516129	4.298839
Albizia procera	2.903225806	2.903168
Amoora sp	2.903225806	2.134847
Anthocephalus kadamba	1.935483871	1.345564
Bahuinia vareigata	1.935483871	1.345564
Bargon	0.967741935	0.967723
Beg Mela or Lahu Beg	0.967741935	0.967723
Careya arberea	7.741935484	2.39662
Cassia fistula	0.967741935	0.967723
Chaap	2.903225806	2.903168
Chisocheton paniculatus	0.967741935	0.967723
Clerondendron indicum	0.967741935	0.967723
Curcuma amarissima	0.967741935	0.967723
Dak Nala	0.967741935	0.967723
Dao Phenda	0.967741935	0.967723
Dillenia pentagyna	26.4516129	12.96411
Dingdinga	2.903225806	1.61931
Diptereocarpus sp	0.967741935	0.967723
Dobu Kari	3.870967742	2.303641
Duabanga sonnerotoides	2.903225806	2.134847
Gmelinia arborea	4.838709677	2.448166
Holorhena antidysentrica	2.903225806	1.61931
Jiya Poma	5.806451613	2.572517
Kirra or Khirra	16.77419355	5.151098
Lagerstroemia parviflora	16.4516129	4.5801
Michallia champaca	0.967741935	0.967723
Mooga Song	1.935483871	1.345564
Phoebe goalparensis	5.806451613	3.23862
Satyun or Sataona	0.967741935	0.967723

Species	Plants/ha	
	Mean	SE
Shorea robusta	98.06451613	17.67303
Simoh	2.903225806	2.134847
Solanum sp	2.903225806	1.61931
Sterculia villosa	2.903225806	2.134847
Swami	2.903225806	1.61931
Terminalia arjuna	19.67741935	4.694536
UI	0.967741935	0.967723

ANNEXURE 11

LIST OF TREE SPECIES WITH THEIR DENSITIES IN SCRUB FORESTS UNDER BTC AREA

Species	Plants/ha	
	Mean	SE
Bombax ceiba	3	2.99994
Chaap	3	2.99994
Dillenia pentagyna	3	2.99994
Doopri or Dookri	6	5.999881
Kankri Kolaol	3	2.99994
Kapro	6	5.999881
Lagerstroemia parviflora	3	2.99994
Moringa angustifolia	29	20.99958
Pera Ri	9	6.402997
Pheela Doot or Pheela Dau	6	3.999921
Radam	3	2.99994
Schima wallichii	3	2.99994

ANNEXURE 12

LIST OF SHRUB SPECIES WITH THEIR DENSITIES IN FORESTS OF BTC AREA

Species	Plants/ha	
	Mean	SE
Acacia pennata	1.273885	1.27386
Acasia tortolis	19.74522	14.18566
Acacia sp	26.75159	26.75106
Adhotoda vasica	154.1401	85.2226
Ficus glomorata	6.369427	6.3693
Archal	8.917197	8.91702
Bagai	15.28662	13.4992
Barbaris sp	6.369427	4.839443
Baskar	6.369427	4.839443
Besigar	20.38217	20.38176
Bhatey	1.910828	1.91079
Bichhu	0.191083	0.191079
Bis Kantaree	1.910828	1.91079
Calamus latifolius	14.64968	8.173564
Chabo	33.12102	27.14507
Chepley	1.910828	1.91079
Custus sp	51.59236	51.59133
Dayin	1.910828	1.91079
Dedonia vicosa	42.03822	30.5655
Deekna	17.83439	17.83404
Eupatorum odoratum	6064.968	835.9721
Gagun	10.82803	9.107466
Gangar Thaisp	17.83439	12.40662
Hooken	61.78344	32.6754
Jasminum pubesens	1184.713	193.4906
Jasminum sp	13.3758	9.943936
Jharoo	74.52229	74.52081
Kanta Kulia	1.910828	1.91079
Kaulo	1.910828	1.91079
Khara Lara	53.50318	47.52075
Khuntai Hara	13.3758	13.37553

Species	Plants/ha	
	Mean	SE
Kusum shrub	1.910828	1.91079
La Saung	1.910828	1.91079
Lakhna	183.4395	76.73392
Lantana camara	738.8535	285.4102
Lao Bantra	1.910828	1.91079
Lapas saika	1.910828	1.91079
Leeva	118.4713	65.24251
Lookua	1.910828	1.91079
Makai Patta or Makai Kate	65.6051	49.0777
Mimosa	70.06369	31.83915
Moonga Soo	24.84076	24.84027
Morang	44.58599	44.5851
Mykheti	49.68153	49.68054
Peepla	15.38462	10.14175
Pesa Gopkho	95.5414	95.5395
Pesa Megun	5.732484	3.288302
Phool Daodi	12.10191	7.135322
Poteto ghas	26.75159	24.90144
Rooruda	1.910828	1.91079
Spilanthus acmela	84.71338	55.54369
Sujai	22.92994	11.4969
UI	379.6178	130.0728

ANNEXURE 13

LIST OF SHRUB SPECIES WITH THEIR DENSITIES IN DRY DECIDUOUS MISCELLANEOUS FORESTS UNDER BTC AREA

Species	Plants/ha	
	Mean	SE
Acasia tortolis	32.8125	32.81185
Adhotoda vasica	114.0625	94.27554
Archal	21.875	21.87457
Bhatey	4.6875	4.687407
Bis Kantaree	4.6875	4.687407
Deekna	87.5	73.30955
Eupatorum odoratum	10070.31	1528.527
Gagun	21.875	21.87457
Gangar Thaisp	10.9375	10.93728
Hooken	4.6875	4.687407
Jasminum pubesens	367.1875	112.0904
Khuntai Hara	32.8125	32.81185
Kusum shrub	4.6875	4.687407
Lakhna	32.8125	24.30073
Lantana camara	1140.625	632.1948
Leeva	285.9375	158.3751
Mimosa hamata	20.3125	16.24123
Peepla	15.625	11.83082
Pesa Megun	4.6875	4.687407
Sujai	4.6875	4.687407
UI	581.25	281.993

ANNEXURE 14

LIST OF SHRUB SPECIES WITH THEIR DENSITIES IN DRY DECIDUOUS MISCELLANEOUS FORESTS UNDER BTC AREA

Species	Plants/ha	
	Mean	SE
Acacia pennata	5.882353	5.882236
Acasia tortolis	8.823529	8.823354
Acacia sp	123.5294	123.527
Adhotoda vasica	497.0588	348.8513
Barbaris sp	29.41176	22.15177
Baskar	29.41176	22.15177
Besigar	94.11765	94.11578
Calamus latifolius	20.58824	20.58783
Deekna	29.41176	29.41118
Eupatorum odoratum	844.1176	369.6577
Hooken	111.7647	63.29567
Jasminum pubesens	1526.471	288.6172
Kaulo	8.823529	8.823354
Lakhna	102.9412	102.9391
Lantana camara	382.3529	282.7259
Lao Bantra	8.823529	8.823354
Lapas saika	8.823529	8.823354
Makai Patta or Makai Kate	2.941176	2.941118
Moonga Soo	114.7059	114.7036
Mykheti	229.4118	229.4072
Pesa Megun	17.64706	12.28759
Phool Daodi	38.23529	30.449
Rooruda	8.823529	8.823354
Spilanthus acmela	214.7059	186.7278
Sujai	97.05882	50.92365
UI	238.2353	159.5983

ANNEXURE 15

LIST OF SHRUB SPECIES WITH THEIR DENSITIES IN EVERGREEN FORESTS UNDER BTC AREA

Species	Plants/ha	
	Mean	SE
Calamus latifolius	88.88889	58.23483
Chabo	288.8889	233.7329
Custus sp	450	449.9911
Dayin	16.66667	16.66634
Deekna	255.5556	255.5505
Eupatorum odoratum	605.5556	433.8879
Ficus glomorata	55.55556	55.55445
Gagun	77.77778	77.77623
Jasminum pubesens	5238.889	1096.412
Khara Lara	466.6667	411.5884
La Saung	16.66667	16.66634
Makai Patta or Makai Kate	566.6667	419.6087
Morang	388.8889	388.8812
Peepla	82.35294	80.03108
Poteto ghas	216.6667	216.6624
UI	888.8889	415.845

ANNEXURE 16

LIST OF SHRUB SPECIES WITH THEIR DENSITIES IN SCRUB FORESTS UNDER BTC AREA

Species	Plants/ha	
	Mean	SE
Eupatorum odoratum	13936.36	4450.106
Hooken	63.63636	63.6351
Jasminum pubesens	418.1818	418.1735
Jharoo	1063.636	1063.615
Lantana camara	2154.545	1412.215
Mimosa hamata	700	399.3097

ANNEXURE 17

LIST OF SHRUB SPECIES WITH THEIR DENSITIES IN SAL FORESTS UNDER BTC AREA

Species	Plants/ha	
	Mean	SE
Acasia tortolis	22.58065	22.5802
Bagai	77.41935	68.10825
Bichhu	0.967742	0.967723
Chepley	9.677419	9.677227
Dedonia vicosa	90.32258	90.32079
Eupatorum odoratum	3670.968	1421.581
Gagun	9.677419	9.677227
Gangar Thaisp	67.74194	58.54523
Hooken	148.3871	148.3842
Jasminum pubesens	435.4839	149.372
Jasminum sp	67.74194	49.81309
Kanta Kulia	9.677419	9.677227
Lakhna	725.8065	356.1664
Lantana camara	125.8065	125.804
Leeva	9.677419	9.677227
Lookua	9.677419	9.677227
Mimosa hamata	54.83871	38.75368
Pesa Gopkho	483.871	483.8614
Phool Daodi	19.35484	13.45564
Poteto ghas	9.677419	9.677227
Spilanthus acmela	193.5484	193.5445

ANNEXURE 18

LIST OF SHRUB SPECIES WITH THEIR DENSITIES IN SAL FORESTS UNDER BTC AREA

Species	Plants/ha	
	Mean	SE
Agrgemone maxicana	366.242	128.8232
Angari	40.76433	40.76352
Apluda asiatica	49845.86	6396.205
Arundo donax	61.1465	61.14528
Asparagus racemosus	81.52866	40.36966
Ban Haldi	224.2038	224.1994
Basi ghas	1200	357.4866
Bauhinia vahlii	81.52866	49.65751
Boomra	244.586	224.9938
Canna sp	3112.739	473.3618
Cassia sp	570.0637	240.8655
Cassia tora	1814.013	904.8911
Cenchrus ciliaris	81.52866	49.65751
Charae	20.38217	20.38176
Cynodon dactylon	12248.41	3069.923
Cyprus bulbolous	5112.102	1672.496
Cyprus rotundus	183.4395	83.01595
Cyprus sp	142.6752	72.83231
Datura metal	61.1465	45.45799
Dauka Comply	20.38217	20.38176
Dichanthium annulatum	13737.58	4351.055
Digiteria tomemtosa	122.293	70.15044
Dioscorea pentaphylla	855.414	209.0518
Eragrostis tenella	2180.255	1205.829
Erianthus ravanae	2812.102	2045.159
Fern 1 or Dhukia	10119.75	2022.133
Fern 2	1445.223	411.0324
Fern 3	40.76433	28.73163
Hibiscus sp	346.4968	346.4899
Holo Dat	20.38217	20.38176
Imperata cylindrical	1711.465	747.0404
Imperata sp	80.89172	80.89011
Jharao	183.4395	148.13

Species	Plants/ha	
	Mean	SE
Kaal Boot	20.38217	20.38176
Khasi Ulta	81.52866	49.65751
Kochu or Banda	183.4395	87.90794
Larang	20.38217	20.38176
Lupa Saiko	20.38217	20.38176
Machuka	20.38217	20.38176
Maidoor	20.38217	20.38176
Michania sp	4213.376	857.1501
Pan bel or Patey Loori	570.0637	139.8318
Panicum antidotale	20.38217	20.38176
Paspalum dictum	3261.146	2280.269
Pesa Megon	40.76433	28.73163
Pharao	20.38217	20.38176
Phragmites karka	264.3312	115.0853
Poa annua	40.76433	40.76352
Polygonium sp	40.76433	40.76352
Reephari	81.52866	49.65751
Rephoji Bundang	20.38217	20.38176
Saccharum procerum	20.38217	20.38176
Saccharum spontaneum	6990.446	2848.928
Sambram	20.38217	20.38176
Santa Looka	224.2038	224.1994
Sijoa	182.8025	129.5016
Simphri ulta	40.76433	28.73163
Thankhoo Bergaon	20.38217	20.38176
Tin Tooka	20.38217	20.38176
UI	1647.771	692.7881
Vessia sp	81.52866	57.46326

ANNEXURE 19

LIST OF HERB SPECIES WITH THEIR DENSITIES IN DRY DECIDUOUS MISCELLANEOUS FORESTS UNDER BTC AREA

Species	Plants/ha	
	Mean	SE
Agrgemone maxicana	450	189.7491
Angari	100	101.5981
Apluda asiatica	66398.44	11982.15
Arundo donax	150	152.3971
Asparagus racemosus	50	50.79904
Basi ghas	1148.438	537.9302
Boomra	550	558.7895
Canna sp	2646.875	645.036
Cassia sp	750	535.7366
Cassia tora	350	179.0879
Cenchrus ciliaris	100	101.5981
Cynodon dactylon	8700	3775.308
Cyprus bulbolous	8092.188	3104.024
Cyprus rotundus	250	150.2315
Cyprus sp	350	179.0879
Datura metal	150	112.8666
Dichanthium annulatum	12550	6668.792
Digiteria tomemtosa	200	142.5365
Dioscorea pentaphylla	998.4375	305.1509
Eragrostis tenella	398.4375	254.765
Erianthus ravanae	200	159.8739
Fern 1 or Dhukia	16895.31	4640.138
Fern 2	2346.875	921.5444
Fern 3	50	50.79904
Imperata cylindrica	2550	1649.868
Imperata sp	198.4375	201.6087
Jharao	100	101.5981
Khasi Ulta	100	71.26825
Kochu or Banda	250	166.7708
Lupa Saiko	50	50.79904
Machuka	50	50.79904
Michania sp	4445.313	1503.785

Species	Plants/ha	
	Mean	SE
Pan bel or Patey Loori498.4375	241.2317	
Paspalum dictum	500	507.9904
Pesa Megon	50	50.79904
Poa annua	100	101.5981
Reephari	150	112.8666
Rephoji Bundang	50	50.79904
Saccharum procerum	50	50.79904
Saccharum spontaneum	12798.44	6454.529
Sijoa	398.4375	318.243
Simphri ulta	50	50.79904
Thankhoo Bergaon	50	50.79904
Tin Tooka	50	50.79904
UI	1148.438	391.6356
Vessia sp	200	142.5365

ANNEXURE 20

LIST OF HERB SPECIES WITH THEIR DENSITIES IN MOIST DECIDUOUS MISCELLANEOUS FORESTS UNDER BTC AREA

Species	Plants/ha	
	Mean	SE
Acacia pennata	5.882353	5.882236
Acasia tortolis	8.823529	8.823354
Acacia sp	123.5294	123.527
Adhotoda vasica	497.0588	348.8513
Barbaris sp	29.41176	22.15177
Baskar	29.41176	22.15177
Besigar	94.11765	94.11578
Calamus latifolius	20.58824	20.58783
Deekna	29.41176	29.41118
Eupatorum odoratum	844.1176	369.6577
Hooken	111.7647	63.29567
Jasminum pubesens	1526.471	288.6172
Kaulo	8.823529	8.823354
Lakhna	102.9412	102.9391
Lantana camara	382.3529	282.7259
Lao Bantra	8.823529	8.823354
Lapas saika	8.823529	8.823354
Makai Patta or Makai Kate	2.941176	2.941118
Moonga Soo	114.7059	114.7036
Mykheti	229.4118	229.4072
Pesa Megun	17.64706	12.28759
Phool Daodi	38.23529	30.449
Rooruda	8.823529	8.823354
Spilanthus acmela	214.7059	186.7278
Sujai	97.05882	50.92365
UI	238.2353	159.5983

ANNEXURE 21

LIST OF HERB SPECIES WITH THEIR DENSITIES IN EVERGREEN FORESTS UNDER BTC AREA

Species	Plants/ha	
	Mean	SE
Calamus latifolius	88.88889	58.23483
Chabo	288.8889	233.7329
Custus sp	450	449.9911
Dayin	16.66667	16.66634
Deekna	255.5556	255.5505
Eupatorum odoratum	605.5556	433.8879
Ficus glomorata	55.55556	55.55445
Gagun	77.77778	77.77623
Jasminum pubesens	5238.889	1096.412
Khara Lara	466.6667	411.5884
La Saung	16.66667	16.66634
Makai Patta or Makai Kate	566.6667	419.6087
Morang	388.8889	388.8812
Peepla	82.35294	80.03108
Poteto ghas	216.6667	216.6624
UI	888.8889	415.845

ANNEXURE 22

LIST OF HERB SPECIES WITH THEIR DENSITIES IN SCRUB FORESTS UNDER BTC AREA

Species	Plants/ha	
	Mean	SE
Eupatorum odoratum	13936.36	4450.106
Hooken	63.63636	63.6351
Jasminum pubesens	418.1818	418.1735
Jharoo	1063.636	1063.615
Lantana camara	2154.545	1412.215
Mimosa hamata	700	399.3097

ANNEXURE 23

LIST OF HERB SPECIES WITH THEIR DENSITIES IN SAL FORESTS UNDER BTC AREA

Species	Plants/ha	
	Mean	SE
Acasia tortolis	22.58065	22.5802
Bagai	77.41935	68.10825
Bichhu	0.967742	0.967723
Chepley	9.677419	9.677227
Dedonia vicosa	90.32258	90.32079
Eupatorum odoratum	3670.968	1421.581
Gagun	9.677419	9.677227
Gangar Thaisp	67.74194	58.54523
Hooken	148.3871	148.3842
Jasminum pubesens	435.4839	149.372
Jasminum sp	67.74194	49.81309
Kanta Kulia	9.677419	9.677227
Lakhna	725.8065	356.1664
Lantana camara	125.8065	125.804
Leeva	9.677419	9.677227
Lookua	9.677419	9.677227
Mimosa hamata	54.83871	38.75368
Pesa Gopkho	483.871	483.8614
Phool Daodi	19.35484	13.45564
Poteto ghas	9.677419	9.677227
Spilanthus acmela	193.5484	193.5445

ANNEXURE 24

LIST OF BIRD SPECIES WITH THEIR DENSITIES IN THE FORESTS OF BTC AREA

Species		Birds/ha	
Common Name	**Scientific name**	**Mean**	**SE**
Phasianidae			
Grey Partridge	*Francolinus pondicerianus*	0.118774	0.15644
Indian Peafowl	*Pavo cristatus*	0.129885	0.133217
Red Jungle Fowl	*Gallus gallus*	3.310843	1.653507
Kalij Pheasant	*Lophura leucomelanos*		
Dendrocygnidae			
Fulvous whistling teal	*Dendrocygna bicolor*	0.003831	0.009056
Anatidae			
Cotton Teal	*Nettapus coromandelianus*	0.061303	0.09298
Northern Pintail	*Anas acuta*	0.038314	0.074611
Gadwall	*Anas strepera*		
Picidae			
Grey-crowned Pigmy Woodpecker	*Picoides canicapillus*	2.528736	2.20493
Great Slaty Woodpecker	*Mulleripicus pulverulentus*	0.030651	0.072451
Common flameback	*Dinopium javanense*	0.183908	0.294729
Great flameback	*Chrysocolaptes lucidus*	2.482759	2.181008
Greater Yellow-nape	*Picus flavinucha*	0.835249	0.77779
Blackrumped Woodpecker	*Dinopium benghalense*	0.762452	0.600623
Lesser Yellow-nape	*Picus chlorolophus*	0.689655	0.679746
Stripebreasted Woodpecker	*Dendrocorpos atratus*	0.191571	0.286048
Paleheaded Woodpecker	*Gecinulus grantia*	0.038314	0.1458
Plain Flowerpecker	*Dicaeum concolor*	0.114943	0.271691
Brown capped Pygmy	*Dendrocopos nanus*	1.149425	1.191655
Red-eared Bay Woodpecker	*Blythipicus pyrrhotis*	0.038314	0.090564
Rufous Woodpecker	*Celeus brachyurus*	1.950192	1.399465
Yellowcrowned Woodpecker	*Dendrocopos mahrattensis*	0.344828	0.658625
Megalaimidae			
Blue-throated Barbet	*Megalaima asiatica*	16.4954	11.90834
Crimson-breasted Barbet	*Megalaima haemacephala*	1.635632	1.103268
Golden-throated Barbet	*Megalaima franklinii*	0.229885	0.383469
Hill Barbet	*Megalaima virens*	0.563218	0.490103
Large Green Barbet	*Megalaima zeylanica*	4.258238	1.913831
Lineated Barbet	*Megalaima lineata*	1.950192	1.973789
Bucerotidae			
Great Pied Hornbill	*Buceros bicornis*	28.59847	46.3247
Common Grey Hornbill	*Tockus birostris*	0.02682	0.063395
Oriental Pied Hornbill	*Anthracoceros albirostris*	0.823755	1.812193
Wreathed Hornbill	*Aceros undulatus*	0.249042	0.235645
Upupidae			
Hoopoe	*Upupa epops*	0.153257	0.286048
Trogonidae			
Red-headed Trogon	*Harpactes erythrocephalus*	0.038314	0.090564

Species		Birds/ha	
Common Name	**Scientific name**	**Mean**	**SE**
Coraciidae			
Broad-billed Roller	*Eurystomus orientalis*	0.32567	0.55912
European Roller	*Coracias garrulus*	0.344828	0.729792
Indian Roller	*Coracias benghalensis*	4.519923	2.87828
Alcedinidae			
Common Blue Kingfisher	*Alcedo atthis*	0.471264	0.663309
Dacelonidae			
Storkbilled Kingfisher	*Pelargopsis capensis*	0.029119	0.063606
Whitethroated Kingfisher	*Halcyon smyrnensis*	1.286207	0.778469
Cerylidae			
Crested Kingfisher	*Megaceryle lugubris*	0.117241	0.20223
Meropidae			
Chestnut-headed Bee-eater	*Merops leschenaulti*	0.421456	0.618938
Green Bee-eater	*Merops orientalis*	0.663218	0.685514
Bluebearded Bee-eater	*Nyctyornis athertoni*		
Cuculidae			
Common Hawk cuckoo	*Cuculus varius*	0.05364	0.069835
Indian Cuckoo	*Cuculus micropterus*	1.735632	1.487653
Green-billed Malkoha	*Phaenicophaeus tristis*	0.842912	0.639039
Pied Cuckoo	*Clamator jacobinus*	0.068966	0.104541
Lesser Cuckoo	*Cuculus poliocephalus*	0.042146	0.077277
Bluefaced Malkoha	*Rhopodytes viridirostris*	0.528736	0.945597
Asian Koel	*Eudynamys scolopacea*		
Strigidae			
Spotted Owlet	*Athene brama*	0.390805	0.905746
Eurasian Scops Owl	*Otus scops*	0.091954	0.130786
Collared Scops Owl	*O.lempiji*	0.130268	0.273953
Centropodidae			
Crow Pheasant	*Centropus sinensis*	0.099617	0.186704
Lesser Coucal	*Centropus bengalensis*	0.462184	0.42359
Psittacidae			
Eastern Blossom-headed Parakeet	*Psittacula roseata*	1.915709	4.528182
Red-breasted Parakeet	*Psittacula alexandri*	26.72031	13.94002
Rose-ringed Parakeet	*Psittacula krameri*	1.340996	1.561659
Caprimulgidae			
Grey Nightjar	*Caprimulgus indicus*		
Columbidae			
Ashy Wood Pigeon	*Columba pulchricollis*	0.084291	0.068504
Bar-tailed Cuckoo Dove	*Macropygia unchall*	0.007663	0.018113
Blue Rock Pigeon	*Columba livia*	0.000383	0.000906
Emerald Dove	*Chalcophaps indica*	0.521073	0.460841
Imperial Green Pigeon	*Ducula badia*	0.245211	0.246157
Euresian collared dove	*Streptopelia decaocto*	0.785441	0.696979
Palmadour Green Pigeon	*Treron pompadora*	1.241379	1.007093
Pompadour green pigeon	*Treron pompadora*	0.881226	1.821455
Pin-tailed Green Pigeon	*Treron apicauda*	0.804598	0.567574
Red collared Dove	*Streptopelia tranquebarica*	2.525287	1.519605
Oriental turtle Dove	*Streptopelia orientalis*	0.149425	0.28101
Spotted Dove	*Streptopelia chinensis*	1.922989	1.379705
Thickbilled Green Pigeon	*Treron curvirostra*	0.030651	0.072451

Species		Birds/ha	
Common Name	**Scientific name**	**Mean**	**SE**
Yellowfooted Green Pigeon	*Treron phoenicoptera*	0.199234	0.300048
Wedgetailed Green Pigeon	*Treron sphenura*		
Rallidae			
Common Moorhen	*Gallinula chloropus*		
Whitebreasted Waterhen	*Amaurornis phoenicurus*		
Scolopacidae			
Eastern Knot	*Calidris tenuirostris*	0.02682	0.063395
Marsh Sandpiper	*Tringa stagnatilis*		
Jacanidae			
Pheasant-tailed Jacana	*Hydrophasianus chirurgus*		
Burhinidae			
Eurasian Thick-knee	*Burhinus oedicnemus*	0.103448	0.191664
Charariidae			
Avocet	*Recurvirostra avosetta*	0.02682	0.063395
Black-winged Stilt	*Himantopus himantopus*	0.153257	0.362255
Little Ringed Plover	*Charadrius dubius*	0.011494	0.027169
Long-billed Plover	*Charadrius placidus*	0.019157	0.045282
Red-wattled Lapwing	*Vanellus indicus*	0.454023	0.587305
River Lapwing	*Vanellus spinosus*	0.645977	0.685237
Yellow-wattled Lapwing	*Vanellus malabaricus*	0.003831	0.009056
Laridae			
River Tern	*Sterna aurantia*		
Accipitridae			
Black-winged Kite	*Elanus caeruleus*	0.011494	0.027169
Bonelli's Eagle	*Hieraaetus fasciatus*	0.13295	0.273077
Booted Hawk Eagle	*Hieraaetus pennatus*	0.145594	0.280908
Booted Warbler	*Hippolais caligata*	0.766284	1.811273
Egyptian Vulture	*Neophron percnopterus*	0.002299	0.005434
Goshhawk	*Accipiter gentilis*	0.187356	0.283981
Northern Harrier	*Circus cyaneus*	0.003831	0.009056
Oriental Honey Buzzard	*Pernis ptilorhyncus*	0.012644	0.027294
Black Kite	*Milvus migrans*	0.277011	0.393817
Euresian Sparrowhawk	*Acipiter nisus*	0.337165	0.402503
Crested Serpent Eagle	*Spilornis cheela*		
Shikra	*Accipiter badius*		
Falconidae			
Collared Falconet	*Microhierax caerulescens*		
Podicipedidae			
Black-necked Gerbe	*Podiceps nigricollis*	0.019157	0.045282
Little Gerbe	*Tachybaptus ruficollis*	0.002299	0.005434
Spot breasted Scimitter Babbler	*Pomatorhinus erythrocnemis*	0.02682	0.063395
Phalacrococidae			
Indian cormorant	*Phalacrocorax fuscicollis*	0.500383	0.860438
Little Cormorant	*Phalacrocorax niger*	0.15364	0.286045
Anhingidae			
Darter	*Anhinga rufa*	0.001149	0.002717
Ardeidae			
Cattle Egret	*Bubulcus ibis*	0.203065	0.294031
Little Egret	*Egretta garzetta*	0.569732	0.896622
Intermediate Egret	*Mesophoyx intermedia*	0.003831	0.009056

Species		Birds/ha	
Common Name	**Scientific name**	**Mean**	**SE**
Indian Pond Heron	*Ardeola grayii*	0.020307	0.023487
Purple Heron	*Ardea purpurea*	0.011494	0.027169
Little Bittern	*Ixobrychus minutus*		
Threskiornithidae			
Blackheaded Ibis	*Threskiornis melanocephalus*	0.494253	0.923235
Euresian Spoonbill	*Threskiornis melanocephalus*		
Ciconiidae			
Greater Adjutant	*Leptoptilos dubius*	0.038314	0.090564
Painted Stork	*Mycteria leucocephala*	0.011494	0.027169
Irenidae			
Fairy Bluebird	*Irena puella*	1.340996	1.18782
Golden-fronted Leafbird	*Chloropsis aurifrons*	2.68659	1.678788
Orangebellied leafbird	*Chloropsis hardwickii*	0.233716	0.308838
Pittidae			
Blue-naped Pitta	*Pitta nipalensis*	0.038314	0.090564
Indian Pitta	*Pitta brachyura*	0.153257	0.286048
Eurylaimidae			
Longtailed Broadbill	*Psarisomus dalhousiae*	0.007663	0.018113
Eopsaltriidae			
Grey-headed Flycatcher	*Culicicapa ceylonensis*	0.229885	0.543382
Asian Paradise Flycatcher	*Terpsiphone paradisi*	0.08046	0.118753
Pigmy Blue Flycatcher	*Muscicapella hodgsoni*	1.187739	1.10118
Siberian Ruby Throat	*Luscinia calliope*	0.02682	0.063395
Lanidae			
Bay-backed Shrike	*Lanius vittatus*	0.268199	0.550524
Longtailed Shrike	*Lanius schach*	0.938697	1.12567
Corvidae			
Ashy Drongo	*Dicrurus leucophaeus*	8.659004	18.19802
Ashy Swallow Shrike	*Artamus fuscus*	0.030651	2.89E-05
Black Drongo	*Dicrurus adsimilis*	2.555556	2.045985
Black-browed Tree Pie	*Dendrocitta frontalis*	0.015326	0.036225
Black-headed Cuckoo Shrike	*Coracina melanoptera*	0.233716	0.308838
Black-headed Oriole	*Oriolus xanthornus*	2.637165	1.623522
Black-naped Flycatcher	*Hypothymis azurea*	0.344828	0.468719
Black-naped Oriole	*Oriolus chinensis*	0.731801	0.829555
Common Iora	*Aegithina tiphia*	0.601533	0.627732
Common Woodshrike	*Tephrodornis pondicerianus*	0.114943	0.271691
Eurasian Golden Oriole	*Oriolus oriolus*	0.306513	0.403248
Green Magpie	*Cissa chinensis*	0.183908	0.281114
House Crow	*Corvus splendens*	1.292337	1.081504
Rufous Treepie	*Dendrocitta vagabunda*	0.927203	0.682889
Jungle Crow	*Corvus macrorhynchos*	3.039464	2.282591
Great Racket-tailed Drongo	*Dicrurus paradiseus*	2.908429	1.274112
Large Wood Shrike	*Tephrodornis gularis*	0.038314	0.090564
Lesser Racket-tailed Drongo	*Dicrurus remifer*	1.37931	2.732685
Long-tailed Minivet	*Pericrocotus ethologus*	0.718391	0.765193
Maroon Oriole	*Oriolus traillii*	0.363985	0.608006
Scarlet Minivet	*Pericrocotus flammeus*	3.532567	4.937168
Small Minivet	*Pericrocotus cinnamomeus*	0.275862	0.393825
Haircrested Drongo	*Dicrurus hottentottus*	0.038314	0.090564

Species		Birds/ha	
Common Name	**Scientific name**	**Mean**	**SE**
Large Cuckoo Shrike	*C.macei*	0.942529	0.4842
Slenderbilled oriole	*Oriolus tenuirostris*	0.279693	0.323127
Yellowbellied Fantial	*Rhipidura hypoxantha*		
Muscicapidae			
Blue-throated Flycatcher	*Muscicapa rubiculoides*	0.229885	0.383469
Golden Bush Robin	*Tarsiger chrysaeus*	0.038314	0.090564
Green Cochoa	*Cochoa virdis*	0.088123	0.124061
Hodgson's Redstart	*Phoenicurus hodgosoni*	0.030651	0.072451
Indian Robin	*Saxicoloides fulicata*	1.302682	1.438916
Jerdon's Bushchat	*Saxicola jerdoni*	0.114943	0.271691
Little Pied Flycatcher	*Ficedula westermanni*	2.375479	4.588434
Oriental Magpie Robin	*Copsychus saularis*	0.490421	0.552524
Pale-blue Flycatcher	*Cyornis unicolor*	1.467433	1.327393
Pied Bushchat	*Saxicola caprata*	2.911877	2.83381
Pied Thrush	*Zoothera wardii*	0.386973	0.733435
Asian Pied starling	*Sturnus contra*	1.927203	1.376563
Plumbeous water Redstart	*Rhyacornis fuliginosus*	0.030651	0.072451
White rumped Shama	*Copsychus malabaricus*	0.1341	0.149852
Small Niltava	*NIltava macgrigoriae*	0.613027	1.054301
White-capped water Redstart	*Chaimarrornis leucocephalus*	0.911877	1.831582
Blue Rock Thrush	*Monticola solitarius*		
Sturnidae			
Common Myna	*Acridotheres albocinctus*	7.689655	5.538981
Chestnut-tailed starling	*Sturnus malabaricus*	0.750958	0.888538
Hill Myna	*Gracula religiosa*	5.743295	4.896866
Jungle Myna	*Acridotheres fuscus*	0.076628	0.127823
Certhiidae			
Euresian Tree Creeper	*Certhia familiaris*	0.881226	1.020299
Bartailed Tree Creeper	*Certhia himalayana*		
Paridae			
Green-backed Tit	*Parus monticolus*	0.229885	0.461435
Grey Tit	*Parus major*	0.344828	0.815073
Sultan Tit	*Melanochlora sultanea*	3.157088	5.499748
Blacklored Tit	*Parus xanthogenys*	0.114943	0.271691
Hirundinidae			
Barn Swallow	*Hirundo rustica*	4.521839	5.854937
Pycnonotidae			
Black Bulbul	*Hypsipetes madagascariensis*	0.015326	0.036225
Black-headed Yellow Bulbul	*Pycnonotus melanicterus*	6.437165	2.867623
Olive Bulbul	*Lole virescens*	0.45977	0.766938
Red-vented Bulbul	*Pycnonotus cafer*	15.58621	4.523196
Himalayan Bulbul	*Pycnonotus leucogenys*	5.095785	4.665396
Cisticolidae			
Grey breasted Prinia	*Prinia hodgsonii*	0.229885	0.543382
Ashy Prinia	*Prinia socialis*	7.578544	4.492263
Plain prinia	*Prinia inornata*	1.417625	2.036375
Rufescent prinia	*Prinia rufescens*	0.114943	0.271691
Graceful prinia	*Prinia gracilis*	0.038314	0.090564
Yellowbellied Prinia	*Prinia flaviventris*	0.842912	1.081681

Species		Birds/ha	
Common Name	**Scientific name**	**Mean**	**SE**
Zosteropidae			
Oriental White Eye	*Zosterops palpebrosa*	0.494253	0.923235
Sylviidae			
Beautiful Sibia	*Heterophasia pulchella*	0.478927	0.385881
Black-browed Reed Warbler	*Acrocephalus bistrigiceps*	1.536398	2.556425
Blue-winged minla	*Minla cyanouroptera*	0.114943	0.271691
Bristled Grass Warbler	*Chaetornis striatus*	0.114943	0.271691
Broad-billed Flycatcher Warbler	*Abroscopus hodgsoni*	1.762452	2.610591
Brown Bush Warbler	*Bradypterus luteoventris*	0.229885	0.543382
Chestnut-throated Shrike Babbler	*Pteruthius melanotis*	0.038314	0.090564
Eurasian Chiff Chaff	*Phylloscopus collybita*	1.37931	2.090816
Common Babbler	*Turdoides caudatus*	2.371648	2.806752
Coral-billed Scimitter Babbler	*Pomatorhinus ferruginosus*	0.114943	0.271691
Crimson-winged Laughing Thrush	*Garrulax phoeniceus*	0.402299	0.614213
Dusky Leaf Warbler	*Phylloscopus fuscatus*	1.800766	2.611591
Greenish Warbler	*Phylloscopus trochiloides*	0.383142	0.905636
Brown cheeked fulvetta	*Alcippe poioicephala*	0.114943	0.271691
Grey Sibia	*Heterophasia gracilis*	0.191571	0.325936
Indian Great Reed Warbler	*Acrocephalusarundinaceus*	0.229885	0.543382
Chestnut crowned Bush Warbler	*Cettia major*	0.229885	0.383469
Large Scimitar Babbler	*Pomatorhinus hypoleucos*	0.574713	0.870911
Long-tailed Sibia	*Heterophasia picaoides*	0.030651	0.072451
Radde's Warbler	*Phylloscopus schwarzi*	0.45977	0.766938
Paddy Field Warbler	*Acrocephalus agricola*	1.992337	3.678545
Plain Leaf Warbler	*Phylloscopus neglectus*	0.114943	0.271691
Red-tailed Minla	*Minla ignotincta*	0.229885	0.543382
Rufous Babbler	*Turdoides subrufus*	0.076628	0.181127
Slender-billed Scimitar Babbler	*Xiphirhynchus superciliaris*	0.011494	0.027169
Common Tailorbird	*Orthotomus sutorius*	0.114943	0.271691
White-bellied Yuhina	*Yuhina zantholeuca*	0.670498	0.850573
Greybreasted Laughing Thrush	*Garrulax jerdoni*	0.130268	0.273953
Striated Yuhina	*Yuhina castaniceps*	0.114943	0.271691
Whitehooded Babbler	*Gampsorhynchus rufulus*	0.229885	0.383469
Yellow-eyed Babbler	*Chrysomma sinense*	0.229885	0.543382
Jungle Babbler	*Turdoides striata*	3.180077	2.98745
Whiskered Yuhina	*Yuhina flavicollis*	0.842912	1.119096
Black headed Shrike Babbler	*Pteruthius rufiventer*	0.114943	0.271691
Alaudidae			
Crested Lark	*Galerida cristata*	0.440613	0.617511
Eastern Skylark	*Alauda gulgula*	0.229885	0.543382
Nectariniidae			
Fire-tailed Sunbird	*Aethopyga ignicauda*	0.574713	0.812204
Little Spiderhunter	*Arachnothera longirostris*	1.111111	1.907079
Gould's Sunbird	*Aethopyga gouldiae*	0.996169	1.888966
Green tailed sunbird	*Aethopyga nipalensis*	1.915709	4.528182
Purple Sunbird	*Nectarinia asiatica*	9.141762	4.970207
Streaked Spiderhunter	*Arachnothera magna*	3.141762	4.909768
Thickbilled Flowerpecker	*Dicaeum agile*	0.268199	0.550524
Crimson Sunbird	*Aethopyga siparaja*	2.452107	2.709956

Species		Birds/ha	
Common Name	**Scientific name**	**Mean**	**SE**
Yellowbellied Flowerpecker	*Dicaeum melanoxanthum*	4.750958	6.124587
Chestnutshouldered Petronia	*Petronia xanthocollis*	0.229885	0.543382
Purplerumped Sunbird	*Nectarinia zeylonica*		
Scarletbacked Flowerpecker	*Dicaeum cruentatum*	0.229885	0.543382
Passeridae			
Baya	*Ploceus philippinus*	0.114943	0.271691
Brown Rock Pipit	*Anthus similis*	0.114943	0.271691
House Sparrow	*Passer domesticus*	2.298851	2.962469
White browed Wagtail	Motacilla maderaspatensis	0.183908	0.294729
Paddyfield Pipit	*Anthus rufulus*	0.804598	0.97422
Whitethroated munia	*Lonchura malabarica*	0.114943	0.271691
White Wagtail	*Motacilla alba*	0.172414	0.287673
Scalybreasted Munia	*Lonchura punctulata*	0.038314	0.090564
Twany Pipit	*Anthus campestris*	0.268199	0.550524
Water Pipit	*Anthus spinoletta*	0.153257	0.286048
White-rumped Munia	*Lonchura striata*	0.796935	1.811273
Euresian Tree Sparrow	*Passer montanus*		
Fringillidae			
Black-faced Bunting	*Emberiza spodocephala*	0.003831	0.009056
Chestnut Bunting	*Emberiza rutila*	0.229885	0.543382
Common Rosefinch	*Carpodacus erythrinus*	1.45977	0.987552
Crested Bunting	*Melophus lathami*	0.114943	0.271691
Grey-headed Bunting	*Emberiza fucata*	0.229885	0.543382
Rofous-necked Laughing Thrush	*Garrulax ruficollis*	0.383142	0.612806
Rofous-vented Laughing Thrush	*Garrulax gularis*	0.02682	0.063395
Yellow-breasted Bunting	*Emberiza aureola*	0.528736	0.672292
Spotwinged Grosbeak	*Mycerobas melanozanthos*		

ANNEXURE 25

BIRD DENSITIES IN DRY DECIDUOUS MISCELLANEOUS FORESTS UNDER BTC AREA

Species	Birds/ha	
	Mean	SE
Ashy Drongo	36.42857	35.39312
Ashy Grey or Franklin's Warbler	1.052632	1.052611
Ashy Wood Pigeon	0.087719	0.087718
Ashy Wren Warbler	6.666667	3.888513
Black Drongo	2.105263	1.139846
Black-browed Reed Warbler	3.508772	3.508702
Black-faced Bunting	0.017544	0.017544
Black-headed Cuckoo Shrike	0.175439	0.175435
Black-headed Oriole	2.649123	1.359634
Black-headed Yellow Bulbul	10.35088	4.158166
Black-naped Oriole	2.122807	1.193125
Blue-throated Barbet	24.08772	12.42346
Bonali's Eagle	0.54386	0.526284
Brain Fever	0.175439	0.122939
Bristled Grass Warbler	0.526316	0.526305
Broad-billed Flycatcher Warbler	7.017544	4.917551
Chestnut Bunting	1.052632	1.052611
Chiff Chaff	1.754386	1.754351
Common Babbler	5.087719	3.821794
Common Iora	0.175439	0.175435
Common Myna	3.298246	1.153039
Crested Bunting	0.526316	0.526305
Crested Lark	0.526316	0.526305
Crimson-breasted Barbet	2.350877	0.782585
Crow Pheasant	0.017544	0.017544
Dusky Leaf Warbler	0.175439	0.175435
Egyptian Vulture	0.010526	0.010526
Embred Dove	0.684211	0.416714
Fire-tailed Sunbird	1.052632	1.052611
Golden Oriole	1.22807	0.753846
Golden-fronted Chloropsis	0.45614	0.237556
Golden-throated Barbet	0.526316	0.526305
Goshhawk	0.103509	0.088849
Great Pied Hornbill	73.80702	70.19691
Greater Adjutant	0.175439	0.175435
Green Bee-eater	0.631579	0.531945

Species	Birds/ha	
	Mean	SE
Green-backed Tit	1.052632	0.89147
Greenish Warbler	1.754386	1.754351
Grey Partridge	0.175439	0.175435
Grey-crowned Pigmy Woodpecker	2.807018	1.36537
Grey-headed Myna	0.298246	0.212342
Hill Barbet	0.666667	0.54227
Hill Myna	12.68421	8.814868
Hogson's Redstart	0.140351	0.140348
House Crow	1.659649	1.168614
Imperial Green Pigeon	0.140351	0.123741
Indian Cuckoo	1.578947	1.066661
Indian Peafowl	0.198246	0.124916
Indian Pied Hornbill	0.035088	0.035087
Indian Ring Dove	0.491228	0.262672
Indian Robin	2.280702	1.822572
Indian Roller	5.45614	3.642742
Indian Tree Creeper	0.526316	0.526305
Indian Tree Pie	0.789474	0.556752
Jungle Babbler	5.964912	3.90079
Jungle Crow	2.807018	1.361694
Large Cuckoo Shrike	0.54386	0.261413
Large Golden-backed Woodpecker	2.105263	1.193548
Large Green Barbet	1.350877	0.419959
Large Green-billed Malkoha	0.701754	0.551795
Large Racket-tailed Drongo	1.929825	1.185694
Large Scimitar Babbler	0.175439	0.175435
Large Yellow-naped Green Woodpecker	1.578947	1.168418
Lesser Caucal	0.280702	0.188571
Lesser Golden-backed Woodpecker	0.175439	0.175435
Lesser Racket-tailed Drongo	0.526316	0.526305
Lineated Barbet	4.473684	3.537776
Little Pied Flycatcher	10.87719	8.857798
Long-tailed Minivet	1.052632	0.737633
Long-tailed Sibia	0.140351	0.140348
Magpie Robin	0.438596	0.251578
Ms Gould's Sunbird	4.561404	3.645144
Olive Warbler	1.052632	1.052611
Orange-bellied Chloropsis	0.526316	0.526305
Paddy Field Warbler	0.526316	0.526305
Pale-blue Flycatcher	3.035088	2.032275
Pale-headed Woodpecker	0.175439	0.175435
Palmadorum Green Pigeon	1.508772	1.23874

Species	Birds/ha	
	Mean	SE
Paradise Flycatcher	0.22807	0.182257
Pariah Kite	0.035088	0.035087
Pied Bushchat	1.052632	1.052611
Pied Myna	3.684211	1.965063
Pigmy Blue Flycatcher	0.526316	0.526305
Grey-fronted Pigeon	3.508772	3.508702
Pin-tailed Green Pigeon	1.315789	0.753905
Plain Coloured Flowerpecker	0.526316	0.526305
Plain Leaf Warbler	0.526316	0.526305
Plain Wren Warbler	0.526316	0.526305
Plumbous Redstart	0.140351	0.140348
Purple Sunbird	14.03509	6.459015
Red Jungle Fowl	2.173684	0.436933
Red Turtle Dove	3.245614	1.365334
Red-breasted Parakeet	20.14035	4.908621
Red-vented Bulbul	23.54386	5.237907
Red-watted Lapwing	0.140351	0.110359
Rofous Dove	0.666667	0.54227
Rofous or Beaven's Wren Warbler	0.526316	0.526305
Rofous Shrike	3.333333	2.084232
Rofous Woodpecker	0.666667	0.54227
Rofous-bellied Shrike Babbler	0.526316	0.526305
Rofous-necked Laughing Thrush	1.052632	1.052611
Rofous-vented Laughing Thrush	0.122807	0.122805
Rose-ringed Parakeet	2.807018	2.029725
Ruby Throat	0.122807	0.122805
Scarlet Flowerpecker	1.052632	1.052611
Scarlet Minivet	1.087719	1.052569
Scops Owl	0.245614	0.182709
Slender-billed Scimitter Babbler	0.052632	0.052631
Shama	0.087719	0.062731
Silver-eared Munia	0.526316	0.526305
Small Green-billed Malkoha	2.280702	1.822572
Small Niltava	2.807018	2.029725
Small Minivet	0.736842	0.552113
Sparrowhawk	0.140351	0.140348
Spangled Drongo	0.175439	0.175435
Spotted Dove	1.666667	0.928955
Spotted Owlet	1.754386	1.754351
Streaked Wren Warbler	0.175439	0.175435
Streaked Spider Hunter	3.508772	3.508702
Sultan Tit	1.22807	0.753846

Species	Birds/ha	
	Mean	SE
Thick-billed Flowerpecker	1.052632	1.052611
Thick-billed Green Pigeon	0.140351	0.140348
UI	18.98246	7.192189
White-bellied Yuhina	1.052632	1.052611
White-breasted Kingfisher	0.140351	0.140348
White-cheeked Bulbul	0.877193	0.575202
White-headed Shrike Babbler	1.052632	0.737633
Wreathed Hornbill	0.035088	0.035087
Yellow-backed Sunbird	0.526316	0.526305
Yellow-bellied Flowerpecker	1.754386	1.754351
Yellow-bellied Wren Warbler	2.280702	1.822572
Yellow-breasted Bunting	0.175439	0.175435
Yellow-cheeked Tit	0.526316	0.526305
Yellow-legged Green Pigeon	0.175439	0.175435
Yellow-naped Oriole	0.175439	0.175435
Yellow-naped Yuhina	2.280702	1.822572

ANNEXURE 26

BIRD DENSITIES IN MOIST DECIDUOUS MISCELLANEOUS FORESTS UNDER BTC AREA

Species	Birds/ha	
	Mean	SE
Ashy Drongo	0.826087	0.671206
Ashy Swallow Shrike	0.173913	0.17391
Ashy Wood Pigeon	0.173913	0.099777
Ashy Wren Warbler	21.30435	8.510175
Beautiful Sibia	1.73913	1.329837
Black Drongo	1.478261	0.915093
Black-browed Reed Warbler	4.347826	4.34774
Black-headed Cuckoo Shrike	0.717391	0.65397
Black-headed Oriole	3.5	2.263881
Black-headed Yellow Bulbul	12.04348	3.666325
Black-naped Flycatcher	1.956522	1.104189
Black-naped Oriole	1.521739	1.31754
Common Blue Kingfisher	0.065217	0.065216
Blue-throated Barbet	8.413043	1.570709
Blue-throated Flycatcher	0.652174	0.652161
Blue-winged Sibia	0.652174	0.652161
Bonali's Eagle	0.065217	0.065216
Booted Hawk Eagle	0.652174	0.652161
Broad-billed Roller	1.521739	1.31754
Chestnut-headed Bee-eater	0.652174	0.652161
Collord Scops Owl	0.086957	0.086955
Common Iora	0.869565	0.68284
Common Myna	5.934783	4.411623
Common Swallow	5	4.382024
Common Woodshrike	0.652174	0.652161
Crimson-breasted Barbet	0.695652	0.652644
Crimson-winged Laughing Thrush	2.173913	1.455032
Eastern Blossom-headed Parakeet	10.86957	10.86935
Embred Dove	0.826087	0.671206
Fairy Bluebird	2.347826	1.116484
Fire-tailed Sunbird	24.56522	21.73293
Golden Bush Robin	0.217391	0.217387
Golden-fronted Chloropsis	2.717391	1.259782
Goshhawk	0.26087	0.168637
Great Pied Hornbill	0.773913	0.654148
Green Cocoha	0.108696	0.108693

Species	Birds/ha	
	Mean	SE
Green Magpie	1.043478	0.674546
Grey Sibia	0.652174	0.652161
Grey-crowned Pigmy Woodpecker	1.521739	1.075278
Grey-headed Myna	0.217391	0.217387
Hill Barbet	1.086957	0.710722
Hill Myna	10.21739	3.618041
Imperial Green Pigeon	0.195652	0.195648
Indian Cuckoo	0.065217	0.065216
Indian Peafowl	0.021739	0.021739
Indian Pied Hornbill	0.282609	0.166411
Indian Ring Dove	0.065217	0.065216
Indian Roller	2.173913	1.107835
Indian Tree Creeper	1.304348	0.91199
Indian Tree Pie	2.130435	1.111016
Jungle Crow	1.521739	0.981323
Large Cuckoo Shrike	1.021739	0.374918
Large Golden-backed Woodpecker	2	0.963068
Large Green Barbet	9.565217	2.148691
Large Green-billed Malkoha	1.521739	0.7593
Large Racket-tailed Drongo	6.76087	2.515445
Large Yellow-naped Green Woodpecker	1.086957	0.710722
Lesser Racket-tailed Drongo	0.652174	0.368063
Lesser Yellow-naped Green Woodpecker	1.956522	1.445256
Lineated Barbet	1.391304	0.491933
Little Spider Hunter	6.304348	4.540215
Long-tailed Minivet	2.608696	1.5676
Magpie Robin	0.934783	0.684107
Stripe-breasted Pied Woodpecker	0.217391	0.217387
Nepal's Yellow-backed Sunbird	10.86957	10.86935
Olive Warbler	1.304348	1.304322
Orange-bellied Chloropsis	0.217391	0.217387
Pale-blue Flycatcher	3.26087	1.917447
Palmadorum Green Pigeon	3.673913	1.64946
Pied Bushchat	1.956522	1.445256
Pied Myna	0.652174	0.652161
Pied-crested Cuckoo	0.282609	0.225566
Pigmy Blue Flycatcher	2.173913	2.17387
Pigmy Woodpecker	0.869565	0.869548
Pin-tailed Green Pigeon	0.652174	0.481752
Purple Sunbird	5.652174	4.511326
Red Jungle Fowl	2.867391	0.954816
Red Turtle Dove	1.73913	1.090311

Species	Birds/ha	
	Mean	SE
Red-breasted Parakeet	29.47826	8.931271
Red-tailed Minla	1.304348	1.304322
Red-vented Bulbul	20.76087	6.141774
Rofous Woodpecker	6.304348	2.888512
Scarlet Minivet	1.304348	0.736126
Shama	0.043478	0.043477
Common Blue Kingfisher	0.065217	0.065216
Small Green-billed Malkoha	0.173913	0.125508
Small Minivet	0.652174	0.652161
Spur-winged Lapwing	0.652174	0.652161
Streaked Spider Hunter	1.304348	1.304322
Sultan Tit	2.021739	1.444765
UI	7.043478	2.874949
White Eye	0.065217	0.065216
White-backed Munia	0.173913	0.17391
White-bellied Yuhina	2.282609	1.551862
White-breasted Kingfisher	0.282609	0.225566
White-capped Redstart	0.652174	0.652161
White-cheeked Bulbul	2.173913	2.17387
Wreathed Hornbill	0.608696	0.464664
Yellow-backed Sunbird	1.956522	1.104189
Yellow-bellied Flowerpecker	19.56522	13.76784
Yellow-breasted Bunting	0.652174	0.652161
Yellow-naped Oriole	0.391304	0.275357
Yellow-naped Yuhina	1.956522	1.445256

ANNEXURE 27

BIRD DENSITIES IN EVERGREEN FORESTS UNDER BTC AREA

Species	Birds/ha	
	Mean	SE
Ashy Drongo	1.923077	0.772905
Ashy Wren Warbler	8.076923	3.245893
Beautiful Sibia	0.192308	3.240098
Small Minivet	3.461538	1.362116
Black-headed Oriole	0.692308	1.385028
Black-headed Yellow Bulbul	8.884615	2.834295
Blue-throated Barbet	57.88462	29.25413
Brown Bush Warbler	2.307692	29.28802
Chestnut-throated Shrike Babbler	0.384615	1.617995
Chiff Chaff	10	5.543248
Common Iora	2.692308	5.729173
Common Swallow	0.384615	1.634053
Crimson-breasted Barbet	4.615385	2.678102
Crimson-winged Laughing Thrush	0.192308	2.67818
Dusky Leaf Warbler	15.38462	7.47434
Embred Dove	0.384615	7.474036
European Roller	3.461538	2.157138
Fairy Bluebird	8.076923	3.759758
Golden Oriole	8.88192	3.174187
Golden-fronted Chloropsis	12.23077	3.438603
Golden-throated Barbet	1.153846	3.491204
Goshhawk	1.153846	1.120692
Great Pied Hornbill	0.730769	0.847123
Green Bee-eater	0.384615	0.398544
Green Cocoha	0.692308	0.425051
Grey Sibia	0.769231	0.623798
Grey-headed Myna	3.6	2.472695
Hill Barbet	1.2	2.504077
Indian Golden-backed Tree-toed Woodpecker	1.92	1.043012
Indian Roller	10.76	5.611655
Jungle Babbler	3.6	6.029784
Large Cuckoo Shrike	0.56	2.447023
Large Golden-backed Woodpecker	1.2	0.829985
Large Green Barbet	0.32	0.83993
Large Green-billed Malkoha	3.076923	1.174773

Species	Birds/ha	
	Mean	SE
Large Racket-tailed Drongo	2.730769	1.944881
Large-wood Shrike	0.384615	1.633608
Large Yellow-naped Green Woodpecker	0.115385	0.277065
Lesser Golden-backed Woodpecker	2.307692	0.984283
Lineated Barbet	0.961538	1.038764
Maroon Oriole	3.653846	1.802378
Stripe-breasted Pied Woodpecker	6.666667	2.404706
Olive Bulbul	4.615385	2.937298
Palmadorum Green Pigeon	0.346154	2.248983
Pigmy Blue Flycatcher	3.076923	1.689257
Pin-tailed Green Pigeon	0.384615	1.692573
Purple Sunbird	11.53846	5.58042
Quaker Babbler	1.153846	5.61578
Red Jungle Fowl	0.361538	0.804372
Red Turtle Dove	6.346154	2.860916
Red-breasted Parakeet	22.07692	6.518928
Red-eared Bay Woodpecker	0.384615	6.077062
Red-headed Trogon	0.384615	0.373564
Red-vented Bulbul	0.653846	0.412968
Rofous Babbler	0.769231	0.615864
Rofous Woodpecker	1.153846	0.953166
Scarlet Flowerpecker	1.153846	0.800636
Scarlet Minivet	22.69231	13.41677
Sparrowhawk	1.153846	13.42154
Streaked Spider Hunter	19.23077	13.35166
Sultan Tit	2.307692	13.40728
UI	21.15385	6.76794
White-bellied Yuhina	0.384615	6.641477
White-breasted Kingfisher	3.884615	1.378899
White-browed Yuhina	1.153846	1.553258
Wreathed Hornbill	0.423077	0.826319
Yellow-bellied Flowerpecker	7.692308	5.336411

ANNEXURE 28

BIRD DENSITIES IN RIVERINE HABITAT UNDER BTC AREA

Species	Birds/ha	
	Mean	SE
Avocet	0.25	0.249995
Baya	1.071428571	1.071407
Black Drongo	1.178571429	0.561199
Black-headed Yellow Bulbul	0.003571429	0.003571
Black-necked Gerbe	0.178571429	0.178568
Black-headed Oriole	0.357142857	0.357136
Black-winged Stilt	1.428571429	1.428543
Blue Rock Pigeon	0.003571429	0.003571
Blue-throated Barbet	0.5	0.195853
Booted Hawk Eagle	0.285714286	0.285709
Cattle Egret	0.821428571	0.433549
Chestnut-headed Bee-eater	2.857142857	2.173459
Common Rosefinch	3.857142857	3.572204
Common Blue Kingfisher	3.214285714	2.35998
Common Myna	5.857142857	2.684763
Cotton Teal	0.571428571	0.357929
Crested Lark	0.464285714	0.36904
Crimson-breasted Barbet	0.010714286	0.010714
Darter	0.010714286	0.010714
Debchick or Little Gerbe	0.021428571	0.021428
Eastern Knot	0.25	0.249995
Eastern Skylark	2.142857143	2.142815
Great Pied Hornbill	114.3071429	114.2827
Green Bee-eater	2.035714286	1.140248
Grey-headed Bunting	2.142857143	2.142815
Grey-headed Myna	0.607142857	0.428287
Han Harrier	0.035714286	0.035714
Himalayan Pied Kingfisher	1.092857143	0.785871
Hoopoe	0.357142857	0.357136
House Crow	2.75	2.153842
House Sparrow	2.142857143	2.142815
Imperial Green Pigeon	0.142857143	0.142854
Indian Cuckoo	0.357142857	0.357136
Indian Peafowl	0.032142857	0.032142
Indian Roller	2.725	2.151668
Indian Shag	0.021428571	0.021428
Jungle Crow	7.046428571	3.541226
Large Cuckoo Shrike	0.035714286	0.035714

Species	Birds/ha	
	Mean	SE
Large Green Barbet	1.071428571	0.348568
Large Green-billed Malkoha	1.071428571	1.071407
Large Pied Wagtail	1.714285714	1.139523
Large Racket-tailed Drongo	0.035714286	0.035714
Large Scimitter Babbler	3.214285714	3.214222
Large Whistling Teal	0.035714286	0.035714
Large Yellow-naped Green Woodpecker	0.178571429	0.178568
Lesser Caucal	0.2	0.116381
Little Cormorant	1.432142857	1.11658
Little Egret	4.703571429	3.465924
Little Ringed Polover	0.107142857	0.107141
Long-billed Ringed Polover	0.178571429	0.178568
Median Egret	0.035714286	0.035714
Paddy Field Pipit	1.071428571	1.071407
Painted Stork	0.107142857	0.107141
Pied Bushchat	7.142857143	7.142715
Pintail	0.357142857	0.291924
Pond Heron	0.189285714	0.087639
Purple Heron	0.107142857	0.107141
Purple Sunbird	0.107142857	0.107141
Red Jungle Fowl	6.15	4.075983
Red Turtle Dove	1.110714286	1.070549
Red-breasted Parakeet	47.92857143	46.37841
Red-vented Bulbul	7.428571429	3.647942
Red-watted Lapwing	3.232142857	2.155221
Rofous Dove	0.035714286	0.035714
Rofous Woodpecker	0.071428571	0.071427
Rose-ringed Parakeet	0.357142857	0.357136
Small Pied Wagtail	1.607142857	1.115453
Sparrowhawk	0.107142857	0.107141
Spotted Dove	2.889285714	1.613021
Spur-winged Lapwing	4.928571429	2.366457
Stone Curlew	0.964285714	0.747967
Stork-billed Kingfisher	0.271428571	0.25012
Twany Pipit	2.5	2.159285
UI	1.439285714	1.116287
Water Pipit	1.428571429	1.116743
White Ibis	0.821428571	0.714635
White-breasted Kingfisher	1.525	0.497673
White-cheeked Bulbul	11.78571429	7.681571
Yellow-bellied Wren Warbler	0.357142857	0.357136
Yellow-breasted Bunting	1.357142857	1.098576

Species	Birds/ha	
	Mean	SE
Yellow-naped Oriole	0.178571429	0.178568
Yellow-throated Sparrow	2.142857143	2.142815
Yellow-watted Lapwing	0.035714286	0.035714

ANNEXURE 29

BIRD DENSITIES IN SAL FORESTS UNDER BTC AREA

Species	Birds/ha	
	Mean	SE
Ashy Drongo	2.54	1.681368
Ashy Wood Pigeon	0.12	0.088708
Ashy Wren Warbler	7.56	3.030823
Black Drongo	5.74	4.035558
Black-headed Cuckoo Shrike	0.2	0.199996
Small Minivet	2.44	1.112856
Black-headed Oriole	5.46	2.282848
Black-headed Yellow Bulbul	5.1	2.268866
Blue-throated Barbet	14.2	2.863365
Blue-throated Flycatcher	0.6	0.599988
Brain Fever	0.02	0.02
Broad-billed Flycatcher Warbler	1.2	1.199976
Broad-billed Roller	0.2	0.199996
Common Babbler	1.8	1.799964
Common Blue Kingfisher	0.6	0.599988
Common Iora	0.74	0.613316
Small Minivet	1.82	0.882322
Common Myna	2.961176	1.99996
Crested Lark	0.1	0.099998
Crimson-breasted Barbet	0.872	0.608546
Embred Dove	0.76	0.607801
Fairy Blue Bird	0.6	0.599988
Fire-tailed Sunbird	1.2	1.199976
Golden Oriole	0.2	0.199996
Golden-fronted Chloropsis	3.898	2.311689
Great Pied Hornbill	0.04	0.039999
Green Bee-eater	2.345045	0.002
Grey-crowned Pigmy Woodpecker	8.54	4.435502
Grey-headed Myna	0.2	0.199996
Great Slaty Woodpecker	0.16	0.159997
Grey Partridge	0.02	0.02
Common Grey Hornbill	0.14	0.139997
Hill Barbet	0.46	0.403254
Hill Myna	4.78	1.870091
Honey Buzzard	0.066	0.060176
Imperial Green Pigeon	0.66	0.4441
Indian Cuckoo	3.58	2.149868
Indian Ground Reed Warbler	1.2	1.199976

Species	Birds/ha	
	Mean	SE
Indian Peafowl	0.2	0.199996
Indian Ring Dove	0.36	0.253557
Indian Robin	2.8	2.080775
Indian Roller	4.72	1.637547
Indian Tree Pie	0.6	0.599988
Jungle Babbler	1.6	1.15562
Jungle Crow	1.48	0.85724
Jungle Myna	0.4	0.279936
Large Cuckoo Shrike	0.8	0.370321
Large Golden-backed Woodpecker	5.72	4.029509
Large Green Barbet	8.9	3.416727
Large Racket-tailed Drongo	3.72	1.55312
Large Scimitter Babbler	0.2	0.199996
Large Yellow-naped Green Woodpecker	0.8	0.628559
Lesser Caucal	0.26	0.207626
Lesser Golden-backed Woodpecker	0.16	0.159997
Lesser Yellow-naped Green Woodpecker	1.8	0.889376
Lineated Barbet	2.5	1.444525
Long-tailed Broadbill	0.04	0.039999
Long-tailed Minivet	0.14	0.139997
Magpie Robin	1.1	1.002935
Orange-bellied Chloropsis	0.42	0.258862
Palmadorum Green Pigeon	1	0.714272
Pariah Kite	0.6	0.599988
Pied Bushchat	1.2	1.199976
Pied Myna	3.2	1.627286
Pin-tailed Green Pigeon	0.64	0.600505
Plain Wren Warbler	6.8	4.41177
Purple Sunbird	10.8	4.578832
Pygmy Woodpecker	6	2.539434
Red Jungle Fowl	4.94	1.676474
Red Turtle Dove	0.1	0.099998
Red-breasted Parakeet	29	10.47367
Red-vented Bulbul	7.6	1.885677
Pygmy Woodpecker	6	2.539434
Red Jungle Fowl	4.94	1.676474
Red Turtle Dove	0.1	0.099998
Red-breasted Parakeet	29	10.47367
Red-vented Bulbul	7.6	1.885677
Red-watted Lapwing	0.4	0.399992
Rofous Woodpecker	2.82	1.173734
Rose-ringed Parakeet	1.6	1.599968

Species	Birds/ha	
	Mean	SE
Scops Owl	0.2	0.199996
Shama	0.36	0.253557
Small Cuckoo	0.22	0.169726
Spotted Dove	1.56	0.867143
Streaked Spider Hunter	1.2	0.839808
Tree Creeper	0.2	0.199996
UI	6.876	2.650605
White-breasted Kingfisher	1.2	0.839808
White-cheeked Bulbul	17	8.97257
White-backed Munia	4	3.999921
Wreathed Hornbill	0.26	0.136454
Yellow-backed Sunbird	10.4	5.777817
Yellow-bellied Flowerpecker	0.8	0.799984
Yellow-bellied Wren Warbler	1.6	1.15562
Yellow-breasted Bunting	1.2	1.199976
Yellow-fronted Pied Woodpecker	1.8	1.448123
Yellow-legged Green Pigeon	0.84	0.628793
Yellow-naped Oriole	0.8	0.628559

ANNEXURE 30

BIRD DENSITIES IN SCRUB FORESTS UNDER BTC AREA

Species	Birds/ha	
	Mean	SE
Ashy Drongo	0.131578947	0.129879
Ashy Wren Warbler	0.789473684	0.779271
Bar-tailed Cuckoo Dove	0.052631579	0.051951
Bay-backed Shrike	1.578947368	1.558542
Beautiful Sibia	1.052631579	1.039028
Black Bulbul	0.105263158	0.103903
Black Drongo	2.078947368	1.280124
Black-browed Reed Warbler	0.026315789	0.025976
Black-headed Cuckoo Shrike	0.210526316	0.207806
Black-headed Oriole	1.718421053	1.089485
Black-headed Yellow Bulbul	0.526315789	0.519514
Blue-naped Pitta	0.263157895	0.259757
Blue-throated Barbet	5.586842105	1.214751
Bonali's Eagle	0.018421053	0.015731
Brain Fever	0.078947368	0.077927
Brown Rock Pipit	0.789473684	0.779271
Collord Scops Owl	0.789473684	0.779271
Common Babbler	5.5	5.194082
Common Myna	34.23684211	14.67935
Common Swallow	8.157894737	3.469535
Coral-billed Scimitter Babbler	0.789473684	0.779271
Crimson-breasted Barbet	1.394736842	0.824537
Embred Dove	0.289473684	0.219956
Fairy Bluebird	0.052631579	0.051951
Fire-tailed Sunbird	0.789473684	0.779271
Golden-fronted Chloropsis	0.981578947	0.450199
Green Bee-eater	0.263157895	0.259757
Grey-crowned Pygmy Woodpecker	0.078947368	0.077927
Grey-headed Flycatcher	1.578947368	1.558542
Grey-headed Myna	1.368421053	0.846009
Hill Barbet	0.157894737	0.108706
Hill Myna	1.5	0.850363
House Crow	0.807894737	0.778938
House Sparrow	9.473684211	7.905624
Indian Cuckoo	3.5	2.690179
Indian Peafowl	0.255263158	0.208468
Indian Pied Hornbill	5.263157895	5.19514
Indian Pitta	1.052631579	0.814736

Species	Birds/ha	
	Mean	SE
Indian Ring Dove	1.921052632	1.565529
Indian Robin	0.263157895	0.259757
Indian Roller	1.589473684	0.46654
House Crow	0.807894737	0.778938
House Sparrow	9.473684211	7.905624
Indian Cuckoo	3.5	2.690179
Indian Peafowl	0.255263158	0.208468
Indian Pied Hornbill	5.263157895	5.19514
Indian Pitta	1.052631579	0.814736
Indian Ring Dove	1.921052632	1.565529
Indian Robin	0.263157895	0.259757
Indian Roller	1.589473684	0.46654
Indian Tree Creeper	5.263157895	3.623537
Indian Tree Pie	0.815789474	0.386629
Jerdon's Bushchat	0.789473684	0.779271
Jungle Babbler	8.421052632	5.664654
Jungle Crow	6.894736842	5.381877
Large Bush Warbler	0.789473684	0.779271
Large Cuckoo Shrike	1.236842105	0.807463
Large Golden-backed Woodpecker	3.157894737	2.608779
Large Green Barbet	2.510526316	1.10112
Large Racket-tailed Drongo	2.107894737	1.116591
Large Scimitter Babbler	1.052631579	0.814736
Large Yellow-naped Green Woodpecker	0.789473684	0.779271
Lesser Caucal	1.474473684	0.83883
Lesser Golden-backed Woodpecker	1.657894737	1.086835
Lesser Racket-tailed Drongo	7.894736842	7.79271
Lineated Barbet	1.052631579	0.814736
Little Egret	0.263157895	0.259757
Long-tailed Minivet	0.013157895	0.012988
Magpie Robin	0.131578947	0.129879
Paddy Field Warbler	12.89473684	10.46975
Palmadorum Green Pigeon	0.263157895	0.259757
Paradise Flycatcher	0.210526316	0.207806
Pariah Kite	1.060526316	0.814505
Pied Bushchat	2.368421053	1.723562
Pied Ground Thrush	0.210526316	0.207806
Pied Myna	2.184210526	1.349419
Pied-crested Cuckoo	0.131578947	0.129879
Pin-tailed Green Pigeon	0.605263158	0.367674
Purple Sunbird	12.71052632	4.282858
Red Jungle Fowl	4.203421053	2.686091

Species	Birds/ha	
	Mean	SE
Red Turtle Dove	0.5	0.294904
Pied-crested Cuckoo	0.131578947	0.129879
Pin-tailed Green Pigeon	0.605263158	0.367674
Purple Sunbird	12.71052632	4.282858
Red Jungle Fowl	4.203421053	2.686091
Red Turtle Dove	0.5	0.294904
Red-breasted Parakeet	25.28947368	11.53596
Red-vented Bulbul	25.5	5.286648
Rofous Shrike	0.526315789	0.362354
Rofous Woodpecker	0.210526316	0.207806
Rose-ringed Parakeet	2.631578947	2.59757
Scarlet Minivet	5.526315789	5.194614
Shama	0.263157895	0.259757
Sparrowhawk	0.263157895	0.259757
Spotted Dove	3.789473684	2.117488
Spur-winged Lapwing	0.015789474	0.015585
Sultan Tit	15.81578947	15.58474
Tailor Bird	0.789473684	0.779271
Thick-billed Green Pigeon	0.263157895	0.259757
UI	15.86842105	12.97235
White-breasted Kingfisher	2.657894737	1.324761
White-breasted Laughing Thrush	0.894736842	0.783379
White-cheeked Bulbul	5.473684211	5.19368
Wreathed Hornbill	0.026315789	0.025976
Yellow-eyed Babbler	1.578947368	1.558542

ANNEXURE 31

BIRD DENSITIES IN PLANTATIONS UNDER BTC AREA

Species	Birds/ha	
	Mean	SE
Black Drongo	6.666667	4.409498
Black-browed Tree Pie	0.444444	0.444436
Black-winged Kite	0.333333	0.333327
Blue-throated Barbet	1.555556	1.106915
Booted Warbler	22.22222	22.22178
Broad-billed Roller	0.555556	0.555545
Cattle Egret	3.333333	3.333267
Common Myna	20.88889	9.080392
Common Swallow	70	66.33118
Crimson-breasted Barbet	0.888889	0.888871
Crow Pheasant	2.777778	2.222178
Dusky Leaf Warbler	6.666667	6.666534
Goshhawk	0.111111	0.111109
Grey Partridge	2.222222	1.469833
Grey Tit	10	9.999801
House Crow	7.222222	6.61168
House Sparrow	6.666667	6.666534
Imperial Green Pigeon	1.111111	1.111089
Indian Peafowl	0.111111	0.111109
Indian Cuckoo	0.111111	0.111109
Indian Ring Dove	5.777778	3.2904
Indian Robin	6.666667	6.666534
Indian Roller	5.444444	3.249342
Indian Tree Pie	4.222222	3.340666
Jungle Crow	3.333333	3.333267
Large Cuckoo Shrike	5	3.308173
Large Green Barbet	1.777778	1.175866
Large Bush Warbler	3.333333	3.333267
Lesser Caucal	3.333333	3.333267
Lesser Golden-backed Woodpecker	4.444444	3.379245
Little Egret	0.777778	0.777762
Paddy Field Warbler	20	9.999801
Pied Bushchat	28.88889	22.38782
Paddy Field Warbler	20	9.999801
Pied Bushchat	28.88889	22.38782
Pied Myna	10.33333	8.777955
Red Jungle Fowl	1.111111	1.111089
Red Turtle Dove	18.88889	8.570523

Species	Birds/ha	
	Mean	SE
Red-breasted Parakeet	5.888889	3.720904
Red-vented Bulbul	15.88889	8.37215
Rofous-necked Laughing Thrush	4.444444	3.379245
Rusty-cheeked Scimitter Babbler	0.777778	0.777762
Sparrowhawk	3.333333	3.333267
Spotted Dove	0.444444	0.444436
Spotted Munia	1.111111	1.111089
Spotted Owlet	0.222222	0.222218
UI	0.888889	0.888871
Wreathed Hornbill	1.111111	1.111089

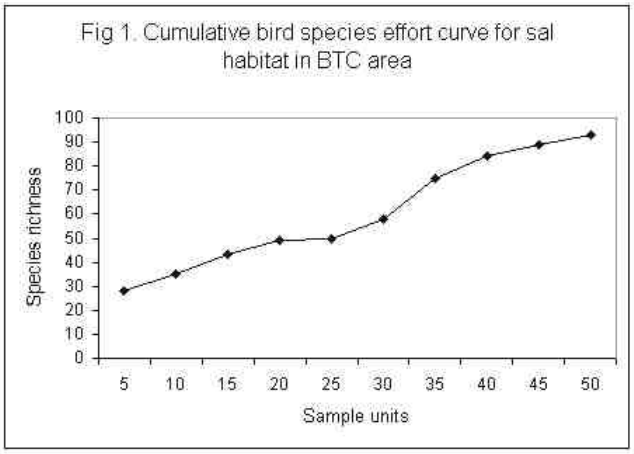
ANNEXURE 32

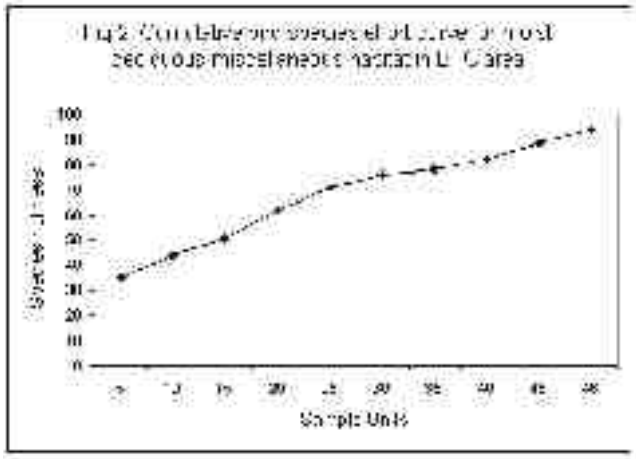
BIRD DENSITIES IN ENCROACHED AGRICULTURE AND FALLOW LANDS UNDER BTC AREA

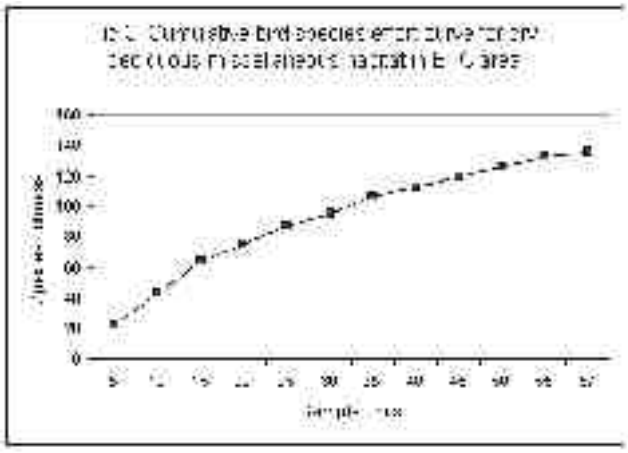
Species	Birds/ha	
	Mean	SE
Bay-backed Shrike	2.00000	1.99996
Black Drongo	4.00000	2.449441
Blue-throated Barbet	6.00000	3.999881
Common Babbler	6.00000	3.999881
Common Myna	13.20000	6.887333
Common Swallow	0.04000	0.039999
Crested Lark	12.00000	11.99976
Crimson-breasted Barbet	7.20000	5.721774
Green Bee-eater	12.00000	11.99976
Hoopoe	6.00000	3.999881
House Crow	14.00000	6.782195
House Sparrow	24.00000	14.69663
Indian Cuckoo	7.40000	5.714779
Indian Ring Dove	6.20000	5.953032
Indian Robin	15.60000	11.28516
Indian Roller	26.00000	16.849
Large Cuckoo Shrike	2.00000	1.378378
Lesser Golden-backed Woodpecker	3.60000	2.227062
Pied Myna	4.00000	2.449441
Red Turtle Dove	0.80000	0.799984
Red-breasted Parakeet	18.00000	11.13531
Red-vented Bulbul	10.80000	9.815099
Rufous Shrike	7.00000	5.830836
Sparrowhawk	1.40000	0.871762
Spotted Dove	20.00000	19.9996
White Eye	20.00000	19.9996
White-breasted Kingfisher	2.00000	1.99996

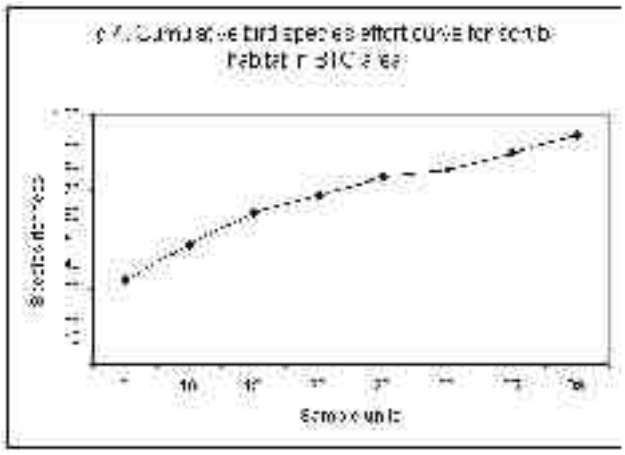
ANNEXURE 33

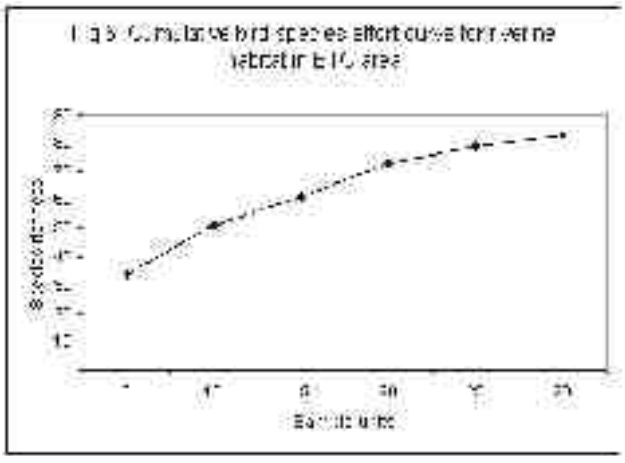
CUMULATIVE BIRD SPECIES V/S EFFORT IN VARIOUS FOREST TYPES OF THE STUDY AREA











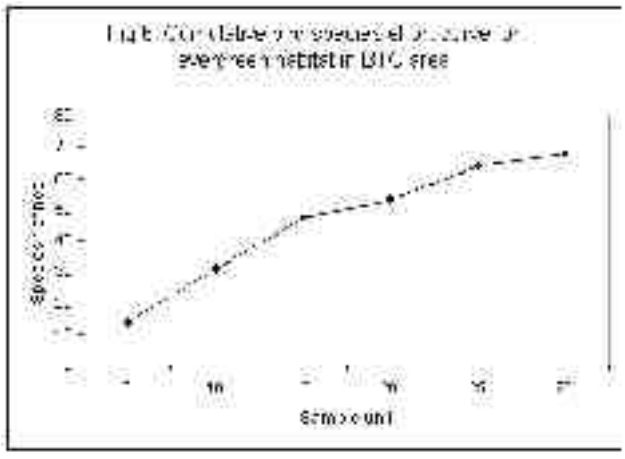


Fig 7. Cumulative bird species effort curve for plantations in BTC area

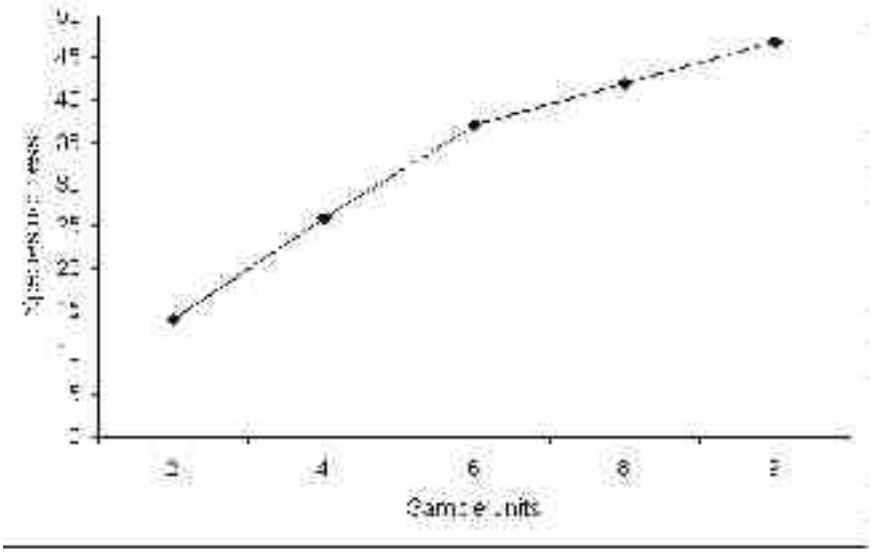
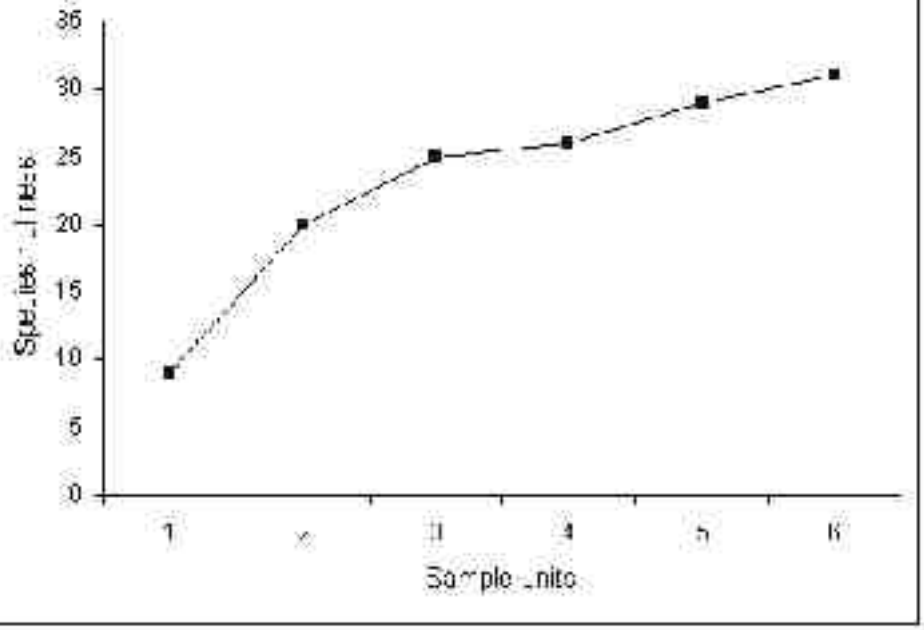
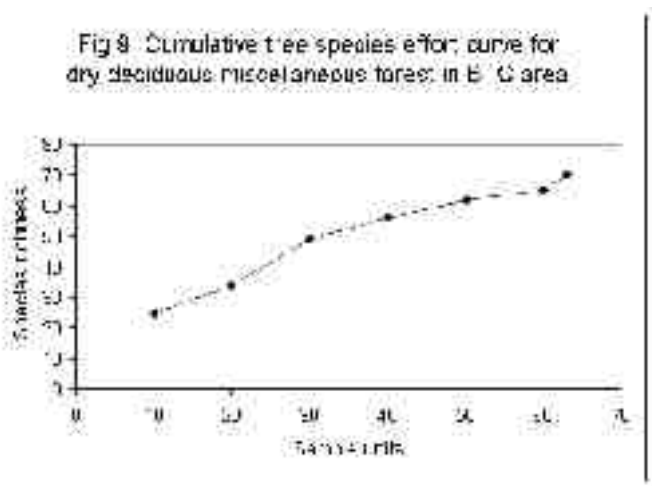


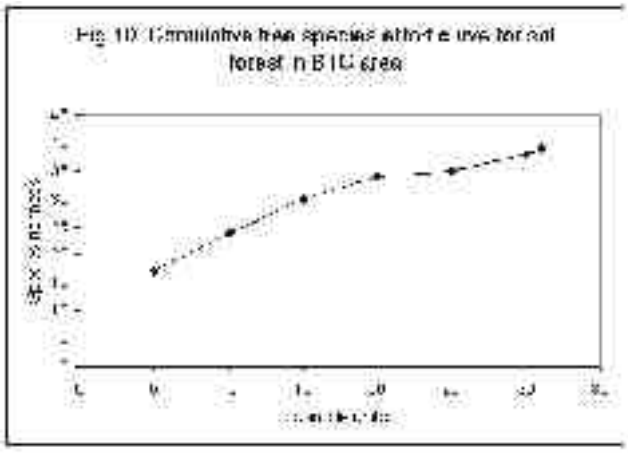
Fig 8. Cumulative bird species effort curve for agriculture habitat in BTC area

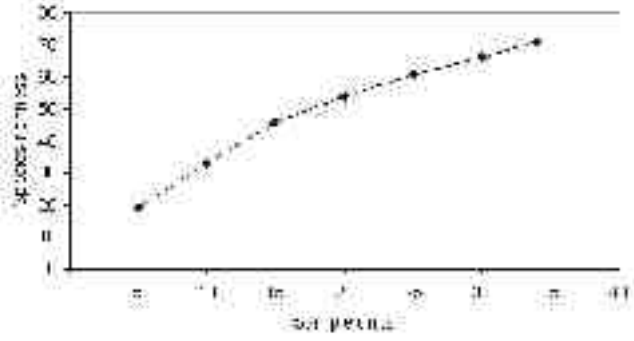


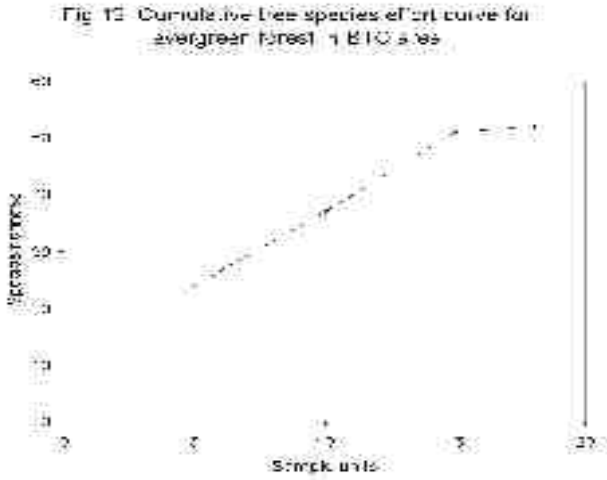
ANNEXURE 34

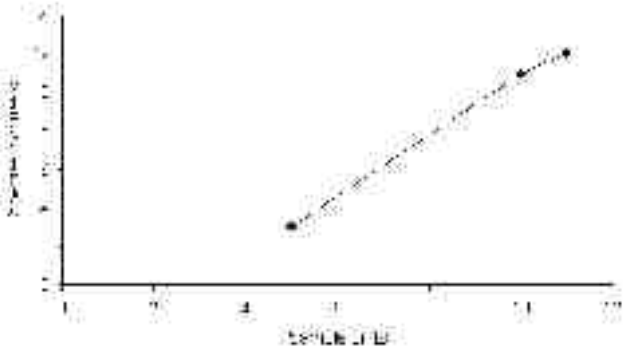
CUMULATIVE TREE, SHRUB AND HERB SPECIES LISTS vsEFFORT IN DIFFERENT HABITATS OF THE STUDY AREA

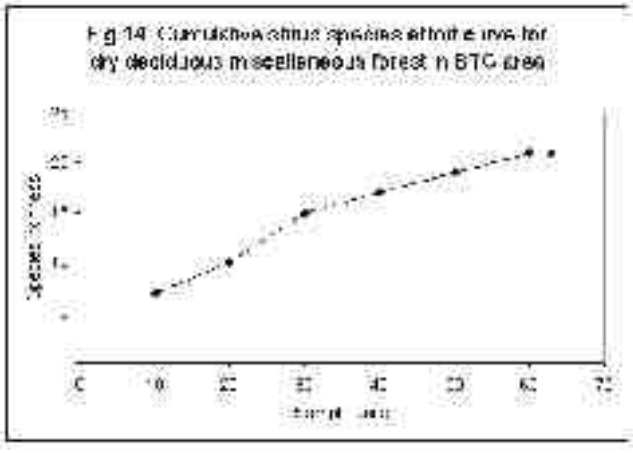












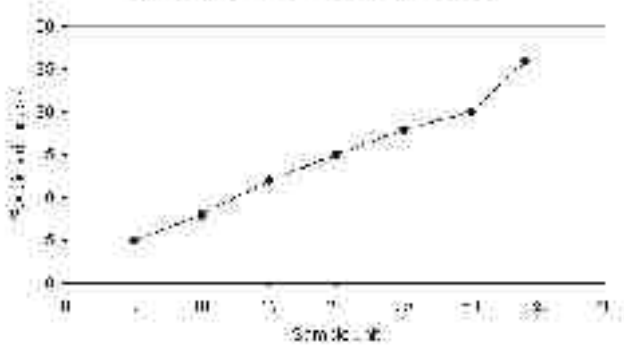


Fig 16. Cumulative shrub species effort curve for sal forest in BTC area

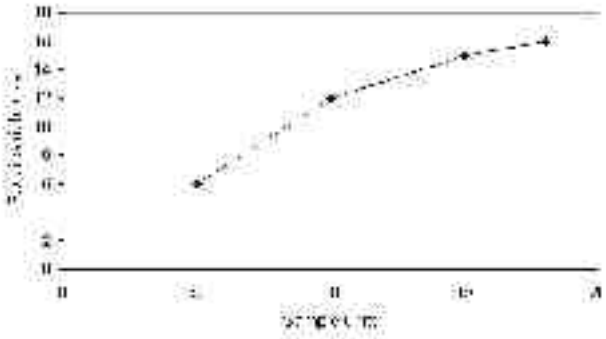


Fig 17. Cumulative shrub species effort curve for evergreen forest in BTC area

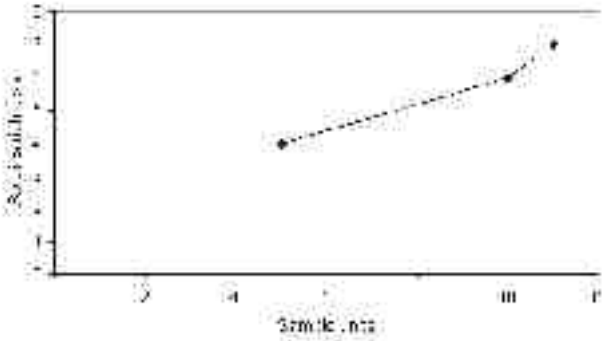


Fig 18. Cumulative shrub species effort curve for scrub forest in BTC area

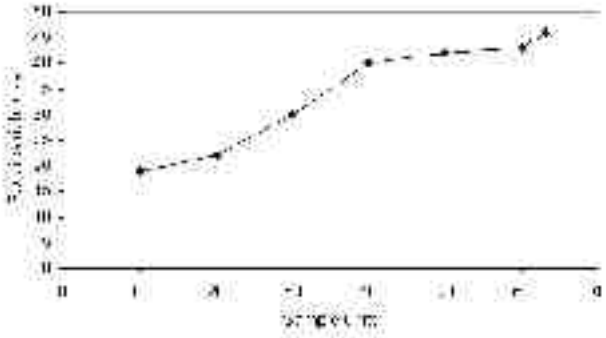


Fig 19. Cumulative shrub species effort curve for dry deciduous miscellaneous forest in BTC area

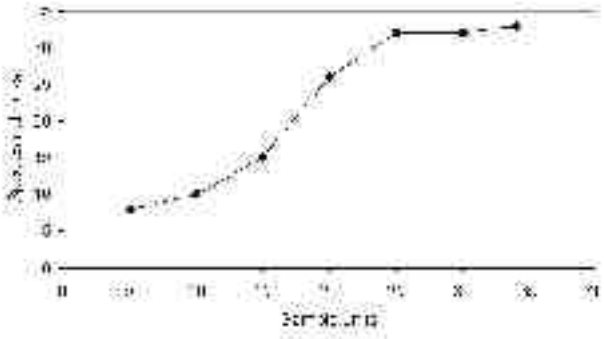


Fig 20. Cumulative shrub species effort curve for moist deciduous miscellaneous forest in BTC area

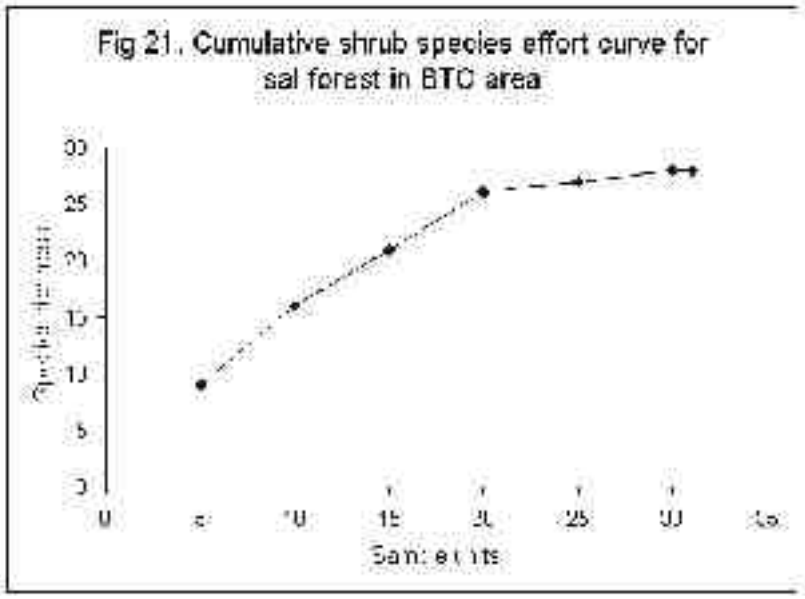


Fig 21. Cumulative shrub species effort curve for sal forest in BTC area

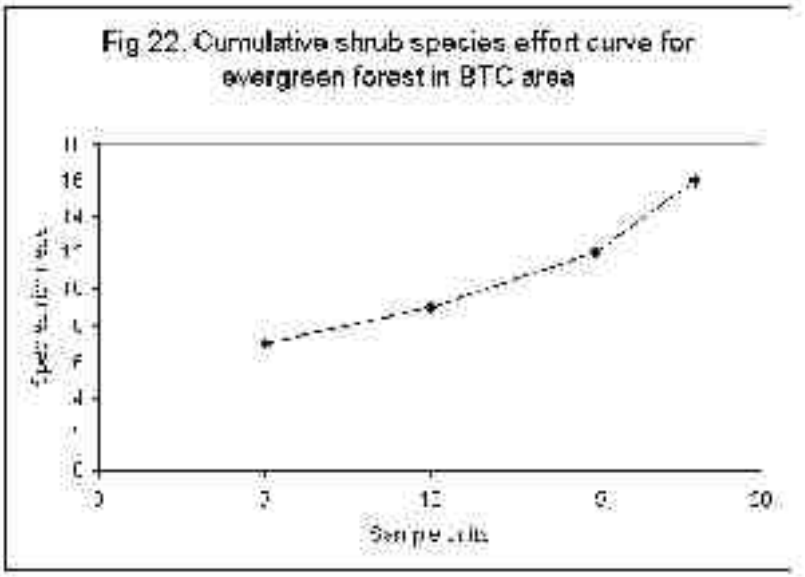


Fig 22. Cumulative shrub species effort curve for evergreen forest in BTC area

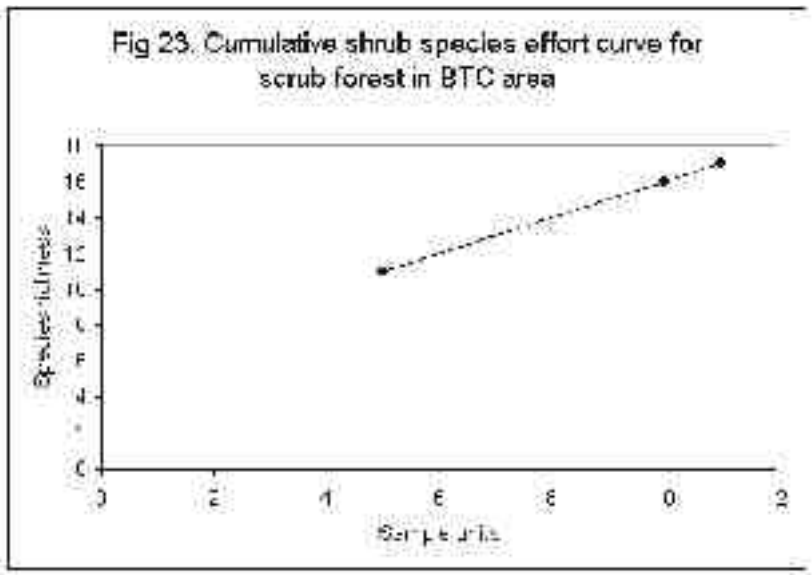


Fig 23. Cumulative shrub species effort curve for scrub forest in BTC area

ANNEXURE 35

Protocol for the rehabilitation of Greater One-horned Rhinoceros (*Rhinoceros unicornis*)

1. Wildlife Rehabilitation

Once distributed all along the terai grasslands in the foothills of Himalayas, the greater one-horned rhinoceros (*Rhinoceros unicornis*) is now restricted to few pockets in India and Nepal (Singh and Rao, 1984). Unlike the other two species of Asian rhinos, the greater one-horned rhinoceros has recovered from very low numbers in the past (Foose and Strien, 1997), thanks to the protection given by the governments of India and Nepal. The Kaziranga National Park (KNP), situated in the state of Assam, has the largest population of the species in India.

Due to increasing man-wildlife conflict and the floods that hit the state of Assam every year, instances of rhino calves getting left behind the wild is not uncommon. The aim of this protocol is to lay down in sequence the procedures involved in the rehabilitation of such rhino calves in the state of Assam.

Any healthy animal, rescued from the wild, is a potential candidate for return to the wild. Before they become permanently displaced, they can be released either immediately without stabilization or a few days later after stabilization in captivity. Once they become permanently displaced, they can be released only after long-term rehabilitation process.

Internationally, Wildlife Rehabilitation is an emerging discipline in the science of wildlife conservation, with both conservation and welfare issues being intricate components. The International Wildlife Rehabilitation Council defines Wildlife Rehabilitation as the treatment and temporary care of injured, diseased, and displaced indigenous animals, and the subsequent release of healthy animals to appropriate habitats in the wild (Miller, 2000).

CWRC: A rehabilitation centre near Kaziranga

Department of Environment and Forest, Government of Assam, Wildlife Trust of India (WTI) in partnership with International Fund for Animal Welfare (IFAW) has been involved in the rehabilitation of displaced, injured and orphaned animals in Assam through the Centre for Wildlife Rehabilitation and Conservation (CWRC) near Kaziranga National Park of Assam, India. The centre has been established considering the impact of annual floods on the wildlife population in KNP and adjoining protected areas. The centre thus acts as a buffer between wilderness and lifetime care facilities like zoos, thereby giving displaced wildlife an opportunity to return to the wild.

Role of CWRC in rhino conservation

1. According to IUCN/SSC Action Plan on Asian rhinos, all the species of Asian rhinos have declined over the years due to habitat loss for agriculture and poaching (Foose and Strien, 1997). Of all the Asian rhinos, only the Grater one-horned rhinoceros has managed to stage a recovery, for otherwise it would have also been listed Critically Endangered (CR) in IUCN Red List Categories. The species is listed Endangered by IUCN and in Appendix 1 by CITES.
2. None of the rhinos taken to the zoos for exhibit and breeding purpose in India has contributed to the cause of either restocking or reintroduction programs. Rehab centres like CWRC are ideally placed to initiate restocking and reintroduction programs because of its location within the protected area limit. The rhinos in rehab centres like CWRC are better candidates for `return to the wild' option than individuals placed or bred in zoos.
3. Considering the fact that infectious diseases like tuberculosis is endemic in most of India's zoos, rhinos in rehab centers stand a better chance of being a source population for reintroduction, restocking and range extension programs.
4. The IUCN Action Plan for Asian rhinos recommends that the one-horned rhinos are translocated and reintroduced into some

areas of Assam, Uttar Pradesh and West Bengal in its former range (Foose and Strien, 1997). The rhino specialist group has also recommended that 10 additional rhino reserves be established in different parts of Nepal and India to ensure the species' long term survival (Suwal and Shakya, 2000). With at least two rhinos calves being brought to the centre every year, CWRC would be ideally placed to provide a stock of rehabilitated rhinos for restocking and reintroduction programs in future.

5. One of the major impacts of rehabilitation projects is that it creates awareness amongst the public on the plight of the animals. The presence of a rehab centre, the translocation exercise and the news of the rhino being returned to the wild, all have a positive impact on the public's mind-set towards wildlife.

2. Hand raising techniques for rhino calves

This section of the protocol describes how rhino calves brought to the centre shall be hand-raised and rehabilitated until they are large enough to be moved to the field for acclimatization before release.

Attending to rhino calf emergencies

1. Only under the following circumstances that a rhino calf seen alone in the forest shall be considered in distress:
   - When the mother fails to turn up for a prolonged period of time and all efforts to locate the mother in the nearby areas, for reunion, fail.
   - When it is being carried away by flood waters.
   - When the calf is unable to move due to injury or illness.

(**Note:** One of the common reasons for rhino calves being abandoned or seen alone in the forest is due to injuries sustained during predator attack. Such calves should be ideally left unattended and only taken to captivity when the natural process of predation is disrupted due to human interference).

Housing and stabilization of rhino calves

1. Soon after arrival at the centre, the calf will be moved to the designated stabilization room meant for hand-raising rhino and elephant calves. The stabilization room typically has indoor rooms and adjoining mini paddocks of about 50-100 square meters each.
2. The room shall be well ventilated for use in summer and well protected from cold weather in winter. The room will also have provision for heaters or UV lamps and fans. The flooring shall be concrete for easy drainage and frequent cleaning, but at the same time well padded with a thick bedding of straw. The bedding will be sun dried every day and the straw replaced.
3. An initial veterinary examination should check all health parameters, if necessary, additional expert opinion shall be called from nearest facility. It will also be advisable to get multiple veterinary advices.
4. While in captivity, the following parameters will be recorded: Age and sex of the calf, morphometrics like shoulder height, chest girth and front-foot circumference, body weight and dentition. These parameters will be recorded every month.
5. Rhino calves are not totally dependent on the 24 hours presence of keepers. They can be left unattended during feeding intervals once the critical period of first two to three months is completed.

Choice of milk formula

Rhino calves can be easily initiated to bottle-feeding. Being myopic, they can be easily drawn towards the feeding bottle and even taken for a walk to newer locations by making them follow the bottle.

- There are no commercial milk replacer available and though rhino milk composition is typically high in lactose and low in fat, they have been found to tolerate human formulas like Lactogen 2 (Nestle India, containing 18% fat of solids).
- If the calf is dehydrated, oral electrolytes will be administered first. The concentration of the milk powder per liter of water shall be gradually increased from mere 50 gms initially to even 150 gms per liter when the calf is 16-18 months of age.
- Depending on the age and body weight, the calf will be initially fed either on demand or every two hours and subsequently reduced to 3 hourly and 4 hourly intervals.
- Specially made rhino teats attached to a two or three litre bottle shall be employed for feeding rhino calves.

Vitamins (especially A, D, E and B-complex) and minerals supplements (especially Calcium and Phosphorus) shall be added to the milk formula as supplements.
Cereals and grams (moong crush and brown rice) will be added as supplements at three to four months of age.

Husbandry and keeper consideration

1. A high standard of hygiene will be maintained during the nursing period as the calves are prone to pick up infection particularly enteric infections. This would include:
   a. Maintenance of personal hygiene of the keepers handling the calves. Employment of a separate set of personnel for food and milk formula preparation.
   b. Frequent disinfection of the stabilization room and the adjoining paddock.
   c. Daily cleaning of the kitchen or milk preparation area.
   d. Sterilization of all feeding bottles, teats and other utensils after every feed.
   e. Preparation of fresh milk formula for every feed and discarding the surplus.
2. Keepers who are attending to diseased animals at the centre shall not be allowed to handle or go near the new arrival. Moreover, all keepers will be regularly screened for infectious diseases like tuberculosis, hepatitis A and B and influenza and only those keepers who have passed these tests will be given responsibility of looking after the calf.
3. Once the calf has stabilized, it will be given a bath during hot hours of the day. As rhinos like to wallow, opportunities will be provided for the calf to wallow in muddy pools in the mini paddock itself.

Veterinary considerations

The family Rhinocerotidae does not have domestic equivalents unlike members of the order Artiodactyla. Most of the domesticated species being cloven-footed ungulates, not many infectious diseases are shared between livestock and rhino.

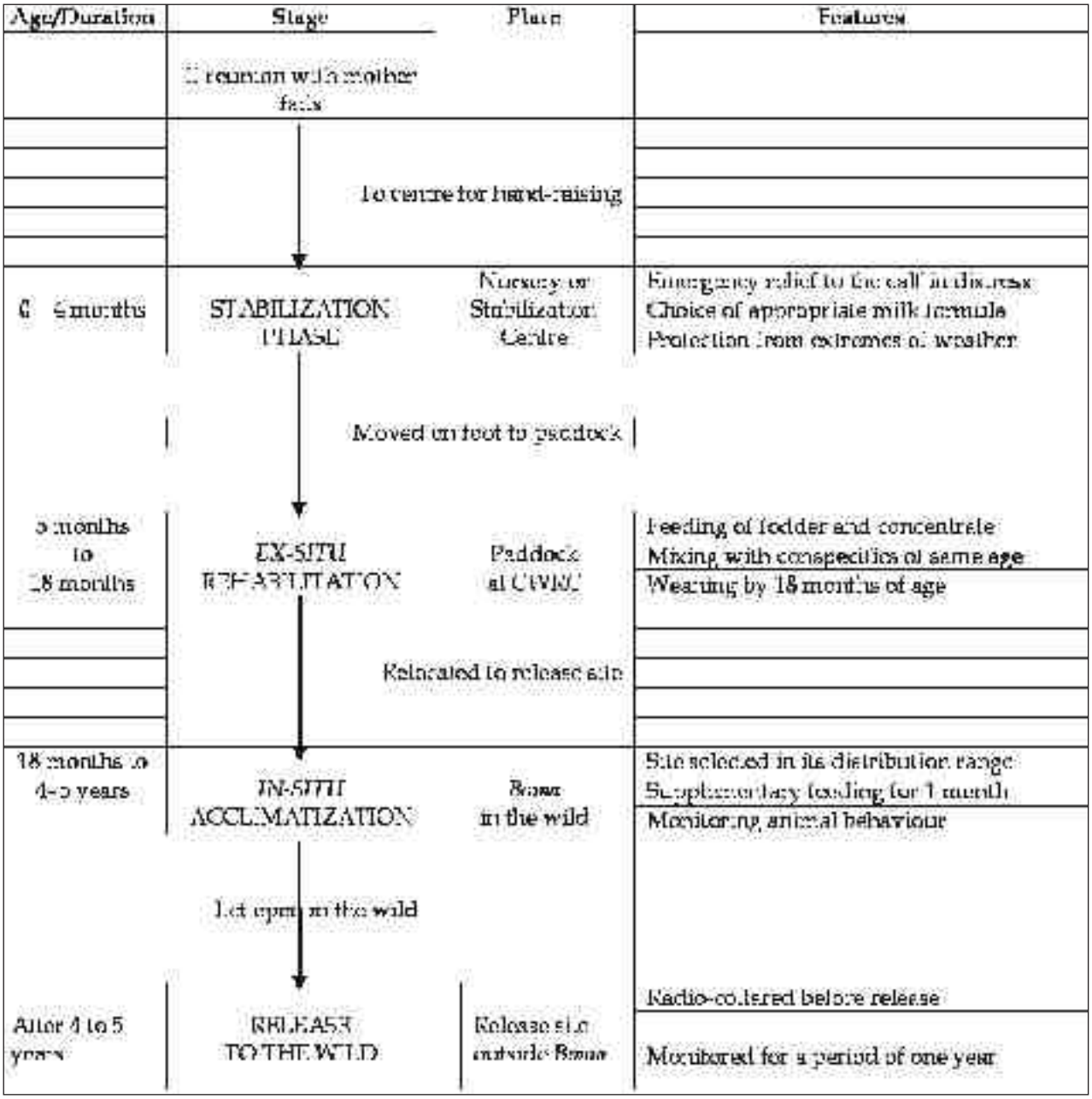
- All rhino calves shall be dewormed with a suitable broad-spectrum althelmintic after two months of age. The stools or dung samples shall be tested every quarter for parasite ova for further deworming.
- Records from captivity indicate that rhinos are not usually vaccinated against any infectious disease. If any vaccination is considered by the attending veterinarian, no modified live vaccines, especially those used against viral diseases of domestic animals, shall be employed. Rhino being a perissodactyle, the need for protection against *Clostridium tetani* shall be investigated.
- Pre-release treatment: The rhino will be checked for infestation with ticks, which may be a vector for insect-born diseases. The endoparasite load will be evaluated by fecal examination and an appropriate anthelmintic will be administered if there is any evidence of severe infection. All pre-release treatments will be completed before one week prior to the transfer of the animal from the centre in order to prevent the drugs from masking the signs of disease and development of drug resistant organisms in the release environment (Woodford, 2001).
- Rhinos with permanent disabilities due to injuries/disease will not be considered for release. They shall be moved to permanent care centres or zoos.
- Serum samples will be subjected to neurological investigations to determine the prevalence of infectious diseases like tuberculosis and other diseases that may be considered important.

3. Stages of rehabilitation of rhinos

Weaning and *ex-situ* rehabilitation

Soon after stabilization in captivity, the rhino calves will be allowed to stay in the stabilization centre until they are 5 to 6 months of age. They will then be moved to a specially made *ex-situ* rehabilitation paddock until they are grown up for *in-situ* acclimatization...

- The paddock will be not be less than 1,000 square meters, fenced by bamboo poles protected by two or three lines of power fence inside to minimize damage to the structure. The paddock will also have a large shelter that is covered on three sides to protect the rhino from extremes of weather.
- Weaning at correct age facilitates in the breaking the bond between keepers and the animal. The rhino calves shall be weaned at the age of 18 months or even before.
- The animals will be introduced to fodder and concentrates during this period. The concentrate will comprise a mixture of gram and cereal fed daily.



- Unlike in the stabilization yard, contact with the keepers shall be further minimized to avoid imprinting and reduce dependency on humans.
- Wherever possible, two rhinos will be allowed to share the same paddock for companionship and social bonding.

Selection of site for *in-situ* rehabilitation

The acclimatization shall be conducted at the proposed site of release itself. The release could be for the purpose of reintroduction or restocking. The task of selecting a suitable site of existing rhino habitat in Assam for eventual release of the animal will be left to the team headed by the Project Leader of CWRC and representatives from Dept. of Environment and Forests, Assam, Wildlife Trust of India and conservation biologists from outside if any. The suitability of the proposed site will be evaluated using a standard proforma which will eventually be signed by the team members. The following criteria would be taken into consideration in selecting the acclimatization and release site.

- The area selected shall fall within the present or past distribution range of the species.
- The area shall be free from anthropogenic pressures like cattle grazing. It should ideally be far away from human settlements.
- Any fencing activity shall cause minimum

disturbance to resident wildlife in nature, the site selected shall not have any resident rhino which may either get disturbed or displaced due to fencing activities.

- The chosen site shall be within a protected area and enjoy adequate protection by the Forest Department personnel.
- The site should be approachable to the rehabilitators from translocation and monitoring point of view.

Construction of the confinement paddock or *boma*

- The *boma* or the temporary captivity zone will encompass an area of not less than 3 acres, fenced with battery operated 7 feet high power fence consisting of 6 to 8 lines to prevent the entry of tigers, leopards and large herbivores. The enclosure shall have one or two gates, large enough to permit the entry of trucks for unloading the rhino.
- The *boma* will have all the necessary elements of a rhino habitat, viz swamp or water body for wallowing, adequate shade, and patches of tall and short grasslands in the middle for the rhino to rest at night.
- The *boma* will also contain elevated locations for the rhino to take refuge during during floods.
- A small camouflaged temporary field camp would be established near this confinement zone for the field staff to monitor the animal during the period of acclimatization.
- The animal will be in the *boma* for a period of one to three years until it is adequately habituated to the surroundings.

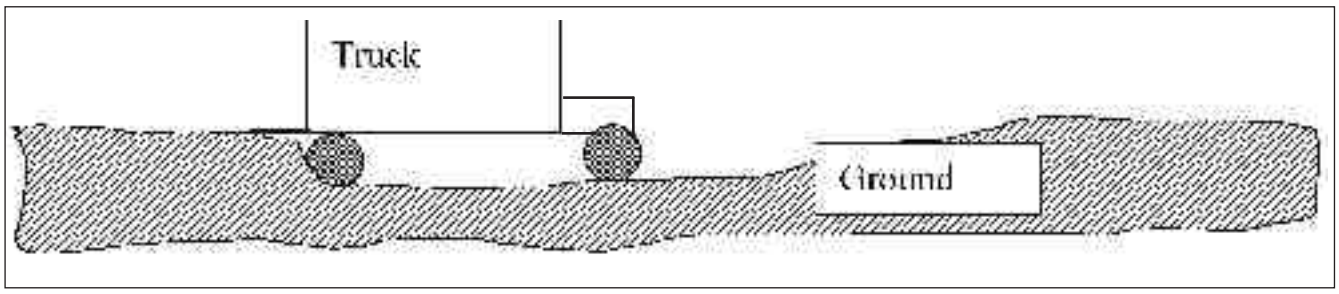
Relocation of the rhino from CWRC to release site

The relocation of hand-raised rhinos for restocking/reintroduction programs like the one being attempted at CWRC does not demand chemical capture as the animal can be lured into the truck directly. Captive rhinos have been made to walk directly into trucks (Suwal and Shakya, 2000). Consequently the need for drug-immobilization and the special sledge often employed to move the heavy animal into the crate may not be required. Nevertheless, the operation still requires meticulous planning and preparation.

- The animal will preferably be radio-collared before it is loaded into the truck.
- Drug immobilization and the use of sledge and crates will be considered only if efforts to load the animal into the truck fail. Rhinos have been captured from the wild, translocated and released to newer areas as part of conservation reintroduction programs in India and Nepal (Singh and Rao, 1984; Suwal and Shakya, 2000). Invaluable experience has been gained from these chemical capture and translocation operations and they all have been well documented.
- The rhino will be habituated to the crate for a period of at least 30 days. The crate shall have vertical sliding doors on both ends and adequate number of strong hooks or rings on all sides for tying and fastening with ropes. The recommended size of the crate will be 1.6% of the body dimension of the rhino.
- The floor of the vehicle would be placed at ground level by digging a small portion of the approach road of the animal paddock (see illustration below). A similar trench will be prepared at the release site also for unloading the animal into the *boma*.
- Once loaded the animal will transported to the release site under mild sedation to prevent anxiety during transit.

Provision will be made, at the release site, for easy unloading of the animal. For this, a part of the soil will be dug so that the rear door of the truck can easily rest at the ground level (see illustration below). However, a crane will be employed to load the crate with the rhino into the truck.

- The vehicle will move at a speed not more than 40 km per hour. If the journey is long (more than 2-3 hours), the vehicle shall be



stopped every hours to thoroughly check the well being and comfort of the animal. The attending veterinarian and keeper shall accompany the animal in the truck to the release site.

- At least six captive elephants shall be kept standby at the unloading site to deal with emergencies.

In-situ acclimatization in the *boma*

Though rhinos occasionally congregate in small groups in the same wallow or grassland, they are mostly solitary (Suwal and Shakya, 2000). *In-situ* acclimatization is therefore essential for a rhino to establish its home range in the wild. All rhinos will be subjected to a period of minimum one year of *in-situ* acclimatization in a large confinement or *boma*. If two rhinos were brought together in company during the *ex-situ* rehabilitation phase, both the animals will be moved to one single *boma* unit.

- A biologist will be appointed to monitor the rhino during the entire period of acclimatization. Monitoring would include behavioral observation and the presence of other wild mammals around the enclosure.
- For the first two weeks, the rhino will be fed with fodder and concentrates as supplementary food. This will be gradually phased out until the rhino becomes totally dependent on the grass and browse available in the wild.
- All rhinos will be radio-collared and old collars replaced before released from *boma*.
- After release, the animal will be monitored on a daily basis for a period of one year to record its movement pattern and habitat use.
- Steps would be taken to take the animal back to the *boma* if the survival of the animal is threatened by conspecifics, other sympatric species or poachers.
- The rehabilitation of rhino involves the following impending risks that are avoidable:
  - The possibility of the animal getting swept along the streams or rivers during the annual floods.
  - Temporary or permanent loss of contact with the animal after release as radio equipments may fail to work.
  - The possibility of individuals getting hurt or killed by people when they accidentally wander into human habitations. Such problem animals will be captured, either for lifetime care or considered for release in a *boma* in a different place.
  - The entire rehabilitation process will be documented by written documents and video and still photography. Interim reports will be published on the progress of rehabilitation.

4. Legal permits for rehab and release

The greater one-horned rhinoceros enjoys a high level of protection under Wildlife (protection) Act, 1972. Following permissions from the Governments shall be obtained from the Central and State Governments during the period of rehabilitation.

1. To facilitate the process of obtaining legal permits from the state and central governments, the following documents will be submitted along with the proposal.

a. The protocol on rehabilitation of rhino

b. The following proformas duly signed by the Project Leader, Centre Manager, Veterinarian and other relevant authorities shall be submitted to the state and central governments for obtaining the permission for translocation and release.

   i. **Site selection:** The site selection criteria have already been listed before..

   ii. **Biological and behavioral considerations:** A careful assessment of the level of habituation of the animal, namely its ability to compete for food and space in the wild shall be determined before and after the *in-situ* rehabilitation. Rhino being a candidate for release after a prolonged period of *in-situ* acclimatization, this assessment is more relevant when done before the animal is released from the *boma*.

   iii. **Veterinary considerations:** The various veterinary protocols to be met under this document have also been dealt before. Permission will be obtained from the Chief Wildlife Warden (CWW) of Assam for the establishment of rehab station comprising the *boma* and monitoring facility in the wild. Prior written permission will also be obtained from the CWW and CZA for the transportation of the animal from the centre to the *in-situ* acclimatization *boma*.

2. All the permission letters, either to the state or central government, shall be routed through the Project Leader.

3. All rehab centres come under the mandate of the Central Zoo Authority (CZA) of the Ministry of Environment and Forests

(MoEF). CWRC has been registered under CZA and all rescues of Schedule I and Schedule II (part 2) animals are being informed to CZA.

4. No rhino shall be moved to the *boma* without the permission of the Assam Forest Department and no animal shall be released to the wild without the written permission of the MoEF, Government of India.
5. Use of radio-telemetry in wildlife requires the permission of the Ministry of Telecommunications. No rhino shall be radio-collared without the permission of this ministry.

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ANNEXURE 36

Protocol for the rehabilitation of displaced elephant calves (*Elephas maximus*)

1. Wildlife rehabilitation

India's wildlife and forests are facing increasing pressures due to developmental activities like agriculture, grazing and human habitation. Though some species are able to adapt to these changes, a vast majority succumb to these pressures. Often, animals tend to stray out of their diminishing habitats in search of food or shelter into villages adjoining forests; or sometimes into urban areas away from the forests. Such animals are often disoriented and injured, eventually ending up in over-crowded zoos or ill-equipped animal care centres. Human intervention is therefore critical to rescue and rehabilitate these animals in distress.

Rescue Centre

The International Wildlife Rehabilitation Council defines Wildlife Rehabilitation as the treatment and temporary care of injured, diseased, and displaced indigenous animals, and the subsequent release of healthy animals to appropriate habitats in the wild. The Centre for Wildlife Rehabilitation and Conservation (CWRC) in Borjuri, Kaziranga, Assam, was established by WTI and Assam Forest Department with support from the International Fund for Animal Welfare (IFAW), realizing the urgent need to save and return to the wild as many wild animals as possible during such periods of crisis. The centre provides food, shelter, veterinary care and other rehabilitation measures to them until they are fit enough to be released back into their appropriate habitats. Elephant calves are one of the most commonly rescued species at the centre.

Basic rehabilitation rules

1. Rehabilitation shall be carried out by group of trained rehabilitators, in accordance with this protocol prepared as per the standards followed in other rehabilitation operations and the guidelines laid down by IUCN Reintroduction & Veterinary specialist groups.
2. Rehabilitation process will not be initiated or continued if it becomes clear to the rehabilitators at CWRC that success is not fairly certain.
3. The overall success of the rehabilitation project shall be evaluated as per the objectives laid down in the beginning. If necessary, decision shall be made to revise, reschedule or discontinue the program.

2. Species account

Protection status

Asian (Indian) Elephant - *Elephas maximus Linnaeus*, 1758, is classified under the IUCN listings (IUCN 2004. 2004 IUCN Red List of Threatened Species) as endangered (EN A1cd) and remains on Appendix 1 of CITES. The Indian Wildlife (Protection) Act, 1972 as amended up to 2003 lists the species in Schedule I and gives the highest degree of protection. The total number Asian elephants left in the wild are thought to be 26,390 – 30,770 (Sukumar, 2004).

Distribution and threats

At present *Elephas maximus* is distributed in India, Nepal, Bhutan, Bangladesh, China, Myanmar, Thailand, Laos, Cambodia, Vietnam, Malaysia, Indonesia and Srilanka (Sukumar, 2004). India by far has the largest living population of the Asian elephant (about 50% of the Asian total). They are found in five different geographic zones: North-Eastern India, Eastern India, Northern India, Southern India and the islands of Andaman and Nicobar (Bist, 2002). About half are in the northeastern states, principally Assam, Arunachal Pradesh and Meghalaya (Sukumar 1986).

The rapid rise and spread in human population has meant the gradual elimination of the elephant in many areas, the principal reason being habitat loss. Poaching

of elephants for ivory continues to be a serious problem in the country. The deliberate killing of elephants by farmers by poisoning or electrocution in retaliation against crop raiding by elephants is another matter of serious concern. Natural calamities like floods and man-made disasters like irrigation canals and tea garden trenches have contributed to the displacement of elephant calves. In a survey conducted on the status of displaced elephant calves, 51% of the 81 displaced calves during the period 2001-2004 were due to man made causes such as falling into tea garden ditches, irrigation canals, or getting caught in train accidents (Menon *et. al.*, 2005).

Need for rehabilitation of elephant calves

The case of displaced elephant calves needs to be addressed primarily from a welfare point of view. With more and more elephant calves getting displaced from their natal herd across the country, they invariably end up in forest department elephant camps or in private hands for hand rearing or are sent to a zoo for exhibition. Since majority of elephant calves across the country get displaced from the wild due to man made causes, there is a strong moral obligation for wildlife managers to make attempts to return these calves back to the wild.

In wild elephants, the skewed male-female ratio is a problem over most of India and the rehabilitation of male calves back to the wild is crucial to have the optimum sex ratio in the wild.

3. Rehabilitation options for elephant calves

Acceptance of calves

1. No trained elephant calves will be accepted.
2. Any calf of wild origin, any age may be accepted
3. Calves born of captive dam and wild sire, if rejected by mother and if the source of them is proven, can be taken for rehabilitation.

Stages of elephant rehabilitation

Since the aim is to put a wild animal back to the place where it really belongs, the predicament of a displaced elephant calf found in the forest shall be addressed in the following ways:

First attempt: *Reuniting with the herd on site*
Second chance:*Reuniting after rescue and stabilization*
Third chance*: Re-integration with a wild herd after long term rehabilitation*

Reuniting with the herd on site

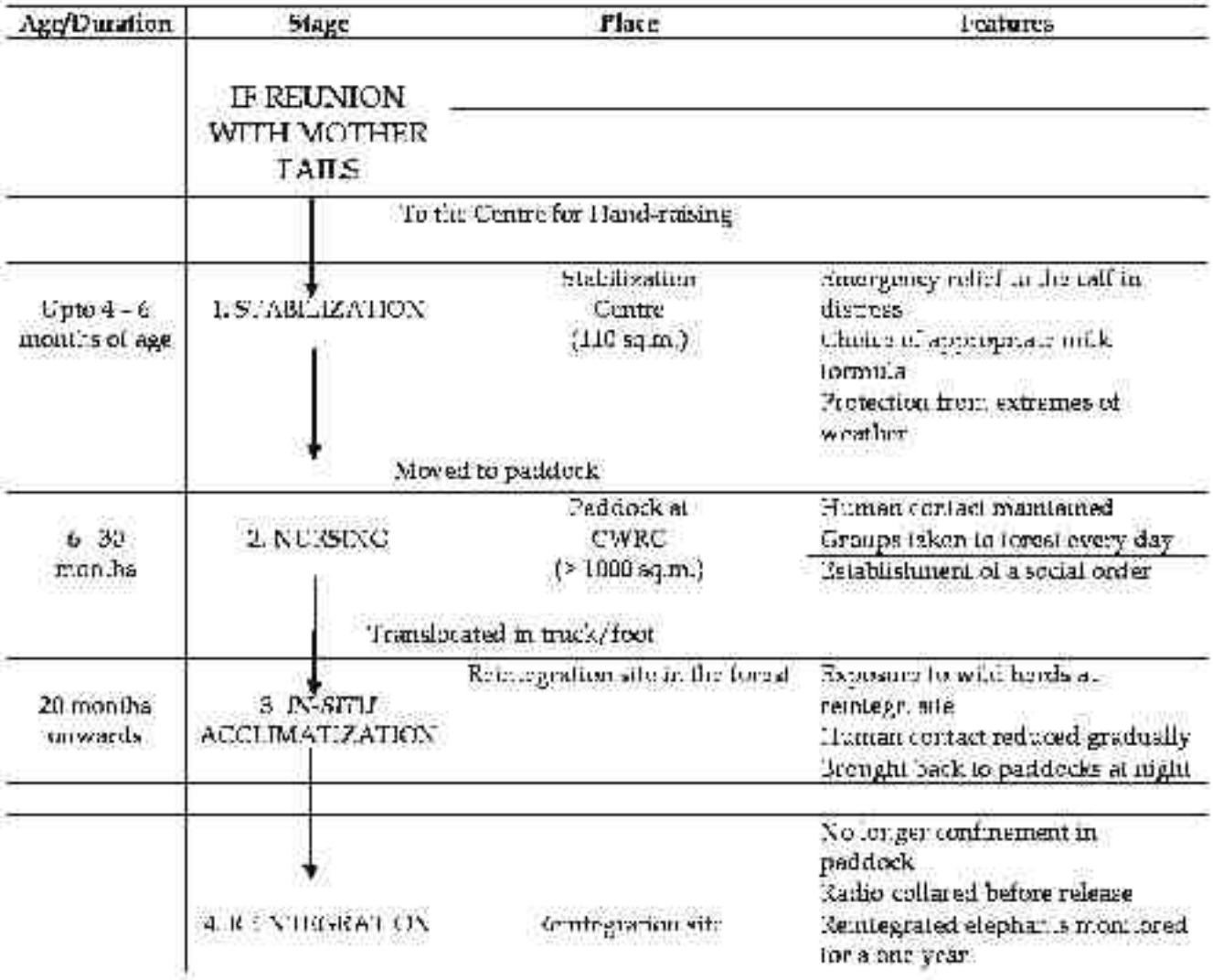
The following points shall be considered when an elephant calf is seen alone in the forest:

a) A calf seen alone in the forest will be considered a temporarily displaced animal. Since the natural mother is always the best option, every effort will be made to reunite young ones that have been separated from the natal herd.
b) There are times when an elephant calf may simply be disoriented as the herd may have temporarily lost track of it. In such a scenario the team shall just wait and watch for the herd to come back and get the calf.
c) If the calf is trapped in a tea garden ditch, irrigation canal, well, river, stream or being washed in the flood, it will be freed from any such obstacle treated incase its suffering from minor injuries.
d) If the calf and the herd are around, the team will withdraw immediately and monitor the reunion from a distance.
e) The calf will be taken to the centre for stabilization only under the following circumstances:
    i. When there is immediate threat to the life of the calf because of floods, a trap, injury or dehydration
    ii. When the natal herd fails to come back after an overnight period of observation
    iii. When the normal process of predation of calves is disrupted by human interference.

Reuniting after stabilization in captivity

a) The displaced elephant calf, even though brought to captivity, will still be considered a temporarily displaced animal and every effort will be made to reunite the calf after stabilization.
b) Stabilization would include treatment for injuries, dehydration, starvation etc.
c) If the calf had not consumed sufficient colostrum resulting in inadequate transfer of maternal antibodies from the mother, plasma from an adult elephant would be collected for feeding the calf.
d) Most calves will be dehydrated and hungry because of the long time separation from the mother. They will be fed with electrolytes for rehydration and a suitable milk formula soon after arrival (see next section on "Hand-rearing" for milk formula).
e) While in captivity, the following parameters will be recorded: Age and sex of the calf, morphometrics like shoulder height, chest girth

Flow Chart of Stages of rehabilitation of elephant calves



and front-foot circumference, body weight and dentition. These parameters will be recorded every month.

f) After stabilization for 6 to 24 hours (or even 48-36 hours or more in the case of injured elephant calves), the calf will be taken to the same area where it was found in the forest, left alone at night and observed overnight from a distance for the herd/mother to come back to attend the calf.

g) The calf need not be reunited with its natal herd. Any herd that shows willingness to accept the calf is ideal. The size and composition of the herd that accepts the calf must be noted in order to monitor the movement of the herd.

h) The calf will be taken back to captivity and prepared for long term rehabilitation if the efforts to reunite with the herd fail even after two to three nights of attempts.

Release after long term rehabilitation

Once all attempts fail to re-unite the elephant calf with its natal herd the calf can be considered permanently displaced. The current practice is to train permanently displaced elephant calves for use in captivity. There is a general assumption in India that permanently displaced elephants cannot go back to the wild. However, elephants (both calves and adults of varying age groups) have been routinely rehabilitated and returned to the wild in Kenya, Africa (Sheldrick, 1995, 2003) and recently in Sri Lanka (Jaywardena *et. al*, 2002).

The long term rehabilitation exercise comprises of three phases: (i) Hand rearing the calves*ex-situ* until they are weaned and (ii) Acclimatizing them *in situ* and (iii) Reintegrating to the wild. The protocols for these phases have been dealt with in the following sections 4 and 5.

4. Hand rearing permanently displaced calves

Period of 60 days from the day of arrival in captivity is considered the crucial period for survival. The calves will be hand raised at the stabilization center for a period up to two to six months until they can be taken either to a larger paddock or to the forest for *in-situ* acclimatization.

Stabilization of elephant calves

The survival of an elephant calf during the period of stabilization depends on a combination of factors like age at rescue, the condition of the calf, interval between separation and rescue, amount of colostrum consumed, extent of injury and the presence/absence of congenital abnormalities and the trauma the calf has undergone.

1. Soon after arrival at the centre, the calf will be moved to the designated stabilization room meant for hand-raising elephant calves. The stabilization rooms will be of 10x10 feet dimension and adjoining mini paddocks of about 50-100 square meters each.
2. The room shall be well ventilated for use in summer and well protected from cold weather in winter. The room will also have provision for heaters or UV lamps and fans. The flooring shall be concrete for easy drainage and frequent cleaning, but at the same time well padded with a thick bedding of straw. The bedding will be sun dried every day and the straw replaced with fresh ones as and when required.
3. During initial examination, the hydration status of the calf shall be examined for appropriate hydration therapy, apart from evidences for injuries due to fall, abrasions or predator attack and open and infected umbilicus.
4. Since elephant calves in the wild are constantly with the herd being looked after by the mother and the herd members, once brought to captivity they need the 24 hr presence of the keepers.
5. The wild elephant family has to be replaced by the human family of keepers. Each keeper has to form a special bond with the elephant calf in their care.
6. A 'security' blanket, which can act as a dummy mother, shall be hung in the enclosure so that the calf can hold on to it.
7. If a foster mother can be identified in a near by forest department elephant camp then the process of hand raising and socialization becomes even easier.

Choice of milk formula and feeding

Elephant calves are difficult feeders and the choice of an appropriate milk formula as well as getting the calf to drink it is an uphill task.

- Elephant milk fat has a unique fatty acid composition. Capric and lauric acids are present in much higher concentrations than in other species (Peters *et. al.* 1972). The intolerance of elephant calves to bovine milk experienced by various facilities hand raising elephants may well be attributed to this unique fatty acid composition (Bowling *et. al.*, 1965).
- The concentration of amino acids in elephant milk is generally low and nearer to human milk than bovine milk (Mainkar *et al.*, 1994). If suitable elephant milk replacers are not available, human infant formula which has been found to cause less intolerance to elephant calves shall be used. Therefore, up till six months the calves are fed on a diet of Lactogen 2, after which may be switched over to Nestogen 2 and a cereal mixture of Nestum (Rice) is also added to the formula.
- If the calf is dehydrated, oral electrolytes will be administered first. Initially, for the first three months the calf will be bottle-fed on demand, through the day as well as night and gradually settle into a three-hourly round the clock feeding schedule.
- For first one week a probiotic is introduced along with the formula for a period of two weeks continuously.
- The calves' digestive system may take some time to get used to the human milk substitutes, and intermittent diarrhoea is something that cannot be avoided. In such a situation the concentration of the milk will be reduced to 50% or even less, and substituted with oral (if necessary intravenous) rehydration solutions.
- All calves will have free access to green pasture and the adjoining forest areas after 4-6 months of age and will be weaned off milk by 24 to 30 months. The calves can be fed in the forest itself.
- From the 8th month onwards the cereal mixture will be changed to increase dry matter consumption, protein supplement and to bring down cost.
- By the 30th month the calves will be completely weaned and the concentrate mixture continued up to 3 years of age or more, depending on the time when it is moved to the release site for acclimatization.
- A 'security' blanket will be hung in the enclosure, and the bottle will be offered to the calf from behind the blanket, while the calf can rest its trunk against the blanket or on the

keeper's shoulder or chest for comfort and security.

Housing, husbandry, veterinary and keeper considerations

1. All keepers, before being handed over the responsibility of hand rearing the calf, will be screened for infectious diseases, especially Tuberculosis and Salmonellosis.
2. At no stage the calf will be left unattended by its keeper. The keeper will always accompany the calf. A stand-by keeper will be identified to attend to the calf in the absence of the main keeper. The keepers will care for the calves on a rotational basis to avoid excessive attachment or habituation on any one keeper.
3. A high level of hygiene will be maintained as elephant calves are highly susceptible to infection due to their immune system being weakened by isolation and inadequate colostrum intake. This would include:
   a. Personal hygiene of the keepers handling the calves
   b. Maintenance of hygiene while preparation of food
   c. Frequent disinfection of the paddock where the calf is confined
   d. Daily cleaning of the kitchen or milk preparation area
   e. Sterilization of the utensils, feeding bottles and teats before and after use at all times.
   f. Cleaning the perennial region after passing of stool if the calf is very young, especially in the case of diahorrea.

4. The calf will never be tied but let loose either in a paddock specially made for them or allowed to move freely along with the keeper. This paddock needs to be re-enforced with an electric fence by the time the calves are a year old. This is when they start becoming difficult to restrain.
5. The calf will be confined indoors every night to protect against extreme climatic conditions. Adequate warm clothes will be used during winters to protect the calf at night. In the case of very young calves, a room heater will be used.
6. Depending on the season, the calf shall be bathed once or twice a day. A mud wallow will be maintained for the calves to have a mud bath everyday. Sand piles will also be maintained for the calf to play in.
7. All calves will be dewormed with suitable anthelmintic before they are two months old. Thereafter the dung samples of all calves will be periodically examined for the presence of parasite ova. Subsequent dewormings will be done at the discretion of the attending veterinarian.

Establishment of social order

1. While in captivity, care will be taken not to endanger the behavioural, conservation and health status of the animal during the period of confinement, or in anyway diminish its rehabilitation potential. The calves will not be taught the commands the camp elephants are subjected to.

2. Elephant calves will naturally form a small social order of their own, establishing a hierarchy amongst themselves like they would do in the wild. This behaviour will be encouraged and the calves will be allowed as much time as possible with each other.

5. Acclimatization and Reintegration

Once the elephant calves are weaned, they are ready to be moved to an area isolated from human interference which is a suitable elephant habitat with a reasonably large resident wild elephant population for *in-situ* acclimitisation. If the reintegration facility has the infrastructure for preparing milk formulas, the calves can be moved to the site even when they are a year old. The young elephant calves need to acclimatize to the wild environment where they come in contact with their wild counterparts and socialize with them. Unlike in many other rehabilitation procedures, the process is more of a "reintegration into the wild" as opposed to "acclimatization in confinement".

1. The calves can be moved to the re-integration site by means of a truck. The size of the truck shall depend upon the number and age of the calves being transported.
2. Most elephant calves are curious and can be tricked into getting inside the truck with the help of food and treats and coaxing by the keepers. However if a calf is being difficult and is stressed it can also be mildly sedated.
3. The keepers who have hand raised the calves must move to the re-integration facility with the calves.
4. The calves will be taken out for foraging and chance encounters with wild elephants every day and confined in a paddock for the night.
5. During this period the elephants are familiarized with the habitat and encouraged to explore their surroundings and forage all by themselves. The food will be supplemented with concentrates in

the evenings for the first 2 - 4 months and substituted with salt licks in the field if needed.

6. The period of acclimatization will vary depending upon the different individual elephant calves and could range from anywhere between under a year to even 15 years.
7. The keeper will gradually reduce his extent of involvement as the elephants gain confidence and are able to venture out over large distances on their own. The keepers will have to have a watchful eye over the animals with the help of a "machan" which should be erected in strategic areas in the habitat which will ultimately be the wild home of these elephants. This process will coincide with the withdrawal of concentrates and introduction of salt licks.
8. The slow transfer of dependence from keepers to wild elephants has to be dealt with extreme care. A right balance of science, the mind and the heart shall be applied. There is every chance that the elephant may not make it either due to the harsh conditions in its wild home or due to rejection by the wild counter-parts or due to excessive attachment to its captive home and keepers.
9. Elephants are born with knowledge important to survival as well as a genetic memory, both of which can only be honed by exposure to a wild situation and with constant support and encouragement of the keepers (Sheldrick, 2003).
10. At no point shall the elephants be pressurized into going "wild" or be alienated for the sake of honing their wild instincts.
11. The elephants must all have the sense of security that if unsuccessful they can return to the nurturing care of their human family.

6.Pre and post-release considerations

Veterinary considerations

As per the IUCN protocol for health screening for wildlife prior to release, every elephant meant for release will be considered a package containing an assortment of pathogens (Woodford, 2001). Prior to consideration for release, all the elephants shall be screened for infectious diseases.

(i) Standards screenings would include

a. **Feces:** Fecal examination for parasite ova and bacteria (Paratuberculosis and Salmonellosis)
b. **Blood:** Blood smear examinations for blood parasites and whole blood for hematology.
c. **Skin:** Examine for dermatological diseases including ectoparasites.
d. **Serum**: For serological investigation against infectious diseases, especially tuberculosis.

(ii) Isolation and disease investigation at the discretion of the veterinarian

a. All elephants meant for release will be isolated from all other animals in suitable secure premises for at least 30 days immediately before being moved for reintegration.
b. During this period of veterinary supervision, the keeper will refrain from contact with other animals outside the isolation yard.
c. A series of clinical and laboratory examinations will be done by the attending veterinarian in consultation with relevant authorities. Based on this, the veterinarian will decide whether the animal shall be taken to the reintegration site.

(iii) Pre-release treatment and immunization

All elephants, based on the findings of parasitological examinations, will be dewormed for round worms and flukes. They will also be treated for infectious diseases diagnosed during the time of quarantine. Vaccinations for elephants would include, if necessary, pasteurellosis and anthrax.

- Elephants with permanent deformities and chronic disease will be moved to appropriate captive facilities like zoos and lifetime care centres. Animals that are healthy and have the potential of being rehabilitated will be retained to give them a chance to go back to the wild.
- Following the screening of elephant calves meant for reintegration, the health of animals especially that of wild elephants at destination will also be evaluated. The local veterinarians in the area of reintegration will be consulted to determine if any diseases of concern for elephants are known to be endemic in the area. These would include primarily FMD, anthrax and hemorrhagic septicemia. Elephants will not be released if there are diseases of concern prevalent in that area.

Behavioural considerations

All elephants will be observed for behavioural abnormalities such as (i) Indiscipline, (ii) Excessive attachment to keepers and the facility and (iii) Inability to adjust to the wild environment or interact with captive and wild conspecifics. If any of these abnormalities are observed measures will be taken to rectify them, and alternatives such as lifetime care facilities shall be considered as a possible option.

Considerations for selecting the reintegration site

1. The site should fall within the present/historic distribution range of the Asian elephant
2. The calves need not be released at the same area of acclimatization. The Sri Lankan experience has shown that they can be released in groups for reintegration far away from the place they were raised and rehabilitated (Jayawardena *et al.*, 2002).
3. The project being reintegration into a wild elephant herd, the site chosen will have a sizeable resident elephant population.
4. The site should be approachable and at the same time located at least 5 km away from human settlement.
5. The site should have adequate fodder for the elephants to graze and browse and also water bodies or rivers/strea ams for water to drink and bath.

Monitoring elephants during and after reintegration

1. The success of the rehabilitation exercise will be monitored by tracking the animals which have assimilated into the wild. For this purpose all hand-raised calves shall be radio collared before they are moved to the re-integration site.
2. As far as possible, expandable or detachable collars will be employed to take care of the growing neck girth in young calves.
3. The elephant will be monitored for 12 months post-release depending on the need and the life of the battery in the transmitter.
4. If any rehabilitated individual fails to reintegrate into the natural habitat and wild herds as anticipated, the animal will be captured and taken back to captivity.

7. Legal permits for rehab and release

The Asian elephant enjoys a high level of protection under Wildlife (Protection) Act, 1972. Following permissions from the Central and State Governments shall be obtained during the period of rehabilitation.

1. To facilitate the process of obtaining legal permits from the state and central governments, the following documents will be submitted along with the proposal.
   a. The protocol on rehabilitation of Asian elephant
   b. The following proformas duly signed by the Project Leader, Centre Manager, Veterinarian and other relevant authorities shall be submitted to the state and central governments for obtaining the permission for translocation and release.

      i. **Site selection:** The site selection criteria have already been listed under section 6.3.
      ii. **Biological and behavioral considerations:** A careful assessment of the level of habituation of the animal, namely its ability to compete for food and space in the wild and assimilate into a wild elephant herd shall be determined before and after the *in-situ* rehabilitation.
      iii. **Veterinary considerations:** The various veterinary protocols to be met under this document have been dealt under section 6.1.
2. Permission will be obtained from the Chief Wildlife Warden (CWW) of Assam for the establishment of rehab station comprising two stockades and monitoring facility in the wild. Prior written permission will also be obtained from the CWW for the transportation of the animal from the centre to the *in-situ* acclimatization or reintegration station.
3. All the permission letters, either to the state or central government, shall be routed through the Project Leader.
4. All rehab centres come under the mandate of the Central Zoo Authority (CZA) of the Ministry of Environment and Forests (MoEF). CWRC has been registered under CZA and all rescues of Schedule I and Schedule II (part 2) animals are being informed to CZA. A proposal for the rehabilitation and monitoring of rehabilitated elephants will also be submitted to CZA.
5. No animal shall be moved to the re-integration facility without the permission of the Assam Forest Department and the MoEF, Government of India.
6. Use of radio-telemetry in wildlife requires the permission of the Ministry of Telecommunications. No elephant shall be radio-collared without the permission of this ministry.

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ANNEXURE 37

Orientation for BTC veterinarians on wildlife rehabilitation
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ANNEXURE 38

Orientation for BTC Veterinarians on Wildlife rehabilitation

Bansbari, Manas, 8th October 2006

Workshop Sessions

Day 1: 8th October, 2006

Registration of participants 08.45 AM
Inauguration 09.30 AM to 10.15 AM

Welcome address by
Inaugural address by Chief guest, Shri B. Narzari

Session 1:10.30 AM -12.15 AM - Introduction to Wildlife Rehabilitation

1. Rehabilitation centres, zoos and other captive facilities : Their differences and roles in conservation - *NVK Ashraf*

……..
TEA BREAK 11.15 AM to 11.30 AM
……

2. Principles of wildlife rehabilitation - *Kadambari Mainkar*

Session 2:12.15 PM - 01.00 PM - Guidelines and Protocols

3. IUCN guidelines on reintroduction and placement of confiscated animals - *NVK Ashraf*

……..
LUNCH BREAK 01.00 PM to 01.45 PM
…….

Session 3:01.45 PM – 03.15 PM - Care and Husbandry

4. General principles in hand-raising wild mammals - *Kadambari Mainkar*
5. Housing considerations, enclosure designs and dimensions for different species in a rescue centre - *NVK Ashraf*

……..
TEA BREAK 03.15 PM to 03.30 PM
…….

Session 4:03.30 PM - 05.45 PM - Emergency Relief and Veterinary Care

6. Medical treatment of wild animals: Justification and consequences of unwanted intervention - *NVK Ashraf*
7. Remote delivery system for drug immobilization – *NVK Ashraf*
8. Drugs and dosages for anaesthesia of wild mammals - *Dr. Bhaskar Choudhury*

Session 5: 10.00 PM – 01.00 PM - Practical sessions

9. Practical sessions on chemical restraint of wild mammals - *Dr. Bhaskar Choudhury*
10. Session on capture, restraint and handling of birds and snakes - *Abhijit Das*

……..
LUNCH BREAK 01.00 PM to 01.45 PM
……

Session 6: 01.45 PM – 05.45 PM- Case studies from Assam

11. Rhino rehabilitation project in Manas National Park - *Rathin Barman*
12. Elephant reintegration in Manas - *Kadambari Mainkar*
13. Rehabilitating of greater adjutant storks in Assam - *Shimanta Goswami*

……..
TEA BREAK 04.00 PM to 04.15 PM
…….

14. Pigmy hog husbandry and pre-release acclimatization - *Parag Deka*
15. Rehabilitation of snakes displaced due to conflict and confiscated from trade: case study from Assam state zoo - *Abhijt Das*

Valedictory function 06.00 PM

Welcome of Chief Guest by
Address by Chief guest,
Distribution of Certificates by Chief guest, Kampa Borgoyari

Abstract of presentations

by resource persons

1. **Rehabilitation centers, zoos and other captive facilities - Their differences and roles in conservation** - *N. V. K. Ashraf.*
This presentation covered at length the definition of the above mentioned captive facilities and their role in conservation, research, education, recreation and animal welfare.

2. **Principles of wildlife rehabilitation** - *Kadambari Manikar.*
This presentation took the participants through the entire process of wildlife rehabilitation from admission, stabilization, hand raising to final release.

3. **IUCN guidelines on re-introduction and placement of confiscated animal** – *N.V.K. Ashraf.*
This is a standard presentation given at all workshops to orient participants the IUCN guidelines on animal release. The presentation dealt with the management of confiscated animals and the placement options available to them. It also included a section on the decision tree for these placement options available to confiscated wildlife. The second part dealt with re introduction of wildlife discussing the principles and the process from planning to final release.

4. **General principles in hand raising wild mammals** - *Kadambari Manikar*
This presentation dealt with the inputs required to hand-raise baby mammals. The principles being stabilization, nutrition, care, social stimulation, housing, weaning and release. Feeding, milk formulation and how to feed young ones was explained in detail. There was also a discussion on how to rear animals in order to ensure they are releasable once adults.

5. **Housing consideration, enclosure designs and dimensions for different species in a rescue center** - *N.V.K. Ashraf.*
The presentation discussed the differences between enclosure designs in zoos, rescue centers and lifetime care facilities. Also about the principles of designing enclosures for different species at rescue centers.

6. **Medical treatment of wild animals: Justification and consequences of unwanted intervention** - *N.V.K. Ashraf.*
This presentation began with the definition of animal welfare and the difference between animal rights and human rights. The ethics of intervention for the welfare of free-ranging wildlife, types of interfaces, reasons for medical intervention and factors influencing our attitude to intervention was also taught. The presentation also discussed transmission of disease and introduction of new diseases into the wild population through the process of rehabilitation and release.

Abstract of presentations

7. **Remote delivery system for drug immobilization** - *N.V.K. Ashraf.*
This presentation dealt with the use of remote delivery systems for drug immobilization of wild animals. The different equipments discussed were pole syringe for small animals in cages, blow pipes, projectors for large animals, pneumatic guns, and the preparation of a gas rifle using a CO_2 cylinder. There was a discussion on the different kinds of darts made of plastic, metal, both disposable and reusable. This was followed by a demonstration on how to assemble a metal syringe and make a plastic dart. Participants were also given an opportunity to do target practice using the blow pipe and the plastic syringes made by them.

8. **Drug and dosages for anesthesia in wild mammals** - *Bhaskar Choudhury.*
This presentation discussed the various types of drugs available for use, their composition, qualities and pros and cons of usage on wild mammals. It also included a detailed discussion on the drugs and dosages for all the major species of mammals of BTC Region.

9. **Rhino rehabilitation project in Manas National Park** - *Rathin Barman*
This presentation discussed the evolution of WTI's rhino rehab station in Manas. The journey of the three year old female rhino rescued from the floods at Kaziranga and hand raised at Center for Wildlife Rehabilitation and Conservation to the rhino's translocation to the Manas National Park was presented. Rahim also emphasized on the impact of reintroducing rhinos in Manas where all the rhinos were previously wiped out due to poaching.

10. **Rehabilitation of greater adjutant storks in Assam** - *Shivendra Goswami*
This presentation was a case study on the rehabilitation of greater adjutant storks by the Green Guard Nature Organization in Nagaon, Assam. The case study described the rescue of falling chicks from nests using safety nests and then rearing them to maturity and eventual release.

11. **Pygmy hog husbandry and pre-release acclimatization** - *Parag Deka*
The presentation spoke about the reasons for establishment of a pygmy hog breeding project and threats to the pygmy hog. It detailed the husbandry, veterinary care and re-introduction of captive bred pygmy hogs in Assam.

12. **Rehabilitation of snakes displaced due to conflict and confiscated from trade: case study from Assam state zoo** - *Abhijit Das.*
This presentation talked about rescuing and rehabilitating snakes displaced due to conflict in Assam. Mr. Das described the entire process from acting on a rescue call, equipments to be used, first aid to be provided, initial examination, housing and feeding, selection of individuals for release and selection of release sites, identification of snakes and marking for monitoring purposes.

ANNEXURE 39

Wildlife cases attended by the Lower Assam MV unit from December 2005 to 31st March 2008

Table 1. Mammals

Case Id	Date of admission	Common Name	Stage	Sex	Cause of Displacement	Outcome	Date of outcome
MVS/LA/01/05	04 12 2005	Rhesus macaque	Adult	Male	Caught/trapped (conflict)	Released	05 12 2005
MVS/LA/02/05	07-12-2005	Common Palm Civet	Adult	Male	Caught/picked up by people	Released	08-12-2005
MVS/LA/01/06	10 01 2006	Asian Elephant	Infant	Male	Unknown (found alone)	Died in captivity	18 02 2006
MVS/LA/05/06	04 05 2006	Five Striped Palm Squirrel	Neonate	Male	Fallen from nest/tree	Died in captivity	06 05 2006
MVS/LA/06/06	04-05-2006	Five Striped Palm Squirrel	Neonate	Male	Fallen from nest/tree	Died in captivity	07-05-2006
MVS/LA/07/06	04-05-2006	Five Striped Palm Squirrel	Neonate	Female	Fallen from nest/tree	Died in captivity	07-05-2006
MVS/LA/11/06	23 06 2006	Rhesus macaque	Adult	Female	Caught/picked up by people	Released	25 06 2006
MVS/LA/12/06	26-06-2006	Rhesus macaque	Adult	Male	Caught/picked up by people	Released	30-06-2006
MVS/LA/13/06	18-07-2006	Leopard Cat	Subadult	Male	Caught/picked up by people	Released	16-10-2006
MVS/LA/14/06	29 07 2006	Slow Loris	Subadult	Male	Caught/picked up by people	Released	24 11 2006
MVS/LA/17/06	11 08 2006	Slow Loris	Subadult	Female	Caught/picked up by people	Died in captivity	14 08 2006
MVS/LA/23/06	20-09-2006	Common Palm Civet	Adult	Male	Caught/trapped (conflict)	Released	20-09-2006
MVS/LA/25/06	29 10 2006	Gaur	Infant	Female	Unknown (found alone)	Captive/Pending	N/A
MVS/LA/31/06	22 12 2006	Hog Deer	Adult	Female	Strayed and caught	Died in captivity	22 12 2006
MVS/LA/03/07	08-01-2007	Jungle Cat	Adult	Male	Caught/trapped (conflict)	Died in captivity	17-01-2007
MVS/LA/09/07	21-02-2007	Hispid Hare	Neonate	Female	Unknown (found alone)	Died in captivity	21-02-2007
MVS/LA/21/07	28 02 2007	Chinese Pangolin	Subadult	Male	Caught (poach/hunt/trade)	Transferred	07 03 2007
MVS/LA/14/07	05-03-2007	Hog Deer	Subadult	Male	Caught (poach/hunt/trade)	Released	05-03-2007
MVS/LA/13/07	05-03-2007	Common Palm Civet	Adult	Female	Caught (poach/hunt/trade)	Dead on arrival	05-03-2007
MVS/LA/11/07	05 03 2007	Pygmy Hog	Adult	Male	Caught (poach/hunt/trade)	Dead on arrival	05 03 2007
MVS/LA/12/07	05 03 2007	Hispid Hare	Adult	Female	Caught (poach/hunt/trade)	Dead on arrival	05 03 2007
MVS/LA/18/07	25-03-2007	Leopard Cat	Adult	Male	Caught (poach/hunt/trade)	Dead on arrival	25-03-2008
MVS/LA/17/07	25-03-2007	Slow Loris	Adult	Male	Caught/picked up by people	Released	11-04-2007
MVS/LA/19/07	31 03 2007	Leopard Cat	Adult	Male	Caught (poach/hunt/trade)	Released	21 04 2007
MVS/LA/20/07	02-04-2007	Big Common leopard	Subadult	Male	Caught (poach/hunt/trade)	Dead on arrival	02-04-2007
MVS/LA/22/07	22-04-2007	Leopard Cat	Subadult	Male	Caught/picked up by people	Released	25-04-2007
MVS/LA/23/07	11 05 2007	Hog Deer	Adult	Male	Strayed and caught	Released	12 05 2007
MVS/LA/24/07	20 05 2007	Indian Muntjac	Adult	Female	Caught/picked up by people	Released	23 05 2007

Case Id	Date of admission	Common Name	Stage	Sex	Cause of Displacement	Outcome	Date of outcome
MVS/LA/25/07	25-05-2007	Indian Muntjac	Adult	Female	Caught/picked up by people	Released	31-10-2007
MVS/LA/27/07	11-06-2007	Asian Elephant	Neonate	Male	Swept by flood/river	Died in captivity	07-09-2007
MVS/LA/26/07	16-06-2007	Wild Pig	Subadult	Male	Unknown (found alone)	Released	17-06-2006
MVS/LA/30/07	08-07-2007	Spotted Deer	Adult	Female	Caught/picked up by people	Released	10-10-2007
MVS/LA/31/07	04-08-2007	Jackal	Adult	Male	Caught (poach/hunt/trade)	Released	17-08-2007
MVS/LA/34/07	24-09-2007	Jungle Cat	Adult	Male	Caught/trapped (conflict)	Released	16-11-2007
MVS/LA/35/07	18-10-2007	Golden Langur	Adult	Female	Disease/Debility	Died in captivity	19-10-2007
MVS/LA/39/07	02-11-2007	Golden Langur	Adult	Female	Injury (electrocution)	Died in captivity	02-11-2007
MVS/LA/41/07	03-11-2007	Leopard Cat	Subadult	Male	Strayed and caught	Released	16-11-2007
MVS/LA/44/07	01-12-2007	Indian Muntjac	Adult	Male	Strayed and caught	Released	06-12-007
MVS/LA/46/07	02-12-2007	Rhesus macaque	Subadult	Male	Caught/picked up by people	Released	09-12-2007
MVS/LA/47/07	03-12-2007	Indian Muntjac	Adult	Male	Strayed and caught	Released	06-12-2007
MVS/LA/60/08	11-02-2008	Jungle Cat	Infant	Male	Unknown (found alone)	Released	09-10-2008
MVS/LA/61/08	20-02-2008	Wild Dog	Infant	Male	Unknown (found alone)	Died in captivity	10-03-2008
MVS/LA/65/08	08-03-2008	Chinese Pangolin	Adult	Female	Caught (poach/hunt/trade)	Released	08-03-2008
MVS/LA/66/08	08-03-2008	Chinese Pangolin	Subadult	Male	Caught (poach/hunt/trade)	Released	08-03-2008
MVS/LA/67/08	10-03-2008	Indian Muntjac	Adult	Male	Caught (poach/hunt/trade)	Released	14-03-2008
MVS/LA/68/08	16-03-2008	Jungle Cat	Infant	Female	Unknown (found alone)	Died in captivity	17-03-2008
MVS/LA/69/08	16-03-2008	Jungle Cat	Infant	Male	Unknown (found alone)	Died in captivity	21-03-2008
MVS/LA/70/08	16-03-2008	Jungle Cat	Infant	Female	Unknown (found alone)	Died in captivity	17-03-2008
MVS/LA/72/08	19-03-2008	Asiatic Black Bear	Infant	Male	Caught (poach/hunt/trade)	Captive/Pending	N/A
MVS/LA/73/08	19-03-2008	Asiatic Black Bear	Infant	Female	Caught (poach/hunt/trade)	Captive/Pending	N/A

Table 2. Birds

Case Id	Date of admission	Common Name	Stage	Sex	Cause of Displacement	Outcome	Date of outcome
MVS/LA/02/06	11-03-2006	White Rumped Vulture	Subadult	Male	Injury (people/dog/cat)	Died in captivity	01-11-2006
MVS/LA/03/06	21-03-2006	Indian Nightjar	Adult	Male	Injury (road/train hit)	Died in captivity	30-03-2006
MVS/LA/18/06	11-08-2006	Oriental Pied Hornbill	Subadult	Male	Caught (poach/hunt/trade)	Released	16-10-2006
MVS/LA/19/06	11-08-2006	Oriental Pied Hornbill	Subadult	Female	Caught (poach/hunt/trade)	Released	16-10-2006
MVS/LA/27/06	26-11-2006	Tawny Eagle	Adult	Male	Disease/Debility	Released	08-12-2006
MVS/LA/28/06	06-12-2006	Himalayan Griffon	Adult	Male	Unknown (found alone)	Released	07-12-2006
MVS/LA/30/06	12-12-2006	Kalij Pheasant	Adult	Male	Caught/picked up by people	Released	20-12-2006

Case Id	Date of admission	Common Name	Stage	Sex	Cause of Displacement	Outcome	Date of outcome
MVS/LA/32/06	20-12-2006	Himalayan Griffon	Adult	Female	Caught/picked up by people	Released	27-12-2006
MVS/LA/01/07	05-01-2007	Barn Owl	Fledgling	Unknown	Fallen from nest/tree	Died in captivity	10-01-2007
MVS/LA/02/07	05-01-2007	Barn Owl	Fledgling	Unknown	Fallen from nest/tree	Died in captivity	11-01-2007
MVS/LA/08/07	20-02-2007	Tawny Eagle	Adult	Female	Disease/Debility	Released	28-02-2007
MVS/LA/28/07	16-06-2007	Indian Peafowl	Adult	Male	Caught/picked up by people	Released	16-06-2007
MVS/LA/37/07	31-10-2007	Brown Fish Owl	Adult	Female	Caught (poach/hunt/trade)	Released	01-11-2007
MVS/LA/45/07	02-11-2007	Himalayan Griffon	Adult	Male	Unknown (found alone)	Escaped	N/A
MVS/LA/48/07	04-12-2007	Himalayan Griffon	Adult	Male	Unknown (found alone)	Released	06-12-2007
MVS/LA/51/08	13-01-2008	Long Billed Vulture	Adult	Male	Injury (road/train hit)	Died in captivity	14-01-2008
MVS/LA/53/08	22-01-2008	Barn Owl	Subadult	Female	Caught (poach/hunt/trade)	Died in captivity	28-01-2008
MVS/LA/54/08	22-01-2008	Barn Owl	Subadult	Male	Caught (poach/hunt/trade)	Released	28-01-2008
MVS/LA/52/08	22-01-2008	Barn Owl	Adult	Female	Caught (poach/hunt/trade)	Released	28-01-2008
MVS/LA/63/08	20-02-2008	Indian Peafowl	Adult	Male	Caught/picked up by people	Captive/Pending	N/A
MVS/LA/74/08	20-03-2008	Barn Owl	Adult	Male	Caught (poach/hunt/trade)	Released	21-03-2008
MVS/LA/75/08	27-03-2008	Barn Owl	Adult	Male	Caught (poach/hunt/trade)	Released	27-03-2008
MVS/LA/76/08	31-03-2008	Barn Owl	Adult	Female	Injury (unknown)	Died in captivity	05-04-2008

Table 3. Reptiles

Case Id	Date of admission	Common Name	Stage	Sex	Cause of Displacement	Outcome	Date of outcome
MVS/LA/04/06	06-04-2006	Burmese Rock Python	Subadult	Unknown	Caught/picked up by people	Released	08-04-2006
MVS/LA/08/06	21-05-2006	Burmese Rock Python	Subadult	Unknown	Strayed and caught	Released	22-05-2006
MVS/LA/10/06	18-06-2006	Keeled Box Turtle	Subadult	Unknown	Strayed and caught	Released	18-06-2006
MVS/LA/15/06	02-08-2006	Burmese Rock Python	Subadult	Male	Caught/picked up by people	Released	03-08-2006
MVS/LA/16/06	06-08-2006	FW turtle (unidentified)	Adult	Female	Caught (poach/hunt/trade)	Released	13-08-2006
MVS/LA/20/06	11-08-2006	Water Monitor	Adult	Female	Caught (poach/hunt/trade)	Released	12-08-2006
MVS/LA/21/06	15-08-2006	Burmese Rock Python	Subadult	Unknown	Swept by flood/river	Released	15-08-2006
MVS/LA/22/06	21-08-2006	Burmese Rock Python	Subadult	Unknown	Caught/trapped (conflict)	Released	21-08-2006
MVS/LA/24/06	26-10-2006	Burmese Rock Python	Subadult	Unknown	Caught/picked up by people	Released	27-10-2006
MVS/LA/26/06	08-11-2006	Burmese Rock Python	Subadult	Unknown	Swept by flood/river	Released	09-11-2006
MVS/LA/29/06	11-12-2006	Burmese Rock Python	Adult	Male	Caught/picked up by people	Released	13-12-2006
MVS/LA/31/06	18-12-2006	Burmese Rock Python	Adult	Male	Strayed and caught	Released	18-12-2006
MVS/LA/33/06	22-12-2006	Burmese Rock Python	Subadult	Male	Caught/picked up by people	Released	26-12-2006
MVS/LA/04/07	16-01-2007	Burmese Rock Python	Subadult	Unknown	Strayed and caught	Released	16-01-2007
MVS/LA/06/07	03-02-2007	Indian Softshell Turtle	Adult	Female	Caught (poach/hunt/trade)	Released	04-02-2007

Case Id	Date of admission	Common Name	Stage	Sex	Cause of Displacement	Outcome	Date of outcome
MVS/LA/05/07	03 02 2007	Burmese Rock Python	Adult	Unknown	Caught/trapped (conflict)	Released	04 02 2007
MVS/LA/07/07	08 02 2007	Burmese Rock Python	Subadult	Male	Strayed and caught	Released	09 02 2007
MVS/LA/10/07	28-02-2007	Burmese Rock Python	Subadult	Female	Fallen into pit/trench/well	Released	28-02-2007
MVS/LA/15/07	25 03 2007	Burmese Rock Python	Adult	Male	Caught/picked up by people	Released	30 03 2007
MVS/LA/16/07	25-03-2007	Burmese Rock Python	Adult	Male	Caught/picked up by people	Released	30-03-2007
MVS/LA/29/07	29 06 2007	Brown Roofed Turtle	Adult	Male	Strayed and caught	Released	29 06 2007
MVS/LA/32/07	02 09 2007	Indian Softshell Turtle	Adult	Male	Caught (poach/hunt/trade)	Released	11 09 2007
MVS/LA/33/07	09-09-2007	Burmese Rock Python	Subadult	Male	Caught/picked up by people	Released	10-09-2007
MVS/LA/36/07	29 10 2007	Copper headed trinket snake	Adult	Male	Strayed and caught	Released	29 10 2007
MVS/LA/38/07	01-11-2007	Gharial	Adult	Female	Caught/picked up by people	Captive/ Pending	N/A
MVS/LA/42/07	03 11 2007	Indian Softshell Turtle	Juvenile	Unknown	Caught/picked up by people	Released	03 11 2007
MVS/LA/40/07	03-11-2007	Burmese Rock Python	Subadult	Male	Caught/trapped (conflict)	Released	03-11-2007
MVS/LA/43/07	13 11 2007	Burmese Rock Python	Adult	Male	Caught/picked up by people	Released	13 11 2007
MVS/LA/49/07	18 12 2007	Burmese Rock Python	Subadult	Unknown	Caught/picked up by people	Released	18 12 2007
MVS/LA/50/07	26-12-2007	Burmese Rock Python	Subadult	Male	Caught/trapped (conflict)	Released	28-12-2007
MVS/LA/55/08	31 01 2008	Burmese Rock Python	Subadult	Male	Caught/trapped (conflict)	Released	31 01 2008
MVS/LA/56/08	11-02-2008	Burmese Rock Python	Adult	Female	Caught (poach/hunt/trade)	Released	11-02-2008
MVS/LA/57/08	11 02 2008	Burmese Rock Python	Adult	Male	Caught (poach/hunt/trade)	Released	11 02 2008
MVS/LA/58/08	11 02 2008	Burmese Rock Python	Adult	Male	Caught (poach/hunt/trade)	Released	11 02 2008
MVS/LA/59/08	11-02-2008	Burmese Rock Python	Adult	Male	Caught (poach/hunt/trade)	Released	11-02-2008
MVS/LA/62/08	20 02 2008	Burmese Rock Python	Subadult	Unknown	Caught/picked up by people	Released	22 02 2008
MVS/LA/64/08	05 03 2008	Burmese Rock Python	Subadult	Unknown	Caught (poach/hunt/trade)	Released	05 03 2008
MVS/LA/71/08	17-03-2008	Keeled Box Turtle	Adult	Male	Caught (poach/hunt/trade)	Released	17-03-2008

OTHER WTI PUBLICATIONS

A. OCCASIONAL REPORTS

Tribal Territories:
Impact assessment around the Jarawa tribal reserve, middle and south Andaman Islands

Captive Concerns:
Health and management of captive elephants in Jaipur

Jumbo Express:
A scientific approach to understanding and mitigating elephant mortality due to train accidents in Rajaji National Park.

Fair Concern:
Health and management of captive elephants in Sonpur

Elephant in Exile:
A rapid assessment of the human-elephant conflict in Chhattisgarh

Ganesha to Bin Laden:
Human-elephant conflict in Sonitpur district of Assam

Healing Touch:
Health and management of captive elephants at Kaziranga elephant festivals

Dog and Bull:
An investigation into carnivore-human conflict in and around Itanagar Wildlife Sanctuary, Arunachal Pradesh

Against the Current:
Otters in the river Cauvery, Karnataka

Silent Stranglers:
Eradication of mimosa in Kaziranga National Park, Assam

Living at the Edge:
Rapid survey for the endangered Ladakh urial *(Ovis vignei vignei*) in Leh district of Ladakh Trans-Himalaya

Search for Spectacle:
A conservation survey of the Phayre's leaf monkey (*Tranchypithecus phayrei*) in Assam and Mizoram

Sighting Storks:
Status and distribution of Greater adjutant storks (*Leptoptilos dubius*) in the Ganga and Kosi river floodplains near Bhagalpur, Bihar

Bait and Watch:
Popularization of alternatives to dolphin oil among fishermen for the conservation of the Ganges river dolphin (*Plantanista gangetica*) in Bihar

Awaiting Arribadda:
Protection of Olive Ridley turtles (*Lepidochelys olivacea*) and their nesting habitats at Rushikuliya rookery, Orissa

Living with Giants:
Understanding human-elephant conflict in Maharashtra and adjoining areas

Crane Capital:
Conservation strategy for Sarus Crane (*Grus antigone*) habitat in Etawah and Mainpuri Districts, Uttar Pradesh

Deadly Tracks:
A scientific approach to understanding and mitigating elephant mortality due to train hits in Assam

Carnivore Conflict:
Support provided to leopards involved in conflict related cases in Maharashtra

India at the International Whaling commission:
A policy document on India's involvement in the IWC 1981-2003

B. CONSERVATION ACTION REPORTS

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Rehabilitation of Asiatic black bears in Arunachal Pradesh

Mountain Migrants:
Survey of Tibetan Antelope (*Pantholops hodgsonii*) and Wild Yak (*Bos grunniens*) in Ladakh, Jammu & Kashmir, India

Predator Alert:
Attacks on humans by leopard and Asiatic black bear in the Kashmir valley – Analysis of case studies and spatial patterns of elevated conflict

Turning the Tide:
The campaign to save Vhali, the Whale Shark (*Rhincondon Typus)* in Gujarat

C. CONSERVATION REFERENCE SERIES

Wildlife Law:
A ready reckoner - A guide to the Wildlife (Protection) Act 1972

Back to the Wild:
Studies in wildlife rehabilitation

Right of Passage:
Elephant corridors of India

Poisons and the Pachyderm:
Responding to poisoning in Asian elephants – A field guide

Commentaries on Wildlife Law:
Cases, statutes & notifications

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Ecology and conservation of Asian elephants in Kameng elephant reserve, Arunachal Pradesh

Canopies and Corridors:
Conserving the forest of Garo Hills with elephant and gibbon as flagships

D. OTHERS

Wrap up the trade:
An international campaign to save the endangered Tibetan Antelope

Tiger Bridge:
Nine days on a bend of the Nauranala

Emergency Relief Network Digest 2005 – 2006

Emergency Relief Network Digest 2006 – 2007

Action Tiger:
Tiger action plans of 12 tiger range countries

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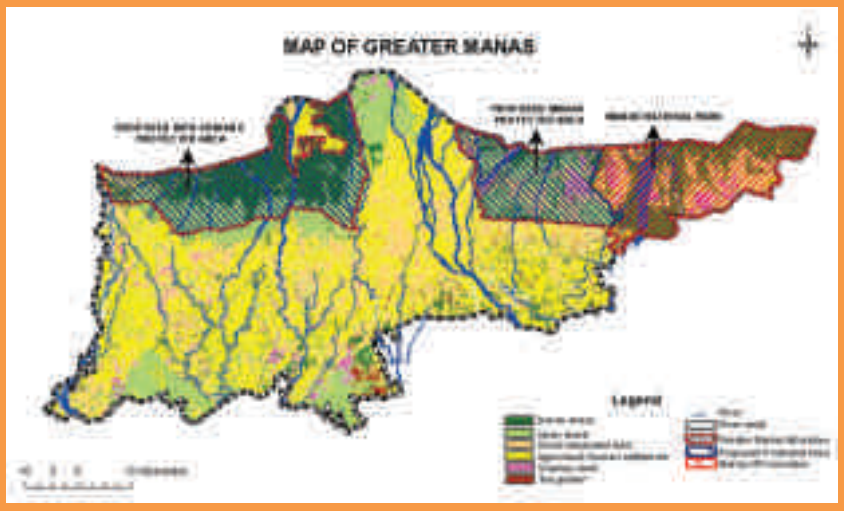

Manas is an unparalleled wilderness ecosystem of Asia, straddling the Indo-Bhutan border along the foothills of the Himalayas. A Biodiversity hotspot and tiger reserve, the Manas National park is also a notified World heritage site. However, due to large scale poaching and destruction of habitat, the park has been a threatened ecosystem till a few years. Over the last few years, the Wildlife Trust of India (WTI) and the International Fund for Animal Welfare (IFAW) has been assisting the Assam Forest Department and the Bodoland Territorial Council in bringing back Manas to its former glory. This includes strengthening its anti-poaching apparatus, bringing back key flagships such as the rhino and the elephant in pioneering rehabilitation projects and building capacity through technical workshops. In a parallel project supported by the British High Commission, WTI and IFAW have assisted the Bodoland Territorial Council in conceptualizing, demarcating and declaring Greater Manas, a doubling of the size of the effective protected area system. This report is a chronicle of the work in these projects over the past five years and also a reference for the Greater Manas ecosystem.

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