

BIODIVERSITY STRATEGY AND ACTION PLAN FOR KARBI-ANGLONG

*A PROJECT UNDERTAKEN AS PART OF THE
NATIONAL BIODIVERSITY STRATEGY AND ACTION PLAN*

Prepared By

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Chapter-1

Introduction

Earth's plants, animals, and micro-organisms interacting with one another and with the physical environment in ecosystems form the foundation of sustainable development. Biotic resources from this wealth of life support human livelihoods and aspirations and make it possible to adapt to changing needs and environments. The current unabated erosion of the diversity of species, genes and ecosystems taking place will undermine progress towards a sustainable society. In fact, the continuing loss of biodiversity is a telling measure of the imbalance between human needs and wants and nature's capacity.

Biodiversity is the variety and variability of plant and animal species on our planet. Diversity itself has a particular value and importance. There are three broad levels of biodiversity: genetic variation within species (and number of individuals within a species); the variety of species within a habitat or ecosystem; and the variety of habitats on the planet. Biodiversity has ethical, social, scientific, aesthetic and economic value distinct from that of biological resources. Its total economic value is made up of several components, but is extremely difficult to estimate because of the lack of information and uncertainty. The general economic case for biodiversity conservation in developing countries is nevertheless strong. Some loss of biodiversity is unavoidable, but there is little doubt that the current rate of loss is socially excessive and reflects a significant under-valuation of biodiversity.

Information about the characteristics and status of biodiversity is severely lacking for most ecosystems. The most important immediate cause of biodiversity loss in countries like India is habitat destruction and disturbance. However, it is the complex of underlying socio-economic causes – development pressure, market failure, and intervention failure – which are more significant, and which have to be addressed by any conservation strategy (This is an important statement, and needs some elaboration later in the context of Karbi Anglong...what in particular are these root causes in this district, what are their manifestations? From this, certain strategies and actions to tackle these causes could also be delineated). A strategy for biodiversity conservation has to resolve a number of issues relating to objectives, information, conservation mechanisms and priorities. Of these, the issue of priorities is the most important. These should not be guided solely by biological or ecological criteria, but must take into account the socio-economic value, the degree of threat, gaps in other programmes, comparative advantage, and the likelihood of success.

The United Nations Conference on Environment and Development, also known as "Earth Summit", held in Rio de Janeiro in June 1992, opened the Convention on Biological Diversity (CBD) for signature by world's countries and over 150 countries signed it. And many countries have begun to implement various components of the treaty. The treaty is a landmark in the environment and development field, as it takes for the first time a comprehensive rather than a sectoral approach to conservation of the Earth's biodiversity and sustainable use of biological resources. It recognizes the vital points made in the World Conservation Strategy (1980), Caring for the Earth (1991), the Global Biodiversity Strategy (1992) and many other international documents that both biodiversity and biological resources should be conserved for reasons of ethics, economic benefit and indeed human survival.

The state apparatus is alone inadequate to translate government policies and programmes into effective action. This is particularly true of conservation. Unless there is grassroots action and people's participation, meaningful conservation is not possible.

The National Bio-diversity Strategy and Action Plan (NBSAP) has been engaged in looking at, analyzing, strategizing and planning for the conservation and enhancement of bio-diversity in diverse fields in India. Apart from the diversity in forest and wildlife diversity the NBSAP has tried to look into biodiversity in all possible forms, e.g. biodiversity engaged in cultural process, domesticated life stocks etc. In doing that it is very essential to involve non-governmental organizations to formulate the strategies and for urgent actions in various levels for conservation of biodiversity with the regular Governmental efforts. Realizing the necessity to incorporate people's view towards biodiversity conservation strategy and action plan, the government of India has asked the non-governmental agencies to prepare the National Biodiversity Strategy and Action Plan, so that greater inputs from the public could be incorporated in the strategy for proper follow up implementation.

This document on Biodiversity Strategy and Action Plan is made for Karbi-Anglong, which is a district council constituted under the sixth schedule of the Constitution of India. The strategy evaluates the key determinants of

geology, geomorphology, soils, climate and human activities that have helped to shape the biodiversity of Karbi-Anglong. It also examines the threats, problems and opportunities related to biodiversity conservation and its sustainable use.

Objectives

The main objective of the Strategy and Action Plan (SAP) was to review the biodiversity from the perspectives of the involvement of local communities in conservation and sustainable use processes. The SAP process ensured high participation by the local communities and is completely based on people's suggestions in planning a strategy for conservation and enhancement of their biodiversity in relation to their traditional culture, beneficial towards conservation and sustainable use. The salient objectives are –

- Assess the current status of biodiversity in Karbi-Anglong and identification of threats
- Promote conservation and sustainable use of the biological resources.
- Promote awareness and dissemination of information amongst government departments and the public for realizing peoples' involvement and participation in conservation activities,
- To prepare an action plan on natural resource management and long term conservation of biodiversity in Karbi-Anglong
- Promote cooperation between all stakeholders including government, public institutions, social & economic groups and the masses,
- Incorporate principles of restoration, conservation & sustainable use of biodiversity in planning & execution of sectoral and cross-sectoral policies.

Scope

The document tried to cover the following aspects –

1. *Natural ecosystems*: e.g. forests, grasslands, wetlands, mountains areas, including the historical changes taking place in such ecosystems.
2. *'Wild' species and varieties*: species of plants, animals, and micro-organisms existing in their natural state, and the genetic variation within each of these species.
3. *Agricultural ecosystems*: e.g. farmlands, pastures, capture fisheries, aquaculture, including historical changes in land-use patterns.
4. *Domesticated species and varieties*: species of crops, livestock (including poultry), captive-bred fish, pets, and micro-organisms in ex-situ collections, and the genetic variation within each of these species.

The Process

NBSAP Karbi-Anglong Sub State site has started just after the June, 2000 national meeting at New Delhi. But the actual field level works have taken its pace just after its first local level advisory level meeting. The First meeting of Local Advisory group of Karbi Anglong Sub-state Site was organized by Aaranyak and was held at Soil Conservation Guest House, Kohora, Karbi Anglong on 25th November, 2000. The meeting was presided by Mr. Mohon Bay, Executive Member, Karbi Anglong Autonomous District Council. All together twenty one persons were present including two women representatives during the day long discussion. After introduction of the participants Prof. P.C. Bhattacharjee , Core Group Member of NBSAP project explained the backgrounds and importance of the NBSAP project to the gathering. In the meeting Aaranyak was represented by Dr. Bibhab Kr. Talukdar and Dr. Rathin Barman. During his speech Mr. Mohon Bay, Executive Member of Karbi Anglong District Council , assured the project team for all cooperation for successful completion of the project. Most of the participants were representative of local administrative bodies from the area and explained the problems and possible solution for biodiversity conservation.

The other important meeting was held at Diphu on 5th June, 2001. This meeting was organised with much greater participation from different folds of the society. This meeting was jointly organised by Forest Department, Karbi

Anglong and Aaranyak. District Administration, local NGOs, local student groups, local women groups, local youth groups, teachers and students were actively participated in this gathering.

Other than these formal meetings some meeting were organised at local level following no formal procedures. And the feed back we got from these meeting were much beneficial for a larger approach for conserving biodiversity in Karbi Anglong. Local experts were consulted for getting information on various related issues. Their feedback was recorded and has been discussed in this report.

All discussion was in two folds. First the identification of the gaps of knowledge and problems related to biodiversity conservation and the second was preservation of existing knowledge and documenting the probable thoughts and ideas towards preservation of biodiversity in Karbi Anglong.

It was pointed that Jhoom Cultivation process, which is a traditional practice of cultivation in the Karbi Anglong hill areas since times immemorial is forced to withdraw now-a days for poor production. It was also felt that as the thick forest cover and food is decreasing in the core areas of forest, animal do come to the Jhoom areas and destroy the production. The gathering discussed with deep feeling that Bamboo, once considered as Karbi Anglong's pride is sharply reducing all around the hill district and identified Nagaon Paper Mill as main culprit for it. It was pointed out that villagers have to travel deep inside for bamboo for their house hold needs and it compel the villagers to destroy the deep forest cover of the hill areas. The discussion felt that large scale plantation of Bamboo in the hill district is a very urgent need and this will solve a number of problem like erosion, availability of fodder for domestic animals etc. and will solve animal depredation problem up to a great extent. It was felt that new generation people have very poor knowledge of medicinal plants and proper identification of medicinal plans. Flow of knowledge from older generation to the next is considered as one of the thrust area for preserving the medicinal plants of the hill district. Animal depredation is a major problem in the hill district and it was suggested that by increasing food and fodder in the core areas of hill district the problem may be reduced. Bamboo plantation after Jhoom cultivation is an important step to regain the green of the area and the different authorities should encourage this process. Existing sericulture process among the villagers should immediately upgrade with recent knowledge and modern techniques to reduce the forest pressure and upgrade the quality of the silk. As the traditional old techniques of silk worm rearing and silk processing is time consuming as well as not profitable the modern women are less interested in rearing silk. By proper training and with proper scheme to upgrade the sericulture in the hill district may help the villagers to busy with this process rather than going forest to collect forest product for their survival.

Most of the villagers have expressed that they have first time discussed such topics, which they think is very important and necessary for sustainable use of biodiversity of Karbi Anglong. In the next meeting they assured that they will come forward with all indigenous techniques of biodiversity conservation spreading among the older generation and will discuss with great detail for the smooth conservation effort of biodiversity of Karbi Anglong Hill District

This was the background of the much greater effort, which just followed after this meeting. In the various field level works attention was given to take maximum participation from local people in the form of group discussions, informal sitting in the various local level religious functions, meeting with the local NGOs, local forest officer and district administration. But the process missed a major player, Karbi Anglong District Autonomous Council, as during the period of process the council was not formed because of certain political instabilities. However as a follow up of recent effort, a final meeting was held at Kaziranga on 20th and 21st September 2002 in which the Conservator of Forests, Karbi-Anglong and other senior forest officials were also present to discuss about the forest related policies. The Forest officials have taken the responsibility to involve the district council members towards overall biodiversity conservation initiatives in the district.

Profile of the Area

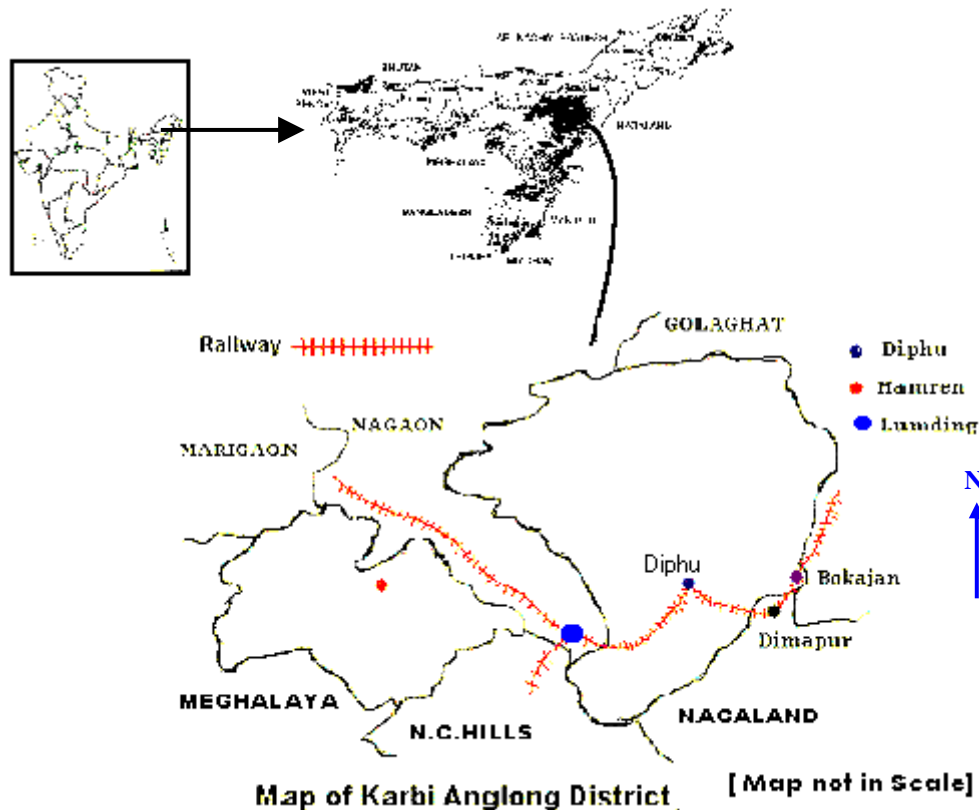
The Karbi-Anglong district holds the central geographical location in Assam and extends from 25°32' to 26°37'N and 92°09' to 93°53'E. It is the largest district in Assam with an area of 10,434 sq km and accounts for 13.3% of the total geographic area of the state. Formerly, it was known as Mikir Hills district, it came into existence in the year 1951. Prior to that it formed parts of Sibsagar, Nagaon, United Khasi & Jaintia Hills, and also Naga Hills districts. The district can be broadly divided into two physiographic units viz., hills and plains. About 85 percent of the district is covered by hills. The highest peak in the district rises to a height of 1360 metres. The area located between the northern and southern

hills of Diphu sub-division is characterised by undulating plains of subdued relief. The plain area consists of valleys of the Jamuna, Kapili and Dhansiri rivers lying in its eastern part. These three are the major rivers of the district, while the minor streams include Kaliani, Barpani, Patradisa and Dikharu.

The mikirs of the earlier days are currently known as the Karbis, who constitute one of the major fractions of the Tibeto-Burman population. They reside both in plains and hills and most predominant group of their population reside in Karbi-Anglong. The population of Karbis during 1901 was 87,046 as per the census report. The current population of Karbis is 6,62,723 as per 1991 census and current population density is 64 per sq km. The male female ratio is 905 males per 1000 females. As per the census of 1991, around 5,92,257 karbis live in rural areas, while only 70,466 karbis live in urban areas. There are six urban township in Karbi-Anglong district of which Diphu town comprised of 39,547 people, Dokmoka comprised of 4,109 people, Howraghat comprised of 3,726 people, Bokajan comprised of 11,025 people, Hamren comprised of 3,761 people and Donkamokam comprised of 8,298 people.

The Karbis called themselves as "Arlengs" meaning man. The Karbis constituting a Non-Ariyan tribal group are the associates of the Bodo tribes and more specifically they are closed in their ethno-graphic entity to the Kukichin. In physical features, the Karbis resemble people of the Assamese communities having Mongoloid characteristics.

The climate of the area is sub-tropical monsoon type, generally with cool and dry winter and hot and wet summer. The temperature ranges from 4°C in winter to 34°C in summer. The rainfall varied from about 800 mm in Diphu-Kheroni area to 2800 mm in the northern slopes. The mountain wall of the Meghalaya plateau and Barail range has made Diphu-Kheroni area a zone of rain shadow, receiving the lowest rainfall in the whole of North-east India.



The settlement pattern of the Karbis is in the form of a village. Each village has a headman called Gaonbura or Sarthe who is appointed by the authority of Karbi Anglong Autonomous Council. But each revenue village has a number of hamlets situated kilometers apart. Each of such hamlets has also a Gaonbura. Each Karbi village is named after the Gaonbura. The Karbis, like the other hill tribes, have a tendency to live on the hilltops. But the people generally do not live in compact areas. The villages are not only smaller in size, but scattered too. In the plains portion of the Karbi Anglong District where the Karbi people practice permanent cultivation and where the village headmen are quite strong, the villages are found to be stationery. But in the interior areas of the district where shifting cultivation is practiced, shifting of village site is still in the practice. The reasons for continuing such a practice are sometimes economic and sometimes social. The following reasons can be ascribed to this:

- a) The post of the village headman whether that of the revenue village or of the hamlet is a very much coveted and prestigious one. In the performance of every socio-religious rite or festival, the headman has to be honoured first. Moreover, the village or the hamlet is also named after him. In a Karbi village there might be a few aspirants for this coveted post. Whenever an aspirant finds that there is no chance of fulfilling his desire if he continues to stay in the village, he leaves the village along with his followers and establishes a village in the new site where he automatically becomes the Gaonbura.
- b) If the Karbi people living in a particular village, think that their village is a haunted place frequented by ghosts or evil spirits, they shift their village to a new site very soon to get rid of the ghosts or the evil spirits.
- c) The Karbis who practice jhuming or shifting cultivation very often shift their villages to new jhum sites which might be 10 to 20 kms away from the present site.

Chapter-2

Land Use and Land Coverage

The major land use land cover categories that are identified in Karbi-Anglong district are shown in Table-1

Land use Pattern in Karbi-Anglong	Area (in Hec.)	Percentage
Build Up Land	126	0.01
Agricultural Land	139731	13.97
Forest Land	436515	43.64
Shifting Cultivation land	423885	42.38

Table-1: Land Use cover in Karbi-Anglong

Wild Biodiversity

The wild biodiversity of Karbi-Anglong is not well known. But the studies conducted by few individual and conservation biologists have revealed that it is one of the key sites for conservation of threatened and endemic flora as well as fauna.

Plant Diversity:

The plant diversity in Karbi-Anglong is mainly sub-tropical. The salient tree species are summarised in Table-2

No.	Local Assamese Name	Botanical Name
01.	Amari or Lali	<i>Amoora wallichii</i>
02	Amloki	<i>Embllica officinalis</i>
03	Amora	<i>Spondies mangifera</i>
04	Bogipoma	<i>Chikrassia tabularis</i>
05	Bhelu	<i>Tetrameles nudiflora</i>
06	Borpat	<i>Alianthus grandis</i>
07	Cham	<i>Artocarpus chaplasha</i>
08	Dimaru	<i>Ficus glomerata</i>
09	Gendeli Poma	<i>Dysoxylum hamiltonii</i>
10	Ghogra Neem	<i>Melia azedarch</i>
11	Hatipoila	<i>Pterospermum acerifolium</i>
12	Hilikha	<i>Termenalia chebula</i>
13	Hollock	<i>Terminalia myriocarpa</i>
14	Jam	<i>Syzygium cumini</i>
15	Kanchan	<i>Bauhinia spp.</i>
16	Khokan	<i>Duabhangana sneratiodes</i>
17	Monipuri Sim	<i>Parkia roxburghii</i>
18	Neem	<i>Azadirachta indica</i>
19	Sonaru	<i>Cassia fistula</i>
20	Sationa	<i>Albizia scholaris</i>
21	Tita Sopa	<i>Michellia champaca</i>
22	Udal	<i>Sterculia villosa</i>

Table-2: Salient Tree Species of Karbi-Anglong.

Under Shrubs: The salient under shrubs are *Eupatorium oderatum*, *Laportea crenulata*, *Alpinia allughas*, *Litsea salicifolia*.

Climbers: The salient climbers are – *Mezonuruon cucullatum*, *Embelia ribes*, *Acacia piñata*, *Mikania scandens*, *Zizyphus rugosa* etc.

Bamboo: Karbi-Anglong is very rich in bamboo species diversity. Till date, the scientific study conducted by the forest staff have found nine species of bamboo while local karbi people have reportedly found 13 different varieties of Bamboo. Some of the salient species of bamboo found in Karbi Anglong are shown in Table-3

Karbi Name	Assamese Name	Botanical Name
Chek Sudo	Kotoha Banh	<i>Bambusa arundinacea</i>
Kappa Kapiho	Bhaluka Banh	<i>Bambusa balcooa</i>
Loto	Bijuli	<i>Bambusa pallida</i>
Bewar		<i>Bambusa khasiana</i>
Chek Keme	Jati Banh	<i>Bambusa tulda</i>
Kaipho	Kako Banh	<i>Dendrocalamus hamiltonii</i>
Footong		<i>Dendrocalamus patellaris</i>
Artem	Muli	<i>Melconna baccifera</i>

Table-3: Salient Bamboo Species of Karbi Anglong.

Bamboo areas of Karbi Anglong since 1982 has been summarised in Table-4, which shows a downward trend.

YEAR	Approx. Area in Ha.	% of total geographic of karbi-Anglong
1981-82	643969	61%
1986-87	477488	45%
1993-94	359444	34%
1999-2000	331624	32%

Table-4: Bamboo Areas in Karbi Anglong (Source: Forest Department, Assam)

Animal Diversity:

Mammals: Salient mammals of Karbi-Anglong are – Asian elephant, royal bengal tiger, leopard, marbled cat, Indian bison, Himalayan black bear, Sambar, Barking deer, hog deer, Hoolock gibbon, Assamese macaques, Pig tailed macaques, stump tailed macaques, Slow loris, serow, Flying squirell etc.

Birds: There are about 400 species of birds in Karbi-Anglong as per data collected by members of Aaranyak and also work done by Dr. A.U. Choudhury. The salient birds of Karbi-Anglong are – Wreathed Hornbill (*Duabanga sonneratoides*), Rufous-necked Hornbill (*Aceros nipalensis*), Great pied Hornbill (*Buceros bicornis*), Indian pied hornbill (*Anthracoseros malabaricus*), Red Jungle Fowl (*Gallus gallus*), Khaleej Pheasant (*Lophura leucomelana*), Peacock Pheasant (*Polyplectron bicalcaratum*), White winged wood duck (*Cairina scutulata*), Blyth's baza (*Aviceda jerdoni*), Crested serpent eagle (*Spilornis cheela*), black crested baza (*Aviceda leuphotes*), Green imperial pigeon (*Ducula aenea*), Tiny Lorikeet (*Loriculus vernalis*), Red breasted parakeet (*Psittacula alexandri*), white breasted water hen (*Amauornis phoenicurus*), cotton teal (*Nettapus coromandalianus*), Lesser whistling teal (*Dendrocygna javanica*), Large racket tailed drongo (*Dicrurus paradiseus*), Hair crested Drongo (*Dicrurus hottentottus*), Sultan tits (*Melanochlora sultanea*), White caped red start (*Chaimarornis leucocephalus*), black francolin (*Francolinus francolinus*), hill partridge (*Arborophila torqueola*), Spotted dove (*Streptopelia chinensis*) etc.

Salient reptiles of karbi Anglong are python, King Cobra, Monitor Lizard, Keeled box turtle, etc. However the amphibian records could not be gathered as there are very negligible studies conducted on amphibians.

Forest Types

As per the State of Forest report 1999 of Forest Survey of India, Dehradun, 6044 sq. Kms. of the district are under dense forest cover while 2776 sq. kms are under open forest cover. The important forest types found in Karbi Anglong District are :-

1. Moist semi-evergreen forests (2BC 1/b and 2 BC)
2. Moist Mixed Deciduous forests (3C/C 3b)
3. Riverain Type
4. Miscellaneous type with scattered pure or mixed patches of bamboos.



Plate-1: Forest type in Karbi Anglong

Moist Semi-evergreen forests are widely prevalent in the district and have commercially important species like *Badam*, *Amari*, *Cham*, *Tita Sopa*, *Nahar*, *Bhelu*, *Gomari*, *Poma*, *Bonsum*, *Dhuna*, *Myrobalans*, *Bhola* and *Bon Am* etc. in the top canopy. Mixed moist Deciduous Forests have *Haldu*, *Bohera*, *Simul*, *Ghogra*, *Azhar*, *odal*, *Outenga* etc. in the top canopy. Riverain Type of forest occupies the localities with alluvial soil of more recent origin in the vicinity of rivers and streams of the district. The common species of importance are *Khair*, *Sissoo*, *Simul*, *Urium*, *Kokoli* etc. Miscellaneous type of forest comprises of *Amari*, *Sopa*, *Cham*, *Bonsum*, *Bogipoma*, *Gonsoroi*, *Dhuna* and *Hingori* etc. Principal species of Bamboos are *Dendrocalamus hamiltonii* (*Kako*) and *Bambusa tulda* (*Jati*) besides a small proportion of other bamboos. *Kako* and *Jati* bamboos are mostly harvested by Hindustan Paper Corporation , Jagiroad. The forests of Karbi Anglong are extensive and rich in minor forest products like *Cane*, *Patidoi*, *Dhuna*, *Agar*, *Ekra*, *Thatches*, *Barks of Baghnala*, *Laham*, *Dalchini*, *Patihunda*, *Rema*, *Satkora* and a variety of medicinal plants. (the above has a mix of local, english, and scientific names...pl. make this consistent. Also pl. add a full list/table as an annex, with the species list containing all three kinds of names where available. If you are primarily using local names in the text, pl. give this table with the local names in alphabetical order so readers can quickly locate the english and scientific names of what you are referring to)

Administrative set up for Conservation

In pursuance of O.M.No. :HAD. 57/95/309 dated 31-12-1996 from Govt. of Assam, the administrative control of forest department has been transferred to Karbi Anglong Autonomous Council while role of the State Government has become advisory in nature (it would be useful to give a short description on the composition of this Council, how it is formed, etc). Three territorial divisions namely Karbi Anglong East Division, Karbi Anglong West Division and Hamren Division control the forest areas. Besides, there are three functional divisions namely Northern Afforestation Division, Working Plan division(Hills) and Silvicultural Division (Hills). A Divisional Forest Officer heads each Division. All these divisions are under the supervisory control of Conservator of Forests, Karbi Anglong Circle, Diphu.

Legal Status of Forest Land

Though a large part of Karbi Anglong District is covered with thick forest cover but the legal status of notified forest area is as under: -

1. State Reserved forests :- 1962.06 Sq. Kms.
2. District Council Reserved Forests :- 1011.26 Sq. Kms.

3. Proposed Reserved Forests :- 1317.01 Sq. Kms.

From the above statement it is evident that only 41.12% of geographical area of Karbi Anglong is under forest cover and some of these also need improvement and restocking. Up to 8th Plan 63,605 Hectares of plantation as per details given in Annexure-II comprising of Teak (*Tectona grandis*), Gamari (*Gmelina arborea*), Titasopa (*Michelia champaca*) Simul (*Bombax ceiba*), Udal (*Sterculia villosa*) Ajhar (*Lagerstroemia flos-reginae*) and Pine (*Pinus khasya*) etc. have been planted in the district to augment the green cover. As per National Forest Policy, it is required to have minimum 60% of geographical area in the hilly terrain under forest cover to maintain proper ecological balance. Accordingly, a moderate plantation target of 20,000 hectares during 9th Five Year Plan period was fixed with annual target of 4000 hectares but due to meager fund allocation the proposed target could not be achieved and only 7536 Hectares of plantations could be taken up against the target of 20000 Hectares during the 9th plan.

The vast tract of hilly slopes also have been badly denuded due to practice of Jhum cultivation, as local tribal still practice this tradition though efforts are being made to permanently settle them by raising cash crop etc. through IJDP programmes. Because of the fragmentation of habitat and increasing human population, there are recurring incidences of conflict between humans (pl. avoid sexist language) and wildlife in the district. The conflict is mainly with the elephant, which by virtue of its being a large herbivore has large ranging distance and it frequently comes into conflict with the human beings during the crop harvesting season when it raids the paddy and sugarcane crops of the district. The resultant conflict culminates in many human deaths and sometimes, as a reprisal, a few elephant deaths.

Current Objectives of Forest Department

The important objectives of Forest Department are: -

- To achieve the goal of bringing 60% of geographical area under forest cover by creating more reserved forests and extending tree cover over degraded lands.
- Afforestation of degraded and ecologically unstable catchments areas.
- Increase the biomass in the degraded and poorly stocked areas in order to increase the water and soil holding capacity of soil and thereby reducing soil and water erosion.
- Re-stocking of jhum abandoned areas under forest cover to check soil erosion.
- To manage the existing forests on sustainable basis as per working plan prescriptions.
- To increase the productivity of forests per unit area per unit time for augmenting production of forests produce to meet industrial and house hold demands.
- To meet the requirement of fuel, fodder and small timber of local people and to augment the income of local people by sustainable harvesting of minor forest produces through joint forest management.
- To create sanctuaries and biosphere reserves to provide habitat for survival and multiplication of wild flora and fauna and to preserve the gene pool and the unique bio-diversity of this area.

Developmental Activities

The territorial Divisions of the Forest Department are entrusted with the over all task of protection and management of forests and wildlife. They carry out extraction of Timber and other forest produces and earn revenue for the Council exchequer. They are engaged in extensive plantation works, improving infrastructure and conservation of flora and fauna. Plantation Schemes undertaken by territorial divisions are Teak Plantations, Rehabilitation of degraded forests, Plywood plantations, Matchwood plantations and Bamboo Plantations.

A) Northern Afforestation Division is entrusted with plantations of quick Growing Species and Social Forestry Plantations.

B) Working Plan Division, Hills, is entrusted with the task of preparation of Working plan for scientific management of forests of the District. Field survey and collection of data has already been completed and compilation of Working Plans of Karbi Anglong East Division, Karbi Anglong West Division, Hamren Division and Bamboo Management Plan are under progress in the year 2002???.

C) The Silvicultural Division, Hills, is involved in research work to find out suitable management practices, crop combinations and appropriate methods for tree culture. There are two botanical gardens maintained by this division. Besides, this division is entrusted with the task of cultivation of medicinal and rare plants.

Creation and Development of Protected area for Wildlife Conservation

Karbi Anglong is rich in varied wild life. Though rich in varied fauna, Karbi Anglong District was not having any sanctuary or protected area. It was during 1999-2000 that the Council Authority was apprised of the Govt. of India Norms wherein at least 4% of the geographical area must be notified as Wildlife area. At present already 4 sanctuaries have been notified covering an area of 360.86 sq. Kms., which roughly forms 3.49% of the district geographical area. Besides, Marat Longri Wild life Sanctuary covering an area of 451.87 sq. Kms has also been proposed. The details are as given below :-

1. Nambor Wildlife Sanctuary: -

The Govt. of Assam vide their Notification No. FEW.57/99/38 dated 27-07-2000 have notified the "Nambor Sanctuary" with an area of 37 Sq. KM. in Silonijan Civil Circle under Bokajan Sub-Division (Civil) under Karbi Anglong East Forest Division, Diphu in Karbi Anglong District under Karbi Anglong Autonomous Council. The Wildlife Sanctuary is situated with its Northern boundary along the western and southern boundary of Garampani Wildlife Sanctuary up to Dhansiri River.

For effective management and conservation of Wildlife in this Sanctuary area proper infrastructure development, habitat manipulation and improvement etc. are required to be done on priority basis. The proposal for sanction of fund for construction of patrolling roads, camps, Watch Towers, purchase of wireless sets, development of water sources, purchase of vehicle etc. has already been submitted to the Government.

2. East Karbi Anglong Wildlife Sanctuary

The Govt. of Assam vide their Notification No. FRW.57/99/51 dated 27-07-2000 have notified the "East Karbi Anglong Wildlife Sanctuary" in Silonijan Circle (Civil) under Karbi Anglong East Forest Division, Diphu in Karbi Anglong District under Karbi Anglong Autonomous Council with an area of 221.81 Sq. Km.

The boundary of this Sanctuary is the external boundary of Mikir Hills Reserve Forests and its addition notified vide No.5B dated 17-10-1878 and No.24 dated 7-10-1882 respectively already delineated on the survey of India toposheets with well described boundaries.

3. Karbi Anglong Wildlife Sanctuary

The Govt. of Assam have notified the "Karbi Anglong Wildlife Sanctuary " in Duar Mauza under Bokajan Sub-Division under Karbi Anglong East Forest Division, Diphu under Karbi Anglong Autonomous Council vide their Notification No. FRW.57/99/42 dated 27/07/2000 with an area of 96 Sq. K.M.

For development and management of this Wildlife Sanctuary , sufficient fund will be required for various developmental activities including infrastructure, purchase of vehicles ,communication and wireless network, etc and a proposal to that effect has already been submitted.

4.Garampani Wildlife Sanctuary

The present Garampani Wildlife Sanctuary was notified during 1952 vide notification No, FR. 199/52 dated 10/07/52 with an area of 6Sq. K.M. The entire sanctuary is situated within the Karbi Anglong Autonomous Council area and is full of rare and endangered flora and fauna.

For effective management and control of Wildlife in this sanctuary area and in light of the fact that there is very heavy biotic pressures near this sanctuary in Golaghat District , it is very essential to develop proper infrastructure to save the present sanctuary area and its proposed extension area in the long run. For development of infrastructure like construction of protection path on it's out skirts, construction of camps at strategic locations, construction of temporary watchtowers and bridges etc., a proposal for sanction of fund has already been submitted.

5. Marat Longri Wildlife Sanctuary

Considering the present bio-diversity of the area and recognizing the need to conserve the sensitive ecosystem of this region, initial notification constituting this area as Karbi Anglong District Council under Mikir Hill District Forest Act issued Wildlife Sanctuary during 1997. However , in view of presence of Central Act on the subject , a proposal was forwarded to Govt. of Assam through Chief Conservator of Forests (Wildlife) Assam for its formal notification under Wildlife (Protection) Act, 1972. Incorporating desired modifications as requested by Chief Conservator of Forests (Wildlife) Assam, the proposal has been resubmitted vide Council's letter No. KAC/F/M.L.WI Sanctuary/99-2000/1742 Dated 25/06/99 for formal notification by the Govt. of Assam through Chief Conservator of Forests (Wildlife) Assam.

The proposal of Marat Longri Wildlife Sanctuary with proposed area of 451.87 Sq.K.M. is quite rich in floral and faunal composition ,and comprises of 4 (four) important Reserve Forests namely Miyungdisa (D.C.R.F.), Disama (R.F.), Kaki(R.F.) and Englongkiri (D.C.R.F.). The important wildlife species found inside proposed sanctuary include Asiatic Elephant ,Royal Bengal Tiger (pl. standardize names throughout the report), Binturong, Himalayan Black Bear, Barking Deer ,Hoolock gibbon, etc. and a variety of avifauna.

This wildlife sanctuary has adequate ecological, floral, faunal, geomorphologic, natural and zoological significance and will go a long way in augmenting the conservation measures and protecting and conserving the valuable forests of this hill district . This proposed Wildlife Sanctuary is adjacent to Dhansiri Reserve Forests, which is one of the largest Reserve Forests in Asia and is also quite rich in floral and faunal composition.

Out of the 4 (four) Reserve Forests constituting this proposed sanctuary Miyungdisa and Englongkiri are D.C.R.Fs., where local tribal have limited cultivation rights since constitution and notification of these D.C.R.Fs. during Seventies. It is proposed to bring these tribal people from the core area to the fringes and rehabilitate them along Diphu-Lumding Road through some scheme., Eco-Development projects, fund from International Fund for Agricultural Development (IFAD) projects and Council budget for preservation of this sensitive eco-system on sustainable basis and to solve the problem of man-animal conflict. In addition there are some illegal jhum areas, which are to be restocked by intensive afforestation efforts . Appropriate habitat management practices are to be adopted for proper management of endangered species inhabiting this area for which proposals have been submitted. There is an additional 44.37 Sq. K.M. forest areas under Lankaijan U.S.F. (Unclassed State Forests), which is quite rich in floristic composition and will be subsequently added to this proposed sanctuary in due course.

For conservation of habitat of elephant and to reduce man-animal conflict , proposal to Govt. of India is being submitted for habitat management of all the R.Fs; D.C.R.Fs; And P.R.Fs under Elephant Project. These measures will go a long way in conservation of unique flora and fauna of this District.

Karbi Anglong Autonomous Council is taking rapid strides in the scientific and sustainable management of forest resources of the district. Complete ban has been imposed on green felling since 1995. Survey of forest areas for sustainable harvesting of timbers and minor forest produces in perpetuity to meet genuine developmental and local needs has been conducted and compilation of Working Plans are under progress. More protected areas are being notified to conserve the gene pool and bio-diversity of the District. Ethno botanical studies by Gauhati University have been taken up to gather the indigenous knowledge of various

tribes in Karbi Anglong who have co-existed with forests since times immemorial and a botanical garden for ex-situ conservation of these resources has been set up at Diphu. These measures will go a long way in conservation of precious flora and fauna of forests of Karbi Anglong .

Chapter-3

Agricultural Biodiversity

The Karbis of the hills are mostly cultivators. Around 1,25,920 people in Karbi-Anglong is involved in cultivation of which 1,22,689 belonged to rural areas and 3,231 belonged to urban areas. They cultivate land on shifting basis always moving in search of fertile soil exhausting the earlier one by several doses of cultivations. Agriculture is the main stay of the tribal population of the districts. The traditional method of cultivation is the slash & burn, commonly known as jhooming.

The department of Agriculture is implementing numbers of schemes and has adopted two pronged strategies for agriculture development, viz. motivation of jhumias for adopting permanent cultivation in slopes through terracing and other measures of checking soil erosion and cultivation of horticultural crops such as pineapple, orange, mausambi, black pepper, papaya, areca nut and field crops like maize, cotton, jute, mesta etc. on the plain valley. The other is the introduction of high yielding varieties of paddy, maize, wheat & improved varieties of oil seed, pulses, sugarcane & vegetables.

The production of food grains has been maintaining and increasing trend during Eight Five Years Plan (Table-5). It is mainly the rice amongst food crops. Popularization of short duration of H.Y.V. paddy and increased doubled cropped area in the autumn paddy helped in increasing the productivity.

YEAR	KARBI ANGLONG (IN MT)
1994-95	196
1995-96	202
1996-97	202
1997-98	207
1998-99	210

Table-5: Food grains production in Karbi-Anglong [Source: Deptt. Of Agriculture]

The total gross cropped areas in the district is about 1,85,000 hect. and the net area is about 1,52, 193 hect. The area sown more than once is about 32,807 hect. with cropping intensity of about 122%.

Rice covers an area of 1,25,936 hectares which is about 90 percent of the food grain areas, and coverage of H.Y.V. paddy is 81,540 hect. (about 65 percent of the total rice area) which greatly contributes to the total production.

Among oil seeds, rape & mustard is cultivated in 20.49 thousands hect. of the total oil seed area of the district. The average productivity of rape and mustard during 1995-96 was 715 Kg. per hect. which was comparatively high to the average of 514 Kg. per hect. of national average. The total production of 15.02 thousands tones was achieved in 1998-99 against 13.62 thousands tones in 1994-95.

The department of Agriculture has taken up schemes to increase oil seed production through introduction of new crops like groundnut, sunflower, soybeans & Niger.

Horticulture in the hill region plays an important role on the tribal economy. The department of Agriculture has developed 14 nos. of progeny orchards in different places in the district with the objective of raising quality planting materials like Assam-lemon-layers, pears cutting, Areca nut seedlings, coconut seedlings, banana suckers, black pepper cuttings etc. for distribution amongst the cultivators through departmental programmes like Kishan Mela & Demonstration Programmes. Endowed with a favourable climate & soil, the crops like pineapples, orange, maushumbi, pears, papaya, areca nut, coconut is extensively cultivated in the region. The total production of fruits was 71.56 thousands tones as against 59.31 thousands tones on 1987-88. Similarly, the region is suitable for growing Kharif & Rabi vegetables. The production of vegetables has increased to 43.98 thousand M.T. in 1998-99 as against 41.83 thousand M.T. in 1994-95.

Similarly, spices are grown extensively under commercial basis. Spices include ginger, turmeric, chili, garlic, onion & coriander in recent years. Likewise, the common tuber crops grown in the district are potato, tapioca & sweet potato.

Area and Production of Major Crops (Data relates to 1998-99)

Sl. No	Crop	Area (000 Hect.)	Production (000 Mt. Basis)
1	Food Grains	144.41	210.27
2	Oil seeds	20.50	15.02
3	Fruit Crops	11.06	84.26
4	Veg. Crops	4.30	43.98
5	Sugarcane	4.22	215.15
6	Fibre Crops	2.63	15.20

Table-6: Production of other major crops in Karbi-Anglong

	Food Grains	Ref. Year	Area in Hect.
	1. Rice	1998	111884
	2. Maize	1998	10561
a)	3. Wheat	1998	1845
	4. Other Cereal & millets	1998	207
	5. Gram	1998	548
	6. Tur (Arhar)	1998	1016
	Oil Seeds		
	1. Linseed	1998	85
	2. Castor	1998	520
b)	3. Sesamum	1998	2413
	4. Rape & Mustard	1998	17092
	5. Coconut	1998	370
	Fibres		
c)	1. Jute	1998	2023
	2. Cotton	1998	659
	3. Mesta	1998	69
	Miscellaneous		
	1. Sugarcane	1998	4209
	2. Tobacco	1998	100
	3. Areca nut	1998	1213
d)	4. Potato	1998	828
	5. Turmeric	1998	372
	6. Chillies	1998	277
	7. Tapiocas	1998	280
	8. Papaya	1998	485

E) **Production of Important Crops**

	Food Grains.			
	1. Rice	1998-99	Tonnes	154151
a)	2. Maize	1998-99	Tonnes	8038
	3. Wheat	1998-99	Tonnes	2670
	4. Gram	1998-99	Tonnes	268
	5. Tur, Arhar	1998-99	Tonnes	692
	Oil Seeds			
	1. Linseed	1998-99	Bales/ Tonnes	35
b)	2. Castor	1998-99	Tonnes	211
	3. Sesamum	1998-99	Bales	1331
	4. Rate & Mustard	1998-99	Tonnes	6312
	Fibres			
c)	1. Jute	1998-99	Bales	17668
	2. Cotton	1998-99	Bales	318
	Miscellaneous			
	1. Sugarcane	1998-99	Tonnes	191700
	2. Tobacco	1998-99	Tonnes	40
d)	3. Potato	1998-99	Tonnes	7240
	4. Turmeric	1998-99	Tonnes	275
	5. Chillies	1998-99	Tonnes	152
	6. Tapiocas	1998-99	Tonnes	1485
	7. Papaya	1998-99	Tonnes	7518
2.	Veterinary, Animal Husbandry			
a)	Total live Stock	1998-99	Nose	1251389
b)	Total Poultry	1998-99	Nose	588744
	Forest			
9.	a) Forest Division	1999	Nose	3
	b) Area under reserved forest	1999	Nose in Hectare	195722
	Fisheries			
	a) Registered beel Fisheries	1997-98	Nos	N.A.
11.	b) Registered River Fisheries	1997-98	Nos	NA
	c) Fish Seed production	1997-98	Million Nos	1.77
	d) Production of fish	1997-98	Million Nos	2245.20
16.	Sericulture			
	a) Total seed grainage Area	1997-98	Hect.	26.50
	b) Total Mulberry Farm Area	1997-98	Hect	6.00
	c) Total Muga Seed Farm Area	1997-98	Hect	26.00
	d) Eri concentration Centre Area	1997-98	Hect	149.09

Table-7: Area of of major cash crops in Karbi Anglong

Shifting Cultivation

Shifting cultivated areas have been deviated into current and abandoned shifting cultivation areas. Shifting cultivation areas includes all those lands, which are used for jhum during the current year. The area under this category has been estimated at 63,125 hectares. Abandoned shifting cultivation area refers to those lands, which were used for jhum during previous years. The area under this category is estimated at 3,60,760 hectares.

Crop Land in Kharif Season

The satellite image examined by Assam Remote Sensing Application Centre (ARSAC) has revealed that the cropped areas are confined to the old alluvial plains along the Jamuna, Kapili and Dhansiri rivers.

Almost the entire area is under paddy cultivation. The area under this class has been estimated at 1,31,287 hectares.

Crop Land Rabi Season

These kinds of areas are confined to only to the canal irrigated plains of Jamuna, Kapili and Dhansiri rivers. Mustard, sesamum and vegetables are the main crops cultivated during Rabi season in the district. The area under Rabi crop has been estimated at 1,25,157 hectares. The entire area under these crops lies in the double-cropped area.

Double Cropped

It was clearly evident from the study of two season data that the most of the double-cropped areas are located in the plains of Jamuna, Kapili and Dhansiri. The area under this category has been estimated at 1,25,157 hectares.

Domesticated biodiversity

The livestock and Poultry Population in Karbi-Anglong has been shown in Table-8

Crossbreed Cattle	Common Cow	Buffalos	Goats	Fowls	Ducks
12,521	5,15,699	45,369	1,20,468	5,02,451	73,988

Table-8 showing the population of livestocks and poultry in Karbi-Anglong (Deptt. Of Vety Sc.)

The details of Sericultural production in Karbi-Anglong is summarised below.

NO. OF SERICULTURAL VILLAGE	NO OF FAMILIES ENGAGED IN SERICULTURE			TOTAL AREA UNDER SILK WORM FOOD PLANTS (HECT.)			YIELD OF COCOONS		
	Eri	Muga	Mulberry	Eri	Muga	Mulberry	Ericut Cocoon (in 000 kg)	Muga Coconut (in Lakhs)	Mulberry Reeling Cocoon (in "000"kg)
862	19,626	17	457	208.64	49.32	142.71	85.51	3.14	10.37

Table-9: Silk industry data in Karbi Anglong

Chapter-4

Culture and Biodiversity:

The cultural affinity of karbi Anglong with nature has been noticed much often with the karbi people. The conservation of biodiversity has been practiced in Karb Anglong by the people through maintenance of sacred groves, exclusively managed and protected by the local people (Plate-2).



Plate-2: Sacred Groves and *Alstonia scholaris* preserved at Sacred Groves in Rongbong area of Hamren

The karbi people have been using the bamboo and thatch materials often for construction of their house holds (plate-3). The traditional use of various medicinal components of nature by the karbi society has been observed, but detailed written documentation has been found lacking which needs proper recording and documentation in printed form so as to continue the traditional cultural knowledge on use of medicinal plants in the karbi society.



Plate-3: Use of Bamboo and Thatch in house construction

Chapter-5

STRATEGIES AND ACTION PLAN FOR KARBI ANGLONG:

Problem Statement

In Karbi Anglong very little scientific effort was made to enhance the biodiversity conservation movement nor from Government side nor from any NGOs. But a “lots of efforts have made to destroy the biodiversity from various angles” said a local enthusiastic villager. The Nagaon Paper Mill has finished almost all forest bamboos from Karbi Anglong, which also increased the man-elephant conflict in the area as bamboo forest is one of the prime elephant habitat in the hills that are now in threatened with further destruction. Human animal conflict has a role in creating distance from people for conservation movement, specially for Elephants. Various groups for collection of medicinal plants over exploit the forest. Any group has made no efforts so far for any conservation education campaign among any sector of the society so far. The potentiality of Sericulture sector is very high and in reality it is almost neglected. The same situation is seen in piggyery and horticultural sectors. These things have bearing on the exploitation of biodiversity products from the wild.

Major Actors in relating to Biodiversity Conservation

The support from Political parties seems to have the major role in the whole process of biodiversity conservation. The local political parties of Karbi Anglong has shown some keen interest in past few years by brining some of the reserved forests within the district council under the protected area network. All other actors who have direct or indirect role in the biodiversity conservation have always pointed towards the political will they need for making a strategy into successful action. Being a autonomous hill district Karbi Anglong District Council has a major role in any kind of biodiversity conservation movement. The Karbi Student’s Organisation has another important role to play in the process although same has not pout the biodiversity issues in top of their agenda. Because this organisation has control over the student groups and involvement of students is very important for setting up any long tern conservation goals. Hence these kind of student’s organisation needs to be oriented through some short term courses on biodiversity conservation and monitoring which could be run by government agencies, educational institutions and more specifically the NGOs. Next important actor will be the District Administration. Specially for enforcement of Law. Forest Department of Karbi Anglong has to play a special role from planning to action level of all biodiversity conservation movement. Diphu College, which is situated in the district head quarter of Karbi Anglong can be made center of all conservation education campaigns.

Strategies and actions suggested by various groups:

5.1. BAMBOO CONSERVATION: Over exploitation of Bamboos must be stopped. To do this, certain target has to be fixed for collection of bamboos by Paper mills. Process for plantation of bamboos in forested areas should start immediately by forest department with proper financial/technical help from Paper Mill authorities. In this whole process, technical expertises may take from Forest Research Institutes. The bamboo offered to the paper mills by the state government on throw away price, needs proper re-look and new rate without any concession be fixed based on recent Supreme Court judgement.

Responsibility: Forest department.

5.2. HORTICULTURAL DEVELOPMENT: Establishment of horticultural farm should be encouraged to local Karbi people. Farms should be established in the abandoned jhoom lands.

Responsibility: Forest department, DRDA, NGOs working in rural development, Women’s group.

5.3. SERICULTURAL DEVELOPMENT: Immediate steps should be taken to encourage Sericulture among the Karbi women groups and also to individuals with government help. Formation of Karbi women groups should be encourage to get Government help for Sericulture. This will keep busy people rather than going forest for commercial collection of biodiversity products. The Government Sericulture Department Officials should visit the Women groups and should explain various govt. technical supports. Otherwise the knowledge of various govt. programmes will never reach the people.

Responsibility: Govt. of India, Deptt. Of Sericulture, NGOs working for rural development.

5.4. ANIMAL HUSBANDARY: To encourage the practice of animal husbandary for economic upliftment of the people, efforts need to be taken to practice the keeping of local indigenous piggery and chicken firm by the Karbi youth groups.

Responsibility: Deptt. of Veterinary sc., DRDA.

5.5. MEDICINAL PLANTS CONSERVATION AND WISE UTILIZATION: Medicinal Plant garden should be established in all major towns of the district. Proper identification and rearing of medicinal plants should be given to youth groups with the help of elderly experts. Local expert in medicinal plants like Sri. Gunaram Khanikar and Sri. Padmeswar Gogoi may be involved in future scientific plan for medicinal plant conservation in Karb-Anglong.

Responsibility: Forest Department, Agriculture Deptt., NGOs working on Health and Traditional Knowledge issues, Women's group, Cooperatives on micro enterprises.

5.6. INVOLVEMENT OF POLITICAL BODIES: Involvement of local political bodies is must for converting all strategies into actions. This is very important and can be done through periodic motivation camps and exchange programme to enable the political leaders to understand the need of biodiversity conservation and its wise use for sustainable future of their local people. Since about 6-7 members are elected from the district to the Assam Assembly, even the speaker of assembly could convene the all party motivation camp related to biodiversity conservation.

Responsibility: Speaker of Assam Assembly, Chief Executive Councillor of District Council, NGOs, Press.

5.7. INTER DEPARTMENTAL COOPERATION: Cooperation between various Government Departments can be achieved through regular discussion among all biodiversity related departments. This discussion should be held at least once in two month to discuss the various needs and time bound action plans for all biodiversity related issues. This was observed during the current meeting with various departments as they often complain each other for not having proper plan for biodiversity conservation. Proper co-operation can be achieved only through regular discussion among these departments.

Responsibility: Forest Department, District Council Chief, Deputy Commissioner, Local member of Parliament, Local MLAs.

5.8. INVOLVEMENT OF WOMEN IN DECISION MAKINGS: Women involvement is very poor in decision-making processes in Karbi Anglong. This need to be considered as basic priority. Forming of women groups should always encouraged in every steps.

Responsibility: District Council Chief, Deputy Commissioner, Women's Organisation, Human Right Commission, NGOs.

5.9. REDUCTION OF MAN-ELEPHANT CONFLICTS: Plantation of fodder plants should be taken immediately by the forest department with the help of local administration in the core areas for elephants. This will bring good will from the villagers towards forest departments and district administrations and also reduce the human elephant conflict. People should encourage to plant non-elephant attracting cash crops near the forest areas and to plant other cereals etc. at some distance from the forest areas. These strategies

can be achieved through mutual agreement among the villagers from near the forest areas and from the distance. Compensation to standing crops if damaged by elephants must be offered to the cultivators under the Elephant Project Schemes of Govt. of India after proper verification by a joint team of forest officials, local NGOs and village heads.

Responsibility: Forest Department, Local MLAs, Local M.P., District Council Chief, NGOs.

5.10. HANDICRAFT DEVELOPMENT: The handicraft made of NTFP should be encouraged and their cultivation by villagers in their own lands should also be encouraged to minimise the destruction of biodiversity in the forests of Karbi Anglong.

Responsibility: DRDA, Forest Department, Women's group, Handicraft institutions, Deptt. of Industry.

5.11. EFFECTIVE MANAGEMENT OF FOREST AREAS: It is very much essential to review and revise the existing manuals of management plans or working plans keeping in view the overall need of biodiversity conservation from the landscape planning point of view and participation of local people. The budget allocation for maintenance of forests resources should be based on the area of forests coverage in the district. Further to protect the valuable natural resources, proper security is needed.

Responsibility: Forest & Police Department, NGOs, Scientific & Social Institutions, Finance Department.

5.12. RESTORATION OF DEGRADED FOREST AREAS: The degraded forest areas in Karbi Anglong need proper planning for restoration, specially after the impacts of jhuming. This effort will provide considerable habitat for spatial movement of spill over species in the area and to offer biological resources the local people needs to prevent their further dependence on primary of dense forests.

Responsibility: Forest Department, Police Department, NGOs, Scientific Institutions, Local people, State Planning Commission.

5.13. MONITORING AND RESEARCH ON BIODIVERSITY: Monitoring and research are tools for better understanding and assessment of biodiversity, its functions and wise utilization of the resources, besides regular evaluation of status of various species of flora and fauna. There is a marked deficiency in qualitative base line data and on information needed to manage biodiversity both within and outside the designated forest areas. Further assessment of ecosystem services needs proper attention.

Responsibility: Forest Department, Scientific Institutions, NGOs with scientific background,

5.14. HUMAN RESOURCES DEVELOPMENT: The human resources development to address the various biodiversity conservation issues including its management is very much essential in Karbi Anglong. Biodiversity conservation and its sustainable use needs efficient and dynamic manager who possess both scientific competence and social awareness aided by communication skills. Training and refresher course for managers of biodiversity is the need of the time.

Responsibility: Forest Service College, Scientific Institutions, NGOs, Assam Public Service Commission,

5.15. TOURISM DEVELOPMENT: Eco-tourism concept should be introduced in Karbi-Anglong and the district council should target to lure atleast 50 percent of tourist visiting Kaziranga to also visit Karbi Anglong forests, which will give not only revenue to the district council, but also ample opportunity to grow the tourism industry which could address the un-employment problem to a great extent.

Responsibility: Assam Tourism, District Council, Forest Department, Indian Tourism, Press, TV.

5.16. PUBLIC PARTICIPATION IN BIODIVERSITY CONSERVATION: Efforts must be made with proper plan to ensure that the local people come forward to conserve the biodiversity of an area, keeping in

mind the long standing affinity and dependence on natural biomass resources for their subsistence, income supplementing and socio-cultural well being.

Responsibility: Educational Institutions, NGOs, Forest Department, Local Social leaders, Press, Film Makers,

GAP ANALYSIS

Gaps were seen in between the actors who are directly involved in the conservation process and the group who has knowledge regarding the conservation process at local level. The planners never approached to the local groups who from centuries are involved with the biodiversity product needs. It has been observed that there is a lack of awareness and understanding among the planners, extension workers, etc. about the benefits of crop diversity and the local solutions that farmers employ to combat pests or to increase soil fertility. Local needs are ignored very often in various Government initiatives. The experts also never informed the local villagers about the various nutrient richness of the various crops. The villagers also never talk to any technical experts for the problem they are facing for pest control, degradation of soil quality, preservation of grains, preservation of gene pools etc. Gaps were seen in the medicinal plants regarding the information banks with the villagers and the information banks with the experts at local level. This gaps widens with the generation goes up. The Jhoom cultivator's knowledge on the traditional varieties of crops lies with them only. These group have rarely interactions with other farmers to pass the information they carries. Attention needs to be given in future to document their traditional knowledges and then circulate it widely through various media. Some groups also have no information regarding loss of biodiversity and its importance while practicing Jhoom. The local people never informed about the global importance of the various endangered species, which are still available in the area. Few villages even don't have idea about the importance of such animals. For them these are only problems (e.g. elephant). No local NGO was involved in the biodiversity conservation process so far and this is to be major gap in the whole process. No systematic environmental education process has so far started by any group in the district and this was found to be a major gap in the whole process.

Follow up mechanism

Follow up mechanism for all strategies should be plan with proper consultation with experts from local levels and from experts from outside the district. For each strategy a local Ngo should be entrusted with the concern government department to monitor the process and progress. All concern agencies (including Govt. and non Govt) should sit together at least annually to get a comprehensive idea for the whole process.

ANNEXURE:**Division wise distribution of Forest Areas****Under Karbi Anglong West Division**

SI No.	STATE RESERVE FOREST	AREA (sq km)	NOTIFICATION No. & DATE
1	DHANSIRI	770.38	No. 3454R Dated 17-08-1951 No. 2537R Dated 11-10-1923 No. 3537GJ Dated 17-06-1939
2	DALDALI	123.32	No. 2178R dated 16-08-1933
3	DISAMA	112.15	No. 2757R dated 11-09-1933
4	KAKI 1 st ADDITION	121.49	No. 1021GJ dated 12-02-1941
	TOTAL	1,127.34	

SI No.	DISTRICT FOREST	COUNCIL	RESERVE	AREA (sq Km)	NOTIFICATION NO. & DATE
1	MIYUNGDISA D.C.R.F.			143.92	No. MHC/PHREFP/21/Pt-1/76/37 dated 14-10-1976
2	TAMULBARI			13.86	No. Nil dated 23-11-1978
3	ENGLONGKIRI			74.32	No. MHC/P/RF-102/76 Dated 23-09-1976
4	BORLONGPHER			77.31	No. KAC/F/21/82 Dated 17-06-1982
5	MATIPUNG			33.00	No. Nil dated 16-01-1976
6	LANGCHOLIATE			1.60	
	TOTAL			344.01	

SI. No.	PROPOSED RESERVE FOREST	AREA (In Sq. Kms)	NOTIFICATION NO. & DATE
1	Hafjan P.R.F.	35.25	Preliminary Notification No. Nil dated 16-01-1976
2	Langkaijan P.R.F.	44.37	Preliminary Notification
	TOTAL	79.62	

Under Karbi Anglong East Division

SI. No.	STATE RESERVE FOREST	AREA (In Sq. Kms)	NOTIFICATION NO. & DATE
1	Mikir Hills R.F.	221.81	No. 5d FRT dated 17-10-1878 No. 24 dated 07-10-1882
2	Kaliyani R.F.	208.96	No. 47 dated 05-08-1887
3	Nambor R.F. (N. Block)	53.09	

4	Nambor R.F. (W. Block)	166.33	
5	Chelabor R.F.	33.54	No. 4717F dated 1906
6	Sildhampur R.F.	15.75	No. 39 dated 27-09-1889
7	Jungthung R.F.	32.56	No. 39 dated 27-09-1889
	TOTAL	732.04	

Sl. No.	DISTRICT COUNCIL RESERVE FOREST	AREA (In Sq. Kms)	NOTIFICATION NO. & DATE
1	Longnit D.C.R.F.	117.62	No. MHC/111/75/66/2290 dated 21-11-1971 and 30-01-1981
2	Patradisa D.C. R.F.	67.33	No. 2392 dated 22-11-1971
3	Hidipi D.C.R.F.	20.08	No. Nil dated 21-04-1976
4	Jamuna D.C.R.F.	11.30	No. Nil dated 21-04-1976
5	Mahamaya D.C.R.F	5.58	No. Nil dated 17-07-1979
6	Khanbamon D.C.R.F	165.50	No. Nil dated 27-08-1979
7	Haithapahar D.C.R.F.	54.39	No. Nil dated 24-03-1982
	TOTAL	441.80	

Sl. No.	PROPOSED RESERVE FOREST	AREA (In Sq. Kms)	NOTIFICATION NO. & DATE
1	Lahorijan P.R.F	37.51	No. Nil dated 14-10-1969
2	Western Mikir Hills P.R.F	173.38	Preliminary Notification
3	Langlokso P.R.F	534.71	No. Nil dated 24-08-1975
4	Kaziranga P.R.F	33.88	Preliminary Notification
5	Dolamara P.R.F	20.18	No. Nil dated 26-05-1982
6	Bokajan P.R.F	24.79	No. Nil dated 05-07-1975
7	Kalapahar P.R.F	9.77	No. Nil dated 27-06-1982
8	Borjuri P.R.F	139.00	Preliminary Notification
9	Parkup Pahar P.R.F	27.73	Preliminary Notification
	TOTAL	1000.95	

Under Hamren Division :

Sl. No.	STATE RESERVE FOREST	AREA (In Sq. Kms)	NOTIFICATION NO. & DATE
1	Amreng R.F. (Addition)	56.94	No. 652GJ dated 31-10-1940
2	Jokota R.F.	12.35	No. 587R dated 26-02-1922 No. 1970GJ dated 04-05-1938 No. 2843R dated Nil
3	Rongkhang R.F.	33.39	No. 1784R dated 26-06-1922 and dated 07-09-1931
	TOTAL	102.68	

Sl. No.	DISTRICT COUNCIL RESERVE FOREST	AREA (In Sq. Kms)	NOTIFICATION NO. & DATE
1	Kolonga D.C.R.F.	17.35	
2	Amreng 1st Addition D.C.R.F.	5.80	No. Nil dated 13-08-1976
3	Amreng 2nd Addition D.C.R.F.	56.30	No. AAA.97/73/152 dated 05-07-
4	Sarchim D.C.R.F.	146.00	No. Nil dated 23-05-1975
TOTAL		225.45	

Sl. No.	PROPOSED FOREST	RESERVE AREA (In Sq. Kms)	NOTIFICATION NO. & DATE
1	Amsolong P.R.F.	74.73	No. Nil dated 16-01-1976
2	Umjakini P.R.F.	36.80	
3	Punja P.R.F.	4.00	
4	Chainanadi P.R.F.	19.87	
5	Balasar P.R.F.	82.79	
6	Rekhalong P.R.F.	18.25	
TOTAL		236.44	

TOTAL PLANTATION CREATED IN KARBI ANGLONG DISTRICT UPTO 8TH PLAN :-

A. KARBI ANGLONG WEST DIVISION , DIPHU

Sl.No.	Range / Division	Area
1	Central Range , Diphu	4,114.10 Ha.
2	Eastern Range, Rangapahar	2,676.42 Ha.
3	Western Range, Borlangpher	3,030.00 Ha.
4	Northern Range, Bokalia	2,226.50 Ha.
TOTAL :-		12,047.02 Ha.

B. KARBI ANGLONG

EAST DIVISION , DIPHU

Sl.No.	Range / Division	Area
1	Central Range , Manja	1,710.82 Ha.
2	Eastern Range, Bokajan	1,314.90 Ha.
3	Western Range, Dokmoka	1,446.00 Ha.
4	Northern Range, Dolamara	3,226.00 Ha.
5	North Eastern Range, Silonijan	3,032.00 Ha.
6	North Western Range , Parkup Pahar	819.00 Ha.
TOTAL :-		11,548.72 Ha.

C. HAMREN DIVISION , HAMREN

Sl.No.	Range / Division	Area
1	Ouguri Range	2,013.00 Ha.
2	Kheroni Range	2,804.00 Ha.
3	Hamren Range	808.00 Ha.
4	Umjakini Range	1,303.00 Ha.
TOTAL :-		6,928.00 Ha.

D. SOIL CONSERVATION DEPARTMENT

Sl.No.	Range / Division	Area
1	Diphu Soil Conservation Division	5,422.00 Ha.
2	Kohora Soil Conservation Division	3,098.00 Ha.
3	Hamren Soil Conservation Division	6,612.85 Ha.
TOTAL :-		15,132.95 Ha.

E. NORTHERN AFFORESTATION DEPARTMENT :-17,949.00 Ha.

GRAND TOTAL :-	63,605.69 Ha.
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