THE WORKING PLAN

FOR

KARIMGANJ FOREST DIVISION

For the period from 2023-24 to 2032-2033

Written by
Mazidul Hussain, IFS
&
Yunush Salim, AFS, DCF

Assam Forest Department
Government of Assam

Table of Contents

Volume – I, Part - I

भारत सरकार / GOVERNMENT OF INDIA
एकीकृत क्षेत्रीय कार्यालय / INTEGRATED REGIONAL OFFICE
पर्यावरण ,वन एवं जलवायु परिवर्तन मंत्रालय
MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE
लॉउसीब लुम्बतंगेन / LAW-U-SIB, LUMBATNGEN, शिलॉग / SHILLONG- 793021
E-mail: ro.nez.shil@gmail.com/moefshil_09@rediffmail.com
Tel: 0364-253-7609/7395/4650

सत्यमेव जयते

No. 12-2/30/2014/RONE/AS/KARIMGANJ/WP/41-42 April 10, 2023

To

The Principal Chief Conservator of Forests & HoFF
Department of Environment & Forest
Govt. of Assam
Dispur

Sub: Approval of Draft Working Plan of Karimganj Forest Division- reg.

Ref: (i) State Govt.'s letter No. FG.62/REWP/WP/Final Approval dated 22.03.2023.
(ii) Ministry's order No. 9-7/2012-ROHQ dt. 23.02.2018.

Sir,

With reference to the subject and State Govt.'s letter cited above, I am directed to inform that the matter has been examined and discussed in the Regional Empowered Committee (REC) meeting held on 28th March, 2023 in pursuant of Ministry's order as cited under reference no. (ii).

In this regard, I am directed to convey that on the basis of the recommendation of the REC, the Central Govt. hereby conveys the approval under Section 2 of the Forest(Conservation) Act, 1980 the approved Working Plan of Karimganj Forest Division subject to the following conditions:-

A. General conditions:-

1. The approval shall be effective from the date of issuance of this letter and is for a period of 10 years i.e. 2023-24 to 2032-33.
2. All the prescriptions of the Working Plan regarding regeneration, protection and management of the forest will be strictly complied with and any change in the prescriptions of Working Plan will be treated as deviation for which prior approval of competent authority as per National Working Plan Code 2014 (Chapter V) shall be obtained in advance.
3. Any alteration in the plan leading to deviations or involving important technical points shall be made available with necessary draft amendments to the Deputy Director General of Forests (Central) through the PCCF and shall be implemented only after amendments are duly approved by the Deputy Director General of Forests (Central).
4. Sufficient budgetary allocations must be ensured for implementation of various prescriptions regarding protection, regeneration and development of the forests and all the prescriptions mentioned in the Working Plan must be carried out as per schedule. All the felling must be commensurate with regeneration and in case the regeneration works in the areas worked in a year are not taken up in the subsequent year, then felling of trees in forest area shall not be undertaken unless facts are appraised to Central Government and concurrence is obtained for

taking up felling operations as per working plan prescriptions. The Hon'ble Supreme Court of India's orders in this regard will be strictly complied with.

5. The standing instructions issued by the Hon'ble Supreme Court from time to time in W.P. (C) No. 202/95 as well as in similar petitions shall be meticulously followed.
6. The domestic requirement of fuel wood from the branches etc and the construction timber should be the first priority of the local people and the balance timber may be utilized for the Forest Based Industries.
7. The approved saw/veneer mills will have to submit the monthly returns as per the Hon'ble Supreme Court order dated 05/12/2005 in WP (C) 202/95 dated 12.05.2001 to the State Government with a copy to this office. The monthly returns are to be duly verified and check by the Forest Officer authorized by the State Government.
8. Rights and concessions, if any, should be given to the rights holders on the principle of sustainability of the forests.
9. Thinning of plantation, if any, should be done after proper assessment of the Plantation taking into consideration the spp., site quality, the expected stand number and basal area for the given age from relevant yield tables and stand tables.
10. No thinning shall be carried out on the slopes over 30^0 (steep slopes), areas having blanks or under stocked or in the areas of 20m strip on both sides along the streams and nallahs and 50m strip on both sides along the rivers.
11. The monitoring of the thinning, if any, will be done by territorial DFO and CCF (30 % and 10%) respectively. A certificate regarding this to be submitted regularly to this office.
12. No new construction of roads in the forest area shall be taken up for the purpose of extraction of timber.
13. The material obtained from thinning, if any, is to be transported to the notified depots and no timber should remain in the felled compartments.
14. Every year after any thinning as per prescription, a report regarding the yield removed shall be communicated to the Regional Office of MoEF&CC with an annual plan of operation to commensurate regeneration in the working plan area before commencement of new forestry operation year (in the month of September).
15. Adequate fire protection measures shall be taken up and adequate funds for this purpose shall be made available by the State Government.
16. Intensive protection measures against biotic interference and encroachment in forest shall be taken up. The case of forest settlement and encroachment shall be expedited and all the Acts,. Rules, Orders of Hon'ble Supreme Court of India shall be followed in letter and spirit. Action should be taken for demarcation of forest areas and budgetary provision should be made for the same.
17. It shall be ensured that no activity is permitted/taken up in forest area in violation of the provisions of Forest (Conservation) Act, 1980.
18. No exotic sps. is to be introduced in the Plantation Working Circle and in any of the compartment for regeneration.
19. Shifting cultivation shall be discouraged and practice shall be devised to contain such cultivation within already affected area with right land use practices and through social forestry/energy plantations etc.

20. Annual updating of compartment history & control forms with the proposed major deviations if any shall be intimated to the Regional Office of MoEF&CC in the month of September every year.
21. The Working Plan Officer is to revise this Working Plan 2 (two) years before the expiry so that there will be a continuity on the Management of the Reserved Forest.
22. A Mid-term review of the progress of implementation of prescriptions as well as efficacy of the Working Plan shall be carried out in the year 2027-28 so that deviations if any causing short falls in achievements of target can be adjusted by the Standing Consultative Working Plan Committee in consultation with the Deputy Director General of Forests (Central).
23. A copy each of the approved final Working Plan is to be sent to the Regional Office, MoEF&CC, Shillong, ICFRE, IGNFA and FSI, Dehradun.
24. The Central Government reserves the right to review/modify or withdraw this approval at any point of time depending upon the management needs and orders of the Central Government /Court.

B. Specific conditions:-

1. The Working Plan should have special provision for conservation of elephant corridors, water conservation, conservation of wetlands and archaeological sites.
2. The Working Plan should have provision for skill development for extraction, development and proper marketing of NTFPs, Bamboo including effort on composting through JFMCs. The Division may prescribe for the collaboration with RFRI, Jorhat for the same.
3. The Working Plan should prescribe for creation of preservation plots of important and threatened species and seek to involve school, college and other like organization in biodiversity conservation.
4. The Working Plan should prescribe for exploration of funds for JFMCs from other sources like MNREGA, CSR etc. The agency providing fund for the implementation of Working Plan to be specified.
5. Special attention to be given to climate change and development of climate-resilient models for plantation and conservation.
6. Provisions to be made for strengthening the protection mechanism and provision of wireless set, GPS sets, drone facility etc.
7. The Working Plan should have prescription for proper demarcation of the forest area and if there is any encroachment, timely and decisive action to be taken.
8. The Working Plan may also calculate the indirect benefits derived from the forest as part of the budget projection.
9. All Appendices as mentioned in para 97 & 98 of the National Working Plan Code, 2014 should be provided in the Plan.

Yours faithfully,

(W.I. Yatbon)
Dy. Inspector General of Forests (C)

Copy to:-

1. The Additional Chief Secretary (Environment & Forests), Govt. of Assam, Dispur.

Dy. Inspector General of Forests (C)

PREFACE

Forests being major natural resources that support sustenance of the human population, play the most important role in the environment and maintaining ecological balance that need to be conserved. Various anthropogenic pressures including industrialization and urbanization are causing depletion of forest cover. Conservation and management of forests has become one of the top priorities globally. Conservation and management practices of forests should focus on the sustained yield and maintaining the flow of ecosystem services. For achieving the sustained yield and improved ecosystem services, there is a need to formulate effective planning. Forests are under the influence of climate change and human-induced pressures affecting sustainability. This has called attention of planners to formulate strategies to achieve the "Sustainability," defined as "the maintenance of natural capital". There is an urgent need to harmonize balance between production from forests and ecological goals through planning processes performed at the national, regional, and local levels.

The significance of forest protection supporting sustainability is well witnessed in the Constitution of India. The Constitution of India under the constitution (42nd amendment) Act, 1976, added article 48A which reads as "Protection and improvement of environment and safeguarding of forests and wild life – "The State shall endeavour to protect and improve the environment and to safeguard the forests and wild life of the country". Similarly, fundamental duties for every citizen were added during 42nd amendment Act, 1976, as Article 51A (51A Fundamental Duties) which says "It shall be the duty of every citizen of India – (g) To protect and improve the natural environment including forests, lakes, rivers and wild life, and to have compassion for living creatures" (National Forest Commission, 2006). The efforts for a structured and scientific forestry planning in India were initiated long ago, beginning with the appointment of Dr. Dietrich Brandis as the first Inspector General of forest in 1894, and the formulation of the first National Forest Policy in 1894. Since then, attempts have been made to evolve more reasonable basis of forest planning and management. This primarily involved the integration of scientific basis for the conservation of natural resources to meet emerging needs of the country and society.

Forests being a renewable resource can be sustained in eternity with well-planned management interventions. The need for management and planning of forests evolves over time with population driven demands. Forest planning is often subjective and unique to situations and problems being addressed. This may also vary according to the forest tract dealt with respect to its characteristics and composition, risks involved, long-term vision, and the requirements visualized at local or national level. Historically, in India, management of forests to retain a sustainable yield, working plan (also called as forest working plan or forest management plan) has been the main instrument in practice for almost 150 years. Although, the initial focus of these

plans was primarily to fetch sustained yield of timber which has gradually shifted to the wider concerns of sustainable management of forests, and also the concerns of the forest fringe communities and overall forest-dependent life support system varying from local level to the national scale.

This Working Plan deals to address the concerns of ecosystem services, environmental stability, biodiversity conservation, climate change, carbon sequestration, soil moisture retention, water yield, minor forest produce in the form of important non timber forest products, pharmaceutical and other industrial requirements, rights of the forest dweller communities. In recent years after the enactment of reducing emissions from deforestation and forest degradation (REDD +) initiative, the requirement of a working plan would shift to fulfill the need to give quantitative evidence about the forest resources to fetch payment benefits. This demands information related to biodiversity conservation, carbon sequestration, and enhancement of rural livelihoods which could fit in the working plans. There has been a paradigm shift in the preparation of working plans in India. Post-Independence era (i.e. after 1947), forestry witnessed a shift in the priority of forest management from production to conservation forestry, particularly after the enactment of Forest Conservation Act in 1980.

Working plan for the Karimganj forest Division, Assam for the period 2022-23 to 2031-2032 has been prepared as per the National Working Plan Code, 2014 (NWPC, 2014 for sustainably managing the forests of the Division, keeping in mind the availability of resources and the issues occurring and expected to occur in the coming ten years. Measures to control the pressure on the forest reserves and increase the forest productivity with increased green cover in the Division have been emphasized in this working plan. It is attempted to integrate information related to Criteria and Indicators (C&I) for sustainable forest management (SFM), carbon sequestration and mitigation, climate change, biodiversity monitoring and conservation, forest certification, enumeration and management of non-timber forest products (NTFPs), preparation of micro-plans for joint forest management (JFM), fringe forest management, water resource management, soil and water conservation, forest health and diseases, forest fires and protection.

The GPS coordinaties for the sample plots were worked out by the North Eastern Space Applications Centre, Shillong (NESAC); with support from O/o the Addl. PCCF (RE&WP), Department of Environment and Forests, Assam. NESAC also supported the Division by mapping the Forest Types, Canopy Density, Slope, Aspect and Landuses. Other relevant surveys, including Plantations, Socio-Economic Survey (*forest and fringe villages*) were conducted in line with NWPC, 2014. Mapping of Trees Outside the Forest, Forest Carbon Stocks, Compartment Wise Growing Stocks, Waterbodies in the Division, Delineation of Microwatersheds, Estimation of USF, LULCF, Mapping of Working Circles were also carried out under the guidance of Additional PCCF(RE&WP), supported by consultants from IORA. Findings of the survey were duly discussed with the relevant stakeholders and then finalized.

Mazidul Hussain
Yunush Salim

Acknowledgement

The success of any project depends largely on the encouragement, guidance and support of many other people. Apart from the efforts of my self, number of senior officials, colleagues, staffs contributed in preparation of this Working Plan. I have taken efforts in this project. However, it would not have been possible without the kind support and help of many individuals and organizations. I take privilege to express my gratitude to the people who have been instrumental in the successful completion of this Forest Management Plan.

I take privilege to offer my deepest gratitude and greatest appreciation to Ms. Imtianla Ao, DDGF and Sri W.I. Yatbon, IFS Dy.Inspector General of Forests (C), MoEFCC, Regional Office (NEZ), Shillong for their continuous guidance and support. Without their encouragement and guidance this project would not have been materialized.

I am highly indebted to Sri. M K Yadava, IFS, PCCF & HoFF, Assam for his guidance and continuous support and encouragement. I offer my sincere gratitude to the APCCFs and SPCCF namely Dr. Alaka Bhargava, IFS, Sri. MK Yadava, IFS and Sri T V Reddy, IFS, Sri N Anand, IFS and Sonali Ghosh, IFS who led the Research Education and Working Plan Wing, Assam during the course of working Plan preparation for their continuous guidance and support. I am thankful to Sri S.S Baidya DCF, Smt. Preeti Buragohain, Smt. Kasturi Goswami, RFO, Munmi Gogoi, RFO and Sri Lakheswar Das RFO for their assistance and co-operation in various stages.

The GPS co-ordinates for the sample plots were worked out by the North Eastern Space Applications Centre, Shillong (NESAC) with active support from staffs of GIS Cell of theo/o. Addl. PCCF (RE&WP), Assam. I offer my sincere acknowledgement to NESAC and staffs of GIS Cell of o/o CCF (RE&WP), Assam for their valuable contributions.

Finally, I express my deep sense of gratitude to Sri Yunush Salim, DCF, whose sincere work and continuous endeavour has given final shape of this Working Plan.

Mazidul Hussain

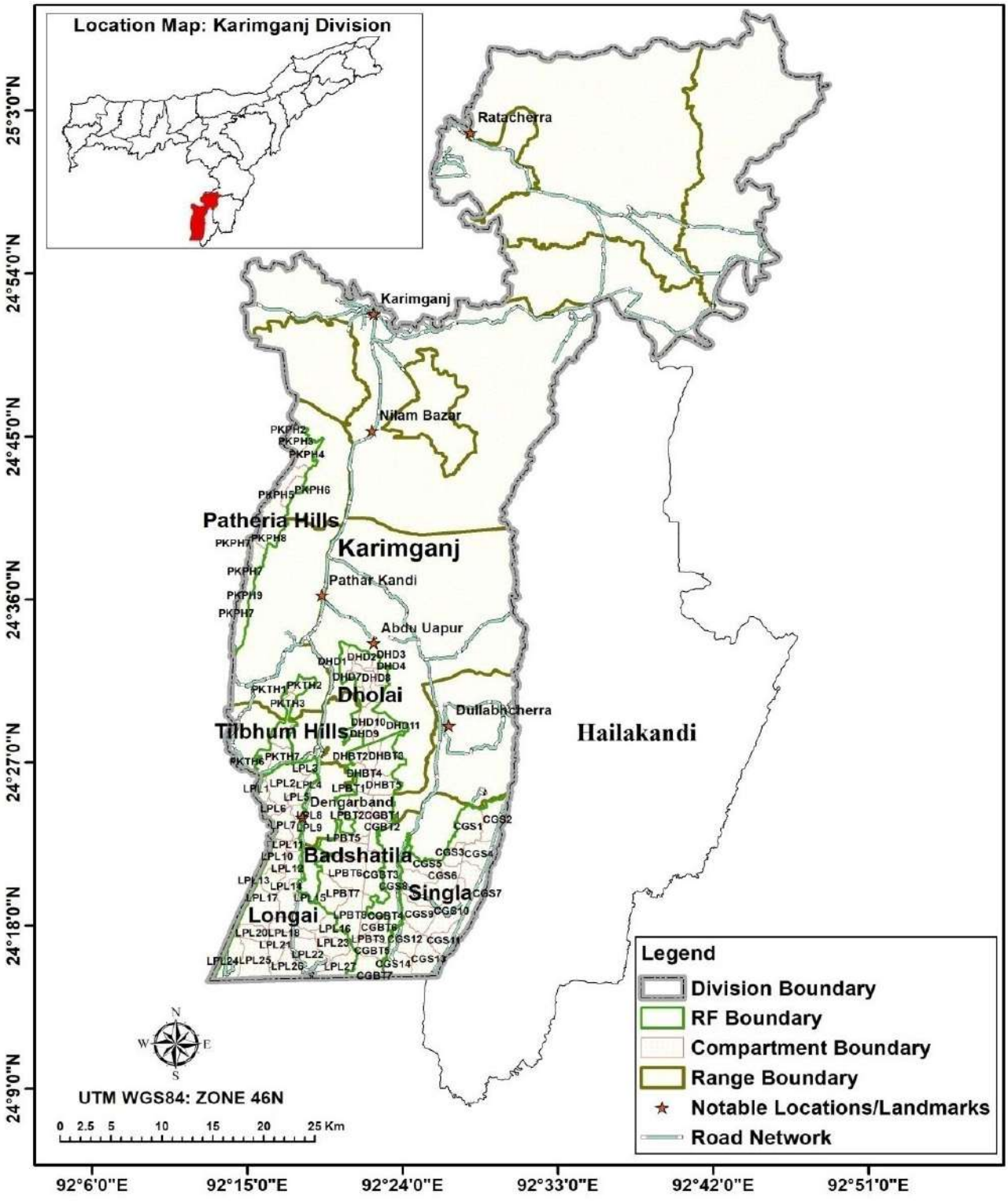


Figure 1: Location Map of Karimganj Division, Assam

I. Abbreviations

ACF	Assistant Conservator of Forests
AACP	Assam Agricultural Competitiveness Project
AFR	Assam Forest Regulation
APCCF	Additional Principal Chief Conservator of Forests
APFBC	Assam Project on Forest and Bio-Diversity Conservation
AR/ANR	Artificial Regeneration/Aided Natural Regeneration
BCD	Biodiversity Conservation and Development
BFO	Beat Forest Officer
BMC	Bio-Diversity Management Committee
BTAD	Bodoland Territorial Area District
CAI	Current Annual Increment
CAMPA	Compensatory Afforestation fund Management and Planning Authority
CASFoS	Central Academy for State Forest Service
CCF	Chief Conservator of Forests
CF	Conservator of Forests
DBH	Diameter at Breast Height
DCF	Deputy Conservator of Forests
DFO	Divisional Forest Officer
DGF & SS	Director General of Forests and Special Secretary
DGPS	Differential Global Positioning System
DSMs	Defence Series Maps
EC	Environmental Clearance
FAO	Food and Agriculture Organization
FC	Forest Clearance
FCA	Forest Conservation Act
FDA	Forest Development Agency
FRA	Forest Rights Act
FRH	Forest Rest House
FSI	Forest Survey of India
FSR	Forest Schedule of Rates
FYP	Five Year Plan
GCS	Geographic Co-ordination System
GDP	Gross Domestic Product
GHGs	Green House Gases
GIM	Green India Mission
GIS	Geographic Information System
GPS	Global Positioning System
Ha	Hectare

HoD	Head of Department
HoFF	Head of Forest Force
ICFRE	Indian Council of Forestry Research and Education
IGNFA	Indira Gandhi National Forest Academy
IIFM	Indian Institute of Forest Management
ITRF	International Terrestrial Reference Frame
IUCN	International Union for Conservation of Nature
IVI	Importance Value Index
JFM	Joint Forest Management
JFMC	Joint Forest Management Committee
LULUCF	Land Use and Land Use Change and Forestry
MAI	Mean Annual Increment
MAPs	Medicinal and Aromatic Plants
MAR	Monitoring Assessment and Reporting
MEoF	Minister of Environment and Forests
MFP	Minor Forest Produce
MHW	Mixed Hard Wood
MIS	Management and Information System
MODIS	Moderate-resolution Imaging Spectroradiometer
MoU	Memorandum of Understanding
MRV	Measuring Reporting and Verification
MSL	Mean Sea Level
NAP	National Afforestation Project
NBM	National Bamboo Mission
NaRMIL	National Resource Management and Intrigated Livelyhood
NFI	National Forest Inventory of India
NGO	Non-Governmental Organization
NH	National Highway
NP	National Park
NPV	Net Present Value
NREGS	National Rural Employment Gurantee Scheme
NREP	National Rural Employment Programme
NRSC	National Remote Sensing Centre
NTCA	National Tiger Conservation Authority
NTFP	Non-Timber Forest Produce
NWAP	National Wildlife Action Plan
NWDB	National Wastelands Development Board
OSMs	Open Series Maps
PA	Protected Area

PBRs	Peoples Biodiversity Registers
PCCF	Principal Chief Conservator of Forests
PCU	Project Co-ordination Unit
PESA	Panchayats (Extension to Scheduled Areas) Act
PIU	Project Implentation Unit
PF	Protected Forests
PRA	Participatory Rural Appraisal
PRF	Proposed Reserved Forest
PWPR	Preliminary Working Plan Report
RAPCCF	Regional Additional Principal Chief Conservator of Forests
RBA	Relative Basal Area
RBAFs	Relative Basal Area Frequencies
RD	Relative Density
REDD	Reducing Emissions from Deforestation and Forest Degradation
REWP	Research Education and Working Paln
RET	Rare, Endangered and Threatened
RF	Reserve Forests
RoFR	Recognition of Forests Rights
RFO	Range Forest Officer
RS	Remote Sensing
SC	Schedule Caste
SD	Standard Deviation
SF	Social Forestry
SFDs	State Forest Departments
SFM	Sustainable Forest Management
SMC	Soil and Moisture Conservation
SOI	Survey of India
ST	Schedule Tribes
TOF	Trees Outside Forests
UF	Unclassified Forests
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
WC	Working Circle
WGS	World Geodetic Survey
WII	Wildlife Institute of India
WLS	Wildlife Sanctuary
WP	Working Plan
WPO	Working Plan Officer
WPU	Working Plan Unit

EXECUTIVE SUMMARY

I. INTRODUCTION

The primary intent of the working plan is to protect existing forest cover of the degraded forest area through adopting suitable management involving the Forest Department's manpower and participation of fringe villagers for overall conservation of biodiversity.Theaim is to develop a sustainable forest cover in the Karimganj district for balance ecology, suitable environment and conservation of biodiversity.The increasing population is creating stress on the forest resources of the State as well as on Karimganj Division, resulting into encroachment and degradation of natural forest.In this plan, strategy has to be adopted for prevention of encroachment as well as degradation of natural forest. Forests play a major role in ecological balance, environmental stability, biodiversity conservation, sustainable development and food security.The traditional management system was aimed for revenue generation and raw materials to various industries. Now the forest policy hasbeen changed and the management should be concerned for ecological balance, environmental stability and suitable development.The strength, weakness, opportunities & threats on the forests of Karimganj Division needs to be studied for prescription of strategies and for achieving the ultimate goal of the working plan.

a) Vision statement

- To make the plan as a tool for scientific forest management over the existing forest of Karimganj Forest Division.
- Evaluating the present status of forest resources of the Division.
- Assessing the impact of past management practice and deciding about the suitable future management.

b) Goals and objectives of management

- Conservation of forests and reduction of forest degradation.
- Enhancement of forest productivity together with establishment of regeneration to improve forest health and vitality as per ecological and silvicultural requirements of the species,
- Progressively increasing the growing stock and carbon sequestration potential.
- Maintenance of biological diversity.
- Sustainable yield of forest produce, prevention of soil erosion and stabilization of the terrain.
- Improvement and regulation of hydrological regime;
- People's involvement in planning and management of forests fulfilling socio-economic and livelihood needs of the people, albeit with simultaneous implementation of various forest laws
- Maintenance and enhancement of ecosystem services including ecotourism.

The objectives of management are –

- Comprehensive and intensified forest management under the participation of available human resources in individual and joint effort with the all relevant department like civil,

police, agriculture, veterinary, rural development and public health etc. in the Karimganj district

- To make the joint forest management practice more viable and effective with further creation of awareness with respect to biodiversity conservation towards mitigation of climate change
- To upgrade the skill of frontline staff for better performance in the field of protection, management and extension of forestry

c) SWOT analysis

The diversity in the floral and faunal composition requires attention in the division. There is poorregeneration of NTFP's. The waterbodies are also undergoingleaching during summer season. Incompetency of the field staff and threats, natural as well as anthropogenic for degradation of the forest areas like pressure floods, forest fire, land slide, illegal felling, and encroachment with high fuel wood extraction rate happen to be the critical areas to be considered by the administration.

Alternative means of livelihood development such as ecotourism for the forest dependent people have also been proposed in the present scheme such that it will counter the intervention in the forest areas for the income generation purposes. Focusing on the appropriate forest management activities and conservation of Medicinal Plants, over different working circles proposed in Cachar Division, Assam through this working plan. The detail SWOT analysis carried out for prescriptions and strategies for achieving the goals and objectives is shown in the table 1.0 below.

Table 1: SWOT analysis of the Karimganj Forest Division, Assam.

STRENGTHS	**WEAKNESS**
➢ Natural forest ➢ Perennial water resources. ➢ Good JFMCs. ➢ Fertile Soil	➢ Absence of diversified flora and fauna. ➢ Absense of Good stock of natural forest ➢ Poor NTFP stock. ➢ Infrastructural deficiency. ➢ Deficiency of trained staffs ➢ Degraded forest.
OPPORTUNITIES	**THREATS**
➢ Ecotourism ➢ Alternate livelihood development. ➢ Good road connectivity. ➢ Job opportunities.	➢ Anthropogenic activities including Jhum cultivation, Encroachment, Illegal felling ➢ Anti-social activities. ➢ Floods ➢ Forest fires. ➢ Landslides

The Expected Outcomes of the Working Plan for the Karimganj Division are:

- Conservation of forests, reduce forest degradation, restoration of degraded forests, increase of forest stock and sustained yield.
- Ensure people's involvement for forest conservation and protection and thereby attain the objective for sustainable supply of forest produce for fringe village communities and generation of green livelihoods.
- Restoration of woodland leading to long term carbon sequestration.
- Conservation of soil and water resources
- Management of flood affected/low lying areas by afforestation activities and controlled rate of
  erosion.
- Ecosystem services including ecotourism activities will be developed.
- Sustainable JFMC/NTFP plantation area development and Biodiversity conservation with a focus on rare and endangered species of floral-faunal components.

e) Abstract of Plan Prescriptions: The abstract of works prescribed in the Working Plan of Karimgang Forest Division, Assam, for the plan period 202-23 to 2031-32 showing its year wise target is summarized below in Table (e) as per the format laid out under National Working Plan Code 2014.

Table (e): Yearwise target of activities prescribed during the Plan period

Ch No.	WC	Prescribed Activity	Physical target Over the Plan Period									
			Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Part-II Ch 2	JFMC WC	Estd of 62 nos. community forest nurseries having 50,000 seedlings each	62	62	62	62	62	62	62	62	62	62
				Maintenance including production of 50,000 saplings each year								
		Plantation 1125 hectares as production forest.	115	115	115	115	115	115	100	105	115	115
		Joint Forest Management Working Circle (Maintenance)2550 hect.	-	115	230	345	460	575	575	560	550	550
		JFMC training and awareness programmes (*4 programs twice a year for ten years, each programme 30 persons*). a) 40 training.	8	8	8	8	8	8	8	8	8	8

		b) 40 awareness programme.										
Part-II Ch 3	Plantation WC	Plantation and regeneration works 18500 hect	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
		Maintenance		1850	3700	5550	7400	7400	7400	7400	7400	7400
Part-II Ch 5	NTFP & Bamboo WC	NTFP Plantation = 2100 hectares	210	210	210	210	210	210	210	210	210	210
		NTFP Maintenance = 5040 hect.	-	210	420	630	630	630	630	630	630	630
		Bamboo Plantation = 2100 hectares	210	210	210	210	210	210	210	210	210	210
		Bamboo Maintenance = 5040 hect	-	210	420	630	630	630	630	630	630	630
Part-II Ch 6	Soil & Water Conservation	Soil and water conservation works Proposed treatment area Plantation 25% of total allotted area of **2537.70 hect** = 634.43 (say) 635 hect.	65	65	65	65	65	50	65	65	65	65
		Maintenance		65	130	195	260	325	310	310	310	310
Part-II Ch 7	WL Conservation and Biodiversity Management	Enrichment plantations 1000 hect.	100	100	100	100	100	100	100	100	100 -	100
		Maintenance of plantation = 2300 hect	-	100	200	300	400	400	400	400	400	400
		b) Establishment of 1 anti-wildlife depredation unit.	1	1	1	1	1	1	1	1	1	1
		d) Safe elephant corridors 4 nos. (Continuous for 10 years)	4	4	4	4	4	4	4	4	4	4
		e) 150 nos. wildlife awareness camps.	15	15	15	15	15	15	15	15	15	15

II. GLOSSARY OF TERMS

S.No.	Term	Definition
1.	Abiotic	Pertaining to the non-living parts of an ecosystem, such as soil particles bedrock, air, and water.
2.	Afforestation	The establishment of a forest or stand in areas where the preceding vegetation or land use was not forest.
3.	Agroforestry	A collective name for land-use systems and practices in which trees and shrubs are deliberately integrated with non-woody crops and (or) animals on the same land area for ecological and economic purposes.
4.	Artificial Regeneration	Establishing a new forest by planting seedlings or by direct seeding (as opposed to natural regeneration).
5.	Aspect	The direction toward which a slope faces; its exposure in relation to the sun.
6.	Basal Area	The area of the circle formed by the cross-section of a tree taken 1.3 m above the ground.
7.	Benefit/Cost Analysis	A set of procedures for defining and comparing the quantified benefits and costs of a project or course of action; used as an aid to decision making
8.	Biodiversity	The biological diversity of plants, animals, and other living organisms in all their forms and levels of organization, including the biological diversity of genes, species, and ecosystems.
9.	Biofuel	Biomass or materials derived from biomass that can be used to generate energy.
10.	Biomass	The dry weight of all organic material, living or dead, above or below the soil surface.
11.	Biosphere	The portion of the earth comprising the lower atmosphere, the seas, and the land surface (mantle rock) in which living organisms exist.
12.	Biosphere Reserve	A management model proposed by the United Nations Man and the Biosphere program, in which a core area is preserved free from human disturbances, surrounded by buffer zones, which then lead into more intensive areas of disturbance and human activity.
13.	Biota	The animal and plant life (fauna and flora) of a given area.
14.	Block Cutting	Removal of the crop in blocks in one or more operations, generally for wildlife management purposes, encouraging regeneration, or protecting fragile sites.
15.	Breast Height	The standard height, 1.3 m above ground level, at which the diameter of a standing tree is measured.
16.	Buffer Zone	A strip of land where disturbances are not allowed, or are closely monitored, to preserve aesthetic and other qualities adjacent to roads, trails, waterways, and recreation sites.

17.	Canopy	The more or less continuous cover of branches and foliage formed collectively by the crowns of adjacent trees.
18.	Carbon Budget	Comparative evaluation of the amount of carbon stored in natural forests (sinks) and the amount emitted by them (sources), which is undertaken to determine whether the forests are sequestering more carbon than they are emitting to the atmosphere. Carbon budgets can be drawn up on various scales, including global.
19.	Carbon Sequestration	The uptake and storage of carbon. Trees and plants, for example, absorb carbon dioxide, release the oxygen and store the carbon. Fossil fuels were at one time biomass and continue to store the carbon until burned.
20.	Carbon Sink	An area where the rate of carbon uptake by living organisms exceeds the rate of carbon release. The surplus carbon is actively sequestered into organic or inorganic forms.
21.	Carrying Capacity	The average number of livestock and (or) wildlife that can be sustained on a management unit, compatible with management objectives for the unit. It is a function of site characteristics, management goals, and management intensity
22.	Climate Change	An alteration in measured quantities (e.g., precipitation, temperature, radiation, wind, and cloudiness) within the climate system that departs significantly from previous average conditions and is seen to endure, bringing about corresponding changes in ecosystems and socio-economic activity.
23.	Conservation	The management or control of human use of resources (biotic and abiotic) and activities on the planet, in an attempt to restore, enhance, protect, and sustain the quality and quantity of a desired mix of species, and ecosystem conditions and processes for present and future generations.
24.	Contour Map	A topographic map that portrays relief by means of lines that connect points of equal elevation.
25.	Crown	The live branches and foliage of a tree.
26.	Crown Density	The amount and compactness of foliage of a tree crown.
27.	Dbh (Diameter At Breast Height)	The stem diameter of a tree measured at breast height, 1.3 m above the ground.
28.	Decision Support Systems (DSS)	Analytical tools (e.g., computer models) that aid decision making by providing information on the projected implications of alternative management actions.
29.	Deforestation	The long-term removal of trees from a forested site to permit other site uses.

30.	Degradation	(1) The erosional removal of materials from one place to another, which lowers the elevation of streambeds and floodplains. (2) Any process or activity that removes or lessens the viability of ecosystem functions and processes, and hence biological diversity.
31.	Depletion	The use or consumption of a resource at a rate greater than the resource can be replenished within a defined time period. The notion of time is important, since many renewable resources can be restored if consumption is halted.
32.	Ecosystem Services	Valuable, ongoing streams of benefits provided by healthy ecosystems, such as air and water purification, biodiversity maintenance, climate stabilization, mitigation of floods and droughts, detoxification and decomposition of wastes, generation and renewal of soil and soil fertility
33.	Endemic Species	A species that is indigenous to a particular area; not introduced and often with a limited geographical range.
34.	Environmental/Ecological Assessment	A process designed to contribute pertinent environmental information to the decision-making process of forest management and other resource projects and programs.
35.	Evergreen	Never entirely without green foliage, leaves persisting until a new set has appeared.
36.	Forage	Grasses, herbs, and small shrubs that can be used as feed for livestock or wildlife.
37.	Forest	A complex community of plants and animals in which trees are the most conspicuous members and where the tree crown density—the amount of compactness of foliage in the tree tops—is greater than 10 percent.
38.	Forest Cover	Forest stands or cover types consisting of a plant community made up of trees and other woody vegetation, growing more or less closely together.
39.	Forest Cover Type	A group of forested areas or stands of similar composition that differentiates it from other such groups. Forest cover types are usually separated and identified by species composition and often by height and crown closure classes. In detailed typing, age, site, and other classes may also be recognized.
40.	Forest Encroachment	The intrusion or establishment of a significant number of trees on grassland(s).
41.	Forest Fire	Any wildfire or prescribed fire that is burning in forest, grass, alpine, or tundra vegetation types
42.	Forest Floor	"Layers of fresh leaf and needle litter, moderately decomposed organic matter, and humus or well-decomposed organic residue.

43.	Forest Management	The practical application of biological, physical, quantitative, managerial, economic, social, and policy principles to the regeneration, management, utilization, and conservation of forests to meet specified goals and objectives while maintaining the productivity of the forest. Particularly, that branch of forestry concerned with the overall administrative, economic, legal, and social aspects and with the essentially scientific and technical aspects, especially silviculture, protection, and forest regulation. Includes management for aesthetics, fish, recreation, urban values, water, wilderness, wildlife, wood products, and other forest resource values.
44.	Gap Analysis	A technique that assesses conservation plans and identifies ecosystems, land formations, or habitat types that are not currently adequately represented in the existing system of protected areas and reserves. Should be performed at regional, subregional, landscape, and watershed scales.
45.	Genetic Diversity	Variation among and within species that is attributable to differences in hereditary material.
46.	GPS (Global Positioning System)	A method of accurately determining or relocating a ground position using the signal from several satellites simultaneously. A small portable computer evaluates the time for each signal to reach it and then computes a three-dimensional location.
47.	Global Warming	A real and projected trend in the warming of the earth's surface caused by natural changes in the global climate system and by human activities such as the release into the atmosphere of the gaseous by-products (principally carbon dioxide) of fossil-fuel consumption, which trap long-wavelength radiant energy.
48.	Greenbelt	A strip of undisturbed soil and vegetation left along waterways or access routes to minimize the environmental impact from development.
49.	Greenhouse Effect	The warming of the earth's atmosphere caused by increasing levels of carbon dioxide and other gases in the air, which trap the sun's heat within the atmosphere.
50.	Greenhouse Gases	Those gases, such as water vapour, carbon dioxide, tropospheric ozone, nitrous oxide, and methane, that are transparent to solar radiation but opaque to longwave radiation. Their action is similar to that of glass in a greenhouse.
51.	Ground Truthing	The use of a ground survey to confirm the findings of an aerial survey or to calibrate quantitative aerial observations.
52.	Groundwater	Water below the level of the water table in the ground; water occupying the subsurface saturated zone.

53.	Growing Stock	The volume estimate for all standing timber at a particular time.
54.	Habitat	The environment in which a population or individual lives; includes not only the place where a species is found, but also the particular characteristics of the place (e.g., climate or the availability of suitable food and shelter) that make it especially well-suited to meet the life cycle needs of that species.
55.	Harvest	To fell or remove timber, other than under a silviculture treatment.
56.	Height Class	Any interval into which the range of tree or stand heights is divided for classification and use (commonly 3-, 5-, or 10-m classes); also the trees or stands falling into such an interval.
57.	Hydrology	Science that deals with the waters above and below the land surfaces of the earth, their occurrence, circulation, and distribution, both in time and space, their biological, chemical, and physical properties, their reaction with their environment, including their relation to living beings.
58.	Institutional Arrangements	"The laws, regulations, policies, social norms, and organizations governing and participating in resource use. Institutional arrangements specify who has access to resources, guide resource development activities, and define who will monitor and enforce the rules.
59.	Intergovernmental Panel On Climate Change (IPCC)	A panel open to all members of the United Nations Environment Programme and the World Meteorological Organization. The IPCC assesses the scientific, technical, and socio-economic information relevant to the understanding of the risk of human-induced climate change.
60.	Invasive Species	Any species not native to a particular ecosystem whose introduction causes, or is likely to cause, economic or environmental harm or harm to human health.
61.	Litter	The surface layer of the forest floor that is not in an advanced stage of decomposition, usually consisting of freshly fallen leaves, needles, twigs, stems, bark, and fruits.
62.	Livestock	Farm animals regarded as an asset.
63.	Lopping	Chopping branches, tops, and small trees after felling into lengths such that the resultant slash will lie close to the ground.
64.	Mean Annual Increment (MAI)	Stand volume divided by stand age. The age at which average stand growth, or MAI, reaches its maximum is called the culmination age. Harvesting all stands at this age results in a maximum average harvest over the long term.

65.	Microclimate	The climate of small areas, such as under a plant or other cover, differing in extremes of temperature and moisture from the climate outside that cover.
66.	Mitigation	To minimize, reduce, or moderate a certain force such as potential for wildfires.
67.	Mortality	Death or destruction of forest trees as a result of competition, disease, insect damage, drought, wind, fire, and other factors (excluding harvesting).
68.	Native Species	A species known to have existed on a site before the influence of humans.
69.	Net Present Value (NPV)	A stand's present worth before harvesting once costs associated with its establishment and tending have been subtracted.
70.	Non Timber Forest Products (Ntfps)	Any commodity obtained from the forest that does not necessitate harvesting trees. It includes game animals, fur-bearers, nuts and seeds, berries, mushrooms, oils, foliage, medicinal plants, peat, fuelwood, forage, etc.
71.	Plantation Forest	Forest stands established by planting and (or) seeding in the process of afforestation or reforestation which are either of introduced species (all planted stands) or intensively managed stands of indigenous species, which meet the following criteria: one or two species at plantation, even age class, and regular spacing.
72.	Plot	A carefully measured area laid out for experimentation or measurement.
73.	Reforestation	The re-establishment of trees on denuded forest land by natural or artificial means, such as planting and seeding.
74.	Regeneration	The act of renewing tree cover by establishing young trees naturally (natural seeding, coppice, or root suckers) or artificially (direct seeding or planting). Regeneration usually maintains the same forest type and is done promptly after the previous stand or forest was removed.
75.	Reserve	An area of forest land that, by law or policy, is not available for harvesting. Areas of land and water set aside for ecosystem protection, outdoor and tourism values, preservation of rare species, gene pool, wildlife protection, etc.
76.	Sapling	The stage of tree development in between the seedling and the pole stage. Saplings are typically 1–2 m tall and 2–4 cm in diameter, with vigorous growth, no loose, dead bark, and few (if any) dead branches.

77.	Silviculture	The art and science of controlling the establishment, growth, composition, health, and quality of forests and woodlands to meet the diverse needs and values of landowners and society on a sustainable basis.
78.	Spacing	The removal of undesirable trees within a young stand to control stocking, to maintain or improve growth, to increase wood quality and value, or to achieve other resource management objectives.
79.	Species	A group of individuals that have their major characteristics in common and (usually) can only breed with each other.
80.	Sustainability	A state or process that can be maintained indefinitely. The principles of sustainability integrate three closely interlined elements—the environment, the economy, and the social system—into a system that can be maintained in a healthy state indefinitely.
81.	Temperate Forest	One of three main forest zones in the world. The woodland of rather mild climatic areas; composed mainly of deciduous trees.
82.	Timber	Trees, whether standing, fallen, living, dead, limbed, bucked, or peeled.
83.	Topography	The collective physical features of a geographic area, such as those represented on a map, especially the relief and contours of the land.
84.	Volume	The amount of wood or fibre contained in a tree, stand, or forest, or parts of these measured in cubic units (e.g., cubic metres per hectare) inside the bark.
85.	Wetland	A swamp, marsh, or other similar area that supports natural vegetation that is distinct from adjacent upland areas.

III. List of diverse flora found in Karimganj Forest Division, Assam

The Karimganj forest division provides habitats to diverse flora. The detailed list of diverse flora found in Karimganj forest division is given below:

Trees

Sl. No.	Vernacular Name	Botanical Name
1	Agar	*Aquilaria agallocha*
2	Amra	*Spondius magifera*
3	Amloki/Amla	*Embilica offcienalis*
4	Aslia/Kalaujha	*Cordia myxa*
5	Asok	*Saraca indica*
6	Aswatha	*Ficus Religiosa*
7	Awal	*Vitex pedunculories (Sila-titu)*
8	Badam	*Sterculia alata*
9	Bohera	*Terminalia bellerica*

10	Bajrang	*Xanthoxylum budrunga*
11	Banak	*Schima wallichii*
12	Ban Am	*Magiferra sylvatica*
13	Ban Belphai/Jalpai	*Elaeocarpus Floribundus or E. varunna*
14	Bandar fela (Rata)	*Dysoxylum binectariferum*
15	Bandar lathi	*Cassia fistula*
16	Bon simul	*Bombax insigne*
17	Barun	*Crataeva religiosa*
18	Bat	*Ficus bengalensis*
19	Bella	*Sapium baccatum*
20	Bhaduk	*Vitex pubescens*
21	Bhatkur	*Vitex heterophylla*
22	Bhola	*Morus laevigata*
23	Bhubi	*Baccaurea sapida*
24	Bhuri	*Trewia nudiflora*
25	Bonsum	*Phoebe goalperensis*
26	Borpat	*Ailanthus grandis*
27	Banbogori	*Heritiera acuminate*
28	Bogori	*Zigyphus Zuzuba*
29	Chatim	*Alstonia scholaries*
30	Chakroshi	*Chickrassia tabularis*
31	Chailta ban	*Dillenia pentagyna*
32	Chailta	*Dillenia indica*
33	Chalmugra	*Hydnocarpus Kurzii*
34	Cham	*Artocarpus chaplasha*
35	Chami	*Polyalthia simiarum*
36	Chamia	*Hibiscus macrophyllus*
37	Champa	*Michelia champaca*
38	Dalmugra	*Gynocordia odorata*
39	Dephal	*Garcinia Xanthochymus*
40	Dewa	*Artocarpus lakoocha*
41	Dhuna rata	*Canarium bengalensis*
42	Dimoru	*Ficus glomerata*
43	Fulkat/phulkat	*Stynax serrulatum*
44	Fulujha/Banmala	*Calicarpa macrophylla*
45	Fuara	*Litsea spp*
46	Gamari	*Gmelina arborea*
47	Garjan	*Dipterocarpus turbinatus*
48	Garumara	*Crypteronia paniculata*
49	Gondroi	*Cinnamomum glanduliferum*
50	Gagnala	*Litsea sebifera*
51	Gulal	*Diospyros toposia*
52	Haldi Kat	*Adina cordifolia*
53	Hansh	*Albizzia stipulate*
54	Hartaki	*Terminalia chebula*
55	Hatia	*Chikrasia tabularis (Bogi Poma)*
56	Heloch	*Antidesma spp*

57	Hergoza	*Dillenia pentagyna (Oxi)*
58	Hengla/Engla	*Bursera scrrata*
59	Hinaru/Moroi	*Albizzia odoratissima*
60	Hizal	*Barringtonia acutangla (Pani-amra)*
61	Hona/Bhatgila	*Oroxylum indicum*
62	Honur	*Stereosparmum spp*
63	Jam	*Eugenia spp*
64	Jakura	*Macaranga denticulate*
65	Jangli badam	*Sterculia alata*
66	Jarul	*Lagerstroemia flosreginae*
67	Jhalna	*Terminalia myriocarpa*
68	Jhawa	*Holigarna longifolia*
69	Jhoki	*Bischofia javanica (Uriam)*
70	Jinari	*Podocarpus nerrifolia*
71	Kadam	*Anthocephalus cadamba*
72	Kat badam	*Castanopsis indica*
73	Kala-ujha	*Cordia myxa (Lessora)*
74	Kanchan	*Bauhinia variegate*
75	Karach	*Pongamia glabra (Karanj)*
76	Kawa thuti	*Cordia fragmentissima*
77	Kayengla	*Garuga pinnata*
78	Koinari	*Miliusa spp*
79	Koroi	*Albizzia procera*
80	Korol	*Kayea floribunda*
81	Katal	*Artocarpus integrifolia*
82	Kow	*Garcinia Cowa*
83	Kum	*Careya arborea (Kumhi)*
84	Kuma	*Cedrela toona*
85	Kuroil	*Dipterocarpus turbinatus*
86	Kurta	*Palaquium polyanthus*
87	Larubandha	*Macaranga spp*
89	Lakiam	*Mangifera sylvatica*
90	Luk luki (Panial)	*Flacourtia cataphracta*
91	Madhubura	*Pterosprmum accerifolium (Hati polia)*
92	Marhal	*Vatica Lanceaefolia*
93	Mahidal	*Cordia fragrantisima*
94	Madar	*Erythrina indica*
95	Mathang	*Carallia integerrima (C. Lucida)*
96	Maralia	*Mallotus albus*
97	Mon	*Randia dumetorum (Mainphal)*
98	Monawal	*Vitex altissima*
99	Moroi	*Albizzia spp*
100	Moralia	*Mallotus albus*
101	Nageswar	*Messua ferrae (Nahar)*
102	Newr	*Bursera serrata (Nejor)*
103	Pakhirhar	*Diplospora singularis*
104	Paraia awal/paroi (Paroli)	*Stereospermum chelonoides*

105	Ping	*Cynometra polyandra*
106	Pipla	*Albizzia lucida*
107	Pisanti	*Grewia microcos*
108	Poma	*Cedrela toona (Toon)*
109	Pongta	*Diplospora sigularis*
110	Poreng	*Eleocarpus robustus*
111	Ramdala	*Duabanga sonneratiodes*
112	Romkota	*Quercus spp*
113	Rata/Phul Rata (Amari)	*Amoora wallichii*
114	Rongi Rata	*Dysoxylum hamiltonii*
115	Rudrakksha	*Elaeocarpus gonitrus*
116	Sanjanel	*Lagerstroemia parviflora*
117	Satkora	*Citus hystrix*
118	Seleng	*Elaeo carpus robustus*
119	Simul	*Bombaxceiba (Cotton tree)*
120	Siris	*Albizzia procera (Safed siris)*
121	Sita	*Echinocarpus assamicus (Phul Hingori)*
122	Sundi, Maricha	*Michelia Montana*
123	Sndi, Til/Jati Sundi	*Tallauma phelocarpa*
124	Sundi, Champa	*Michelia Champaca*
125	Satrong	*Lophopetalum fimbriatum*
126	Tarua	*Endospamum chinensis*
127	Tezhuara	Myrstia angustifolia
128	Tezia	*Cinnamomum obtusifolium*
129	Tezapata	*Cinnamomum spp.*
130	Telo	*Canophyllum enophyllum*
131	Tula	*Tetrameles nudiflora*
132	Tetul	*Tamarix indica*
133	Udal	*Sterculia alata*
134	Ukhali	*Talauma hodgsonii (Baram thuri)*
Bamboo		
Sl. No.	**Vernacular Name**	**Botanical Name**
135	Baziail	*Pseudostachyum polymorphum*
136	Bhulka	*Bamboosa balcooa*
137	Bakail/Burwal/makail	*Bambusa pallid*
138	Beti bans	*Bambusa mastersii*
139	Dalu	*Teinostachyum dullooa*
140	Daral/Lata bans	*Melocalamus compactiflorus*
141	Kalia	*Bambusa auriculata*
142	Kail	*Oxytenanthera nigrocilliata*
143	Kata/Ketura	*Bambusa valgaris*
144	Kaligoda	*Oxytenanthera nigrociliata*
145	Kali sundi	*Oxytenanthera albociliata*
146	Karail/jati	*Dendracalamus strictus*
147	Khang	*Dendrocalamus longispathus*
148	Lota	*Dinocloa maclellandii*
149	Mirtenga/Paura	*Bambus tulda*

150	Muli	*Melocanna baccifer*
151	Parua/Paura	*Bambusa teres*
152	Pecha/Kako	*Dendracalam hamittonii*
153	Rupali/Rupahi	*Dendrocalamus longispathus*
154	Pichlee	*Bambusa nutans*
Canes		
Sl. No.	**Vernacular Name**	**Botanical Name**
155	Golla	*Daemonorps Jenkinsianus*
156	Horna	*Calamus latifolius*
157	Jali	*Calamus tenuis*
158	Sundi	*Calamus guruba*
Shrubs		
Sl. No.	**Vernacular Name**	**Botanical Name**
160	Biardala	*Livistonia jenkinsiana (Toko pat)*
161	Ban laldi	*Curcuma spp*
162	Bhat	*Clerodendron infortunatum*
163	Dudhkari	*Holarrhena antidysenterica*
164	Gandhi	*Homalomena rubsesterica*
165	Kitta pata	*Phrynium imbricatum*
166	Lutki/Phutuki	*Melostoma malabarithicum*
167	Patidul/Chhatipat	*Liculala peltata*
168	Patidoi (Murta)	*Clinogyne dichotma*
169	Pisach ban	*Eupotarium spp*
170	Ramgua	*Pinanga gracilis*
171	Suchutra/surat pat	*Laportea crenulata*
172	Tara pat	*Alpinia nutans*
Reeds And Grasses		
Sl. No.	**Vernacular Name**	**Botanical Name**
173	Kash	*Saccharum procerum*
174	Khagra	*Saccharum spontancum*
175	Ekra	*Erianthus raveneac*
176	Nal	*Phragmites Karka*
177	Rema	*Thysanolaena maxima*
178	Khor/Thatching grass	*Impereta cylindrical*
Epihytes		
Sl. No.	**Vernacular Name**	**Botanical Name**
179	Karau	*Loranthus scurrula*
Climbers		
Sl. No.	**Vernacular Name**	**Botanical Name**
180	Bat	*Ficus spp*
181	Chattalat/panilot	*Delima sarmentosa*
182	Ghilla	*Entada scandens*
183	Kuchai/Boloa lot	*Acacia pinnata*
184	Chepeta lot	*Vitis planicaulis*

The Karimganj Forest Division provides suitable habitat for a diverse fauna. The detail list of different Fauna found in this division is shown in table below.

Mammals

Local Name	Eniglish Name	Seientific Name
Badur	Fruit bat	Rousettas leschenaultia
Bagh	The leopard	Panthera pardus
Baghdash	The clouded leopard	Neofelis neboulosa
Baltholoi	Field mouse	Musd booduya
Baltiholoi	Wood rate	Blandus blandfordi
Ban-biral	The Jungle cat	Felis chaus
Bandar	The Rhesus	Macaca Mulatta
Ban-rui	Pangolin	Manis pentadactyla
Bhallook	Sloth bear	Melursus ursinus
Bham	Indian civet	Viverra zibetha
Bholangi	Samber	Cervus unicolor
Boro Endure	Bamboo rat	Cannomys badius
Chamchika	Pipstrelle	Pippstrellus coromondra
Chika	Mole	Talpa micrura
Endur	Tree shrew	Tupia glis
Gandar	Small one horned Rhinoceros	Rhinoceros sondicus
Ghandhagokul	Small civet	Viverricula indica
Gulbagh	The leopard	Panthara pardus
Hailda bhallok	Sun bear	Ursus malayansus
Hanuman	The common langur	Presbytis entellus
Hati/Atti	The Elephant	Elephus maxiimas
Katt bilai	Giant squirrel	Ratufa bicolor
Khorgush	Hare	Lepus nigrocollis
Lajwabati Bandar	The Slow loris	Nycticebus couca
Lal Bandar	The Assamese macaque	Macaca assamensis
Landor	The leaf monkey	Prebytis pileatus
Machh biral	The Fishing cat	Felis viverrina
Maya harin	Muntjac	Cevrulus muntjac
Nartini harin	Hog deer	Cervus porcinus
Neyonl	The mongoose	Hapestes auropunctuatus
Pahari chhagal	The Goral	Nemorhacdus goral
Sajaru	Porcupine	Hystrix indica
Shiyal/Hiyal	The jackal	Canis aureus
Sishoo	Gangetic dolphin	Platanista gangetica
Suar	Wild Boar	Sus scrofa

Ud	Common otter	Lutra lutra
Ullook	The hoolock	Hylobates hoolock
Birds		
Local Name	**Eniglish Name**	**Seientific Name**
Babui	Baya	Ploceus philippinus
Basanto bouri	Copper smith	Megalaima haemacephala
Bata	Raiin quail	Coturnix coromandelica
Batasi	Crested Tree swift	Hemiprocne longipennis
Batasia	House swift	Apus affinis
Baz	Hawk Crested Honey Buzzard	Pernis ptilorhynehus
Bene bon	Blue throated Barbet	Megalaima asiatica
Bhimraj	Large Racket tailed drongo	Dicrurus paradiscus
Bhutum pecha	Indian Eagle owl	Bubo bubo
Bon murgi	Red jungle fowl	Gallus gallus
Bou kathaa kou	Brain fever bird	Cuculus varius
Bul-bul	All bul buls	Pycnonotus jocosus
Chakha	Brahminy duck	Tadorno ferrugineo
Chamcha	Spoonbill	Platalea leucordia
Charul	House sparraw	Passer domesticus
Chatak	Smmall Skylark	Alauda gulgula
Cheel	Pariah kite	Milvus migrans
Darkak/Kauwa	Jungle crow	Corvus macrorhynchos
Dauk	White breasted Water hen	Amaurornis phoenicurus
Dhanesh	Great Pied hornbill	Buceros bicornis
Doyel	Magpie Robin	Copsychus saularis
Dub dubi	Dabchick	Tachylaptrus ruficollis
Duphi	Spotted dove	Streptopelia chinensis
Gachh peeha	Spotted owlet	Athene brama
Gai bog	Egret heron	Egretta garzetta
Gai bog	Cattle egret	Bubulcus ibis
Gang shalik	Bankmyna	Acridotheres gingianus
Goganbha	Spot billed Pelican	Pelecanus Phillippensis
Hairtal	Green pigeon	Treron phoenicoptera
Haldiya pakhi	Black headed oriole	Oriolus xanthornus
Hargila	Adjutant stork	Leptopilos dubius
Hiramon	Blossom headed parakeet	Pittacula cyanocephala
Hutum pecha	Brown Fish owl	Ketupa zeylonensis
Jalghora	Black winged stilt	Himantopus himantopus
Jalghuri	Pheasnat tailed Jacana	Hydrophaisanus chirurgus
Jalali Koitor	Blue rock pigeon	Columba livia

Jal Ghura	Water cock	Gallicrex cinerea
Jal pipi	Bronze winged Jacana	Metopidius indicus
Tel tupi	Red rumped swallow	Hirundo daurica
Junglee paroh	Maroon backed Imperial pigeon	Ducula badia
Janglee shalik	Grey headed myna	Sturnus malabaricus
Kanakua	Crow pheasant	Centropus sinensis
Kath-Thukra	Rufous wood pecker	Micropternus barchyurus
Ketketi dhanesh	Grey hornbill	Tockus birostris
Khanjan/Dhobani	White wagtail	Motacilla alba
Khantiya	Geese	Anas Penelope
Kukil	Koel	Eudynamys scolopacca
Lakhi pecha	Barn owl	Tyto alba
Lalbog	Chestnut bitem	Ixobrychus cinnamomeus
Lalduphi	Red Turtle dove	Streptopelia tranquebarica
Latkan	Indian Lorikeet	Loriculus vernails
Lanjo	Pintail	Anas acuta
Machhmar	Palla's Fishing eagle	Haliaeerus leucoryphus
Machhmar	Osprey	Pandion haliaetus
Machh ranga	Common king fishers	Alcedo atthis
Madhupiya	Fire breasted flower pecker	Dicacum ignipectus
Manikjor	Whit necked stork	Ciconia episopus
Mohonchura	Hoopoe	Upupa epops
Munia	White backed Munia	Lonchura striata
Munia	Spotted Munia	Lonchura punctulata
Myna, Sonpati	Hill myna	Gracula religiosa
Nak thuti	Nakta duck	Sarkidiornis melanotos
Neelpakhi	Fairy blue bird	Irena puella
Nil kantha	Blue jay/Indian Roller	Coracias benghalensis
Pancowri	Little Cormorar	Phalacrocorax niger
Pan duri	Darter	Anhinga rufa
Pana teltupi	Wire tailed swallow	Hirundo smithii
Pati hans	Mallard	Anas Platyrhynchos
Pati kak	House crow	Corvus splendens
Pech kunda	Black drongo	Dicrurus adsimilis
Phatringa	Little green Bec eater	Merops orientalis
Phul tooshi	Yellow backed Sun bird	Aethopyga Siparaja
Raj chaha	Painted Snipe	Rostratula benghalensis
Raj hans	Bar hended goase	Anser indicus
Rait kana	Indian Night Jat	Caprimulgus asiaticus
Raja rani	Scarlet minivet	Pericroctus flammeus

Raj shakum	King vulture	Torgos caluus
Sabaj pheki	Gold fronted leaf bird	Chloropsis auifrons
Sada duphi	Ring dove/collared dove	Streptopelia decaocto
Sada mach ranga	Pied king fisher	Ceryle rudis
Samuk bhanga	Open bill Stork	Anastomus oscitans
Sapmar	Crested Serpent Eagle	Spilornis cheela
Sat dhai	All babblers	Alcippe poioicephala
Sat dhai	Yellow eyed bat bler	Chrysomma sinense
Sepai bulbul	Red vented bullul	Phcnonotus cafer
Shahi bulbul	Paradise fly cacher	Tersiphone paradise
Shakun	White backed vulture	Gyps bengalensis
Shalik	Common myna	Acridotheres tristis
Shama	Shama	Copsychus malabaricus
Shankha cheel	Brahminy kite	Haliastur Indus
Shikra	Shikra	Accipiter badius
Kachua Koitor	Emerald Dove	Chalcophaps indica
Soralee	Common Teal	Anas crecca
Swen	Pallid Harrier	Circus macrourus
Tal chocn	Palm swift	Cypsiurus francolinus
Teka chur	Indian Tree pic	Dendrocitta vagabunda
Tai	Alexandrine Parakeet	Psittacula eupatria
Tittive	Red wattled Lapwing	Vanellus Indicus
Tun Tuni	Tailor bird	Orthotomus sutorius

Reptiles and Turtles

Local Name	**Eniglish Name**	**Seientific Name**
Baital Kanthva	Assam Roofed urtle	Kachugur Sylhetensis
Bali Kauthya	River terrapin	Batagur baska
Dhola Khauthaya	Dhond Roofed urtle	Kachuga dhongoka
Diba Kachim	Box turtle	Cuora amboinensis
Kala Kauthya	Pond tutle	Cuora amboinensis
Kali Kuthya	River turtule	Hardella thurjii
Kori Kuthya	Roofed turtle (Tent turtle)	Kachuga tecta tecta
Pahari kacho	Brown tortoise	Geochelone emys
Tis Kacho	Softshell tutle	Chitra indica

Snakes, Lizards and Geckos

Local Name	**Eniglish Name**	**Seientific Name**
Ajagar	Indian phython	Phython molurus
Bans sap	Bamboo viper	Trimeresurus graminius
Boro laudovga	Green keel back	Macropisthodon plumbicolor

Chitti	Wolf snake	Lycodon aulicus
Darais/Alad	Rat snake	Ptyas mucosus
Dhora	Checkered keel back	Natrise piscator
Gokhra	Cobra	Naja naja
Gosap	Monitorm lizaro	Varanus bengalensis
Kala sap	Black Krait	Bungarus niger
Karait	Common Krait	Bungarus cacrubus
Kumior	Gharial	Gavialis gangeticus
Laudoga	Green whip snake	Dryophis nasutus
Mati sanp	Common blind snake	Typhops braminus
Rajokhra	King cobra	Naja hanrab
Shankhini	Banded krait	Bungams fasciatus
Sona-gui	Water monitor	Varanus salvator
Takshak	Gecko	Gecko gecko

AMPHIBIANS

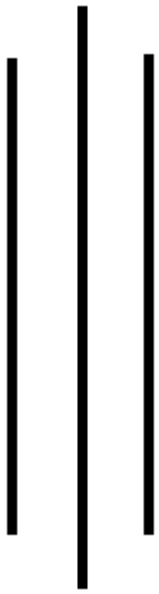
Local Name	**Seientific Name**
Gauchha beng	Bufo melanostictus
Gharu beng	Rana trigrinsa
Suna beng	

Fishes

Local Name	**Seientific Name**
Ari	Mystus seenghala
Baam	Mestocembelus armatus
Bacha	Eutropiich Chysavcha
Bag-machh	Bagarius bagarius
Banspati	Silonia silonia
Bat	Labeo bata
Bhola	Barilius bola
Bual	Wallago attu
Chella	Oxygaster bacails
Cheng	Channa gachua
Chital	Notopterus chitala
Darkina	Rasbera daniconius
Ghania	Labeo gonius
Goilsha	Mystus carasius
Goria	Labeo dyocheilus
Goroi	Chnna punctatus
Ilish	Hilsa ilisha

Kajli	Ailia coilia
Kaliara	Labeo calbasu
Kangla	Notoptenus notopterus
Katal	Catla catla
Khanka bata	Cirrihina reka
Koi	Anabas testitudincus
Kuchea	Amphipnous euchia
Magur	Clarias bactrachus
Mirgel/Mirgah	Cirrihina mrigala
Nandina	Labeo nandina
Padda	Ompok pabo
Pakhiranga	Tor tor
Phul chela	Oxygaster phulo
Puti	Puntius saranus
Rani mach	Trichogaster fasciatus
Rui	Labeo rohita
Sal	Channa marulius
Silkuri	Batitora bruai
Singi	Mystus vittatus
Tengra	Tor putitora

PART I



Summary of facts on which

Proposals are made

CHAPTER 1
THE TRACT DEALT WITH

1.1 Name and situation

The Karimganj Forest Division was created during the year 1981 bifurcating the Cachar Forest Division. It is situated within the longitudes of 92º12.2′ E and 92º 48.2′ E and the latitudes of 24º 15.0′ N and 25º 8.3′ N. The total geographical area of the division is 2603 sq. km. and falls under Karimganj district with a part of Cachar District. Total Forest area including recently declared Borail WLS (252.387 sq.km) is 797.846 sq.km. The Division is surrounded by Jatinga & Barak Rivers on the north-east, by Hailakandi District on the east, by the state of Mizoram and Tripura on the south, by the nation of Bangladesh on the west, by the state of Meghalaya on the north-west and by Dima-Hasao Autonomous District on the north.

Karimganj Forest Division consists of six Reserved Forests, two Proposed Reserved Forests & four Unclassed State Forests apart from one wildlife sanctuary (part). The forests along with their areas are shown below –

Table 1.1: Administrative setup of the Karimganj Division forests

Division	Range	RF	Area sq.km
Karimganj	Kalain Range	North Cachar RF	252.387
		Arang PRF	64.2425
	Karimganj Range	Adhorkona PRF	0.6484
	Patharkandi Range	Tilbhum RF	18.489
		Patharia Hill RF	76.473
	Duhalia Range	Duhalia RF (Part)	34.782
		Badshahtilla RF	-
	Cheragi Range	Singla RF	124.293
		Badshahtilla RF	-
	Lowairpowa	Badshahtilla RF	75.1381
		Longai RF	151.393
Total area =			797.846

North Cachar RF (252.387 sq.km.) is declared as Borail Wildlife Sanctuary and as such it is not included in this Working Plan.

1.2 Configuration of the ground

The Borail Range which is the highest hill Range in the state of Assam stands along the northern portion (west to east) of the Division. Its terrain is rugged, full of steep slopes and its rocky out-crops restrict approach to the area only through the narrow river valleys. The important streams emerging from the Borail Hills are Jatinga, Arang, Larang, Kalaincherra, Gumrah and Boleswar. On the southern part of the Division, the Chatachura Range stands, the ridge line of which divides the districts of Karimganj & Hailakandi. The other hill ranges are Badsahi Tilla, Tilbhum, Patharia Hills, Duhalia Hills and Jampui Hills.

There are three major rivers flowing through the territory of Karimganj Forest Division. These are

Barak river, Longai River (emerging from Lusai Hills running from south to north) & Singla river (emerging from Lusai Hills and streaming into a vast lake called as *Sonbeel*, which is one of the largest water bodies in the state) rivers.

1.3 Geology, rock and soil

The Surma basin of south Assam (Barak Valley) and Mizoram consist of N-S ridges of hilly terrain surrounded and bowl shaped synclinal valley elongated in the E-W direction respectively. The basin forms part of the greater Bengal basin. Geologically, sediments of Barak valley can be divided into, i) unconsolidated alluvial deposits of Holocene age and ii) semi-consolidated deposits of the Surma Group – consisting of Bhuban formation which forms oldest rocks in the area overlain by Bokabil subgroup, and Tipam Groups of Mio - Pliocene age and Holocene Dihing formation. The alluvial deposits in Barak Valley consist of sand, silt and clay with gravel and occasional lignite beds. The semiconsolidated older rocks exposed in the area include shale, ferruginous sandstone, mottled clay, pebble bed and boulder bed etc., belonging to Bhuban and Barail groups of rocks formed under marine condition, while subduction plate of Indian plate under the Burmese plate has resulted in the migrating accretionary prism complex representing the remnant ocean basin sediments. Further, the younger Tipam formation with thin layer of coal is deposited in the freshwater condition, overlying the shallow marine condition deposits of Bhuban formation of rocks. The geological formation of the Division is mainly tertiary. The older alluvium soil consists of pebble beds and falls under Surma series. The river beds of Barak, Longai & Singla were earlier deeper but due to soil erosion, the river banks have sunken and due to siltation the beds of the rivers have risen-up considerably. The flat land consists of alluvium, sandy soil with sandy loam. The river courses are very unstable leading to the formation of crescent shaped beels at different places. The geology of the division suggests that soil and water conservation measures are very important to check further erosion and siltation.

1.4 Climate parameters

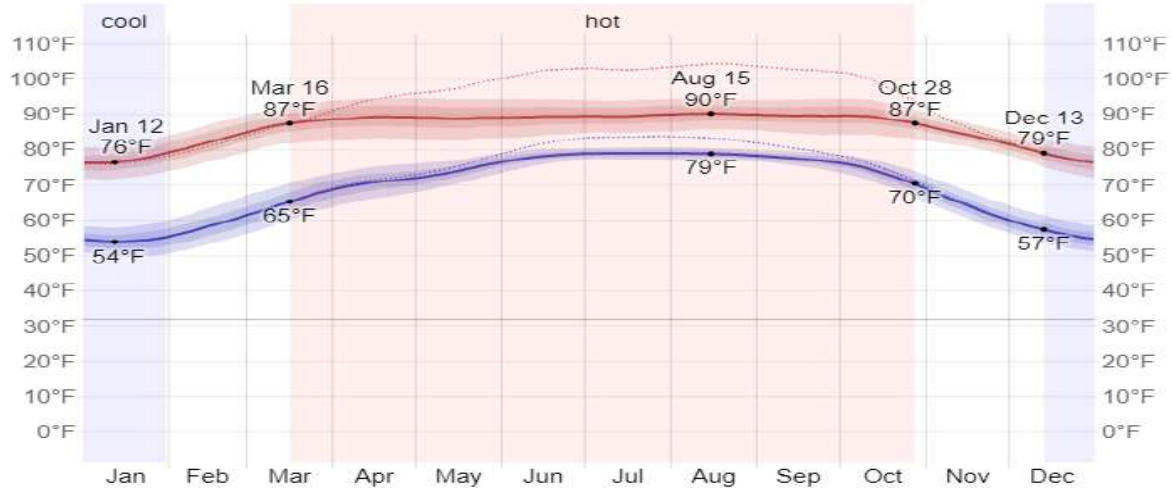
The climate of the District bears the characteristic of the climate of Barak Valley. The rainy season is from May to October. During the month of March & April, high velocity winds, hail storms & inclement weather are noticed. In October, winter season sets in. The temperature never goes very low during day time. Nights are comparatively cooler. During the monsoons, the District is affected by floods. The Daily Maximum, Minimum and Mean annual temparature in centigrade from 2007 to 2011 are given below. The hot season lasts for 7.4 months, from March 16 *to* October 28, with an average daily high temperature above *87°F*. The hottest month of the year in Karimganj is August, with an average high of *90°F* and low of 79°F.

The cool season lasts for 1.5 months, from December 13 *to* January 30, with an average daily high temperature below 79°F. The coldest month of the year in Karīmganj is January, with an average low of 54°F and high of 77°F.

The rainy period of the year lasts for 10 months, from January 31 to December 4, with a sliding 31-day rainfall of at least 0.5 inches. The month with the most rain in Karīmganj is June, with an average rainfall of 14.4 inches.

The rainless period of the year lasts for 1.8 months, from December 4 *to* January 31. The month with the least rain in Karīmganj is January, with an average rainfall of 0.3 inches.

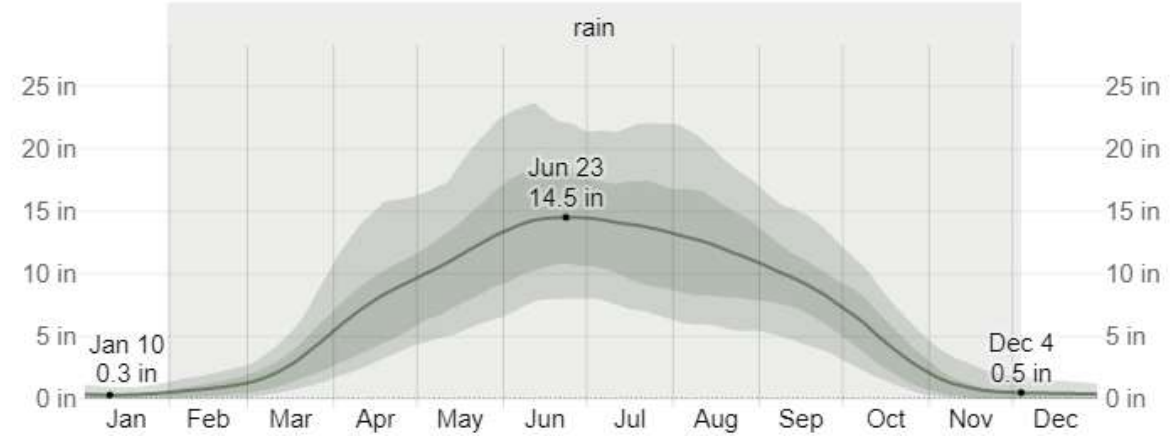
Figure 1.4.a*:* Average High and Low Temperature in Karīmganj



The daily average high (red line) and low (blue line) temperature, with 25th to 75th and 10th to 90th percentile bands. The thin dotted lines are the corresponding average perceived temperatures.

Average	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High	77°F	82°F	87°F	89°F	89°F	89°F	90°F	90°F	90°F	89°F	84°F	78°F
Temp.	64°F	69°F	76°F	80°F	81°F	83°F	83°F	84°F	83°F	80°F	73°F	66°F
Low	54°F	58°F	65°F	71°F	74°F	78°F	79°F	79°F	77°F	73°F	64°F	57°F

Figure 1.4a: Average Monthly Rainfall in Karīmganj



The average rainfall (solid line) accumulated over the course of a sliding 31-day period centered on the day in question, with 25th to 75th and 10th to 90th percentile bands. The thin dotted line is the corresponding average snowfall.

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall	0.3″	0.8″	2.7″	7.9″	11.5″	14.4″	14.0″	12.2″	9.4″	4.5″	0.9″	0.4″

CHAPTER 2

Maintenance/ increase in the extent of forest and tree cover

2.1 Area of forests under different legal classes (RF, PF, USF and others)

The detail area of forests under different legal class of Karimganj Forest Divisions is given below. The Reserved Forests have been constituted under the relevant provision of Assam Forest Regulation'1891. A statement showing the details of notification number with date and area of forest under different legal classes are shown in following table.

Table 2.1a: Area of forest under different legal classes in Karimganj Divison, Assam

Sl.No.	Name of R.F. / PRF	Area (km^2)	Notification No.	Date
1	Tilbhum RF	18.489	No. 2846R No. 3033R	dtd. 06.11.1922 dtd. 13.10.1933
2	Patheria Hills RF	76.473	No. 3698F No. 3322R	dtd. 27.04.1920 dtd. 11.08.1914
3	Duhalia RF	34.782	No. 1598R	dtd. 14.06.1926
4	Longai RF	151.393	No. 3341R No. M-78 No. 3433F No. 1433F	dtd. 13.09.1901 dtd. 15.07.1901 dtd. 12.05.1919 dtd. 12.05.1919
5	Singla RF	124.293	No. FRS.593/75/6 No 3479R	dtd. 08.03.1976 dtd. 19.08.1915
6	Badsahi Tilla RF	75.1381	No. 3602R No. 2465R No. 4688R	dtd. 01.10.1914 dtd. 22.06.1915 dtd. 08.12.1916
7	Arang PRF	64.2425	No. GFR.110/4913	dtd. 15.07.1949
8	Adharkuna PRF	0.6484	No. Kg/2516/9	dtd. 10.07.1958
9	Borail Wild Life Sanctuary [West Block](North Cachar Hills RF)	252.387	No. FRW.12/2001/Pt/4	dtd. 19.06.2001
	Total	797.846		

As per Reserved Forests Notification, the external boundaries of Reserved Forests are mostly defined by natural features like streams, rivers, hill ridges. In some parts, the boundary runs along artificially marked lines along the boundaries of Tea Estates etc.

The status of Reserved Forest boundaries has worsened since 1957-58 when P.N. Bhattacharjee had discussed thread-bare regarding the boundary problems in his plan. The International boundary of Patharia Hills RF and also its internal boundary, the western boundary of Badsahi

Tilla Reserved Forests near Patiala, Radhamadhabpur, Chandrapur areas, the northern, eastern & western boundary of Tilbhum Reserved Forests, the southern boundary of Longai & Singla Reserved Forests along the Assam-Mizoram Inter-State border and boundary of the Division near Ratacherra (Assam-Meghalaya border) are all disputed. There is urgent need to consolidate the areas afresh. Differential GPS survey is suggested for accurate demarcation of the forest areas to solve the boundary dispute at the earliest.

Boundaries of Forest Villages adjacent to ReservedForests are not clearly demarcated at any place. Therefore, great threat of encroachment is now coming from the forest villagers. These villagers are on the habit of increasing lands under cultivation by slowly invading the neighboring forest areas. Hence, the boundaries of forest villages should be surveyed and clearly demarcated immediately.

Table 2.1b: Blocks and compartment-wise details of forest area under Karimganj ForestDivision

Name of the RFs	Compartment No.	Area in Hectares	Perimeter in metres
Badshatila	CGBT1	501.17	11176.84
Badshatila	CGBT2	484.68	13840.69
Badshatila	CGBT3	863.65	17306.43
Badshatila	CGBT4	443.70	13399.01
Badshatila	CGBT5	526.30	12428.84
Badshatila	CGBT6	447.12	11442.35
Badshatila	CGBT7	646.45	13130.50
Badshatila	DHBT1	254.69	6965.74
Badshatila	DHBT2	368.61	9997.39
Badshatila	DHBT3	723.84	15129.04
Badshatila	DHBT4	504.35	12393.39
Badshatila	DHBT5	545.00	10758.83
Badshatila	LPBT1	394.80	10596.40
Badshatila	LPBT2	370.54	10603.37
Badshatila	LPBT3	338.51	9410.42
Badshatila	LPBT4	302.82	12045.91
Badshatila	LPBT5	724.09	14044.11
Badshatila	LPBT6	1214.47	17202.15
Badshatila	LPBT7	863.87	14052.33
Badshatila	LPBT8	948.48	15619.56
Badshatila	LPBT9	81.25	3942.26
Dholai	DHD1	336.57	10576.86
Dholai	DHD10	610.70	15159.04
Dholai	DHD11	563.33	10830.18
Dholai	DHD2	367.47	9150.16
Dholai	DHD3	114.28	5818.72
Dholai	DHD4	206.91	7128.34
Dholai	DHD5	166.69	7245.18

Dholai	DHD6	90.29	4374.94
Dholai	DHD7	319.99	11196.52
Dholai	DHD8	364.92	12965.90
Dholai	DHD9	252.76	11013.95
Longai	LPL1	189.81	7036.86
Longai	LPL10	563.28	13789.64
Longai	LPL11	146.02	5453.77
Longai	LPL12	582.64	13731.34
Longai	LPL13	423.84	9547.61
Longai	LPL14	577.39	13746.57
Longai	LPL15	881.57	14332.16
Longai	LPL16	503.04	13609.35
Longai	LPL17	1117.31	15331.24
Longai	LPL18	306.85	7511.47
Longai	LPL19	196.07	6536.60
Longai	LPL2	1068.29	16365.40
Longai	LPL20	472.27	10109.19
Longai	LPL21	555.21	12087.34
Longai	LPL22	991.49	14555.95
Longai	LPL23	540.61	11194.16
Longai	LPL24	811.88	13069.85
Longai	LPL25	1139.75	15364.27
Longai	LPL26	685.26	13378.47
Longai	LPL27	830.69	19584.59
Longai	LPL3	252.54	7473.68
Longai	LPL4	280.93	8030.64
Longai	LPL5	176.52	5795.89
Longai	LPL6	230.62	8169.91
Longai	LPL7	529.95	12415.80
Longai	LPL8	148.46	5456.56
Longai	LPL9	200.45	6947.54
Patheria Hills	PKPH1	388.36	10512.62
Patheria Hills	PKPH2	452.11	17161.09
Patheria Hills	PKPH3	1931.77	34697.72
Patheria Hills	PKPH4	417.07	11869.41
Patheria Hills	PKPH5	1019.75	21397.07
Patheria Hills	PKPH6	361.26	10252.45
Patheria Hills	PKPH7	1442.64	24592.36
Patheria Hills	PKPH8	715.48	12515.26
Patheria Hills	PKPH9	1318.08	28712.85
Singla	CGS1	950.66	16314.60
Singla	CGS10	975.00	17069.14

Singla	CGS11	690.94	12517.16
Singla	CGS12	753.44	14216.38
Singla	CGS13	1022.31	14137.04
Singla	CGS14	690.62	11934.21
Singla	CGS2	1093.72	16749.80
Singla	CGS3	355.78	8182.52
Singla	CGS4	923.11	13951.53
Singla	CGS5	663.00	18736.69
Singla	CGS6	928.86	17028.64
Singla	CGS7	1585.59	20753.61
Singla	CGS8	830.40	16955.58
Singla	CGS9	827.06	15056.07
Tilbhum Hills	PKTH1	106.77	5637.49
Tilbhum Hills	PKTH2	263.47	8092.28
Tilbhum Hills	PKTH3	184.61	7206.01
Tilbhum Hills	PKTH4	193.44	7304.99
Tilbhum Hills	PKTH5	294.89	9442.79
Tilbhum Hills	PKTH6	334.74	9639.95
Tilbhum Hills	PKTH7	443.87	10948.25

2.1.1 Status of encroachment

The reserved forest wise encroached area alongwith the eviction operation carried out in the recent past is shown in the following table.

Table 2.1.c: Status of encroachment by neighbouring state under Karimganj Division

Sl. No	Name of RF	RF Area in Sq Km	Encroachd Area (Hect)	Agricultural Area (Hect)	Rural Area (Hect)
1	Singla	124.293	1672.48	1284.45	388.04
2	Langai	151.393	3797.97	2741.03	1056.94
3	Badshatila	75.1381	1163.72	956.91	206.82
4	Tilbhum Hills	18.489	168.06	130.73	37.34
5	Dohalia	34.782	587.46	518.18	69.28
6	Patheria	76.473	1187.31	924.17	263.15
7	NC Hills	252.387	NA	NA	NA
8	Arang PRF	64.2425	No Record	No Record	No Record
9	Adharkuna PRF	0.6484	No Record	No Record	No Record
Total		797.846	8577.00	6555.47	2021.57

Forest land under this Division have been diverted to non-forest purpose time to time. The status of diverted forest land to non-forest purpose is given below:

Table 2.1.d: Status of forest land diverted for non-forest purpose

Sl. No.	Name of RF	Total Area(ha)	Area Diverted	Coordinates	GOI Letter No. & Year of diversion	User Agency
1	Patheria Hills RF	7,647.3	90.3	N24.72611111^{o} E92.2894444^{o} N24.5475000^{o} E92.231388889^{o}	No. 8-73/87-FC dtd. 11.12.1989 Year =1989	PWD BRC, Karimganj
2	Patheria 'B' Block RF	293	7.5	N24^{o} 45' 03.7" E92^{o} 17' 17.5"	No. 8-12-030/92/RD-NE-AS dtd. 12.11.1993 Year =1993	ONGC Ltd.
3	Tilbhum RF	1,848.9	13.5	N24^{o} 26' 28.1" E92^{o} 15' 23.2" N24^{o} 26' 03.7" E92^{o} 17' 17.5"	No. 8-4-46//93/RO-NE-AS dtd. 07.03.1995 Year =1995	Power Grid
4	Longai RF	15,139.3	3.641	N24^{o} 27' 05.5" E92^{o} 18' 07.5"	No.8-2-42/2001/ RONE-AS/ 635-38 dtd. 26.06.2001 Year =2001	ONGC Ltd.
5	Tilbhum RF	1,848.9	0.9995	N24^{o} 26' 23.2" E92^{o} 15' 48.2"	No. 8-9-16/2003/ RO-NE-AS/424-27 dtd. 12.05.2004 Year =2004	BRTF
6	Tilbhum & Duhalia RF	T=1,848.9 D=3,478.2	T=5.99 D=7.81 13.8	N24^{o} 27' 43.0" E92^{o} 16' 00.2" N24^{o} 28' 04.2" E92^{o} 17' 26.4" N24^{o} 30' 57.1" E92^{o} 21' 29.3" N24^{o} 30' 59.7" E92^{o} 21' 29.9"	No. 3-ASC-019/ 2012-SHI/144-46 dtd. 08.04.2013 Year =2013	Power Grid
7	Duhalia & Tilbhum RF	D=3,478.2 T=1,848.9	D=9.40 T=9.04 18.44	N24^{o} 30' 50.5" E92^{o} 21' 16.8" N24^{o} 38' 48.9" E92^{o} 22' 31.8" N24^{o} 27' 54.5" E92^{o} 16' 11.4" N24^{o} 28' 07.5" E92^{o} 17' 17.5"	No. F-No.8-104/ 2007-FC dtd. 08.05.2012 Year =2012	NERTC

2.2 Forest area under different working circle/management plan

The all forest area under this Division are not reflected in working circle wise in the past working plan. However, the different working circle as per past working plan are given below:

Table 2.2: Area covered by working plan for Karimganj Forest Division, Assam

Sl.No.	Working Circle	Area under different WC
1.	Joint Forest Mangement Working Circle	9555.00
2.	Plantation Working Circle	18500.00
3.	Forest Protection over lapping Working Circle	Entire area of the Division
4.	NTFP and bamboo (overlapping) working circle	4625.00
5.	Soil and water conservation over lapping working circle	2243.00
6.	Wildlife management overlapping working circle	Entire area of the Division

Table 2.2a:Statement of areas under various working circles (WC)
Divisional area Statement (Compartment-wise area distributed in various Working Circle

Name of the RFs	Compartment No.	Area in Hectares	JFMC WC	Plantatio n WC	NTFP WC	Soil & water Con
Badshatila	CGBT1	501.17		295.00		10.00
Badshatila	CGBT2	484.68		280.00		11.00
Badshatila	CGBT3	863.65	90.00	500.00	90.00	5.00
Badshatila	CGBT4	443.70	150.00	250.00	100.00	
Badshatila	CGBT5	526.30	200.00		200.00	
Badshatila	CGBT6	447.12	230.00		100.00	
Badshatila	CGBT7	646.45	245.00	340.00	100.00	
Badshatila	DHBT1	254.69		200.00		33.00
Badshatila	DHBT2	368.61		200.00		30.00
Badshatila	DHBT3	723.84	130.00	300.00	100.00	
Badshatila	DHBT4	504.35		215.00		198.00
Badshatila	DHBT5	545.00		385.00		12.00
Badshatila	LPBT1	394.80		240.00		120.00
Badshatila	LPBT2	370.54	100.00	200.00	85.00	0
Badshatila	LPBT3	338.51	60.00		30.00	30.00
Badshatila	LPBT4	302.82	50.00		25.00	30.00
Badshatila	LPBT5	724.09		345.00		50.00
Badshatila	LPBT6	1214.47		400.00		175.00
Badshatila	LPBT7	863.87		350.00		100.00
Badshatila	LPBT8	948.48		620.00		
Badshatila	LPBT9	81.25		50.00		
Dholai	DHD1	336.57	105.00	200.00	70.00	20.00
Dholai	DHD2	367.47	215.00	200.00	150.00	
Dholai	DHD3	114.28		100.00		
Dholai	DHD4	206.91	130.00		50.00	

Dholai	DHD5	166.69	105.00			
Dholai	DHD6	90.29	35.00			
Dholai	DHD7	319.99	100.00			
Dholai	DHD8	364.92	105.00			
Dholai	DHD9	252.76		250.00		
Dholai	DHD10	610.70	160.00		120.00	
Dholai	DHD11	563.33	120.00		100.00	
Longai	LPL1	189.81		150.00		
Longai	LPL2	1068.29		800.00		30.00
Longai	LPL3	252.54	145.00		100.00	
Longai	LPL4	280.93	195.00		100.00	10.00
Longai	LPL5	176.52	125.00		50.00	
Longai	LPL6	230.62		200.00		
Longai	LPL7	529.95		325.00		
Longai	LPL8	148.46	100.00			
Longai	LPL9	200.45	150.00			
Longai	LPL10	563.28	70.00		50.00	
Longai	LPL11	146.02	140.00		25.00	
Longai	LPL12	582.64	400.00		150.00	30.00
Longai	LPL13	423.84		250.00		
Longai	LPL14	577.39	400.00		200.00	60.00
Longai	LPL15	881.57	500.00		100.00	66.00
Longai	LPL16	503.04		400.00		0
Longai	LPL17	1117.31		800.00		5.00
Longai	LPL18	306.85	200.00		100.00	20.00
Longai	LPL19	196.07	100.00			31.00
Longai	LPL20	472.27		375.00		
Longai	LPL21	555.21	225.00	200.00	50.00	38.00
Longai	LPL22	991.49	315.00	300.00	200.00	73.00
Longai	LPL23	540.61		300.00		
Longai	LPL24	811.88		500.00		
Longai	LPL25	1139.75		800.00		38.00
Longai	LPL26	685.26	400.00		100.00	59.00
Longai	LPL27	830.69		600.00		10.00
Patheria Hills	PKPH1	388.36		300.00		
Patheria Hills	PKPH2	452.11		300.00		
Patheria Hills	PKPH3	1931.77	105.00	800.00	100.00	
Patheria Hills	PKPH4	417.07	200.00		50.00	
Patheria Hills	PKPH5	1019.75	120.00		100.00	
Patheria Hills	PKPH6	361.26	115.00		50.00	
Patheria Hills	PKPH7	1442.64	-	900.00		
Patheria Hills	PKPH8	715.48	135.00		100.00	

Patheria Hills	PKPH9	1318.08	100.00		75.00	70.00
Singla	CGS1	950.66	200.00		200.00	
Singla	CGS2	1093.72		800.00		48.00
Singla	CGS3	355.78	90.00		75.00	
Singla	CGS4	923.11		600.00		110.00
Singla	CGS5	663.00	500.00		200.00	30.00
Singla	CGS6	928.86	230.00		150.00	
Singla	CGS7	1585.59		1000.00		389.00
Singla	CGS8	830.40	600.00		200.00	16.00
Singla	CGS9	827.06	325.00		200.00	0
Singla	CGS10	975.00		720.00		
Singla	CGS11	690.94		410.00		100.00
Singla	CGS12	753.44	300.00		200.00	
Singla	CGS13	1022.31		750.00		145.00
Singla	CGS14	690.62	285.00		200.00	
Tilbhum Hills	PKTH1	106.77	50.00			
Tilbhum Hills	PKTH2	263.47	50.00			
Tilbhum Hills	PKTH3	184.61	80.00			
Tilbhum Hills	PKTH4	193.44	50.00		30.00	
Tilbhum Hills	PKTH5	294.89	100.00		50.00	
Tilbhum Hills	PKTH6	334.74	65.00		50.00	20.00
Tilbhum Hills	PKTH7	443.87	60.00		50.00	21.00
		51503.84	9555.00	18500.00	4625.00	2243.00

2.3 Percentage of forest with secured boundaries

The Karimganj Forest Division having an international boundary of 27.861 Km with Bangladesh. This Division is also having the Inter-State Boundary with Assam-Meghalaya, Assam-Mizoram & Assam-Tripura comprising about 17Km, 14Km & 35Km respectively with the State boundary and there is continuous tendency of encroachment from the neighbouring states. As per records, the neighbouring state has already encroached over forest land of Karimganj Forest Division.A statement showing the forest landencroached by the neighbouring state are given below. Therefore, the Inter-State boundary required immediate survey with fixing of permanent boundary pillar by the Survey of India as per State Boundary Notification for well demarcation of the interstateboundary.

2.4 Land use, land use change and forestry (LULUCF)

The land use and land use change in forests was assessed and compared among two assessment base years of 2005-06 and 2015-16. Due to increase in grazing activities, the area under grasslands and grazing lands has also reduced significantly. Owing to increase in population, urbanization and industrialization, there is an ever-increasing demand of land to cater the requirements. As a result significant area under forest has been transformed to build up areas for both rural and urban settlements. Due to increase in agricultural practices, the area along the forest fringe has also

witnessed major shift. Due to anthropogenic pressure, the areas under forests have also significantly deteriorated. Cartosat satellite imagery of 2.5 m resolution at two time points 2005-2006 and 2015-2016 was analysed using and RS/GIS tools applied to map LULUCF. There are visible changes detected in land use, land use change and forestry in Karimganj division. The change analysis matrix is shown in table 2.4.1. Increase or decrease in the extent of LULUC categories at two time points is shown graphically in Figure 2.4.a. Detail LULC maps developed at the two time points is shown in Figure 2.4.b.

Figure 2.4. a: Graph showing extent of changes (hactares) in LULC detected between 2005-2006 and 2015-2016

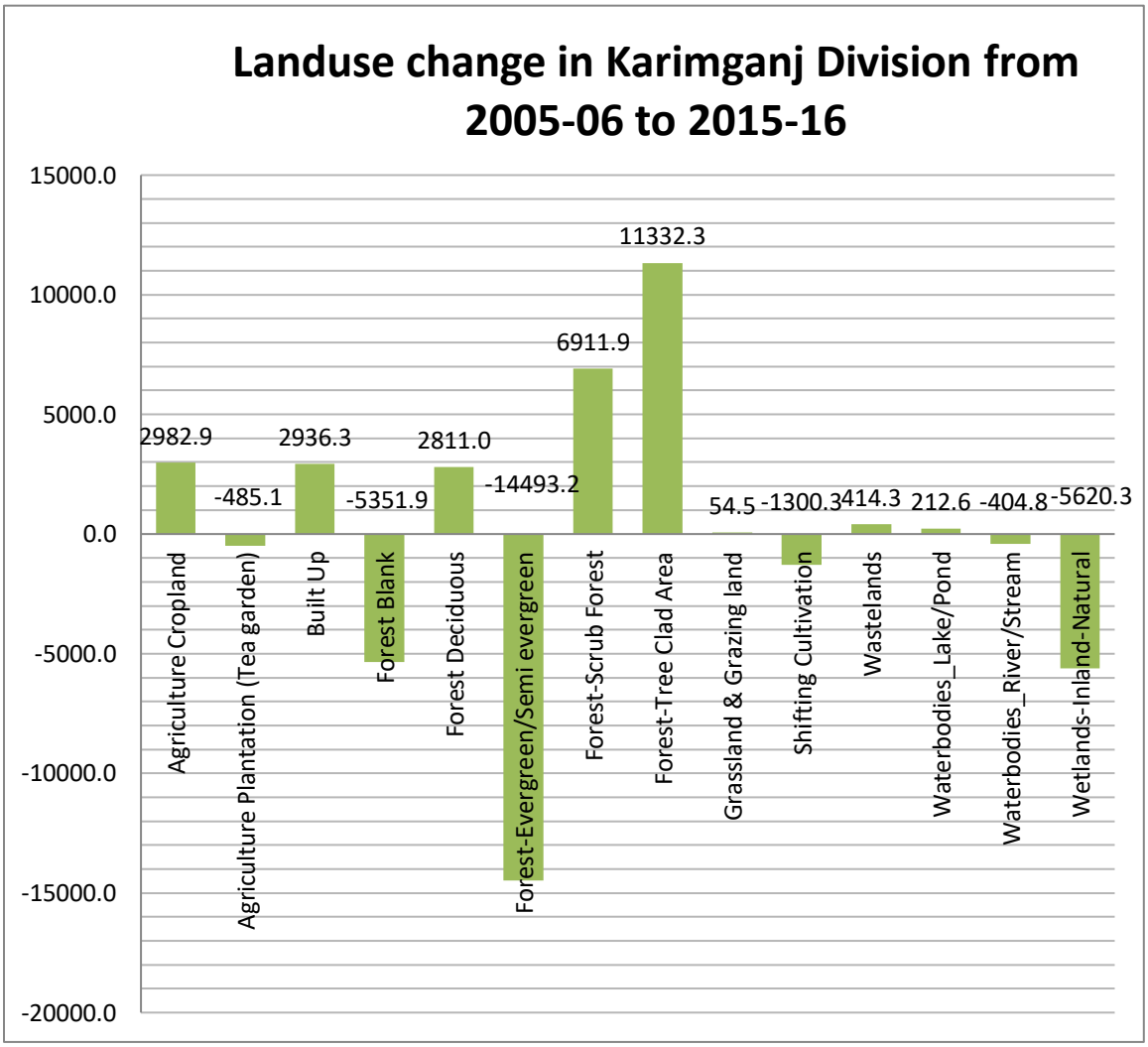


Table 2.4.b: LULC matrix of two time points 2005-06 and 2015-16

LULC Change Matix	2005-06 and 2015-16														
2005-06	**Agriculture Cropland**	**Agriculture Palntation**	**Built-Up**	**Forest Blank**	**Forest Deciduous**	**Forest-Evergreen /Semi**	**Forest-Scrub Forest**	**Forest-Tree Clad Area**	**Grassland & Grazing**	**Shifting Cultivation**	**Wastelands**	**Waterbodies_Lake/ Pond**	**Waterbodies_River/ Stream**	**Wetlands-Inland-Natural**	**Grand Total**
Agriculture Cropland	52900.6	129.00	947.19		7.23	237.09	147.65	3664.89	30.2		1.81	34.93	282.79	3592.5	61975.9
Agriculture Plantation (TE)	106.80	13231.2	33.20		2.59	131.38	87.51	898.79		0.08	44.22	0.32	59.69	47.14	14642.7
Built Up	1.48	14.23	621.82			2.95		43.87		0.11			1.05	0.45	685.96
Forest Blank	680.97	25.50	11.44		3.09	893.81	3323.3	411.44		5.19	6.73	1.08	6.73	13.10	5382.40
Forest Deciduous					18.06	0.69									18.75
Evergreen/Semi evergreen	580.70	474.42	15.46	30. 8	2580.6	100685.52	2688.47	9729.51		226.08	282.24	21.79	118.33	331.46	117765.10
Forest-Scrub Forest	42.18	1.99			183.71	155.83	980.96	248.85		0.23	0.75		6.46	2.72	1623.68
Forest-Tree Clad Area	1639.31	245.97	1339.56		32.52	732.76	98.31	30574.75	22.64		20.01	42.12	153.18	284.26	35185.38
Grassland & Grazing land	0.17								1.93				2.64		4.74
Shifting Cultivation	0.05	0.67	69.52		0.66	257.80	1172.24	31.02		981.13	0.14			0.17	2513.39
Wastelands						0.20		0.02		0.12					0.35
Waterbodies_Lake/Pond	0.92							4.64				29.44			35.00
Waterbodies_River/Stream	329.82	21.99	37.00		0.98	129.86	15.58	494.90	4.52		3.84	0.23	2315.37	22.78	3376.88
Wetlands-Inland-Natural	8675.50	12.84	547.03		0.29	44.01	21.49	414.97		0.10	54.87	117.68	25.84	5581.92	15496.54
Grand Total	64958.45	14157.61	3622.22	30.8	2829.78	103271.90	8535.53	46517.65	59.29	1213.05	414.62	247.60	2972.08	9876.24	258706.50

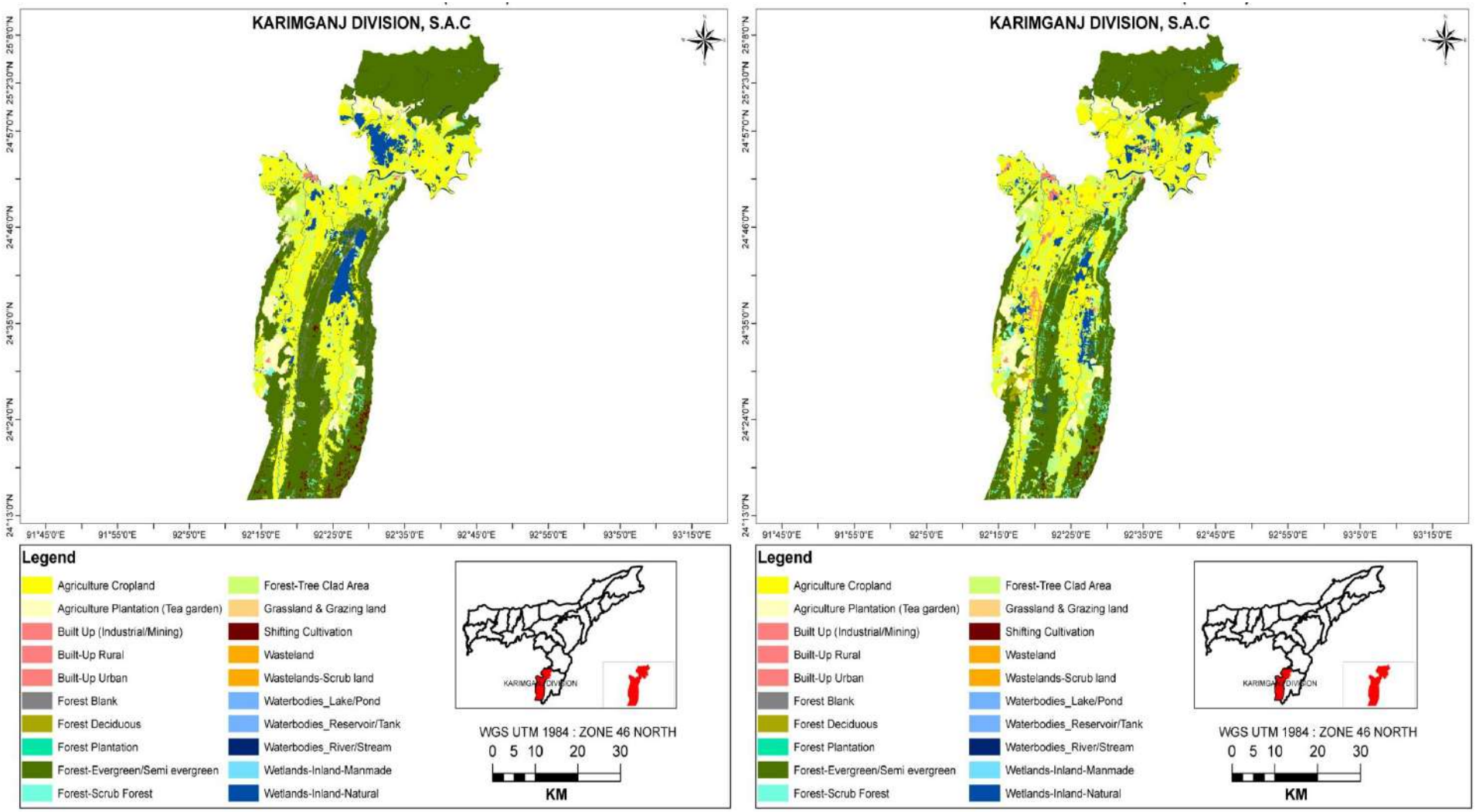


Figure 2.4b: Land Use Land Cover Map of Karimganj division in 2005-2006 and 2015-2016.

2.5 Threats to the forests:

Human activity: The degree of injury and damage to the forests on account of human activities is the greatest and in fact it is greater than all other factors (listed earlier) put together. Humans cause damage to the forests in various ways.

2.5.1 Encroachment: Almost all the Reserve Forests under this Division are surrounded by revenue villages and illegal removal of forest produces from these forests was a common occurrence in the past. As a result, the condition of the Reserve Forests got gradually worsened. However, the RFs are now showing improvementin terms of their growing stocks. Encroachment is the single largest cause of damage to the Reserve Forests. Constitution of Reserve Forests**,** subsequent additions, was allowed to be continued, resulting in difficulties in consolidation of the respective boundaries on the ground. As a result, the trend of encroachment inside Reserve Forests by the people of bordering villages is still widespread. Population in the villages has increased considerably and this has led to increased pressure on the reserve forests. Almost the whole of Telpani RF and Jokai RF have been under the grip of encroachements. Hence, remedial measures like rehabilitation of these villages need to be taken up by granting suitable economic packages. Maximum damage of the forests may therefore be attributed to all these encroachments. Hence, to demarcate and consolidate the notified boundaries of the said RFs, immediate measures such as survey, demarcation, fixing of boundary pillars need to be taken up.

2.5.2 Deforestation: The other major factor that threatened the forest is deforestation. There were illicit fellings for meeting domestic needs of the villagers and the degree was not alarming. But during last couple of decades illicit felling of trees increased so high that at a point of time it went out of control. Following ban on tree felling by honourable Supreme Court in WP(C) 202/1995 in famous Godavaran Vs Union of India case, timber became scarce in market. On the other hand demand for timber was grown very high. Real Estate (Apartment/Flat) business in Assam got momentum during those decades and demand for wood reached the sky. As a result, forests had to bear the adverse effect. Organised timber smugglers involved in tree felling in such a way that the Division had to witness massive forest destruction. However, incident of illicit felling has been reduced during last 5/6 years. Sporadic incidents of illegal felling takes place.

2.5.3 Jhum cultivation: The practice of *Jhum* cultivation is prevalent in the Division. During the months of March and April, the tribal people living in the forest areas and in the vicinity of the forests, clear the forest area and carry out uncontrolled burning that results in destruction of a large volume of flora and fauna.

2.5.4 Climber: *Mikania* is the main problem of these forests. They invade and cause damage to the seedlings. Their damage is heavy in open areas than in high forests. Other climbers also affect the healthy growth of the trees.The greatest damage to these forests, however, is caused by the climbers. When severe in intensity, climbers can, by sheer physical suffocation, kill trees outright. However, in general, if they are less insidious, the damage they cause inhibition of crown development to such an extent as to cause a considerable loss of increment in the standing crop.

2.5.5 Epiphytes and Parasites: Most of the epiphytes occurring in these forests are harmless in nature except *Ficus. Ficus* damage which result in the ultimate death of the trees, however the number is is negligible. Among parasites, a number of fungii are found in these forests, living on dead trees but mention can be made of root fungus that attacks and often causes the death of Hollong, young and old trees alike.

2.5.6 Weeds: Weed growth is heavy in the operated areas and their root competition is injurious to the regeneration and planted seedling.The invasion of weeds is very rapid with any opening in the forests and effects regeneration by swamping it out unless prompt and effective measures are taken.*Mikenia micrantha* occupies the space and spreads rapidly to from a mat and all shrubs and seedlings of tree species are covered and as a result, the seeds from the trees cannot reach the ground for further regeneration. On open patches at the boundary and adjacent to inspection paths *Lantana camara* is also observed. The wetlands are full with *Eicchornia* spp. and *Ipomea* spp. covers the adjacent areas.

2.5.7 Insects: Borer attack on felled trees and logs is massive in this Division. In some places, borer causes damage to all the portions of a log even within a month. Sam and Mekai seedlings are attacked by twig borer. However, on the whole, the forests are immune from any large scale danger from any source as they have the security of a mixed crop which provides a very efficient check on large scale damage by the insects.

2.5.8 Animals: Elephants cause damage to plantations and nurseries. Deer cause damage to miscellaneous plantations eating up their shoots.

2.5.9 Human: Illegal removal of trees, encroachment, felling of trees for firewood are some of the anthropogenic activities affect adversely on forests of the Division.

2.5.10 Storm: Storm damage is caused mainly in the areas where the trees become solitary due to operation.

2.5.11 Erosion and Flood damage: Flood damage to the forests of annual feature. Vast tract of forests in this reserved forests are eroded by the Tributories of Barak river.

2.5.12 Grazing: Grazing causes damageto the forests near the human habitation by eating the tips of the seedlings and by trampling them and hardening the soil. Hollong (*Dipterocarpus retusus*) leaves are normally not eaten by cattle.

2.6 Distribution of different forest types

By consulting the present forest cover and forest type, it reveals that there is no major change except over the area where jhum cultivation and encroachment took place. The high forest area with dense canopy are converting to the degraded forest in some area where the jhum cultivation and encroachment taken place for cultivation of agricultural crop, cash crop and construction of dwelling houses.

2.7 Tree cover outside forest area

The tree cover outside the forest area are not in large scale. However, some of the private individual created plantation over their own land, out of which some are registered in the Division. The road side plantation created by Social Forestry Wing are there. Due to socio

cultural practice, the villager living in the rural area used to plant fruit trees, medicinal trees, aromatic plant, bamboo and valuable species also in their basti land.There are large number of home grown species found in the revenue areas of these districts. These are grown by people in rural areas over their land as habitual socio-cultural practices by planting fruit bearing trees like Mango (*Mangifera indica*), Jamun (*Syzygium cumini*), Jackfruit (*Artocarpus spp*), Jalpai (***Elaeocarpus serratus)***, Amlakhi (***Phyllanthus emblica)*** , Silikha *(Terminalia chebula)* etc. along with patches of Bamboos. Further, these can be noticed on road-sides, planted by the Forest department. The list of tree species reflected through a general survey has been shown in Table 2.7.a. The tree outside forest cover is shown in the map. Fig 2.7.a. and 2.7.b show the tree outside forest in Karimganj Division.

Table 2.7.a.The list of tree species reflected through a general survey

Sl. No	Local name	Botanical name
1	Jarul	*Lagerstroemia flosreginae*
2	Jam	*Engenia jambos*
3	Arjun	*Terminalia arjuna*
4	Kadam	*Anthoccphaluscadamba*
5	Coconut	*Coccus nucifera*
6	Kanchan	*Bauhinia spp.*
7	Kathal	*Artocarpus integfolia*
8	Aam	*Mangifera indica*
9	Koroi	*Albizzia proccra*
10	Bokphul	*Mimuso pselengi*
11	Sajina	*Moringa oleifera*

2.7a. Unclassified State Forest (USF)

USF areas are those patches in the jurisdiction of the forest divisions, outside the reserve forests that are above 10 hectares in area. USF map is annexed as figure 2.7.a.

2.7b. Tree cover outside forest area

Trees outside forest (TOF) are the trees growing outside the recorded forest area in the division. A large part of the demand of the people in terms of timber, fuelwood, and resources is being met from outside forest areas and therefore assessment of TOF becomes imperative in this working plan. IRS P-6 LISS IV (5.8m) satellite images were geometrically rectified with the help of Survey of India toposheets on 1:50,000 scale. Mapping of TOF areas was carried out by digitizing the green-wash area by taking them as proxy forest areas and masking them out. Map showing the tree outside forest areas in Karimganj Division is shown in the figure 2.7.b. The total area of tree outside forest in Karimganj division is 30,244.22 ha.

2.8 Shifting cultivation (Jhumming)

The Jhum cultivation are the traditional practices done by the forest dweller which further enhanced due to the migration of people belongs to Riang community from Mizoram, Tripura & Khasi community from Meghalaya.The Riang community used to go for Jhum cultivation of Agricultural crops and the Khasi community are used to grow Battle leaf (Pan) on the tree, lopping tree branches. These two kind of jhum practices have bad impact on the forests. The Jhuming practices those often observed in the different location of reserved forest of Karimganj Division are shown below.

Table 2.8: Details of jhum cultivation in the forests of Karimganj Division, Assam

Name of the RF	Location	Type of Jhuming	
		Pan Jhum	**Agricultural crops**
Longai RF	Churaibari, Karikhai, Kulicherra	Pan jhum	—
	Sobri, Karikhai, Magurapunjee, Medli, Rangamati East	—	Agricultural crops
Badsahi Tilla RF	Sagolmoha, 16Dewa, 10Dewa, Esacherra, Kashinathpur, Kalamaggura	Pan jhum	—
	Srirampur, Magurcherra, Kalamagura & bordering to Mizoram	—	Agricultural crops
Singla RF	Fanairbond, Bhutucherra	Pan jhum	—
	Kalaland, Gopinathpur, Chuto Bhubirbond, Bhutucherra Barman Basti	—	Agricultural crops
Duhalia RF	Chandrapur, Lalcherra, Teriang basti, Gopinathpur	Pan jhum	—
Patheria Hill RF	Bilbari, Sunatola	Pan jhum	—
	Sunatola, Fulkandi	—	Agricultural crops
Tilbhum RF	Sarjulpunjee	Pan jhum	—
	Solgoi 8No., Indurailpunjee	—	Agricultural crops

Fig 2.6: Forest type map of Karimganj Division

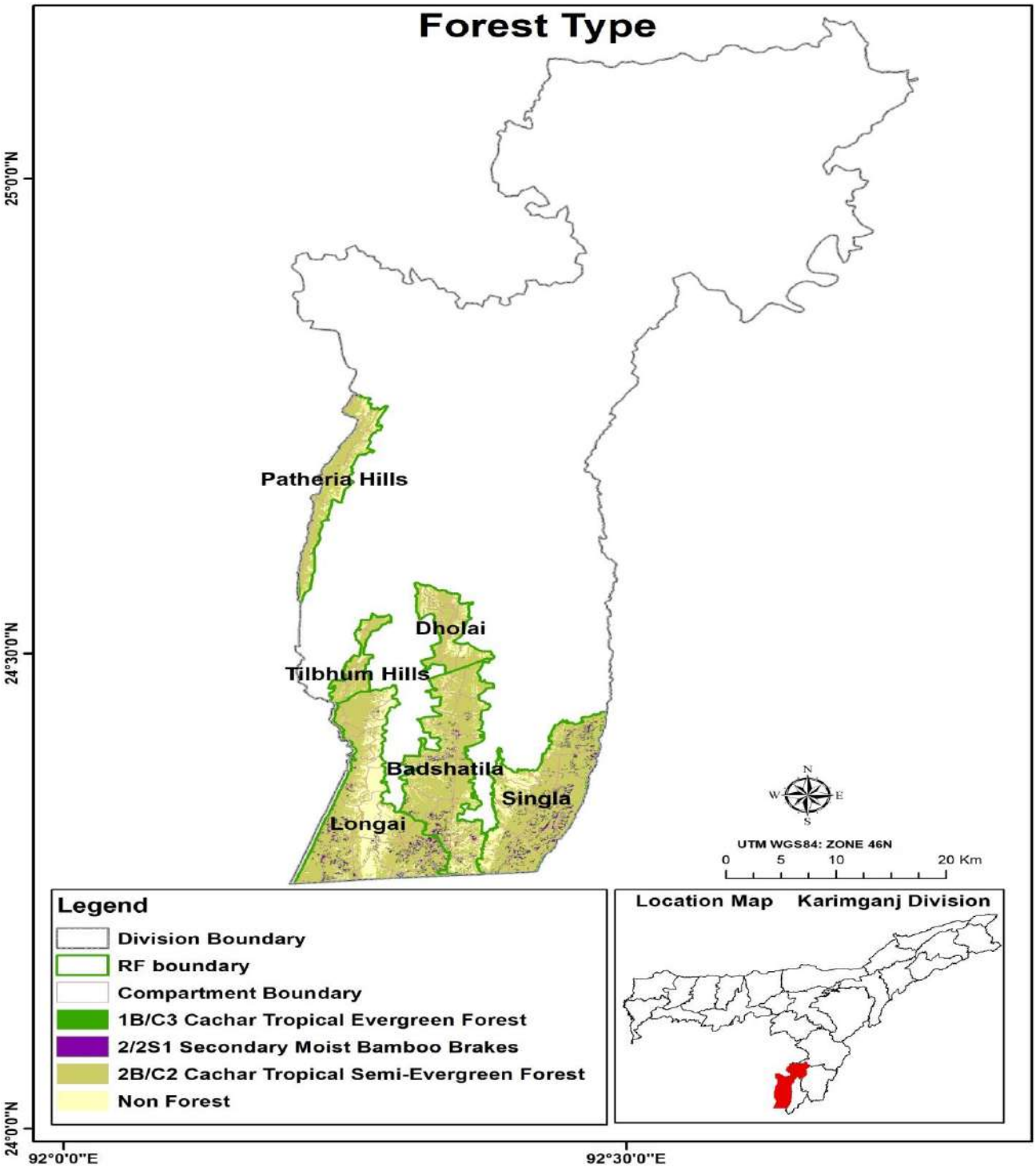
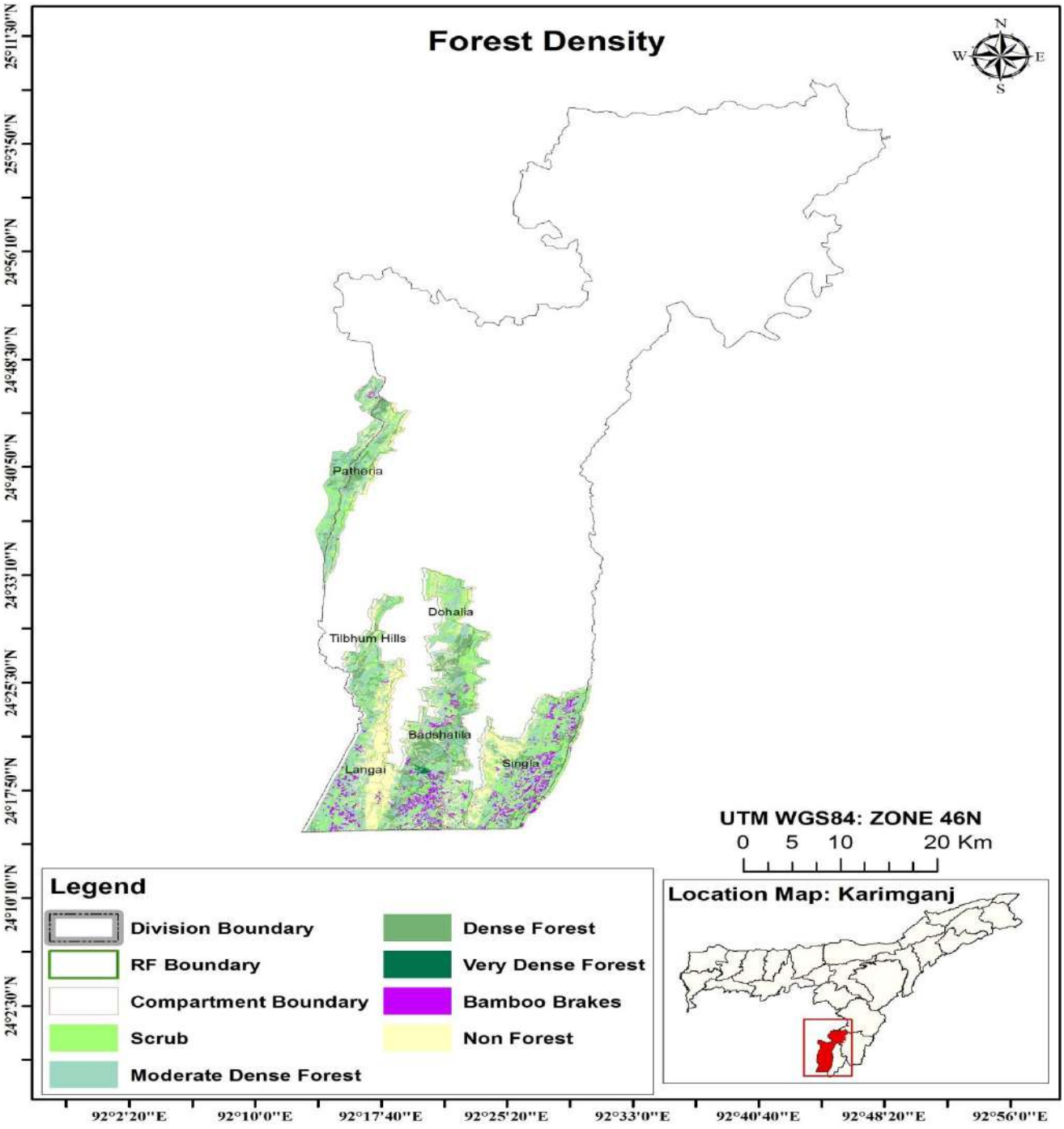


Fig.: Forest Density map of Karimganj division



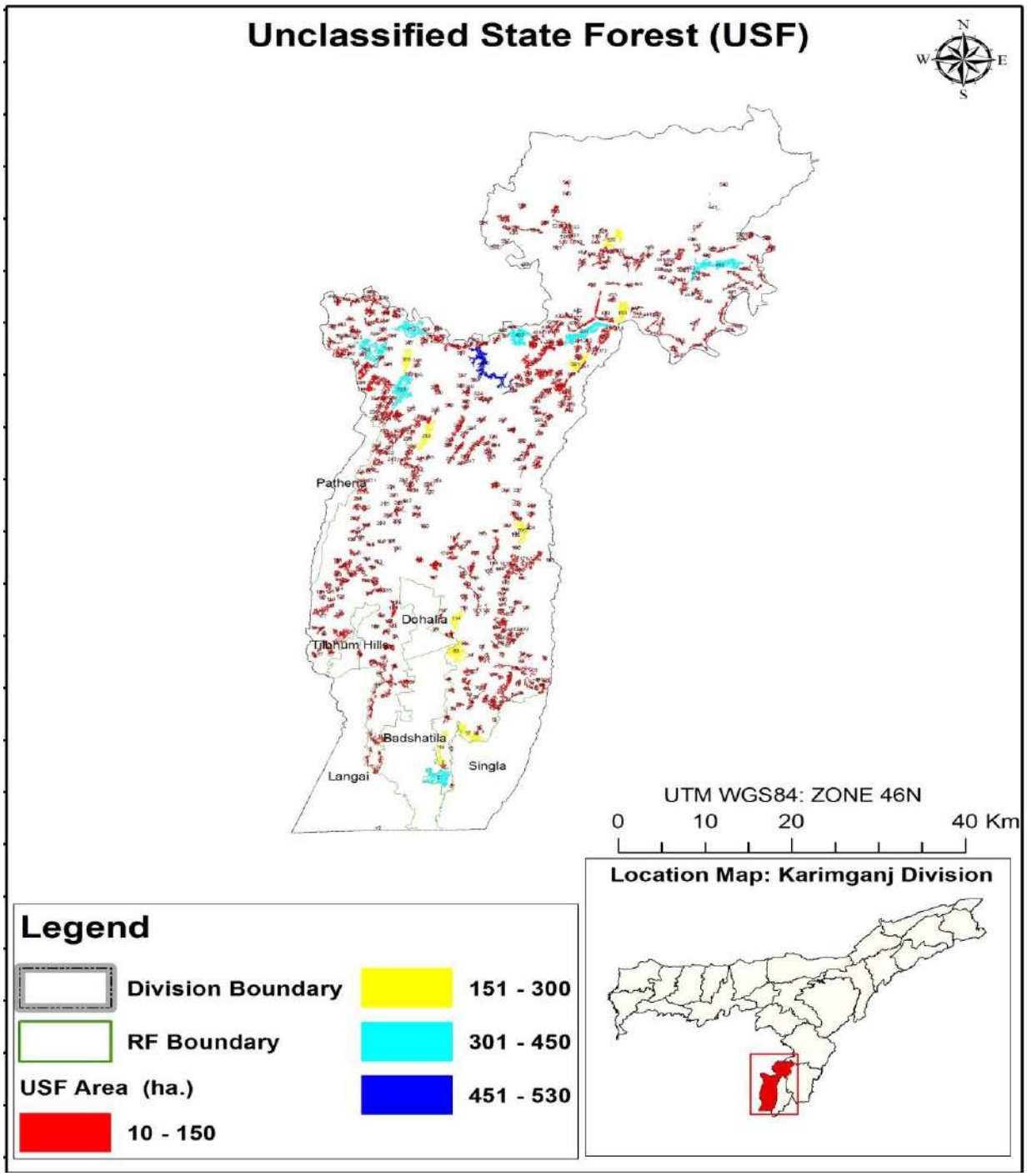
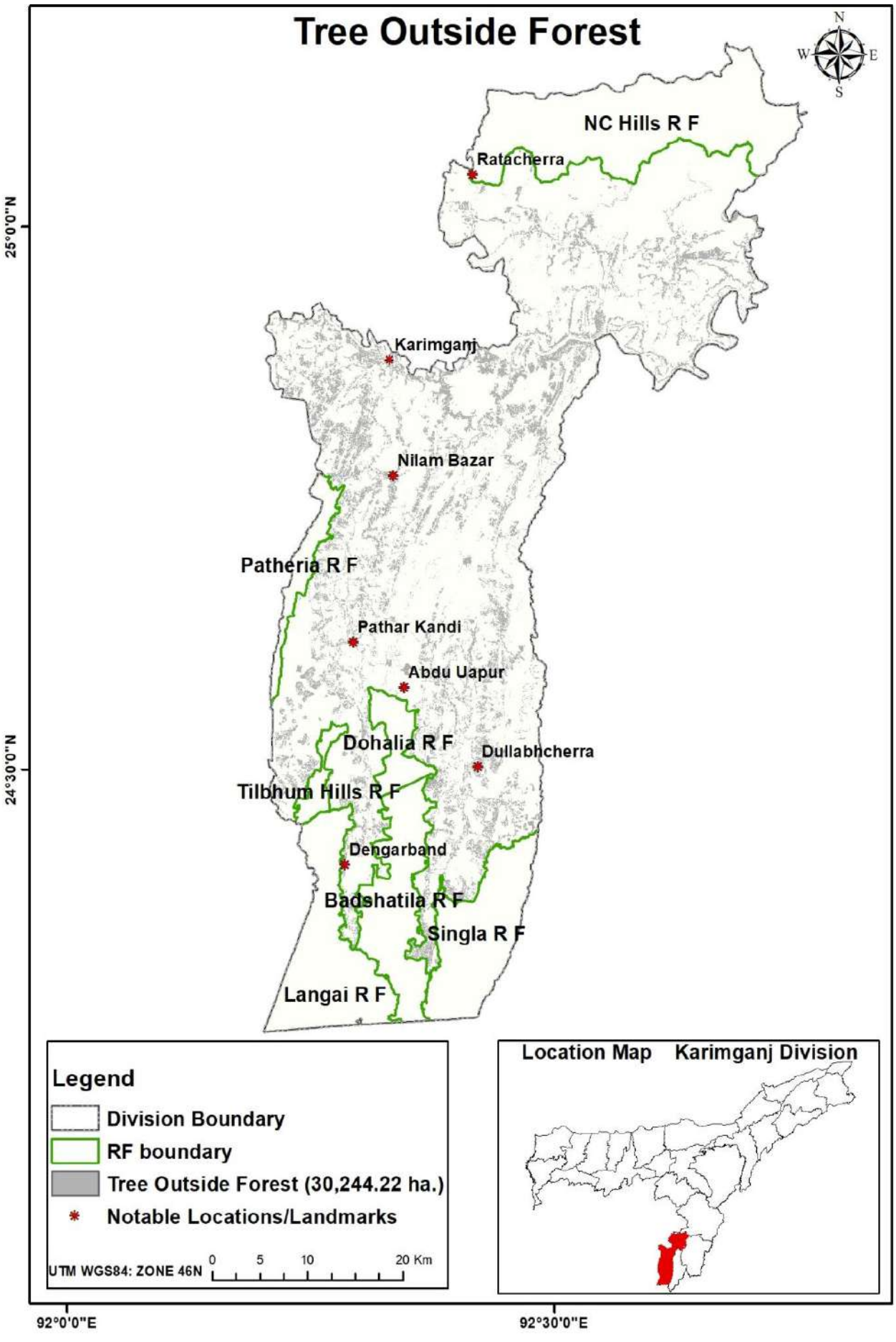


Fig 2.7.a. Unclassified state of forest map in Karimganj division

Fig.2.7.B. Tree Outside Forest Map of Karimganj Division



CHAPTER 3

MAINTENANCE, CONSERVATION AND ENHANCEMENT OF BIODIVERSITY

3.1 Forest composition and distribution

According to Champion and Seth's revised forest type classification, 2 (two) major forest types occur in Karimganj Forest Division. The forest types over the years have undergone considerable changes. It is felt that these forest types need revision to reflect the reality.

3.1.1 Cachar Tropical Evergreen Forrest (1/1/B/C3)

This is a *Mesua-Dipterocarpus-Palaquiun* formation as typified by Rajkhowa. Though it is supposed to be climatic climax, it has been severally modified and restricted in occurrence due to long history of jhuming in the area. It is confined to the Northern & Eastern aspects where slopes are steep and uncultivable. It is also found in Rocky and shady stream banks. Most of the formation occur in the lower slopes of the hill. The endemic species of the formation are Dipterocarpus turbinatus and Palaquiun polyanthum and these are characteristics species of the formation. The other species found here are given below canopy wise.

Table 3.1.1: Prevalent species in Cachar Tropical Evergreen Forests

Top & second canopy	*Diospyros topiosia, Cynometra polyandra, mesua ferrae, Euphoria longana, Sapium baccatum, Vatica lancefolia, Canarium spp., Hydnocarpus kurzil*
Bamboos	*Melocanna bacciferra, Bambusa balcoa, Teinostachyum dullooa*
Shrubs	Evergreen undergrowth with palms
Climbers	*Entada phaceoloides, combretum spp., Delim spp.*

Due to intensive jhumming in the past, the climatic climax formation has been immensely modified and is now restricted to small patches. The abandoned jhum areas are colonized by *Melocanna bacciferra* and *Macaranga* species. However, if left for long, deciduous species may succeed under strict and long protection. Then it may be expected that the deciduous species would give way to climatic climax species.

3.1.2 Cachar Tropical Semi Evergreen Forest (2/2B/C2)

The top hills slopes of the Division were once occupied by the semi evergreen type of formation. The Southern and the Western Slopes are the most favored slopes for this type of formation. *Artocarpus chaplassa* and *Dipterocarpus turbinatus* are characteristic species of this type. In addition, the following species also occur.

Table 3.1.2: Prevalent species in Cachar Tropical Semi Evergreen

Top & second canopy	*Palaquium polyanthum, Cynometra polyandra, Euginia spp. Vitex peduncularis, Pterospermum acerifolium, pterigota alata, Chukrasisa velutina, pteropspermum acerifolium, pterygota alata, Chukrasisa velutina, Tetrameles nudiflora, adina cordifolia, Protium serratum, Albizia procera, Premna bengalensis, Gmelina arborea, Salmalia insignis, Stereospermum personatun.*
Bamboos	*Melocanna bacciferra, Bambusa balcoa, Teinostachyum dullooa*
Shrubs	Evergreen undergrowth with palms

Climbers	*Entada phaceoloides, Mucuna bracteata, Atylosia crusa.*

This formation type has severely degraded into climber or bamboo brakes or deciduous type formations due to jhuming in the past. Scattered stands of evergreen and deciduous patches could be found together depending upon their successional stage.

3.1.3 Local variation of forest types

The two major types described above are very indistinct to differentiate. The chief causative factor responsible is intensive jhumming that was done all over the tracts. Most of the low hill slopes that otherwise have been the home of evergreen formations, have become deciduous in character by virtue of large scale teak plantations. However, to differentiate the various formations, the following classification has been devised that include both types of formations described in the earlier plans.

3.1.3.1 Hill type

This type occurs on the hill ridges. Muli bamboos come up as a colonizer in abandoned jhum areas. All the open areas are attacked by weeds. Some hillocks have been invaded by thatching grasses as well.

The species occurring in this type are Gamari (*Gmelina arborea*), Cham (*Artocarpus chaplasha*), Garjan (*Dipterocarpus turbinatus*), Sundi (*Michelia mentena*), Hatia (*Chikrasia tabularis*) (*Bogi Poma*), Poma Cedrela toona (*toon*), Gondroi (*Cinnamomum glanduliferum*), Jhawa (*Holigarna longifolia*), Rata (*Amoora wallichii*), Tarua (*Endospamum chinensis*), Jinari (*Podocarpus nerrifolia*), Jam (*Eugenia species*), Bohera (*Terminalia bellerica*), Kayengla (*Garuga pinnata*) and many other species as well. This hill type area is heavily encroached by the tribes who practice jhum cultivation and deciduous conditions have invaded these areas.

3.1.3.2 Low Hill type

This type of forest is confined to small hills and on the slopes along the streams. The stretches next to the streams are mostly covered by growth of bamboo. The higher ridges in some areas have been planted with *Teak (Tecktona grandis), Gamari (Gmelina arborea)* and misc. species.

The tree species naturally found in this type areas are Tula (*Tetrameles nudiflora*), Kadam (*Anthocephalus cadamba*), Madhubura (*Petrosprmum accerifolium*) (*Hati polia*), Jam (*Eugenia species*), Awal (*Vitex pedunculoris*) (*sila titu*), Kurta (*Palaquium polyanthus*), Nageswar (*Messua ferrae*) (Nahar), Chailta (*Dillenia indica*), Ramdala (*Duabanga sonneratiodes*), Hortaki (*Terminalia chebula*), Hatia (*Chikrasia tabularis*) (*Bogi Poma*), Poma Cedrela toona (*toon*), Ping (*Cynometra polyandra*), Rata (*Amoora wallichii*), Boroi (*Zigyphus zuzuba*) etc.

3.1.3.3 Alluvial type

This type occurs on the flat lands of major streams and rivers. The soil is acidic in nature. Most of such tracts have either been allotted as forest villages or are encroached upon by people for cultivation. Few tree species such as *Tula (Tetrameles nudiflora), Simul (Bombax ceiba) (cotton tree), Bohera (Terminalia bellerica), Jam (Eugenia species), Ramdala (Duabanga sonneratiodes), Kadam (Anthocephalus cadamba), Chalmugra (Hydnocarpus kurzii)* etc. are scatterly found.

3.1.3.4 Swamp type

This types occurs in the eco-tone zones where the hill ranges merge with the alluvial flats. Growth of *Cane, Tara, Ekra (Arianthus raveneac)* mixed with species such as *Jarul (Lagerstroemia flosreginae), Paruli (Stereospermum chelonoides)* are also found. Silted belts on the periphery and low swamps also support such type of vegetation.

3.1.3.5 Bamboo brakes

A considerable forest tract of the Division is covered by bamboo. Pure bamboo brakes also occur in the abandoned jhum areas. The most important species is non clump forming species *Melocanna baccifera*. It occurs as pure crop or as under storey in open tree forests. *Melocanna* grows best on the hill slopes having good drainage. It cannot withstand water stagnation. In those areas, the most common species is *Dendrocalamus hamiltonii*. Other important bamboo species are *Teinostachyan dullooa, Oxytenanthera nigrociliata, Bambusa balcooa, Bambusa auriculata*.

3.1.3.6 Cane brakes

Four important species of Cane occur in this Division. These are *Golla (Demonorps jenkinsianus), Mona, Jalliad (Calamus tenuis)&Sundi (Michelia mentena)*. The scope for commercial exploitation does not exist, as the areas are few & far between. If steps for its conservation are not taken, the various cane species may disappear altogether from the forests of the Division shortly.

3.2 Plan species diversity

The forest types namely Cachar Tropical Evergreen Forest and Cachar Tropical Semi-Evergreen Forest are found in this Division. The species are available in the Top & Second Canopy in the forest type are *Diospyros topiosia, Cynometra polyandra, mesua ferrae, Euphoria longana, Sapium baccatum, Vatica lancefolia, Canarium spp., Hydnocarpus kurzil***and***Palaquium polyanthum, Cynometra polyandra, Euginia spp. Vitex peduncularis, Pterospermum acerifolium, pterigota alata, Chukrasisa velutina, pteropspermum acerifolium, pterygota alata, Chukrasisa velutina, Tetrameles nudiflora, adina cordifolia, Protium serratum, Albizia procera, Premna bengalensis, Gmelina arborea, Salmalia insignis, Stereospermum personatun* respectively.

Table 3.2: Species diversity index of selected plant species inKarimganj Division, Assam

Local name	Name of Species	Density	Frequency (%)	Total basal area	Dominance	IVI
Lali	Aglaia spectabilis	0.20	8.93	0.24	0.00	0.98
Forish	Albizia chinensis	0.04	1.79	1.56	0.03	1.00
Sirish	Albizia lebbeck	0.30	19.64	1.74	0.03	2.65
Hiharu	Albizia odoratissima	0.41	25.00	0.09	0.00	2.26
Koroi	Albizia procera	0.04	3.57	5.91	0.11	3.45
Tilkhundi	Alseodaphne owdenii	1.27	48.21	0.07	0.00	4.92
Satiana	Alstonia scholaris	0.02	1.79	2.85	0.05	1.67
Jakura	Altingia excelsa	0.79	39.29	3.14	0.06	5.34
Sachi /Agaru	Aquilaria agallocha	1.57	17.86	0.07	0.00	3.26
Cham	Artocarpus chaplasha	0.11	3.57	11.29	0.20	6.44
Kothal	Artocarpus heterophyllus	2.09	69.64	0.97	0.02	7.90
Bahat	Artocarpus lacucha	0.21	10.71	2.54	0.05	2.36

Neem	Azadirachta indica	0.57	30.36	0.02	0.00	2.79
Bhubi	Baccaurea ramiflora	0.02	1.79	0.31	0.01	0.31
Bolosh	Balakata baccata	0.07	7.14	0.30	0.01	0.74
Hijal	Barringtonia acutangula	0.02	1.79	1.22	0.02	0.80
Kanchan	Bauhinia purpurea	0.18	10.71	0.14	0.00	1.02
Urium	Bischofia javanica	0.05	5.36	1.00	0.02	0.97
Simul	Bombax ceiba	0.18	14.29	11.82	0.21	7.53
Dhuna	Canarium bengalense	2.30	82.14	0.27	0.00	8.64
Mathang	Carallia brachiata	0.11	3.57	0.51	0.01	0.65
Kum	Careya arborea	0.23	3.57	2.78	0.05	2.03
Sonaru	Cassia fistula	0.64	26.79	0.40	0.01	2.85
Bandar lathi	Cassia javanica	0.16	12.50	0.67	0.01	1.41
Hingari	Castanopsis indica	0.16	10.71	0.02	0.00	0.94
Bon simul	Ceiba pentandra	0.04	3.57	1.80	0.03	1.25
Chakros	Chukrasia tabularis	0.23	12.50	0.30	0.01	1.30
Gondhsorai	Cinnamomum glaucescens	0.05	5.36	0.94	0.02	0.93
Tajiya	Cinnamomum impressinervium	0.11	8.93	0.02	0.00	0.75
Outenga	Dillenia indica	0.02	1.79	1.01	0.02	0.69
Okshi	Dillenia pentagyna	0.21	10.71	3.08	0.05	2.65
Gual	Diospyros racemosa	0.77	30.36	0.29	0.01	3.19
Garjan	Dipterocarpus indicus	0.05	3.57	1.95	0.03	1.36
Kakoi chura	Discospermum abnorme	0.25	14.29	0.57	0.01	1.59
Khokan	Duabanga grandiflora	0.09	1.79	3.37	0.06	2.04
Bandardima	Dysoxylum reticulatum	0.93	37.50	11.05	0.20	9.65
Jalphai	Elaeocarpus floribundus	2.41	76.79	0.06	0.00	8.31
Rudrakshya	Elaeocarpus sphaericus	0.02	1.79	0.11	0.00	0.20
Modar	Erythrina stricta	0.04	1.79	1.28	0.02	0.85
Bot	Ficus benghalensis.	0.50	14.29	3.07	0.05	3.25
Dengura	Ficus hispida	0.04	3.57	0.23	0.00	0.41
Dimaru	Ficus racemosa	0.07	3.57	1.56	0.03	1.17
Jori	Ficus rumphii	0.36	17.86	0.13	0.00	1.73
Engla	Garuga pinnata	0.02	1.79	1.53	0.03	0.96
Gamari	Gmelina arborea	0.34	17.86	1.84	0.03	2.63
Fuhura	Grewia eriocarpa	0.59	16.07	0.68	0.01	2.21
Jawa, Jhawa	Holigarna longifolia	0.13	5.36	1.15	0.02	1.14
Chalmugra	Hydnocarpus kurzii	0.39	10.71	0.21	0.00	1.34
Kotoki	Ilex chimantaensis	0.04	1.79	0.26	0.00	0.31
Bella	Jasminum sambac	0.11	3.57	0.17	0.00	0.47
Halud sopa	Khasiaclunea oligocephala	0.07	5.36	1.02	0.02	1.00
Sidha	Lagerstroemia parviflora	0.11	8.93	0.11	0.00	0.80
Azar	Lagerstroemia speciosa	0.02	1.79	0.53	0.01	0.43
Jiol	Lannea coromandelica	0.18	10.71	0.15	0.00	1.03
Litchu	Litchi chinensis	0.02	1.79	0.10	0.00	0.19

Sutrang	Lophopetalum wightianum	0.02	1.79	2.89	0.05	1.69
Bura	Macaranga peltata	0.34	19.64	0.19	0.00	1.86
Tita sopa	Magnolia champaca	0.11	3.57	1.43	0.03	1.15
Morolia	Mallotus tetracoccus	0.18	12.50	2.49	0.04	2.40
Aam	Mangifera indica	0.55	25.00	0.84	0.01	2.84
Bon-am	Mangifera sylvatica	0.16	7.14	2.92	0.05	2.25
Ping	Maniltoa polyandra	0.68	41.07	5.50	0.10	6.59
Pahari Badam	Mansonia dipikae	1.32	51.79	4.27	0.08	7.48
Nahar	Mesua ferrea	0.79	26.79	0.88	0.02	3.29
Misc	Misc	0.20	8.93	1.66	0.03	1.75
Bola	Morus macroura	0.30	16.07	7.46	0.13	5.47
Kadam	Neolamarckia cadamba	1.11	44.64	3.55	0.06	6.34
Madhu pat	Nicotiana rustica	0.96	33.93	0.05	0.00	3.55
Bhatghila	Oroxylum indicum	0.02	1.79	0.72	0.01	0.53
Hunor	Pajanelia longifolia	0.16	16.07	1.53	0.03	2.11
Kurta	Palaquium polyanthum	0.59	33.93	3.90	0.07	5.13
Bonsum	Phoebe goalparensis Hutch	0.84	39.29	0.52	0.01	4.00
Jinari	Podocarpus neriifolius	0.09	8.93	1.19	0.02	1.35
Ful ujha	Premna bengalensis	0.18	16.07	0.93	0.02	1.81
Bhadruk	Premna mollissima	0.50	8.93	0.87	0.02	1.71
Modubura	Pterospermum acerifolium	0.25	7.14	0.30	0.01	0.96
Bherenda	Ricinus communis	0.09	3.57	0.81	0.01	0.79
Bajrang	Rubus biflorus	0.34	7.14	0.15	0.00	1.00
Makrisal	Schima wallichi	0.05	3.57	3.67	0.07	2.28
Amara	Spondias pinnata	0.89	23.21	1.31	0.02	3.42
Udal	Sterculia villosa	0.29	19.64	2.54	0.05	3.05
Paroli	Stereospermum chelonoides	0.66	32.14	0.15	0.00	3.09
Seora	Streblus asper	0.05	3.57	0.13	0.00	0.38
Jamu	Syzygium cumini	0.07	5.36	14.76	0.26	8.37
Tetali	Tamarindus indica	4.41	57.14	0.08	0.00	9.57
Teak	Tectona grandis	0.05	3.57	14.40	0.26	8.03
Bhomara	Terminalia bellirica	4.05	10.71	3.06	0.05	7.58
Horitoki	Terminalia citrina	0.59	32.14	1.04	0.02	3.48
Hollock	Terminalia myriocarpa	0.20	7.14	0.89	0.02	1.21
Poma	Toona ciliata	0.13	8.93	2.63	0.05	2.17
Horu agra	Triumfetta rhomboidea	0.71	41.07	0.02	0.00	3.69
Morhal	Vatica lanceifolia	0.02	1.79	0.23	0.00	0.27
Awal	Vitex pinnata	0.05	1.79	4.05	0.07	2.36
Bogori	Ziziphus jujuba	35.71	2.05	4.05	0.07	48.32
	Total Value	77.63	1485.98	186.58	3.33	300.04

3.3 Status of biodiversity conservation in forests

Regarding Biodiversity Conservation, there was no any working circle in the past working plan of this Division. Thus, the management with specific reference to biodiversity conservation

were not implemented. But under plantation and protection working circle, the biodiversity has been conserved in the time of creation of plantation.But the traditional practice of jungle clearance, debris collection noticed which is not at all desirable for conserving the driver species belongs to herb, grass and shrubs.Therefore, such traditional clearance practice should be avoided. Also the local tree species like Gorjan, Kurta, Sundi, Khangla, Ginari and Nageswar required special attention and care for conservation and regeneration. The other species like Chalmugra, Dalmugra, Satkora various varieties of cane such as Golla, Mona, Jalliad & Sundi needs special conservation and regeneration for sustainable management of biodiversity conservation.

3.4 Status of species prone to over exploitation

The major tree species naturally found in the forests of Karimganj like, Sundi, Gorjan, Haldu, Bola, Ramdala, Cham, Nageswar etc. are already over exploited because of huge demand for both domestic and commercial purpose. The cane species likeGolla, Mona, Jalliad & Sundi etc. are also over exploited without conservation and regeneration. The other medicinal and aromatic species belongs to herbs, shrubs and grass are also harvested unscientifically leading to over exploitation.

3.5 Conservation of genetic resources

There are seven nos. of sample plot in this Forest Division look after by office of the Silviculturist, Assam, Basistha, Guwahati for conducting different aspect of genetic research of plant. The list of such sample plot with other information are given below.

Table 3.5: Sample plot maintained by Silvicultural Division for genetic research

Sl. No.	Name/ No. of Plot	Location	Tree Species	Description of plot	Aims & Objective
1	Sample Plot No.1, Churaibari	Tilbhum RF N 24° 26' 29.0"E 92° 15' 43.3" N 24° 26' 29.4"E 92° 15' 43.0" N 24° 26' 31.4"E 92° 15' 44.7" N 24° 26' 32.2"E 92° 15' 47.0" N 24° 26' 32.8"E 92° 15' 46.1" N 24° 26' 32.6"E 92° 15' 44.1" N 24° 26' 30.8"E 92° 15' 42.7"	Teak (Tectona grandis)	Total area=0.50Ha. Total No.of tree=311No. Year of formation= 1975-76 Average height attain=13.58m Average diameter=0.333m Top height recorded=26m Top girth recoded=2.30m	The aim and object of formation of the sample plot is to study the growth behaviour of Teak in Tilbhum RF
2	Sample Plot No.3, Manikchera	Tilbhum RF N 24° 19' 06.5" E 92° 18' 26.4" N 24° 19' 05.1" E 92° 18' 26.2" N 24° 19' 04.7" E 92° 18' 27.3" N 24° 19' 07.1" E 92° 18' 29.2"	Teak (Tectona grandis)	Total area=0.5Ha. Total No.of tree=140No. Year of formation= 1981-82 Average height attain=10.27m Average diameter=0.28m	The aim and object of formation of the sample plot is to determine the diameter increment and to collect data for volume and yield

				Top height recorded=17m Top girth recoded=1.80m	table of Teak
3	Sample Plot No.4, Borohati	Tilbhum RF N 24° 27' 04.9" E 92° 17' 12.8" N 24° 27' 02.4" E 92° 17' 17.0" N 24° 27' 04.6" E 92° 17' 09.2" N 24° 27' 06.1" E 92° 17' 10.3" N 24° 27' 05.7" E 92° 17' 12.1"	Teak (Tectona grandis)	Total area=0.25Ha. Total No.of tree=152No. Year of formation= 1990-91 Average height attain=8.41m Average diameter=0.41m Top height recorded=17m Top girth recoded=1.90m	The aim and object of formation of the sample plot is to determine the diameter increment and to collect data for volume and yield table of Teak
4	Sample Plot No.5, Suknacherra	Tilbhum RF N 24° 26' 47.6" E 92° 16' 22.7" N 24° 26' 49.2" E 92° 16' 22.4" N 24° 26' 48.7" E 92° 16' 20.9" N 24° 26' 47.5" E 92° 16' 21.3"	Sal (Shorea robusta)	Total area=0.25Ha. Total No. of tree=238No. Year of formation= 1985-86 Average height attain=8.62m Average diameter=0.36m Top height recorded=16m Top girth recoded=1.60m	The aim and object of formation of the sample plot is to determine the diameter increment and to collect data for volume and yield table of Sal
5	Experimental Plot No.3, Tilbhum, Suknacherra	Tilbhum RF N 24° 27' 03.2" E 92° 16' 17.7" N 24° 27' 04.6" E 92° 16' 16.1" N 24° 27' 02.9" E 92° 16' 15.5" N 24° 27' 02.5" E 92° 16' 16.5" N 24° 27' 08.2" E 92° 16' 17.5"	Mixed species [Jam (Eugenia spp), Rata (Amoora wallichii), Aam (Mengifera indica), Garjan (Dipterocarpus turbinatus), Jinari (Podocarpus nerrifolia) etc.]	Total area=5.0Ha. Total No. of tree=40No. Year of formation= 1989-90 Average height attain=7.56m Average diameter=0.14m Top height recorded=10m Top girth recoded=0.90m	The aim and object of formation of the experimental plot is to study the growth behaviour of Mixed species in Tilbhum RF under Karimganj Division
6	Experimental Plot No.7, Tilbhum	Tilbhum RF N 24° 26' 53.1" E 92° 16' 24.7" N 24° 26' 54.7" E 92° 16' 26.3" N 24° 26' 55.7" E 92° 16' 24.1" N 24° 26' 54.2" E	Rata (Amoora wallichii), Garjan (Dipterocarpus turbinatus) & Mixed cropping	Total area=2.0Ha. Total No. of tree=10No. Year of formation= 1989-90 Average height attain=11.3m Average	The aim and object of formation of the experimental plot is to study the growth behaviour of Rata, Garjan &Mixed cropping

		92° 16' 22.8" N 24° 26' 53.2" E 92° 16' 24.2"		diameter=0.151m Top height recorded=13m Top girth recoded=0.70m	in Tilbhum RF which was most affected by the jhum cultivation
7	Experimental Plot No.72, Tilbhum	Tilbhum RF N 24° 26' 46.2" E 92° 16' 21.3" N 24° 26' 47.3" E 92° 16' 20.8"	Pine (Pinus khasiana) New: Pinus insularis	Total area=0.6Ha. Total No. of tree=46No. Year of formation= 1981-82 Average height attain=20.55m Average diameter=0.35m Top height recorded=30.0m Top girth recoded=2.35m	The aim and object of formation of the experimental plot is to study the growth behaviour of Pine (Pinus khasiana) in Tilbhum RF under Karimganj Forest Division

3.6 Fauna and their habitats

The Reserved Forest area of Karimganj Division comprises of mammals, birds, reptiles etc. Due to the excessive biotic interference resulting degradation of their habitat and all species are not secured, thus need special care for improvement of their habitat by planting indigenous tree species, fruit species etc.in general.The rare species such as Hoolock gibbon, Spectacle langur, Slow loris, Monkey are found in the Patheria Reserved Forest, therefore, special care need be taken to maintain their habitat in the said Reserved Forest.Besides, wild elephants are also found in Patheria Reserved Forests which are not reported from any corner of Borak Valley, thus, adequate fodder plantation may be raised for suitable habitat for wild elephants.

Table 3.6: Statement showing fauna and their habitats

Sl.No.	Name of the species	Habitat/microhabitat	Area (sq. Kms)	Remarks
1	Slow loris	Patiala & Swargatilla	14.00	
2	Jungle cat	Longai Kalagang Durbintilla	6.25 2.00 30.00	
3	Jackal	Longai Cheragi Magurcherra	9.00 4.00 5.00	
4	Monkey	Longai Damcherra Nabin Nagar	10.00 3.50 2.25	
5	Pig	Singla RF	3.00	
6	Elephant	Mohangool, Adamtilla, Champabari, Ankapi, Chipacherra, Panighat	58.00	The elephant habitat is located in Patheria Hills RF which is adjacent to International boundary of Bangladesh and the elephant used to visit Bangladesh

				crossing the border
7	Hollock gibon	Mukamtilla, Adamtilla	13.00	
8	Specticle langur	Mukamtilla, Fulkandi Border road	12.00	
9	Golden langur	Swargatilla, Mukamtilla	14.00	
10	Hog deer	Paschim Lakhipur area	1.00	

3.7 Threats and challenges to wildlife

The jhum cultivation, encroachment disturbs the Wild life corridor and their habitat. The forest area diverted for non-forest purpose also impact on the habitat of Wild life. Thus, the degraded forest may be covered with vegetation through plantation to maintain the habitat of Wild life and the encroached area also shall be cleared followed by creation of vegetation with indigenous species to minimize the threat and challenge to the Wild life and reduce man and animal conflict.

3.8 Protection and management of fauna

The North Cachar Hills Reserved Forests comprising of 25238.7 Ha. has been declared as Borail Wild Life Sanctuary vide Govt Notification No. FRW.12/2001/Pt/4 dtd. 19.06.2001 for protection and management of fauna such as rare species Goral (Wild hill goat)locally known as “Pahari Chagoli”, Clouded leopard, Samber, Pangolin, Indian civet, Procupine, Wild boar, eight species of primets, large number of reptiles, tortle and more than 325 species of birds found there. Besides, a large numbers of trees are found in the sanctuary. Borail is an example of significant biodiversity. Borail bears a good habitat for wild animals and avifauna. Borail consists of 1.5% grass land of its total area and good source of water for its animal.

The fauna available in the Division can be protected by improving the habitat and creating public awareness involving the JFMCs, Forest Right holders and villagers residing in the fringe area of Reserved Forests.

CHAPTER 4

Maintenance and Enhancement of Forest Health and Vitality

4.1 Status of regeneration

From the preliminary survey conducted during 2012 in different sample plot, it reveals that the regeneration of major species like Cham, Garjan, Gamari, Sundi, Simul are satisfactory but due to heavy cattle grazing, the regeneration get damaged in the young stage. The cane and NTFP species regeneration also facing the same problem due to biotic interference. The bamboo natural regeneration was disturbed while unscientifically operated by the unskilled persons of HPC violating the prescribed silvicultural system.

Therefore, the natural regeneration area shall be protected from biotic interference and the degraded forest shall be taken under artificial regeneration by planting indigenous species under different schemes with reference to the biodiversity conservation.

4.2 Area affected by forest fire

No natural forest fire takes place in the forests of this Division but intentional forest fire are observed in the Jhuming area, broom stick area, grass land and thatch area. As soon as such forest fire noticed by frontline staff, they rushed to the spot and control the fire. Fire control equipment may be provided to the frontline staff for easy control of forest fire and legal action shall be taken against the culprit, who encourages the fire for their vested interest.

4.3 Area damaged by natural calamities

The natural calamities like flood, draught and erosion are occurring in the forest area. Flood caused damage in low lying area and in nursery. The different watershed and catchment area under this Division are not managed scientifically resulting erosion in forest.

To reduce the damage by natural calamities, the following measures may be taken.

- Selection of nursery site should be judicious to avoid flood damage
- Nursery site shall have adequate watering facility to overcome draught situation
- Scientific management of watershed and catchment area shall reduce erosion in the slope of hills and forests.

4.4 Area protected from grazing

There are 45 Nos. of Forest Villages and several fringe villages are in this Forest Division. The sample survey of Forest Village & Fringe Village reveals that huge number of cattle are grazing over the forest area as there are no sufficient land in the revenue area. The socio economic survey indicate that the main source of fodder are the forest area and there are no practice of stall feeding noticed as the villagers are marginal farmer thus, all cattle are grazing openly to the forest area.

4.5 Lopping practices

No such lopping practice is seen under Karimganj Forest Division except during flood situation but there are practices of Pan jhum cultivation by lopping of trees which have a bad

affect on the canopy of forests. The NTFP items like Broom stick, Gandhiroot, Bon ada etc. are collected but without any lopping.

4.6 Area infested by invasive weeds species in forests

In Karimganj Division weed like *Michenia scandon* and *Acasia paniata* are generally affect the main tree species during young stage. The climber weeds like *Michenia micranta* hamper plants growth in their young stage mostly in artificial regeneration and aided natural regeneration. The affect of weeds are observe in all Reserved Forests of the Division.

4.7 Incidence of pest and diseases

There is no such incidence in last few years for damage of forest vegetation by the pests and diseases in this Forest Division.

4.8 Forest degradation and its drivers

In the Karimganj Forest Division, the forest area is degraded due to the huge biotic interference. Encroachments for agriculture and settlement, illegal felling , unregulated removal of forest produce, overgrazing etc are main drivers of forest degradation in the Reserved Forest area.

4.9 Pollution control and protection of environment

As per records, there is no huge pollution of soil water and air in the forest area. Due to illegal collection of fuel wood, domestic timber, encroachment and Jhuming, pollution impact are noticed in some pockets of the Reserved Forests.

The burning practice for Jhuming cultivation polluted both soil and air by destroying their carbon. The traditional practice of fishing by tribal people, poisoning in the water stream causes water pollution and affected the aquatic fauna.

To control the pollution and protection of the environment, the encroachment and Jhuming area shall be evicted and planted with indigenous tree species to cover the area. Legal action shall be initiated against the culprit in and around the forest area.

CHAPTER 5

CONSERVATION AND MAINTENANCE OF SOIL AND WATER RESOURCES

The Karimganj Division comprises of Karimganj District and part of Cachar District. The river Borak and its branches – Surma and Kushiara provide the complete drainage to the area. Karimganj is drained by the north flowing tributaries viz.Longai and Singla river, where the northern part of the Division is drained by the southwards flowing Jatinga, Arang, Gumra and Malidora river.

5.1 Area treated under soil and water conservation measures

In the past working plan, there is a working circle, viz, Jhum Rehabilitation Working Circle where the main objects of the management was soil and water conservation, especially on the high altitudes and steep slopes and to carry out remedial measures to arrest any further degradation and thus it was suggested to cover the barren area under vegetation ensuring soil enrichment at the same time. The silvicultural system was prescribed artificial regeneration with multiple cropping preferably by Taungya system.

The area vulnerable to soil erosion located within the Reserved Forest of Karimganj Division are given below where scientific management like terracing, river bank plantation with indigenous tree and bamboo species in both side shall be taken. In addition to that, suitable scientific measures shall be taken for combating soil erosionin consultation with the Soil Conservation Department.

Tabe 5.1: Location vulnerable to soil erosion in the forest of Karimganj Forest Division, Assam

Sl. No.	Name of the RF	Location	Approximate area(in ha)	Remarks
1	Singla RF	Rongpur (both side of river Singla)	75	Immediate protection measures required to protect the existing Beat Office and bridge over Singla river
		Cheragi bazaar (both side of river Singla)	95	Protection measures required to protect the Cheragi bazaar and the RCC bridge over Singla river including Range office complex and the Afforestation Centre
2	Longai RF	Balipipla (booth side of the river Longai)	65	Protection measures required to protect both side of the RF including the NEC road from the erosion of river Longai
		Longai Beat area	120	Protection measures required to protect the Beat Office, Magura Forest Village and Teak plantation eroded by the river Longai

5.2 Duration of water flow in the selected seasonal streams

Due to absence of vegetation cover, resulting from biotic interference, the speed of water flow from top of the hillock to the water stream causes soil erosion in the rainy season. The eroded soil reduces the depth of stream and river resulting flood in monsoon season. It is observed and assessed on comparing the rain water flow rate in the catchment area between the dense forests and open foreststhat both vegetative and mechanical control measure in the catchment area, the soil erosion will be reduced alongwith increase rate of water absorption.

Table 5.2:Status of streams flow in litres per minute in Karimganj Forest Divison, Assam

Months	River Longai	River Singla	River Borak	Rainfall
Jan-15	12.14	5.29	603.97	7.6
Feb-15	13.36	5.38	607.52	22.2
Mar-15	15.62	5.85	589.58	103.4
Apr-15	30.02	6.5	649.39	490
May-15	39.68	16.4	1,242.43	667
Jun-15	39.26	38.2	2,318.78	636.4
Jul-15	41	32.71	2,407.14	365.6
Aug-15	41.77	37.88	2,521.46	1026.1
Sep-15	37.52	29.77	2801.78	410.5
Oct-15	29.21	27.35	1,574.22	131.1
Nov-15	18.47	9.5	750.67	6.2
Dec-15	14.94	5.37	513.77	15.4
Yerly mean	27.74916667	18.35	1,381.725833	323.5

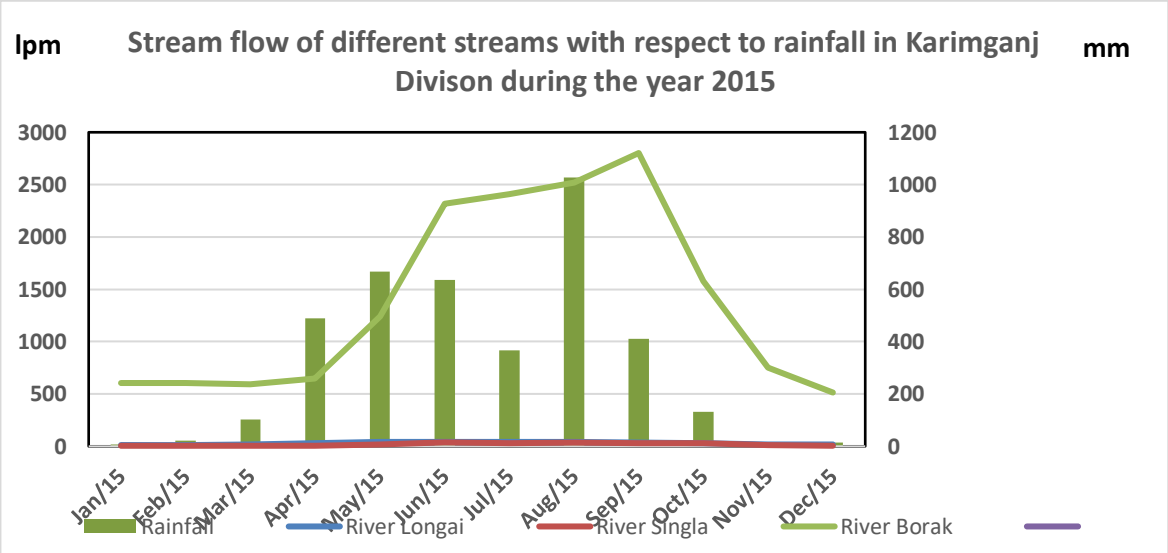


Figure 5.2: Stream flow of different streams with respect to rainfall in Karimganj Division, Assam

5.3 Wetland in forest areas

There are 2 major wetlands, namely, Sonbeel & Ratabeel and several small water bodies are found within the reserved forests of the division. The area and geo co-ordinates of some of the water bodies in Patharia Hills RF and Tilbhum RFs are given below.

Table 5.3: Details of water bodies in Patheria & Tilbhum RF of Karimganj Division, Assam

Sl. No.	Location of water body	Reserve Forest	Approximate area	Geo Co-ordinates
1	Keuticherra Link Road	Patharia Hills	1 Bigha	N 24° 39′ 33.6″E 92° 15′ 50.5″
2	Keuticherra Link Road	Patharia Hills	1 Bigha	N 24° 39′ 36.0″E 92° 15′ 48.4″
3	Keuticherra	Patharia Hills	4 Bigha	N 24° 39′ 47.8″E 92° 15′ 48.7″

4	Keuticherra	Patharia Hills	3 Bigha	N 24° 39′ 46.7″E 92° 15′ 55.8″
5	Keuticherra	Patharia Hills	1 Bigha	N 24° 39′ 43.1″E 92° 15′ 54.8″
6	Keuticherra	Patharia Hills	4 Bigha	N 24° 39′ 44.1″E 92° 15′ 56.0″
7	Keuticherra	Patharia Hills	1 Bigha	N 24° 39′ 45.6″E 92° 15′ 59.2″
8	Keuticherra	Patharia Hills	1 Bigha	N 24° 39′ 50.4″E 92° 16′ 01.0″
9	Keuticherra	Patharia Hills	5 Bigha	N 24° 39′ 55.6″E 92° 16′ 01.2″
10	Pekujuri area	Patharia Hills	2 Bigha	N 24° 39′ 55.6″E 92° 16′ 01.2″
11	Pekujuri area	Patharia Hills	1 Bigha	N 24° 39′ 40.8″E 92° 16′ 17.0″
12	Pekujuri area	Patharia Hills	2 Bigha	N 24° 39′ 45.4″E 92° 16′ 19.1″
13	Pekujuri area	Patharia Hills	3 Bigha	N 24° 39′ 45.6″E 92° 16′ 18.7″
14	Pekujuri area	Patharia Hills	4 Bigha	N 24° 39′ 48.2″E 92° 16′ 18.6″
15	Pekujuri area	Patharia Hills	1 Bigha	N 24° 39′ 50.4″E 92° 16′ 25.2″
16	Kumaura	Patharia Hills	1 Bigha	N 24° 39′ 42.3″E 92° 16′ 13.5″
17	Kumaura	Patharia Hills	½ Bigha	N 24° 39′ 27.4″E 92° 16′ 15.6″
18	Kumaura	Patharia Hills	4 Bigha	N 24° 39′ 26.3″E 92° 16′ 09.7″
19	Sunatola	Patharia Hills	1 Hect.	N 24° 39′ 59.4″E 92° 16′ 15.6″
20	Mukamtilla	Patharia Hills	1 Hect.	N 24° 39′ 13.1″E 92° 15′ 42.5″
21	Panighat	Tilbhum	2 Hect.	N 24° 31′ 05.2″E 92° 17′ 21.8″
22	Solgoi	Tilbhum	5 Bigha	N 24° 30′ 23.8″E 92° 17′ 41.8″
23	Solgoi	Tilbhum	1 Hect.	N 24° 30′ 23.1″E 92° 17′ 40.0″
24	Solgoi	Tilbhum	3 Bigha	N 24° 30′ 51.6″E 92° 18′ 03.3″
25	Solgoi	Tilbhum	3 Bigha	N 24° 31′ 02.5″E 92° 18′ 18.9″

5.4 Water level in the wells in the vicinity (upto 5km) of forest area

The pond is the main source of water facilityin the village area. In addition to that there are well in the villages as source of drinking water. Water level in the well during the rainy season is high and simultenously low in the dry season. The water level in the well in the vicinity of the forest area are given below.

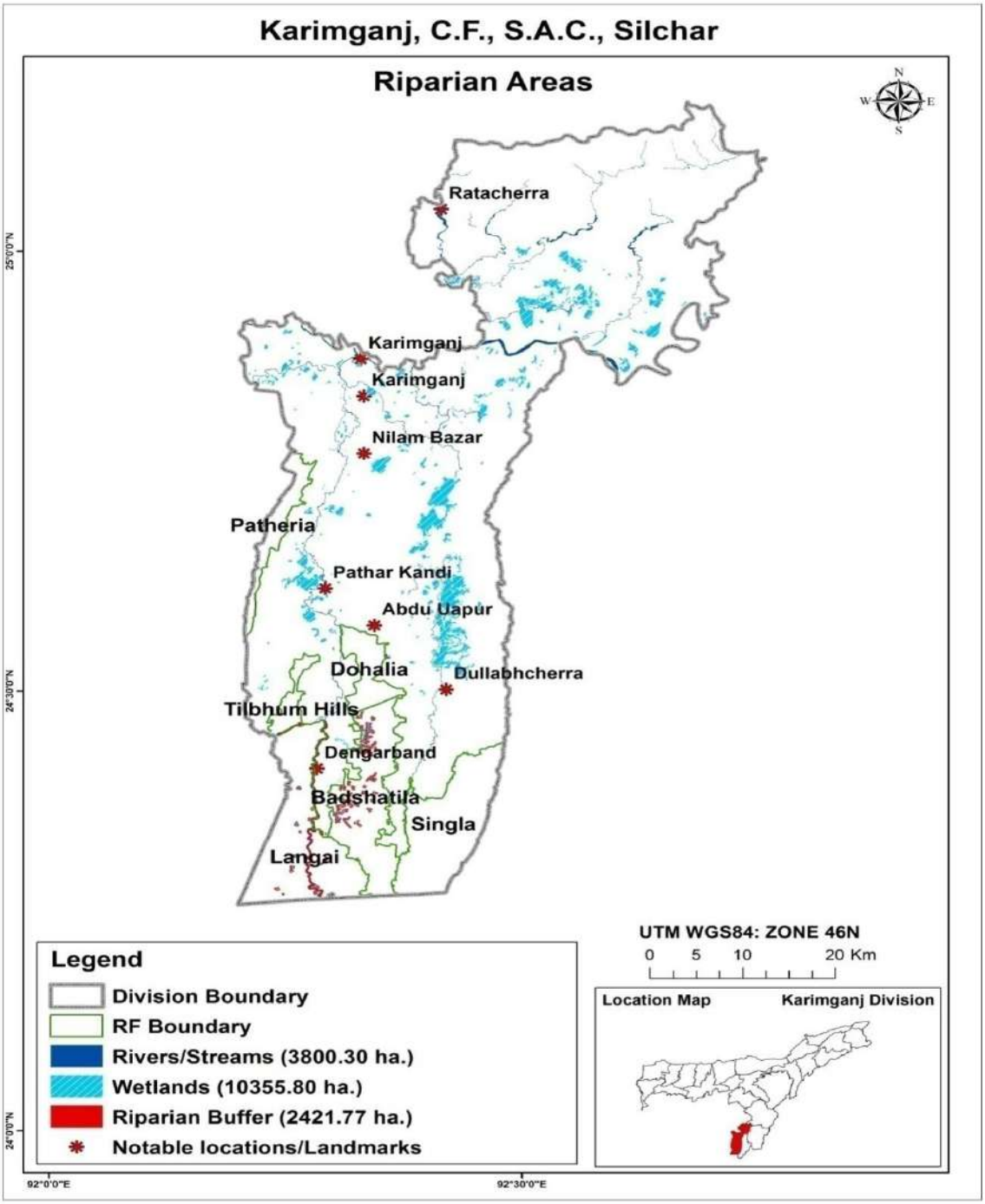
Table 5.4: Water level in the wells in vicinity (5Km) of the forest of Karimganj Division, Assam

Sl. No.	Range	Village name	Latitude	Longitude	Water level in meters			
					Aug	Sep	Jan	Feb
1	Lowairpoa	Noorkha	N24° 18' 57.00"	E92° 15' 48.00"	4	3.5	2.5	2
		Jacobnagar	N24° 16' 49.6"	E92° 18' 58.1"	5.2	4.75	3.6	3.1
		Magura	N24° 21' 16.1"	E92° 16' 14.0"	5	4.5	3.55	3.05
2	Duhalia	East Assairghat	N24° 29' 53.2"	E92° 19' 57.8"	5	4.5	3.5	3
		Assairghat	N24° 29' 52.1"	E92° 19' 48.3"	5.5	5	1	0.5
		Jagannathpur	N24° 31' 23.3"	E92° 23' 20.4"	3.1	2		
3	Cheragi	Bhutucherra, Charaginagar	N24° 20' 17.81"	E92° 25' 57.58"	4	3.5	1	Dry
		Vitorbalia	N24° 17' 38.44"	E92° 21' 49.86"	4.5	3	1	Dry
		Magura	N24° 24' 45.0"	E92° 23' 18.6"	4	3.5	1.5	Dry
4	Patherkandi	Dhalcherra Khasia Punjee (Vitorgool)	N24° 41' 18.1"	E92° 16' 44.9"	3	3	1	0.5
		Hatirgool Barman Basti (Sunatola)	N24° 40' 19.0"	E92° 16' 46.8"	3.5	3	1.5	1
		Mukamtilla Khasia Punjee	N24° 39' 14.7"	E92° 15' 47.6"	3	2.5	1	1

5.5 Status of aquifers

The aquifers in the division lie in both confined and unconfined situation in Karimganj Forest Division. Tubewell depth usually varies from 35-45 m. The quality of water is usually fit for drinking purpose. Detailed monitoring of the aquifers will be further carried out sustainably and assessed during this working Plan.

Figure: 5.3 Map showing riparian areas in Karimganj division.



CHAPTER 6

MAINTENANCE AND ENHANCEMENT OF FOREST RESOURCE PRODUCTIVITY

6.1 Growing stock of wood

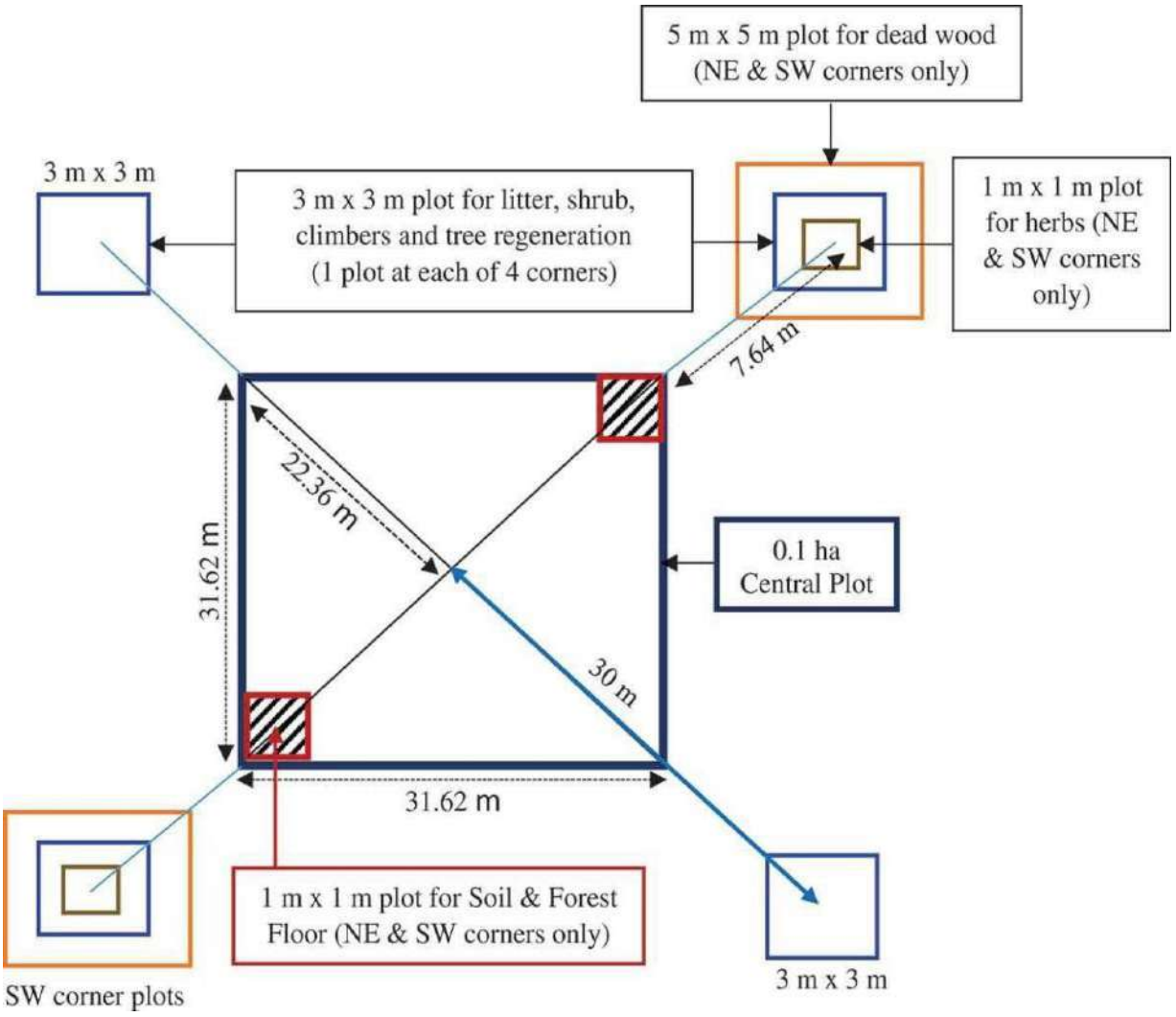
Forest inventory and analysis of growing stock is necessary to quantify tree growth and its sustainable utilization. Growing stock analysis is essential to calculate harvestable yield in the working plan. Mean annual increment is an important parameter for sustainable management of forest. Growing stock analysis is necessary to ensure sustain flow of income and ecosystem services to local communities considering conservation and ecological security.The forest resource assessment methodology prescribed in the National Working Plan Code-2014 was followed to conduct assessment of the total growing stock of trees and biomass. Grid based Systematic Stratified Random Sampling was carried out. Map of the sample plots is provided in Figure 6.1b. Sample plots were laid out and observational assessment of site quality, tree species, composition, its health, density and crop age etc. were recorded in Plot Approach Form I.Blanks, important scattered trees, plantations raised were noted. Information on drivers of forest degradation, NTFP species, intensity of invasive species, faunal sights/ traces, microhabitats of wildlife were recorded.

In accordance with the guidelines and methodology stipulated in National Working Plan Code 2014, North East Space Application Center (NESAC) derived the location of Sample Plots.Plot locations are shown through figure 6.1b. After navigating to each sample plots using a hand held GPS, a square plot of 0.1 ha was laid measuring 22.36 m horizontal distance i.e. half of the diagonal in all the four directions. After hecking the dimensions of the plot, latitude, longitude and altitude were recorded using the handheld GPS device. The main plot was used for recording the trees and bamboo stocking. The enumeration of trees was done by measuring the girth of each tree above 30 cm girth found in the sample plot. In case of bamboo, each clump was enumerated by taking its height, number of first, second and third year old culms, dried, congested culms and overall condition of the culms.

Information on regeneration status of forest species, injury to forest species, grazing incidence, fire incidence, soil type, gradient of slope etc. were gathered through visible evidences and recorded. Data of shrubs, climbers and regeneration status were recorded from all quadrats of 3m×3m laid out at a distance of 30 metres from the centre of the main plot of 0.1ha at SE and NW directions. Data of herbs from all nested quadrats of 1m×1m laid within each quadrat of 3m×3m was collected and recorded in the plot enumeration form. Growing stock analysis is a representation of 127 different tree species recorded in the sample plots.

A detailed enumeration of trees for the distribution of trees into diameter classes of different species has been limited to the measurement of standing biomass of trees having diameter at breast height above 30 cm. All woody litter below 5 cm diameter is enumerated from the four nested quadrats of size 3 m x 3 m and from the same plot, all shrubs and climbers are uprooted

and weighed for the estimates of biomass and carbon. Estimate for the herbs, grasses and leaf litter and data on humus and soil carbon of the forest floor is obtained from the nested quadrats of 1 m x 1 m plots of NE and SW corners and a pit of size 30 cm x 30 cm x 30 cm is dugged within these plots to collect composite samples of soil for the estimate of soil organic carbon. The schematic diagram of field enumeration plots is shown in Figure 6.1a



Schematic representation of field enumeration plots (NE:NorthEast,SW:SouthWest)

Figure 6.1a: Layout of Sample Plots in the field

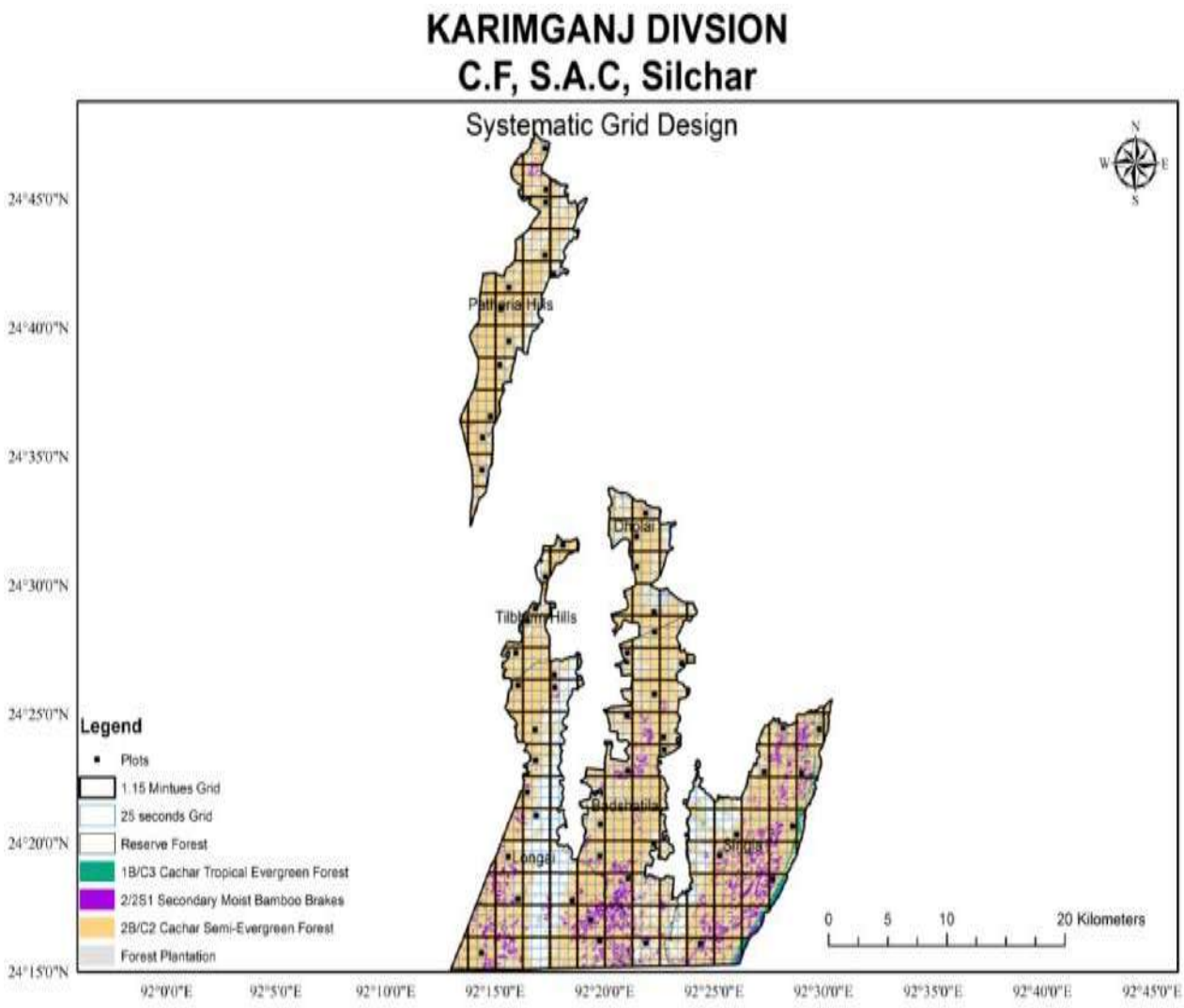


Fig 6.1.b Systematic grid map of Karimganj Division

Sample points were allocated by North East Space Application Center adopting the method as provided in the National Working Plan Code 2014. Plot locations are shown through figure 6.1a. After navigating to each sample point using a hand held GPS, a square plot of 0.1 ha was laid measuring 22.36 m horizontal distance i.e. half of the diagonal in all the four directions. After hecking the dimensions of the plot, latitude, longitude and altitude were recorded using thr handheld GPS device. The main plot was used for recording the trees and bamboo stocking. The enumeration of trees was done by measuring the girth of each tree above 30 cm girth found in the sample plot. In case of bamboo, each clump was enumerated by taking its height, number of first, second and third year old culms, dried, congested culms and overall condition of the culms.

However, it must be admitted that the forest is fairly balanced. Quantification of the number of trees that can be accommodated in the higher diameter classes cannot be reflected by this graph. Keeping in line with the past management practices, structure and composition of the forests in this division, it will be advisable to work out the forest as a selection forest with good distribution of trees at all classes and species. The growing stock map of Karimganj division is shown in figure 6.1.d.

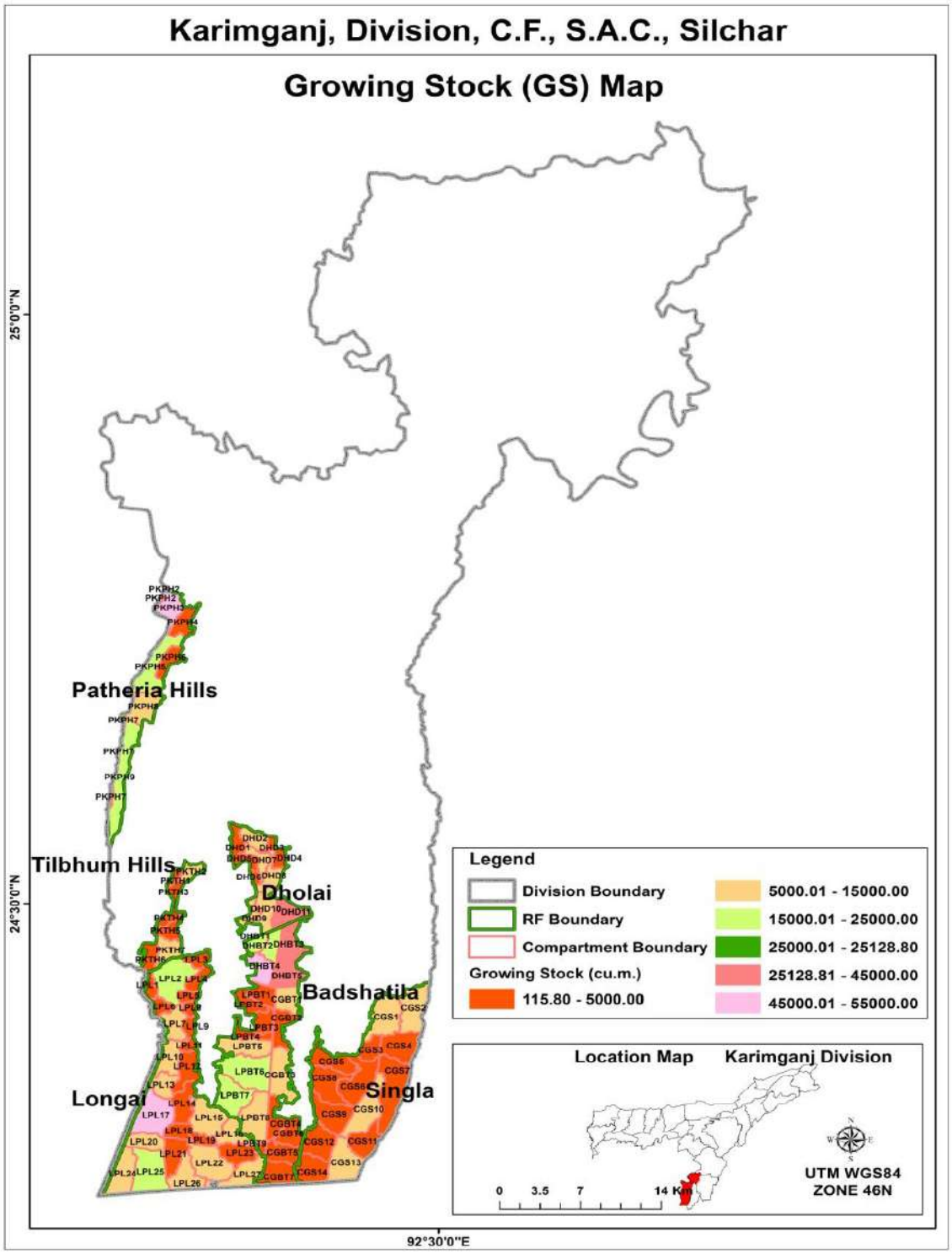


Fig. 6.1.c Growing stock map of Karimganj Division

Table 6.1d: Compartment wise growing stock (cu.m/ ha)

Name of RF	Compart	Growing stock (cu.m./Ha.)
Badshatila	CGBT1	5.64
Badshatila	CGBT2	80.03
Badshatila	CGBT3	12.17
Badshatila	CGBT4	122.03
Badshatila	CGBT5	121.54
Badshatila	CGBT6	1.36
Badshatila	CGBT7	69.14
Badshatila	CGS12	15.52
Badshatila	CGS14	14.55
Badshatila	DHBT1	97.36
Badshatila	DHBT2	65.57
Badshatila	DHBT3	47.69
Badshatila	DHBT4	2.18
Badshatila	DHBT5	63.24
Badshatila	DHD11	33.64
Badshatila	LPBT1	35.03
Badshatila	LPBT2	2.17
Badshatila	LPBT3	183.32
Badshatila	LPBT4	274.40
Badshatila	LPBT5	271.59
Badshatila	LPBT6	64.06
Badshatila	LPBT7	105.44
Badshatila	LPBT8	247.71
Badshatila	LPBT9	63.24
Badshatila	LPL27	175.68
Dohalia	DHBT1	131.50
Dohalia	DHBT2	119.17
Dohalia	DHD1	178.06
Dohalia	DHD10	292.09
Dohalia	DHD11	185.01
Dohalia	DHD12	188.54
Dohalia	DHD2	190.91
Dohalia	DHD3	368.37
Dohalia	DHD4	117.38
Dohalia	DHD5	155.69
Dohalia	DHD6	290.05
Dohalia	DHD7	128.85
Dohalia	DHD8	788.00
Dohalia	DHD9	168.68
Langai	CGBT5	372.82
Langai	LPL1	122.03
Langai	LPL10	114.22
Langai	LPL11	376.86
Langai	LPL12	374.06
Langai	LPL13	154.84
Langai	LPL14	229.75
Langai	LPL15	109.46
Langai	LPL16	273.17
Langai	LPL17	100.27
Langai	LPL18	22.22
Langai	LPL19	142.16
Langai	LPL2	215.52
Langai	LPL20	150.87
Langai	LPL21	186.91
Langai	LPL22	188.54
Langai	LPL23	13.55
Langai	LPL24	34.61
Langai	LPL25	64.67
Langai	LPL26	426.53
Langai	LPL27	115.38
Langai	LPL3	145.56
Langai	LPL4	194.54
Langai	LPL5	126.46
Langai	LPL6	41.39
Langai	LPL7	88.91
Langai	LPL8	109.48
Langai	LPL9	151.31
Patheria	PKPH2	5.55
Patheria	PKPH3	106.02
Patheria	PKPH4	201.73
Patheria	PKPH5	122.49
Patheria	PKPH6	114.18
Patheria	PKPH7	42.80
Patheria	PKPH8	135.55
Patheria	PKPH9	100.88
Singla	CGS1	218.94
Singla	CGS10	8.07
Singla	CGS11	21.80
Singla	CGS12	373.96
Singla	CGS13	37.08
Singla	CGS14	284.86
Singla	CGS2	43.06
Singla	CGS3	87.95
Singla	CGS4	0.43
Singla	CGS5	501.12
Singla	CGS6	233.16
Singla	CGS7	7.70
Singla	CGS8	603.77
Singla	CGS9	324.47
Tilbhum Hills	PKTH1	42.67
Tilbhum Hills	PKTH2	44.91
Tilbhum Hills	PKTH3	80.02
Tilbhum Hills	PKTH4	41.31
Tilbhum Hills	PKTH5	91.06

Tilbhum Hills	PKTH6	66.94	Tilbhum Hills	PKTH7	58.25

6.2 Growing stock of bamboo

As per past working plan for bamboo overlapping circle, an area of 480.5731 Sq.Km. was allotted in Karimganj Forest Division. A quantum of 107001.0 Metric Ton/Green growing stock was allotted to HPC, out of which 62492.0 Metric Ton/Green removed by HPC during the previous plan period.

6.3 Increment in volume of identified timber species

There are 7(seven) Nos. of sample plot to study increment in volume of Teak (*Tectona grandis*), Sal (*Shorea robesta*), Mixed species[Jam (*Eugenia spp*), Rata (*Amoora wallichii*), Aam (*Mengifera indica*), Garjan (*Dipterocarpus turbinatus*), Jinari (*Podocarpus nerrifolia*)] in Tilbhum Reserved Forests under Karimganj Division. The detail information of the sample plot has given in the Chapter-3.

6.4 Efforts towards enhancement of forest productivity through quality plantation activities

Efforts towards enhancement of forest productivity through quality plantation activities are indicated by various plantations raised under the Karimganj Division. Plantation raised from 2003-04 to 2015-16 are shown below.

Table 6.4: Statement showing pantation activities for enhancing forest productivity

Year	Name of Scheme	Species	Total area	Survival %
2003-04	NAP	ANR = Jam, Gamari, Ping, Kadam, Arjun, Garjan, Rata, Cham, Kurta, Tula etc.	ANR= 200	60 to 65
2004-05	NAP	ANR=Jam, Gamari, Ping, Kadam, Arjun, Garjan, Rata, Cham, Kurta, Tula etc. AR=Teak, Gamari, Arjun, Haritoki, Jam, Neem etc. Bamboo=Muli, Bethu, Barua etc.	ANR= 200 AR= 200 Bamboo= 200	60 to 65
2005-06	NAP	ANR=Jam, Gamari, Ping, Kadam, Arjun, Garjan, Rata, Cham, Kurta, Tula etc. AR=Teak, Gamari, Arjun, Haritoki, Jam, Neem etc. Bamboo=Muli, Bethu, Barua etc.	ANR= 200 AR= 200 Bamboo= 200	60 to 65
2006-07	NAP	ANR=Jam, Gamari, Ping, Kadam, Arjun, Garjan, Rata, Cham, Kurta, Tula etc. AR=Teak, Gamari, Arjun, Haritoki, Jam, Neem etc. Bamboo=Muli, Bethu, Barua etc.	ANR= 200 AR= 200 Bamboo= 200	60 to 65
	NBM	Bamboo=Muli, Jai, Barua etc.	Bamboo= 120	70 to 75
2007-08	NAP	ANR=Jam, Gamari, Ping, Kadam, Arjun, Garjan, Rata, Cham, Kurta, Tula etc.	ANR= 100 AR= 100 Bamboo= 100	60 to 65

		AR=Teak, Gamari, Arjun, Haritoki, Jam, Neem etc. Bamboo=Muli, Bethu, Barua etc.		
	NBM	Bamboo=Bethu, Jai, Barua etc.	Bamboo= 150	70 to 75
2008-09	NAP	ANR=Jam, Gamari, Ping, Kadam, Arjun, Rata, Cham, Sonaru etc. AR=Teak, Gamari, Arjun, Haritoki, Jam, Neem, Am, Ficus etc. Bamboo=Muli, Bethu, Barua etc.	ANR= 100 AR= 100 Bamboo= 100	60 to 65
	NBM	Bamboo=Bethu, Jai, Barua etc.	Bamboo= 100	70 to 75
2009-10	NAP	ANR=Jam, Gamari, Ping, Kadam, Arjun, Rata, Cham, Sonaru etc.AR=Teak, Gamari, Arjun, Haritoki, Jam, Neem, Am, Ficus etc.Bamboo=Muli, Bethu, Barua etc.	ANR= 100 AR= 50 Bamboo= 50	60 to 65
	NBM	Bamboo=Bethu, Jai, Barua etc.	Bamboo= 100	70 to 75
2010-11	NAP	ANR=Jam, Gamari, Ping, Kadam, Arjun, Rata, Cham, Sonaru etc. AR=Teak, Gamari, Arjun, Haritoki, Jam, Neem, Am, Ficus etc. Bamboo=Muli, Bethu, Barua etc.	ANR= 100 AR= 50 Bamboo= 50	60 to 65
	NBM	Bamboo=Bethu, Jai, Barua etc.	Bamboo= 180	70 to 75
2011-12				
2012-13	NBM	Bamboo=Bethu, Jai, Barua etc.	Bamboo= 300	70 to 75
2013-14	APFBC	MHW=Teak, Gamari, Cham, Ping, Moroi, Sirish, Jam, Koroi etc. NTFP=Amloki, Tetul, Jamun, Kathal, Boroi, Bel, Arjun, Jalpai, Amra etc. ANR=Jam, Gamari, Ping, Bohera, Arjun etc.	MHW= 120 NTFP= 70 ANR= 60	80 to 90
	NBM	Bamboo=Bethu, Jai, Barua etc.	Bamboo= 50	70 to 75
2014-15	APFBC	MHW=Teak, Gamari, Cham, Ping, Moroi, Sirish, Jam, Koroi etc. NTFP=Arjun, Jam, Amloki, Neem	MHW= 90 NTFP= 114	80 to 90
2015-16	APFBC	Am, Jam, Kathal, Moz, Amra, Casia Chama	Firewood Plantn= 10 Ha.	75

6.5 Carbon stock

Forests sequestrate and store more carbon than any other terrestrial eco system. Forest play an important role in mitigation and adaptation of climate change. Forestry activities are relatively inexpensive means of addressing climate change. Forests are sinks of carbon and matured forests are storehouse of carbon. The world's forests and forest soils store more than one trillion tons of carbon, twice the amount found floating free in the atmosphere. Therefore, assessment of carbon stock in forest division is vital.

6.5.1 Forest Carbon Inventory in India

India has been involved in climate change negotiations since the formation of UNFCCC in 1992, and is an international leader in carbon markets, especially in the Clean Development Mechanism (CDM). In forestry sector, India led the evolution of REDD to REDD+ through decisions adopted at the Climate Change COP at Bali, 2007. The Bali COP defined the instrument as "reducing emissions from deforestation and forest degradation; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries" (REDD+). With over 70 million hectares (ha) under forest cover (primarily stewarded by State governments and local communities), approximately 33% of which is managed through the Joint Forest Management (JFM) initiative, India is well-positioned to take advantage of and champion REDD+.

The Ministry of Environment and Forestry (MOEF) has created a REDD+ Cell, to lead the nation's efforts to participate in REDD+. To decrease national emissions and increase India's forest cover by over two million hectare annually and the carbon stocks within existing forest, the nation created the Green India Mission (GIM) and National Afforestation Program (NAP), along with other agricultural and rural development programs.

India is a country with tremendous human and institutional capacity and strong forest mapping capacity, extensive research and training capacity, and State Forest Departments (SFDs) that reach down into local communities or "beats." The Forest Survey Institute (FSI) develops a bi-annual forest cover inventory, and it will lead the national-level carbon stock accounting system in coordination with the India Institute of Remote Sensing (IIRS), the India Institute for Sciences (IISc), and the India Council for Forestry Research and Education (ICFRE). All of these will be critical to the long-term success of REDD+ in India.

One of the biggest challenges on carbon forestry is quantifying nation's carbon emissions and storage in forests, which requires region specific information. A credible monitoring system that shall measure, report and verify carbon in the Indian forests is a very critical element for the mitigation activities of India. This involves developing cost-effective, robust and compatible national monitoring and MRV systems, innovating tools, methodologies, inclusive training and knowledge sharing that shall strengthen India's technical and institutional capacity for effective MRV systems. Monitoring of forest carbon requires remote sensing as well as ground based data. Monitoring is essential for appropriate compensation of the carbon sequestered as well as fulfilling India's commitments of the GIM.

The IPCC 2006 Guidelines provides advice on estimation methods at three levels of detail, from tier 1 (default) to tier 3 (most detailed locally applicable data). This consists of mathematical specifications of the methods, information on emission factors or other parameters to use in generating the estimates, and sources of activity data to estimate the overall level of net emissions (emission by sources minus removals by sinks). When properly implemented, all tiers intends to provide unbiased estimates. Accuracy and precision should in general, improve from tier 1 to tier 3. The provision of different tiers enables inventory compilers to use methods consistent with their resources and to focus their efforts on those categories of emissions and removals that contribute most significantly to national emission totals and trends. The subsequent sub-chapters shall discuss the steps involved in carbon quantification of forests in Karimganj division.

6.5.2 Inventorying and reporting emissions and removals

The steps involved in inventorying and reporting follows the National Working Plan Code-2014, with additional references made to recommendations of reports of Forest Survey of India, Good Practice Guidance for Land Use, Land-Use Change and Forestry (GPG LULUCF) (IPCC, 2003) and the National Greenhouse Gas Inventory Guideline (IPCC, 2006). The steps in brief are given below:

i) Identify land use category and, estimate the land areas in each land use category for the time period required.

ii) As per GPG LULUCF, the total area is to be categorised into six major land classes, which are, forest land, cropland, grassland, wetlands, settlements and other land. The exact land area under each land classification is to be done by remote sensing analysis to reach at the area covered by each category. Carry out assessment for the relevant LULUCF categories. Within the key categories, carry out an assessment on which non-CO_2 gases and carbon pools are significant.Carbon pools are broadly classified into three groups:

1. Living biomass: consisting of above ground biomass (AGB) and below ground biomass (BGB).
2. Dead organic matter: consisting of Dead wood and Litter.
3. Soil: consisting of soil organic matter.

For the computation purpose, all non-CO_2 gases and carbon pools that are significant are to be selected. As per the forestry regime in Karimganj division, no non-CO_2 gases are considered to be significant. There are no peat lands identified in the landscape; and the emissions from and fertilizer application in the forest nurseries are considered to be negligible as only organic fertilizers are used as much as possible. Among the carbon pools, Above Ground Biomass, Below Ground Biomass and Soil Organic Carbon are considered to be significant; Dead Wood and Litter are considered to be *de minimis* and is not considered in the estimations.

iii) Ensuring that the requirements in terms of emission and removal factors and activity data appropriate to the tier level are being met.As far as possible region specific volume equations, wood density, root to shoot ratio and biomass expansion factors are to be applied in the absence of tier-3 data sets. In the absence of tier-3 data, efforts are to be made to make them available.

(iv) Quantification of emissions and removals and estimation of the uncertainty in each estimate.

Quantification of total carbon content in steps

6.5.3 Carbon inventory: biomass and soil carbon

Carbon inventory at the national level is done mainly through the NFI of FSI. However, to make it more comprehensive and robust, the code suggests forward and backward linkage between forest inventory of working plan and the inventory of FSI. The forward linkages have been ensured by suggesting the working plan methodology of enumeration following the exact methods of NFI. The code suggests using NFI data as a historical reference for a particular forest grid as backward linkage. The code has adopted grid-based systematic sampling of NFI for the working plans to ensure the linkages between NFI and working plans. The grid-based systematic sampling design also offers a better opportunity to revisit the area for change detection. The total carbon stocked in the forest is divided into different pools similar to the Good Practices Guidance developed by IPCC (2003). Changes in carbon stocks in these pools are to be estimated following the methods of IPCC (2003). Working plans are suggested to

highlight the gaps in data collection and research needs explicitly for further refinement of the inventory. Use of IPCC Tier 2 and Tier 3 methodology has been suggested to provide estimates of greater certainty. This is expected to have a better link between biomass and soil carbon dynamics.

It has been estimated that 50% of a tree's biomass by weight is carbon. By estimating the biomass of a tree, carbon content of a tree, or the AGB, can be calculated. Volume equations of most of the trees have already been developed by FSI. These regression functions in volume, height and DBH provide the mercantile or bole volume (m^3) of a species. Each forest class has a specific biomass expansion factor (BEF), which is the ratio of the total volume of a tree above ground (including leaves, branches etc.) to that of its mercantile volume. Further, species have a specific wood density (WD) which is used to convert volume into mass (in tons). Volume of BGB depends on AGB. IPCC in its Good Practice Guidance for Land Use, Land-use Change and forestry (GPG-LULUCF) has provided root-to-shoot ratios (RF) from which the root volume can be calculated. Since the mass of AGB in tons is already calculated, BGB is calculated using RF. Sum of AGB+BGB gives total biomass in tons in a tree. 50% of biomass by weight is carbon. Carbon is completely assimilated from atmospheric CO_2. From the amount of carbon stored within a tree, the amount of CO_2 sequestered can be calculated using the molecular weights of carbon and oxygen. To this the carbon content in the dead wood, litter and soil organic carbon are added to arrive at the total carbon content. Wood density has been sourced from country specific (tier-2) data[1]. Biomass expansion factor and root-to-shoot ratio have been sourced from GPG LULUCF (tier-1 data). The volume equations used are sourced from Forest Survey of India (tier-2 data). Soil Organic Content has been estimated from Government recognized laboratories using the soil samples collected during ecological data collection exercises.

(v) Using appropriate reporting tables to report emissions and removals estimates.

Appropriate tables shall be used in reporting that shall ensure transparency in calculation.

(vi) Documentation and archiving all information used to produce the emissions and removals estimates.

Appropriate documentation and archiving practices shall be followed for all the records used in the

calculations.

(vii) Quality control checks, verification, and expert/peer review of the emission estimates.

Appropriate quality control, which includes checking by competent source shall be undertaken to ensure the veracity of the calculations.

6.5.4 Calculations of carbon stock in Karimganj Divison

Biomass studies for carbon stock assessment were carried out in the Division by collecting samples from multiple forest plots. The preliminary carbon stock of Division showed that there are 48,670.12 tons of carbon in the living biomass of natural forest area. Forest carbon stock under different RFs is shown in table 6.5. Forest carbon distribution is shown as per the existing compartment in Figure 6.5a.

Quantification of total carbon content in steps

AGB:
Step 1: Calculate mercantile volume using volume equations (m^3).
$V = a + bD^2H$
Where V = Mercantile volume (m^3)
D = DBH (m)
H = Height (m)
Step 2: Calculate the mass of the AGB biomass in tons
$G_{AGB} = V * BEF * WD$
Where G_{AGB} = Biomass at above ground biomass in tons of dry matter (t)
V = Mercantile volume (m^3)
BEF = Biomass Expansion factor
WD = Wood density
BGB:
Step 3: Calculate the mass of BGB (roots) using the RF
$G_{BGB} = G_{AGB} * RF$
Where G_{BGB} = Biomass at below ground biomass in tons of dry matter (t)
G_{AGB} = Biomass at above ground biomass in tons of dry matter (t)
RF = Root to shoot ratio
Step 4: Calculate total biomass in tons of dry matter (tdm)
$G_{TOTAL} = G_{AGB} + G_{BGB}$
Where G_{TOTAL} = Total biomass of the tree in tdm
G_{BGB} = Biomass at below ground biomass in tons of dry matter (t)
G_{AGB} = Biomass at above ground biomass in tons of dry matter (t)
Step 5: Calculate the carbon content in a tree
$C_{TOTAL} = G_{TOTAL} * 0.5$
Where C_{TOTAL} = Total carbon content in a tree (tC)
G_{TOTAL} = Total biomass of the tree in tdm
Step 6: Calculation of net anthropogenic sequestration or CO_2 sequestered from living biomass
$ER = C_{TOTAL} * 44/12$
Where ER = Net anthropogenic sequestration or CO_2 sequestered in tCO_2
C_{TOTAL} = Total carbon content in a tree (tC)
Step 7: Calculation of carbon content in litter and dead wood and soil organic carbon as per the tier-3 methodology. In the absence of tier-3 data, tier-2 or tier 1, in that order may be used.
Step 8: $C_{living} + C_{dead} + C_{soil}$ = Total Carbon content

Table 6.5: Reserve forest wise carbon stock in Karimganj Division

Reserve Forest	Area	Carbon Stock (in tons)
Bshatila	11548.39	14,797.76
Dholai	3393.90	8,839.9
Longai	14402.76	28,64,491
Patheria Hils	1840.32	2,822.61
Singla	12290.48	22,209.85
Total	1821.79	48,670.12

6.6 Carbon sequestration and mitigation:

6.6.1 Role of Forest wood and Biomass in retarding Climate Change

Due to various factors including anthropogenic activities, the earth is getting more and more warmer than ever. Human activities have caused an imbalance in natural carbon cycle, consequently greenhouse effect and global warming came into being. When fossil fuels are burnt for transportation, heating, cooking, electricity, and manufacturing, we are effectively releasing more carbon into the atmosphere than it is being removed naturally. Ultimately we are causing more carbon concentration into atmosphere. As a result we are proceeding on the path of global warming and climate change. Global warming and climate change refer to an increase in average global temperatures. Natural events and human activities are believed to be contributing to an increase in average global temperatures. This is caused primarily by increases in "greenhouse" gases such as Carbon Dioxide. Climate change is a global threat that needs urgent action from global community. All countries will be affected by climate change and its impacts, particularly developing countries. If temperature is taken as an climate change indicator, it has been found that earth's average temperature has risen by 1.4°F (0.72°C) over the past century. It is projected that it will further likely to rise another 2 to 11.5°F over next century (NCAR, 2014). Therefore it is important to understand Carbon cycle, climate change and how climate change can be mitigated

Carbon cycle refers to the movement of carbon, in its different forms, between the biosphere, atmosphere, oceans, and geosphere. (i) Carbon exchange between atmosphere and vegetation - Plants absorb CO2 from the atmosphere during photosynthesis, and release CO2 back in to the atmosphere during respiration. Another major exchange of CO2 occurs between the oceans and the atmosphere. The dissolved CO2 in the oceans is used by marine biota in photosynthesis. (ii) Burning of Fossil Fuel- another important processes is fossil fuel burning. In fossil fuel burning, coal, oil, natural gas, and gasoline are consumed by industry, power plants, and automobiles. In this process carbon directly goes to the atmosphere from its source point. (iii) Change in Land use & Land cover - Changing land use also affect carbon cycle in broad term which includes essential human activities e.g. agriculture, deforestation, transportation activities etc. In modern world alterations in land use & land cover and ever increasing usage of energy for the purpose of development is the focal reasons for global warming and climate change. Global warming and climate change refer to an increase in average global temperatures over a very long period of time. As discussed in carbon cycle, natural events and human activities are believed to be contributing to an increase in average global temperatures. This is caused primarily by increasing in "greenhouse" gases such as Carbon Dioxide (CO2). Small changes in the average temperature of earth so far, can transform into large in coming hundred years. Moreover, these climatic changes will have great potential to create negative impacts on environment and mankind. Therefore, it is essential to mitigate climate change for advance minimization of its dangerous impacts. Current evidence suggests that to avoid the worst impacts of climate change, we should aim to limit the global average temperature rise to 2°C (35.6°F), not beyond that. This requires undertaking immediate reduction in global greenhouse gas emissions in all the sectors.

Climate forcing refers to the amount of energy earth receive from sun and the amount of energy earth radiate back into space. All extra carbon dioxide in the atmosphere is increasing overall temperature of earth on day to day basis, causing global warming. It is changing climate in unpredictable ways, from floods and hurricanes to heat waves and droughts. To try and reduce the risk of global warming and extreme weather events, it is required to reduce the

amount of fossil fuel we are burning. This isn't an easy process. In the 1997 Kyoto Protocol, it was decided that carbon emission in the atmosphere will be reduced by 5% below 1990 levels between 2008 and 2012. Several measures can be found out to reduce carbon from atmosphere and thus to reduce adverse impacts of climate change.

One of the measure is carbon sequestration, which is cheap and simple as well as costly and complex. That is natural carbon sequestration and geological carbon sequestration.

6.6.2 Carbon Sequestration

Carbon sequestration is the process of capture and long-term storage of atmospheric carbon dioxide to mitigate global warming and to avoid dangerous impacts of climate change. In other words, it also refers to the process of removing carbon from the atmosphere and depositing it in a reservoir. This carbon storages or reservoirs are also known as carbon pools. Carbon pool refers to a system or mechanism which has the capacity to accumulate or release. It can be natural or human induced. Examples are forest biomass, wood products, soils, and water. Carbon pools in a forest are a complex mix of live and dead organic matter and minerals. Human induced carbon pools are geological storages of carbon dioxide. The quantity of carbon in a pool is known as carbon stock and any change may be expressed as 'stock change'.

The use of forest is also a financially viable technique to reduce emission from atmosphere. It could also bring significant benefits to the local communities involved and consequently helps in reducing poverty at the same time. Forestry projects can bring social, economic, and local environmental benefits to millions of people. Trees are natural sequesters of carbon, they take carbon from atmosphere; utilize it in the process of photosynthesis as well as they store it in the form of biomass or wood. For this process of carbon sequestration to be success it is essential that carbon must not return to the atmosphere from burning. Carbon Sequestration can assist significantly in maintaining the natural carbon cycle. Therefore, requirement is that we need to implement this practice properly. There is a need to go for natural sequestration first, thus conservation of existing forests and more and more reforestation is required. Only then we will be able to reduce carbon emission and corresponding harmful impacts

Greenhouse Gases (GHG) have the capability to reflect back shorter wavelength infrared (IR) radiation. GHGs allow the longer wavelength IR radiation from sun to reach earth through the atmosphere. Earth absorbs the IR radiation, and radiates shorter wavelength IR radiation back into the atmosphere, which is reflected back into earth by the GHGs. So, the GHGs (such as water vapor, CO_2, CH_4, SF_6, HFCs, PFCs and O_3 (in troposphere)) form a blanket around earth resulting less variation in night and day temperatures, which is critical for life to flourish. This phenomenon is called the greenhouse effect. Moreover, due to the increase in consumption of fossil fuels after the industrial revolution and other sustained life style patterns of humans, the concentration of GHGs in the atmosphere increased, leading to an increase in the average temperatures on land as well as oceans. This increase in temperature caused the air and ocean circulation systems to behave differently, and change course patterns in certain cases, resulting in a change in climatic patterns on the earth. Further, life on earth will have to adapt to this increase in temperatures in a very short period. This phenomenon, which threatens the very existence of life on earth, is termed as Global Climate Change or GCC. Since these changes have been brought about due to human action, these are also called anthropogenic climate change. Mitigation strategiesinclude reduction in emissions of GHGs from sources as well as capture and storage of GHGs over a long period of time (sequestration).

Trees use the energy from sunlight to convert CO_2 in the atmosphere to sugars through the process of photosynthesis. Melvin Calvin was awarded the Nobel Prize in 1961 in Chemistry for his research on the process of carbon dioxide assimilation in plants using carbon isotopes, which proved that the carbon assimilated in trees, are absorbed from atmospheric CO_2. This way trees and forests act as a major sink of carbon in the natural carbon cycle. Destruction of forests leads to release of CO_2 into atmosphere, which has been calculated to be more than the global vehicular emissions. Harvested wood traps and stores the carbon within it over a long period of time. So promoting carbon sequestration in trees is a practical and cost effective way to capture carbon from atmosphere and store away for a long period of time. Hence the emission reductions are real and long term.

6.6.3 Enhanced carbon sequestration through recognised and innovative silvicultural practices, eco-restoration of degraded/mined out forest land

Forestry has been recognized as a means to reduce CO2 emissions as well as enhancing carbon sinks. Forests are a large sink of carbon and their role in carbon cycles is well recognized. Forestry provides a unique opportunity to combine the twin objectives of climate change adaptation and mitigation. It has the ability to enhance the resilience of the system for coping with the adverse impacts of climate change. Forestry systems offer important opportunities for creating synergies between both adaptation and mitigation actions. Forestry practices in climate change mitigation in India can be realized to its full potential by overcoming various technical, financial and institutional barriers.

The carbon storage capacity in plants varies across species and geography. Further, the amount of carbon in any forestry system depends on the structure and function of different components within the systems put into practice. The fact that forestry systems can function as both source and sink of carbon has been presented in literature. There is also clear evidence to suggest that forestry system greatly influences the source or sink of carbon. For example, agri-silvicultural systems where trees and crops are grown together are net sinks while agrosilvipastoral systems are possibly sources of GHGs. Practices like tillage, controlled burning, manuring, application of chemical fertilizers and frequent soil disturbance can lead to significant emissions of GHGs.The carbon in the aboveground and belowground biomass in an forestry system is generally much higher than the equivalent land use without trees (i.e. crop land without any trees). India has a long tradition of agroforestry practices. The agroforestry systems in India include trees on farms, community forestry and a variety of local forest management and ethno forestry practices. In India, the practice of growing scattered trees on farmlands is quite old and has not changed much over centuries; these trees are multipurpose, used for shade, fodder, fuel wood, fruit, vegetables and medicinal uses.

There is a growing interest in the role of different types of land use systems in stabilizing the atmospheric CO2 concentration and reducing the CO2 emissions or on increasing the carbon sink of forestry systems. Forestry has been recognized as a means to reduce CO2 emissions as well as enhancing carbon sinks. The role of forests (or trees) in carbon cycles is well recognized and forests are a large sink of carbon. There is considerable interest to increase the carbon storage capacity of terrestrial vegetation through land-use practices such as afforestation, reforestation, and natural regeneration of forests, silvicultural systems and agroforestry. Agroforestry systems are very important given the area currently under

agriculture, the number of people who depend on land for their livelihoods, and the need for integrating food production with environmental services

Globally, climate negotiations have highlighted the importance of land use sectors in mitigating the climate change. Agriculture alone accounts for 10-12% of the total global anthropogenic emissions of GHGs with an estimated non-CO2 GHG emission of 5120-6116 MtCO2 eq/yr in 2005. Since agricultural lands are often intensively managed, they offer many opportunities to improve agronomic practices, nutrient and water management, land use practices to fit the objectives of carbon sequestration. The emphasis of land use systems that have higher carbon content than existing plant community can help achieve net gains in carbon, specifically and significant increases in carbon storage can be achieved by moving from lower biomass land uses (e.g. grasslands, crop fallows, etc) to tree based systems such as forests, plantation forests and agroforestry.

Enhancements in biomass productivity, etc. result in improvement of forest health and vitality. Forest soil must be kept as healthy and fertile as possible and the forest crops must be kept as vigorous as possible to produce as rapidly as they can, till the biomass production attains its most desirable level. The growing stock of trees must be so constituted that it provides regularly the greatest possible quantity of the desired products, including intangible benefits. It is therefore essential that the specific composition and the structure or form of the forest must harmonise with the environment or factors of the locality, and the species grown and the methods of silviculture adopted must be suitable to the site to ensure full growth. Data is not yet available for carbon sequestration and mitigation.

6.6.4 Forest Carbon Finance

Carbon financing for forestry is a mechanism to incentivize carbon sequestration and long-time storage in forest lands. This can take different forms such as carbon credit based which includes Clean Development Mechanism (CDM) based Afforestation/Reforestation (AR) project activities and voluntary markets such as Agriculture, Forest and Other Land Uses (AFOLU) projects under Verified Carbon Standard (VCS), Plan Vivo and Gold Standard or program based where carbon forestry is made a part of a state's Nationally Approved Mitigation Activities (NAMAs) or a specific program aimed at improving tools and techniques and the Monitoring, Reporting and Verification (MRV) systems associated with carbon forestry. It is understood that the financing options could be domestic, bilateral or multilateral; in-line with the Government's decisions.

REDD+ is a mechanism being negotiated through the United Nations Framework Convention on Climate Change (UNFCCC) to mitigate climate change by compensating developingcountries for demonstrated reduced emissions from deforestation and forest degradation. Since REDD was introduced on to the UNFCCC agenda in 2006 its scope has been expanded through successive negotiations to include not only forest conservation activities, but also forest enhancement and sustainable management of forests. With growing momentum to develop REDD+ systems, there has been increasing focus on the appropriate institutional arrangements for implementing REDD+ at the international, national andproject levels. Currently the Assam Forest Department has considered potential revenues from carbon that may arise from the REDD+ carbon projects, and had piloted a jurisdictional REDD+ project design in Nagaon division (Lowering Emissions, Enhancing Forests (LEEF) in

Nagaon). This REDD+ design detailed the prescriptions for various elements and extent of conservation, regeneration and afforestation activities, which can be included in the working plans to account Carbon sequestration by this forest division also. This can eventually help in state-wide reporting of contribution to national NDC goals.

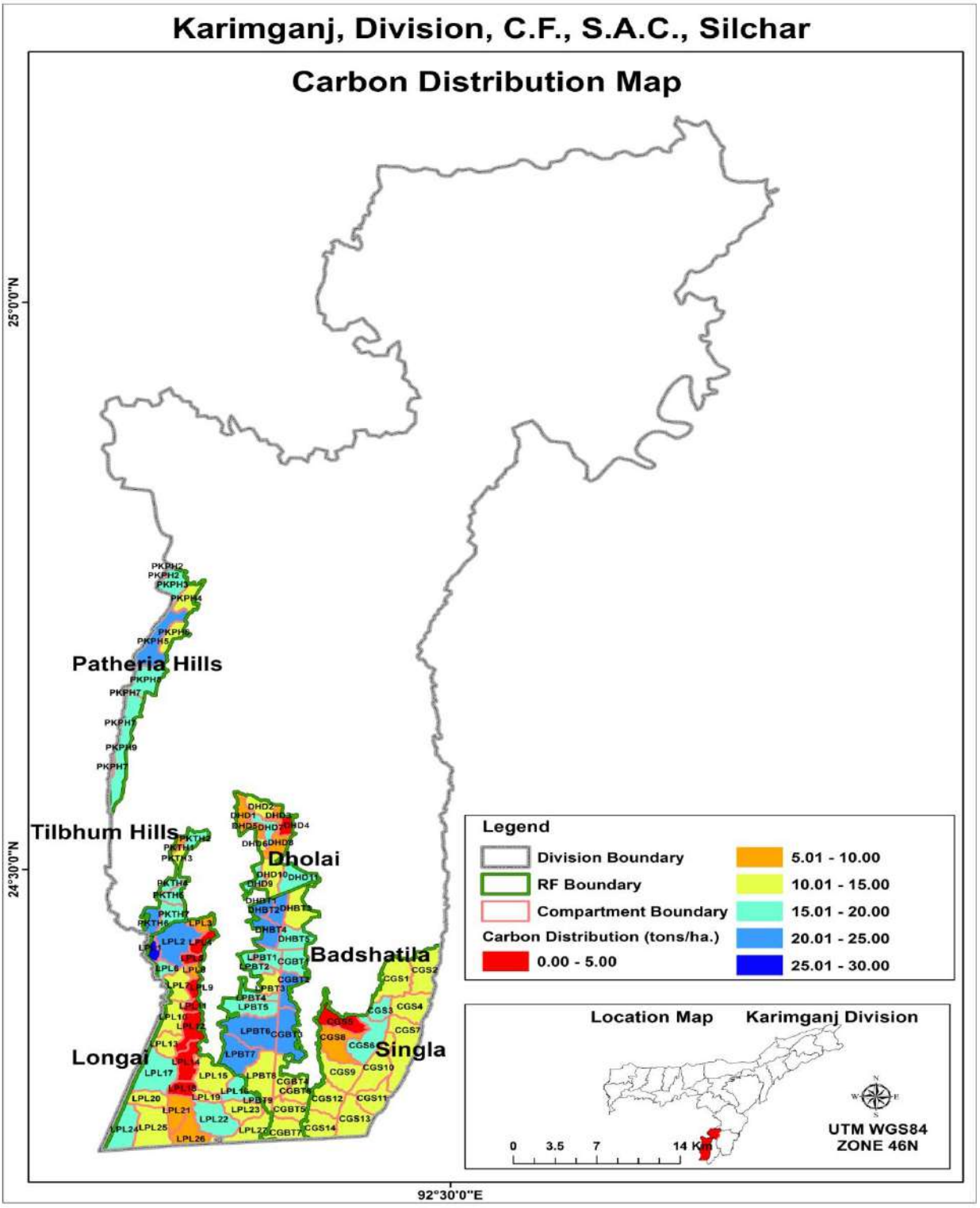


Figure 6.5: Carbon Distribution Map of Karimganj Division

CHAPTER 7

OPTIMIZATION OF FOREST RESOURCES UTILIZATION

7.1 Recorded removal of timber

Due to hon'ble Supreme Court's ban on WP(C) 202 onGodavaran case 1995, harvesting of timber and other forest produces were stopped. As such the record of removal of timber is available only from the timber that is either wind-fallen or/and seized in the Ranges under Karimganj Division and is shown below (Table 7.1). Major portion of timber had been removed by timber smugglers.

The statement of records of removal of timber in Karimganj Division is given below.

Table 7.1: Statement showing the record of removal of timber

Year	Species	Range	Compartment	Removal (m^3)
2006-07	Teak & Misc	Lowairpoa	LPL/1 to LPL/27 & LPBT/1 to LPBT/9	70.022
2007-08	Teak & Misc	Lowairpoa		65.389
2008-09	Teak & Misc	Lowairpoa		63.786
2009-10	Teak & Misc	Lowairpoa		11.998
2010-11	Teak & Misc	Lowairpoa		9.702
2011-12	Teak & Misc	Lowairpoa		27.203
2012-13	Teak & Misc	Lowairpoa		106.073
2013-14	Teak & Misc	Lowairpoa		5.112
2014-15	Teak & Misc	Lowairpoa		2.485
2015-16	Teak & Misc	Lowairpoa		10.148
2006-07	Teak & Misc	Duhalia	DHD/1 to DHD/10 & DHBT/1 to DHBT/5	29.347
2007-08	Teak & Misc	Duhalia		11.288
2008-09	Teak & Misc	Duhalia		42.953
2009-10	Teak & Misc	Duhalia		14.292
2010-11	Teak & Misc	Duhalia		7.694
2011-12	Teak & Misc	Duhalia		6.675
2012-13	Teak & Misc	Duhalia		9.675
2013-14	Teak & Misc	Duhalia		2.938
2014-15	Teak & Misc	Duhalia		11.441
2015-16	Teak & Misc	Duhalia		189.325
2006-07	Teak & Misc	Patherkandi	PKTH/1 to PKTH/7 & PKPH/1 to PKPH/9	23.25
2007-08	Teak & Misc	Patherkandi		34.64
2008-09	Teak & Misc	Patherkandi		61.77
2009-10	Teak & Misc	Patherkandi		102.443
2010-11	Teak & Misc	Patherkandi		37.985
2011-12	Teak & Misc	Patherkandi		37.108
2012-13	Teak & Misc	Patherkandi		3.854
2013-14	Teak & Misc	Patherkandi		12.458
2014-15	Teak & Misc	Patherkandi		31.142
2015-16	Teak & Misc	Patherkandi		16.642
2006-07	Teak & Misc	Cheragi	CGS/1 to CGS/14 &	12.994

2007-08	Teak & Misc	Cheragi	CGBT/1 to CGBT/6	6.801
2008-09	Teak & Misc	Cheragi		36.736
2009-10	Teak & Misc	Cheragi		120.08
2010-11	Teak & Misc	Cheragi		11.805
2011-12	Teak & Misc	Cheragi		27.616
2012-13	Teak & Misc	Cheragi		2.08
2013-14	Teak & Misc	Cheragi		10.189
2014-15	Teak & Misc	Cheragi		35.859
2015-16	Teak & Misc	Cheragi		16.398
2016-17	Teak & Misc	Cheragi		62.572
2017-18	Teak & Misc	Cheragi		309.543
2018-19	Teak & Misc	Cheragi		27.289
2019-20	Teak & Misc	Cheragi		133.377
2020-21	Teak & Misc	Cheragi		132.047
2016-17	Teak	Sadar	——	NIL
2017-18	Teak	Sadar		NIL
2018-19	Teak	Sadar		NIL
2019-20	Teak	Sadar		NIL
2020-21	Teak	Sadar		1.340
2016-17	—	Kalain	——	NIL
2017-18	—	Kalain		NIL
2018-19	—	Kalain		NIL
2019-20	—	Kalain		NIL
2020-21	—	Kalain		NIL

7.2 Recorded removal of fuelwood

The fuel wood collected by the villagers living in the vicinity of Reserved Forest as also by the forest villagers without any record being their traditional practice.

7.3 Recorded removal of bamboo/rattans

The forest villagers and the people living in the fringe village used to collect bamboo for their domestic purpose. However, the bamboo supplied to HPC from the Reserved Forest are recorded, which are as follows.

Table 7.3: Statement showing record removal of bamboo in Karimganj Division, Assam

Year	Species	Range	Compartment	Growing stock (MT)	Removal (MT)
2001-02	Muli (Melocanna baccifer), Khang (Dendrocalamus longispathus), Kaligoda (Oxytenanthera nigrociliata), Pecha (Dendracalam hamittonii), Dalu (Teinostachyum dullooa)	Lowairpoa, Cheragi	LPL/1 to LPL/27 LPBT/1 to LPBT/9 & CGS/1 to CGS/14 CGBT/1 to CGBT/6	14,750.0 MT/ Green	8,791.0 MT/ Green
2002-03	Do	Lowairpoa,	LPL/1 to	23,901.0	13,668.0 MT/

		Cheragi, Kalain	LPL/27 LPBT/1 to LPBT/9 CGS/1 to CGS/14 CGBT/1 to CGBT/6 KBWS/1 to KBWS/14	MT/ Green	Green
2003-04	Do	Patherkandi, Cheragi	PKPH/1 to PKPH/9 PKTH/1 to PKTH/7 & CGS/1 to CGS/14 CGBT/1 to CGBT/6	14,750.0 MT/ Green	11,694.0 MT/ Green
2004-05	Do	Duhalia, Lowairpoa	DHD/1 to DHD/10, DHBT/1 to DHBT/5 & LPL/1 to LPL/27 LPBT/1 to LPBT/9	10,050.0 MT/ Green	9,833.0 MT/ Green
2005-06	Do	Lowairpoa, Cheragi	LPL/1 to LPL/27 LPBT/1 to LPBT/9 & CGS/1 to CGS/14 CGBT/1 to CGBT/6	14,750.0 MT/ Green	9,200.0 MT/ Green
2006-07	Do	Lowairpoa, Patherkandi, Cheragi	LPL/1 to LPL/27 LPBT/1 to LPBT/9 PKPH/1 to PKPH/9 PKTH/1 to PKTH/7 & CGS/1 to CGS/14 CGBT/1 to CGBT/6	14,750.0 MT/ Green	3,768.0 MT/ Green
2007-08	Do	Patherkandi, Cheragi	PKPH/1 to PKPH/9 PKTH/1 to PKTH/7 & CGS/1 to CGS/14 CGBT/1 to	14,050.0 MT/ Green	5,538.0 MT/ Green

			CGBT/6		
2008-09to2015-16	No operation of bambbo has been made since 2008-09 to 2015-16 under Karimganj Forest (T) Division				

7.4 Recorded removal of locally important NTFPs including MAPs

There are three Mohals of MFP in Karimganj Divisionto extract Non Timber Forest Produce from the mohals. The statement showing removal of Non Timber Forest Produce of this Division from 2008-09to 2015-16 is given below.

Table 7.4: Statement showing removal of NTFP in Karimganj Division.

NTFPs	Range	Permit Details	Quantity (Kg)
Rema (Broom stick)	Cheragi, Lowairpoa & Duhalia	Sale of MFP Mohals through tended system	48,31,250
Gandhi roots			6,52,900
Nageswar flower			1,99,300
Chalmugra			1,950
Sukhchini			1,06,100
Tezpata			20,000

7.5 Demand and supply of timber and important non-timber forest produce

The demand of quality timber and NTFP in Karimganj Division is high in both domestic and commercial sector due to traditional livelihood system and living standard of the people. The statement showing the demand and supply of important timber and NTFP is given below.

Table 7.5: Statement showing demand and supply of important timber & NTFP

Year	Species/items	Range	Demand (Kg)	Supply (Kg)	Stock (Kg)
2008-09	1) Rema (Broom stick)	Cherag, Lowairpoa & Duhalia		10,41,750	
	2) Gandhi Roots	Cherag, Lowairpoa & Duhalia		1,08,250	
	3) Nageswar flower	Cherag, Lowairpoa & Duhalia		60,800	
	4) Sukchini	Cherag, Lowairpoa & Duhalia		21,000	
	5) Chalmugra	Cherag, Lowairpoa & Duhalia		750	
	6) Tez pata	Cherag, Lowairpoa & Duhalia		7,500	
2009-10	1) Rema (Broom stick)	Cheragi & Lowairpoa		10,23,500	
	2) Gandhi Roots	Cheragi & Lowairpoa		1,29,150	
	3) Nageswar flower	Cheragi & Lowairpoa		36,000	

	4) Sukchini	Cheragi & Lowairpoa		35,300	
	5) Chalmugra	Cheragi & Lowairpoa		600	
	6) Tez pata	Cheragi & Lowairpoa		-	
2010-11	1) Rema (Broom stick)	Cheragi, Lowairpoa & Duhalia		1,55,500	
	2) Gandhi Roots	Cheragi, Lowairpoa & Duhalia		77,000	
	3) Nageswar flower	Cheragi, Lowairpoa & Duhalia		15,500	
	4) Sukchini	Cheragi, Lowairpoa & Duhalia		1,800	
	5) Chalmugra	Cheragi, Lowairpoa & Duhalia		600	
	6) Tez pata	Cheragi, Lowairpoa & Duhalia		12,500	
2011-12	1) Rema (Broom stick)	Cheragi		9,63,000	
	2) Gandhi Roots	Cheragi		33,000	
	3) Nageswar flower	Cheragi		31,000	
	4) Sukchini	Cheragi		19,000	
	5) Chalmugra	Cheragi		-	
	6) Tez pata	Cheragi		-	
2012-13	1) Rema (Broom stick)	Lowairpoa		2,67,500	
	2) Gandhi Roots	Lowairpoa		57,500	
	3) Nageswar flower	Lowairpoa		-	
	4) Sukchini	Lowairpoa		-	
	5) Chalmugra	Lowairpoa		-	
	6) Tez pata	Lowairpoa		-	
2013-14	1) Rema (Broom Stick)	Cheragi	2351000	9,63,000	13,88,000
	2) Nageswar Flower	Cheragi	751000	31,000	7,20,000
	3) Gandhi Root	Cheragi	1051000	33,000	10,18,000
	4) Sukchini	Cheragi	503000	19,000	4,84,000
2014-15	1) Rema (Broom Stick)	Cheragi	1812000	2,60,000	15,52,000
	2) Nageswar Flower	Cheragi	625000	10,000	6,15,000
	3) Gandhi Root	Cheragi	1440000	1,22,000	13,18,000
	4) Sukchini	Cheragi	450000	-	4,50,000
2015-16	1) Rema (Broom	Cheragi	1552000	1,57,000	13,95,000

	Stick)				
	2) Nageswar Flower	Cheragi	615000	15,000	6,00,000
	3) Gandhi Root	Cheragi	1318000	93,000	12,25,000
	4) Sukchini	Cheragi	450000	10,000	4,40,000
2016-17	1) Rema (Broom Stick)	Cheragi, Duhalia, Patherkandi, Sadar, Lowairpoa, Kalain	NIL	NIL	NIL
	2) Nageswar Flower	Cheragi, Duhalia, Patherkandi, Sadar, Lowairpoa, Kalain	NIL	NIL	NIL
	3) Gandhi Root	Cheragi, Duhalia, Patherkandi, Sadar Range, Lowairpoa	NIL	NIL	NIL
		Kalain Range	NIL	6500	9900
	4) Sukchini	Cheragi, Duhalia, Patherkandi, Sadar, Lowairpoa, Kalain	NIL	NIL	NIL
2017-18	1) Rema (Broom Stick)	Cheragi, Duhalia, Patherkandi, Sadar, Lowairpoa, Kalain	NIL	NIL	NIL
	2) Nageswar Flower	Cheragi, Duhalia, Patherkandi, Sadar, Lowairpoa, Kalain	NIL	NIL	NIL
	3) Gandhi Root	Cheragi, Duhalia, Patherkandi, Sadar, Lowairpoa, Kalain	NIL	NIL	NIL
	4) Sukchini	Cheragi, Duhalia, Patherkandi, Sadar, Lowairpoa, Kalain	NIL	NIL	NIL
2018-19	1) Rema (Broom Stick)	Cheragi, Duhalia, Patherkandi, Sadar, Lowairpoa, Kalain	NIL	NIL	NIL
	2) Nageswar Flower	Cheragi, Duhalia, Patherkandi, Sadar, Lowairpoa, Kalain	NIL	NIL	NIL
	3) Gandhi Root	Cheragi, Duhalia, Patherkandi, Sadar, Lowairpoa, Kalain	NIL	NIL	NIL
	4) Sukchini	Cheragi, Duhalia, Patherkandi, Sadar, Lowairpoa, Kalain	NIL	NIL	NIL
2019-20	1) Rema (Broom Stick)	Cheragi, Duhalia, Patherkandi, Sadar, Lowairpoa, Kalain	NIL	NIL	NIL

	2) Nageswar Flower	Cheragi, Duhalia, Patherkandi, Sadar, Lowairpoa, Kalain	NIL	NIL	NIL
	3) Gandhi Root	Cheragi, Duhalia, Patherkandi, Sadar, Lowairpoa, Kalain	NIL	NIL	NIL
	4) Sukchini	Cheragi, Duhalia, Patherkandi, Sadar, Lowairpoa, Kalain	NIL	NIL	NIL
2020-21	1) Rema (Broom Stick)	Cheragi, Duhalia, Patherkandi, Sadar, Lowairpoa, Kalain	NIL	NIL	NIL
	2) Nageswar Flower	Cheragi, Duhalia, Patherkandi, Sadar, Lowairpoa, Kalain	NIL	NIL	NIL
	3) Gandhi Root	Cheragi, Duhalia, Patherkandi, Sadar, Lowairpoa, Kalain	NIL	NIL	NIL
	4) Sukchini	Cheragi, Duhalia, Patherkandi, Sadar, Lowairpoa, Kalain	NIL	NIL	NIL

7.6 Import and export of wood and wood products

There is instances of import and export of wood product to the Division or from the Division. The statement showing the import and export of wood and non-wood product of Karimganj Division are given below.

Table 7.6: Statement showing export & import of wood and non wood product

Year	Species/item	Range	Import (m^3)	Export (m^3)
2006-07	Teak	Sadar & Lowairpoa Range	—	—
2007-08	Teak	Sadar & Lowairpoa Range	3,762.671	20.013
2008-09	Teak	Sadar & Lowairpoa Range	3,751.092	18.578
2009-10	Teak	Sadar & Lowairpoa Range	4,231.103	—
2010-11	Teak	Sadar & Lowairpoa Range	4,756.213	364.365
2011-12	Teak	Sadar & Lowairpoa Range	4,123.214	234.645
2012-13	Teak	Sadar & Lowairpoa Range	3,134.102	274.117
2013-14	Teak	Sadar & Lowairpoa Range	4,123.043	1835.709
2014-15	Teak	Sadar & Lowairpoa Range	3,792.327	1352.18
2015-16	Teak	Sadar & Lowairpoa Range	3,486.671	419.904
2016-17	Teak	Sadar	18.763	NIL
	NIL	Kalain	NIL	NIL
	NIL	Cheragi	NIL	NIL
	Teak	Lowairpoa	470.545	NIL
	Bamboo	-Do-	797350 nos.	NIL
	Broom Sticks	-Do-	180.11 Quintals	NIL

	NIL	Patherkandi	NIL	NIL
	NIL	Duhalia	NIL	NIL
2017-18	Teak	Sadar	5.165	NIL
	Non Sal	-Do-	16.776	NIL
	NIL	Kalain	NIL	NIL
	NIL	Cheragi	NIL	NIL
	Teak	Lowairpoa	1595.028	NIL
	Bamboo	-Do-	623350 nos.	NIL
	Broom Sticks	-Do-	85.0 Quintals	NIL
	NIL	Patherkandi	NIL	NIL
	NIL	Duhalia	NIL	NIL
2018-19	Non Sal	Sadar	27.371	NIL
	NIL	Kalain	NIL	NIL
	NIL	Cheragi	NIL	NIL
	Teak	Lowairpoa	3430.936	NIL
	Bamboo	-Do-	855800 nos.	NIL
	NIL	Patherkandi	NIL	NIL
	NIL	Duhalia	NIL	NIL
2019-20	Teak	Sadar	1.945	NIL
	Non Sal	-Do-	28.686	NIL
	NIL	Kalain	NIL	NIL
	NIL	Cheragi	NIL	NIL
	Teak	Lowairpoa	3179.559	NIL
	Bamboo	-Do-	868920 nos.	NIL
	NIL	Patherkandi	NIL	NIL
	NIL	Duhalia	NIL	NIL
2020-21	Non Sal	Sadar	13.403	12.472
	Teak	-Do-	NIL	1.340
	NIL	Kalain	NIL	NIL
	Bamboo	Cheragi	15000 nos.	NIL
	Teak	Lowairpoa	3326.487	NIL
	Bamboo	-Do-	24000 nos.	NIL
	Broom Sticks	-Do-	300 Quintals	NIL
	NIL	Patherkandi	NIL	NIL
	NIL	Duhalia	NIL	NIL

7.7 Import and export of NTFPs

Records reveal that there are no import and export of NTFP to the Division or from the Division.

7.8 Removal of fodder

There is no system of collecting of fodder from forest area. Grazing of cattle in the forest area is a traditional exercise in the Division. The socio-economic survey reveals that more than 80%

of the fodder requirement of forest villagers and fringe villagers are depends on Reserved Forest of this Division.

7.9 Valuation of the products

The valuation of forest product is as per schedule rates of royalty notified by Govt. of Assam time to time. The market value is higher than that of Govt. value. The statement showing the past and current price of the forest product pertaining to this Division are given below.

Table 7.9: Statement showing the past and current price of product

Sl. No.	Items	Quantity (m^3)	Past prices (₹)	Current prices (₹)
1	Teak	1.0	28,000 to 33,000	37,080.00
2	Sundi	1.0	28,000 to 33,000	37,080.00
3	Gamari	1.0	28,000 to 33,000	37,080.00
4	Sam	1.0	22,000 to 30,000	33,500.00
5	Khakan	1.0	17,000 to 20,000	26,500.00
6	Ramdala	1.0	17,000 to 20,000	26,500.00
7	Jarul	1.0	17,000 to 20,000	26,500.00
8	Koroi	1.0	17,000 to 20,000	26,500.00
9	Moroi	1.0	17,000 to 20,000	26,500.00
10	Sirish	1.0	17,000 to 20,000	26,500.00
11	Red	1.0	14,000 to 18,000	21,200.00
12	Jam	1.0	14,000 to 18,000	21,200.00
13	Kadam	1.0	10,000 to 12,000	15,900.00
14	Saral	1.0	8,000 to 10,000	12,500.00
15	Simul	1.0	8,000 to 10,000	12,500.00

CHAPTER 8

MAINTENANCE OF SOCIAL, ECONOMIC, CULTURAL AND SPIRITUAL BENEFITS

8.1 Number of JFM committees and area protected by them

As per the National Forest Policy of India 1988, the participation of local community living in and around the forest areas is vital for the conservation and development of forests. In order to implement this policy, the Government of India issued a clear Guideline on 1st. June, 1990 to develop and manage degraded forestland with the help of the local community and voluntary organizations. Communities organize themselves into a Joint Forest Management Committee (JFMC) to protect and manage forests. The benefits to them is direct access and control on the use and sale of most NTFPs and a share in the income from timber as well as other intangible benefits from local ecosystem services – like water recharge, pollination, eco-tourism etc. Thus involvement of communities in conservation of forests and wildlife is of paramount interest. Also, as per the Assam Forest Policy 2004, Joint Forest Management (JFM) practices would form the basis of forest management in the State. Hence, the Working Plan will make all the necessary provision for participation of forest fringe communities aiming to sustainable forest management and benefits of communites.

There are sixty-two numbers of JFMCs in the fringe villages of the Reserve Forest under Karimganj Forest Development Agency and the plantation area raised under these JFMCs are protected by them.

Table 8.1: JFMC status of Karimganj Forest Division, Assam

Sl. No.	Name of JFMC	Year of estd.	Area protected (km^2)
1	Bhutucherra Tribal Basti JFMC	2002	0.25
2	Kakurapunjee JFMC	2002	0.6
3	Bhutucherra (M) JFMC	2002	0.35
4	Ronpur JFMC	2002	0.3
5	Baruatilla JFMC	2002	0.65
6	Kishoripur JFMC	2002	0.5
7	Birojapur JFMC	2002	0.8
8	Bijoypur JFMC	2002	0.85
9	Boro Bhubirbond JFMC	2002	0.4
10	Cheraginagar JFMC	2002	0.3
11	Akshaypur JFMC	2002	0.2
12	Rajendrapur JFMC	2002	0.35
13	Balia Daluacherra JFMC	2002	0.3
14	Ujan Daluacherra Vitorgool JFMC	2002	0.9
15	Patheria 'B' Block JFMC	2002	0.12
16	Sadhukuti JFMC	2005	0.4
17	Manikbond Punjee JFMC	2006	0.35
18	South Magura JFMC	2006	0.6

19	Noorkha JFMC	2006	0.3
20	Jacobnagar JFMC	2006	0.65
21	Manikbond Mahi JFMC	2006	0.6
22	Balipipla JFMC	2006	0.55
23	Piplapunjee JFMC	2006	0.55
24	Baliapunjee JFMC	2006	0.7
25	Mohangool Chipacherra JFMC	2002	0.14
26	Jagannathpur JFMC	2002	0.15
27	Lalcherra JFMC	2002	0.13
28	Karikhai JFMC	2002	0.135
29	Kurtacherra JFMC	2004	0.3
30	Bethubari Muliala JFMC	2004	0.75
31	East Pecharghat Koilaghat JFMC	2004	0.85
32	Gajitilla Awalala JFMC	2004	0.9
33	Baithakhal JFMC	2004	0.8
34	Uttarkeuti Sonatula JFMC	2004	0.105
35	Katabari JFMC	2004	0.11
36	Pecharghat JFMC	2004	0.12
37	Lalgenai JFMC	2005	0.45
38	Muliala JFMC	2005	0.35
39	East Lowairpoa JFMC	2005	0.75
40	Dumabari JFMC	2005	0.2
41	Piplacherra JFMC	2005	0.3
42	Sonatula Pt-I JFMC	2005	0.105
43	Nilkantapur JFMC	2006	0.4
44	Bhutucherra (D) JFMC	2006	0.4
45	Samboonagar JFMC	2006	0.45
46	Old Solamona JFMC	2006	0.35
47	Rangamati JFMC	2006	0.2
48	Dewali JFMC	2006	0.25
49	Bhutukuchi JFMC	2006	0.5
50	Hempur JFMC	2006	0.7
51	Dubri JFMC	2007	0.6
52	North East Jherjheri JFMC	2007	0.25
53	South Jherjheri JFMC	2007	0.25
54	Hailamcherra JFMC	2007	0.45
55	Dukhipur JFMC	2010	0.05
56	Paschim Singla JFMC	2010	0.05
57	Jugicherra Sobri JFMC (NaRMIL)	2009	0.185
58	Bijoypur JFMC	2002	0.185
59	Boro Bhubirbond JFMC	2002	0.185
60	Cheraginagar JFMC	2002	0.17
61	Akshaypur JFMC	2002	0.95
62	Rajendrapur JFMC	2002	0.25

63	Balia Daluacherra JFMC	2002	0.2
64	Ujan Daluacherra Vitorgool JFMC	2002	0.2

8.2 Status of empowerment of JFMCs

To empower the JFMCs, regular meeting, training at the community level and training at Divisional level are conducted time to time to increase awareness and skill development.

8.3 Labour welfare

The plantation activities taken in the Reserved Forests through JFMCs or by the Department are labour oriented works. The forest villager, people living in the fringe area of forest and forest dwellers are generally engaged as daily labour in the plantation activities right from advance work, creation, maintenance and survival. Thus, huge number of labours are required.

8.4 Use of indigenous knowledge

The indigenous knowledge regarding various activities in development and extension of forest are practicing with the help of local peoples, casual labours. In regards of formation of JFMC, the indigenous knowledge, procedure are documented while preparing the micro plan through PRA exercise. The newly constituted nine numbers of Biodiversity Management Committee in Karimganj Division, playing the role for gathering the indigenous knowledge towards conservaton and utilization of the various Minor Forest Produce.

8.5 Extent of cultural/sacred groves

There are no sacred groves found in the forests of Karimganj Division.

8.6 Ecotourism areas and activities

There is no important ecotourism place in the forests of Karimganj Division.

8.7 Social customs

Muli and Bhuluka bamboo species are traditionally used in the winter season for preparation of Chunga Pitta (the young shoots of bamboo are suing to pour the sticky rice for boiling, specially prepared for Poush Sankrati/ Bhogali Bihu festival). It is estimated that approximately 50,000 units of 2 years old bamboo of the said verities are used by the local people for the festival.It is also used in the Bengali month of Magha for preparation of "Chungah" (the young bamboo are pour with a special variety of rice, viz. "Biroin" and burnt with fire).

8.8 Status of compliance of Forest Rights Act (FRA)

Total 2,548Nos. of Title Certificate has been issued under Forest Rights Act'2006 pertaining to Karimganj Division. The details of the Title Certificate since been issued Range wise and RF wise is furnished below.

Table 8.8: Details of the Title Certificate issued in Karimganj Division, Assam

Sl. No.	Name of Range	Name of RF	Titles Issued	
			No.	Area (in ha)
1	Patherkandi	Patheria Hills RF	194	343.00
		Tilbhum RF	133	287.13
2	Lowairpoa	Longai RF	1126	2,245.90
3	Duhalia	Duhalia RF	106	197.47

4	Cheragi	Singla RF	505	872.66
5	Lowairpoa, Duhalia & Cheragi	Badsahi Tilla RF	484	1,327.73
Total			2,548	5,273.89

8.9 Other Rights and Concessions

The right and concession have been settled at the time of constitution of RFs. The same have been duly notified in the Gazette Notification of the concerned RFfor sake of continuity, the same are being reproduced. The following rights and concessions are there for the forest villagers, fringe villagers and JFMC members.

- Right of way over the path
- Right to entry in the RF
- Control cattle grazing
- Fuel & fodder collection for domestic purpose
- NTFP / MFP collection for domestic use

8.10 Dependency of local people on NTFPs

As per the right and concession, the forest villager, fringe villagers, JFMC members are dependent on Non Timber Forest Produce available in the forest for their day to day domestic use. They collect thatch, fire wood, fodder, broom stick, bamboo, part of medicinal plant, fruits, flower for their domestic use as per right and concession provided.

8.11 Other aspects

Other aspects are not yet listed. A brief account of other rights and concessions, their extent, nature,etc. which are to be regulated or met under working plan prescriptions will be provided during tenure of this Working Plan.

-SSS-

CHAPTER 9

ADEQUACY OF POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

9.1 Existing policy and legal framework and their compliance

Forest resources have been regulated since early times. The roots of legislations, policies and guidelines for natural resource management in India can be traced back to the days of British Colonialism. The relevant constitutional frameworks at the backdrop of management of forests resources are briefly enumerated as following.

9.1.1 The Constitution of India

Article 48 of the Directive Principles, states that the State shall endeavour to protect and improve the environment and to safeguard the forests and wildlife of the country.

Article 51 A deals with the fundamental duties of citizens, which includes the citizen's duty to value and preserve the rich heritage of our composite culture and to protect and improve the natural improvement including forests, lakes, rivers and wildlife and to have compassion for living creatures.

Article 246 points towards the Seventh Shedule to the Constitution, which enlists (in the union list, and the concurrent list) the subjects that the Central and State governments are to legislate upon. Forest is one of the subject placed in the Concurrent List on which both the Central and State Government shall legislate upon.

In 1952, the erstwhile Ministry of Food and Agriculture, Government of India enunciated a Forest Policy to be followed in the management of Forests in the country. Subsequently, due to large scale deforestation and diversion of forest land for non forestry uses finally led to the formulation of a new forest policy in 1988. The Forest Policy of 1988 was a pro people document, placing greater emphasis on the ecological role of forests and recognizing for the first time the rights of the people, especially the tribals, with the direction that their domestic requirements of fuel wood, minor forest produce and construction timber would be the first charge on forest produce. Subsequently Assam enunciated a Specific Forest Policy for the State in the year 2004 with certain definite objectives.

The management of Forests in the Division is to be in accordance with the existing Assam Forest Policy 2004. The Reserve Forests have been declared as per the provisions made in Assam Forest Regulation 1891 and in managing Forests, provisions made in the said Regulation and Assam Forest Regulation (Ammendment) Act 1995 are strictly followed. The Wildlife (Protection) Act 1972 as amended till date and the The Wildlife Protection Rule 1995 are other Acts and Rules in force for dealing with the matter related to Wildlife in the Division.

Other Acts and Rules which are held by the Division for discharging its functions for management of Forests are

- Assam Forest Regulation Acts (amended 1995)
- Wild Life Act, 1972
- The Assam Wild Life Protection Rule'1997
- Indian Forest Act, 1927

- Forest Conservation Act, 1980
- The Biological Diversity Act, 2002
- Assam Biodiversity Rule, 2010
- The Wood based Industries (Establishment & Regulation) Rules, 2000
- The Cattle trespass Act, 1871
- The Assam Forest (Removal and storage of Forest produce) Regulation Act, 2000
- The Assam (Control of Felling & Removal of trees from Non-forest Land) Rules, 2002
- The Schedule Tribe & Other Traditional Forest Dwellers (Recognition of Forest Right) Act, 2006
- The Schedule Tribe & Other Traditional Forest Dwellers (Recognition of Forest Right) Rule, 2007
- The Assam Joint (People's participation) Forestry Management Rule, 1998
- The Assam Minor Mineral Concession Rule, 2013

9.2 Status of approved working plans and their compliance

The working circle wise analysis of the works prescribed in last working plan are discussed below.

9.2.1 Plantation and Protection Working circle

The total area allotted to the working circle was 14,272.66 ha. It was composed of 10 watershed compartments (WSC) of Singla RF, 2 of Langai RF, 5 of Tilbhum RF, 3 of Dohalia RF, 5 of Patharia Hulls RF and 15 WSC of Badshahi Tilla RF. The plantation target for this working circle was fixed at 3514 ha. This translated into in an annual target of around 350 ha. The plantations were to be maintained for a period of 5 years. But, during plan period, this target of plantation was not fulfilled. Only 2,270 ha plantation was raised during plan period. Regular thinning with no felling of the crops was prescribed for this working circle. Teak has been the preferred species in these plantations though it was to be discouraged in these areas and only local and indigenous species were recommended for plantations The thinning schemes were to be prepared by DFO in advance, giving details of plantations that had attained the age of 5, 10,20 or 30 years. But, thinnings were not done in the plantations. But, sporadic illegal felling has taken place in the plantation areas. Evictions were strongly prescribed for this working circle. But, during plan period no eviction was done.

9.2.2 Jhum Rehabilitation Working circle

All jhum affected areas were covered under this working circle. Most of these areas were located at altitudes as high as 600m and were having steep slopes. The silvicultural system adopted for these areas was Artificial Regeneration with Multiple Cropping (Taungya system), largely to satisfy the aspirations of tribal communities residing in the forests. Only the abandoned jhum areas of past few years with a total area of 5148.5 hectares were to be taken for improvement. This translated to an annual target of 515 hectares. All the other jhum areas which were abandoned earlier assumed to regenerate on their own due to the process of ecological succession. During plan period, only 840 ha of jhum affected area were brought under regeneration progamme through plantation. The suggested land use for a hectare of land was 45% of food crops, 30% permanent crops and 25% nitrogen fixing plants. The spacing of food and forestry crop was to be 3-5m and the nitrogen fixing plants were to planted thickly between the two contours. But, this crop composition was not followed.

9.2.3 Energy Plantation Working circle

All the predominantly encroached areas and forest villages were included under this working circle. This working circle had 39 WSCs and was primarily meant to create fuel wood plantations. Short rotation crops such as *Alianthus excels, Anthocephalus Kadamba, Leucaena spp.* etc. with a rotation of around 10 years (lesser or more depending upon the growing conditions) were to be raised in these areas. The plantation target for this working circle was fixed at 4107.42 ha. This translated into in an annual target of around 411ha. But, under this circle, only 720 ha fuelwood plantations were done during plan period.

9.2.4 Forest Village regulation and Encroachment Overlapping Working Circle

The working circle was formed pursuant to the guidelines of Government of India on encroachments. All predominantly encroached areas, forests villages, fringe areas of the RF/PRFs etc. were included in this working circle. The major objective was to carry out eco-development and entry point activities in the forest villages and the fringe areas in order to involve the inhabitants in forest protection. The PRA exercises were to be done to assess the needs of the dependents and microplans were to be prepared based on that. Several income generating activities, developmental activities and forestry activities were to be incorporated in the microplans. Microplans of these Forest Villages were prepared after formation of Joint Forest Management Committees through PRA exercise. Apart from plantation activities, development of villages like drinking water facility, construction of earthen road and culverts, renovation of school buildings, income generation activities like poultry, piggery and vocational training were done in forest villages under "Development of Forest Village Scheme" and under Entry Point Activities of National Afforestation Programme.

9.2.5 Bamboo overlapping Working circle

There was a separate Bamboo Plan for the period from 2001-02 to 2008-09 written by Sri M. K. Yadava. The Bamboo bearing areas were allotted to Cachar Paper Mill through an agreement between Hindustan Paper Corporation and Assam Forest department for extraction of bamboo to meet the raw material requirement for production of pulp and paper. The HPC, Panchgram imported the Labour largely imported from outside areas. The imported labours prefer to harvest bamboo in easily accessible areas, and stay away from remote areas on various grounds. Even 1-2 year old bamboo culms were cut by the HPC from easily accessible areas leaving them less productive. No effort has been taken by the executives of Cachar Paper Mill to form Labour Cooperative Societies.

Thus, it is clear that for several reasons, harvesting could not proceed as envisaged by the plan. This practice has led to degradation of bamboo areas in certain pockets which are easily extractable. On the other hand, the inaccessible and inoperative areas due to reasons of bad communication and insurgency were left with considerable stock. Gregarious flowering of *Muli* Bamboo occurred during 2006 to 2008 in the Barak valley and all the *Muli* bamboo died. The bamboo left after gregarious flowering were removed to a large extent by the HPC, Panchgram. The quantity of Bamboo extracted from different Felling Series of Reserve Forests of Karimganj division from 2001-02 to 2010-11 is given below.

Year	Name of the Felling Series	Quantity Extracted	
		(MTG)	(MTAD)
2001-02	Longai F.S.	6,878	3,439
	Singla F.S.	1,913	986

	Sub-total	8,791	4,425
2002-03	Longai F.S.	8,343	4,172
	Singla F.S.	294	152
	Borail F.S.	5,031	3,446
	Sub-total	13,668	7,770
2003-04	Longai F.S.	5,835	2,917
	Singla F.S.	5,859	3,018
	Sub-total	11,694	5,935
2004-05	Longai F.S.	3,930	2,023
	Singla F.S.	5,973	3,076
	Sub-total	9,903	5,099
2005-06	Longai F.S.	8,046	4,023
	Singla F.S.	1,086	559
	Sub-total	9,132	4,582
2006-07	Longai F.S.	3,768	1,884
	Singla F.S.	Not settled	Not settled
	Sub-total	3,768	1,884
2007-08	Longai F.S.	3,098	1,549
	Singla F.S.	2,441	1,257
	Sub-total	5,539	2,806
2008-09	Nil	Nil	Nil
2009-10	Longai F.S.	264	132
	Singla F.S.	55	29
	Sub-total	319	161
2010-11	Nil	Nil	Nil

9.2.6 NWFP overlapping Working Circle

Comprised of areas under Plantation & Protection Working Circle and Jhum Rehabilitation Working Circle. Due to the increasing scarcity and growing market demand of the naturally occurring NWFPs of this area, inter planting of NWFPs like Sukhchini, Gandhi, *Serpentina*, pepper, ginger, cane etc. was envisaged under this working circle. Cardamom plantations were to be taken up at altitudes above 1600m. The working circle aimed at arresting the depleting biodiversity of the area as well as introducing measures for sustainable extraction of the same. Not much effort, except from protection, was done to enrich the area with NTFP species. NTFPs were allowed to collect through tender under Mahal system. During plan period, 2,220 MT of Broom Grass, 3,144 MT of Gandhi, 112 MT of Nageswar flower, 58 MT of Sukchini, 20 MT of Tezpatta were collected from forest areas of Karimganj division.

9.2.7 Wildlife and Biodiversity Conservation Working Circle

The entire North Cachar RF due to its inaccessible and thus least exploited nature was included under this working circle. Area allotted to this Circle was declared as Borail Wildlife Sanctuary (West Block) under the provision of the Wildlife (Protection) Act, 1972 consisting an area of 25,238.6 ha vide Govt. of Assam notification No.FRW.12/2001/Pt/4 dtd.19.06.2004. Thereafter, the sanctuary is being managed under Wildlife Rules and guidelines. There is a separated Management Plan for the Sanctuary.

9.2.8 Wetland Conservation Working Circle

The working circle was proposed to conserve Sonbeel and Ratabeel wetlands. The major objectives of this working circle were to introduce watershed management practices along the ridges surrounding the Sonbeel and to reduce the dependence of the surrounding populations on the Singla, Dohalia and Badshahi Tilla RFs. The prescriptions included formation of watchtowers around the beel, promotion of tourism and introduction of water sports in the beel area, formation of FPRCs for taking up of massive plantation activities on the hill ranges surrounding the beels. High density plantations to meet the fuelwood requirement and erection of water harvesting structures after a proper study were also proposed. Prescription of this working circle have not been implemented during the plan period.

9.3 Number of forest offences

As per records, it reveals that there were illegal felling of timber in the Reserved Forest. Out of which, some timber has been removed by the miscreants and remaining timber has recoverd by the staff observing necessary formalities. A statement is given below showing the timber recoveredunder offence reports during last five years.

Table 9.3a: Statement of recovered timber of Karimganj Divisionunder offence reports.

Sl. No.	Year	Timber recovered (in m^3)
1	2011-12	49.753
2	2012-13	212.863
3	2013-14	28.247
4	2014-15	30.961
5	2015-16	42.641
6	2016-17	64.159
7	2017-18	18.207
8	2018-19	80.457
9	2019-20	205.283
10	2020-21	123.617

During recovery of illegally operated timber, sometimes offender detected then offence was drawn against the offender. The number of offence drawn, person arrested alongwith seizure and sending of offence to the court for trial of this Division are given belowduring last five years.

Table9.3b: Statement showing the status of offence in Karimganj Division, Assam

Sl. No.	Year	No. of Offence drawn	No. of person arrested	Offence sent to Court	Remarks
1	2011-12	52 Nos.	10 Nos.	14 Nos.	Year wise offence reports as tabulated comprises illicit felling, transportation and illegal mining etc
2	2012-13	50 Nos.	15 Nos.	30 Nos.	
3	2013-14	25 Nos.	7 Nos.	15 Nos.	
4	2014-15	36 Nos.	13 Nos.	2 Nos.	
5	2015-16	23 Nos.	11 Nos.	9 Nos.	
6	2016-17	66 Nos.	4 Nos.	0	
7	2017-18	55 Nos.	7 Nos.	2 Nos.	
8	2018-19	92 Nos.	5 Nos.	10 Nos.	
9	2019-20	186 Nos.	5 Nos.	7 Nos.	
10	2020-21	179 Nos.	11 Nos.	2 Nos.	

9.4 Status of research and development

There are seven numbers of research plot in Tilbhum Reserved Forest of this Division to study growth behavior, increament of diameter for volume and yield calculation which areconducted by the Silvicultural Division, Assam, Guwahati. The details in this regard has discussed in Chapter3.5.

9.5 Human resource capacity building efforts

The capacity building of staff of this Division was organized through shortterm training, refreshers training at Divisional Level, Circle Level and State level. In addition to that, exposure visit has also organized for the frontline staff outside the State.

Table 9.5: Status of training of forest department

Year	Person attended training	Title of training
2006-07	Deputy Ranger=0 Forester-I=0 Forest Guard=3	Forest Guard Training for 6 months
2007-08	Deputy Ranger=1 Forester-I=6 Forest Guard=3	Forester-I Training for 1 year, Forest Guard Training and Short Term Refresher Course
2008-09	Deputy Ranger=0 Forester-I=3 Forest Guard=3	Forester-I Training for 1 year, Forest Guard Training and Short Term Refresher Course
2009-10	Deputy Ranger=1 Forester-I=5 Forest Guard=0	Short Term Refresher Course and 3 months crushed course
2010-11	Deputy Ranger=1 Forester-I=3 Forest Guard=2	Forester-I Training for 1 year and Short Term Refresher Course
2011-12	Deputy Ranger=2 Forester-I=3 Forest Guard=9	Forest Guard Training for 6 months and Short Term Refresher Course
2012-13	Deputy Ranger=0 Forester-I=6 Forest Guard=2	Short Term Refresher Course and 3 months crushed course
2013-14	Deputy Ranger=0 Forester-I=4 Forest Guard=4	Short Term Refresher Course and 3 months crushed course
2014-15	Deputy Ranger=0 Forester-I=8 Forest Guard=3	Short Term Refresher Course and 3 months crushed course
2015-16	Deputy Ranger=0 Forester-I=2 Forest Guard=3	3 months crushed course

9.6 Forest Resources accounting

The records of Karimganj Forest Division so far consulted, it is seen that after the last working plan survey, there is no intermediary or annual resource accounting system is in practice except a bamboo resource survey conducted by the Forest Resource & Survey Division in respect of growing of stock and annual yield during the year 2009-10. Regarding Bamboo Resource Accounting, the requisite data has been furnished in Chapter-7.3 above.

9.7 Budgetary allocation to the forestry sector

In the following table, the budgetary allocation of Karimganj Forest Division has been furnished which is not upto the optimum level in respect of the requirement of intensification of management, public demand, status of supply, logistic support etc.

Table 9.7: Allocated budget in Karimganj Forest Division, Assam

Sl. No.	Year	Allocated budget provisions (Plan) (in Rs.)	Allocated budget provisions (Non plan) (in Rs.)
1	2006-2007	81,30,559.00	2,18,63,801.00
2	2007-2008	55,67,000.00	2,07,44,000.00
3	2008-2009	1,08,04,572.00	20,50,000.00
4	2009-2010	1,21,09,088.00	24,05,000.00
5	2010-2011	60,79,070.00	17,08,000.00
6	2011-2012	51,41,330.00	29,82,000.00
7	2012-2013	58,10,540.00	55,73,000.00
8	2013-2014	52,48,852.00	39,58,000.00
9	2014-2015	24,41,664.00	28,09,000.00
10	2015-2016	6,25,000.00	28,09,000.00
11	2016-2017	21,90,080.00	29,67,000.00
12	2017-2018	76,80,810.00	63,90,500.00
13	2018-2019	42,76,750.00	42,96,000.00
14	2019-2020	51,50,174.00	55,45,000.00
15	2020-2021	28,65,000.00	54,00,400.00

9.8 Existence of monitoring, assessment and reporting mechanism

The monitoring, assessment and reporting mechanism so far Karimganj Division is concerned is not transperant. All the field activities so executed by the frontline staff need to be cent percent supervised and monitored by the Range Forest Officerand then by the Asstt. Conservator of Forests, Divisional Forest Officer upto 50% & 25% respectively. The Circle Conservator will monitor 10% of the work for grand success of the scheme. To maintain thetransfereancy of monitoring and supervising activities, there should be a record in the prescribed format which may be retained in Beat, Range and Division to have the details at a short notice in addition to the existing method.

9.9 Public awareness and education

To make public awareness and education in general, in Karimganj Forest Division, efforts are being made by organizing meeting, rally, art competition among the students on the subject of natural picture on the occassion of World Environment Day, Vana-Mohatsava Week, Wild Life Week, World Wetland Day etc. In these above occasions, senior citizens, persons of reputation, educationist, members from NGO, members from JFMCs have been involved to create awareness among the general public regarding the benefit of forest and sustainable management of flora and fauna to conserve theenvironment as well as to maintain balance eco system.

9.10 Adequate manpower in forest division

The Karimganj Forest Division is came into being since 1981 (22.05.1981) on bifurcation of earstwhile Cachar Forst Division with the following staff strength which is now required to be modified &enhanced considering population growth and different biotic factor which badly impact on forests. The cadre wise sanctioned staff strength and man in position under Karimganj Forest Divisionare shown in the following table.

Table 9.10: Statement showing the cadrewise sanctioned staffstrength,man in position & vacancy position as on 30.06.2016.

Sl. No.	Name of the post	Staff Position		
		Total Sanctioned Post	Man in Position	Vacant Post
1	Deputy Conservator of Forests	1	1	-
2	Assistant Conservator of Forests	2	2	
3	Forest Ranger	9	6	3
4	Head Assistant	1	1	-
5	Accountant	1	1	-
6	U.D. Assistant	3	2	1
7	L.D. Assistant	10	7	3
8	Draughtsman	1	1	-
9	Deputy Ranger	5	5	-
10	Forester-I	43	23	20
11	Forester-II	11	4	7
12	Forest Guard	99	75	24
13	Driver	4	2	2
14	Dak Runner	1	1	-
15	Office Peon	3	-	3
16	Office Chowkider	1	1	-
17	Gate Man	3	3	-
18	Chowkider	8	2	6
19	Boatman	9	5	4
20	Plantation Mali	5	2	3
21	Sweeper	1	1	-
22	Forest Surveyor	2	-	2
	Total =	223	145	78

CHAPTER 10

FIVE YEARS PLANS

10.1 Details of five year plans

The First Five Year Plan (1951-56) laid significant importance on the development of forests. The Plan aimed for the improvement as well as expansion of the areas under forests to cater the increased demand for timber and forest produce in sustainable manner. The enunciation of the New National Forest Policy of India,1952 was a major step in this direction to revise and align with the trends of economy. The policy emphasized the protective as well as productive roles of forests and envisaged that one third of the land area (around 33%) should be under forests including 60% of the land 86 in hilly regions and 20% in the plains. The First Five Year Plan also laid importance to the role of forests in soil conservation.

The Second Five Year Plan (1956-1961) aimed mainly at adopting measures for afforestation and improvement of backward areas in the forests and extension forestry, formation of plantations of species of commercial and industrial value, promotion of methods for increased production and availability of timber and other forest produce for the future, conservation of wildlife, amelioration of the conditions of staff and labour in the forests, increased volume of forest research, increased provision of technical personnel and central coordination and guidance in the implementation of forest development schemes all over the country.

The Third Plan (1961-1966) laid special emphasis on adopting measures which ensured more economic and efficient utilization of the available forest products including inferior timber and wood residues. Major forest development programmes included in the plan were economic plantations for industrial and commercial purpose, plantations of quick growing species, village and extension forestry. The plan included programmes for the development and establishment of five zoological parks, five national parks and ten wildlife sanctuaries.

The Fourth Five Year Plan (1969-1974) laid emphasis on three main objectives in the area of forestry, namely, to increase the productivity of forests, to link up forest development with various forest based industries and to develop forests as a support to rural economy. Important objective was to achieve self-sufficiency in forest products especially for major forest based industries. The plan also recommended special training in ecology and conservation. Two centrally-sponsored schemes- Project Tiger and Development of National Parks and Sanctuaries also came into existence in 1973.

The major programmes of forest development included in the Fifth Five Year Plan were large scale commercial plantations, plantations of quick growing species, social forestry, forest consolidation, surveys and statistics, communications and logging. 1974-1991.

Mass afforestation and social forestry programme programmes were emphasised during the Sixth Five Year Plan (1980-1985). The Forest (Conservation) Act was enacted in 1980 with the main objective of checking the diversion of forest land for non- forestry purposes. Forest Survey of India (FSI) was established in June 1981 (on the recommendations of the National Commission on Agriculture) for carrying out regular surveys of forest resources of the country. The policy encouraged people's participation in the protection and management of forests and a decentralized system of forest management was started during the Seventh Plan with the

introduction of JFM programme in 1990. Despite various efforts undertaken to enhance and promote the area under, the forests faced massive destruction due to anthropogenic pressure which ultimately resulted in the degradation of forests.

The Eight Plan (1992-1997) also initiated various programmes and schemes regarding the protection and conservation of forests. A number of afforestation schemes like Integrated Afforestation and Eco-Development Project Scheme, Fuel wood and Fodder Project Scheme, Non-Timber Forest Produce Scheme, etc were initiated under NAEB for reclaiming degraded forest areas.

The Ninth Five Year Plan (1997-2002) stressed on massive afforestation programmes, control over hacking and grazing and provision of cheap fuel through alternative technologies. A National Forestry Action Plan was also launched during the plan in 1999 to address major issues in forestry sector. The plan also laid emphasis on the conservation of biodiversity in the country.

The Tenth Five Year Plan (2002-2007) further emphasized on the important role of forests in achieving environmental and economic sustainability as well as in maintaining life support systems on earth. The target of Tenth Five Year Plan had stipulated the need to bring 25% of area under forest and tree cover by 2007 and 33% by 2012. It was also proposed to merge all afforestation programmes of National Afforestation and Eco-development Board (NAEB) into a single scheme called National Afforestation Program (NAP). This 100% Centrally Sponsored Scheme (CSS) was started in 2002-2003 for regeneration and eco-development of degraded forests and adjoining areas on watershed protection and conservation of natural resources through active involvement of people and checking land degradation, deforestation and loss of biodiversity (The Tenth Five Year Plan, 2002-2007).

The strategy of the Eleventh Plan for forestry sector development was to create an environment for achieving sustainable forestry and wildlife management with specific focus on the socio-economic targets. Accordingly, the plan initiated various programmes for developing forestry and improving the status of green cover.

The plan wise and scheme wise budget allocation for Karimganj Division for the last ten years is tabulated below.

Table 10.1: Plan budget received during last 10 years by Karimganj Division, Assam

Year	Name of the plan	Budget allocation (in ₹)
2006-07	2406-01-800-0800-0708-26 Plan	38,00,000.00
	105-1263-26 Plan (Bamboo Plantation CSS)	34,50,559.00
	IV-111-1283-26 (Project Elephant)	50,000.00
	110-1270-26 Plan	3,00,000.00
	101-1680-26 Plan (CSS Integrated Forest)	5,30,000.00
2007-08	2406-02-111-1285 Wild Life	4,90,000.00
	2406-01-105-1263-0000 (Bamboo Plantation)	21,22,000.00
	2406-01-800-08-26 (TFC)	10,95,000.00
	2406-01-101-1680-26 (Integrated Forest)	18,00,000.00
	2406-02-111-1283 (Project Elephant)	60,000.00

2008-09	2406-01-105-1245-17 (Nursery)	3,78,000.00
	2406-01-101-1240-26 (Amenities to staff)	2,90,000.00
	2406-01-070-121-000-26 (Buildings)	10,23,000.00
	2406-01-105-1259-0000-17-04 (RDF)	16,18,000.00
	2406-01-070-1230-0000-26 (Communication)	10,70,000.00
	2406-01-800-708-0000-17-04 (ABY)	4,71,000.00
	2406-02-111-1285-26-00 (Wild Life Sanctuaries)	7,90,000.00
	2406-01-105-1263-26 (Gregarious flowering)	24,60,000.00
	2406-01-101-1680-26 (IFP)	14,80,000.00
	2406-01-800-0800-0708-26 (12th FC)	9,30,000.00
	2406-02-110-1268-0110-26 (Monkey Census)	20,000.00
	2406-01-800-0800-0708-26 (Uniform & cloth)	2,74,572.00
2009-10	2406-02-111-1280-26 Plan (Dev. National Park)	9,00,000.00
	2406-01-800-0800-708-17-04 (ABY)	4,08,060.00
	2406-01-800-0800-708-26 (12th FC)	22,08,000.00
	2406-01-070-0121-26 Plan (Building)	13,18,000.00
	2406-01-102-1245-17-00 (Nursery)	10,50,000.00
	2406-01-101-1240-26-00 (Amenities to staff)	4,20,000.00
	2406-01-101-1680-13-00 (IFP)	7,34,000.00
	2406-01-105-1259-07-04 (RDF)	11,06,088.00
	2406-02-1285 (Wild Life Sanctuary)	5,65,000.00
	2406-01-070-1230-26-00 (Roads & communication)	14,00,000.00
	2406-01-789-0789-17-04 (SCC Plan)	20,00,000.00
2010-11	2406-02-111-1280-26-00 (BWLS)	4,00,000.00
	2406-01-070-1230-26 Plan (Road & bridge)	3,50,000.00
	2406-01-101-1240-26 (Amenities to staff & labour)	4,70,000.00
	2406-01-102-1245-17 (Nursery)	10,50,000.00
	2406-01-105-1253-17 (Civil work)	3,55,900.00
	2406-01-105-1259-17-04 (RDF)	11,59,110.00
	2406-01-800-0800-0708-17-04 (ABY)	4,08,060.00
	2406-02-111-1283 (Project Elephant)	28,000.00
	2406-01-101-1680-000-13-00 (CSS)	12,34,000.00
	2406-02-111-1285-0000-00 (BWLS)	6,24,000.00
2011-12	2406-01-070-1230-0000-26 (Road & bridge)	10,00,000.00
	2406-01-101-1240-0000-26 (Am. to staff & labour)	9,00,000.00
	2406-01-102-1245-0000-17 (Nursery)	2,50,000.00
	2406-01-105-1253-0000-17 (Civil work)	3,19,440.00
	2406-01-105-1259-0000-17 (RDF)	13,78,290.00
	2406-02-110-1268-26 (Dev.of other wildlife works)	4,00,000.00
	2406-01-800-0800-0708-17 (ABY)	1,93,600.00
	2406-FWL-01-Forestry-800-0E-0710-26 (Forest publicity fund)	75,000.00
	2406-IV-CSS-020-111-1283 (Exgretia)	75,000.00
	2406-IV-CSS-111-1285 (A.P. Camp)	5,50,000.00

2012-13	2406-01-105-1253-0000-17 (ANR)	4,16,660.00
	2406-01-102-1245-0000-17	1,25,000.00
	2406-02-110-1268-0000-26 (PGA)	15,000.00
	2406-02-11-1283-0000-26 (Project Elephant)	4,13,400.00
	2406-01-800-0800-0708-26 (13th FC)	6,53,000.00
	2406-02-111-1285-0000-26 (BWLS)	7,25,000.00
	2406-01-800-0800-0708-26 (13th FC)	3,31,500.00
	2406-01-800-0800-0708-26 (13th FC)	7,86,300.00
	2406-01-800-0800-0708-17	8,02,300.00
	2406-01-101-1240-0000-26	5,50,000.00
	2406-01-105-1259-0000-17	9,92,380.00
2013-14	01-105-0000-1253-17-00 (Regulation of civil work)	2,57,280.00
	01-800-0800-0708-17-00 (ABY)	4,17,360.00
	01-070-1230-0000-26-00 (Roads & bridge)	5,00,000.00
	01-105-1259-0000-17-00 (RDF)	6,57,012.00
	01-101-1240-0000-26-00 (Am. to staff & labour)	6,15,000.00
	2406-01-800-0800-008-26-00 (13th FC)	26,08,200.00
	2406-Forestry&WL-111-V-CSS-02-Env. Forests & WL-111-Zeological Park-1285 (CSS)	1,94,000.00
2014-15	01-070-1230-0000-26-00 (Road & bridge)	5,00,000.00
	02-111-1280-0000-26-00 (Dev.of NP & WLS)	5,00,000.00
	01-800-0708-0000-17-00 (ABY)	4,91,200.00
	01-105-1259-0000-17-00 (RDF)	4,55,464.00
	02-800-2853-0000-26-00 (Int. Dev. of WL)	4,95,000.00
2015-16	01-800-0708-808-17-99 Plan (NBM)	6,25,000.00
2016-17	2406-02-800-2853-000-26-99 CSS IN Dev. of WL habitat	8,60,000.00
	2406-02-800-1241-224-26-99 CSS Internsi of Forest Management	12,74,400.00
	FD/WL/D/CSS-Project Elephant/16-17/ dtd. 31.03.2017	30,000.00
	WL/FA/Corpus Fund/Meeting/2016/G dtd. 20.03.2017 Elephant Population Estimation	25,680.00
2017-18	4406-01-070-1230-107-13-99-SOPD G Road & Bridge	14,50,000.00
	4406-01-070-0121-000-14-99 SOPD ODS Building	12,02,099.00
	2406-01-101-1240-000-04-99 SOPD G Ammenities of staff and labour	1,50,000.00
	2406-02-111-1280-000-26-99 SOPD G Dev. Of National Park & WL Sanctuary	5,00,000.00
	2406-01-105-1259-000-17-99 SOPDG RDF	8,64,336.00
2018-19	2406-01-105-1259-000-17-99-SOPD-ODS RDF	34,76,750.00
	2406-02-111-1280-000-26-99 SOPD-G Dev. Of National Park & Wildlife Sanctuary	6,00,000.00

	2406-01-101-1240-000-04-99 SOPD-G Ammenities to staff & labour	2,00,000.00
2019-20	4406-01-070-0121-000-14-99-SOPD-ODS Build	15,00,000.00
	4406-01-070-1230-107-13-99-SOPD-G Road & Bridge	13,00,000.00
	2406-02-111-1280-000-26-99-SOPD-G Dev. Of National Park & Wildlife Sanctuary	3,00,000.00
	CSS/Project Elephant	1,25,000.00
	2406-01-101-1240-000-04-99-SOPD-G Ammenities to staff & labour	6,00,000.00
	2406-01-105-2547-000-17-99-SOPD-G	13,25,174.00
2020-21	2406-02-III-1280-000-26-99-SOPD-G Dev. Of National Park & Wildlife Sanctuary	2,96,000.00
	2406-01-800-0708-000-26-99 SOPD-G Reduce Man Elephant Conflict	22,55,000.00
	2406-02-110-1268-000-26-99 SOPD G	1,84,000.00
	CSS Project Elephant	1,30,000.00

CHAPTER 11

PAST SYSTEMS AND MANAGEMENT

11.1 General history of the forest

Earlier the forests of Karimganj Division were managed under the erstwhile Sylhet division and in part under the Cachar division formed in 1874. After independence, the Karimganj Forest Division was managed by Cachar Forest Divisionand from the year 1981, when Karimganj Division was bifurcated from the Cachar Division, the management of the above mentioned forests was transferred to the Karimganj Division.

11.2 Past system of management and their results

The important plans under which forests of Karimganj Division were managed in the past are mentioned below:

11.2.1 Pre plan Management Period (1874-1924)

In Cachar Division, certain revenue stations were notified where forest produce was checked and revenue collected at cubic meter rate. Timber was marked in huge quantum by the Government as well as private timber merchants. In 1890-91, system of pre-marking of timber was introduced. This system however did not apply to Innerline R.F. In 1903-04, Cavendish prepared a scheme of pre marking of timber by the Forest Officer as against the earlier practice of pre marking the timber by traders, before felling. This system met with a failure as there was no compliance from traders as well as people at large. Conservator of the Division then recommended writing a regular working plan of the division. This could not be done due to the want of survey data till J.S. Owden initiated the detailed survey work for writing the first regular working plan.

11.2.2 Owden's Plan (1925-37)

In Owden's plan two working circles were proposed:

- Production Working Circle for harvesting of timber, bamboo and canes.
- Regeneration Working Circle to study the silviculture of trees.

He retained the block system but divided it in 5 coupes. Minimum yield and royalty was fixed for each block. The floods of 1929 resulted in abandoning of all the working plan prescriptions. The traders were then given a free hand, resulting in loss of much wooded vegetation.

11.2.3 MohanLal's Plan for Cachar Division (1937-38 to 1954-55)

The chief object of the plan was to ensure sustained yields of timber, fuel wood, bamboo and other forest produce. Mohanlal proposed 4 working circles, taking into consideration the prevailing ground realities.

- Recuperation working circle for areas where no felling was to be done.
- Working Circle-1 for supply of timber.
- Working Circle-2 included most inaccessible areas.
- Bamboo overlapping working circle.

He introduced compensatory afforestation in the areas where felling was carried out. He also introduced control felling in USF areas to ease the pressure on heavily marked reserve forests.

11.2.4 N N Das's Plan for Sylhet division (1937-38 to 1947-48)

The general objectives of the plan were to introduce such management practices that would lead to attainment of a normal forest, to meet the local and foreign demand of timber and other forest produce. He attempted to create a demand for various forest produce which was insignificant till that time. He divided the reserved forests into compartments by natural boundaries as far as possible. The growing stock was divided into four categories, namely, Class I, II, III and IV. Class I and II areas were having valuable trees of good quality. Class III areas had lesser stocking than the above classes. Class IV areas consisted mostly of Bamboos, blanks, marshy land and swamps. He divided the forests into following working circles:

- Timber Working Circle A with 2 felling series and silvicultural system of Selection with Improvement felling. The felling cycle was fixed at 30 years.
- Timber Working Circle B, consisting of depleted areas, for meeting timber requirement of local people. The felling cycle was fixed at 30 years.
- Bamboo Working Circle
- Fire-Wood Working Circle A
- Fire-Wood Working Circle B

He lamented on the conditions of the forests, particularly of Singla RF, Badshahi Tilla RF, Longai RF and Patharia Hills RF. He observed that these forests were capable of natural regeneration if suitable conditions were obtained. In miscellaneous prescriptions, he prescribed regular and proper burning of thatch areas after harvest in March.

11.2.5 P.N. Bhattacharajee's Plan (1957-58 to 1971-72)

The general objectives of management as set out by him were to improve the general condition of the crop and increase its capital value in the stocked areas; to provide protection and much needed rest to the open forest areas; to introduce a sound system of exploitation that would lead to maximum utilisation of it; and lastly, to meet market demands of timber, bamboo, fire-wood and other forest produce as far as practicable. To fulfil the above mentioned objectives following working circles were proposed.

- Local trade Working Circle for areas having good stocking of valuable species with diameters above the exploitable diameter. This working circle covered an area of 29,805 acres and included well stocked compartments of Singla RF and Badshahi Tilla RF. The felling cycle was fixed at 25 years.
- Long term lease Working Circle for areas composed largely of Ping. This Working Circle included North Cachar RF. The felling cycle was fixed at 30 years and prescribed yield was 725 trees annually.
- Protection Working Circle included areas which were worked heavily in the past and required rest (Longai RF and Patharia Hills RF. and other areas mentioned as such by N.N.Das's Plan).
- Regeneration Overlapping Working Circle for whole forest area.
- Bamboo Overlapping Working Circle

11.2.6 Thinning Scheme of Teak plantations (1972-73 to 1981-82)

The scheme was authored jointly by H. C. Changkakoty and A. H. Chaudhary. This scheme covered all Teak plantations, covering an area of 211.34 Hectares of the present day Karimganj Division and which were raised between 1922 and 1965. The area was divided into 8 felling series and average site quality was found to be II/III. The annual yield of 658 cu. m. was fixed for the 10-year period.

11.2.7 M.K. Yadava's Bamboo Plan (1997-98 to 2000-01)

The need for a separate plan for bamboo was triggered by the raw material crisis at the Cachar Paper Mill and its subsequent closure, pursuant to the order of the honourable Supreme Court of India, dated 12-12-96, which required forest areas not to be worked without approved working plan. Shri M.K. Yadava's plan kept 66.8% of the total accessible growing stock of bamboo for environmental protection, wildlife and meeting local demand. Only $1/4^{th}$ of the area was allowed to be harvested annually. The Bamboo areas were divided into 3 Felling Series namely Borail, Longai and Singla with 2, 4 and 8 coupes respectively.The annual yields for three felling series were 6280, 4699 and 2757 MTAD respectively. The plan was revised in 2001 by the author.

11.2.8 M.K. Yadava Plan (1999-2000 to 2010-11)

The major objectives of the plan were to rehabilitate all degraded and jhum affected forest areas, to conserve and enrich the forest cover in RFs, to take steps to meet the fuelwood requirement of people on sustainable basis, to uplift the quality of life of people residing in the forests as well as fringe forest areas using a watershed based approach and to take steps for conservation of wildlife and biodiversity. The plan also stressed on the need for ensuring mobility of the staff which had declined in the past few years. He introduced several working circles which aimed at addressing the core problems in the management of these forests.

- Plantation and Protection Working circle including areas with forest cover but having complete watershed units. The provisions of this working circle extended to plantation areas also.
- Jhum Rehabilitation Working Circle covering steep and barren hill slopes that have been subjected to heavy jhumming in the past. These areas were to be included in Integrated Watershed Management scheme.
- Energy Plantation Working Circle in forest villages and encroached areas. It aimed at creating firewood surplus centres by raising firewood species in such areas and thus to reduce pressure on intact reserved forests.
- Forest Village Regulation and Encroachment Overlapping Working Circle
- Bamboo Overlapping Working Circle (Bamboo PLAN 1997-2001)
- NWFP Overlapping Working Circle was introduced to take care of disappearing valuable ground flora, medicinal plants and other economic herbs. This working circle also recommended intercropping of spices in forest plantations for the benefit of local people.
- Wildlife and Biodiversity Conservation Working Circle was created to preserve the biodiversity hotspot of the division, i.e., North Cachar R.F.
- Wetland Conservation Working Circle for Sonbeel and Ratabeel wetlands.

The most important contribution of the plan was to introduce a logical method to delineate compartments. He delineated compartments based on watershed units which were derived from the topographical maps of the region.

11.2.9 M.K.Yadava Bamboo Plan (2001-02 to 2008-09)

This working plan was written for the entire Barak valley encompassing all its three divisions. The major objectives of the plan were to improve the bamboo forests of the Barak valley by adopting sound silvicultural system, to obtain maximum sustained yield of bamboo to meet the requirements of Cachar Paper Mill, Cottage industries and domestic use and to raise plantations of bamboo and other high yielding pulpwood species for reduction of pressure on

the reserved forests. This plan found *Melocanna spp* as the predominant bamboo species of the Barak valley. This plan estimated the growing stock of the species to be 242018 MTAD and fixed its annual exploitable yield to 41,059 MTAD for the whole Barak valley. The annual exploitable yield for the Karimganj Division was fixed at 10,557 MTAD. The felling series constituted in the Karimganj division along with the area and yield are shown below:

Table 11.2.9: Felling series constituted under M.K. Yadava Bamboo Plan (2001-02 to 2008-09

Felling Series	Gross Area (in ha)	Bamboo Area(in ha)	Growing Stock(MTAD)	Yield (MTAD)	No. of Coupes	Coupes worked annually
Longai	3,2747	5,814	51,751	4,528	8	2
Singla	17,408	5,835	43,969	3,847	4	1
Borail*	39,606	7,018	24,926	2,181	–	–

*****Borail Felling Series coupes have not been operated after the declaration of area as Wildlife Sanctuary.

11.3 Special works of improvement undertaken

In Karimganj Division, there remains no fire hazard problem, as such, no scheme implemented as fire protection. But for improvement of communication within the Reserved Forests, the existing Forest Roads are annually maintained. Besides, interface activities such as refixation of RF boundary pillars, survey of boundary etc. are done as and when required. As regards, amenities to staff, all works relating to the scheme has been implemented under the requirsite heads and different schemes as per fund allocated.

11.4 Past yield, revenue and expenditure

In the last Working Plan of this Division, there was no prescription for departmental operation hence, no yield was calculated. But there was timber accumulated out of seizure made from illegal felling and that of the wind fallen pertaining to Karimganj Division. The yield, revenue and expenditure are furnished below.

Table 11.4: Past yield, revenue and expenditures in Karimganj Forest Division, Assam

Sl. No.	Year	Yield (m^3)	Revenue (₹)	Expenditure (₹)
1	2006-07	286.174	4,81,29,422.00	2,99,48,251.00
2	2007-08	432.702	4,67,39,884.00	1,53,20,128.00
3	2008-09	329.021	6,08,40,178.00	1,26,44,572.00
4	2009-10	303.426	7,59,03,440.00	1,41,93,088.00
5	2010-11	210.337	5,22,53,025.00	74,54,070.00
6	2011-12	332.199	4,31,90,556.00	27,15,000.00
7	2012-13	1278.487	1,38,89,875.00	1,13,72,540.00
8	2013-14	309.688	1,06,67,873.00	91,28,852.00
9	2014-15	220.985	2,47,44,255.00	51,97,664.00
10	2015-16	322.997	1,96,65,163.00	3,27,8721.00
11	2016-17	91.296	3,78,12,778.00	44,38,328.00
12	2017-18	141.059	7,11,29,861.00	1,23,96,586.00
13	2018-19	178.433	9,52,94,531.00	20,09,000.00
14	2019-20	117.05	10,91,59,250.00	23,98,000.00
15	2020-21	189.74	2,10,75,910.00	42,07,400.00

CHAPTER 12

STATISTICS OF GROWTH AND YIELD

12.1 Statistics of growth and yield

The volume table has been prepared on the basis of the growing stock of major species found in Karimganj Division during the field survey which are furnished below. The last Working Plan of the Division do not find mention of any such growth statistics.

Table 12: Statistics of growing stock of major species

Sl. No.	Species	Age	Dia (in meter)	Hieght (in meter)	Volume (in m^3)
1.	Teak	5	0.30 - 0.35	2.00 – 2.50	0.180 – 0.306
		10	0.45 - 0.50	3.00 – 3.50	0.607 – 0.875
		15	0.55 - 0.60	4.00 – 4.50	1.210 – 1.620
		20	0.60 - 0.65	4.50 – 5.00	1.620 – 2.112
		25	0.80 - 0.85	5.00 – 5.50	3.20 – 3.97
2.	Garjan	5	0.80 – 0.85	3.50 – 4.00	2.240 – 2.890
		10	0.95 – 1.00	4.00 – 4.50	3.610 – 4.500
		15	1.15 – 1.20	6.00 – 6.50	7.935 – 9.360
		20	1.20 – 1.25	7.00 – 7.50	10.080 – 11.718
		25	1.50 – 1.55	7.50 – 8.00	16.875 – 19.220
3.	Sundi	5	0.45 – 0.50	3.00 – 3.50	0.607 – 0.875
		10	0.75 – 0.80	4.00 – 4.50	2.250 – 2.880
		15	1.05 – 1.10	4.50 – 5.00	4.961 – 6.050
		20	1.15 – 1.20	5.00 – 5.50	6.612 – 7.920
		25	1.25 – 1.30	5.50 – 6.00	8.593 – 10.140
4.	Cham	5	0.40 – 0.45	3.00 – 3.50	0.480 – 0.708
		10	0.70 – 0.75	3.50 – 4.00	1.715 – 2.250
		15	1.00 – 1.05	4.00 – 4.50	4.000 – 4.961
		20	1.10 – 1.15	4.50 – 5.00	5.445 – 6.612
		25	1.20 – 1.25	5.00 – 5.50	7.200 – 8.593
5.	Simul	5	0.80 – 0.85	3.00 – 3.50	1.920 – 2.528
		10	1.00 – 1.05	4.50 – 5.00	4.500 – 5.512
		15	1.15 – 1.20	6.00 – 6.50	7.935 – 9.360
		20	1.20 – 1.25	7.00 – 7.50	10.080 – 11.718
		25	1.30 – 1.35	8.00 – 8.50	13.520 – 15.491

12.2 Statistics of forest carbon stock

Under the national forest inventory programme, FSI has been calculating carbon stock of forests under different types. As per the methodology, in each sample plot all trees of diameter 10 cm and above are measured. The woody volume of trees for each sample plot is calculated using volume equation developed by FSI for various species. The volume equation provides above ground woody volume i.e. above ground volume, which includes volume of mainstem measured upto 10 cm diameter and volume of all branches having diameter 5 cm or more. Data of specific gravity and percentage carbon content of most of tree species have been obtained from different published literature. Standard formulae were used to calculate biomass and carbon content of eachtree.

During forest inventory the data on above ground biomass and soil carbon is collected from each sample plot. For collecting soil carbon, two sub-plots of size 1m×1m were laid out withint he main plot and at the centre of these two sub-plots, a pit of 30cm × 30cm × 30cm was dug and a composite sample of soil weighing 150 gm was kept for organic carbon analysis.

Samples of soil were analysed and were used for carbon calculation. Below ground biomass was being calculated using a relationship (usually a root-to-shoot ratio) to above ground biomass which had been established by FRI. GPG also provided default ratios for six major global forest types. FSI had selectively used these defaults to arrive at the carbon number. The forest Carbon stock was analysed for different species under different girth classes. It was found that carbon content was maximum under girth class >180 cm. A direct relationship was found between girth class and carbon. Average carbon content in different girth class is shown in table 12.2.a

The forest Carbon stock was analysed for different species under different diameter classes. Maximum carbon content was found under 03 to 0.4 m diameter class.

Table 12.2. Total Carbon content under different diameter classes

Diameter Class(m)	Count of Spp.	Carbon Content (tonnes)
<0.1	19	1.73
0.1-0.2	608	83.90
0.2-0.3	896	337.20
0.3-0.4	596	498.56
0.4-0.5	169	271.53
0.5-0.6	69	176.79
0.6-0.7	63	223.09
0.7-0.8	12	62.80
0.8-0.9	2	11.29
>0.9	3	45.36

PART II

FUTURE MANAGEMENT

CHAPTER 1

BASIS OF PROPOSAL

The working plan of Karimganj Division is a technical document prepared to manage the forest under Karimganj Division on sustainable basis. The overall objectives of the working plan are to restock the forest with its original multy layered floral composition, enhance biodiversity, improve growing stocks and maintain the environmental stability in the areas under the Division.

1.1 Objectives of Management

To contributeachieving the National goal to have a minimum one-third of total geographical area of the country under tree cover. Effort should focus for consolidation and preservation of the existing forest cover and increase their productivity. The objectives of this forest management plan is organised around the following major elements for sustainable management.

1.1(1) Dynamics of Forests and Stands

Forest is a dynamic system. It is disturbed, destroyed and again regains its status through a dynamic process. Forest disturbances are events that cause change in the structure and composition of a forest ecosystem, beyond the growth and death of individual organisms. Disturbances can vary in frequency and intensity, and include natural disasters such as fire, landslides, wind, outbreaks of insects, fungi, and other pathogens, animal-caused effects such as grazing and trampling, and anthropogenic disturbances such as warfare, logging, pollution, the clearing of land for urbanization or agriculture, and the introduction of invasive species. Not all disturbances are destructive or negative to the overall forest ecosystem. Many natural disturbances allow for renewal and growth and often release necessary nutrients.

Small-scale disturbances are the key to creating and maintaining diversity and heterogeneity within a forest. Small-scale disturbances are events such as single-tree blowdowns, which create gaps that let light through the canopy to the understory and forest floor. This available light allows early-successional shade-intolerant species to colonize and maintain a population within the dominant forest, leading to the complex spatial mosaic forest structure recognized as old-growth. This process is referred to as patch dynamics or gap dynamics and has been described across many types of forests, including tropical, temperate, and boreal.

The sets and patterns of natural disturbances that characterize a particular area or ecosystem are referred to as the ecosystem's disturbance regime. A natural community is closely linked with its natural disturbance regime. For example, temperate and boreal rainforests typically have a disturbance regime consisting of high-frequency but small-scale events, resulting in a highly complex forest dominated by very old trees. In contrast, forests that have a disturbance regime consisting of high-severity stand-replacing events, such as frequent fires, tend to be more uniform in structure and have relatively young tree stands.

Forest succession is the process by which species recover and regenerate after a disturbance. The type of disturbance, the climate and weather conditions, the presence of colonizing species, and the interactions among species all influence the path that succession will take. Species diversity and composition fluctuate throughout succession. The classic model of

succession is known as relay floristics and refers to a relay of dominant species. After a stand-replacing disturbance, shade-intolerant species colonize and grow into a dominant canopy, but due to their shade-intolerance they are unable to regenerate under their own canopy; the understory (composed of shade-tolerant species) gradually replaces the canopy, and due to its shade-tolerance it can regenerate under its own canopy and therefore becomes the dominant species. Often succession is not so complete or directed as the relay floristics model describes. Species can be mid-tolerant of shade and survive by taking advantage of small amounts of light coming through the canopy, and further disturbances can create small gaps. These and other factors can lead to a mixture of dominant species and a not so obvious "end" to succession (climax community).

Many successional trajectories follow a basic four-stage development pattern. The first of these stages, stand initiation, occurs after a major disturbance and involves many species arriving in the area of abundant light and nutrients. The second stage, stem exclusion, describes the growth and competition of these species as resources become less available; likely one or a few species outcompetes and becomes stand-dominating. The third stage, understory reinitiation, involves further disturbance and the creation of gaps; at this point stratification develops, with layers of canopy, midstory, and understory appearing. The final stage, known as old-growth, is the extension and completion of the understory reinititation; a complex multi-aged and multi-layered forest has developed.

The forests of Karimganj Division already attained the fourth stage of successional trajectory, but the disturbances including over exploitation had pushed it steps back which need to be addressed by assisting with appropriate silvicultural treatment.

1.1(II) Forests and Soil

Forests and forest soils play a broad, complex and interactive role within the environment. Soils have provided the foundation for trees and entire forests over millions of years. Soil is an important component of forest and woodland ecosystems as it helps regulate important ecosystem processes, such as nutrient uptake, decomposition, and water availability. Soils provide trees with anchorage, water and nutrients. In turn, trees as well as other plants and vegetation, are an important factor in the creation of new soil as leaves and other vegetation rot and decompose.

1.1(III) Forests and Water

Water is the most vital element of all natural resources and is essential to life. Forests and woodlands have a close relationship with our water resources, and forest management and water quality are closely linked. It is widely recognised that sustainably managed forests play an important role in maintaining water quality. Through stabilisation of soil, forests minimise erosion and hence reduce the impairment of water quality due to sedimentation. Woodlands protect water bodies and water courses by trapping sediments and pollutants from other up-slope land use and activities. Forests also play a role in water availability. They influence the amount of available water by intercepting precipitation, evaporating moisture from vegetative surfaces, transpiring soil moisture, capturing fog water and maintaining soil infiltration. At the same time, forests may influence the timing of water delivery by maintaining and improving soil infiltration and the soil's water-storage capacity.

1.1(IV) Forest Biodiversity

Forest biological diversity is a broad term that refers to all life forms found within forested areas and the ecological roles they perform. As such, forest biological diversity encompasses not just trees, but the multitude of plants, animals and micro-organisms that inhabit forest areas and their associated genetic diversity. Forest biological diversity can be considered at different levels, including the ecosystem, landscapes, species, populations and genetics. Complex interactions can occur within and amongst these levels. In biologically diverse forests, this complexity allows organisms to adapt to continually changing environmental conditions and to maintain ecosystem functions. Forest biological diversity results from evolutionary processes over thousands and even millions of years which, in themselves, are driven by ecological forces such as climate, fire, competition and disturbance. Furthermore, the diversity of forest ecosystems (in both physical and biological features) results in high levels of adaptation, a feature of forest ecosystems which is an integral component of their biological diversity. Within specific forest ecosystems, the maintenance of ecological processes is dependent upon the maintenance of their biological diversity.

1.1(V) Climate and Forests

Forests' role in climate change is two-fold. They act as both a cause and a solution for greenhouse gas emissions. Around 25% of global emissions come from the land sector, the second largest source of greenhouse gas emissions after the energy sector. About half of these (5-10 $GtCO_2e$ annually) comes from deforestation and forest degradation. Forests are also one of the most important solutions to addressing the effects of climate change. Approximately 2.6 billion tonnes of carbon dioxide, one-third of the CO_2 released from burning fossil fuels, is absorbed by forests every year. Estimates show that nearly two billion hectares of degraded land across the world – an area the size of South America – offer opportunities for restoration. Increasing and maintaining forests is therefore an essential solution to climate change.

IUCN's forest work tackles the role of trees and forests in building resilience to climate change in several ways:

- **Combatting deforestation and forest degradation** in areas of high biodiversity and cultural significance, such as primary forests and World Heritage sites. This helps conserve the benefits that people and societies get from forests, including forest carbon stocks and livelihoods.
- **Restoring forest landscapes** helps enhance climate change mitigation and adaptation. As the co-founder and Secretariat of the Bonn Challenge – a global effort to bring 150 million hectares of deforested and degraded land under restoration by 2020 and 350 million hectares by 2030 – IUCN supports national and sub-national decision makers in reaching this important goal. Reaching the 350 million hectare target could sequester up to 1.7 gigatonnes of carbon dioxide equivalent annually.
- **Enabling rights-based land use** ensures community involvement in land-use outcomes. IUCN produces results on the ground through partners and projects worldwide to help strengthen community control over forests, alleviate poverty, empower women and men, enhance biodiversity, and sustainably manage forests.
- **Unlocking forest benefits** is critical to a sustainable and equitable supply of forest goods and services. IUCN builds capacity for implementing restoration, engaging the private sector and striving to make sure benefits – such as those from Reducing Emissions from Deforestation and Forest Degradation (REDD+) – are equitably shared with local landowners and forest communities.

1.1(VI) Socioeconomic considerations and generation of forest based employment opportunities and livelihood options

India is a developing nation. The majority of its population resides in rural areas. Forests are important renewable natural resources generating livelihood requirements for more than 25% of the world's population. Forests play an important role in the rural economy. In many areas, forests and trees are among the few resources that are available to rurals. They provide different kinds of benefits: employment and incomes often needed to supplement inadequate returns from agriculture; produce such as fuelwood, food, fodder and poles for the home; and - a range of environmental benefits, without which other activity, such as agriculture might be impossible. Forest sector is the second largest land use after agriculture. Statistics reveals, in remote forest villages about 300 million tribal and other local people depend on forest for their subsistence and livelihood and about 70% of India's rural population depends on fuelwood to meet its domestic energy needs. For about 100 million of them, forests are main source for livelihood and cash income from fuelwood, non-timber forest products or construction materials. The application of local skills and village-level technology in wood-based and small-scale forest based enterprises provide secondary employment and livelihood opportunities for rural people, Forest development integrated with agricultural and industrial progress has great potential to enhance livelihood security, poverty reduction and food security for vulnerable section of society including illiterate, unskilled, resource-poor, jobless, landless and labourers people in rural India.

1.1(VII) Tool for integrated development: Integrated development means the integration of development schemes. This Working Plan may be a tool for integrated development. The main objective of integrated development is to provide employment opportunities to the poor as well as to provide opportunities to develop their skill sets so as to improve their living conditions. This Working Plan emphasizes in upliftmant of socio-economic condition the village community. There are numbers of rural development schemes of the Government. Maximum of those schemes do not percolate to the village communities particularly to the fringe forest areas. Forest department can create a liaission with the departments with a view to take these communities accessed to the development schemes. Working in convergence with other line departments for upliftment of socio economic condition of rural people shall be emphasized during the tenure of this Working Plan. Details are mentioned in para 8.20, chapter-8 of Part-II.

Considering the above major elements and with a view for sustainable management, the following objectives are set for this forest management plan.

i) Main objective of the Working Plan is to increase productivity of the forest ecosystem and maintain the vitality. To restock the degraded forest with its original multi-layered indigenous floristic composition under intensive system of management with the aim of attainment of normal forest in due course.
ii) To protect the forest from various forest depletion drivers e.g., illegal felling, encroachments and other anthropogenic factors.
iii) To retain and enrich all the moist deciduous forests of comparatively poor value by raising plantations of more valuable indigenousspecies.
iv) To protect the crests, ridges and steep slopes as well as the forest soil from erosion adopting various biological and engineering interventions.

v) To protect water bodies by increasing woodlands and toaugment hydrological regime of both surface water and ground water.
vi) To protect and conserve the rich biodiversity of the forest which include multitude of plants, animals and micro-organisms that inhabit forest areas and their associated genetic diversity.
vii) To create a substitute habitat for wildlife in the reserve forests so that wild animals can enjoy a broader habitat besides the Protected Areas (PA).
viii) To improve of degraded habitat of wildlife ensuring availability of basic habitat formation criteria e.g, food, water and shelter. Biodiversity conservation shall be one of the prime agendas.
ix) To enhance the Carbon pool growing more and more trees enabling increased carbon sequestration and decreased green house gas emission.
x) To uplift socio-economic condition of rural communities living in and around the forests and fringe forest areas.
xi) To evolve means for generation of forest based employment opportunities and livelihood options besides catering their need for firewood, timber, NTFP etc. sharing forest management practices and empowering village community.
xii) To improve the living conditions of tribals and forest dependent communities through sustainable harvest of non timber forestproducts.
xiii) To take communities accessed to various Government development schemes.Apart from development schemes of the forest department, other departments' schemes are also will be brought for their socio-economic development.

1.2 Methods of treatment to be adopted

Method of treatment depends upon the ecological and silvicultural requirements for sustainable management of different identified forests. Different method of treatment for different Working Circle keeping in view the stakeholder's requirements, aspects of biotic factors, legal status of forests, drivers of unsustainability, etc. shall be prescribed.

1.2.1 Treatments prescribed

i) Existing forests will be protected from all sorts of forest degradation factors. All efforts shall be given to restock the forest as it was a couple of decades ago.
ii) Soil and moisture conservation efforts shall be boosted to prevent soil erosion and siltation of the water bodies.
iii) Suitable tending and soil working operations will be carried out to stimulate the growth of the naturally regenerated seedlings and rootstock.
iv) Timber, if silviculturally available, will be extracted from the dense tree forests capable of producing medium to large-sized timber and poles on sustained basis.
v) Open forest areas and traditional pastures will be managed with active participation of tribal and village communities for improving the productivity of the land to meet the local domestic needs of fodder and fire wood.
vi) Uncontrolled grazing, fire, poaching, illicit cutting and uncontrolled encroachment, the major threats for sustainable growth for forest, shall be curbed.

1.2.2 The General Approach of the Treatments

i) The entire forests will be protected from harvesting. 20 meters wide strips on both sides of streams, watercourses and 40 meters from the river will be protected, no harvesting in these strip areas.

ii) Special habitat management for wildlife conservation will receive high priority. Karimganj being frequented with riparian zones and mesic sites these needs to be protected with extra care. Adequate buffer will be provided to any such important sites in the Division for preparing treatment maps including any harvestings. Dead, dying, decay snag, den trees and down logs will be protected to cater the habitat requirement of birds and small animals, they prefer to build their nests in such build formations. Wildlife requirements shall be the most important consideration for water body management in forest areas.

iii) Preference will be accorded to natural regeneration and rootstock management. Natural regeneration and promising coppice growth will receive suitable tending and soil working to stimulate growth and development. Areas having good natural regeneration of valuable species shall be protected from fire and grazing. Artificial regeneration will be used as supplementary activity, at places, where natural regeneration is inadequate or is not likely to succeed.

iv) Management of forests close to villages will be given priority for meeting demands of local people for small timber, poles, firewood, fodder, non-wood forest produce, etc. Local people will be actively involved in forest management, forest protection, plantations and development of natural resources in the village. Management of forests close to villages shall primarily be done through JFM committees.

v) Non-Timber Forest Produce (NTFP) has great potential for sustainable economic development of local communities with conservation of forest resources. Sustainable NTFP production will be given high priority in the forest management.

vi) Sustainable use of forest resources will remain the guiding principle for managing the demands of forest produce and services. Various government and non-government agencies will be engaged in identification and promotion of ecologically sound and economically feasible alternatives like wood saving technology, stall-feeding, population control of cattle and livestock improvement.

vii) Involving local people in managing forests and generating awareness in rural and tribal areas is considered indispensable for the forest conservation.

viii) Reducing biotic pressure on forests, particularly, illicit felling, unsustainable grazing, fire and encroachment near villages will be considered on priority basis.

ix) Forests capable of producing medium to large sized timber will be harvested under the Selection-Cum-Improvement management system.

x) Boundary demarcation will be carried out in time-bound manner for ensuring territorial integrity of forests.

xi) Action will be taken to convert all the miscellaneous forests adjoining the Reserved Forests and large patches, away from villages into Reserved Forests.

1.3 Constitution of Working Circles

The Working Circles proposed and approved in PWPR for Karimganj Forest Division are listed below.

1. Joint Forest Management Working Circle.

2. Plantation working circle.
3. Forest Protection and Bio-diversity conservation working Circle.
4. NTFP and Bamboooverlapping working Circle.
5 Soil and Water Conservation overlapping working Circle.
6. Wildlife management overlapping Working Circle.

Justification for constitution of the Working Circles

Joint Forest Management Working Circle

This working circle has been constituted keeping in view the present requirement of the local people for planning and implementation of the various forestry activities. There has been a paradigm shift in the concept of forest management. Involvement of rural communities must be ensured in forest protection instesd of policing with a little manpower.The past experience has taught a lesson that unless and until the rural communities are taken into confidence and their regular requirements, are not met meticulously, possibility of achieving the desired results of bringing the forest cover as envisaged in the 1988 forest policy are very little. Joint Forest Management is sharing of responsibilities, authority and usufructs between the village community or the forest user group and the forest department on the basis of a memorandum of understanding (MoU) between the two.

Plantation Working Circle

Forests of this Division have been degraded to a large extent. Encroachment and illegal felling alongwith other anthropogenic interferences resulted depletion of forest cover including timber stock. Coal mining has already destroyed huge rain forest patches. There is an urgent need to restock the forest and it is proposed to undertake massive plantation activities in the Division. Forest Areas with canopy density of less than 10 percent and suitable for raising plantation but does not fall in Wildlife and Bio-diversity, JFM Working Circle or NTFP Working Circle or areas having matured plantations, irrespective of canopy density, without any naturally regenerated forest crops as under canopy are allotted to this Working Circle. Management intervention such as artificial regeneration, felling of the matured crop including dead, dying, diseased, wind fallen, top and mid broken trees and artificial regeneration of commercial long rotation high value species, short rotation high yielding species, fuel wood species, soil moisture conservation works are taken up in this working circle.

Forest Protection and Bio-diversity conservation (Overlapping) Working Circle

Forests of Karimganj Division are under tremendous pressure from encroachment, illicit felling, grazing besides other anthropogenic activities like Coal mining etc. As per Land use change analysis, significant forest area has been lost during last couple of decades. It is need of hour to protect the last vestiges of the biodiversity hotspot checking further shrinkage. From the view point of forest protection, this working circle shall include entire forest area of the Division. Such areas shall not be worked for timber or other NTFPs but shall be preserved by providing highest degree of protection. These areas should be seen as the ones which sustain the flow of ecosystem services to the fringe forest areas/JFMC areas as well as to the non-forest areas. Hence, it becomes absolutely essential to keep the core of the forest areas/ representative ecosystems intact and free from human disturbances. After many years in future, when the ecosystem starts functioning again at its peak productivity, sustainable extraction

from these forests may be allowed. Till that time, these forests shall function as nature's laboratories, which will keep on imparting insights about the functioning of the nature, to a keen observer.

The objective of the Working circle is not only to protect the existing forests but also to clear the encroached areas for restoration of the forests as per the rules and regulations in vogue. Ejection of encroachers is no doubt an uphill task for the present-day administrators simply because of the whooping extent and magnitude of the problem. It requires an all-out effort from all government departments such as Revenue, Police, Forest, Paramilitary, Judiciary etc. There is every need to revise certain policies to begin thinking in the direction of rehabilitation of such a huge number of encroachers to suitable places with attractive compensation package.

NTFP and Bamboo overlapping Working Circle

The NTFP working circle shall comprise largely of fringe forest areas or such other areas, which according to WPO, are fit for extraction of a particular NTFP at a rate, prescribed by him, that does not lead to the long term decline of the biological diversity so as to maintain its potential to meet the needs and aspirations of present and future generations.Therefore, the WPO will prescribe appropriate steps such as closure of an area for the collection or extraction of particular forest produce for a specified period (closed area); restricting or banning the collection or extraction of any forest produce for certain period or periods of a year (closed season); limits on quantities of any forest produce to ensure sustainable harvesting for the future (sustainable harvesting limits); sustainable harvesting/ collection practices etc. NTFPs shall be managed on JFMC areas, fringe forest areas, community forest areas with the help of community after imparting proper training to them regarding time of harvesting, grading and storage for sustainable management and value addition etc.

The Karimganj Forest Division consists of various NTFP such as Cane, Broom, Sukchini, Gandhi Root, Ekra, Patidoi, Kittapata, Honey, Satkora, Chalmugra, Nageswar along with the various medicinal and aromatic plants. The NTFPs are extracted through Mahal system. There are three such MFP Mahals. Mohal No.1 covers Singla RF & Adarkuna PRF under Cheragi & Sadar Range, Mohal No.2 covers part of Badsahi Tilla RF & Duhalia RF under Cheragi, Lowairpoa & Duhalia Range and Mohal No. 3 covers whole of Longai RF under Lowairpoa Range. The departmental extraction of various important NTFPs over the past few years is shown below. It can be seen that the quantity extracted for various NTFPs is decreasing over years, largely due to decreasing productivity.

In continuation of previous Bamboo plans, this working circle aims at the production and harvesting of high quality bamboo on a sustainable basis. Earlier there was separate Working Plan for Bamboo Working Circle for whole Barak valley (Cachar, Karimganj and Hailakandi divisions) which expired during 2008-09. But, now the Bamboo Working Circle is being proposed here and it will be a part of this Working Plan. All the poorly stocked bamboo bearing areas, particularly in the fringe areas, shall be restocked with indigenous and commercially harvestable species. Efforts shall be made to extract bamboo from the difficult to work areas included as parts of prescribed felling series. The working circle should not only meet the demands of Cachar Paper Mill, Households, Crafts and Cottage Industries but also provide proper facilities for processing, storing and marketing of the bamboo. The felling series adopted during previous plans shall continue for this plan period as well. The Longai

felling series consists of Longai RF, part of Badshahi Tilla RF, Tilbhum RF and Patharia Hills RF. The Singla felling series consists of Dohlia RF, part of Badshahi Tilla RF and Singla RF. It is needless to mention that bamboo can replace timber in most of its uses. The main objectives of this working circle are:

- To improve the bamboo forests of the Barak valley by adopting sound silvicultural system.
- To obtain maximum sustained yield of bamboo to meet the requirements of cottage industries and domestic use.
- To harvest the mature bamboo in the felling series by coupe system.
- To raise plantations of bamboo and other high yielding pulpwood species for reduction of pressure on the reserved forests.

Soil and Water Conservation (overlapping) Working Circle

The effective soil conservation measures along with the catchment and watershed management are the pre conditions for a sustainable forest management. The forests are also sources of water (surface, sub-surface and ground water). Over exploitation of the ground water resources results in a decline in ground water levels; there is an urgent need to augment the ground water resources through suitable management interventions. It is desirable to have forest management practices dovetailed with the principles of watershed based development approach especially in the source areas of water. Such areas should have restrictions on tree felling but there should be operations to improve the water regimes and natural regeneration. Many water streams originate from the R.F.'s of the division and many streams and rivers originated from other states pass through the R.F.'s of this division. There are 2 major wetlands, namely, Sonbeel and Ratabeel, and 25 small water bodies within the reserve forests of the division.

Wildlife Management (overlapping) Working Circle

Zoo-geographically this division lies on the traditional zone between Indian Sub Region and Indo-Chinese sub region of oriental region. As a result, there is intermingling of species of both regions. Though previously this region was very rich in diversity of its wildlife, at present the diversity has reduced. There is a need to conserve biodiversity of the region. Biodiversity represents diversity of life forms. It includes diversity within species, among species of an ecosystem and among ecosystems. The contribution of individual species to the overall diversity within a community or ecosystem varies to a great extent. The coexistence of organisms that differ widely from each other contributes more to overall diversity than the co-existence of very similar species. Functional diversity is considered to be one of the main factors determining the long-term stability of an ecosystem and its ability to recover from major disturbances. Assessment of status of plant and faunal species and their periodic monitoring can be helpful in formulating strategies for conservation, maintenance and enhancement of overall biodiversity through sustainable management and use practices. Assessment of biodiversity especially the lower forms of life (algae, fungi, lichens, epiphytes, parasites, etc.) of a forest division must be made an on-going programme with the support from State Biodiversity Board as it may be difficult for the working plan officer (WPO) to do it within two years, the normal time allotted for writing the plan.

Karimganj Division has created 9 (nine) Nos. of Bio-diversity Management Committees at Anchalik Panchayat level in the revenue areas of the district. A district level meeting on

Awareness Generation and related activities was held on 12-06-2014. With a view to implement the provisions of Assam Bio-diversity Rules, 2010 a Technical Support Group has been constituted with Deputy Commissioner, Karimganj as its Chairman. Preparation of People Bio-diversity Register (PBR) is under process.

1.4 Period of working plans and necessary for intermediate revision

The period of working plan will be for 10 years i.e. from 2022-23 to 2032-31. A midterm review of the working plan should be undertaken for mid-course correction by the consultative committee under the chairmanship of PCCF (HoFF) with representation from RAPCCF (MoEF). Similarly, based on the performance of the WP prescriptions the plan period may be extended up to 5 years beyond the stipulated plan period by designated authority on the recommendations of the standing consultative committee authorized for this purpose.

Implementing Authority

The Divisional Forest Officer, Karimganj Forest Division is the principal implementing authority of the Working Plan. Range Officers of various Ranges under the Division, Beat officers assisted by all subordinate Officers and staffs are also equally responsible for implementation of the Working Plan in their respective Ranges and Beats.

Fund

Fund for implementation of the prescriptions as estimated and as required shall be allotted by the Government from the State Plan (SOPD) and Non-Plan head. Other fund like CAMPA,EAP(APFBC,JICA),World Bankaid or any other fund may also be utilized.

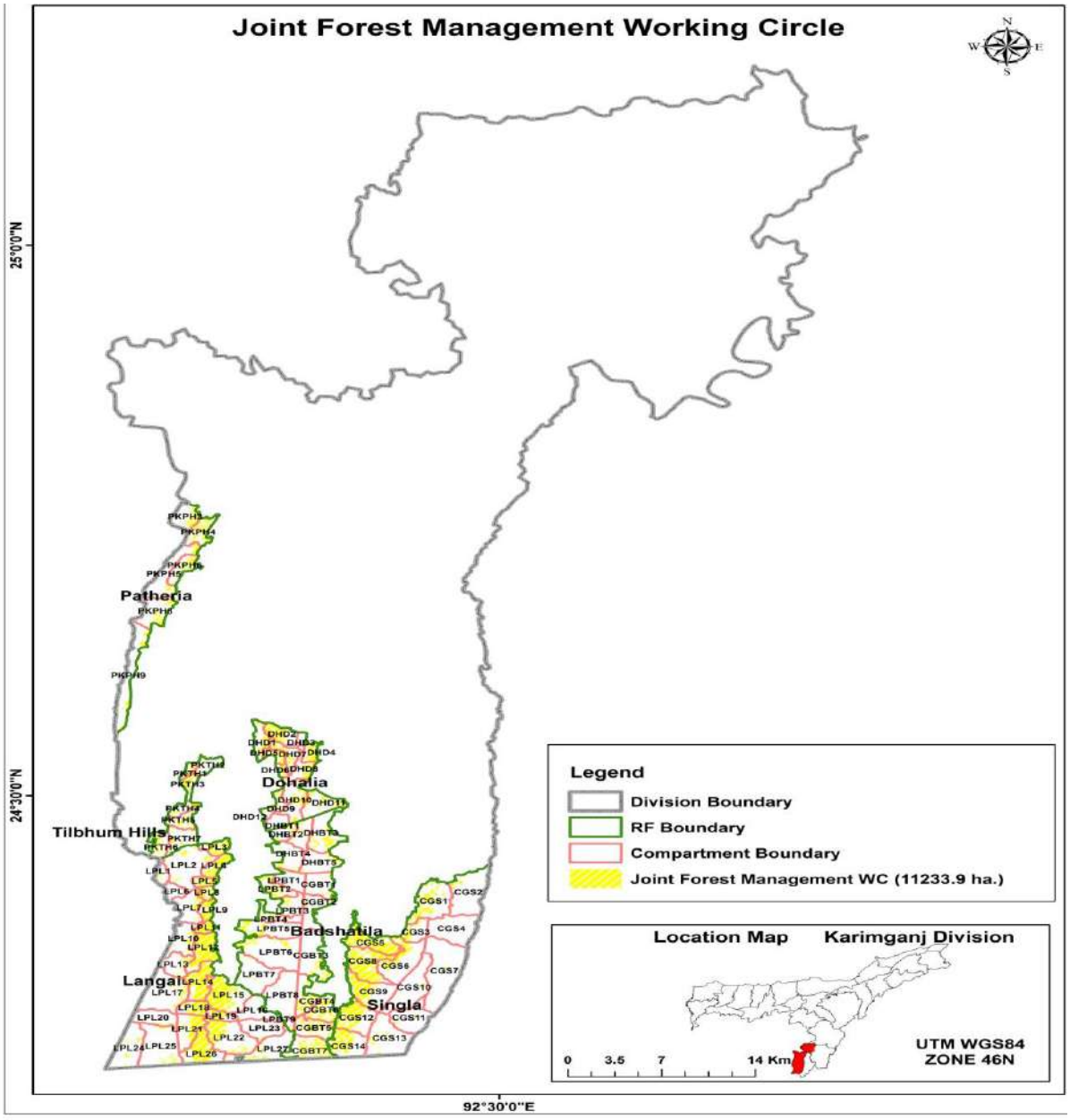
CHAPTER 2

Joint Forest Management Working Circle

2.1 Name of the Working Circle

Joint Forest Management Working Circle. The detail map of this working circle is shown in Plate 14.1.

Fig. 14.1. Joint forest management working circle map of Karimganj Division



2.2 General constituents of the Working Circle

JFM is a concept, which is based on the principle of rights of local communities in forests, a mechanism to manage the forest that is owned by the State but appropriated by local communities, also an approach involving the evolution of a very complex property rights regime to generate a sustainable interface between the Forest Department (FD) and the local community and it is a possible way through which the interests of people and of long term sustainability are harmonized in a mutually supporting manner.

Prior to 1988, the forest management objectives were commercial forestry & revenue generation. But the 1988 Forest Policy envisaged for conservation of soil and environment, subsistence requirements of the local people etc. Thereafter, the Government of India issued guidelines on 1st June, 1990 and adopted Joint Forest Management under the National Afforestation Programme for conservation of forests with clearly identified duties and functions for ensuring protection of forests. The policy was motivated by a desire to both reduce environmental degradation and also reduce rural poverty.

This working Circle can play the pivotal role for the success of the rest of the working circle towards achieving the objectives. The joint Forest Management is sharing the responsibilities under legal frame of the Rule namely "The Assam Joint (Peoples Participation) Forestry Management rules 1998 by executing the Memorandum of understanding. The concept of this working Circle will be participatory approach and shall include the entire existing plantation raised under JFMC's in different scheme like NBM, NAP etc. The areas allotted under this Circle is nearby the JFMC beneficiaries and the total area allotted to each of the JFMC are reflected in the below table. The allotted figures of area and number of household along with the plantation already created by the respective JFMC can assess the magnitude and dimension of their participation and further land also available for creation of plantation.

The microplans of the JFMCs constituted in Karimganj division include activities such as creation of fuel wood, NTFP, aromatic and medicinal plantations depending upon the need and expectations of the people. Important entry point activities such as construction of community halls, repairing of school buildings, construction of Ring wells & installation of tube wells for drinking water etc. have been taken up. Implementation of several other income generating activities like Bee-keeping, *Agarbatti* stick making, bamboo mat making, weaving etc. have been done through SHGs to demonstrate the seriousness of department to involve people as partners in sustainable management of forests.

Preliminary consultations with the JFM Committees and Forest Development Agency, as mandated by the NWPC 2014, have been done. The aspirations of people resulting from the consultations are summarised below:

- Requirement of fuelwood for local people may be addressed.
- Intercropping of medicinal, aromatic plants, herbs and shrubs may be allowed between the plantation rows.
- Encouragement to traditional, cottage industries and other non forest based income generating activities for economic upliftment of poor people.

- Revision of The Assam Joint (peoples' participation) Forestry Management Rules 1998, with regards to, benefit sharing from final felling of trees. At present there is a provision of 25% share to JFMC members, from final felling which should be increased to 50%.
- Rationalisation of wage rate in forestry activities in comparison to non forestry activities in private sector.

2.3 General Characteristics of Vegetation

Hill type

This type occurs on the hill ridges. Muli bamboos come up as a colonizer in abandoned jhum areas. All the open areas are attacked by weeds. Some hillocks have been invaded by thatching grasses as well.

The species occurring in this type are Gamari (*Gmelina arborea*), Cham (*Artocarpus chaplasha*), Garjan (*Dipterocarpus turbinatus*), Sundi (*Michelia mentena*), Hatia (*Chikrasia tabularis*) (*Bogi Poma*), Poma Cedrela toona (*toon*), Gondroi (*Cinnamomum glanduliferum*), Jhawa (*Holigarna longifolia*), Rata (*Amoora wallichii*), Tarua (*Endospamum chinensis*), Jinari (*Podocarpus nerrifolia*), Jam (*Eugenia species*), Bohera (*Terminalia bellerica*), Kayengla (*Garuga pinnata*) and many other species as well. This hill type area is heavily encroached by the tribes who practice jhum cultivation and deciduous conditions have invaded these areas.

Low Hill type

This type of forest is confined to small hills and on the slopes along the streams. The stretches next to the streams are mostly covered by growth of bamboo. The higher ridges in some areas have been planted with *Teak (Tecktona grandis), Gamari (Gmelina arborea)* and misc. species.

The tree species naturally found in this type areas are Tula (*Tetrameles nudiflora*), Kadam (*Anthocephalus cadamba*), Madhubura (*Petrosprmum accerifolium*) (*Hati polia*), Jam (*Eugenia species*), Awal (*Vitex pedunculoris*) (*sila titu*), Kurta (*Palaquium polyanthus*), Nageswar (*Messua ferrae*) (Nahar), Chailta (*Dillenia indica*), Ramdala (*Duabanga sonneratiodes*), Hortaki (*Terminalia chebula*), Hatia (*Chikrasia tabularis*) (*Bogi Poma*), Poma Cedrela toona (*toon*), Ping (*Cynometra polyandra*), Rata (*Amoora wallichii*), Boroi (*Zigyphus zuzuba*) etc.

Alluvial type

This type occurs on the flat lands of major streams and rivers. The soil is acidic in nature. Most of such

tracts have either been allotted as forest villages or are encroached upon by people for cultivation. Few tree species such as *Tula (Tetrameles nudiflora), Simul (Bombax ceiba) (cotton tree), Bohera (Terminalia bellerica), Jam (Eugenia species), Ramdala (Duabanga sonneratiodes), Kadam (Anthocephalus cadamba), Chalmugra (Hydnocarpus kurzii)* etc. are scatterly found.

Swamp type

This types occurs in the eco-tone zones where the hill ranges merge with the alluvial flats. Growth of *Cane, Tara, Ekra (Arianthus raveneac)* mixed with species such as *Jarul (Lagerstroemia flosreginae), Paruli (Stereospermum chelonoides)* are also found. Silted belts on the periphery and low swamps also support such type of vegetation.

Bamboo brakes

A considerable forest tract of the Division is covered by bamboo. Pure bamboo brakes also occur in the abandoned jhum areas. The most important species is non clump forming species *Melocanna baccifera*. It occurs as pure crop or as under storey in open tree forests. *Melocanna* grows best on the hill slopes having good drainage. It cannot withstand water stagnation. In those areas, the most common species is *Dendrocalamus hamiltonii*. Other important bamboo species are *Teinostachyan dullooa*, *Oxytenanthera nigrociliata*, *Bambusa balcooa*, *Bambusa auriculata*.

Cane brakes

Four important species of Cane occur in this Division. These are *Golla (Demonorps jenkinsianus)*, *Mona*, *Jalliad (Calamus tenuis)*&*Sundi (Michelia mentena)*. The scope for commercial exploitation does not exist, as the areas are few & far between. If steps for its conservation are not taken, the various cane species may disappear altogether from the forests of the Division shortly.

2.4Compartments and JFM areas

Compartment allotted for JFMC Working Circle is as per criteria mentioned above. Felling series are not formed. The microplans prepared for the area allotted to a particular village of JFM committee shall be inconsonance with the prescriptions given for that area under this working plan. Any deviation from the plan requires permission of the competent authority. A total of 11233.94hectare area is allocated under this working circle. RF's and compartment and the area to be covered in this working circle is provided in the table 2.4.a

Table 2.4.a: Compartment wise area allotted for JFMC Working Circle

Name of the RFs	Compartment No.	Area in Hectares	Area allotted in JFMC WC
Badshatila	CGBT3	863.65	90.00
Badshatila	CGBT4	443.70	150.00
Badshatila	CGBT5	526.30	200.00
Badshatila	CGBT6	447.12	230.00
Badshatila	CGBT7	646.45	245.00
Badshatila	DHBT3	723.84	130.00
Badshatila	LPBT2	370.54	100.00
Badshatila	LPBT3	338.51	60.00
Badshatila	LPBT4	302.82	50.00
Dholai	DHD1	336.57	105.00
Dholai	DHD2	367.47	215.00
Dholai	DHD4	206.91	130.00
Dholai	DHD5	166.69	105.00
Dholai	DHD6	90.29	35.00
Dholai	DHD7	319.99	100.00
Dholai	DHD8	364.92	105.00
Dholai	DHD10	610.70	160.00
Dholai	DHD11	563.33	120.00
Longai	LPL3	252.54	145.00
Longai	LPL4	280.93	195.00

Longai	LPL5	176.52	125.00
Longai	LPL8	148.46	100.00
Longai	LPL9	200.45	150.00
Longai	LPL10	563.28	70.00
Longai	LPL11	146.02	140.00
Longai	LPL12	582.64	400.00
Longai	LPL14	577.39	400.00
Longai	LPL15	881.57	500.00
Longai	LPL18	306.85	200.00
Longai	LPL19	196.07	100.00
Longai	LPL21	555.21	225.00
Longai	LPL22	991.49	315.00
Longai	LPL26	685.26	400.00
Patheria Hills	PKPH3	1931.77	105.00
Patheria Hills	PKPH4	417.07	200.00
Patheria Hills	PKPH5	1019.75	120.00
Patheria Hills	PKPH6	361.26	115.00
Patheria Hills	PKPH8	715.48	135.00
Patheria Hills	PKPH9	1318.08	100.00
Singla	CGS1	950.66	200.00
Singla	CGS3	355.78	90.00
Singla	CGS5	663.00	500.00
Singla	CGS6	928.86	230.00
Singla	CGS8	830.40	600.00
Singla	CGS9	827.06	325.00
Singla	CGS12	753.44	300.00
Singla	CGS14	690.62	285.00
Tilbhum Hills	PKTH1	106.77	50.00
Tilbhum Hills	PKTH2	263.47	50.00
Tilbhum Hills	PKTH3	184.61	80.00
Tilbhum Hills	PKTH4	193.44	50.00
Tilbhum Hills	PKTH5	294.89	100.00
Tilbhum Hills	PKTH6	334.74	65.00
Tilbhum Hills	PKTH7	443.87	60.00
			9555.00

JFM Committees

There are 62 JFMCs in the fringe villages of the Reserve Forest under Karimganj Forest Development Agency, as shown below:

Sl. No.	Name of JFMC	Name of R.F.	No. of family	Area allotted
1	Karikhai JFMC	Longai RF	42	150.00
2	Piplacherra JFMC	Longai RF	214	100.00
3	Piplapunjee JFMC	Longai RF	158	150.00
4	Jacobnagar JFMC	Longai RF	84	100.00
5	Nilkantapur JFMC	Longai RF	96	100.00
6	Baliapunjee JFMC	Longai RF	141	105.00

Sl. No.	Name of JFMC	Name of R.F.	No. of family	Area allotted
7	Rangamati JFMC	Longai RF	107	100.00
8	South Magura JFMC	Longai RF	87	95.00
9	North East Jherjheri JFMC	Badsahi Tilla RF	156	100.00
10	South East Jherjheri JFMC	Badsahi Tilla RF	146	80.00
11	Samboonagar JFMC	Longai RF	165	120.00
12	Old Solamona JFMC	Longai RF	123	110.00
13	Magurapunjee JFMC	Longai RF	138	95.00
14	Hailamcherra JFMC	Duhalia RF	103	110.00
15	Lalcherra JFMC	Duhalia RF	158	150.00
16	Gajitilla Awalala JFMC	Duhalia RF	74	140.00
17	Jagannathpur JFMC	Duhalia RF	96	300.00
18	Bethubari Muliala JFMC	Duhalia RF	139	150.00
19	Muliala JFMC	Duhalia RF	94	150.00
20	East Lowaiapoa JFMC	Duhalia RF	124	150.00
21	East Pacharghat Koilaghat	Duhalia RF	108	150.00
22	Balia Daluacherra JFMC	Duhalia RF	120	380.00
23	Pacharghat JFMC	Duhalia RF	83	200.00
24	Katabari JFMC	Duhalia RF	124	250.00
25	Baithakhal JFMC	Duhalia RF	99	150.00
26	Bijoypur JFMC	Singla RF	115	195.00
27	Lalgenai JFMC	Singla RF	31	140.00
28	Hempur JFMC	Singla RF	184	140.00
29	Bhutukuchi JFMC	Singla RF	19	140.00
30	Kishoripur JFMC	Singla RF	25	100.00
31	Baruatilla JFMC	Singla RF	25	150.00
32	Kakurapunjee JFMC	Singla RF	35	150.00
33	Akshaypur JFMC	Singla RF	27	150.00
34	Bhutucherra (D) JFMC	Singla RF	50	195.00
35	Bhutucherra (M) JFMC	Singla RF	48	100.00
36	Birojapur JFMC	Singla RF	62	175.00
37	Rongpur JFMC	Singla RF	46	140.00
38	Cheraginagar JFMC	Singla RF	39	140.00
39	Boro Bubirbond JFMC	Singla RF	55	175.00
40	Bhutucherra (T) JFMC	Singla RF	28	200.00
41	Mohangool Chipacherra	Patharia Hills RF	58	160.00
42	Sonatola Pt-I JFMC	Patharia Hills RF	98	160.00
43	Ujan Bilbari Satkoragool	Patharia Hills RF	75	140.00
44	Sadhukuti JFMC	Tilbhum RF	86	140.00
45	Patharia ‘B’ Block JFMC	Patharia Hills RF	42	100.00
46	Dubri JFMC	Patharia Hills RF	91	150.00
47	Dumabari JFMC	Patharia Hills RF	89	135.00
48	Kurtacherra JFMC	Patharia Hills RF	60	200.00
49	Ujan Dhalcherra Vitorgool	Patharia Hills RF	59	200.00
50	Uttarkeuti Sonatola JFMC	Patharia Hills RF	70	150.00
51	Manikbond Mahi JFMC	Longai RF	173	130.00
52	Manikbond Punjee JFMC	Longai RF	153	130.00
53	Dewali JFMC	Longai RF	97	120.00
54	Noorkha JFMC	Longai RF	106	160.00
55	Balipipla JFMC	Longai RF	117	125.00

Sl. No.	Name of JFMC	Name of R.F.	No. of family	Area allotted
56	Rajendrapur JFMC	Singla RF	20	150.00
57	Dukhipur JFMC	Badsahi Tilla RF	76	150.00
58	Paschim Singla JFMC	Badsahi Tilla RF	80	230.00
59	Jugicherra-Sobri JFMC	Longai RF	89	200.00
60	Sakalpur JFMC	Badsahi Tilla RF	101	200.00
61	Srirampur JFMC	Badsahi Tilla RF	46	300.00
62	Tilbhum JFMC	Tilbhum RF	69	150.00
Total			**5623**	**9555.00**

2.5 Special Objective of management

Economic objective: JFMC is a production farm where cultivation of various forestry crops is practiced. This Working Plan will allow practice of horticulture crop, agro-forestry cash crop, animal husbandry, bee keeping etc. for economic development of rural people. Agarwood (*Aquilaria agallocha*) cultivation which can bring a drastic change of the rural economy is proposed. The land for growing such crops shall be shared by the forest department.

Social objective: Uplifting socio-economic condition of rural people by providing employment and catering their need for firewood, timber, NTFP etc. sharing forest management practices and empowering village community shall be other agenda.

Conservation objective: Ensuring involvement of rural people in JFMC programmes will give a positive impact on forest conservation. The usufruct benefits gained out of farming in forest land is reciprocated by the rural villages in the form of helping hand for forest conservation.

Otherobjectives of management under this working circle shall be:

- To convince the people living in and around forests and fringe forest areas, that the Forest Department is committed to work for their welfare.
- To carry out detailed socio-economic surveys in every JFMC/fringe village to accurately assess the dependency of people over forests in terms of timber and other NTFP.
- To afforest the degraded areas/ compartments allotted to various JFMCs to scientifically meet the above assessed demand both in short and in long terms.
- To document the indigenous traditional knowledge and incorporate the same in the micro-plans of the JFMCs.
- To assess the possibility of converting these areas into production areas in the long run, as envisaged by the NWPC, 2014.
- To provide income support to JFMCs by helping them in raising intercrops of naturally occurring, marketable varieties of various medicinal and aromatic plants within the allotted JFMC areas.
- To associate the people of JFMCs with identification, documentation and implementation of ecotourism activities.
- To analyse the past working of JFMC and suggest suitable policy modifications required for more effective functioning of JFMCs.
- To win over people so that they become willing partners in protection of forests both within and outside the JFMC areas.

- To involve local people (by introducing JFM principles as outlines by Govt. of Assam vide Notification No. FRW,8/93/75 dated 10th November 1998, (*Annexures*) protection, maintenance and creation of plantations, by forming Forest Protection and Regeneration Committee of the willing villagers of the adjacent villages.
- To develop the degraded forest resources by promoting natural and artificial regeneration (through plantation activity) with active participation of the villagers. It also aims to provide effective protection.
- To empower village communities to play a crucial role in forest resource conservation and enable them to resolve their issues and problems.
- This JFM approach should be widely applied even at places were formal JFM committees have not been constituted.
- JFM should be evolved on the basis of its capacity to generate sustainable employment.

2.6 Treatment prescribed for JFM

In the system of JFM the forest staff must know the principles and approach of JFM. The first and foremost thing is to convince the local people about the importance of forestry and their role in meeting daily needs of them. The villagers who are willing to take part in JFM programme a memorandum of understanding shall be signed. DCF of Karimganj Division shall prepare Microplans for the area to be assigned to concerned JFM Committee as provided in the The Assam Joint (Peoples Participation) Forestry managementRule-1998 and guidelines issued by Govt. of India from time to time.

- The microplan prepared for the particular village shall be in consonance with the prescriptions contained in Working Plan, the microplans shall be sanctioned by competent authority.
- The assigning of forest area to JFM committee and execution of works shall be strictly in accordance with the guidelines issued by Government of India as well as Government of Assam.
- MOU shall be signed regarding forest area assigned to JFM Committee and there should not be any ambiguity in terms and conditions.
- The area allotted to JFM committee should be shown on the map and incorporated in the memorandum of understanding.
- The Micro Plan should be prepared with active involvement of members of JFM Committee on scientific lines and the site specific estimates shall be prepared for the works which would be taken up and sanctioned by competent authority before implementation.

2.7 Activities to be taken up

JFM Committees should be involved to take up the under mentioned activities in the area assigned to them.

(1) Stringent protection of forests allotted to JFM committee.

(2) Active participation of members of JFM committee in protecting, improving and developing forests.

(3) Protection of forests from illegal felling, grazing and encroachment, collection of NTFP on scientific lines or non- destructive collection methods.

(4) Helping forest officials in patrolling and enforcement of law for forest protection. For protection of forests from grazing, integrated efforts should be taken to improve the

breed of cattle so that, the income may be increased with less number of cattle. In this regard the Rural Development and other departments should be requested to help the JFM committees. The forest officials will have to play the role of facilitator for implementation of various development works. Necessary legal and moral help should be provided to members of JFM Committee for the protecting forests from illicit felling, encroachment, grazing, fire protection etc.

2.7.1 Active cooperation and participation of people

It is the duty and responsibility of forest officials to create awareness among the members of Forest Protection Committee as well as villagers about the importance of forests, its intangible benefits and protection of the forest from fire, illicit felling, encroachment, grazing, etc. The active participation of local people must be encouraged in management, protection and developmental activities of the forest assigned to them. For achieving effective results in this regard it is required to take up regular efforts like conducting meetings, workshops and exposure visits to successful areas shall be arranged to explain about the protection of forests and achievements in other villages. A comprehensive protection scheme shall be prepared and explained to JFM members for prevention and protection of forest from any destructive factors. The Forest Protection Committee's members shall be made to aware of their duties and responsibilities to have their active participation in the protection and management of the forests. The produce obtained from the assigned areas will play an important role for the improvement of economy of JFM members as well as restoration and improvement of the forest area.

2.7.2 Role of Forest Officials

The role of forest officials in implementing of JFM is as the facilitator as given below.

(1) Providing technical inputs and support for the activities under JFM and ensure implementation of scientific forest management.

(2) Creation of awareness amongst the members of JFM Committee about the role and various benefits available.

(3) The forest officials shall act as facilitators for implementation of various development activities by other departments.

(4) The responsibility and benefit of local people should be thoroughly briefed by forest officials. JFM requires strong institutional capacity to make collaborative efforts for forest protection and make it successful in getting the economic returns and regeneration of the forests. Therefore the forest officials have to take adequate measures and precautions in formalising participatory management.

2.7.3 Sharing of benefits

Usufruct sharing mechanism under this working circle will include as per the following govt.rules:

a) Full share of NTFP collection.
b) Full share in the harvest of timber in plantation raised byJFMC
c) Share in proportion to the period of management in high forests managed byJFMC
d) 50% of net revenues to be reinvested in forestry works - a step towards sustainability of JFMCs.

2.7.4 Proposed activities under JFMC workingcircle:

1. A very ambitious plan which can bring a drastic change in rural economy is thought of. Cultivation of Agar wood trees (*Aquilaria agallocha*) through JFMCs at strategic areas creating a buffer belt to protect the forest is intended to be materialized. The areas through which men and cattles trespass into the forest and cause damage including illegal felling, lopping, grazing and also encroached shall be taken up for Agar wood cultivation. This will create a barrier around the core forest areas and will protect the forestry species (trees) and forest land from encroachments besides uplifting socio-economic condition of rural community.
2. Raising of grafted fruit plants in forest areas, nearby fringevillages.
3. Raising of fast growing timber yielding species such as Azar, Tita sopa, Kadam, Bandordima, Hatipoliya, etc. endemic to thedivision.
4. Raising of firewood species - Kadam,Simalu.
5. Development of nurseries for local forest species with technical guidance from the forest department.
6. Training on bamboo and cane based skill development training for providing employment opportunities.
7. Developing participatory catchment area treatment plans in area under Karimganj Division along the catchment of River Burhidehing. DFO should conduct field investigations and initiate watershed development projects. Looking at the socio-cultural conditions in that area promotion of fishery, poultry with compulsorily forestry activities in the JFMC villages be initiated under the watershed projects.
8. Developing medicinal plants saplings and its plantation on theirhomesteads.
9. As entry point activities promotion of improved cooking mechanism - biogas, improved chullas,solar lamps etc.
10. Eco-tourism activities shall be developed in the Eco-tourism spots mentioned in chapter 8, para 8.6 (Part-I)
11. Promotion of raising Trees outside forests.

2.7.5 Additional Prescriptions under JFMC workingcircle

i) Forest department staffs with active participation of JFMC shall conduct PRA exercises and develop microplans for socio-economic upliftment and livelihoods development of the local people. This microplans needs to be submitted to DFO for technical feasibility for final approval of the microplan as per the available government schemes and any other funders norms. Before implementing the project Government orders, any amendments to be strictly followed.

ii) There should be monthly review meeting of the JFMCs under the Chairmanship of JFMC president. Range Forest Officer should attend meeting at leastquarterly.

iii) NTFPs to be collected and sustainably harvested from forest fringe areas under the JFMC and shall be sold by the concernedJFMC.

iv) Continuous efforts should be made to create and sustain the JFMC movement by creating required awareness among the people and the staff through trainingprogrammes.

v) Agroforestry plantations should be carried out in the encroached areas through the JFMC. In between tree lines ginger, turmeric and other medicinal herbs should becultivated.

vi) JFMC areas to practice minimum tillage, organicformulations.

vii) As entry point activities, development of roads, community hall, culverts, fibre

boat/machine boat as per the technical feasibility, for carriage and transportation, construction of drinking water facilities, if mentioned in the microplans.

viii) System of rice intensification ensures higher productivity with optimum utilizing the resources, may be promoted in JFMC cultivated paddy fields to increaseproductivity.

ix) Establishment of biogas plant as an entry point activity based on themicroplans.

x) JFMC plantation assistance will be released as per the standard government norms, funder norms based on the survival of theplants.

xi) The forest areas and plantations under the control of Joint Forest Management Committee (JFMC) should be mapped out clearly and necessary records maintained in the Beat, Range and DFO office. While doing so, the provisions of guidelines and resolutions of Govt. of Assam may be followedstrictly.

xii) It is considered necessary that the requirements of the members of JFMCs relating to fuel wood, fodder, bamboo, thatch and other non-wood Minor Forest Products is to be met from the forests free of cost as per govt.circular.

xiii) It is felt necessary that a leadership should be developed from amongst the committee members for Joint Forest Management. Assistance from local NGOs (if available) may be obtained. Each JFMC should closely interact with the village Panchayats in the interest of forest protection and for all round development of the landresources.

xiv) JFMC members may be consulted in choosing the species to be planted, keeping due regard to the biodiversity of the area and silviculturalsuitability.

xv) It is necessary to start a publicity campaign for motivating the people for JFM. It is necessary that in DFO's office a separate section may be opened for monitoring the JFM activities in the Division. For better exchange of ideas between different committees a co-coordinator may be appointed by the DFO from amongst the staff for holding experience sharing meeting. Local NGO's, club may be involved in thisprocess.

xvi) It is considered necessary that the skills of local committee members are required to be harnessed for different arts and handicrafts techniques. Arrangements for necessary training for the beneficiaries may be undertaken through link up with otherdepartments.

xvii) Soil and land development works may be undertaken in forest areas. Water harvesting structures may be constructed for soil and water conservation andfisheries.

xviii) The committee members should interact frequently with each other in order to share their experience. Team of JFMC of each Division should visit other successful works done in otherareas.

xix) Whereas, demand of planting trees on private land is increasing, the JFMC members may be allowed Social Forestry benefits on their individualland.

xx) Whereas, the involvement of women in the functioning of those committees is necessary, more & more women should be encouraged to become member of the committees.

xxi) Whereas, it is felt that the population pressure on forests is increasing and it is desirable that the JFMC members should be mobilized for adopting small family norms. JFMC may be supplied with medicines and other family planningdevices.

xxii) The JFMC members should have a meeting place. A community hall may be constructed for use of the JFMCmembers.

xxiii) The Micro Plan is to be prepared for each of the areas covered under JFMC by involving Executive Committee and other members of the JFMC. The Micro Plan' would contain all the prescriptions for management, development of the concerned area including flow of

usufruct benefits from NTFPs and short rotation timber species to the beneficiaries. The Micro - Plan should have inconformity with National Forest Policy and Forest ConservationAct.

xxiv) After formulation of the aforesaid Micro-Plan, it is to be approved by concerned JFMC General Body meeting and also by competent authority of the Forest Department. After approval and adoption of concerned Micro Plan, the prescriptions contained in the Micro-Plan would be deemed to have super ceded the Working Plan of that area to thatextent.

xxv) A Divisional Level Review Committee (DLRC) may also be constituted with DFO as the Chairman and concerned Forest Range Officers and Beat Officers as members to review the working of different JFMC under theirjurisdiction.

xxvi) No new human settlement in any part of the Reserve Forest should be undertaken, whether under JFM or village grouping or under jhum control scheme or any other scheme except after obtaining clearance under Forest (Conservation) Act1980.

2.7.6 Targets of achievements

Targets of achievements are-

1. To establish 5 nos. community forest nurseries having 1,00,000 seedlings each

Plantation 10% of total allotted area of 11233.94 = 1125.00 hect.

2. Maintenance of 1125.00 x 5 years
3. JFMC training and awareness programmes (*4 programs twice a year for ten years, each programme 30 persons*).
4. 40 training programmes.
5. 40 awareness camp.
6. **Ecotourism activites**

Year-wise physical target of achievement:

Prescribed activity	**Physical target over a period of ten years**									
	Y1	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Estd of 62 nos. community forest nurseries having 50,000 seedlings each	62	Maintenance of Nursery with 50,000 seedling production each year.								
Plantation 1125 hectares as production forest.	115	115	115	115	115	115	100	105	115	115
Joint Forest Management Working Circle (Maintenance) 2550 hect.	-	115	230	345	460	575	575	560	550	550
JFMC training and awareness programmes (*4 programs twice a year for ten years, each programme 30 persons*). a) 40 training. b) 40 awareness programme.	8	8	8	8	8	8	8	8	8	8

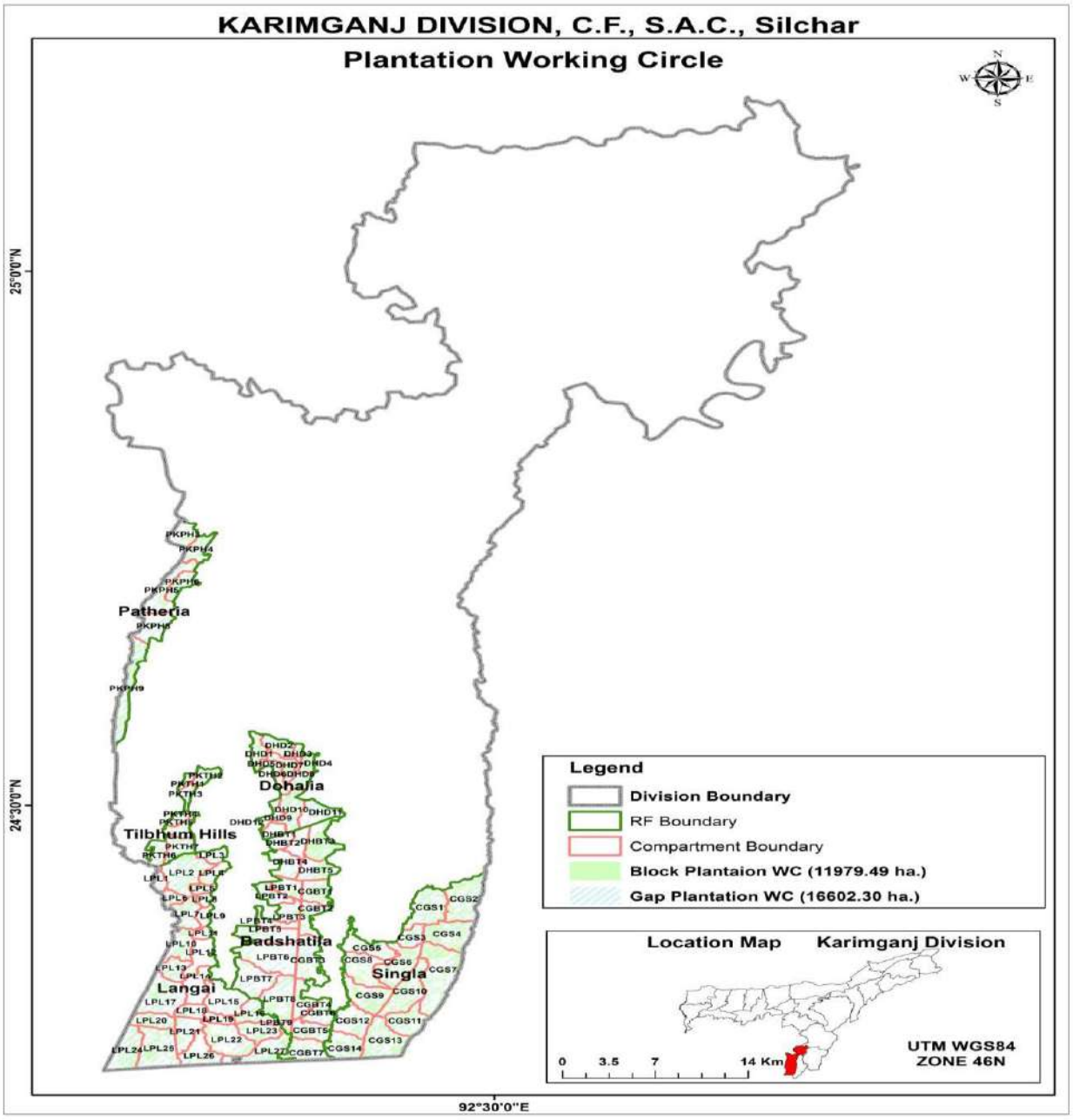
-SSS-

CHAPTER 3

Plantation Working Circle

3.1 Name of the Working Circle

Plantation working circle. The detail map of this working circle is shown in Fig 3.1



3.2 General Constitutents of the Working Circle

The working Circle jurisdiction and area shown in the map as collected from the Forest Survey of India. The Working Circle has been constituted after the careful consideration of previous Working Plan, past System of Management and Present Status of the Forest Area under proper filed verification and comparison. The each Working Circle having the unique management objectives and Methodology for achieving the objectives / target. The overlapping Working Circle spread over other Working Circle but without hampering the objectives of each other. This working Circle is an overlapping covering the areas like degraded, Jhum abandoned, Open/ moderate dense area, suitable pocket for ANR in the forest area and also the areas located outside the notified forest area but suitable for growing trees such as roadside/ riverside/ railway side/ embankment site/ Govt. Khas land/ Community land etc.

The forest area plantation shall have the plantation journals along with proper evaluation and monitoring but the outside forest area where trees will be grown also to be maintained record and specifically the private land owner plantation shall come under registration as provided by "The Assam Control of felling and removal of trees from non-forest land Rules-2002." The effort of such extension of tree cover in both the forest area and outside forest areas will not only enhance the production/ supply of timber but also carbon stocks and the Conservation of soil and water. Such creation of plantation can play the pivotal role under REDD towards mitigation of climate change.

3.3 General Characteristics of Vegetation

The vegetation of this are is mostly represented by tropical moist evergreen and tropical moist semi-evergreen forest types (Champion & Seth 1968). The forests of these compartments are relatively unexplored harbouring rich plant diversity. But due to rapid population growth and development activities, some parts of the forests are under huge anthropogenic pressure such as over exploitation of species for timber, fuel-wood, fodder, bamboo cutting, settlement etc. The floristic composition is one of the major anatomical characters of the forest community (Dansereau 1960). So it is very important to know the species composition and its distribution of these forests to take proper management strategies. A good number of scientific literatures are available on angiosperm flora of Assam (Kanjilal et al. 1934– 1940, Hooker 1872–1887, Rao & Verma 1969, 1976, Choudhury 1982, Dam & Dam 1984). For a modern floristic assessment, it is important to know the tree wealth of a forest along with their ecological amplitude as they are the backbone of any forest and provides the microclimate suitable for the survival of other small plants as well as animals.

Depletion of species number and frequency due to the different anthropogenic pressure are the main disquiet. Utilization of traditional knowledge and legal and full involvement of the local communities in conservation practices might be very effective to conserve the forests in this region. Despite of rich tree species diversity it provides various ecosystem services such as habitat to other species, carbon storage, carbon sequestration etc. and environmental benefits which needs further study.

The invasive alien plants are introduced to an ecosystem and extend their geographical occupancy with the potential to perturb the native vegetation. Phyto-sociological analysis revealed that the recorded plants belonged to 23 different families, 36 genera and 44 species. Amongst the recorded plants were noted as the aggressive and Ageratum conyzoides, Chromolaena odorata, Lantana camara Mikania micrantha noxious invaders. Therefore, further

ecological investigations are warranted to provide an insight into underlying invasion mechanisms. The results of such invasive-native interactions are prerequisite for formulating management strategies to safeguard the biodiversity of this study area lying in an Indo-Burma hotspot region.

3.4 Plantation Series

As the nomenclature "Plantation and Regeneration Working Circle" indicates that the activity of the Working Circle shall limited on plantation and regeneration, there shall not be any felling series or cutting section; and instead there will be Plantation Series. Table 3.4.a shows the plantation series.

3.5 Blocks&compartment allotment of areas

Blocks, compartment and the area to be covered in this working circle is provided in the table below. Compartmentwise detail is under the Plantation working circle is shown below.

Table 3.5: Area allotted in plantation Working Circle

Name of the RFs	Compartment No.	Compt. Area (Hect)	Area allotted in Plant WC
Badshatila	CGBT1	501.17	295.00
Badshatila	CGBT2	484.68	280.00
Badshatila	CGBT3	863.65	500.00
Badshatila	CGBT4	443.70	250.00
Badshatila	CGBT7	646.45	340.00
Badshatila	DHBT1	254.69	200.00
Badshatila	DHBT2	368.61	200.00
Badshatila	DHBT3	723.84	300.00
Badshatila	DHBT4	504.35	215.00
Badshatila	DHBT5	545.00	385.00
Badshatila	LPBT1	394.80	240.00
Badshatila	LPBT2	370.54	200.00
Badshatila	LPBT5	724.09	345.00
Badshatila	LPBT6	1214.47	400.00
Badshatila	LPBT7	863.87	350.00
Badshatila	LPBT8	948.48	620.00
Badshatila	LPBT9	81.25	50.00
Dholai	DHD1	336.57	200.00
Dholai	DHD2	367.47	200.00
Dholai	DHD3	114.28	100.00
Dholai	DHD9	252.76	250.00
Longai	LPL1	189.81	150.00
Longai	LPL2	1068.29	800.00
Longai	LPL6	230.62	200.00
Longai	LPL7	529.95	325.00
Longai	LPL13	423.84	250.00
Longai	LPL16	503.04	400.00
Longai	LPL17	1117.31	800.00
Longai	LPL20	472.27	375.00

Longai	LPL21	555.21	200.00
Longai	LPL22	991.49	300.00
Longai	LPL23	540.61	300.00
Longai	LPL24	811.88	500.00
Longai	LPL25	1139.75	800.00
Longai	LPL27	830.69	600.00
Patheria Hills	PKPH1	388.36	300.00
Patheria Hills	PKPH2	452.11	300.00
Patheria Hills	PKPH3	1931.77	800.00
Patheria Hills	PKPH7	1442.64	900.00
Singla	CGS2	1093.72	800.00
Singla	CGS4	923.11	600.00
Singla	CGS7	1585.59	1000.00
Singla	CGS10	975.00	720.00
Singla	CGS11	690.94	410.00
Singla	CGS13	1022.31	750.00
			18500.00

3.6 Special objective of management

The broad objective of this working circle is to improve the stocks of the forest of this Division through plantation to fill the gaps and regeneration of the species. Specific objectives are given below:

i) To restock existing blanks and scrub areas with species of higher utility & economic value
ii) To re-habilitate degraded areas, & failure plantations;
iii) To improve the moisture regime with soil conservation measure via bio-engineering;
iv) To meet with the requirement of local population for fuel, fodder, fruit & small timber;
v) Initiate research on tree improvement and genetic resources studies to enhance growth of Shorea assamica and its associates.

3.6.2 Silvicultural system

The Working Circle shall be treated for regeneration only. Except removal of dead dying and wind fallen trees there shall not be any harvesting in the Working Circle. However, Improvement felling or regeneration felling or canopy manupilation works may be undertaken subject to mid term deviation with approval of the PCCF.

3.6.3 Thinning

Thinning is considered as principal tending operation. The aim of thinning is to achieve appropriate stand density and enhance diameter growth. Thinning is targeted for sapling, pole and young tree within the compartments. Proper method for thinning operation is lacking in the Division. The spacing between the stems depends upon the size of stem to be retained after thinning. Number and average size of stem need to be assessed to fix the required number of stem in compartment. For this objective, the condition of pole and sapling in each compartment requires further assessment.

In the past, no thinning was done in the Plantation as timber harvesting was done by Clear Felling Coupes followed by Artificial Regeneration. Thinnings were prescribed in the

plantations by taking into account the average site quality class of the area. Under this Plan, only fou thinnings are prescribed. The first two thinnings are mechanical cum silvicultural and other two are silvicultural thinning. Though the number of trees to be retained after the first thinning is more, the same is being adopted in the present plan as the excess number of stems will compensate towards damages caused by wild elephants, which is quite common in this area. The details of the thinnings regime recommended are given below:-

i. First mechanical cum silvicultural thinning at the 10th year by retaining about 70% of the total trees by marking the stems silviculturally in the alternativediagonals.

ii. Second mechanical cum silvicultural thinning at the 20th year by retaining about 50% by marking the trees silviculturally in the alternatelines.

iii. First silviculture thinning at the 30^{th}year (leaving about 35% of the balancetrees).

iv. Second silviculture thinning at the 40^{th}year (leaving about 15 % of the balance trees).

Guide for Thinning:

Thinning are to be carried out comparing th field stock with that given in yield table for certain age and specific site quality for ordinary C grade thinning.

i. Site quality may be ascertained first by measuring top diameter and height of crop.
ii. Age of the plantation to be ascertained from record or from age/dia curve drawn from yield table.
iii. The basal area of the stock of plantation is to be determined using Wedge Prism or Relaskepe.
iv. The basal area figure/ha thus obtained should be compared with yield table figure against the crop age and for that particular site quality class.
Thus requirement of thinning for a particular plot may be ascertained and to be followed by marking.
v. In between marking and felling recheck is to be made in similar method as to whether the marking is adequate or not. Over thinning must be avoided.
vi. The exercise must be done by an officer not below the rank of Assistant Conservator of Forests.

Marking Rules

The following instructions are included for guidance of marking for thinning.

A. In older plantations where growth differentiation has already set in-
   i. Mark all dead, top broken, mid broken, uprooted and suppressed trees.
   ii. Mark all mal formed or crocked trees provided no large gaps are created.
   iii. Mark all stems of inferior species interfering with Teak.
   iv. Crown dominants to be freed by opening the culture where there are more than 3 dominants or co-dominants
   v. In case of any doubt regarding removal or otherwise of a tree, decide in favour of retention.
   vi. At the end of final thinning (4^{th} round), the spacing from stem to stem sould be 10.5m x 10.5m.

B. In younger plots without crown differentiation-
   i. Where material spacing is 1.83m x 1.83m, the five thinnings from 1^{st} 5^{th} year thinning

is to be carried out. In the spacing of plantation is 2.24 m x 2.74m or more, the first thinning may be omitted.

ii. Remove dead, top broken, mid broken, uprooted and suppressed trees.

iii. The spacing out should be done mechanically by removing alternate stem in each thinning.

iv. The approximate spacing from stem to stem at the end of each round of thinning with an initial spacing of 1.83m x 1.83m would be-

1^{st} thinning = 2.6 mts

2^{nd} thinning = 4.2 mts

3^{rd} thinning = 7.5 mts

5^{th} thinning = 10.5 mts

v. Only Congested patches of poles are to be thinned out. For guidance of thinning in congested patch following Laurie's Formula.

Laurie's Formula: **S = 1.5 (d + 3) {**Where S = average spacing in feet in triangular spacing; d = average crop diameter in inches} may also be used for this exercise.

By using this formula, the desired triangular spacing for a given plantation is estimated to work out the number of plants to be retained. This formula is very useful when one does not have the history of past thinning of a plantation. The guiding principle is the number of trees with better crown, stem-form and free from the attack of pests and diseases, to be retained with even spacing. The number of sound trees retained after any thinning should be as per the number worked out by using Laurie's formula. This method of thinning has merits as well as some constraints. It is easy to fix the required distance, more objective, technically standard and reduces the personal error but it demands relatively more skilled human resource for enumeration andmeasurement especially for identifying stems to be retained with the help of GIS.

vii. The spacing and desirable number of trees per hectare by diameter (BH) are given in table 2.6.11.a.However, the number of trees to be retained may be increased considering local conditions, threats etc. as found fit by the DFO.

Table 3.6.3 a: The designed method for thinning

Diameter	Spacing	Minimum No of trees to be retained/hect	Considering local conditions May be increased upto
10 cm	3.15 m	1170	+ 90
15 cm	4.00 m	725	+ 80
20 cm	5.00 m	460	+ 70
25 cm	5.86 m	340	+ 60
30 cm	6.81 m	250	+ 50
35 cm	7.66 m	195	+ 40
40 cm	8.64 m	155	+ 30
45 cm	9.46 m	129	+ 20
50 cm	10.36 m	108	+ 10

Importance is given to retain a definite number of trees after the thinnings. This is to ensure that any subsequent variation in the number of trees in the plantation at the time of thinning should not result in excess thinning of plantation.

The prescriptions laid down above should be followed in all the plantations where regular thinnings have been carried out in the past. But in case the thinning regime as given in the previous plan has not been followed in the past it is not desirable to reduce the number of stems as per these prescriptions at one stroke as such action may cause opening of canopy and consequently invasion of weeds and also make the stand susceptible to wind damage. In such cases, gradual reduction of excess number of stems during the next thinnings or over a period of time will be desirable. Modified thinnings in such plantations are proposed from this point of view. In case if more number of trees are found in certain pockets ofthesameplantationwhereoverallnumberoftreesperha.islessinthatcasedesirable number of trees may be felled to remove the congestion after verification and marked by the Deputy Conservator of Forests and Chief Conservator of Forests. Care should be taken so that sufficient number of trees per ha. is retained to fulfill the requirement of prescribed thinning regime for the particular closely spaced trees.

3.6.4 Regeneration

Natural regeneration is the process by which juvenile plants and coppice that have established naturally replace plants which have died or have been killed. Over time, following a disturbance, the growth of natural regeneration will reestablish canopy trees. Natural regeneration shall be encouraged in places where it is growing naturally without biotic interference.

- For protection and development of natural regeneration of important species (both seed and coppice origin as well as for management of malformed rooted stock/shoots, tending of NR and rooted stock have to be done properly and in proper time. Plantation Register will be maintained on the lines of AR areas.
- All seedlings and saplings of seed origin of valuable species, more than 60 cm in height as well as healthy coppice shoots would be identified in the first year, which will be nursed as future crop. Specing operations, if requird, would be carried out to leave nearly 400 saplings per hectare at an average of 5.00 mt spacing spacing out operation may be in favour of ecologically valuable species and species rarely found in the area.
- Tending of natural regeneration and coppice shoot management, Cut-back operation (CBO) and artificial regeneration may be carried out in the next year of main felling.
- All treatment type areas will be shown distinctively on the map, including the area suitable for planting, areas having adequate promising natural regeneration and rooted stock and areas prone to soil erosion. For this purpose, grid maps (100m x 100m) with GPS reading should be used.
- As per requirement of site, weeding, soil working should be done after inspection by Zonal CCF/ APCCF. Model estimate for tending of NR to be approved by Zonal CCF/ APCCF.
- The areas poor in natural regeneration should be artificially regenerated by Teak, Miscellaneous species and Bamboo as per actual site condition.
- Involvement of JFMCs, giving benefit to JFMCs from cutback, stump dressing etc. should be considered as per Government guidelines.
- The natural regeneration should be assisted and encouraged by soil working and mulching around them, wherever needed.

Tending of Natural Regeneration

- **First year operation i.e, subsequent to main felling year:** Weeds in one meter diameter saplings of valuable species should be cleared during the first week of July/August. Uprooted weeds, grasses and leaf litter should be mixed in the upper layer of soil as the organic mulch and facilitate loosening and aeration of the soil by worms and insects. One soil working should be carried out in October/ November.
- **Second year operation:** The soil working should be repeated in the following year in the month of October in the seedlings of seed origin. However, one scrap weeding of one meter diameter should be carried out in the first week of August/October around the shoots of seedlings of coppice origin within the rootstock management area.
- **Third year operations:** Singling of coppice shoots, management of damaged and malformed saplings, climber cutting and shrub clearance should be repeated as third year operations.

- **Root stock and Coppice management:** In the areas where there is no sufficient seedlings of seed origin (at least 400 healthy and established saplings) are found, the existing root stock should be managed to increase the density and productivity of the crop. Preference should be given to encourage the ecologically valuable species. Tending of root stock (ecologically valuable species) in the B-1 type may be carried out as follows:

● **Singling of Coppice Shoots:** One healthy and promising coppice shoot shall be retained with the stump and the rest are to be removed. However, coppice shoots interfering with promising saplings of seed origin would be removed. Such coppice shoots should also be close enough to the ground so that it would no topple after gaining volume and weight and would be able to develop root system of its own subsequently.

● Coppice management of damaged malformed saplings: The saplings and poles of upto 45 cm gbh having one-third of the stem damaged and malformed should be coppiced by cutting flush to the ground. Such coppicing, however, should not expose the ground causing erosion and leading to soil loss. Poles having at least 2.50 meter of clean bole would not be treated as malformed.

- All such sites selected for tending of natural regeneration and root stock and coppice management should be geo-referenced on digital map of the division by taking GPS reading of at least four corners of the said site, which may be compared later with the satellite imagery of the division for any change of vegetation cover.
- A proper record, in the form of NR Register, should be maintained at Range level as well as division level regarding all activities of Regeneration. Records such as Register, number of seedling identified, cleaned saplings, maps, GPS reading, operations, photographs etc. should be maintained on regular basis.
- All entries should be made in the relevant *Coupe Control Forms and Compartment History Forms.* In case of Artificial Regeneration, proper Plantation registers should be maintained at Range level as well as division levels.
- In case of any deviation from the prescriptions of approved Working Plans, proposal should be submitted and got approved by competent authority in time.

Aided Natural Regeneration

ANR is most applicable in areas with remain-ing trees or patches of natural forest within a wider degraded landscape, as these trees provide propagation material or attract dispersal agents (birds, bats, mammals, etc).

Artificial Regeneration

Artificial regeneration is accomplished by the planting of seedlings (the most common method) or by the direct planting of seeds. Direct seeding is reserved for remote or inaccessible areas where seedling planting is not cost-effective. The most common method is to plant nursery raised saplings in the selected areas. In this division Artificial regeneration shall be undertaken.

Block plantation will be carried out in scrubs, gap filling in open forest area and in moderately dense area natural regeneration or assisted natural regeneration shall be promoted. The regeneration capacity of the endemic species, elephant liking species shall be enhanced. A total ecosystem conservation concept will be adopted for conservation of the wildlife habitat and conservation of biodiversity in these forests. An effective , efforts should be made to restore native complementing natural species rather than planting as many different kinds of trees as

possible without looking into the natural regeneration and the needs of the natural fauna of the site. Further, introduction of exotic species in the area will be restricted and plantation of both, slow and fast growing native species of herbs, shrubs, and trees shall be promoted.

Involvement of local communities especially youths, women from the forest and fringe villages shall be ensured in plantation and regeneration activities. The efforts, therefore, be to impose restrictions on local populations through participation in purview of legal and allow traditional practices to continue to ensure their long-term success. For this purposes capacity building programs may be taken up. Regular monitoring and updation of species data through R & D activities needs to be taken up taking the present data as the base. Ethno biological information also needs to be generated.

3.6.5 Measures for its protection

Measures for protection in this working circle is elaborated below under proposed plantation and regeneration working circle

i) Strict ban on grazing in such areas.
ii) No firewood removals
iii) Soil and moisture conservation measures is to be ensured while planting and regeneration, soil compaction should be avoided
iv) Protection from illicit felling
v) Encroachments should be strictly avoided,
vi) Illegal mining to be checked
vii) Restriction on felling.
viii) Silvicultural practices to be adopted to enhance the growing stock and carbon sequestration of the forest.

3.6.6 Method of treatment

Garjan (*Dipterocarpus turbinatus*) being a shade bearing species in the early stage prefer diffused light and moist conditions with well drained soils. Two-stoereyed high forest silvicultural system is to be followed where the crop will be obtained by under planting a high forest after it has been opened up removing the matured trees above some girth limits remaining the balance as advance growth. The general performance of Gamari (*Gmelina arborea*), Cham (*Artocarpus chaplasha*), Garjan (*Dipterocarpus turbinatus*), Sundi (*Michelia mentena*) in this tract is presently not very encouraging perhaps due to the changing climate, anthropogenic disturbances and may be alteration of the hydrological regime. Regeneration and growths achieved except in few patches are not satisfactory, despite, almost all the areas are considered suitable earlier. Hence further planting of the species by clear felling of forest is not prescribed, though it may be raised along with other species in open and well drained areas where it performs better.

3.6.7 Prescriptions

The following prescriptions are recommended for ther Working Circle –

a) Identification of good seed bearers and collect information on seed year.
b) Select mother trees, collecting the geo-cordinates and marking those.
c) Before a heavy seedfall, cleanings can be made beneath fruiting trees to form natural nurseries, which can be used later to plant forests with low natural regeneration or in secondary vegetation.

d) Transplantation of naturally regenerated seedlings which are 45 centimeters to 55 centimeters, and 6 to 8 months old.
e) For seeds raised in nurseries, it is advisable to sow seeds as soon as it falls, since it loses its viability very quickly. It is to be raised in biodegradable poly bags.
f) All areas that are having gaps are to be planted with native tree species.
g) Planting schedule to be followed is presented in Table 3.6.7.b.

Table 3.6.7.a: Target of Achievement during W.P Period

Activity	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Plantation and regeneration works 18500 hect	1850	1850	1850	1850	1850	1850	1850	1850	1850	1850
(Maintenance		1850	3700	5550	7400	7400	7400	7400	7400	7400

Table 3.6.7.b: Overview of month-wise work to be undertaken by Plantation and Regeneration W.C.

Period	Works to be done
August September	Survey & demarcation of areas under annual coupes, preparation of maps
October	Marking of annual coupes
November February	Timber operation and disposal
March	Advance work for plantation, nurseries
April - May	Seed sowing/ transplanting
June	1st Rain weeding
July	2nd Rain weeding
Aug-September	3rd Rain weeding
November - December	Winter weeding

Table 3.6.7.c: Planting schedule to be followed in Working Circle

Sl.No.	Items of Work	Operation to be completed
1.	Survey & Demarcation	31st October
2.	Clearance of undergrowth i/c climber cutting, removal of unwanted tree species	31st January
3.	Laying of line, clearance of line, Ranging, staking, pit digging & hoeing of soil, etc.	15th March
4.	Planting out.	25th March
5.	Direct sowing of seeds	25th March
6.	Fire line cutting	25th March
7.	Making of Inspection path	25th March

Table 3.6.7.d: Sequence of regeneration proposed
(Year-wise Plantation activities in Compartments)

Name of the RFs	Compt No.	Area of WC	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Badshatila	CGBT1	295	30	30	30	30	29	29	29	29	29	30
Badshatila	CGBT2	280	30	30	30	30	30	25	25	25	25	30
Badshatila	CGBT3	500	50	50	50	50	50	50	50	50	50	50
Badshatila	CGBT4	250	25	25	25	25	25	25	25	25	25	25
Badshatila	CGBT7	340	40	35	35	35	35	30	30	30	35	35
Badshatila	DHBT1	200	20	20	20	20	20	20	20	20	20	20

Badshatila	DHBT2	200	20	20	20	20	20	20	20	20	20	20
Badshatila	DHBT3	300	30	30	30	30	30	30	30	30	30	30
Badshatila	DHBT4	215	25	25	25	25	20	20	20	20	20	15
Badshatila	DHBT5	385	40	40	40	40	40	40	35	35	35	40
Badshatila	LPBT1	240	25	25	25	25	25	20	25	20	25	25
Badshatila	LPBT2	200	20	20	20	20	20	20	20	20	20	20
Badshatila	LPBT5	345	40	35	35	35	35	35	30	30	35	35
Badshatila	LPBT6	400	40	40	40	40	40	40	40	40	40	40
Badshatila	LPBT7	350	35	35	35	35	35	35	35	35	35	35
Badshatila	LPBT8	620	65	65	65	65	65	60	60	60	60	55
Badshatila	LPBT9	50	10	-	10	-	10	-	10	-	10	-
Dholai	DHD1	200	20	20	20	20	20	20	20	20	20	20
Dholai	DHD2	200	20	20	20	20	20	20	20	20	20	20
Dholai	DHD3	100	10	10	10	10	10	10	10	10	10	10
Dholai	DHD9	250	25	25	25	25	25	25	25	25	25	25
Longai	LPL1	150	15	15	15	15	15	15	15	15	15	15
Longai	LPL2	800	80	80	80	80	80	80	80	80	80	80
Longai	LPL6	200	20	20	20	20	20	20	20	20	20	20
Longai	LPL7	325	30	35	30	35	35	30	30	30	35	35
Longai	LPL13	250	25	25	25	25	25	25	25	25	25	25
Longai	LPL16	400	40	40	40	40	40	40	40	40	40	40
Longai	LPL17	800	80	80	80	80	80	80	80	80	80	80
Longai	LPL20	375	30	40	40	40	40	40	35	35	35	40
Longai	LPL21	200	20	20	20	20	20	20	20	20	20	20
Longai	LPL22	300	30	30	30	30	30	30	30	30	30	30
Longai	LPL23	300	30	30	30	30	30	30	30	30	30	30
Longai	LPL24	500	50	50	50	50	50	50	50	50	50	50
Longai	LPL25	800	80	80	80	80	80	80	80	80	80	80
Longai	LPL27	600	60	60	60	60	60	60	60	60	60	60
Patheria Hills	PKPH1	300	30	30	30	30	30	30	30	30	30	30
Patheria Hills	PKPH2	300	30	30	30	30	30	30	30	30	30	30
Patheria Hills	PKPH3	800	80	80	80	80	80	80	80	80	80	80
Patheria Hills	PKPH7	900	90	90	90	90	90	90	90	90	90	90
Singla	CGS2	800	80	80	80	80	80	80	80	80	80	80
Singla	CGS4	600	60	60	60	60	60	60	60	60	60	60
Singla	CGS7	1000	100	100	100	100	100	100	100	100	100	100
Singla	CGS10	720	75	75	75	75	75	70	70	70	70	65
Singla	CGS11	410	45	45	45	40	40	40	40	40	40	35
Singla	CGS13	750	75	75	75	75	75	75	75	75	75	75
		18500	1875	1870	1875	1865	1869	1829	1829	1814	1844	1830

NB: Considering feasibility, existing stock and priority with respect to necessity of restocking immediately to avoid possible encroachment, DFO may allow deviation to an extent of 25% in terms of location/area.

CHAPTER 4

Forest Protection Overlapping Working Circle

4.1 Name of the Working Circle

Forest Protection Over lapping Working Circle.The detail map of this working circle is shown in Plate 4.1

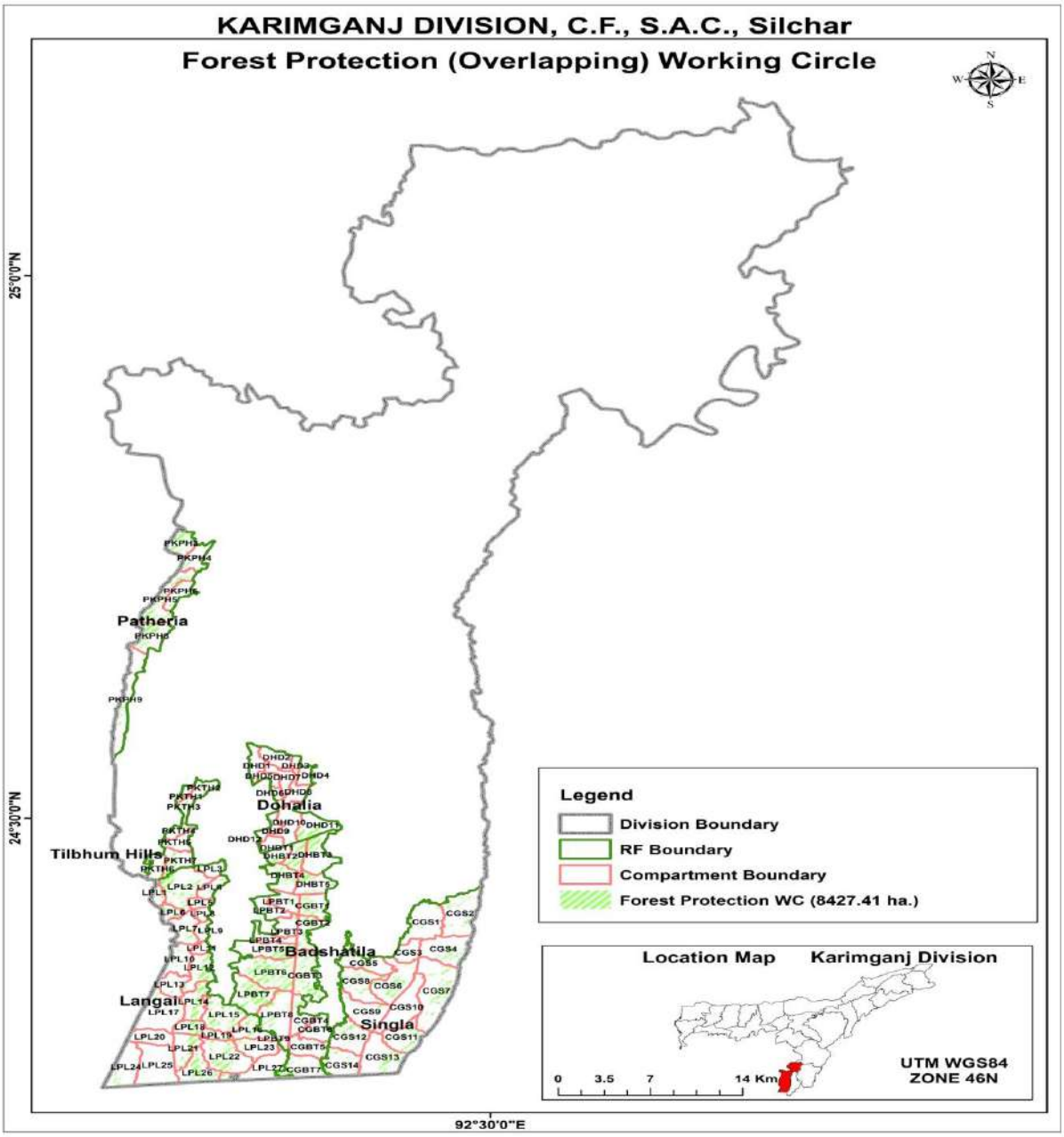


Fig 4.1: Forest protection overlapping working circle map of Karimganj Division

4.2 General constitutents of the Working Circle

The areas with canopy cover above 70% and other areas under extreme biotic pressure and natural hazard prone areas will be under this working circle. Acute biotic pressure is changing the conditions of forests. It becomes absolutely essential to keep the core of the forest areas

intact and free from anthropogenic (human) disturbances. No harvesting prescription is given under this Working Circle. In future, when the forests start functioning again at its peak productivity, sustainable extraction from these forests may be allowed. Till that time, forests falling under the identified working circle shall function as nature's laboratories, which will keep on imparting insights about the functioning of the nature, to a keen observer. Specifically these forests include areas of unique flora and fauna with rich biological diversity and genetic resources. The forest provides habitat ofwildlife especially elephants and straying cats and other herbivores so it is necessary to protect these areas. The division, serves as catchments to critical wetlands, its denudation facilitates erosion especially after heavy monsoonrains and it is absolutely essential to maintain a permanent vegetation cover over the catchments. The role of the forests in these catchments, which receive very heavy rainfall in a short span of four months from June to September, needs no emphasis. In the past, these forests were worked repeatedly and heavily in accessible areas and along riverbanks.

It will include all the water bodies of the forest division. Such areas shall not be worked for timber or other NTFPs but shall be preserved by providing highest degree of protection. These areas should be seen as the ones which sustain forest productivity, the flow of ecosystem services and also protect from floods.

The ecological and environmental role of forests has precedence over all other roles one can think of. Forests are the natural resources which are to be passed on to the posterity with least disturbance to the natural processes they are being subjected. Keeping this mandate in view, the protection working circle is carved out.

4.3 Objectives of the Working Circle

The broad objective of this Working Circle is to protect the reserve forests from all sort of forest degradation factors. Specific objectives are given below:

1. To protect the forests of the Division from all sort of forest degradation drivers including encroachment, illegal felling, lopping, grazing, illegal collection of NTFP, illegal clearance of forests for coal mining, illegal removal of minor minerals etc.
2. Augmenting forest growth including restotation of degraded forest to maintain environmental stability and ecological balance wherever it has been disturbed. And to protect the biological diversity of the area.
3. To sensitize local people about forest protection and involve them in preventing forest offences.
4. To raise the moral of staff and strengthen their capabilities to deal with illicit felling, encroachment, poaching etc.
5. To develop database to monitor various offence cases.

The broad objective of this working circle is to improve the stocks of the forest of this division by regeneration and plantation. Specific objectives are given below:

4.4 Blocks & Compartment Allotment of Areas

Forest protection working circle comprises all the forest area of Karimganj Division comprising 54545.90 hect.

4.5 Forest Protection Aspect

4.5.1 General: The forest protection is one of the most important and difficult aspects of forest management. Lot of degradation of forest has already taken place due to increased anthropogenic (human) activities. The increase of human population and requirement of timber to meet their luxurious demands combined with other developmental works requiring diversion of forest land for cultivation, irrigation projects, industries etc. resulted degradation of forest and in shrinkage of forest area. This situation has created huge gap in demand and supply of forest produce. The forests of Karimganj division have tremendous pressure of illicit felling and encroachment. The local people move in groups, indulge in illicit felling and there have been many cases of assault on staff by illicit cutters. The forest offenders are agricultural labourers and the intensity of forest offences increases during lean season of agriculture. Offenders indulge in forest offences prior to festival occasions such as Durga Puja, Bihu, Dipawali etc. They resort to illicit felling for easy money for festival celebration.

There were illicit fellings for meeting domestic needs of the villagers and the degree was not alarming. But during last couple of decades illicit felling of trees increased so high that at a point of time it went out of control. Following ban on tree felling by honourable Supreme Court in WP(C) 202/1995 in famous Godavaran Vs Union of India case, timber became scarce in market. On the other hand demand for timber was grown very high. Real Estate (Apartment/Flat) business in Assam got momentum during those decades and demand for wood reached the sky. As a result, forests had to bear the adverse effect. Organised timber smugglers involved in tree felling in such a way that the division had to witness massive forest destruction.

The general modus operandi of the illegal felling was that the smugglers engage the poor unemployed labours, in organised manner, to cut trees and carry to char areas and other nearby villages where they convert and it then sell to another group of smugglers. Syndicates had grown up in those areas. The Saw pits which used to convert timber manually 20 years back have now been improved to Mechanical Band Saw increasing conversion capacity. However, number of such illegal Band Saw Mills has reduced than the number of Saw pits because of shortage of raw materials in the forests. Higher girth class trees have been wiped out from the forest.

It is not that the forest staffs never tried to resist the illegal doers from illegal activities. The DFO is assisted by ACFs, 6(six) Territorial RFOs. Protection Squad Range Officer and 150-200 frontline staffs have been being strugling for protection of forests. They have been provided with vehicles. There were number of Check Gates established at strategic points with 24 hours working. Yet, it has never been a full proof protection measure. In some of the places the forest offenders indulge in offences in groups and it is very much difficult to control them by few Forest Guards. There are instances of staffs being assaulted by timber smugglers. Several hundred M^3 (cubic meter) of timbers were seized by the forest staffs besides drawing up Offence Reports and accused been sent to jail.

4.5.2 Special objectives of management

Economic objective: To protect the forest from various forest destruction factor e.g., illegal felling, encroachment, grazing etc. with a view to restock the forest with valuable timber species to fetch revenue to the State.

Social objective: To engage village communities in protection works ensuring employment to them uplifting socio-economic condition of such people. Consistent with above to meet the part of local demand for firewood, timber etc. from the out turns that would come out from the thinning of the plantation crop.

Biodiversity & Ecological objective: To create forest of heterogeneous nature with valuable species as well as with other indegeneous species to maintain Forest Eco-system. The increased growth of biomass will help in carbon sequestration.

4.5.3 Strategy for forest protection

The strategy to be adopted to protect forest is of integrated approach and it shall be applied at various fronts by undertaking collective measures based on situation and time. The strategy shall be direct / field oriented in a participatory manner with active involvement and co-operation of local people specially members of JFM Committees. Total villages around reserve forests of this division are 802 whereas 108 Forest Guards are placed at various places to protect forests. Therefore there is a need to seek the co-operation of local people in forest protection. The main components of strategy are given below.

(1) Existing forest needs to be well protected and developmental works like soil and moisture conservation measures, natural and artificial regeneration works and other cultural operations shall be carried out in order to increase productivity of forests.
(2) Regulation of grazing and controlling fire.
(3) Seeking co-operation and active participation of local people in all operations of forest management and employment generation to local people during lean period.
(4) Fulfilling the demands of local people for forest produce.
(5) Effective utilization of existing infrastructure, strengthen and updating infra-structural facilities, improvement in communication facility and mobility of the forest staff.
(6) Installation of new Check posts at hyper sensitive and sensitive points.
(7) Patrolling sensitive forest areas along with the local people/ JFM Committee members.
(8) Intelligence gathering including introducing Rewards, Awards and informer system and making forest offences high risk low gain process.

4.5.4 Protection measures:

4.5.4.1 Inspection in transit: Though there is no check gate to control and regulate transit of forest produce, yet the DFO may arrange to check transit of forest produce. Section 40 of Assam Forest Regulation (Amendment) Act'1995 is to be enforced strictly.

4.5.4.2 Patrolling: To control illicit felling regular patrolling is essential in sensitive and hyper sensitive beats where illicit felling takes place. Separate day and night patrolling around the sensitive, highly sensitive areas and on roads leading from jungle to High way shall be carried out. Record or register should be kept in Range Office regarding patrolling. ACF should supervise this type of patrolling and also he should participate in such patrolling at least once in the month. Smart patrolling initiatives may be designed. GPS based patrolling to be introduced so that effective monitoring is possible. Every Range shall have a mobile squad under leadership of a Deputy Ranger or senior Forester. Forest offense register should be maintained and Offence Registered should be pursued in proactive manner to ensure conviction.

4.5.4.3 Protection Squad: The Protection Squad of the Division is very much weak. It shall be strengthened with posting of one Range Officer, at least 8 foresters, 12 forest Guards and one section of armed Assam Forest Protection Force (AFPF) battalion. Two vehicles including one Mini truck shall be at the disposal of Protection Squad. Jurisdiction of the Protection Squad shall be the entire Karimganj Forest Division. The rank and status of the Protection Squad shall be equivalent to other range Officer. He will perform protection duties independently and report day to day performance to the DFO. Sufficient fund shall be provided for mobilizing the Squad day and night. Head Quarter of Protection Squad shall be at Division Head quarter (Bamunigaon). The DFO should closely monitor the work of Protection squad and should obtain weekly reports to monitor the protection activities.

4.5.4.4 Wireless network: Presently there is no wireless network in this division. In the present day society offenders posses modern communication systems like mobile phones while committing forest offences and transporting forest produce. Cellular phones may be provided to the entire staff for effective protection of the forests.

4.5.4.5 Mobility of staff: In Karimganj Forest Division Government vehicles are provided to DFO, and RFOs. With the existing road network by using modern speedy vehicles, the forest offenders easily transport the illicit material. It is necessary to provide Bolero or other SUV vehicles to the territorial RFOs and ACFs for effective forest protection. Each Range should have at least two good conditioned vehicles. AFPF battalion shall be posted in each Range and in vulnerable Beats.

4.5.4.6 Provision of Arms: Sometimes offenders use modern weapons like fire arms in committing forest offences. For forest staff without modern weapons, it is difficult to tackle those offenders from committing forest offences. With a view to combat such attempts by illegal doers and for self defence, Forest personnel are to be equipped with weapons. Every Range Officer including Protection Squad Range Officer and ACF should be sanctioned Government pistol/revolver and at least five rifles to be issued to each Range. Fire arms may also be provided even to the lower rank staff those who involve in forest protection duty. Fire arms should handled carefully following all protocols.

4.5.4.7 Territorial Inspections: Beat checking: It is necessary that the staff is required to carry out patrolling in their respective jurisdictions and the officers concerned will exercise effective supervision and control at all levels. It is necessary to report every forest offence promptly as per directions given in the standing order. For effective protection of forest the following prescriptions are made.

(1) Review the offence cases beat wise, every month.
(2) To enforce the provisions of Assam Forest Regulation 1891 (Amendment) Act'1995 strictly.
(3) Forest Offences in arrest cases should invariably be submitted to the court within the prescribed time. Delay in the submission of charge sheets in the courts is viewed seriously.
(4) Use IPC provisions for the effective control of the illicit felling.
(5) The data related to offence cases shall be analyzed with the help of computers using available software.
(6) Monitor the occurrence of all the offence cases daily through wireless.

(7) Identify and list all the paths used for the transportation of illicit material.
(8) Place effective patrolling squad at all important routes to prevent the transportation of illicit material.
(9) Emphasis shall be made to arrest and prosecute the offenders rather merely seizing the material.
(10) Plan in such a way to have young guards in the hyper sensitive areas.
(11) History sheets of all the offenders along with their photo and bio-data are maintained at Range and Division level.
(12) Prepare list of offenders, showing the offence cases involved by him, against each offender.
(13) Use Cr.P.C. 110 provisions with respect to habitual offenders.
(14) Provisions of IPC 395 shall be used by registering the complaint in the police station for the offences wherein five or more than five offenders are involved. The DFO shall co-ordinate with the Superintendent of Police to see that stringent sections of IPC will be used in the F.I.R.
(15) Every Beat shall maintain a register of stumps in a specific format. Every stump is registered by a serial number followed by and year, for example, if tree number is 129/08. Here 129 is tree number and 08 is year. Every year from January 1st, onwards start the new series. After one year all the high stumps be dressed to ground level to obtain good coppice. The supervisory officers, during the beat inspection, verify the registered stumps and unregistered stumps. The beat officer shall be held responsible for non-registering the illicit stumps.
(16) Every range and division office shall maintain the Xerox copies of the judgement of all forest cases for the guidance and improvement purposes.
(17) Court Guard duties be assigned to a special duty FG for each Range Office and as well as Division office to monitor the dates and for timely communication to the witnesses.
(18) All officers including DFO, ACF, RFO, Deputy Ranger, Forester and Forest Guards are to submit fortnightly diary mentioning their performance and activities.

4.5.4.8 Fire protection: The areas of Karimganj Forest Division are prone to fire due to heavy biotic pressure and due to deciduous nature and the dry climate. Fire caused damage to the forest specially regeneration, forest growth, ground flora, soil organisms and the soil productivity. Prevention of fires and effective control of fires as prescribed in the plan is essential for forest development. The leaf litter on the ground and highly combustible under growth of grasses etc. catch fire and spread instantly. In summer high speed of winds spread fire easily before it could be brought under control. Fire line with appropriate width as per the guide lines shall be maintained and patrolled by fire watchers.

4.5.4.9 Grazing Control: Grazing causes lot of damage to regeneration due to trampling. The incidence of grazing is high in and around the forest areas where the villages are situated and the impact of grazing, illicit felling, fire encroachment is also tremendous around the villages. Therefore the forest areas around villages are deprived of regeneration. In many places especially areas around villages, the ground story is completely missing. To control grazing, grazing units are to be formed in the division. The number of cattle heads per each unit are to be fixed as per the carrying capacity of the area. Grazing shall be allowed as per the carrying capacity of each class of forests.

4.5.4.10 Encroachment: The National Forest Policy 1988 in para 4.8.1 envisages that-
"Encroachment in forest land has been on the increase. This trend has to be arrested and effective action taken to prevent its continuance. There should be no regularization of existing encroachment."
The problem of encroachment is common in almost all the areas specially the forest areas located adjoining human habitations. Out of total 68124.892 hectare of forest land in Karimganj Division 20734.977 hectare (30.44%) of forest land are under encroachment. However the figure is inclusive of the areas inhabitated by Schedule Tribes and other forest dwellers. Population increase and requirement of land for agriculture and settlements besides greed of land hungers are the main cause of encroachment. The problem aggravated because of apathy and laxity of forest staffs. Morale of frontline Staffs had gone down because of the fact that even after assaulting number of staffs including Range Officer of Protection Squad, no punitive action was taken against timber smugglers and offenders. The morale of staffs is so ruined that, except few, staffs donot own the forest. Though the encroachment is a clandestine and gradual process, resisting and reporting of such encroachment had never been distinguished. In order to mitigate the problem, it is essential to take up survey and demarcation works on top priority. Boundary pillars shall be erected after the survey is over which can be completed in a phased manner. Table 5.5.4.10 reflects the status of encroachment in Karimganj Division.

All encroachments are to be evicted as early as possible. The following instructions shall be followed regarding encroachments.

1. Eviction of encroachers from forest land as per the provisions of Rules framed under section 72(c) of the Assam Forest Rgulation' 1891 is a normal duty of the Forest Department, which should be carried out regularly by the Department as and when required subject to availability of logistic support. The procedure laid out in the The Assam land and revenue Regulation'1886 together with Section 434 of IPC and Section-7, 24, 25, 59, 61 and 66 of Assam Forest Regulation 1891(Amendment) Act1995 shall be followed.
2. All external boundaries shall be demarcated with concrete pillars. All sensitive and important boundaries and wherever disputes are there, be surveyed and concrete pillars be laid immediately. Multy-strand concertina (Rajor) wire fencing 2.00 meter high with precasted 150 mm x 150 mm RCC posts 2 meter apart shall be erected in strategic places so as to prevent human trespass into the forest.
3. All encroachments shall be listed with their names, age, residence, profession whether belongs to SC, ST, OBC/NT, extent of encroachment, sl.no. and location of encroachment. Offence Report (OR) shall be drawn against such encroacher and be sent to Court for prosecution. Repeated drawing up of offence reports will definitely discourage encroachment.
4. Eviction drive should be a big operation comprising staffs from entire division and nearest divisions.
5. If the encroachments in a village are more in number, police protection be obtained for the operation. Use of Cr. P.C. provisions like section 106 and 110 be used to smoothen the eviction operations as well as to prevent the tendency of future encroachments.
6. For the encroachments on the un-classed forests/PRF, FIR shall be lodged in the concerned police station for the prosecution.
7. To prevent the tendency of encroachments, improved crop techniques be propagated in the problematic villages to enhance the crop productivity with the help of Agricultural

Department.

8. After the listing of all encroachments, sample verification shall be carried out by all supervisory officers to detect unregistered encroachments.

9. In the month of May, a drive for encroachment prevention be taken up in all the sensitive areas by taking meetings in the villages and by distribution of leaflets and posters.

10. Keep a watch on all the sites meant for debris cleaning, plugging etc., in the month of May, so that encroachments are removed even before the sowings. In the recent past the tendency for encroaching forest land for cultivation increased the actual encroached area is higher than that of recorded one.

11. The causes of forest encroachments shall be examined thoroughly and corrective measures shall be taken.

12. All necessary support should be extended to evict the encroachments as early as possible. The boundary management and standard administrative guidelines will help to control the encroachment.

13. Range Officer must inspect at least 50% of the boundary demarcation, ACF at least 10% of the boundary demarcation, DFO at least 2% of the boundary demarcation. RFO Mobile Squad shall check 2 % of the boundary demarcation.

14. Not reporting of encroachment by any officer/staff under his jurisdiction shall be deemed as abatement in encroachment.

15. All encroached areas, after result oriented eviction operation shall be undertaken under massive plantation.

4.5.4.11 Role of Joint Forest Management: JFM committee will contribute to a large extent in protection of the forest from illicit felling, encroachment, fire, grazing, etc provided if the forest staff has a constant dialogue with the JFM committees and involve them for joint patrolling, management and development of the forests. The JFM committees shall be entrusted with specific area earmarked for the protection, management and development of the area. The JFM committee members need to be given training in technical matters of protection at the same time they should be provided with gainful employment by taking up management and developmental activities. Visit of JFM Committee members to successful areas in the state may be undertaken.

4.5.4.12 Capacity Development and training of frontline staffs: Government policies in personnel management for professional Foresters, while aiming at optimum utilization of their professional skill, would endeavour to enhance their status attracting qualified and motivated personnel, keeping in view particularly the arduous nature of duties performed, often in remote and inhospitable areas. Frontline staffs should be deputed for undergoing training for capacity development. They should be exposed to various successful States to inculcate modern techniques and to generate love to the forest bringing attitudinal change. Apart from deputing staffs to the SFTIs, training to field staff shall be organised by DFO from time to time on the issues of various Acts, preparation of offence cases, tackling assault on staff, framing charge sheets, filing court cases, recording evidence etc. For this purpose help of police officers, ex-army men, advocates, forest officers should be sought to train field staff. Three trainings are proposed in one year for a batch of 25 Foresters and Forest Guards. Necessary budget provision shall be organised for training.

4.5.4.13 Use of GIS/GPS: Geographic Information System (GIS) and Global Positioning System (GPS) technologies have important applications in forestry. A GIS Centre for monitoring of forestry activities need to be established in the Division.

4.5.4.14 Legal Cell: In order to have speedy disposal of forest offences to file and pursue court cases, a legal cell headed by one Forest Prosecutor may be constituted at Karimganj Division with supporting staff.

4.5.4.15 Provision of lock-ups: Some forest offences are of non-bailable nature and for prosecution of offenders it is necessary to provide lock-up cells at every Range head quarter. It is prescribed that lock-up cells shall be established at every Range head quarter and will be manned with two Forest Guards in three shifts.

4.5.4.16 Collection of intelligence and information: The RFO/ Beat Officers should frequently interact with villagers to collect information regarding illicit felling, encroachment, poaching, illegal grazing etc. through its intelligence network and keep that information, suggestions in a register in his personal custody. Through the intelligence network, village wise record of habitual offenders must be prepared by RFO in consultation with Beat Officers and this register must be updated regularly. A secrete fund to gather intelligence and information is proposed to setup under the control of DFO.

4.5.4.17 Register of habitual offenders: Name & address of the offender Previous record POR No./qty/Action taken Modus – operandi Photograph if available

4.5.4.18 Rewards: The existing provisions of rewards to subordinate staff for exemplary work in detection and prevention of offence cases need to be reviewed. The reward amount may be enhanced and maximum amount may be granted. It is proposed that the scheme may be extended to gazetted officers also.

4.5.5 Consolidation of Boundary

Maintenance of boundaries and Pillars: To avoid legal disputes in the future, maintenance or boundary pillars is necessary especially the state boundaries. Inspection path of 3 m wide all along the boundary should be prepared for inspection and protection. The boundary pillars must be numbered and written. The distantly located pillars may be connected to one another by digging lines, which should be regularly cleared. Boundary registers should be maintained. The records be prepared in triplicate and kept in Range, Division and Circle Offices.The Range Officer should check the boundaries once a year and record a certificate to that effect on the Boundary Register. The Beat Officer should check the entire boundaries of the forest under his jurisdiction and send the necessary report to the Forest Range Officer. The Beat Officers should keep the records of boundaries of their beats in the Beat Book.The programme repair of Boundary Pillars should be followed as given in the Protection Working Circle. The dimensions of Main Pillar and Sub Pillar shall be as per estimates prescribed by Assam Forest Department. The estimated costs is as per prevailing rate of wages and cost of construction material (in 2019) and approved estimate. Such estimate shall be revised as and when felt necessary.

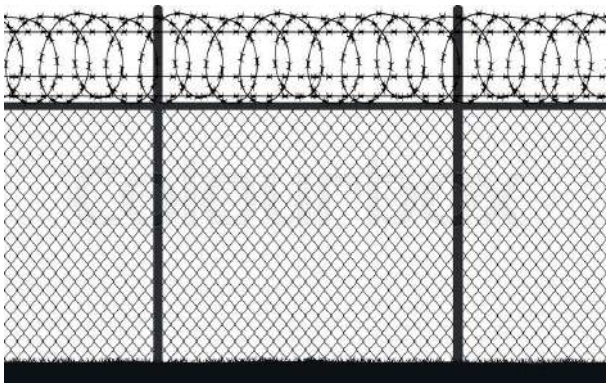
The following proposal is prescribed based on the need to maintain Pillar after every 3 year period. Cost of maintenance is 25 % of cost of creation of Boundary Pillar.

Table: 5.5.5a: Approximate Number of Pillars Proposed to be constructed

Total no Pillars to be Consructed (10 year)						
SL No	**Item**	**Length of Boundary of All Reserve Forests (km)**	**No of Pillars (per km)**	**Total No of Large pillars required**	**No of Pillars existing at present in the division**	**Required no of pillars to be established (10 year)**
1	Main Pillars	232	3	696	17	679
2	Sub Pillars	232	7	1624	55	1569

Footnote: Requirement of Boundary Pillars is as per the ground confuguration and change of direction of boundary (traverse) line. The number shown in the above table is an approximation assuming 3 (three) Main pillars and 7 (seven) Sub pillars per kilometer in average.

Apart from Boundary Pillars, fencing, of the design of border fencing, should be erected in strategic places to check biotic pressures inflicted on plantation and nursery, to check illegal felling and to check encroachment. Estimates for construction/erection of such fencing shall be prepared with the help of competent engineer and shall be materialized.



CHAPTER 5

NON TIMBER FOREST PRODUCE AND BAMBOO (OVERLAPPING) WORKING CIRCLE

5.1 Name of the Working Circle

Non timber forest produce and bamboo (overlapping) working circle. The detail map of this working circle is shown in Plate 5.1

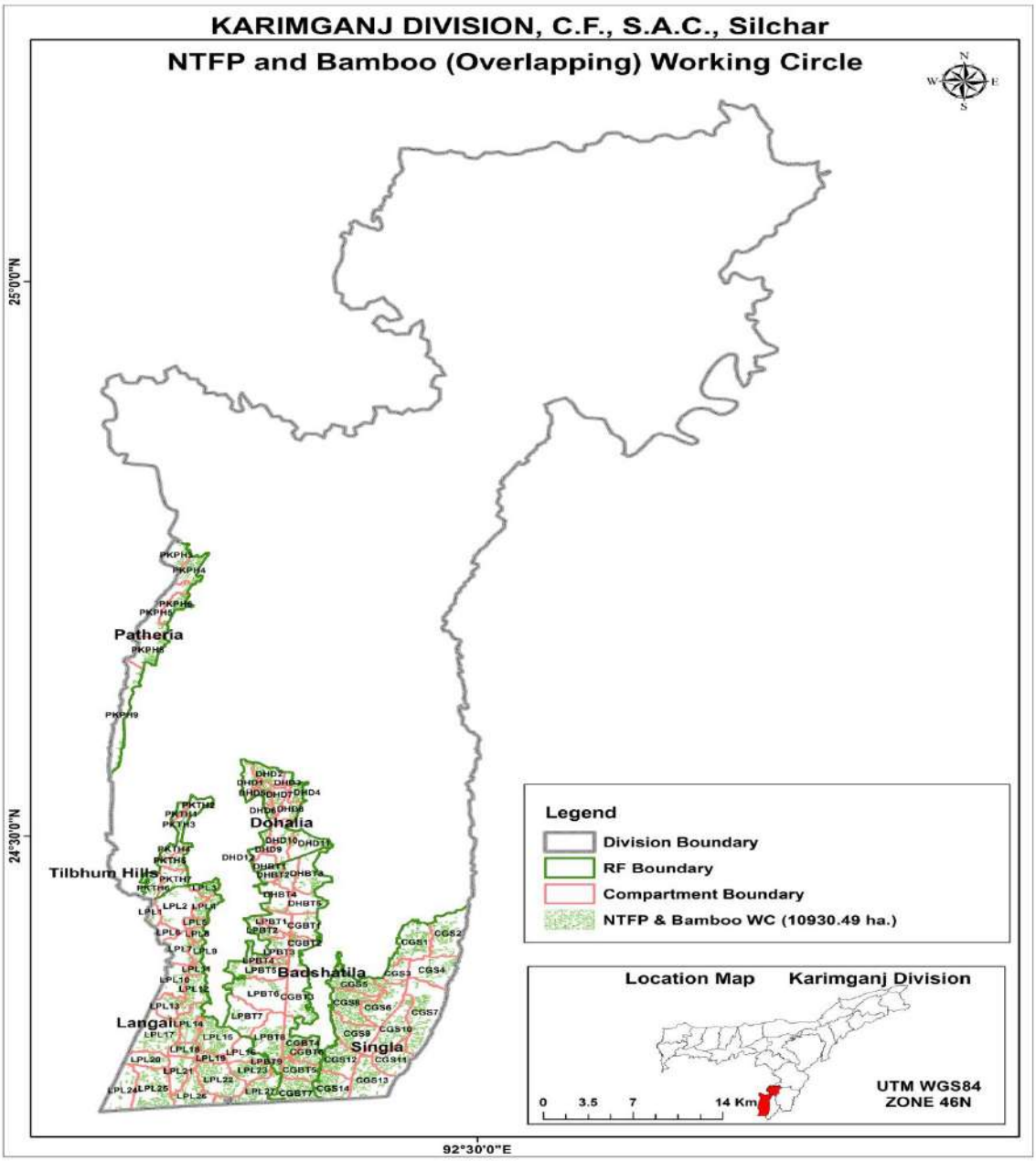


Fig. 5.1: NTFP and Bamboo overlapping working circle map of Karimganj Division

5.2 General Constitutents of the Working Circle

The NTFP working circle shall comprise largely of fringe forest areas or such other areas are fit for extraction of a particular NTFP at a rate, prescribed by him, that does not lead to the long term decline of the biological diversity so as to maintain its potential to meet the needs and aspirations of present and future generations. Closure of an area for the collection or extraction of particular forest produce for a specified period (closed area); restricting or banning the collection or extraction of any forest produce for certain period or periods of a year (closed season); limits on quantities of any forest produce to ensure sustainable harvesting for the future (sustainable harvesting limits); sustainable harvesting/ collection practices etc. NTFPs shall be managed on JFMC areas, fringe forest areas, community forest areas with the help of community after imparting proper training to them regarding time of harvesting, grading and storage for sustainable management and value addition etc.

5.3 General characteristics of vegetation

According to physiography, the division can be divided into eight (8) classes ranging from high hills with elevation exceeding 300m to perennially waterlogged beels that may be described as follows:

(a) High Hill Region: This region includes those high hills which have an elevation of above 300m; and the region occurs mostly in the Northern and Eastern parts of the zone bordering Meghalaya, N.C.Hills and Manipur. The species naturally occurring this type are Cham, Garjan, Moricha Sindi, Til Sundi, Champa Sundi, Poma, Kurta, Gamari, Rata, Zinari, Jamuk, Kayengla, Hotia, Kurta, etc. alongwith bamboo species as reflected in the above tables.

(b) Dissected Foot Hill Region: This region lies on the North and North-East areas bordering the high hills and interspersed by thin strips of detraited valleys. Same flouristic composition exist in this region.

(c) Low Hill Region: This region has an elevation of less than 300m and it covers a large area mixed with broad meander and undulating plains, particularly extensive in the southern half of the zone. The composition found as Tula, Kadam, Awal, Jamuk, Nageswar, Bonak, Ramdala, Bohera, Ping, Sundi spp etc alongwith bamboo in some overlappingarea.

(d) Undulating Plains: The zone has scattered undulating plains. The plains have piedmonts and narrow valleys mixed with low hills and meander plains.

(e) Detraited Valley: These occurin small strips in the dissected foot hillregion and also scattered mainly in undulating plain areas. species sporadically simul, Tula, Kadam, Bohera, Dhuna, Tejpat, Jamuk, Dea cham, Alstonia, Boroi alongwith few patch of bamboo.

(f) Broad Meander Plains: These occur mainly on the North of the Barak river in large patches mixed with low hills and piedmonts.

(g) Flood Plains: These plains chiefly coverthe banks of the Barak river which flows in the EastWest direction dividing the zone into northern and southern regions. The species like Tara, Ekra, Nall, Khogra, Mized with Lagastromi, Paruti etc. The wet land also exists in this local type.

(h) Low lying Areas(Beels and Haors): These include natural depressions and water-logged areas, scattered in all the three districts. But most of these low-lying areas are found in the south of the Barak river.

5.4 Blocks & Compartment allotment of Areas

Blocks, compartment and the area to be covered in this working circle is provided in the table below totaling 10930.50 hect, out of which area earmarked for NTFP plantation is 2100.00 hect. And bamboo plantation is 2100 hect.

Table 5.4a: Compartmentwise Area allotted for NTFP Working Circle

Name of the RFs	Compartment No.	Compt Area (Hect)	Area allotted to NTFP WC
Badshatila	CGBT3	863.65	90.00
Badshatila	CGBT4	443.70	100.00
Badshatila	CGBT5	526.30	200.00
Badshatila	CGBT6	447.12	100.00
Badshatila	CGBT7	646.45	100.00
Badshatila	DHBT3	723.84	100.00
Badshatila	LPBT2	370.54	85.00
Badshatila	LPBT3	338.51	30.00
Badshatila	LPBT4	302.82	25.00
Dholai	DHD1	336.57	70.00
Dholai	DHD2	367.47	150.00
Dholai	DHD4	206.91	50.00
Dholai	DHD10	610.70	120.00
Dholai	DHD11	563.33	100.00
Longai	LPL3	252.54	100.00
Longai	LPL4	280.93	100.00
Longai	LPL5	176.52	50.00
Longai	LPL10	563.28	50.00
Longai	LPL11	146.02	25.00
Longai	LPL12	582.64	150.00
Longai	LPL14	577.39	200.00
Longai	LPL15	881.57	100.00
Longai	LPL18	306.85	100.00
Longai	LPL21	555.21	50.00
Longai	LPL22	991.49	200.00
Longai	LPL26	685.26	100.00
Patheria Hills	PKPH3	1931.77	100.00
Patheria Hills	PKPH4	417.07	50.00
Patheria Hills	PKPH5	1019.75	100.00
Patheria Hills	PKPH6	361.26	50.00
Patheria Hills	PKPH8	715.48	100.00
Patheria Hills	PKPH9	1318.08	75.00
Singla	CGS1	950.66	200.00
Singla	CGS3	355.78	75.00
Singla	CGS5	663.00	200.00

Singla	CGS6	928.86	150.00
Singla	CGS8	830.40	200.00
Singla	CGS9	827.06	200.00
Singla	CGS12	753.44	200.00
Singla	CGS14	690.62	200.00
Tilbhum Hills	PKTH4	193.44	30.00
Tilbhum Hills	PKTH5	294.89	50.00
Tilbhum Hills	PKTH6	334.74	50.00
Tilbhum Hills	PKTH7	443.87	50.00
			4625.00

5.5 Special objectives of Management

(i) Economic objective: To enhance the productivity of Non timber forest produces with a view to cater the need of rural people of fringe villages and schedule tribes living inside reserve forests. Culture of the NTFPs by the forest department engaging such people will help them economically.

(ii) Social objective: To engage village communities in culture and development of NTFPs will ensure employment to them uplifting socio-economic condition of such people.

(iii) Biodiversity & Ecological objective: Culture and development of NTFPs will create forest of heterogeneous nature with diversed species to maintain Forest Eco-system. The increased growth of biomass will help in carbon sequestration.

5.5.1 Other objectives of NTFP Working Circle

i) Sustained use of forests through sustainable collection, harvesting of NTFP adopting sound silvicultural principles.

ii) To involve the local communities living in and around the forest areas, in the management of resources.

iii) To motivate and train the forest dependent communities in protection, improvement, harvesting and disposal of NTFPs including nondestructive collection, processing value addition and marketing of products.

iv) To increase the extent of minor forest produce plantations.

v) To increase the yield of NTFPs by encouraging regeneration and supplementing with artificial regeneration by intensive cultivation.

vi) To identify and conserve locally available medicinal plants and raising endangered or threatened medicinal species on a large scale by involving village forest committees and research organisations.

vii) Initiate research on medicinal plants.

viii) To promote Bamboo Plantation in the natural bamboo areas for meeting domestic need of local people and fodder for Elephant population

ix) To promote afforestation of open and degraded patches of forests.

5.6 Non Timber Forest Produce found in the Division

The Karimganj Forest Division consists of various NTFP such as Cane, Broom, Sukchini, Gandhi Root, Ekra, Patidoi, Kittapata, Honey, Satkora, Chalmugra, Nageswar along with the various medicinal and aromatic plants. The NTFPs are extracted through Mahal system. There

are three such MFP Mahals. Mohal No.1 covers Singla RF & Adarkuna PRF under Cheragi & Sadar Range, Mohal No.2 covers part of Badsahi Tilla RF & Duhalia RF under Cheragi, Lowairpoa & Duhalia Range and Mohal No. 3 covers whole of Longai RF under Lowairpoa Range. The departmental extraction of various important NTFPs over the past few years is shown below. It can be seen that the quantity extracted for various NTFPs is decreasing over years, largely due to decreasing productivity.

Table 5.6: NTFP extracted in the past from various NTFP Mahals

Year	Name of NTFP	Quantity extracted (MT)			Total quantity removed (MT)
		Mohal No.1	Mohal No.2	Mohal No.3	
2008-09	1) Rema (Broom stick)	894	127.75	20	1041.75
	2) Gandhi root	28	65.25	15	108.25
	3) Nageswar flower	43	16.5	1.3	60.8
	4) Sukchini	21	—	—	21
	5) Chalmugra	—	0.75	—	0.75
	6) Tez pata	—	7.5	—	7.5
2009-10	1) Rema (Broom stick)	798	——	225.5	1023.5
	2) Gandhi root	24		105.15	129.15
	3) Nageswar flower	27		9	36
	4) Sukchini	18		17.3	35.3
	5) Chalmugra	0.6		—	0.6
2010-11	1) Rema (Broom stick)	—	64.5	91	155.5
	2) Gandhi root		40	37	77
	3) Nageswar flower		1.5	14	15.5
	4) Sukchini		0.5	1.3	1.8
	5) Chalmugra		0.6	—	0.6
	6) Tez pata		12.5	—	12.5
2011-12	1) Rema (Broom stick)	963	——	——	963
	2) Gandhi root	33			33
	3) Nageswar flower	31			31
	4) Sukchini	19			19
2012-13	1) Rema (Broom stick)			267.5	267.5
	2) Gandhi root			57.5	57.5
2013-14	-	-	-	-	-
2014-15	-	-	-	-	-
2015-16	-	-	-	-	-
2016-17	1) Rema (Broom stick) 2) Gandhi root 3) Nageswar flower 4) Sukchini 5) Chalmugra 6) Tezpata	NIL	NIL	NIL	NIL
2017-18	–Do–	NIL	NIL	NIL	NIL
2018-19	–Do–	NIL	NIL	NIL	NIL
2019-20	–Do–	NIL	NIL	NIL	NIL
2020-21	–Do–	NIL	NIL	NIL	NIL

5.6.1 Other commonly found NTFPs

1. Amlakhi (Fruits of Emblica officinalis)
2. Dhuna (Exudation of Canarium resiniferum)
3. Jamuk (Fruits of Syzygium jamboos).
4. Arjun (Terminalia arjuna)
5. Hilikha (Terminalia chebula)

6. Bhomora (Terminalia balerica)
7. Bhatghila (Oroxylum indicum)
8. Sarpagandha(Rauwolfia serpentine)
9. Satmul (Asparagus racemosa
10. Curcuma aromatica (Ban-haldi),
11. Emblica officinalis (bel),
12. Eugenia jambolana(Loha-jam),
13. Holarrhina antidysentrica (Dudhkuri)
14. Hydnocarpus kurzii (Chalmugra),
15. Litsea cubeba (Mejankuri),
16. Phlogocanthus thyrsiflorus (Titaphul),
17. Piper longum (pipoli),
18. Saraca indica (Asoka),
19. Wedelia calandulacea (Mahabhringraj,
20. Zinziber officinalis (Ada)
21. Pods of Sterculia alata)
22. Cinogyne dichotoma (Patidoi)
23. Laham bark
24. Adhatoda vasica (Bahak Tita)
25. Honey

Medicinal plants: *Bhedailata, Dhekia, Kochu, Kathalu, Manimuni, Jamlakhuti.*
Orchids: *Rhyncostylis retusa, Aerides odoratum, Aerides multiflora, Papilonthe teres (Bhatou phool), Dendrobium fibricatum, D. Aphylum, Cymbidium aloipholium*

5.6.1.1 Collection of Forest Products and Period/Season

People collect different types of products for different purposes, e.g., food products like edible vegetable, fruits and fish. For construction and domestic use products like Bamboo, thatch, cane,broomstick *(phuljharu)* etc are collected. Some of these products are collected throughout the year while some are during certain period.

5.6.1.2 Edible Forest Vegetable

Traditionally forest dwellers are habituated in collecting varieties of wild edible vegetables from forest to meet household food requirements throughout the year. Edible fruits of all kinds, leaves, roots, tubers, constitute the items of food. There are households who depend up to 100 percent on forest vegetable. There is no such restriction from the Forest Department on collection of the forest vegetables. Most of the household hardly can afford to cultivate in the own land because of expenses, low productivity, insufficient land. Both male and female members are involved in collecting forest vegetable, but during summer season mostly female members collect the edible vegetables for the household.

5.6.1.3 Household Building, Fencing and Handicraft Material

Produces generally collected by the forest villager are Bamboo, Thatch, palm leaves *(Japipat* & Tokopat), Cane and Broomstick. These products are collected during a particular season i.e. from November to February. Mostly male members of the households are involved in

collection of these products. Entire day spent for the collection of these products as they have to cover 10 to 15 km for collection. Knife, sickles *(Daus)* are use for cutting and carried by bamboo made *bhar.*

5.6.1.4 Stakeholders

Primary and secondary stakeholders are: -

i) Local people for their daily needs,
ii) Local health practitioners,
iii) Cottage industries,
iv) Petty sellers,
v) Dhobi or washer man.

5.6.1.5 Constraints

i) Absence of fixed price for NTFP,
ii) Absence of marketing facilities,
iii) No standard procedure for collection or harvesting,
iv) Involvement of middlemen,
v) Ring formation at the time of tender cum auction sale,
vi) Lack of processing units,
vii) Ignorance of people about the availability of local resources.

5.6.2 Strategy

With the coming of the Scheduled Tribes and Other Traditional Forest Dwellers Recognition of Forest Rights) Act, 2006 and the distribution of Community rights, generally covering the right to collect NTFP in forest areas. It is important that items of NTFP that are being collected are listed and prescribed for collection.

All the listed NTFPs are of great demand in the market particularly the plants having medicinal properties The Perfume or Aromatic Oil sector, the aromatic plant has become of very high demand in the commercial world for the Aromatic plants found in the forest areas. For example, the Fruits of Emblica officinalis (Amlakhi) rich in vitamin C are in demand for its various uses, including medicinal. Fruits may be allowed to be collected with the restriction as in case of Syzigium Jambos. In case of Garcinia spp, the trees are found in the evergreen areas, but are not very frequent. It may be conserved as in the case of Knema and Myristica dealt with above.

To avoid over exploitation, the use of NTFP should be in such a manner and at such rate that does not lead to the long time decline of biological diversity.The concerned Range Forest Officer and his staff will closely supervise all works of collection and ensure that there is neither any violation of lease agreement nor damage to any trees.

5.6.3 Propagation

All endegeneous species of NTFPs shall be propagated and cultivated as multy crop system beneath the forest species with due sylvicultural prescriptions.

5.6.4 Harvesting and Yield

No harvesting method has been prescribed and no yield is calculated as the NTFPs available in

all the forest are not quantified during the field survey. As the exercise is too exhaustive, so the NTFP could not be quantified and it is proposed, an exclusive survey should be carried out to get actual available quantity of the NTFPs. Although during the survey a long list of NTFP s was prepared in regards the various kind of NTFP available but the exact quantity of harvestable size was not done.

5.6.5 Method of Sale

As per the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 and Rules 2008 and Amendment Rules, 2012the forest dwelling tribes living in and around the forests will be allowed to collect, use and dispose off NTFP which has been traditionally collected within or outside village boundaries. The committee constituted under Grama Sabha has to prepare conservation and management plan for community forest resources in order to sustainably and equitably manage such community forest resources for the benefit of forest dwelling Scheduled Tribes and Other Traditional Forest Dwellers and integrate such conservation management plan with the working plan of the forest department after Forest Dwellers rights on such resources are recognized.

Recently launched the Biodiversity Management committees (BMC) have a pivotal role in stoppage of over exploitation of any biodiversity potential material in & around the revenue villages including the nearby forest areas. The Assam State Biodiversity Rule, 2010 has contemplated sufficient scope for the BMCs for curbing unscientific extraction of NTFPs from the non-forest areas and takes measure for sustainable use of the product. Under various programme partuclarly, NaRMIL and recently under APFBC, the local people are being trained for income generation activities with the medicinal, aromatic plants available both in villages and forest areas purely in a sustainable manner.

In such cases, the NTFP will be collected by the JFMCs and the sale proceed will be shared between the JFMCs and the Government as per the prevailing Government order. As the procedure being followed in the division is in conformity with the current policy of the Government, the same may be continued in future also.

5.6.6 General Measures

1. No NTFPs will be allowed to collect from the areas alloted under protection working circle with the exception of the cases provided under Forest Right Act.

2. The collection of NTFPs should be done in a systematic, scientific and controlled manner. Non destructive methods of extraction have to be followed. Therefore there should be proper supervision at the field level to avoid any harm to the trees. The responsibility to the proper compliance of agreement conditions will be with the Range Forest Officer concerned. In case of any violation of agreement conditions, he should report the matter to the Deputy Conservator of Forests for taking penal action against the society/contractor.

3. It will be the responsibility of the JFMC or SHG s to ensure that during summer season the local tribals engaged in the collection of NTFPs do not set fire to the forests to facilitate collection of any item and that they extend all co-operation to the local staff to keep the forests free from fire. In the interest of sustainability of forest and wildlife, the sensitive areas having the problem of over-exploitation, smuggling, poaching, fire etc. may be ordered for closure.
4. The Deputy Conservator of Forests should ensure that JFMCs etc. submit regular monthly

returns of the quantity of NTFP collected and disposed off. This information will give an idea about the correct potential of particular non timber forest produce in the division.

5. The restricted items found during the routine perambulation of the staff should be sent to the concerned Range Forest Officer for safe custody. Range Forest Officer in turn will give regular report in this regard to Deputy Conservator of Forests.

6. In case the seeds of any species included in the list of non timber forest produces are required for departmental purpose, the society/contractor will have to supply the same to the Department on priority as per the rates fixed by the Silviculturist.

7. The JFMC has to comply all the conditions cited in the prevailing government order and also the agreement.

8. The D.F.O. should sensitize the JFMCs and the tribal community through awareness program regarding method of collection, the time of harvesting, its grading, and storage and value addition for economically important species for sustainable management. The DCF should develop a good practice guide for sustainable harvesting, grading, effective storing and value addition. The tribal community and the JFMC s need to workout and agree on sustainable harvesting methods as a collective enterprise.

9. The DFO should verify the present status of the NTFP yielding species in the division by special studies and if he finds that, specific NTFP species comes under RET status in the division should stop harvesting of such species.

5.7 Prescriptions for Bamboo Plantation

Choice of Species should be based on availability of the following species or planting material. Following species of Bamboo is available in entire state of Assam.

Sl no	Vernacular Name	Botanical Name	Status
1	Saru Bijuli	*Baambusa assamica*	Commonly cultivated, culms are used as handicrafts, fishing rod and for erecting fence.
2	Bhaluka banh	*Bambusa balcooa*	Widely cultivated and nowhere found in wild state. It is probably the best and strongest species for building purposes.
3	Kotoha banh	*Bambusa bambos*	Flowering gregarious, occasionally sporadic. Sporadic flowering occurred in some parts of homestead under Kamrup district during 2008-2009.Species use in paper mill, young shoots are edible.
4	Barosi banh, Hedge banh	*Bambusa multiplex*	Indigenous to China but now available in throughout the state. Frequently cultivated as hedge .
5	Makal banh	*Bambusa nutans*	Naturally occurring in the state. Flowering sporadic ,occasionally gregarious. Use in construction.
6	Jati banh	*Bambusa tulda*	Widely cultivated all over Assam, used for house building, construction , fencing etc. Although Rajkhowa (1964) mentioned that it

			forms extensive gregarious belts in low hills of Central Assam Zone yet after investigations could not find it in wild state. Flowering gregarious , occasionally sporadic. Sporadic flowering recorded in two localities, one in Marakdola and other in North Guwahati in Kamrup district during the period 2007-2009.
7	Bijuli banh	*Bambusa pallida*	Cultivated in the plains of Assam. It is used for house building , handicraft, mat etc. Flowering sporadic.
8	Kalachi banh	*Bambusa vulgaris var. Wamini*	Cultivated throughout Assam as ornamental. So far flowering is not known for this taxon.
9	Haladhia banh	*Bambusa vulgaris var. vittata*	Cultivated throughout Assam as ornamental. Flowering sporadic and rare ,does not set seeds.
10	Kako banh	*Dendrocalamus hamiltonii*	Wild in the lower hills of Assam, often forming extensive patches and also occasionally cultivated in the plains. It is used in house building , making of busket, mat and containers for water and milk, tender shoots are eaten. Flowering gregarious and sporadic after 30-40 years. Gregarious flowering recorded in Kamrup during 1999. Sporadic flowering recorded in Garbhanga and khanapara RF during 2006-2008.
11	Muli banh	*Melocanna baccifera*	Cultivated all over Assam. It is used prefabricated walls called tarja, roofing, and walls of huts etc. Flowering gregarious rarely sporadic after 35 to 60 years. Sporadic flowering and fruiting recorded in Marakdola during 2010 -11.

5.7.1 Bamboo Cultivation

The bamboo plantations efforts are constrained due to non – availability of planting stock or the seeds as most of the economically important bamboo species shows considerably long seeding cycles viz. 30-60 years. Seedling production is the simplest and cheapest method of producing planting stock. Vegetative propagated of bamboo van be done through rhizomes, offsets, layering, culm cutting, branch cutting etc.

5.7.2 Production through seeds

If seeds are available, after sporadic or gregarious flowering mature seeds should be collected from top portion of the clump is usually by cutting the seed bearing culms. Due to the short viability the seeds should be sown immediately to get maximum germination.

5.7.3 Preparation of nursery bed

Seeds are usually sown in standard nursery beds (10 m x 1.2 m) or raised nursery beds of any convenient dimension. The top portion of the bed must be filled with a soil sand, compost mixture (1:1:1 ratio) for proper aeration and root development. After broadcast seeds and raise the plants in nursery beds, seedlings are ready for transplant to polybags after 45 to 60 days of growth in nursery beds. The seedlings are maintained in the nursery for one year before transplanting to the field .

When seeds are not available, vegetative propagation methods are used for the production of planting stock. In vegetative propagation, conventional method like offset planting, rhizome planting , layering etc are used.

5.7.4 Offset planting

An offset is the basal portion of a single culm with the rhizome axis and roots attached to it .For offset planting, preferably one to two year old culms from the peripheral portion of a clump are cut in a slanting manner in such a way that two nodes are left at the base .The major limitation of this method is that the offsets are bulky and extraction and transportation are labour intensive and hence the method is not feasible for raising large scale plantations.

5.7.5 Rhizome cuttings

Rhizome cuttings are sections of fresh living rhizomes with at least a bud of the preceding year along with a portion of the culm (about 15 to 30 cm long). If transportation is involved the rhizome s should be protected from drying as in offset. This technique is mainly suitable for monopodial bamboos with runner type of rhizome.

Vegetative propagation through techniques like divisions, rhizomes, offsets, layering etc. yield limited number of planting stocks and hence are not appropriate for large scale plantation. In order to meet the ever increasing demand of planting stocks on regular basis and also to study the different vegetative propagation technique of bamboo species , Research and Education circle under state Forest Department in 2007-2008, developed , a new ,easy and low cost technique for production of quality planting stock of commercially important bamboo species of Assam vegetatively through two noded culm cutting with macro proliferation technique which yields planting stock with survival rate of 90-100 %.

5.7.6 Plantation Management

Production of field planting stock of bamboo species through two noded culm cutting with macroproliferation technique:

5.7.6.1 Methodology

1) **Bed preparation:** Nursery beds of 10 m x1.2 mx 0.5 m are prepared. Beds should be filled up with a mixture of soil, sand and FYM in a ratio of 1: 1: 1. Seven days prior to the planting all the beds are fumigated with Formaldehyde solution to prevent insect attack. For each bed, 15 Lit. of 0.4 % Formaldehyde solution required.

2) **Preparation of culm cuttings:** From the already identified healthy non- congested clumps 1 year 6 months old culms should be selected and extracted with a sharp instrument leaving at least two node at the base. After extraction culms should be transported to the nursery site and prepare two noded cuttings (leaving 5-8 cm on either side).

3) **Planting of Cuttings:** Two noded cutting can be planted in the nursery beds horizontally, about 25 numbers of cuttings are required in one bed.
4) **Maintenance of nursery beds and sprouts:** Nursery beds should be provided with Shade (Agronet) to protect the cuttings from direct sunlight. Beds should be watered regularly and also maintained by regular weeding and soil working.
5) **Macroproliferation:** Nodes of the each cutting will be sprouted within 7 to 10 days and root development takes within 30 to 60 days after planting. After root development completed the sprouts (propagules) are ready for separation. At the time of separation of propagules from the nodes of each cutting the care should be taken to ensure that the segregated propagules comes out with a portion of rhizome as well as roots. The segregated propagules are again planted to the already prepared macroproliferation beds (10 m x 1.2 m x 0.5 m beds filled with a mixture of soil, sand and vermin-compost in the ratio of 1 : 1 : 1).

   Through this simple technique from a single bamboo node average 120 nos of bamboo saplings can be produced in a year, which could be increased gradually by continuing macroproliferation.

Propagules ready for field planting: The propagules /saplings do not need to the planted in polybags. It can directly be transferred to the earthen beds or to the fields.

Transportation: The bare rooted planting can be transported from nursery to the field directly with 100% survival.

5.8 Silvicultural System

The silvicultural system to be followed here will be selection system.

5.8.1 Pre-monsoon Works

Demarcation of the patches suitable for existing bamboo plantations will be done in the year of demarcation of the bamboo coupe. Plantable patches not less than 5 ha. in extent of plantable area will bear separate demarcation. Pits will be dug at 6m x 6m and of size 45 cm x 45 cm x 45 cm negotiating the overwood and bamboo clumps etc. to bring up the bamboo population to sufficient extent. Preplanting operations will be carried out in the year of harvesting the bamboo in the coupe. Planting operations will be carried out in the rains subsequent to bamboo harvesting. In case of uderplanting the bamboo , it will be done in the 4th year of main planting. The coupe will be demarcated soon after the rains in the year in which the pre-monsoon works are to be undertaken by erecting posts at suitable intervals. This demarcation will exclude the working coupes of the main working circle to which this working circle overlaps to avoid confusion. On the posts, compartments number, coupe number and name of the planting series should be written with black paint.

5.8.2 Cutting Cycle

5.8.2.1 Working Cycle: The minimum age at which culm is harvestable and age of full maturity of culm determine the length of working cycle. The minimum age of harvest is two years and the age of full maturity of a culm is about 5 years. Smaller working cycle may result in over exploitation of clumps whereas longer working cycles result in over crowding of clumps. In view of the prevailing biotic conditions, a working cycle of 3 years has been prescribed from technical and administrative c onvenience.

5.8.2.2 Method of Treatment: The bamboos are in great demand and it will be harvested under periodic thinning in the clumps. A cutting cycle of 3 years has been fixed as it has been found that the yield reduces considerably at a short rotation of 2 years 1st and 2nd year bamboo culms provide food and nourishment to the rhizomes under soil and should not be cut. They are also deficient in lignifications and are brittle and highly vulnerable to fungal attack. Only 3rd year culms are fit for harvesting.

5.8.2.3 Formation of Cutting Series: It is not possible to establish cutting Seris as on date and it will entirely depend on extend of plantation and species selected.

5.8.2.4 Regulation of Yield: It is regulated by area.

5.8.3 Identification of Age of Bamboo

Since the marking of bamboo is highly selective, it is necessary to distinguish, current year, previous year and mature culms from one another.

Current Year: Culm sheath is present on lower half of the culm, branches are present throughout the length of the culm and bloom (White powdery dust) is present abundantly and comes off easily when touched.

Second Year: Culm sheath absent, branches are present practically at all nodes. Bloom is patchy and does not come off easily.

Third Year: Culm sheath absent branches are present practically at all nodes, white bloom is absent and it becomes blackish grey.

5.9 Harvesting

Harvesting should be done under strict supervision of the Department.

5.9.1 Methods of Working

Present practice of working bamboo forests areas on three years felling cycle shall continue.

I) No harvesting works should be permitted between 15th June to 30th September.

ii) No culms below the age of two years will be felled.

Following culms shall be removed from all clumps:-

i) All dead, decayed and dry bamboos.

ii) Culms whose half or more top part is broken or damaged.

iii) Twisted or malformed culms.

iv) In a mature clump the following types of culms (green and living) will be retained.

v) All current season's (i.e. less than one year old) culms.

vi) From the rest culms equal in number to the current season's (i.e. less than one year old) culms or eight, whichever is more.

The remaining culms will be considered available for harvesting.

The cutting height of culms will be between 15 cm to 45 cm. above the ground level i.e. above the first internode above the ground. The cut shall be slant with a sharp instrument. In case of any flowering, no culms from flowered clump shall be felled in the year of flowering.

No clump should be considered fit for harvesting unless it contains more than 12 mature culms (one year as well as two years old included)

Harvesting of bamboo shall be done in a manner so as to ensure that the retained culms are evenly spaced and that some mature culms i.e. more than two years old are retained on periphery for the purposes of support to the new culms.

h) Following Acts will be strictly prohibited: Digging of rhizome, lopping of bamboo culms for fodder, use of tender bamboo culms bundling, Climbers infesting with growth of bamboo clump shall be cut. After cutting the debris will be removed away from the clumps and will be stacked at a distance not less than 2 meter away from the outer periphery of each clump.

i) Tending Operations: After completion of seeding it is essential to properly look after the young regenerated crop till a time the clump formation starts. The following operations will be carried out depending upon the age of the crop.

5.9.2 Crop age between 1 to 3 years:

During this period the area will normally contain thick seedling crop and the clump formation does not start. During this period following tending operations will be carried out. i) The area will be thoroughly gone over and 0.6 meter diameter foci at the rate of 300 per hectare will be formed, distributed evenly over the whole area.

ii) All the rank growth of grasses, weeds and even bamboo seedlings upto a distance of 1.5 meter all around the foci formed as above, will be cleared so that the growth of the bamboo seedlings in the selected foci are not hampered.

iii) All climbers within and around the foci upto 1.5 meter distance will be completely removed.

iv) The whole area will be strictly protected from fire and grazing.

5.9.3 Crop age between 3 to 8 years. :

During this period the clump formations starts but the crop is yet immature for harvesting. During this period following operations will be carried out.

i) All badly grown, twisted and damaged culms from the selected foci, will be removed.

ii) All weeds, grasses and climbers, within and around the foci upto a distance of 1.5 meter, will be completely removed.

iii) Tree growth of species, others than teak, ain, shisham, bija, tinsa, tiwas , dhaora, haldu, karam, semal, mowai and bhirra over topping the clumps, will be removed.

iv) The whole area will be strictly protected from fire.

5.9.4 Cycle of tending operations:

The operations, as prescribed under (A) and (B) above, will be carried out annually. Where there is not possible due to administrative reasons, these operations, except fire protection, will be carried out on 2 years or at the most 3 years cycle. The territorial Conservator of Forests will decide and tending cycle to be followed in each area. The fire protection operations will be carried out every year and the area will be closed to grazing till completion of clump formation.

5.9.5 Protection of regeneration of bamboo area : Protection of regeneration bamboo seedlings in flowered area is most important for the future of the bamboo stand. Since

abundant seeds is available near the flowered clumps , sufficient regeneration usually occur in areas except where soil is deficient or soil surface is too hard.

5.9.6 Bamboo plantation and Economics for vegetative planting stocks :

For one hacter Plantation of clump forming bamboo 400 vegetative planting stocks (rhizome, offset, culm cutting etc.) required with 5m x 5m spacing. After plantation it takes 3 -4 years to produce culms of harvestable. A well-managed bamboo plantation can yields 2700 to 3000 culms /ha yearly after 3 years of growth.

5.9.7 Economics of Bamboo (clump forming) cultivation (5.0 ha area) and harvesting

a) Spacing : 5.0m x 5.0m
b) Number of clumps : 400/ha
c) Number of productive clumps : 350/ha
d) Total Number of productive clumps for 5 ha plantation : 350 x 5 =1750.

Table 5.9.7.a : Cultivation and harvesting plan for 5 Ha plantation model of bamboo

Year	Yield			
	No of culms to be recruited per clump	No of culms to be harvested (3-yr old)/clump	Total no of culms to be harvested (350 clumps)	Total no of culms to be harvested for 5 ha plantation (350 x5 clumps)
1	1.5			
2	4.5			
3	7.5	1.5	525	2625
4	8.0	3.0	1050	5250
5	8.0	6.0	2100	10,500
6	8.0	7.5	2625	13,125
7	8.0	8.0	2800	14,000
8	8.0	8.0	2800	14,000
9	8.0	8.0	2800	14,000
>10	8.0	8.0	2800	14,000

Table 5.9.7.b Projected yield calculation for the Bamboo Plantations as per presumptions of

Year of creation of Plantation in Ha	Year of Harvesting of Bamboo Culms 5th Year Onwards	2021-22	2022-23	2023-24	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30
2020-21	75	78750	157500	196875	210000	210000	210000	210000		
2021-22	125		131250	262500	328125	350000	350000	350000	350000	
2022-23	180			189000	378000	472500	504000	504000	504000	504000
2023-24	180				189000	378000	472500	504000	504000	504000
2024-25	155					162750	325500	406875	434000	434000
2025-26	105						110250	220500	275625	294000
2026-27	30							31500	63000	78750
Total culms to be harvested		**78750**	**288750**	**648375**	**1105125**	**1573250**	**1972250**	**2226875**	**2130625**	**1814750**

5.9.8 Analysis and Valuation of the Crop

The bamboo crop was not undertaken during the tree enumeration exercise. For development of the working plan the following FSI data on bamboo was taken into account.

Table 5.9.8.a

Species	Clumps	Culm	<2 yr culm	2 yr culm	>2 yr culm	Damaged culm
Bhaluka	141	10077	4348	2338	2608	750
Bijuli	23	2351	1199	501	465	186
Jati	539	42571	17449	9939	12799	2385
Bakal	8	695	268	197	183	47
Total	711	55694	23265	12973	16055	3368
Dry weight (t)		532	177	123	198	33

Species	Clumps	Clump diameter class			
		0 – 200 cm	200 – 300 cm	300 – 400 cm	>400 cm
Bhaluka	141	29	24	29	59
Bijuli	23	12	6	1	4
Jati	539	140	146	92	161
Bakal	8	1	0	0	7
Total	711	182	176	122	231

5.9.8.1 Fire Protection: Fires cause extensive damage to the new shoots of bamboos and, therefore, these areas will be completely protected from fire.

5.9.8.2 Grazing Control: These areas should be protected from grazing especially after flowering and in the rainy seasons in which the recruitment of new culms will takes place.

5.10 Associated Regulations and Measures

Closure of an area for the collection or extraction of particular forest produce for a specified period (closed area); restricting or banning the collection or extraction of any forest produce for certain period or periods of a year (closed season); limits on quantities of any forest produce to ensure sustainable harvesting for the future (sustainable harvesting limits); sustainable harvesting/ collection practices etc. NTFPs shall be managed on JFMC areas, fringe forest areas, community forest areas with the help of community after imparting proper training to them regarding time of harvesting, grading and storage for sustainable management and value addition etc.

5.11 Cultivation of Agarwood (Aquilaria agallocha)

Agar oil and wood are highly sought after products around the world, and Agar tress can offer lucrative global trade options to locals in this Division. Agar (*Aquilaria agallocha*) could be the driver of an economic empowerment for the marginalised aboriginal, native, tribal and forest dwelling communities in this Division. Such rural communities may be guided for exploring the green economic opportunities by planting Agar trees. Such plantation drives will not only work to combat climate change and pollution but exploring livelihood opportunities naturally would alleviate poverty by empowering marginalised communities. Hundreds of hectares of forest land are lying barren without any production. These barren lands can be braught under cultivation of Agar trees.

Aquilaria malaccensis locally known as Xasi or Agar, acts as a world class perfumery fixative and is highly sought after and priced by European perfumers for making their best grade scents. It acts as a stimulant, cardiotonic, carminative, aphrodisiac, alternative anodyne, antidiarrheal, antiasthamatic, astringent, laxative stomachic and tonic.

A cost and benefit analysis done by Kumar Deepak, an environmentalist working with the United Nations Development Programme (UNDP) reveals that around 3,000 Aquilaria agallocha trees in two hectares of farmland over a 20 year time period adds up to a total expenditure of about Rs 7.5 lakh. Anticipated yield and income generally comprise two phases. As an interim yield, 40% of the selected Agar plants were harvested in the first phase in thinning operation. The yield of distillable wood (Low quality Dum/Boya) from 10 years old tree (about 20 kg per tree) sells at about Rs 10 per kg. And the Dum quality wood from a 20 year old tree (about 50 Kg per tree) sells at Rs. 50 per kg. Batli Mal/kalagachi of a 20 year old tree (about 0.5 Kg per tree) sells at Rs. 2,000 per Kg. So the gross return from a two hectare field over two decades was Rs. 65 lakh.

Forest land being fertile and natural abode of Sashi (Aquilaria agallocha), introduction of cultivating the species by JFMCs will be promoted. This will definitely boost livelihood opportunities of local communities.

Regeneration of Agarwood (Aquilaria agallocha)

Distribution: North-Eastern States of India namely Assam, Meghalaya, Manipur, Mizoram, Arunachal Pradesh and Nagaland.

Climate and Soil: This is a tropical tree which grows over high rainfall tract throughout humid regions. The region experience low temperature variations between 20ºC to 28ºC and relative humidity around 80%. It grows over sandy loam and slightly acidic soils.

Propagation Material: Seeds.

Nursery Technique

Raising Propagules: Seeds mature during July-August. It loses viability soon. Thus seeds are sown within a week of collection. Raising seedlings in poly-bag is preferred. Seed germination is more than 80%.

Propagule Rate and Pretreatment: 4500 plants/ha are required.

Planting in the Field:

Land Preparation and Fertilizer Application: Before transplanting of seedlings, land should be thoroughly ploughed and harrowed to bring it up-to a good tilth. FYM @ 20 t/ha may be applied at the time of land preparation supplemented with NPK @ 60:60:40 may be applied in split doses. The fertilizer level is increased with age from 3rd year onwards.

Transplanting and Optimum Spacing: Seedlings when attain a height of 30-40 cm should be transplanted in the field during rainy season (April-June) at optimum spacing of 3X 3 meter.

Intercropping System: Annual or biennial medicinal herbs viz. *Andrographis paniculata* (Kalmegh), *Withania somnifera* (Ashwagandh), *Rauwolfia serpentina* (Sarpagandha), *Bacopa monnieri* (Bhrami), *Piper longum* (Pippali) etc. may be cultivated as catch crops till the trees attain growth.

Inter-culture and Maintenance Practices: Spading and simultaneous weeding at 90 days after transplanting is required.

Irrigation Practices: Rainfed plantation.

Weed Control: Hand weeding is done after 90 days of transplanting, thereafter Gramoxone @ 0.5 kg/ha may be applied when necessary. Glycel @ 1.5 kg/ha may be applied to eradicate weeds.

Disease and Pest Control: Attack of Heortia vitessoides is observed during May-August. This causes defoliation of whole tree. Application of Thiodan @ 2 ml/lit at 15 days interval during infestation is found to control the pests effectively.

Harvest Management

Agar-wood develops a peculiar, persisting strong odour because of infestation by a fungal identified as Zeuzera conferta, it penetrates the hard wood, through wounds, injury or borers. All attempts to induce artificial infestation have failed; it is a natural phenomeon. It develops black patches and stores resinous oil which is separated through distillation of the woody chips. This oil has high value in medicine and perfumery industry.

Crop Maturity and Harvesting

Time of harvesting depends on disease infestation in hard wood. Agar is regarded as a pathological product formed as result of infection. Black patches in the bark indicate occurrence of infection and can be used for harvesting hard wood to commercial use.

Post-harvest Management: Wood chips or chips powdered mechanically without generating heat are soaked in water for 2-3 days and transferred to stainless steel vessel which is part of a distillation unit. The distillation is done for 30-36 hours. Oil and water is collected in a separator and stored. The oil and water ratio in the condenser is kept low on account of the high boiling point. Oil is stored in closed container preferable in Aluminum bottles.

Chemical Constituents: The woody chips have an essential oil commonly known as Agar oil from 0.8% to 2.2% in fungal infested wood of 8-50 years old plant. The wood contains hexadecanoic acid (25.0%), pentadecanoic acid (6.7%) and oleic acid (4.9%); other constituents range from0.1to2.1%.

Yield and Cost of Cultivation (Hectare): This oil is exceptionally costly.

Treatment prescribed: Areas allotted under JFMC Working Circle and NTFP Working Circle will be selected for Agarwood cultivation. 30 % of such area shall be braught under Agarwood cultivation under JFMC agenda. Regeneration expenditures, as in other JFMC plantation, shall be borne by Forest Department. Protection of the Crop shall be done by the JFMCs. Sharing of harvested crop shall be as per norms of the JFM.

Table: 5.12: Year-wise activities to be undertaken in NTFP Working Circle:

Activity	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
NTFP Plantation = 2100 hect	210	210	210	210	210	210	210	210	210	210
Maintenance = 5040 hect.	-	210	420	630	630	630	630	630	630	630
Bamboo Plantation = 2100 H.	210	210	210	210	210	210	210	210	210	210
Maintenance = 5040 hect	-	210	420	630	630	630	630	630	630	630

CHAPTER 6

SOIL AND WATER CONSERVATION OVERLAPPING WORKING CIRCLE

6.1 Name of the Working Circle

Soil and water conservation over lapping working circle. The detail map of this working circle is shown in the figure 6.1

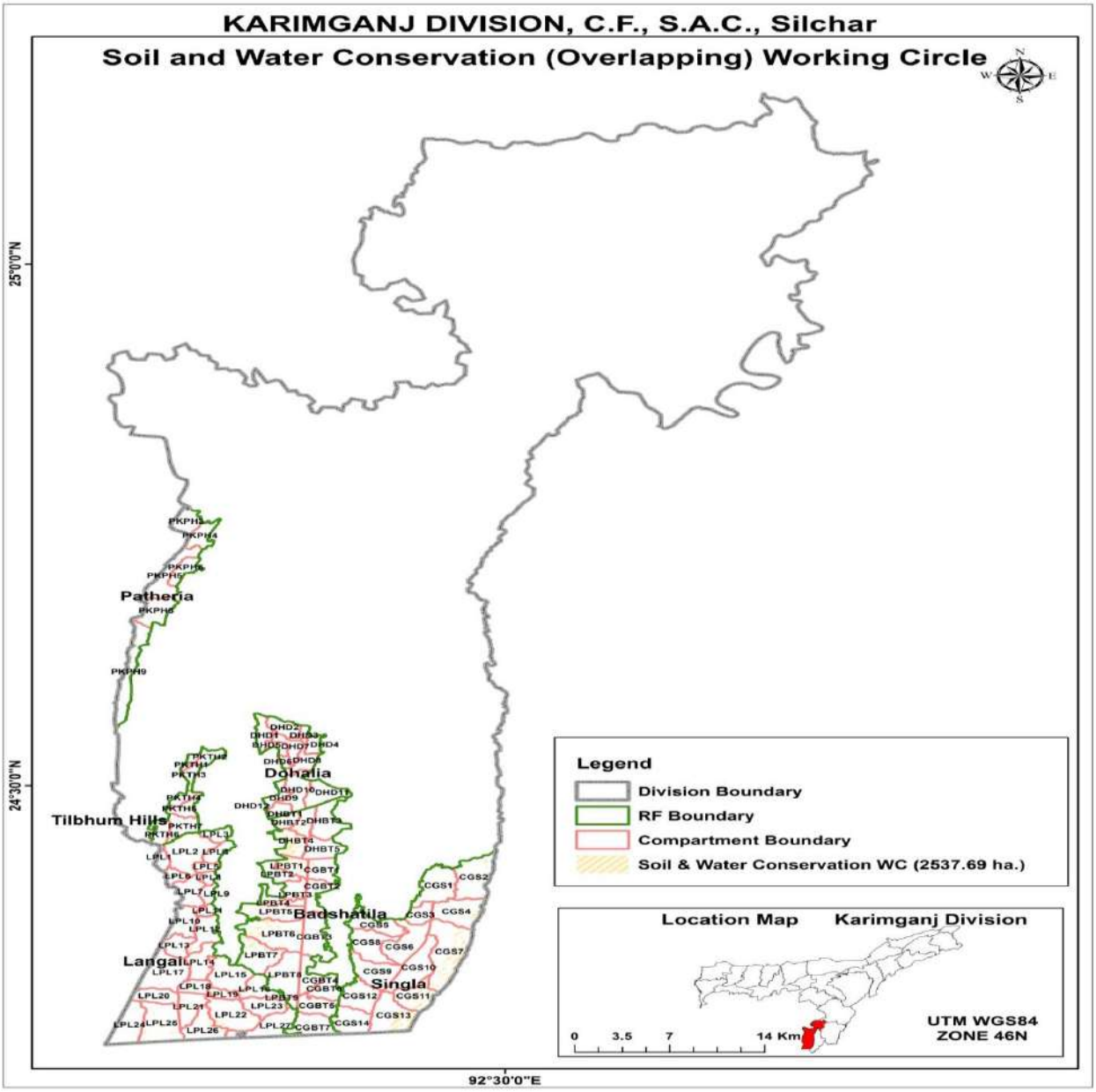


Fig. 6.1. Soil and water conservation over lapping working circle map of Karimganj Division

6.2 General constitutents of the working circle

All the areas of forest which are prone to soil erosion would be part of this Working Circle. The main emphasis is to reduce top soil erosion and minimize soil loss during floods.The effective soil conservation measures along with the catchment and watershed management are the pre conditions for a sustainable forest management. The forests are also sources of water (surface, sub-surface and ground water). Over exploitation of the ground water resources results in a decline in ground water levels; there is an urgent need to augment the ground water resources through suitable management interventions. It is desirable to have forest management practices with the principles of watershed based development approach especially in the source areas of water. Such areas should have restrictions on tree felling but there should be operations to improve the water regimes and natural regeneration. Special provisions shall be made in the working plan to sustain water resources and to address the livelihood issues of the people living in and around the natural inland water sources. Further, areas susceptible to soil erosion such as steep slopes and areas in the vicinity of perennial streams shall be focused for soil and water conservation using mechanical or vegetative control measures.

6.2.1 Need for Soil and Water Conservation (SWC) for Forest Development

Soil and water conservation measures are absolutely essential for forest development particularly in degraded sites where availability of moisture in soil is very low and the top soil is either eroded or prone to erosion. Tree growth responds more to water stress than any other perennial factors of the forest site. Thus soil water is the key to forest site productivity for many species.

Soil-water stress plays an equally important role in the radial growth of trees. It affects the annual growth, and thus forest productivity, and various wood properties, particularly, wood specific gravity.

Forest floor, if denuded and subjected to heavy erosion, loses the top layers of the soil. The topmost layer, unique to forest soils, contains organic matter, partly or well decomposed, and the next horizon in the soil profile is that of mineral soil mixed with organic matter. These are the layers that supply nutrients to plants and contribute to forest growth. Thus once these layers are removed due to erosion, the forest plants suffer from lack of food and become dependent on supply of fertilizers for survival and growth. Sustaining forest growth by external application of fertilizers is not an economic measure. Heavy erosion of the forest soil also destroys its physical properties like soil texture, structure, porosity etc. The physical properties of the solid, liquid, and gaseous phases of soil have a substantial influence on the supply of water, nutrients and oxygen for metabolism, and the availability of physical space to anchor the underground plant structures. Providing physical support for above ground tissues is of particular importance, because plants must properly orient themselves to capture sun's energy for use in photosynthesis. In shallow and poorly drained soils, wind throw is common because of limited physical space in the former case, and anoxic (without oxygen) condition in the latter. Thus arrest of soil erosion in forest floor is essential for survival and growth of forest trees.

6.3 Objectives of the working circle

The broad objective of this working circle is to conserve soil and water in the Division. The main objectives of this working circle shall be –

- To assess soil erosion vulnerability of various areas and to suggest control measures shown on a map.
- To propose several water harvesting structures and show them on map.
- To periodically monitor the river flow pattern with reference to annual rainfall/duration to show the status of improvement due to various control measures proposed.
- To map the wetlands in the forest area and to ensure that the water levels in these wetlands does not fall.
- To monitor the level of ground water in various wells, located within the vicinity of the RFs, with respect to the annual rainfall.

6.4 General characteristics of the Vegetation:

According to physiography, the division can be divided into eight (8) classes ranging from high hills with elevation exceeding 300m to perennially waterlogged beels that may be described as follows:

(a) High Hill Region: This region includes those high hills which have an elevation of above 300m; and the region occurs mostly in the Northern and Eastern parts of the zone bordering Meghalaya, N.C.Hills and Manipur. The species naturally occurring this type are Cham, Garjan, Moricha Sindi, Til Sundi, Champa Sundi, Poma, Kurta, Gamari, Rata, Zinari, Jamuk, Kayengla, Hotia, Kurta, etc. alongwith bamboo species as reflected in the above tables.

(b) Dissected Foot Hill Region: This region lies on the North and North-East areas bordering the high hills and interspersed by thin strips of detraited valleys. Same flouristic composition exist in this region.

(c) Low Hill Region: This region has an elevation of less than 300m and it covers a large area mixed with broad meander and undulating plains, particularly extensive in the southern half of the zone. The composition found as Tula, Kadam, Awal, Jamuk, Nageswar, Bonak, Ramdala, Bohera, Ping, Sundi spp etc alongwith bamboo in some overlappingarea.

(d) Undulating Plains: The zone has scattered undulating plains. The plains have piedmonts and narrow valleys mixed with low hills and meander plains.

(e) Detraited Valley: These occurin small strips in the dissected foot hillregion and also scattered mainly in undulating plain areas. species sporadically simul, Tula, Kadam, Bohera, Dhuna, Tejpat, Jamuk, Dea cham, Alstonia, Boroi alongwith few patch of bamboo.

(f) Broad Meander Plains: These occur mainly on the North of the Barak river in large patches mixed with low hills and piedmonts.

(g) Flood Plains: These plains chiefly coverthe banks of the Barak river which flows in the EastWest direction dividing the zone into northern and southern regions. The species like Tara, Ekra, Nall, Khogra, Mized with Lagastromi, Paruti etc. The wet land also exists in this local type.

(h) Low lying Areas(Beels and Haors): These include natural depressions and water-logged areas, scattered in all the three districts. But most of these low-lying areas are found in the south of the Barak river.

6.5 Blocks, compartment and JFM areas

Blocks, compartment and the area to be covered in this Working Circle is provided in Table 6.5.

Table 6.5: Area details under the soil and water conservation working circle

Name of the RFs	Compartment No.	Compt.Area (Hect)	Area allotted in Soil & water Conservation WC
Badshatila	CGBT1	501.17	10.00
Badshatila	CGBT2	484.68	11.00
Badshatila	CGBT3	863.65	5.00
Badshatila	DHBT1	254.69	33.00
Badshatila	DHBT2	368.61	30.00
Badshatila	DHBT4	504.35	198.00
Badshatila	DHBT5	545.00	12.00
Badshatila	LPBT1	394.80	120.00
Badshatila	LPBT3	338.51	30.00
Badshatila	LPBT4	302.82	30.00
Badshatila	LPBT5	724.09	50.00
Badshatila	LPBT6	1214.47	175.00
Badshatila	LPBT7	863.87	100.00
Dholai	DHD1	336.57	20.00
Longai	LPL2	1068.29	30.00
Longai	LPL4	280.93	10.00
Longai	LPL12	582.64	30.00
Longai	LPL14	577.39	60.00
Longai	LPL15	881.57	66.00
Longai	LPL17	1117.31	5.00
Longai	LPL18	306.85	20.00
Longai	LPL19	196.07	31.00
Longai	LPL21	555.21	38.00
Longai	LPL22	991.49	73.00
Longai	LPL25	1139.75	38.00
Longai	LPL26	685.26	59.00
Longai	LPL27	830.69	10.00
Patheria Hills	PKPH9	1318.08	70.00
Singla	CGS2	1093.72	48.00
Singla	CGS4	923.11	110.00
Singla	CGS5	663.00	30.00
Singla	CGS7	1585.59	389.00
Singla	CGS8	830.40	16.00
Singla	CGS11	690.94	100.00
Singla	CGS13	1022.31	145.00
Tilbhum Hills	PKTH6	334.74	20.00
Tilbhum Hills	PKTH7	443.87	21.00
			2243.00

6.6 Special Objectives of Management

The broad objective of this working circle is to conserve soil and water in the Division. Specific objectives are given below:

1. To check soil erosion and to maintain the dydrological regime of Division.

2. To adopt appropriate planting technique for the non-agricultural land in the watersheds to ensure control of erosion, improvement of moisture regime and production of fuel wood, fodder, small wood as an additional component. This includes management of forests and afforestation of degraded lands.
3. To reduce runoff by ensuring extensive absorption and percolation of rain water and consequent better recharge of wells for domestic uses and for irrigation, wherever possible.
4. To adopt corrective measures on land to prevent erosion by water and wind, gully formation etc.
5. To provide for storage of available rain water in situ and re-use it within watershed for crop production.
6. To prepare land and a drainage system for optimum use of scarce water.
7. To reclaim eroded land and restore it to productive use.
8. To generate adequate employment opportunities through improved crop and plant management and also through animal husbandry.

6.7 Strategy

Watershed management approach to protect soil and water would be undertaken in the Division. Involvement of local communities especially youths, women from the forest and fringe villages will be ensured.

6.7.1 Watershed management

A watershed is a drainage basin or catchment area of a particular stream or river. Watershed is defined as a hydro-geological unit of area from which the rainwater drains through a single outlet.

Watershed Deterioration: Deterioration of a watershed means decline in the status and productivity of the natural resources – land, vegetation and water – that comprise the watershed. The deterioration may occur due to many factors. These include:

• Faulty agricultural, forestry, and pasture management leading to degradation of land;
• Fire (however there is no impact of fire in this Forest Division)
• Unscientific mining and quarrying;
• Faulty road alignment and construction;
• Industrialization;
• Lack of awareness of the people.

Results of watershed deterioration

• Poor returns from agriculture, forests, grass lands, fruit orchards due to degradation of land;
• Increased erosion hazards resulting in decreased biomass production;
• Quick siltation of reservoirs, lakes and riverbeds;
• Poor water yield in terms of quantity and quality;

Importance Watershed Management

• To maintain a sufficient and quality water supply
• To avoid and contain erosion
• To improve planning and reduce risk of floods and droughts
• To be prepared for the impacts of climate change

Concept of Integrated Watershed Management

Integrated watershed management involves integration of technologies within the natural boundary of drainage area for optimum development of land, water and plant resources to meet the basic minimum needs of people in a sustained manner. Integrated Watershed Management is thus

• Multi-technology initiative – technologies relating to forests, agriculture, land management, management of water resources, management of animal resources etc.

• Management by Multi-stakeholder – appropriate departments of the government, local bodies, Panchayet Institutions, local people.

• Multi-subjects of focus – land, water and plant resources within the watershed area.

Objectives of Integrated Watershed Management Plan

The objectives of Integrated Watershed Management plan are-

(a) To adopt optimum agricultural cropping system for all culturable land backed by an appropriate package of inputs (seeds, fertilizer etc.)

(b) To adopt appropriate planting technique for the non-agricultural land in the watersheds to ensure control of erosion, improvement of moisture regime and production of fuel wood, fodder, small wood as an additional component. This includes management of forests and afforestation of degraded lands.

(c) To reduce runoff by ensuring extensive absorption and percolation of rain water and consequent better recharge of wells for domestic uses and for irrigation, wherever possible.

(d) To adopt corrective measures on land to prevent erosion by water and wind, gully formation etc.

(e) To provide for storage of available rain water in situ and re-use it within watershed for crop production.

(f) To prepare land and a drainage system for optimum use of scarce water.

(g) To reclaim eroded land and restore it to productive use.

(h) To generate adequate employment opportunities through improved crop and plant management and also through animal husbandry.

Land and Water Conservation Practices

Soil and water conservation practices are the primary step of watershed management program. Conservation practices can be divided into two main categories: 1) *in-situ* and 2) *ex-situ* management. Land and water conservation practices, those made within agricultural fields or young forest plantations, like construction of contour bunds/trenches, field bunds, terraces building, broad bed and furrow practice and other soil-moisture conservation practices are known as in-situ management. These practices protect land degradation, improve soil health, and increase soil-moisture availability and groundwater recharge. Moreover, construction of check dam, farm pond, gully control structures, pits excavation across the stream channel is known as *ex-situ* management. *Ex-situ* watershed management practices reduce peak discharge in order to reclaim gully formation and harvest substantial amount of runoff, which increases groundwater recharge and irrigation potential in watersheds.

Crop Diversification and Intensification

The crop diversification refers to bringing about a desirable change in the existing cropping patterns towards a more balanced cropping system to reduce the risk of crop failure and

provide yields of multifarious products. For forest crop it is always advisable to try judicious mixture of indigenous species suitable for the agro-climatic zone in question. Crop intensification is the increasing cropping intensity and production to meet the ever increasing demand for food and forest products in a given landscape. Watershed management puts emphasis on crop diversification and intensification through the use of advanced technologies, especially good variety of seeds and planting stock, balanced fertilizer application and by providing supplemental irrigation.

Capacity Building

Watershed development requires multiple interventions that jointly enhance the resource base and livelihoods of the rural people. This requires capacity building of all the stakeholders from farmer to policy makers. Capacity building is a process to strengthen the abilities of people to make effective and efficient use of resources in order to achieve their own goals on a sustained basis. Capacity building program focuses on construction of low cost soil and water conservation methods, production and use of bio-fertilizers and bio-pesticides, income generating activities, livestock based activities, waste land development, market linkage for primary stakeholders and so on.

6.7.2 Soil Erosion

There are two major types of erosion, namely Geological Erosion and Accelerated Erosion.

Geological Erosion:

The wearing away of the land surface by running water , wind, waves, and moving ice generally has been looked upon as a normal geological process. Geological erosion is sometimes referred to as normal erosion or Natural erosion that represents the erosion characteristic of the land in its natural environment, undisturbed by human activity. Geological erosion has contributed to the formation of our soils and their distribution on earth. This long term eroding process has given rise to most of our present topographic features like stream channels, valleys etc.

Accelerated Erosion:

Accelerated Erosion or what is normally referred to soil erosion represents the soil loss in excess of geological erosion. Soil erosion means the process of detachment of particles from the soil surface and their transportation to other areas through the agencies of water, wind or gravity. Soil erosion is caused primarily by two agencies- water and wind. Water erosion is further subdivided into Raindrop, Sheet, Rill and Gully erosion.

Factors involved in Erosion:

The major factors affecting soil erosion are –

- Climate
- Soil
- Vegetation
- Topography

Of the above factors, vegetation and to some extent soil may be manipulated or controlled. However, the climatic and topographic factors remain beyond human control. The factors affecting erosion are further described below.

Climate – Climatic factors affecting erosion are precipitation, temperature, wind, humidity and solar radiation. The influence of temperature and wind is most evident through their effects on evaporation and transpiration. Precipitation has a direct impact on runoff, as has been

explained earlier. As the runoff increases, so does the soil erosion or soil loss. Soil- Physical properties of soil, namely soil structure, texture, organic matter, moisture content, density or compactness as well as chemical and biological characteristics influence the infiltration capacity and extent to which soil is likely to be dispersed or transported.

Vegetation-The major effects of vegetation in reducing erosion are –

• Interception of rainfall and thus reducing runoff
• Retardation of erosion by decreased surface velocity
• Physical restraint of soil movement
• Improvement of aggregation and porosity of the soil by roots and plant residue
• Increase biological activity in the soil and
• Transpiration which decreases soil moisture, resulting in increased storage capacity. It may, however be noted that the above influences of vegetation on erosion will vary with the season, crop , age of the crop, climate and nature of the vegetative material, i.e, roots, plant tops/crown and plant residues.

Topography –Topographic features influencing the erosion are degree of slope, length of slope, and size and shape of the watershed.

Accelerated erosion is attributable to the following causes –

• Faulty agricultural practices
• Faulty silvicultural practices
• Inadequate soil cover
• Uncontrolled grazing
• Large scale deforestation
• Fire
• Road construction on hills without adequate arrangements for drainage of water.

6.7.3 Water Erosion

Water Erosion is basically of four types:

i) Raindrop Erosion: Soil splash resulting from the impact of raindrops directly on soil particles or on thin water surfaces is called raindrop erosion. On soil protected with vegetation or plant residues, raindrop erosion may be insignificant, but on bare soil as much as 100 tonnes per acre are splashed into the air during a heavy rain. Size of raindrop and its velocity are two characteristics of raindrop that affect erosion. Large drops increase sediment carrying capacity of runoff. The velocity of rainfall also greatly affects the soil splash and erosion. The soil characteristics that determine the ease with which soil particles may be detached and transported are soil detachability and soil transportability. In general soil detachability increases with the increase in size of soil particles and soil transportability increases with decrease in particle size. It means that clay particles are more difficult to detach than sand, but clay is more easily transported. The effect of raindrop splash is more pronounced on sloping fields than on level land.

ii) Sheet Erosion: The uniform removal of soil in thin layers from slopping land is called sheet erosion. The beating action of raindrops combined with surface slope causes the major portion of sheet erosion. From the energy point of view raindrop erosion is far more important because raindrops have velocities of about 20 to 30 fps whereas overland flow velocities are about 1 to 2 fps.

iii) Rill Erosion: Soil removes from small but well defined channels (rills) resulting from concentration of surface flow is called rill erosion. Rill erosion is more serious because runoff moves faster in these small channels than in surface slope.

iv) Gully Erosion: Rills are small enough to be removed by normal tillage operations. Gullies are defined as large channels that cannot be filled except by earth moving machines in addition to normal tillage. Gully erosion takes place when concentrated runoff from a vast slopping land in sufficient volume and velocity continues cutting the soil in the form of channels. Gullies are the spectacular results of erosion. The area under gully is lost for cultivation. The gully erosion is an advanced stage of rill erosion much as rill erosion is an advanced stage of sheet erosion.

Process of Gully erosion:

The rate of gully erosion depends on runoff producing characteristic of watershed. These are:

- Drainage area
- Soil characteristics
- Alignment, Size and shape of the gully
- Slope in the channel

Development of a gully is combination of a number of processes occurring simultaneously or in

different stages. These processes are:

- Waterfall erosion at the gully head (See Fig.4.1)
- Channel erosion caused by water flowing through the gully or by raindrop splash
- Slides or mass movements of soil in the gully

6.7.4 Wind Erosion

Wind is one of the active forces causing soil erosion particularly in tracts subjected to frequent and heavy gales. The wind picks up lighter particles and transports them to great distances. This is particularly seen in the coastal and desert areas. Like water erosion, the loss of soil by wind involves two processes, namely, (a) detachment; and (b) transportation. The abrasive action of the wind results in some detachment of tiny soil grains from the granules or clods of which they are a part and transportation of the particles takes place in many ways.

Factors involved in wind erosion:

The major factors affecting wind erosion are

- Climate
- Soil
- Vegetation

Topography is relatively unimportant; though the length of the eroding surface greatly influences soil movement.

Climatic factors – factors influencing wind erosion are –

- Precipitation (Amount and distribution of rainfall and its effect on soil moisture);
- Temperature;
- Wind (velocity, direction, duration and turbulence) ;
- Humidity, viscosity and density of the air

(Temperature, wind and humidity influence evaporation and transpiration which deplete soil moisture. Depletion of soil moisture makes it more vulnerable to wind erosion.)

Soil factors - factors influencing wind erosion are –

- Texture

• Structure
• Density of particles
• Density of soil mass
• Organic matter
• Moisture content
• Surface roughness

Moisture content is the most significant factor, as relatively dry soil is more prone to wind erosion.

Effects of Soil Erosion:

• The fertile top soil is removed and along with it the plant nutrients are lost and less productive sub soil is exposed.
• Drought becomes more severe as the water is not stored in the sub soil to be used by the plants in the dry season.
• Erosion reduces cultivable area by cutting deep gullies; makes farming difficult and uneconomic.
• Fertile lands go out of cultivation due to formation of sand dunes by wind erosion.
• Erosion in reservoirs and tank catchments causes silting of those irrigation structures and reduces their capacity and finally render them to be abandoned.
• Erosion in river catchment results in silting up of the rivers. Consequently the bed is raised, thereby causing overflowing of rivers and flood.
• Soil erosion prevents replenishment of ground water supply and springs and wells.

Soil and Water Conservation Measures – Brief Outline

Erosion control measures are of two types structural and biological.

Splash erosion - Splash erosion may be checked by growing vegetal cover. Grass and shrubs are best vegetal cover. Dub grass (*Cynodon dactylon*), Cenchrus spp., Pennisetum, Spear grass(Heteropogon spp. in dry areas), trailers like Ipomea biloba, sabai grass etc.are good ground cover. In the hills Kudzu vine, Amlisho etc. are good cover.

Sheet Erosion - Areas under sheet erosion should be closed to grazing. If the area is closed to grazing and fire, chances and extent of erosion are much less .This may be done by erecting fencing or cutting cattle proof trenches etc. In the areas with moderately loamy soil contour trenches may be dug at suitable intervals depending on slope. This will intercept run off and help infiltration. In the south western region (Bankuara, Purulia, Birbhum) the major soil is laterite red loam having moderately heavy sub soil. The size of the contour trench should be sufficient to intercept at least 12 hours continuous run off. Staggered contour trenches with intermediate spaces are more effective than continuous contour trenches. The dug out soil is neatly piled the shape of a bundh. In the agricultural fields, contour bundhs are erected. Spillways are provided in staggered manner to drain out excess water. Please see Fig. 4.3

Vegetative Measures:

Soil completely covered with vegetation is in an ideal condition to absorb moisture and resist the inroads of erosion, provided the cover is continuous and the soil is well penetrated with roots. Under such conditions, erosion is limited to a normal, harmless rate. Close-growing vegetation serves to reduce or eliminate direct impact of rain on the soil. In open forest areas, species with low crown may be planted. Growth of grass need be encouraged. Perennial shrubs like Croton, Indigofera, Zizyphus etc. may be raised. In fact, shrubs are more effective to check

erosion than trees. Even on steep slope, soil erosion is minimum in tea gardens with thick tea crop.

In agricultural land, erosion promoting and erosion retarding crop may be planted in alternate strips. Maize, Bazra, potato etc are erosion promoting crops, whereas legumes (pulses) are erosion retarding crops.

In the pasture land, rotational and regulated grazing need be practiced.

Rills should be closed by ploughing the land. Other measures prescribed for sheet erosion need be adopted.

Gully Erosion – Principal steps of control measures are given below. The major steps are

• To arrest water from coming into gullies. This is done by cutting diversion drains, catch water drains or ring bundhs.

• To smoothen the slope of gully head. It is done by cutting in slpoe of 1 in 2. The slope is grass sodded or pitched with stone masonry.

• To check the velocity of water flowing over the gully. For shallow gullies, this is effectively done by raising brushwood dams. Small barriers with thickly placed branches of Vitex negundo, Ipomea supported by live posts etc may be raised.

• To control velocity by constructing engineering structures. Rock check dams are constructed in small gullies.

• Storage in lower reaches. Earthen dam is constructed at lower reaches for storage purpose. It checks the velocity of water and arrests the soil. Earthen dams are provided with spillways.

6.8 Target of Achievement

Activity	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
Soil and water conservation works = **635 hect.**	65	65	65	65	65	50	65	65	65
Maintenance	65	130	195	260	325	310	310	310	310

-SSS-

CHAPTER-7

WILDLIFE MANAGEMENT OVERLAPPING WORKING CIRCLE

7.1 Name of the Working Circle

Name of the Working Circle is Wildlife management overlapping working circle. Ut extends the wole of the forest area of karimganj Division.

7.2 General Constitutents of the Working Circle

The working Circle jurisdiction and area shown in the map as collected from the Forest Survey of India. The Working Circle has been made based on careful consideration of previous Working Plan, past System of Management and Present Status of the Forest Area under proper filed verification and comparison. The each Working Circle having the unique management objectives and Methodology for achieving the objectives / target. The overlapping Working Circle spread over other Working Circle but without hampering the objectives of each other.

The present status of forest cover is not at upto the mark for wild Life habitat. The prominent wildlife that exist in the forest area such as Elephant Barking deer, slow lorries, Hillock gibbon, Rhesus Macaque, Monitor lizard, Pangolin, Sloth bear, water lizard, Leopard, tiger, Jungle Cat, Indian fox, common otter, Jackal, Mongoose etc. along with the prominent birds like Babui (Ploceus philippinus Rain quail, Milvus migruns, Vulture, Maina, Shalik, orinolus, Xanthornus etc. and reptiles/ turtles, snakes, the fishes etc. Therefore, the protection/ Conservation along with the improvement of habitat required in favour of biodiversity of fauna.

7.3 Blocks & Compartment Allotment Areas

Entire area of the Division i.e., 797.846 sq. km including Borail Wildlife sanctuary are covered under this Working Circle.

7.4 Objectives of the working circle

The aim and objective under this proposed overlapping working circle is to ensure wildlife habitat conservation, identification of corridors for movement of elephants and their protection, management options for reducing man-animal conflict, and conservation and preservation of biodiversity. Further the specific objectives of this working circle is divided into two sub-heads, one focusing wildlife management and the other focusing biodiversity conservation in the areas.

7.4.1 Wildlife management

i) Habitat maintenance of important wildlife species available in the Division.
ii) Ensure preservation of the rich biodiversity of the Division through man-induced actions.
iii) Ensure reduction of man - wildlife / elephant conflicts.
iv) To check wildlife trade and smuggling of wildlife and its products from the division.
v) Initiating protection, conservation and improvement of habitat to ensure survival of all forms of animals including the endangered, threatened and rare species.
vi) To maintain the terrestrial ecosystem in and around the wildlife habitat areas.

vii) To initiate researches on the faunal diversity and their habitat.
viii) Generate adequate publicity measures for conservation of wildlife.
ix) Initiate projects on wildlife management and its protection.

7.4.2 Biodiversity conservation

1) To ascertain the present status of various flora and fauna, especially the lower life forms, algae, fungi etc. and the IUCN Red Data book species, if any, and to monitor their status periodically. Various biodiversity parameters such as dominance, diversity, frequency, basal area, importance vegetation index etc. shall be calculated for each compartment.
2) To map herbs, shrubs and climbers, and to make inventories of various NTFPs and Medicinal Aromatic Plants.
3) To prepare and update people's biodiversity registers with the help of Biodiversity Monitoring Committees formed. The support of universities as well as interested NGOs shall also be taken for this.
4) To carry out various studies related to biomass productivity, regeneration potential, NTFP productivity, carbon sequestration, effects of climate change on species range shifts, species growth rates and biodiversity, etc. by establishing permanent sample plots, preservation plots, regeneration plots and NTFP plots at various representative locations within the forest. State government is expected to provide support to the division in form of instruments and subject matter experts.
5) To initiate non-polluting, non-degrading ecotourism activity in the areas which are representatives of unique ecosystems, such activities will provide livelihood support to locals and shall be largely aimed at awareness generation among tourists and locals.
6) To take up collaborative projects with local and international Educational Institutes, Academic bodies, Research and other Organizations, agencies.

7.5 General characteristics of the Vegetation

According to physiography, the division can be divided into eight (8) classes ranging from high hills with elevation exceeding 300m to perennially waterlogged beels that may be described as follows:

(a) High Hill Region: This region includes those high hills which have an elevation of above 300m; and the region occurs mostly in the Northern and Eastern parts of the zone bordering Meghalaya, N.C.Hills and Manipur. The species naturally occurring this type are Cham, Garjan, Moricha Sindi, Til Sundi, Champa Sundi, Poma, Kurta, Gamari, Rata, Zinari, Jamuk, Kayengla, Hotia, Kurta, etc. alongwith bamboo species as reflected in the above tables.

(b) Dissected Foot Hill Region: This region lies on the North and North-East areas bordering the high hills and interspersed by thin strips of detraited valleys. Same flouristic composition exist in this region.

(c) Low Hill Region: This region has an elevation of less than 300m and it covers a large area mixed with broad meander and undulating plains, particularly extensive in the southern half of the zone. The composition found as Tula, Kadam, Awal, Jamuk, Nageswar, Bonak, Ramdala, Bohera, Ping, Sundi spp etc alongwith bamboo in some overlapping area.

(d) Undulating Plains: The zone has scattered undulating plains. The plains have piedmonts and narrow valleys mixed with low hills and meander plains.

(e) Detraited Valley: These occurin small strips in the dissected foot hillregion and also scattered mainly in undulating plain areas. species sporadically simul, Tula, Kadam, Bohera, Dhuna, Tejpat, Jamuk, Dea cham, Alstonia, Boroi alongwith few patch of bamboo.

(f) Broad Meander Plains: These occur mainly on the North of the Barak river in large patches mixed with low hills and piedmonts.

(g) Flood Plains: These plains chiefly coverthe banks of the Barak river which flows in the EastWest direction dividing the zone into northern and southern regions. The species like Tara, Ekra, Nall, Khogra, Mized with Lagastromi, Paruti etc. The wet land also exists in this local type.

(h) Low lying Areas(Beels and Haors): These include natural depressions and water-logged areas, scattered in all the three districts. But most of these low-lying areas are found in the south of the Barak river.

7.6 Legal Position

Wildlife (Protection) Act, 1972 is applicable for entire Assam. Indian Forest Act 1927 also deals with wildlife. The Wildlife (Protection) Assam Rules, 1980, Bamboo and Rattan Policy, 2003. are applicable. Assam Forest Policy, 2004 under IFA, 1927 hunting of wild animals has been completely banned as per the amendments made to the Wildlife (Protection) Act, 1972 in the year 1991 are in vogue.

7.7 Monitoring of Wildlife

Some of the direct or indirect evidences to judge presence of wild animals and to monitor them are-

i) Sighting: Near water holes, salt licks, grazing sites, near the roads, actual sightings of wild animals and their photography.

ii) Infrared photography: Installation of photographic units on probable areas to get picture of the wild animal.

iii) Pug marks: By keen observation of these pug/hoof marks we can identify the category of wild animals, theirs sex and age. This gives an indication, however for authentication of wildlife, evidence based photographic method should be applied.

iv) Grazing marks: Identification of the category of herbivore by analyzing the nature of grazing and browsing, since all herbivores have different grazing.

v) Feces: Collection and examination of animal feces for knowing the wildlife and getting idea on their population, food, etc.

vi) *Antlers marks*: Before falling of antlers e.g. spotted deer's and Sambars rub their antler on some stem.

vii) By salt licks: In forest some soil contains more percentage of salt and minerals and wild animals lick such salt bearing soil to get the required amount of salt. Sights of such indicates presence of wildlife.

viii) By sound: Hearing sounds of wild animals a fair understanding of the wildlife presence, location can be ascertained.

ix) By wallowing sights: Samber, Wild Boars etc. like mud and they wallow in mud. By this they clean their skin and protect it from insects. Such signs indicate presence of wildlife

x) Nail Marks: Tiger and Bear with the help clear, sharpens their claws/nails by scratching the bark of some trees. Such signs indicate presence of wildlife.

The wildlife, which used to flourish in the forests of the Division, is threatened due to various anthropogenic factors, elaborated under 8.10.1: 1 to 9. Broadly due to increase in demand for wildlife products all over the world, poaching problems have increased over the years in the region and Wild animals of Karimganj Division are very much susceptible to poaching . Hence, special efforts are required to be made by the division to protect the wildlife in the division. Migratory birds visiting the area mostly during winter also face threat from poachers and fishermen. There are many endangered insects and plants included in the schedule of Wildlife Protection Act 1972 in this division. The insects are threatened from the insecticides and pesticides that's gets leached into the division from the surrounding tea estates. These insects play a very important role in pollination of floral species and overall ecology of the division.

7.8 Strategy

For wildlife management the key focus is to ensure maintenance of wildlife habitats in the Division. This is to be ensured through spatial mapping of such areas and assisting regeneration of suitable species in those areas. For biodiversity conservation, natural regeneration or assisted natural regeneration shall be promoted. The regenerative capacity of the endemic species, elephant liking species shall be enhanced. A total ecosystem conservation concept will be adopted for conservation of the wildlife habitat and conservation of biodiversity in these forests. An effective naturalization plan needs to be devised based on principles for maintaining natural diversity. To enrich the low diversity areas, efforts should be made to restore native complementing natural species rather than planting as many different kinds of trees as possible without looking into the natural regeneration and the needs of the natural fauna of the site. Further, introduction of exotic species in the area will be restricted and plantation of both, slow and fast growing native species of herbs, shrubs, and trees shall be promoted.

Since the composition under the forest type found in Karimganj has signature species namely Gamari (*Gmelina arborea*), Cham (*Artocarpus chaplasha*), Garjan (*Dipterocarpus turbinatus*), Sundi (*Michelia mentena*), it is essential to protect and maintain the habitat. It is necessary to prescribe plantation of these signatures species to maintain the composition of the forest type in the reserve forests. High rainfall experienced in this division which facilitates dense undergrowth is another important factor that needs to be maintained.

Involvement of local communities especially youths, women from the forest and fringe villages will be sensitized in forest and wildlife protection issues identification and appropriate measures, participatory planning and sharing of responsibility and benefits needs to be promoted. Excluding local population can often lead to illegal activities which can cause further degradation of the flora and fauna. The efforts therefore shall be to impose restrictions on local populations through participation in purview of legal and allow traditional practices to continue to ensure their long-term success. For this purpose, capacity building programmes may be taken up.

Further efforts should be made to preserve as many patches of natural communities as possible. This will help to sustain regional diversity. Wherever possible, fragmentation of large patches of natural vegetation shall be avoided. Even a narrow access road through a forest can act as a barrier to movement of small organisms and affect their habitats.

Ecotones between natural communities support a variety of species from both communities. Hence, these should be allowed to develop naturally between adjacent communities.

Regular monitoring and updation of species data through research and development activities needs to be taken up taking the present data as the base. Ethno biological information also needs to be generated for the species recorded in the Division.

7.8.1 Target of Achievement

Activity	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Enrichment plantations 1000 hect.	100	100	100	100	100	100	100	100	100	100
Maintenance of plantation = 2300 hect	-	100	200	300	400	400	400	400	400	400
b) Establishment of 1 anti-wildlife depredation unit.	1	1	1	1	1	1	1	1	1	1
d) Safe elephant corridors 4 nos. (Continuous for 10 years)	4	4	4	4	4	4	4	4	4	4
e) 150 nos. wildlife awareness camps.	15	15	15	15	15	15	15	15	15	15

7.9 Measures for its protection

Measures for protection in this working circle is elaborated below under proposed wildlife management prescriptions, and proposed biodiversity conservation measures.

7.9.1 Prescriptions proposed wildlife management

The main issues are hunting, poaching, illegal felling, and illegal removal of NTFP, encroachment, grazing, man-animal conflict, and livestock disease.

Hunting: It has been observed that in the past there were occasional attempts by miscreants to capture wild elephants. There were some cases of hunting of male wild elephants in the past. There were instances of organized community hunting by Tea Garden labours for bush meat. Though in recent time no such incident of hunting has taken place, yet the wild animals are

very much susceptible to hunting. Forest staffs in the Division shall keep uninterrupted vigil to prevent hunting. The forest staff shall develop an intelligence system with the help of local people to gather information about any activities related to hunting and take appropriate steps accordingly for its prevention. Five watch towers proposed under anti depredation unit which may be utilized for vigilance against hunters.

Poaching: There were attempts to kill Hoolock gibbon in the forests and were thwarted timely. Staffs shall keep strict vigil to thwart such further attemps. The forest staff shall develop an intelligence system with the help of local people to gather information about any activities related to poachers and traders of wild life and take appropriate steps accordingly to prevent any poaching in the division.

Illegal felling: Illegal felling is the major concern of all the forests of the State. Karimganj Division is not exception to this activity. There have been illegal felling in the forest areas Illegal felling has to be checked. All necessary legal measures shall be taken to stop illegal felling.

Encroachment and other illegal activities: A few boundary pillars were constructed in the protected area with proper demarcation during the last management plan period. Encroachment identified and the standard procedure of eviction of any such encroachment is to be done at priority. No new villages or new dwellers should be permitted to come out in future in close proximity of the wildlife habitats. Forest staffs must report about any attempt of encroachment. Not reporting of such encroachment attempt shall be deemed to be abetment on part of concerned staffs having jurisdiction of the area.

Grazing: The grazing is negligible in the forests of the Division. However, domestic cattle sometimes stray to the forests of the Division which are to be driven away from forest. All domestic cattle need to be immunized from timetotime. Initiation in this regard should be taken by facilitating vaccination camps for cattle of the fringe villagers.

Habitat management

Due to anthropogenic pressure, the wild life habitat has deteriorated. Water, food, safe resting places for wildlife, breeding areas, and nesting areas is to be ensured in the Division. Wallows and salt licks are other factors. For this the following activities are proposed:

Creation of water holes: Water availability, or the scarcity of it, is one of the major factors that decide the health of wildlife habitat is regulated by availability of water. During water scares seasons, probability of wildlife increases near water holes or near villages and thereby increases their susceptibility to poaching. So it is proposed to create water holes, density shall be commensurate with the density of wild animals found in the area.

Fruit and fodder plantations: Plantation of fruit plants like *Dilenia* spp., *Syzygium* spp., *Guajava* spp., *Artocarpus* spp., *Mangifera* spp., *Tamarindus* spp., *Phyllanthus* spp. *Eugenia* spp., plantation of fodder species like *Musa spp*. *Bambusa* spp. *Bauhinia* spp., *Andropogon* spp., *Buchanania* spp., *Cassia* spp., *Croton* spp., *Dioscorea* spp., *Eragrostis* spp., *Eugenia* spp., *Ficus* spp., *Lagerstroemia* spp., *Saccharum* spp. etc. shall be undertaken. To improve the prey base, care of herbivores should be taken by improving the assured fodder availability in

the forest. The open areas in wildlife rich zones should be developed with suitable fruit and fodder species as mentioned above.

Development of Nesting Sites: Especial emphasis should be given to improve and maintain the characteristic waterbodies for white winged wood duck. Water bodies, small and large should be developed and maintained for migratory birds and other bird species. To provide suitable nesting places to birds, seed sowing of *Ficus* spp. and its planting should be done near water-bodies and in the riparian areas. No new villages or new dwellers should be permitted to come out in future in close proximity of such important wildlife habitats.

Establishment of wildlife anti depredation unit (ADU)

Establishment of anti depredation unit is proposed. Raising an wildlife anti depredation squad (ADS) is proposed for this Division. It should include DFO, selected ACFs, RFOs BOs and Forest guards. A committee willl be consituted with the ADS members and local veterinary officer, prominent villagers from JFMC who have knowledge on wildlife. Discussions should be conducted to jointly find solutions for man animal conlifct issues. The ADS should be equipped with wireless sets, high beam, tranquilizers, tranquilizing guns, GPS. Tranquilizers to be carefully used as per the Assam forest department standards incase of only straying small animals like cats, etc. For tranquilization the local veterinarian officer would be consulted. Five watch towers will be constructed to

It is proposed that under the anti depredation unit *koonkies* (*trained elephants*) should be kept at the division at all times to chase away *makhana* and other straying elephants, wild elephant herds from areas outside wildlife areas especially from human habitations/settlements/agricultural fields/towns,etc. Incase of elephant straying into habitattions *koonkie* should be used to chase them away. It is proposed to keep four (4) *koonkies* during planting and harvesting seasons in the division as anti depredation measure. For this, it is proposed to catch two (2) numbers of elephants per year from the Karimganj forest division as a measure to:

i) control wild elephants which are already pocketed,
ii) meet the future demand of *koonkie* in other forest divisions,
iii) meet the future demand of elephants for the national parks, and sanctuaries for patrolling, and control the population of elephant.

Trenching: Straying out of elephant and other wildlife from the forests of the Division to human population is to be minimized. A total of 10 km length of fragmented trenches is proposed in identified patches.

In view of IGF and Director (Project Elephant) vide Notification issued on 11th November 2009 (see below) electric fencing, if any, posing danger to any wild life in tea estates in the Karimganj forest Division should be removed.

"The Ministry is reviewing reports of death in tea/coffee estates aspecially in Assam and Karnataka due to unregulated voltage in the solar power fencing erected by them. This is a serious issue and in fact such an act tantamount to willful hunting as per section 16(b) and thus in violation of section 9 of the Wildlife (Protection) Act'1972.
2. You are therefore requested to make it known to all the tea gardens, coffee estates and other

located in the elephant areas to ensure that no such fencings are erected in future. Whenever deaths of elephants due to electrocution in such places have taken place, the management needs to be prosecuted for hunting and such fencing needs to be removed at once."

Wildlife first aid kit: Wild animals get wounds, injured by accidents or by disease. These wounds and injuries are so small that there is no need to get them to Veterinary doctor. Therefore, training of the forest staff on such injuries and first aid is to be organized so that they know about such wound, injuries, disease. Wildlife first aid kits should be kept in the division and be given to the needy animals as required.

Awareness Campaign

To ensure the participation of local communities in the conservation planning, awareness generation among them is a pre-requisite. Awareness activities can involve wildlife awareness and environmental awareness through medium of picture, videos and talks by resource persons. It is essential to make the community aware of the importance of protecting forest, wildlife and wildlife related laws, rules and regulation. Similar awareness activities can be carried out in a small scale approach involving the school children from the surrounding villages. In addition, to promote all these activities, preparation and installation of signage and hoardings at strategic places should be carried out. These signages in local languages can educate people on restrictions on hunting, logging and firewood collection, and punishments; information on mitigation of wildlife conflict; on the importance of forest and wildlife. Awareness in the public administration level can also be achieved by conducting meetings with the district administration to make them aware about the initiatives. Mitigation measures of human-animal conflict in the region can also be taken up by the department. As villagers are unaware of compensation procedure, awareness about how to report crop depredation or injury and casualty is also essential.

To initiate scientific studies on endangered and threatened flora, fauna and habitat:

Research is an important aspect in management of any protected area; a protected area cannot be managed without information on the various species of the area, their ecology, habitat and relevant issues in management. Thus research should be given due importance and there should be incentive and promotion of research at a protected area. A good manager can utilize the information given by researchers and can take a judicious decision on implementing recommendations for conservation of wildlife.

7.10 Proposed Biodiversity conservation prescriptions

Guidelines proposed on treatment prescriptions for preservation and conservation of biodiversity in Karimganj division is as follows:

Important Value Index (IVI): Tree species having IVI is less than 5.00 will be promoted by planting and preservation.

Fruit trees: Fruit trees such as Outenga, Mango, Amla, Bel, Jamun, Arjuna, Bahera, Bot, Aahat, Bamboo, etc. will not be felled during any operation.

Promoting endemicity: Areas infested with dense *Mikenia micrantha*, *Lantana spp.*, *Parthenium spp*. (*found on the areas nearby the villages*) shall be replaced by useful

economical species. Compartments or parts of compartments which have population of fruit trees, or trees of lesser known species shall be preserved against any exploitation activity.

Banning application of inorganic pesticides: Application of pesticides/ insecticides around a 5 km periphery of the forest in this division is to be completely banned. The forest houses diverse insects, birds and application of insecticides/pesticides by the surrounding tea estates affects the insect population of the forest division. It hampers pollination of important tree species and indirectly affects the birds and fish population.

Fire protection measures: Fire protection measures, though fires incidences are not reported to be done as a precautionary measure to protect the endemic biodiversity.

Natural regeneration: Natural regeneration or assisted natural regeneration shall be promoted. The regenerative capacity of the endemic species, elephant liking species shall be enhanced. A total ecosystem conservation concept will be adopted for conservation of the wildlife habitat and conservation of biodiversity in these forests. An effective naturalization plan needs to be devised based on principles for maintaining natural diversity. To enrich the low diversity areas, efforts should be made to restore native complementing natural species rather than planting as many different kinds of trees as possible without looking into the natural regeneration and the needs of the natural fauna of the site. Further, introduction of exotic species in the area will be restricted and plantation of both, slow and fast growing native species of herbs, shrubs, and trees shall be promoted.

Involvement of local communities: Involvement of local communities especially women in forest and wildlife protection through awareness, participatory planning and equitable sharing of responsibility and benefits needs to be promoted. Excluding local population can often lead to illegal activities which can cause further degradation of the environment. The efforts therefore shall be to impose minimum restrictions on local populations under the purview of the legal provisions and allow beneficial traditional practices for improving the habitat to initiate for ensuring long-term success. For this purposes capacity building programmes needs to be taken up.

Preservation of good patches: Efforts should be made to preserve as many patches of natural communities as possible. This will help to sustain regional diversity. Wherever possible, fragmentation of large patches of natural vegetation be avoided. Even a narrow access road through a forest can act as a barrier to movement of small organisms and effect their habitats. Ecotones between natural communities support a variety of species from both communities. Hence, these should be allowed to develop naturally between adjacent communities.

Biodiversity monitoring: Regular monitoring and updation of species data through R & D activities needs to be taken up taking the present data as the base. Ethno biological information also needs to be generated.

-SSS-

CHAPTER 8

General financial Forecast & Financial Plan of operation

8.1 General

This Working Plan is devoid of harvesting prescription. The forests of the Division have been degraded to a considerable extent. Absence of harvestable crop led to restrain the WPO from harvesting prescription. However, regeneration and restocking are prescribed in the Working Plan. Huge regeneration and protection of crop from biotic interference will lead to achieve the goal. As there has been a paradigm shift of forest management from production forestry to protection forestry and there is a need to evaluate the intangible benefits of forests it is justified to spend money on reforestation without counting its tangible benefits.

Costs and prices are influenced by market forces and depend on supply and demand. It further depends on the principle of management and pattern of exploitation adopted from time to time. Therefore, it is not possible to estimate with reasonable accuracy the expenditure and revenue during the period of this working plan. The estimates given below are based on the current prices of various items of forest produce and the cost involved in carrying out the prescriptions of the plan at current rates.

8.2 Past Revenue and Expenditure

The details of past revenue and expenditure have been given in the following table 8.2.

Table 8.2: Past revenue and expenditure (Rs. in lakhs)

Year	Expenditure incurred	Revenue generated	Surplus
2008-2009	220.95	65.31	Shortfall
2009-2010	239.08	71.49	Shortfall
2010-2011	343.74	81.12	Shortfall
2011-2012	374.34	131.67	Shortfall
2012-2013	453.51	39.48	Shortfall
2013-2014	467.42	123.14	Shortfall
2014-2015	460.78	92.96	Shortfall
2015-2016	457.67	94.89	Shortfall
2016-2017	445.73	192.04	Shortfall
2017-2018	481.67	308.42	Shortfall
2018-2019	462.84	322.04	Shortfall
2019-2020	421.21	167.71	Shortfall

8.3 Future Revenue

In this Working Plan there is no harvesting prescription. This is in view of neccesity for restocking the already dedraded forest. As such, no revenue is forcasted from harvesting of forest produce.

8.4 Future Expenditure

The estimated expenditure includes all development works during the Working Plan perion of 10 years. The estimates are as per price index prevailed in current year. The estimated expenditure may increase subject to increase of price index and deviation(alteration/inclusion/modification) of plan. Estimated expenditure for various Working Circles are given as under.

8.4.1 Estimated expenditure for Joint Forest Management Working Circle

JFMC Nursery

Table: 1.1: Proposed estimate for development of nursery under Joint Forest Management working circle in Karimganj Division(in terms of mandays)

Item No	Details Item of Works	Qty	Number of man-days
1.	Nursery development LS	10	923
2.	Sapling raising – 1,50,000 saplings will be produced per nursery/JFMC	-	13,838
3.	ContingencyL.S	-	1,476
4.	**Total**		**16,236**

8.4.1.2 JFMC Plantation

Proposed estimate for JFMC plantations under Joint Forest Management working circle in Karimganj division for the period of 2022-23 to 2031-32.

Item No	Details Item of Works	Qty	Number of man-days
1.	Plantation – including land preparation, pit digging, manuring , watering and maintenance @50 ha/yr x 2500/ha x 10 yrs.	1250000	96,095
2.	ContingencyL.S		961
3.	**Total**		**97,056**

8.4.1.3 JFMC NTFP/Organic formulations/ Hydrams/CAT plans related development

Proposed estimate for JFMC other activities related to NTFP/organic formulations/hydrams/CAT plans under Joint Forest Management working circle in Karimganj division for the period of 2022-23 to 2031-32.

Item	Details Item of Works	Qty	Number of
1.	Lump sum for each JFMC for development of NTFP processing values adding, development of inorganic formulations, manure, fabrication of	10	3075
2.	ContingencyL.S		308
3.	**Total**		**3,383**

CAMPA Assam, Norms (Rs.) used for estimation.

S.No.	Works	25 Ha	1 Ha
1	Site Selection, Advance Work, Creation and 1st Year Maintenance	35,14,375	1,40,575
2	2nd Year Maintenance	4,91,250	19,650
3	3rd Year Maintenance	4,35,000	17,400
4	4th Year Maintenance	3,22,500	12,900
5	5th Year Maintenance	2,78,750	11,150
	TOTAL	**50,41,875**	**2,01,675**

Norms for Maintenance 1.5 Ha. Nursery under CAMPA

Number of standard beds for raising naked seedlings =25
Number of standard mother beds for raising polypot seedlings = 10
Number of beds for arranging polypot seedlings = 110
Total number of polypot seedlings to be raised = 1,00,000
Total number of naked seedlings to be raised = 10,000
Total number of tall seedlings to be raised = 1,000
Total number of seedlings to be raised = 1,11,000

Sl. No.	Particulars of works	Unit	Qnty	Rate (Rs.)	Amount (Rs.)
1	Maintenance of chainlink fencing including repairing of fencing	LS	-	-	10,000.00
2	Preparation of 35 standard beds (10 mother beds for polypots + 25 for naked seedlings/stumps) by soil working etc. @1.5 DLs/bed= 53 DLs	DLs	53	250	13,250.00
3	Preparation of 100 beds for arranging polypot seedlings @ 4 bed/DL	DLs	28	250	7000.00
4	Procurement of Bamboo for arranging Polypots in the raised beds including ropes for tieing etc.	No	110	150	16,500.00
5	Procurement of of quality seeds	LS	-	-	12,000.00
6	Cost of procurement of fertile soil, river silt/ sand soil 225 cum @300/- per cum including loading, transporting and unloading	Cu.m	225	300	67,500.00
7	Cost of farm yard manure & Vermi-composit: 75 cu.m @ Rs. 500	Cu.m	75	500	37,500.00
8	Cost of fungicide, insecticide, pesticide etc. & their application	LS	-	-	2,500.00
9	Cost of sowing, dibbling of seeds in standard/ mother beds @ 5 beds/DL for 35 beds = 7 DLs	DL	7	250	1,750.00
10	Cost of perforated virgin HDPE black polypot including 5% VAT 15% excise duty for a) 1,00,000 polypots 5 inch x 8 inch x 300 gaige + 3.8 quintals (approx 26,500 polypots per quintal) b) 1,000 polypots 12 inch x 18 inch x 300 gauge = 0.2 quintal	Qtls	4	18500	74,000.00
11	Preparation of 1,00,000 polypots including selving of soil, mixing of soil with manure, filling of soil in polypots, arranging the polypots in beds, transplanting seedlings as per sylviculture requirement of species etc. (1 DL = 200 polupot per day) = 500 DLs	DL	500	250	1,25,000.00
12	Preparation of 1000 polypot seedlings for tall planting	No	50	250	12,500.00

	including cost of polypot preparation and upkeepment (1 DL = 20 polypots per day) = 50 DLs				
13	Shifting of polypot seedlings to avoid rooting in soil atleast twice in a year@1000 polypots/DL = 201 DLs	DL	201	250	50,250.00
14	Providing temporary shed using agronet for shade demanding species (both bareroot and polypot) including purchase of bamboo posts etc.	LS	-	-	12,500.00
15	Watering of 35 beds & 1.o1 lakh polypots (110 beds) as and when necessary @ 150 beds/DL x 90 days (180 days of lean period) = Total 145 beds x 90 days	DL	90	250	22,500.00
16	Weeding of 35 beds and 1.01 lakh polypots (110 beds) @ 3 beds/DL x 5 weeding/year = 242 DLs	DL	242	250	60,500.00
17	Protection work, cattle watching, fencing repairing and upkeepment of nursery works = 365 days	DL	365	250	91,250.00
18	Cost of tools, implements, signboard, bed wise sinage (Rs.100/ sinage showing details of species, date of sowing/transplanting and number of plants) etc.	LS	-	-	25,000.00
19	Transportation of materials & seedlings for free distribution etc.	LS	-	-	10,000.00
20	Awareness, monitoring & Evaluation works	LS	-	-	5,000.00
21	Overhead, administrative expenditure & contingency	LS	-	-	8,500.00
				Grand Total = Rs.	6,65,000.00

Estimate for development of nursery for the period of 2022-23 to 2031-32

Y1 (Rs.in Lakh)	Y2 (Rs.)	Y3 (Rs.)	Y4 (Rs.)	Y5 (Rs.)	Y6 (Rs.)	Y7 (Rs.)	Y8 (Rs.)	Y9 (Rs.)	Y10 (Rs.)
6,65,000	**-**	**6,65,000**	**-**	**6,65,000**	**-**	**6,65,000**	**-**	**6,65,000**	**-**

Estimate for creation of Plantation for the period of 2022-23 to 2031-32

Year	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
area	**200**	**200**	**150**	**150**	**150**	**-**	**-**	**-**	**-**	**-**
@ 1,40,575/-	**28115000**	**28115000**	**21086250**	**21086250**	**21086250**	**-**	**-**	**-**	**-**	**-**

Estimate for maintenance of Plantation for the period of 2022-23 to 2031-32

Year	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
area	-	200	400	550	500	450	300	150		
@61100	**-**	**12220000**	**24440000**	**33605000**	**30550000**	**27495000**	**18330000**	**9165000**	-	-

JFMC Training and awareness programmes

	Y1 (Rs.)	Y2 (Rs.)	Y3 (Rs.)	Y4 (Rs.)	Y5 (Rs.)	Y6 (Rs.)	Y7 (Rs.)	Y8 (Rs.)	Y9 (Rs.)	Y10 (Rs.)

No. of Training	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**	**8**
Amt	4000000	4000000	4000000	4000000	4000000	4000000	4000000	4000000	4000000	4000000

Promotion of ecotourism

	Y1 (Rs.)	Y2 (Rs.)	Y3 (Rs.)	Y4 (Rs.)	Y5 (Rs.)	Y6 (Rs.)	Y7 (Rs.)	Y8 (Rs.)	Y9 (Rs.)	Y10 (Rs.)
No. of Trg	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**	**2**
Amt	**1000000**	**1000000**	**1000000**	**1000000**	**1000000**	**1000000**	**1000000**	**1000000**	**1000000**	**1000000**

8.4.1 Estimated expenditure for Plantation Working Circle

Proposed estimate for Plantation and regeneration working circle in Karimganj division for the period of 2019-20 to 2028-29

Item	Detail Itemof Works	Qty	Number of mandays
1.	Block Plantation – including land preparation, pit digging, manuring , watering and maintenance @100 ha/yr x 1111/ha x 10	1000 ha	10,763
2.	Gap filling (150 ha/yr) and regeneration activities (50 ha /yr) @ 200 ha/yr x 10 years @20,000/ha	2000 ha	3,075
2.	ContingencyL.S		953
3.	**Total**		**14,791**

Proposed estimate in mandays in for the period of 2019-20 to 2028-29

Sl. No.	Details of Itemof Works	Mandays
1.	Plantation and regeneration - including land preparation, pit digging, manuring, watering	2,73,278
2.	Maintenance	1,20,779
3.	**Total**	**3,94,057**

CAMPA norms (Rs.) used for estimation of expenditure

S.No.	Activities	25 Ha	1 Ha
1	Site Selection, Advance Work, Creation and 1st Year Maintenance	35,14,375	1,40,575
2	2nd Year Maintenance	4,91,250	19,650
3	3rd Year Maintenance	4,35,000	17,400
4	4th Year Maintenance	3,22,500	12,900
5	5th Year Maintenance	2,78,750	11,150
	TOTAL	**50,41,875**	**2,01,675**

Estimate for creation of Plantation for the period of 2019-20 to 2028-29

Year	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10

area	525	525	525	525	525	525	525	525	-	-
@ 1,40,575/-	**73801875**	73801875	73801875	73801875	73801875	73801875	73801875	73801875	73801875	73801875

Estimate for maintenance of Plantation for the period of 2019-20 to 2028-29

Year	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
area	-	525	1050	1575	1575	1575	1575	1575	1575	1050
@61100	-	**32077500**	**64155000**	96232500	96232500	96232500	96232500	96232500	96232500	64155000

8.4.2 Estimated expenditure for Forest Protection Working Circle

Proposed estimate in mandays in for the period of 2019-20 to 2028-29

Item	Details Item of Works	Qty	Number of
1.	Boundary pillars	200	21,525
2.	Plantation of evicted areas (10 ha/year)	1000	1,07,626
	Total		**1,29,151**

Total Costs for Boundary Pillars: New Construction and Maintenance (10 Year Period).

Sl No	Year of Working Plan	Item	Pillars to be established	No of Pillars expected to be existing	Pillars to be maintained	Unit Cost of establishment (Rs)	Unit Cost of Maintenance (Rs)	Total Costs (Rs)	Total Cost (Per Year) (Rs)
1	2019-2020	Main Pillar	26	0	0	15300	3825	3,97,800	9,52,800
		Sub Pillar	74	0	0	7500	1875	5,55,000	
2	2020-2021	Main Pillars	26	22	0	15300	3825	3,97,800	9,22,800
		Sub Pillar	70	64	0	7500	1875	5,25,000	
3	2021-2022	Main Pillars	26	44	0	15300	3825	3,97,800	9,22,800
		Sub Pillar	70	128	0	7500	1875	5,25,000	
4	2022-2023	Main Pillars	26	66	22	15300	3825	4,81,950	11,26,950
		Sub Pillar	70	192	64	7500	1875	6,45,000	
5	2023-2024	Main Pillars	26	88	22	15300	3825	4,81,950	11,26,950
		Sub	70	256	64	7500	1875	6,45,000	

		Pillar							
6	2024-2025	Main Pillars	22	110	22	15300	3825	4,20,750	10,65,750
		Sub Pillar	70	320	64	7500	1875	6,45,000	
7	2025-2026	Main Pillars	22	132	22	15300	3825	4,20,750	10,65,750
		Sub Pillar	70	384	64	7500	1875	6,45,000	
8	2026-2027	Main Pillars	14	154	22	15300	3825	2,98,350	9,43,350
		Sub Pillar	70	448	64	7500	1875	6,45,000	
9	2027-2028	Main Pillars	0	168	22	7500	3825	84,150	2,04,150
		Sub Pillar	0	504	64	7500	1875	1,20,000	
10	2028-2029	Main Pillars	0	168	22	7500	3825	84,150	2,04,150
		Sub Pillar	0	504	64	7500	1875	1,20,000	
GRAND TOTAL		**Main Pillars**	**188**	-	-	-	-	34,65,450	85,35,450
		Sub Pillar	**564**	-	-	-	-	50,70,000	

Estimate for implementing works of Forest Protection(Preservation)Working Circle:

SNo	Items of work	Unit	Cost/Unit	Total (in Rs.)
	Cost for implementing the ejection plan			
1	50 labour/day for 91 days	4550	250	1137500.00
2	1 Truck/day for labourers for 91 days	91	6000	546000.00
3	1 Truck/day for seized materials for 2 days	2	6000	12000.00
4	1 Bus/day for security personnels for 91 days	91	10000	910000.00
5	2 Small vehicle/day for Officers and staff for 91 days	182	5000	910000.00
6	1 Ambulance with medical team/day for 91 days	91	5000	455000.00
7	1 No. JCB for 2 days @Rs. 3000/- per Hour X 5 Hours per day= 10 Hours	2	3000	30000.00
8	1 Kunki elephant/day for 2 days	2	5000	10000.00
9	Tools and equipments	L/s		300000.00
10	Contingency/TA/DA, etc.	L/s		1000000.00
11	Tents, accommodations of security forces	L/s		500000.00
12	Construction of new camp	6	1000000	6000000.00
13	Construction of new security barrack	11	2000000	22000000.00
14	Mini Truck (hiring)	3	1200000	3600000.00
	Sub Total:-			**3,74,10,500.00**

SNo	Items of work	Unit	Cost/Unit	Total (in Rs.)
	Cost for implementing the ejection plan			
	Cost for creation Nursery and Plantation			
1	1.5 Ha Nursery	4	6,65,000	26,60,000.00
2	Plantation	1440	52528/-	7,56,40,320.00
3	Maintenance of plantation (3 maint./year) for 5 yrs	1440 x 5yr	18864/-	13,58,20,800.00
4	Maintenance of Nurseries for 4 years	4 Nos. x 4 yrs	320000	51,20,000.00
	Sub Total:-			**21,92,41,120.00**
	Roads and Bridges			
1	Maintenance of existing roads	30	100000	30,00,000.00
2	Solar Lights	17		11,90,000.00
3	Erection Shine / Signboard	L/s		1,00,000.00
4	G.P.S.	12	45000	5,40,000.00
5	Wireless Set with walkie talkie 12 Nos. X 12 Camp/Beat etc.	12	10000	1,20,000.00
	Sub Total:			49,50,000.00
1	Wall/fencing in strategic places to check biotic interference		-	4,50,00,000.00
1	Intensive protection measures including patrolling, staff mobilizing etc.			20,00,00,000.00
	Total =			50,66,01,620.00

* CAMPA norms for plantations and nursery and for other items prevailing market rate is considered for calculations which is purely subjective and objective.

8.4.4 Estimated expenditure for NTFP Working Circle.

Estimate for creation of Plantation for the period of 2019-20 to 2028-29

Year	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
@	25	25	25	25	25	25	20			
1,40,575	**3514375**	3514375	3514375	3514375	3514375	3514375	2811500			

Maintenance

Year	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
area		25	50	75	75	75	75	70	45	
@61100		1527500	3055000	4582500	4582500	4582500	4582500	4277000	2749500	

Norms proposed for implementation of 1 ha of bamboo plantation

NORMS PROPOSED FOR IMPLEMENTATION OF 1 Ha OF BAMBOO PLANTATION (Wage rate @ Rs. 247/-)			
	Patern of Works	**No.of Labour Units**	**Amount (Rs) per Hect**
A. Advance works			
1	Site clearance & planting	30	7410.00
2	Fencing (LS)	LS	25000.00
3	Planting materials- 625 Rhizomes/Ha @ Rs. 20/Rhizome		12500.00
B. Creation (First year)			
1	Planting	49	12103.00
2	First rain weeding		
3	2nd rain weeding		

4	3rd weeding		
5	4th weeding		
Sub Total			**57013.00**
C. First Year			
1	First weeding	18	**4446.00**
2	2nd weeding		
3	3rd weeding		
4	4th weeding		
5	Fire watching etc.		
D. Second Year			
1	First weeding	18	**4446.00**
2	2nd weeding		
3	3rd weeding		
4	4th weeding		
5	Fire watching etc.		
D. Third Year			
1	First weeding	18	**4446.00**
2	2nd weeding		
3	3rd weeding		
4	4th weeding		
5	Fire watching etc.		

The rates are subject to revision based on approval from the Forest Department

Estimate for Bamboo plantations and maintenance for the period of 2019-20 to 2028-29

Year	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
	25	25	25	25	25	25	20	-	-	-
@ **57013**/-	**1425325**	1425325	1425325	1425325	1425325	1425325	1425325	-	-	-

Maintenance

Year	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
area		25	50	75	75	75	75	70	45	
@13338	-	333450	666900	1000350	1000350	1000350	1000350	933660	600210	-

8.4.5. Expenditure for Soil & water Conservation W.C.

Proposed estimate for SWC (Overlapping) Working Circle for the period of 2019-20 to 2028-29

Item	Details Item of Works	Qty	Number of
1.	SWC activities (spring shed/CAT/WMP) for treatment of 600 ha in 7 years	600	1,10,701
2.	Riparian plantation (row plantation) both sides of rivers/streams 50 m on each side 62500 endemic trees	1000 000	3,844
3.	Contingency L.S		1,107
4.	**Total**		**1,15,652**

Proposed estimate for creation plantation for the period from 2020-21 to 2028-29

Sl. No.	Details Itemof Works	Mandays
1.	Soil conservation works 500 ha @250 hectares for 2nd, and 3rd year	1,845

2.	Contingency L.S	185
3.	**Total**	**2,030**

Estimate of Expenditure for Creation of Plantation from 2020-21 to 2028-29

Year	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
Creation Plantation = 500 hect. @ Rs. 1,40,575/-	-	35143750	35143750	-	-	-	-	-	-

Maintenance

Year	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9
Creation Plantation = 500 hect. @ Rs. 61100/-	-	-	1527500	3055000	3055000	1527500	-	-	-

Estimate of Expenditure for of soil and water conservation engineering measures

Year	2020-21 (Rs)	2021-22 (Rs)	2022-23 (Rs)	2023-24 (Rs)	2024-25 (Rs)	2025-26 (Rs)	2026-27 (Rs)	2027-28 (Rs)	2028-29 (Rs)
Engineering works	1 Crore	1 Crore	1 Crore	1 Crore	1 Crore	-	-	-	-

8.4.6. Estimate for Wildlife and Biodiversity Conservation Working Circle

Estimate for creation of waterbodies

Item No	Details Item of Works	Qty	Number of mandays
1.	Clearing, digging, deepening, desolation, of waterbodies LS	10	1,538
2.	Contingency L.S		77
3.	**Total**		**1,614**

Proposed estimate for enrichment plantation

Item	Details Item of Works	Qty	Number of mandays
1.	Clearing of land, fruit saplings, fodder species, plantation of fruit plants, fodder species @ 5 ha/year (625 saplings/ha, x 5ha x 10 yrs.)	5	24,024
2.	Wages for skilledlaborsfor clearing, pit digging =1563DLS	1563	1,754
3.	Contingency L.S		1,289
4.	**Total**		**27,067**

Estimate of Expenditure for Creation of Plantation from 2020-21 to 2028-29

Year	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Creation Plantation = 800 hect. @ Rs. 1,40,575/-	14057500	14057500	14057500	14057500	14057500	14057500	14057500	14057500	-	-

Maintenance

Year	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Creation Plantation = 2300 hect. @ Rs. 61100/-	-	6110000	12220000	18330000	18330000	18330000	18330000	18330000	18330000	12220000

Estimate for establishment of anti-depredation unit

Item No	Details Item of Works	Qty	Number of mandays
1.	Tranquilizer medicines	-	461
2.	Tranquilizer guns	2	154
3.	Wireless sets *(radio, transmitter and receiver, battery)*	10	246
4.	High beam torch lights	10	77
5.	GPS sets	2	49
6.	Purchase of crackers LS 1,00,000 per year		3075
7.	Purchase of DBBL/SBBL guns	10	923
8.	Purchase of ammunition	100/yr	154
9.	Feed, training, others of catching elephant LS	2x90x10	0
10.	Feed, etc. of four koonkies LS	4x365	5535
11.	Bolero Camper	4	4490
12.	Anti-depredation squad	4	8426
13.	Maintenance LS 10,00,000/yr from 4th yr onwards	-	49200
14.	Wildlife first aid kits LS 20,000/yr	-	2768
15.	Human injury compensation LS	-	615
16.	Crop damage compensation LS	-	308
17.	Ex gratia for causality LS	-	308
18.	Construction of watch towers	5	1538
19.	Contingency L.S		9225
20.	**Total**		**91,927**

Estimate for digging trench as per SOR, APWD 2009

Item	Details Item of Works	Qtv	Number of mandavs
1.	Excavation for roadway in soil using manual means for carrying of cut earth to embankment site with a lift up to1.50 m and lead upto 50 m asper technical specification clause-302.3. **Elephant**	375000	10,955
2.	Contingency L.S		548
3.	**Total**		**11,503**

Proposed estimate for improvement of elephant corridor

Item No	Details Item of Works	Qty	Number of mandays
1.	Construction of cemented camouflaged on corridor (40m x 20m) across railway lines LS	-	3,075
2.	Eviction (hiring of cranes, etc.) LS	10	769
3.	Insulation of electric lines, etc. LS	-	3,075
4.	Contingency L.S		346
5.	**Total**		**7,265**

Proposed estimate for awareness campaign etc.

Item No	Details Item of Works	Qty	Number of mandays

1.	Awareness of identified areas (8 camps x 2 x 10 years)	160	12,300
2.	Contingency L.S		615
3.	**Total**		**12,915**

Summary of the proposed estimates for prescriptions proposed under wildlife management and biodiversity conservation (overlapping) working circle for the period of 2018-2019 to 2027-2028.

Sl. No.	Summary of works	Detail Estimate Table	Mandays
1.	Maintenance of water holes	18.11 b	1,692
2.	Fruit and fodder plantation	18.11 c	28,373
3.	Wildlife depredation unit	18.11 d	91,991
4.	Trenching (Elephant trenches)	18.11 e	12,058
5.	Improvement of elephant corridor	18.11 f	7,616
6.	Awareness	18.11 g	13,538
7.	Biodiversity conservation	18.11 h	55,847
8.	Ecotourism	18.11 i	12,000
8.	**Total**		**2,23,115**

Estimate for establishment of anti-depredation unit

Sl. No.	Details Itemof Works	Nos.
1.	Tranquilizer related (medicines) procurement	462
2.	Tranquilizer (guns) procurement	154
3.	Wireless sets (radio, transmitter and receiver, battery)	246
4.	High beam torch lights	77
5.	GPS sets	50
6.	Purchase of crackers LS 1,00,000 per year	3,077
7.	Purchase of DBBL/SBBL guns	924
8.	Purchase of ammunition	154
9.	Feed, training, others of catching elephant LS	5,539
10.	Feed, etc. of four koonkies LS	4,493
11.	Bolero Camper	8,431
12.	Anti depredation squad	49,231
13.	Maintenance LS 10,00,000/yr from 4th yr onwards	2,770
14.	Wildlife first aid kits LS 20,000/yr	616
15.	Human injury compensation LS	308
16.	Crop damage compensation LS	308
17.	Ex gratia for casuality LS	1,539
18.	Construction of watch towers	9,231
19.	ContingencyL.S	4,381
20.	**Total**	**91,991**

Estimate for biodiversity conservation

Sl. No.	Details Item of Works	Mandays
1.	Yearly data collection, research on biodiversity, monitoring	30,770
2.	Preservation plots for Gamari (*Gmelina arborea*), Cham (*Artocarpus chaplasha*), Garjan (*Dipterocarpus turbinatus*), Sundi (*Michelia mentena*)	6,154
3.	Development of nurseries of RET species and raising its seedlings LS	1,539
4.	ANR activities LS	9,231
5.	Cleaning, maintaining, repairing, collection LS	3,076

6.	Maintenance L.S	5,077
7.	**Total**	**55,847**

Proposed estimate for Ecotourism development

Sl. No.	Details Item of Works	Mandays
1.	Ecotourism - Nature trail, boating, camps, weaving center, weavng center in Villages in the periphery RFs.	67,340

Estimate for Establishment of 1 anti-wildlife depredation unit.

Sl No.	Item of works	Unit/specification	Amount Required (Unit Price)	First year's expenditure Total(In Rs)	Subsequent years expens
1	Purchase of crackers		Rs.3,00,000 /yr	3,00,000.00	3,00,000.00
2	Purchase of Arms & ammunition	DBBL - 10 Nos. SBBL - 10 Nos.	Rs.30000 / unit - DBBL Rs.25000 / unit- SBBL	5,50,000.00	-
3	Ammunition	500 / yr	Rs 120 / unit	60,000.00	60,000.00
4	Purchase of ropes etc.		Rs. 60,000 /yr	60,000.00	60,000.00
5	Hiring of Kunki elephant for Anti-Depredation	3 (for 180 days)	Rs. 3000/ day / elephant	16,20,000.00	16,20,000.00
6	Purchase of vehicles	5 Nos.	Rs. 6,85,000 per unit	34,25,000.00	-
7	Vehicle maintenance Rs. 100000/- year	5 Nos.	Rs. 1,00,000 per yr		5,00,000.00
8	Food for Kunki & rescued elephant calf etc.	3 (for 180 days)	Rs. 1000 /day	5,40,000.00	5,40,000.00
9	Anti Depredation Squad (Rs. 4,00,000 /Range and Account Beat/yr)	5 Estabs	Rs. 20,00,000/ yr	20,00,000.00	20,00,000.00
10	Tranquilizing Gun & Chemicals	2 Nos	Rs.1,50,000 /unit	3,00,000.00	-
11	Procurement of wireless handsets	20 Nos.	Rs.20,000 /Unit	4,00,000.00	-
12	Watch & Ward & forewarning labourers payment	10 nos	Rs. 400 /DLS/day	14,60,000.00	14,60,000.00
13	Rescue & Rehabilitation fund for wild animals during flood		Rs.2,00,000 /yr	2,00,000.00	2,00,000.00
14	Protection of elephant corridor (at entry/exit point)		Rs.3,00,000 /yr	3,00,000.00	3,00,000.00
15	Provision for Trapping cage & other wildlife emergency	4 Nos	Rs.2,00,000 / unit	8,00,000.00	-
			Total = Rs.	**1,20,15,000.00**	**70,40,000.00**

8.5 Cost of the Preparation of the Working Plan

The actual expenditure incurred on the preparation of this Working Plan during 2013-2014 to 2018-2019 and expenditure likely to be incurred during 2019-2020 is given in table 8.5.

Table 8.5 Table showing the cost of preparation of the working plan

Details	Expenditure incurred during Financial year in Rs.			
	2013-2014 (Actual)	2018-2019 (Actual)	2019-2020 (Estimated)	Total
01. Pay	-	-	-	-
02. Labour	-	-	-	-
03. Dearness Allowances	-	-	-	-
04.Travelling allowance	-	-	-	-
05.T.T.A	-	-	-	-
06.Other allowance	-	-	-	-
08. Office Expenditure	-	-	-	-
11. Stationery &printing of forms.	-	-	-	-
12. Office furniture	-	-	-	-
13.Telephone	-	-	-	-
15.Vehicles maintenance and petrol	-	-	-	-
18. Publication	-	-	-	-
42. Other expenditure (Field data collection from sample points, plantation survey, boundary survey, socioeconomic survey, encroachment survey for the forest areas of 2000 ha and travel ost of forest staff)	771000	-	-	771000
47. Computer Maintenance		-	-	
Total	7,71,000	-	-	7,71,000

(Note: The working plan team has been assigned to revise & prepare the working plans of the Division. Hence, 60% of total expenditure can be considered as the expenditure for making this plan)

8.6 Mandays to be generated during current plan period

Apart from estimate of probable cost in terms of Rupees for execution of works, Mandays are also estimated to be engaged for each item of works.

8.7 Possible Funding Agencies

Normally the forestry activities are funded through various schemes under District, State & Central sector. In the state, the district & state sector schemes are totally funded by State government. Presently 40 schemes are under operation. Assam being given special status by the central government; the central sector schemes are funded on a 90%:10% basis. Eight such schemes are running in the State. The details are given in chapter V of Part I of the plan. Besides these schemes, funding can also be received from other sources. The following are the main agencies from where the funds may be obtained for implementation of prescriptions of this plan.

Table 8.7 Table showing the probable funding sources

	Funding Agency	Schemes involved	Nature of works
1.	Ministry of Forest &Environment, Government of India.	National Afforestation and Eco-Development Board(NAEB), Project Elephant, Project Tiger etc.	Ecological restoration, Wildlife & forest Protection.
2	Ministry of	River Valley Project	Increase of Forest cover

	Agriculture,GOI		Through Afforestation.
3	Ministry of RuralDevelopment, GOI	Integrated-Watershed Development, Industrial and Pulpwood Plantation	Integrated Forest Development.
4	District Rural Development Agency(DRDA)	National Rural Employment Guarantee Act(NREGA)	Community infrastructure & Forest resource development
5	Forest DevelopmentCorporation, Uttarakhand	Forestry developmental work	Buildings, Roads, Silvicultural operations, marking, etc.
6.	French Government	APFBC	Biodiversity Conservation,…..

8.8 Prioritization of works

All the works prescribed in this plan are important for effective forest management. Hence, funds should be made available to carry out all the prescriptions prescribed for the sustainable management of the forest. However, scarcity of financial allocation is often felt while implementing working plan prescriptions. Therefore, priority of works has been fixed to guide DFO while preparing annual budget & sending his demand. It is also suggested that DFO should carry out top priority works with the available budget:

Table 8.8: Table showing the priority of work

Priority	Nature of works to be carried out
I	Forest Protection i.e. protection from forest fire, encroachment, illicit felling, poaching etc.
II	Joint Forest Management Activities
III	Plantation and regeneration
IV	Long distance Group patrolling & Monsoon patrolling.
V	Improvement of waterbodies
VI	Soil & Water Conservation works.
VII	Strengthening the knowledge of field staff by imparting training & exposure visits.
IX	Maintenance of buildings &other infrastructure (Nursery etc.) in the division.

-SSS-

CHAPTER 9

MISCELLANEOUS REGULATIONS

9.1 Deviations

Any large and unusual operation, variation from yield and target for plantation/regeneration and other activities provided in control forms of the working plan constitutes a deviation. Deviation beyond 25 percent of target is considered to constitute a major deviation. All deviations, which permanently alter the basis of management laid down in a working plan, will require prior sanction of the PCCF. All deviations, which do not permanently alter the basis of management and with the necessity of which he agrees, may be approved and sanctioned by the Working Plan Conservator on behalf of the PCCF. Where there is difference of opinion between the Working Plan Conservator and the territorial Conservator of Forests, the former will refer them to the PCCF for instructions. The PCCF/CFWP, as the case may be, will counter sign the deviation statement. Minor deviations can be sanctioned at the level of the CF Working Plan or the PCCF as the case may be, but the PCCF before sanctioning the major deviations of following nature, will necessarily take prior approval of the Regional CCF/APCCF of the Ministry of Environment and Forests:

(i) Change in Silvicultural system
(i) Clear felling of natural forest
(ii) Formation of new felling series; and
(iii) Large scale felling due to natural calamities.

For all major deviations with respect to prescriptions where sanction of the MoEF is mandatory, an explanatory note along with the request for regularization has to be sent by PCCF (HoFF) to RAPCCF (MoEF). In case, where there is difference of opinion between the PCCF (MoFF) and RAPCCF (MoEF), the former will refer the matter to DG F&SS (MoEF), whose decision shall be final. The PCCF (HOFF) will countersign the deviation statement for reporting to the MoEF (para 132 of National Working Plan Code-2014).The following format for deviation statement should be used:

Year….. Division……

Sl. No. of	Controlbook, name, form,	Reference to Working Plan		Nature of deviationrequiring
		Paragrap	Nature ofPrescription	

The DFO territorial will forward through the Head, territorial circle, typed copies of this form in triplicate yearly with his copy of control forms. No explanatory remarks are required on this form but these should be given in theforwarding letter. The Head, Working Plan Organisation, as per situation given above, after sanction, will return one copy of the statement to the DFO territorial through the Head, territorial circle, and the other copy will be sent to the WPO for record. All major deviations without altering the basis of management, the prior sanction of the PCCF (HoFF) should have been obtained in advance, the sanction number and date should be quoted in the last column.

9.2 Construction of Roads/Link roads

No construction of roads/link roads passing through the forests shall be allowed without the sanction of the competent authority/Government of India, as they attract the provisions of the Forest (Conservation) Act, 1980.

9.3 Buildings

The old buildings requiring repair needs to be approved by the PCCF. Those building that are not put to use needs to be used.

9.4 Maintenance of boundaries and Pillars

This has been dealt with in the Protection Working Circle. To avoid legal disputes in the future, maintenance or boundary pillars is necessary especially the state boundaries. Inspection path of 3 m wide all along the boundary should be prepared for inspection and protection. The boundary pillars must be numbered and written. The distantly located pillars may be connected to one another by digging lines, which should be regularly cleared. Boundary registers should be maintained. The records be prepared in triplicate and kept in Range, Division and Circle Offices.The Range Officer should check the boundaries once a year and record a certificate to that effect on the Boundary Register. The Block Officer should check the entire boundaries of the forest under his charge and send the necessary report to the Forest Range Officer. The Beat Guards should keep the records of boundaries of their beats in the Beat Book.The programme repair of Boundary Pillars should be followed as given in the Protection Working Circle.

9.5 Fire Protection

There are as such no significant damages from fires, however the following miscellaneous regulations are necessary to ward of forest fires:

i) Annual maintenance of fire lines to be done in the January through vegetation clearing from fire lines.
ii) Fire risks should be notified by the DFO to the staff for necessary preventive measures.
iii) Entry of people inside the forests for extraction of MFP should be regulated.

The territorial staff should maintain cordial relations with the local people to garner their support in case of fires and other eventualities.The Divisional Forest Officer should visit the fire-affected areas immediately after it comes to his knowledge and should submit a report to the Conservator of Forests giving all the detail of occurrence of fire, causes of fire and damage occurred to the crop with remedial measures for the future.

9.6 Control of Grazing

The prescriptions on control of grazing made in the various working circles should be strictly observed. In this regard, strict enforcement of the penal provision of the Indian Forest Act, 1927 and the Cattle Trespass Act, 1871 should be ensured.

9.7 Preservation Plot

It is proposed to preserve 3.00 ha area of endemic species Gamari (*Gmelina arborea*), Cham (*Artocarpus chaplasha*), Garjan (*Dipterocarpus turbinatus*), Sundi (*Michelia mentena*) as the permanent preservation plot to study the increment of these species in the area and its further prospects. Artificial protection around this forest patch to be initiated. The boundary geo-coordinates should be recorded. Periodical measurement should be taken and recorded.

Account of any silvicultural operation, maintenance measures and natural disasters should also be recorded.

9.8 Nurseries

To meet the needs of plantation in the area, new nursery for raising tree species, medicinal plants, and fruit species needs to be initiated. To raise good quality seedlings, the following steps should be taken up in the nurseries:

i) Seed from identified Plus Trees should be used. In case of other species seed from reliable seed orchards should be used.
ii) Production through vegetative means like root, stem, shoot cuttings, tissue culture, tree improvement techniques, cloning, rhizomes to raise the planting stock.
iii) For bamboos, cuttings, rhizome multiplication method should be used to raise qualitative seedlings.

To minimize the cost of transportation of seedlings to the field in the difficult terrain situations, seedlings should be raised in the root-trainers which give sturdy seedlings with high root-shoot ratio.

9.9 Petty Sales

Dry, dead and wind fallen trees after getting sanction from the CCF through the DFO may be disposed off as early as possible to avoid financial loss. Thatch and other grass if falling inside the JFMC areas may be handed over to the JFM committees. However, if there are problems with JFMC or they are not willing to take over, various minor forest produces should be auctioned.

9.10 Stone Mahals

All stone mahals should be geotagged, inspection carried out and quarrying in stone mahals may be in operation adhering all the formalities. It should be ensured that in no way there are any environmental and ecosystem and its services degradation / deterioration through stone quarrying activities.

9.11 Sand Mahals

All sand mahals should be geotagged, inspection carried out and sand mining in sand mahals may be in operation adhering all the formalities. It should be ensured that in no way there are any environmental and ecosystem and its services degradation / deterioration through sand mining activities.

9.12 Fishery Mahals

All fishery mahals should be geotagged, inspection carried out and fishing adhering all the formalities / norms may be in operation in the fishery mahals. It should be ensured that in no way there are any fish biodiversity losses and introduction of exotics fishes and any environmental and ecosystem and its services degradation / deterioration through fishery mahal activities.

9.13 Departmental supply of wind fallen logs

The competitive sale needs to be improved to prevent further deterioration of wind fallen, dead, dying and decay trees in the process of disposal.

9.14 Celebration of Forest related festivals

Awareness campaign to educate and sensitize people with the objective to protect forest and biodiversity including flora and fauna is to be undertaken. Celebration of some specific days/festivals together with communities especially students are suggested.

Van Mahotsava is an annual pan-Indian tree planting festival, occupying a week in the month of July. During this event millions of trees are planted. It was initiated in 1950 by K. M. Munshi, the then Union Minister for Agriculture and Food to create an enthusiasm in the mind of the populace for the conservation of forests and planting of trees. By encouraging Indians to support tree planting and tending, festival organizers hope to create more forest in the country. It would provide alternative fuels, increasing production of food resources, creating shelter-belts around fields to increase productivity, provide food for cattle, offer shade and decorative landscapes, reducing drought and helping to prevent soil erosion.

Wildlife Week is celebrated all over the country in the month of October from 2nd to 8th October every year with the view to preserve the fauna means the animal life of the India. Wild Life Week celebration was planned to arouse the general awakening of the normal people in the country towards the protection of wildlife. It was first started in the year 1952 with the great vision of saving the life of the Indian animals by taking some critical steps. It involves the planning to save animal extinction of any species of the India. The Indian Government has established an Indian Board of Wild Life which works to improve the awareness as well as the consciousness of the Indian people towards the wildlife preservation.

World Environment Day (**WED**) is celebrated on 5 June every year, and is the United Nations' principal vehicle for encouraging awareness and action for the protection of our environment. First held in 1974, it has been a flagship campaign for raising awareness on emerging from environmental issues to marine pollution, human overpopulation, and global warming, to sustainable consumption and wildlife crime. World Environment Day has grown to become a global platform for public outreach, with participation from over 143 countries annually. Each year, WED has a new theme that major corporations, NGOs, communities, governments and all celebrities worldwide adopt to advocate environmental causes.

World Wildlife Day: On 20 December 2013, at its 68th session, the United Nations General Assembly (UNGA), in its resolution UN 68/205, decided to proclaim 3 March, the international day of the adoption of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) on the planet raise awareness and benefits fauna and flora in 1973, as **World Wildlife Day**, which was proposed by Thailand, to celebrate and raise awareness of the world's wild fauna and flora.

World Earth Day is an annual event celebrated around the world on April 22 to demonstrate support for environmental protection. First celebrated in 1970, it now includes events coordinated globally by the Earth Day Network in more than 193 countries.

International day for the preservation of the ozone layer: September 16 was designated by the United Nations General Assembly as the International Day for the Preservation of the Ozone Layer. This designation had been made on December 19, 2000, in commemoration of the date, in 1987, on which nations signed the Montreal Protocol on Substances that Deplete

the Ozone Layer. In 1994, the UN General Assembly proclaimed 16 September the International Day for the Preservation of the Ozone Layer, commemorating the date of the signing, in 1987, of the Montreal Protocol on Substances that Deplete the Ozone Layer.

9.15 Training of Staffs

The ongoing developments in the forestry sector at policy, administrative and implementation level together with paradigm shift towards sustainable forest management, participatory forestry, biodiversity conservation, forests for climate change mitigation and adaptation through the mechanism of REDD +(Reducing Emissions through Deforestation and Forest Degradation) , focus on forest based livelihoods and forests for water and increasing role of technology and social media in forestry and sustainable development etc. have necessitated fundamental re-orientation and attitudinal changes of forestry personnel. These challenges coupled with conflict resolution issues faced in protection, management and conservation of the forest resources require appropriate capacity building of frontline forestry personnel by providing them the state of art information, knowledge and skills. Staffs and officers of the division shall be deputed to various forestry training Institutes including SFTIs of the State for imparting training.

9.16 Achieving SDG

Sustainable Development Goals

The world economies have unified in their efforts to achieve the goals of sustainable development. This is in sheer contrast to the earlier approaches where governments pursued goals for the growth and development of their respective economies. The struggle for growth and excellence has created imbalance in the economic development among countries, depleted some of the natural resources and has thus altered the ecological balance. The impact of this is being experienced in the form of global warming and climate change. Since this threatens the very existence of human life on earth, a course of action that would ensure a safe environment for future generations has become the need of the hour. Sustainable development is a term coined to ensure that development takes place in such a way that natural resources are sustained and passed on to the future generations unimpaired.

India has, over the past years, directed its development pathway to meet its priorities of employment, economic growth, food, water and energy security, disaster resilience and poverty alleviation. India has also aimed to restore its natural capital and adopt transparent and robust governance along democratic lines. However, emerging challenges of climate change impacts, increasing inequities, and lagging human development indices are well recognised by both the citizens as well as the government. The SDGs will be more ambitious than the MDGs, covering a broad range of interconnected issues, from economic growth to social issues to global public goods. To realise this vision, a just-as-ambitious plan for financing and implementation is needed. The magnitude of the SDG financing challenge far exceeds the capacity of any one organisation and demands a strong partnership among governments, the private sector, and development organisations.

Sustainable Development Goals

Goal 1 End poverty in all its forms everywhere

Goal 2 End hunger, achieve food security and improved nutrition and promote sustainable

agriculture
Goal 3 Ensure healthy lives and promote well-being for all at all ages
Goal 4 Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
Goal 5 Achieve gender equality and empower all women and girls
Goal 6 Ensure availability and sustainable management of water and sanitation for all
Goal 7 Ensure access to affordable, reliable, sustainable and modern energy for all
Goal 8 Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
Goal 9 Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
Goal 10 Reduce inequality within and among countries
Goal 11 Make cities and human settlements inclusive, safe, resilient and sustainable
Goal 12 Ensure sustainable consumption and production patterns
Goal 13 Take urgent action to combat climate change and its impacts*
Goal 14 Conserve and sustainably use the oceans, seas and marine resources for sustainable development
Goal 15 Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss
Goal 16 Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels
Goal 17 Strengthen the means of implementation and revitalize the global partnership for sustainable development

Dibrugarh Forest Division shall contribute for achieving Sustainable Development Goals.

9.17 Forest Certification

Forest certification, a mechanism based on third-party auditing of compliance with established standards, was quickly accepted as a means to promote sustainable forest management and directly influenced forest management practices. Through certification as a soft policy instrument, it is possible to provide credible assurance to customers about the effective compliance of forest management with sound social, environmental, and economic principles. However, as sustainable development is a continuous process and its concept is further adjusted according to new knowledge, sustainability indicators are continuously improved in order to achieve credibility and legitimacy within society through a wider form of participation involving citizens or their representatives.

The key financial benefit of forest certification is market access. In summary, the benefits of forest certification were grouped into conventional economic, social, and environmental components of sustainable development. In addition to those perceived benefits associated with forest certification, there are also direct and indirect expenses related to certification adoption. Forest certification was developed in the early 1990s to curtail tropical deforestation through verified use of sustainable forest management. Certification systems generally are market-based, non-regulatory, and focused on forests, operations and products, and associated

businesses and communities. Certified raw material is accounted for or tracked using chain-of-custody and certified products typically are labelled.

In the global quest for ways to protect the world's forests and to slow down, if not reverse, the pace of deforestation, much faith has been reposed in what is known as Forest Certification (FC) and the Criteria and Indicators (C&I) of Sustainable Forest Management (SFM). The C&I are supposed to give an objective measure of how close the forest management is to a sustainable regime. The FC framework is supposed to provide an impartial process for inspecting each forest management unit (FMU) to assess its performance periodically and bestow an internationally recognized certificate of good practices. By extension, the FC framework also provides for certifying and labeling the products that come out of such units. In principle, consumers can encourage the manufacturers to use more and more of these certified raw materials. By actively rejecting or shunning material coming out of unsustainable logging or poaching, consumers could theoretically put pressure on the primary producers themselves to clean up their act and adopt sustainable ('green') practices. Thus the undesirable practices that are resulting in deforestation the world over will be eliminated.

Measures for Forest Certification shall be taken in next Working Plan.

9.18 Convergence with other Departments

With a view to achieving achieving the goal of the Working Plan, socio-economic condition of communities residing in and around the forest need to be uplifted. It is important that the various development projects reach communities. Forest department may play the pivotal role to take the communities accessed to various departments so that they can avail such Government schemes/projects. Work in Convergence with other departments like Panchayat & Rural Development, Agriculture department, Animal Husbandry & Veterinary department, Fishery department etc. can facilitate the communities to avail following schemes/projects to bring about overall improvement in the quality of life of the people in forest fringe areas.

Panchayat & Rural Development

1. Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS),
2. Deendayal Antyodaya Yojana – National Rural Livelihoods Mission (DAY-NRLM),
3. Deen Dayal Upadhyay – Gramin Kaushalya Yojana (DDU-GKY),
4. Pradhan Mantri Awaas Yojana – Gramin (PMAY-G),
5. Pradhan Mantri Gram Sadak Yojana (PMGSY),
6. Shyama Prasad Mukherjee National RuRBAN Mission
7. National Social Assistance Programme (NSAP)

Agriculture department

1. National Mission for Sustainable Agriculture (NMSA)
2. Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)
3. The Paramparagat Krishi Vikas Yojana (PKVY)
4. Pradhan Mantri Fasal Bima Yojana (PMFBY)
5. Livestock insurance Scheme
6. Micro Irrigation Fund (MIF)
7. Assam Farmers' Credit Subsidy Scheme (AFCSS),
8. Assam Farmers' Interest Relief Scheme (AFIRS)
9. Assam Farmers' Incentive Scheme (AFIS).

Animal Husbandry & Veterinary department

1. Chief Minister Samagra Gramya Unnayan Yojana' also referred as Assam Milk, Meat & Egg Mission society (AMMEMS-CMSGUY).
2. Livestock, Health & Disease Control Programme

Fishery department

1. Development of Inland Fisheries and Aquaculture

9.19 Duties and responsibilities of officers and staffs

Duties and responsibilities of officers and staffs are mentioned in The Assam Forest Manual, Vol-II. All officers and staffs must adhere to the provisions of the Manual and shall be be dutiful to protect and develop the forests.

-SSS-

CHAPTER 10
MOINTORING, ASSESSMENT AND REPORTING

10.1 Control and Records

The control forms required for control of deviation from prescriptions for JFMC operation, plantation and regeneration, forest protection, soil and moisture conservation, FRA operations, Wildlife Management and Biodiversity Conservation is provided in this chapter.The control forms shall be prepared and submitted annually to the Conservator of Forests with a copy to the Working Plan Officer on the 1st of January for scrutiny and obtaining sanctions of deviations, if any.

The following control forms will be used for monitoring all the important operations prescribed and suggested in this working plan:

10.1.1. Bamboo Harvesting Control Form: For cutting bamboo identified for felling and bamboo left out, the Control Form 1 shall be used.

10.1.2 Silvicultural Control Form: For control of all silvicultural operations such as subsidiary cultural operations, cleanings, and burnings etc., Form No. 2 shall be used.

10.1.3 NTFP Control Form: For controlling and maintaining a record of all NTFPs harvest so as to make the removal/harvesting of NTFP sustainable, Form No. 3 shall BE used.

10.1.4 Wildlife Management and Biodiversity Conservation Control Form: For improvement of wildlife habitat and conservation and preservation of biodiversity, Form No. 4a, 4b & 4c shall be used.

10.1.5 Plantation Control Form: For any plantation block, gap, regeneration natural and assisted Form No. Pa, 4a, 4b & 4c shall be used.

The DFO territorial will annually make entries in his copy of the controlforms and send them, together with the deviation statement in triplicate to theHead, territorial circle. After the entries have been checked and approved, theHead, territorial circle will first get his copies completed and then send it in twocopies to the concerned WPO. The later will then complete his copy and finallyreturn the DFO‟s set for deposit in the latter's office till next year. The WPO willsend the deviation statement with appropriate justification in four copies to the CCF/APCCF (RE&WP) for recommendation to PCCF (HoFF) for sanction. After the sanction, one copy each will be sent to theWPO, Head, territorial circle and the DFO territorial for their record and theCCF/APCCF (WP) as the case may be, will retain the fourth copy for his set ofcontrol forms. The control forms should be submitted by the DFO territorial to theHead, territorial circle by October and the latter should send them to the WPOconcerned by December each year (para 129 of the National Working PlanCode-2014).

10.2 Compartment History

Compartment history will be furnished and any deviation for aligning compartments for the current context of sustainable management of forests adhering to watershed approach will be recorded. The DFO will direct the marking Officer to write the compartment description and maintained in the registrar. The compartment history along with a thematic map will include

the operations, silvicultural operations, and any other operations in the compartment as prescribed in the working circles.

10.3 Maintenance of Records

A detailed record of each forestry activity shallbe maintained in order to have a solid database for scientific monitoring,evaluation and future planning. In order to avoid any complicacy at any level, thecontrolling officers should inspect the following documents during inspection and enter signed observations.

i. Annual Plan of Operations (APO)
ii. Plantations Journals
iii. Nursery Registers
iv. Measurement Books
v. Divisional Note Book
vi. Fire Control Forms
vii. Beat Book

10.3.1 Annual Plan of Operations: An annual plan of operations should beprepared by the Divisional Forest Officer based on the prescriptions andoperations to be carried out as per the provisions of the Working Plan. It shouldbe approved by the Conservator of Forests.

10.3.2 Plantation Forms and Journals: The existing system of filling plantation forms and compartment history will be furnished and any deviation for aligning compartments for the current context of sustainable management of forests adhering to watershed approach will be recorded. The DFO will direct the marking Officer to write the compartment description and maintained in the registrar. The compartment history along with a thematic map will include the operations, silvicultural operations, and any other operations in the compartment as prescribed in the working circles.

For each plantation, a separate journal shall be maintained in the prescribed form wherein a complete record of plantation viz. year and month of plantation, area planted, Number of plants planted, species. All activities such as advance work, plantation, regeneration, maintenances, felling and enumeration, maintenance cost, weed cutting, constructing of fire-lines etc. should be recorded for a year. For each year, there will be one entry that should be signed by the Forest Range Officer. The inspection notes by the officers should be recorded in the journals. The Divisional Forest Officer should inspect the entries at the time of annual office inspection.

Details of expenditure incurred month-wise, compartment wise/and operation wise including maintenance cost for subsequent three years. At the end of each year observation regarding success of plantation, survival percentage and the reports on monitoring and evaluation should be given. Specific instructions given during the inspection by senior forest officers to be recorded. Instructions of the PCCF/APCCF on checking of plantations issued from time to time should also be followed.

10.3.3 Nursery Register: The existing system of filling plantation forms and compartment history will be furnished and any deviation for aligning compartments for the current context of sustainable management of forests adhering to watershed approach will be recorded. The DFO will direct the marking Officer to write the compartment description and maintained in the registrar. The compartment history along with a thematic map will include the operations,

silvicultural operations, and any other operations in the compartment as prescribed in the working circles.

For each nursery, separate registers need to bemaintained. It shall have monthly detail of operations and expenditure incurred,plants raised, plants used departmentally, plants supplied to the public during themonth etc. Detail of plants supplied free of cost to other GovernmentDepartments, public institutions, NGOs etc. shall also be recorded in the register.Plants destroyed as a result of natural calamities or otherwise destroyed shall begot written off from the competent authority. A copy of the nursery statementshowing details of species wise nursery stock should be sent to the Divisionaloffice monthly.

10.3.4 Divisional Note-Book: The Divisional Forest Officer should maintain anote-book in which the following information shall be recorded.

a) Flowering of important tree species.

b) Seeding of important tree species including geo-coordinates of mother trees

b) Gregarious flowering of bamboos.

c) Climate-rainfall and temperature experienced during this year and itseffect of the forest crop.

d) Pests and diseases noticed in the crop, treatment and result thereof.

e) Growth date of trees collected during the year.

f) Labor related problems faced during the year.

g) Market trend of forest produce.

h) Working of JFM committees.

i) Any other major important issue from the forest management point ofview.

10.3.5 Fire Control Form: The record of forest fires should be maintainedwithout any bias. The details of area burnt with sketch, cause of fire, date of fire,time of fire, date and time of control, damage and financial loss will be recorded.The copy of the fire report should be sent to the Conservator of Forests.

10.3.6 Deviation statement: To exercise control over progress of variousoperations at the end of each financial year, the prescriptions of the working planwill be compared with the actual operation done in the field on felling, silvicultural operations and miscellaneous works and any excess or short fall shall berecorded giving reasons for deviation and sanction of the competent authorityshall be obtained as per the details given in the Miscellaneous Regulations.

10.3.7 Beat Books: Each beat guard will maintain a Beat-Book to be preparedand issued by theDivisional Office. The Beat-Book shall contain the followinginformation:

a) Beat map

b) Detail of forests in the beat

c) Copy of boundary register of forests

d) Duties of Forest Guard

e) Legal status of the forest area with notifications

f) Abstract copy of the relevant sections of the Indian Forest Act, 1927;Wildlife (Protection) Act, 1972; Forest (Conservation) Act, 1980 andvernacular translation thereof.

g) List of buildings, roads, paths, fire-lines in the beat

h) List of plantations raised during the past 10 years

i) Record of water table at various places in the area

10.3.8 Registers And Records: The following updated (till last financial year)register and records will be maintained by the Division:

i) Compartment histories
ii) Fire records and registers
iii) Register of Boundary Pillars
iv) Register of Rights and Concessions
v) Record of forest produce harvested
vi) Free grants
vii) Register of land transferred to other departments under FC Act.
viii) Register of soil and water conservation works
ix) Register of rotational grazing
x) Register of invasive species e.g. Lantana eradication
xi) Register of wildlife management may include detailed record of human wildlifeconflicts that includes data on human causalities and injuries, lossof domestic animals and crop damage and compensation paid etc.
xii) Register of Government buildings that includes log of the repairs andaddition (if any) undertaken in the building.
xiii) Register of registered saw-mills in the Division.

10.3.9 Annual Inspection Annual: inspection of DFO territorial office by CF/CCFand Range office by DFO territorial is mandatory within three months ofcompletion of financial year to have checks on annual statements in controlforms and deviation statements and maintenance of registers and records.

-SSS-

CHAPTER 11

SUMMARY OF THE PRESCRIPTIONS

The brief summary of prescription against each Working Circle are narrated in table 11.

Table 11: Summary of prescriptions for each Working Circle.

Chap No.	Name of the W. C.	Para No / Sub para	Prescription	Remarks
Chap 2	Joint Forest Management Working Circle	2.10.2.1	The prescriptions of micro plans needs to be aligned with the working plan and objectives of the JFMC working circle. The staff shall follow the procedure laid down and prepare site specific plans involving all the stakeholders before implementing the project adhering Government orders any amendments to be strictly followed.	Stakeholder's engagement in achieving the objectives of JFMC working circle.
		2.10.2.2	There should be monthly meeting of the JFMCs under the Chairmanship of JFMC president. Range Forest Officer should attend meeting at least quarterly.	Ensure functionality of the JFMC.
		2.10.2.3	NTFPs to be collected and sustainably harvested from areas from JFPC area and shall be sold by the concerned JFMC.	Sustainable NTFP harvesting.
		2.10.2.4	Collection, processing, value adding and sale of NTFP should be as per the guidelines issued by Divisional Officer.	Value addition of NTFP.
		2.10.2.5	Continuous efforts should be made to create and sustain the JFPM movement by creating required awareness among the people and the staff through training programmes.	Capacity building of JFMC members.
		2.10.2.6	After eviction of encroached areas massive plantations should be carried out through the JFMC members. JFMC will maintain nursery of endemic species and saplings of endemic trees species from the JFMC members maintained nurseries and will be	Ensure enhancement of forest cover through people's participation.

Chap No.	Name of the W. C.	Para No / Sub para	Prescription	Remarks
			planted in the evicted areas.	
		2.10.2.7	JFMC areas to practice minimum tillage, organic formulations.	Maintenance of ecology of the area
		2.10.2.8	System of crop intensification to be promoted in JFMC cultivated paddy fields to increase productivity.	Enhanced crop yield to meet people's requirement.
		2.10.2.9	JFMC plantation assistance will be released as 1st year 40%, 2nd year 40% and 3rd year 20% based on the survival of the plants.	Ensure maximum plantation survival.
		2.10.2.10	Ecotourism should be promoted, fringe village population should be made aware, nature trail should be set identified and set up.	Improvement of livelihoods of local population.
Chap 3	Plantation and Regeneration Working Circle	3.11.3.1	Identification of good seed bearers and collect information on seed year.	Database and geotagged location of good seed bearing trees.
		3.11.3.2	Select mother trees and marking those.	Ensure adequate number of mother trees of endemic species.
		15.11.3.3	Before a heavy seed fall, cleanings can be made beneath fruiting trees to form natural nurseries, which can be used later to plant forests with low natural regeneration or in secondary vegetation.	To ensure minimum seed losses and enhance maximum seed germination.
		3.11.3.4	Transplantation of naturally regenerated seedlings which are 45 cm to 55 cm and six to eight months old.	Ensure survival of naturally regenerated seedlings.
		3.11.3.5	For seeds raised in nurseries, it is advisable to sow seeds quickly since it loses its viability quickly, to be raised in biodegradable poly bags.	Ensure maximum germination of seeds.
		3.11.3.6	Block plantations in scrub areas i.e. areas with less than 10% canopy density cover with endemic species mainly Hollong – Mejkai - Nahor and its associates.	1000 ha of scrub will be brought under forest through block plantation over 10 year's period.

Chap No.	Name of the W. C.	Para No / Sub para	Prescription	Remarks
		3.11.3.7	Gap filling in open forest areas i.e. areas with canopy density cover from 10% to 40% with endemic and native tree species.	Increase of forest cover by gap filling of 1500 ha area under open forest over 10 years period.
		3.11.3.8	Assisted regeneration in moderately dense forest area i.e. areas with canopy density cover of 40% to 70% with endemic and native tree species.	Increase 500 ha of land from moderately dense to very density canopy cover over a period of 10 years.
		3.11.3.9	No introduction of non - division native species.	Stopping introduction of invasive exotics.
Chap 4	Forest Protection Working Circle	4.10.1.1	Eviction of encroachments and consolidating the forest boundary are to be made mandatory.	Release areas from encroachment.
		4.10.1.2	Creating massive awareness and involvement of people in all round protection and development of forests should form a part of conservation programme.	Engaging the local people in protection of forest.
		4.10.1.3	To completely shift grazing, lopping, shifting cultivation and other forms of forest degrading activities to the fringe forests or JFMC working circle areas.	Minimising forest degradation drivers and improve forest health.
		4.10.1.4	Boundary survey and erection of RCC boundary pillars of atleast 1.2m height and colored to locate it from a distance.	Securing the forest boundaries.
Chap 5	Non Timber Forest produce & Bamboo (Overlapping) Working Circle	5.11.1	In consultation with the officials JFMCs are allowed to collect NTFP from the area under JFMCs without damaging any part of the tree or trunk.	Preservation of threatened NTFPs.
		5.11.2	Collection of bark of any tree is strictly prohibited.	Ensure survival of threatened species.
		5.11.3	Only flowers, leaves, fruit and nuts are permitted to collect.	Enhance survival of NTFP species.
		5.11.4	A list of endangered species has to be prepared by the department time to time and collection of	Ensure conservation and preservation of

Chap No.	Name of the W. C.	Para No / Sub para	Prescription	Remarks
			NTFP from such trees has to be banned.	threatened NTFP species.
		5.11.5	While collecting NTFP some trees in the area may be identified and left as mother tree/ tree for seed resources.	Ensure maintenance of adequate male: female ratio of dioecious species and enhance natural regeneration.
		5.11.6	Only authorised member of the VFC with their Identity card are permitted to enter into the forest and collect the NTFP.	Reduce pressure from on dioecious species and enhance natural regeneration.
		5.11.7	JFMCs are permitted to collect the NTFP only through the members of the JFMC. From the permitted micro plan areas.	Ensure benefit to only the needy JFMC members
		5.11.8	The collected NTFPs in the JFMCs areas should be stored in a declared godown properly after processing and disposed by tender–cum-auction sale in the presence of the forest staff.	Value addition of NTFP and maintain transparency.
		5.11.9	JFMCs are to raise NTFP plantation and bamboo species in their land.	500 ha NTFP plantation and 1000 ha bamboo plantation to be raised over a period of ten years.
		5.12.2	Bamboo cutting regulations.	Ensure sustained yield of bamboo and maintenance of bamboo habitat for wildlife.
Chap 6	Soil and Water Conservation Working Circle	6.11.1	Identification of SWC related issues during microplanning.	Ensure people participation.
		6.11.2	Technical and social feasibility of soil and water conservation works.	Minimise conflicts arised out of water conservation issues.
		6.11.3	Development of detailed project report.	Ensure flowing of adequate resources for implementation.
		6.11.4	Gully plugging works to check further extension of the gullies.	Ensure reduction of soil loss.

Chap No.	Name of the W. C.	Para No / Sub para	Prescription	Remarks
		6.11.5	Minor engineering works in eroded areas and in slips prone areas to check the soil erosion and reduce runoff.	Check soil erosion.
		6.11.6	Crate works on the sides of diversion drains to checking further cutting of the drains/channels.	Ensure soil conservation.
		6.11.7	Planting of cuttings of soil binding species in vegetative spurs but avoid exotic species.	Reduction of surface water loss and maintain geohydrology.
		6.11.8	DRSM works in the areas are also recommended to check the soil and water erosion.	Conservation of soil and water.
		6.11.9	Creation of continuous trenches across the slope and planting of soil binding species in the pit. 19.11.10 The dugout soil will be placed towards the flow of water to check the soil erosion and reduce run-off.	Ensure water conservation and preservation.
		6.11.10	Delineation of spring sheds and initiating springtide treatments.	Enhance potentiality of springs.
		6.11.11	Plantation keeping a buffer of 50 meters on both sides of streams/rivers.	Riparian plantation in row covering 10,00,000 sq. meter area Ensure preservation of riparian ecosystem.
		6.11.12	Identification of SWC related issues during microplanning.	Addressing issues through stakeholder's participation.
Chap 7	Wildlife Management and Biodiversity Conservation (Overlapping) Working Circle	7.10.1.1 and 7.10.1.2	Stop hunting Stop Poaching	Five watch towers proposed
		7.10.1.3 and 7.10.1.4	The forest staff shall keep vigil all the time through patrolling, information sharing, information on felling equipment through network develop with the help of local people, shopkeepers selling	Stop illegal felling of trees and collection of NTFPs

Chap No.	Name of the W. C.	Para No / Sub para	Prescription	Remarks
			felling equipment.	
		7.10.1.5	Encroachment identified and the standard procedure eviction of any such encroachment is to be done at priority. No new villages or new dwellers should be permitted to come out in future in close proximity of the wildlife habitats	Prevent encroachment and illegal activities
		7.10.1.7	Creation of water holes Fruit and fodder plantation Development of nesting sites	Improve degraded wildlife habitats
		7.10.1.8.1	Improvement of three major elephant corridor	Minimize human animal conflict
		7.10.1.8.2	Establishment of wildlife anti-depredation unit. Keeping 4 koonkies to chase away makhanas and catching 2 elephants every year	Reduce human elephant conflicts man
		7.10.1.8.3	1 km trenching around habitations	Keeping away straying of wild animals and makhanas.
		7.10.1.8.4	Removal of electric fencing from tea gardens, etc.	Reducing wild elephants death
		7.10.1.8.5	Wildlife First aid kit	First aid to wounded wild animals
		7.10.1.8.6	Awareness should be conducted to sensitize the people from not creating chaotic situation when wildlife stray into habitations, agricultural fields etc.	Awareness on wildlife to reduce human wildlife conflicts
		7.10.2.1	Tree species whose IVI is less than 5.00 will be promoted by planting and preservation.	Conserve and preserve endemic floral biodiversity
		7.10.2.2	Fruit trees such as Outenga, Mango, Amla, Bel, Jamun, Arjuna, Bahera, Bot, Aahat, Bamboo, etc. will not be felled during any operation	Enhance wildlife habitats and reduce conflicts and
		7.10.2.3	Areas infested with dense Mikenia micrantha, Lantana spp.,	Promote endemicity

Chap No.	Name of the W. C.	Para No / Sub para	Prescription	Remarks
			Parthenium spp. (found on the areas nearby the villages) be replaced by useful economical species. Compartments or parts of compartments which have population of fruit trees, or trees of lesser known species shall be preserved against any exploitation activity	
		7.10.2.4	Application of pesticides/ insecticides around a 5 km periphery of the forest in this division is to be completely banned. The forest houses diverse insects, birds and application of insecticides/pesticides by the surrounding tea estates affects the insect population of the forest division. It hampers pollination of important tree species and indirectly affects the birds and fish population.	Prevent degradation of ecosystem services
		7.10.2.5	Fire protection measures, though fires incidences are not reported to be done as a precautionary measure to protect the endemic biodiversity	Precaution from fire
		7.10.2.6	During plantation or departmental removal for any wind fallen trees care should be taken not to sacrifice the rarely found species or their regeneration	Precaution to decrease mortality of endemic shrubs and natural regeneration
		7.10.2.7	An effective naturalization plan needs to be devised based on principles for maintaining natural diversity.	Promote natural regeneration of endemic species
		7.10.2.8	Involvement of local communities especially women in forest and wildlife protection through awareness, participatory planning and equitable sharing of responsibility and benefits needs to be promoted.	Participation of local communities for biodiversity conservation
		7.10.2.9	Further efforts should be made to preserve as many patches of	To preserve regional

Chap No.	Name of the W. C.	Para No / Sub para	Prescription	Remarks
			natural communities as possible.	biodiversity preservation
		7.10.2.10	Regular monitoring and updation of species data through R & D activities needs to be taken up taking the present data as the base.	Monitor status of biodiversity and develop a biodiversity database of the division
		7.10.2.11	To preserve the natural floristics of the forest, it is proposed to establish a permanent preservation plots of Gamari (*Gmelina arborea*), Cham (*Artocarpus chaplasha*), Garjan (*Dipterocarpus turbinatus*), Sundi (*Michelia mentena*) in the selected compartments.	Biodiversity conservation a preservation of Gamari (*Gmelina arborea*), Cham (*Artocarpus chaplasha*), Garjan (*Dipterocarpus turbinatus*), Sundi (*Michelia mentena*)

-SSS-