THE WORKING PLAN
OF
HAILAKANDI FOREST DIVISION

For the period of 2023-2024 to 2032-2033

Vol-I

Written by
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Government of Assam

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सत्यमेव जयते

No. 12-2/32/2014/RONE/AS/HAILAKANDI/WP/39-40 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 Hailakandi 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 Hailakandi 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,

10/4/23

(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)

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PREFACE

Working Plan has been the main instrument for scientific management of forests. It is a very useful document for evaluating the status of forests and biodiversity resources of a forest division, assessing the impact of past management practices and deciding about suitable management interventions for future. All forests are to be sustainably managed under the prescriptions of a working plan/scheme. Forest Management Planning must provide for sustainable management of forests and its biodiversity as enshrined in the National Forest Policy, encompassing the ecological (environmental), economic (production) and social (including cultural) dimensions. The objectives for attaining this goal include conservation of forests and reducing forest degradation, maintenance and enhancement of ecosystem services including ecotourism, 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.

Forests and wood products can effectively reduce the process of climate change in several ways. Growing trees absorb carbon dioxide from the atmosphere and store the carbon so efficiently that about half the dry weight of a tree is carbon. This carbon remains locked up in the form of wood and wood products. Enhanced carbon sequestration through recognized and innovative silvicultural practices, eco-restoration of degraded/mined out forestlands, improved biomass productivity, etc. will help in improving forest health and vitality. Forest soil must be kept healthy and fertile. The growth of forest crops must be kept vigorous to attain the most desirable level of biomass production within an optimal time scale.

Information on growing stock and its growth is necessary for efficient planning and management of forests. The forest inventory, survey and mapping provide this important input. Assessment of forests resources makes use of a combination of geomatics and field inventory data. For the first time in the country, inventory and mapping of the entire vegetation including herbs, shrubs, grasses and climbers along with trees, has been brought within the ambit of the forest resource assessment. This will also include inventory of the non timber forest products (NTFPs) and medicinal and aromatic plants (MAPs) which will ultimately help to prepare the livelihood plans for the local communities in a more effective manner. Fragmented patches of forest need to be covered in the survey and assessment so as to provide focused management prescriptions for ensuring no discontinuous forest patch is left out from the purview of survey.

A network of grid based permanent sample plots should be identified and established in different strata of the forests to provide necessary database for growth/increment. These permanent sample plots are necessary to assess the role of forests as source or sink for greenhouse gases on a long term basis and to study carbon sequestration and storage in trees both above and below ground biomass (stem and roots), deadwood, litter, soil and harvested wood products for different forest types of India with an emphasis on different management

regimes. Establishment and maintenance of these plots be carried out by silvicultural wing for continuous collection of data.

Preparation of working plan is a highly technical exercise under taken at regular interval in each forest division. It is based on stock and vegetation maps which is prepared through ground surveys. Use of modern tools like remote sensing, GIS and GPS is utilized for preparing the forest cover maps of forest divisions. There has been a paradigm shift in the objectives of forest management it has become more people centric and oriented to provide the goods and services from forests on sustained basis, with an emphasis on ecological services and harvest of usufructs as well. The working plan should be in consonance with general planning, which is village based. Therefore the working plan should encompass the village as a unit and re-align the compartments accordingly.

Working plan for the Hailakandi Division, Assam for the period 2023-24 to 2032-33 is prepared in accordance with the guidelines stipulated in the National Working Plan Code, 2014. The Division is situated within the Geographical limits of 92˚25' E to 92˚46'E Longitude 24˚8' N to 24˚53' N Latitude. The working plan is prepared for sustainably managing 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. The working plan of Hailakandi Division is a technical document prepared to manage the forest under Hailakandi Division on sustainable basis with the overall objective to conserve biodiversity, soil and water regime, enhance production of forest produce to meet the market needs and also the needs of the local people.

The sample plots of plot size 0.1 Ha were laid as per the GPS coordinates worked out by the North Eastern Space Applications Centre, Shillong (NESAC) with support from the o/o. Addl. PCCF (RE&WP), Department of Environment and Forest, Assam. NESAC also supported the division by mapping the forest types, canopy density, slope, aspect and land uses. The thematic maps were further validated on the ground with support from IORA Ecological Solutions. Other relevant survey including plantations, socio-economic survey (*forest and fringe villages*) were conducted as per guidelines of NWPC, 2014. Mapping of Tree outside the forest, Forest carbon stocks, Compartment wise growing stocks, Water bodies in the division, Delineation of microwatersheds, Estimation of USF, LULUCF, Mapping of working circles were carried out with support from IORA Ecological Solutions. The findings of the survey were duly discussed with the relevant stakeholders and then finalized. All the field data was provided by NESAC and the major findings were communicated to the forest department reflecting forest type, growing stock, land use which was further verified on the ground and final calculations were done. This Working Plan has been prepared in consideration to ever-intensifying forest-degradation, and suggests appropriate prescriptions for increasing forest productivity to meet fuelwood, fodder, timber needs, enhancing carbon sink and generate revenue, enhance biodiversity and restore the ecosystems services of Hailakandi division. It is believed that this working plan will help achieving the stated objectives in a systematic, organized manner and lead to sustainable management of forests in Hailakandi Forest Division.

The working circles proposed and approved in Preliminary Working Plan Report (PWPR) for Hailakandi forest division are as follows:

1. Joint Forest Management and FRA Working Circle
2. Plantation and Regeneration Working Circle
3. Forest Protection (Overlapping) Working Circle
4. NTFP (overlapping) Working Circle
5. Bamboo Working Circle
6. Soil and Water Conservation (overlapping) Working Circle
7. Wildlife Management (overlapping) Working Circle

1. Joint Forest Management and FRA Working Circle:

The success of the rest of the working plan depends entirely on the successful management of the JFM working circle. 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. The management of the jointly managed forests is done through the provisions of a micro-plan prepared by the community on participatory rural appraisal (PRA) basis with the technical help of the officials of the forest department. The concept of this Working Circle will be participatory approach, participatory planning, participatory implementation and participatory sharing of the outturn as per "The Assam Joint (peoples' participation) Forestry Management Rules 1998".

Every effort shall be made by the officials as well as policy makers to meet the genuine expectations of the people of the JFMCs. This would help in ensuring protection to the interior forest areas and thus would result in biodiversity conservation. This Working Circle shall include the entire existing plantation in this division raised with the help of JFMCs under different schemes as well as all the plantations so far raised under the FDA/other project in this Division. The areas allotted to this Working Circle will mainly consist of fringe forest areas that are poorly stocked or encroached or productive blank areas. All the areas treated under this circle along with the Microplan prescriptions shall be synchronized with the working plan prescriptions and the compartment boundaries shall be realigned according to boundary of village/JFMC unit.

2. Plantation and TOF Working Circle:

There shall be an overlapping plantation working circle to cover existing plantations, blanks and under stocked areas not suitable for ANR, clear felled areas, road side, river side, canal side, rail side areas and lands under compensatory afforestation etc. which are suitable for plantations will be identified and allocated to different years of plan period along with prescription of sustainable management. The areas previously affected by *jhum* cultivation and areas resulting after eviction of encroachers shall also form part of this working circle. Every effort shall be made to restore the ecology of such areas to their previous status. All plantation areas shall also focus on enhancement of the carbon stocks. Every effort shall be made to register such plantations under REDD+.

3. Forest Protection (Overlapping) Working Circle:

Forest protection is envisioned for the complete forest area of the division. However, a higher degree of protection is envisaged for the steep slope areas, watershed areas, unique species areas, wetlands of reserved forests, areas which are representatives of unique ecosystems etc. 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 this Working circle is not only to protect the existing forests but also to clear the encroached areas 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. Otherwise the ejection will certainly lead to conflict and bloodshed.

The intensive protection of 60 Km long Inter-State border with the Mizoram State needs special mention. There is a continuous tendency of encroachment from the counterparts by way of jhum cultivation and establishment of new villages and other Govt. establishments. New Border Outposts should be established in all strategic vulnerable points.

4. NTFP (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 WPO may 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.

5. Bamboo Working Circle:

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 inaccessible and difficult areas included as part 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. It is

needless to mention that bamboo can replace timber in most of its uses. The felling series adopted during previous plans shall continue for this plan period as well. The Katakhal-A felling series consists of Katakhal RF and a part of Inner Line RF. The Katakhal-B felling series consists of Dinonathpur, Bokabeel and Sulatani USFs, and a part of Inner LineRF.

6. 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. The forest area of Hailakandi Forest Division is covered by the catchment area of Dhaleswari, Bhairabhi, Kukicherra, Baruncherra, Dhalcherra, Lalcherra, Balicherra rivers. Hence, 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 focussed for soil and water conservation using mechanical or vegetative control measures.

7. 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.

Dr. S. U.Choudhury,IFS
Yunush Salim, AFS

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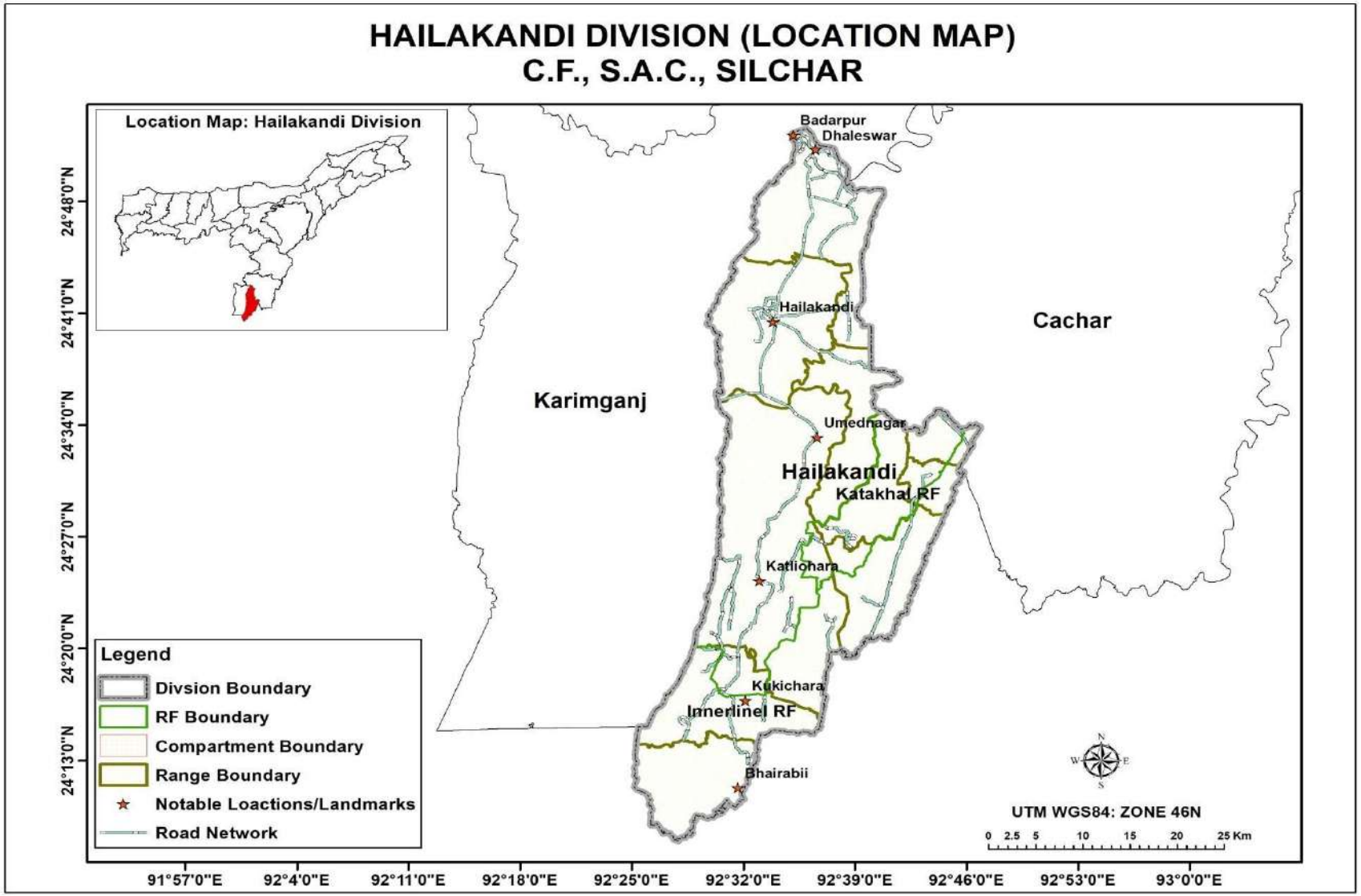
Hailakandi Forest Division.

Working Plan of Hailakandi Division

Location map of Hailakandi Forest Division



EXECUTIVE SUMMARY

I. Introduction

The Working Plan for the Hailakandi forest division, Assam for the period 2023-2024 to 2032-2033 is prepared as per the National Working Plan Code 2014. The working plan emphases on, conservation and utilization of the state forests, its biodiversity, and improve flow of ecosystem goods and services. Further the working plan aims to steer processes to guide increase the green stock in the reserves & the number of trees outside forest. The Hailakandi Forest Division is situated within the longitudes of 92º25.0' E and 92º46.2' E and the latitudes of 24º08.0' N and 25º53.2' N.

Hailakandi Forest Division consists of two Reserved Forests, Proposed Reserved Forests & Unclassed State Forests. The total geographical area of the division is 1352 Sq. Kms and out of which 25 Sq. Kms fall under the Cachar Civil District. The Hailakandi Forest division is having a 60 Km inter-state boundary with state of Mizoram. The Division is surrounded by the state of Mizoram to the east and south. In east the boundary of the division is also shared by Cachar district which extends to the North of the division forming its Northern boundary and in the west Karimganj district forms boundary line.The western boundary of the District is an extension of the Lushai Hills from South to North. From Gutguti stream to Chatachura ridge, the terrain is full of steep slopes. It is a high hill range up to 600m elevation. The Chatachura ridge gradually tapers down as one proceeds northwards and ends near Badarpur. On the Eastern side, the Lushai hills extend with decreasing altitude up to the point where the boundaries of Hailakandi, Cachar and Mizoram meet. Then, there are scattered low hillocks, all below 100m. Most of the hillocks are under Tea cultivation. River Dholeswari emerges from the Lushai hills. It is joined by some streams such as Jhalnacherra, Palaicherra, Kukicherra, Rupacherra as it runs towards north. Then it is bifurcated by a man-made channel called Katakhal, near Rupacherra.

The main water supply to the District is provided by the channel Katakhal. The stream Dholeswari, also joins the river Barak at the northern periphery of the District. Katakhal and Dholeswari form the sub-watershed of river Barak. The geological formations of the District are mainly tertiary. The older alluvium consists of pebble beds and falls under Surma series. The river bed of Dholeswari was considerably higher earlier, but due to constant erosion, the bed has sunk. Rocks are mostly sandstone, containing fossils at places. Though there is potential of Hydrocarbons, no such source has been struck in the district. The flat lands consist of day to clay loam alluvium. The river courses are highly unstable, leading to formation of many crescent shaped beels. The geology of the valley suggests that soil and water conservation measures are very important to check further erosion in the valley. Mankind has only escalated the pace of otherwise snail-paced geological process of erosion-siltation. Other issue are of encroachment, illegal felling for fulfilling the demand of fuel wood and fodder for domestic use. Grazing in to the forest areas has also created a severe pressure on the reserves forests, thus the boundary requires permanent pillars to resist encroachment from the jhum cultivation and tea garden as well as the threat due to population explosion in the nearby villages.

a) Vision Statement

Visions of working plan of Hailakandi division looks upon the process to reduce current pressure on resources and their extraction rate. Extension of the management plans that are already under progress and successful in sustainable management of the forest. Scientific and advance techniques to monitor the carbon stock of the forest reserves that will help in analysing the demand and supply gap by assessing the past records and fulfilling that demand in the division. Biodiversity, NTFP conservation and management practise shall be on the list such that protection as well as the marketing forest products can be achieved simultaneously.

b) Goals and Objectives of Management

The goal of this working plan is about enhancing the green stock of the forest areas in the division especially in the open forest patches by carrying out massive afforestation activities. Involvement of JFMC to manage NTFP cultivation and provision of marketing facilities with value addition for the forest products. Further Combating encroachment in the face of population expansion with a strong motive to stop illegal felling.

The objectives of the working plan to achieve the goals are listed below:

- To Bridge the gap between supply and demand of the forestresources.
- To carry out Eviction from forest land with a post eviction managementplan.
- Extension of forest by artificial plantation and assisted NaturalRegeneration.
- To motivate peoples for diversion from fuel wood to other alternativesources.
- Prohibition on open grazing over regenerated forestarea.
- Creation of livelihood for the forest villagers and fringevillages.
- Cultivation of NTFP/medicinal/aromatic plants with storage and marketingfacilities.
- Protection and scientificmanagement

C) SWOT Analysis

Available natural forest that are properly established and JFMC's are active in the division for the management of the forests in the division. Forest right committee is present in the fringe areas that adds to the conservation and management views of the forest. Perennial water resources and non-existence of man animal conflict are the positives of the division, further the excellent road connectivity, availability of human resources and logistic support assures the proper management of the reserves forest in the division. Alternative sources of forest product can be utilised for the attraction of people's dependency on them such that to reduce the pressure on limited ones. Ecotourism can bring several prospects of livelihood among the community people as high diversity in the forest reserves can be used to attract the tourist as well as their conservation status will be also maintained. Boundary disputes in the interstate boundaries of the division and insufficient fund and logistic support in some areas of the division are weakness of the division moreover insufficient numbers of trained staffs and biotic interference from the community people cause of the gap between demand and supply of forest supplies also makes it count in the list. Encroachment illegal felling and open grazing in the forest area for the successful living are the basic cause of degradation in the reserves. Jhum cultivation and anti-social activities in the remote sensing areas shall be checked on urgent basis which adds up to the other threats in the reserves.

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 Hailakandi forest divisions, Assam.

STRENGTHS	WEAKNESS
➢ Availability of natural forests having high species diversity. ➢ Fertile Soil ➢ Perennial water resources. ➢ JFMCs & Forest Right Committee.	➢ Lack of sufficient trained staffs. ➢ Boundary disputes in interstate border. Insufficient fund/logistic support. ➢ Gaps between demand and supply of forest produces.
OPPORTUNITIES	**THREATS**
➢ Ecotourism prospect. ➢ Alternate sources of forest produces. ➢ Good Road connectivity ➢ Available human resources. ➢ Non - existence of man – elephant conflicts.	➢ Illegal felling for meeting the local demand. Encroachment ➢ Open cattle grazing over the forest area. Jhum cultivation. ➢ Anti – social activities in remote forest areas. ➢ Biotic interferences.

d) Expected Outcome

With the implementation of the working plan, the pressure on the forest resources will be reduced and current extraction rate will be checked. The plan that are successfully working in the division will be promoted for the conservation purposes. The green stock will be maintained and with the JFMC involvement Biodiversity, NTFP and MFP management such as protection as well as marketing of such products will be carried out. Scientific and advanced techniques will be helpful in monitoring the changes in the carbon stock of the division. Post eviction plans will be prepared and eviction process will be imposed.

e) Abstract of Plan Prescriptions

The abstract of plan prescriptions in the Working Plan of Hailakandi Forest Division, Assam, for the plan period 2023-2024 to 2032-2033 is summarized in Table (e) as per the format laid out under National Working Plan Code 2014.

Table (e): abstract of plan prescriptions

Chapter No.	Name of the Working Circle	Prescribed activity	Physical target over a period of ten years/ Remarks
Part 2 Chapter 2	Joint Forest Management Working Circle	Preparation of microplans aligned with the working plan and objectives of the JFMC working circle.	Stakeholders engagement in achieving the objectives of JFMC working circle.
		Practice sustainably harvesting of NTFPs	Sustainable NTFP harvesting.
		JFMC participation for anti encroachment	Ensure enhancement of forest cover through community participation.
		Promotion of near to nature agriculture	Maintenance of ecology of the area
		Performance based incentive system	Ensure maximum plantation survival.

		Development of nursery under Joint Forest Management Working Circle for the period of 2023-2024 to 2032-2033.	a) Establishment of 5 community forest nurseries. b) 1,00,000 seedlings in each nursery.
		Plantation under joint forest management working circle for the period of 2023-2024 to 2032-2033.	2100 hectares as production forest. Maintenance= 2100hect.for 5 years
		JFMC training and awareness programmes for the period of 2023-2024 to 2032-2033. (*4 programs twice a year for ten years, each programme 30 persons*).	a) 40 training. b) 40 awareness programme. c) 2400 beneficiaries target.
Part 2 Chapter 3	Plantation and Regeneration Working Circle	Development of database of mother trees	Database and geo tagged location of good seed bearing trees.
		Ensuring availability of quality planting materials from natural stands	To ensure minimum seed losses and enhance maximum seed germination.
		Proposed works under Plantation and regeneration working circle in Hailakandi Division for the period of 2023-2024 to 2032-2033.	2780 hectares Maintenance 2780 hect for 5 years
Part 2 Chapter 4	Forest Protection Working Circle	a) Intensive protection measures will be taken for protection with greater emphasis to forest areas with canopy density over 60 percent, grassland of RFs b) Ejection plan. c) Boundary pillars (Main pillars 1 every kilometer and sub pillars 3 every 1 km). d) Creation of barriers including rajor-wire permanent fencing etc. to check biotic interference wherever necessary.	a) Strengthening the forest protection squads/personnel with modern equipments, logistics, vehicle and manpower. b) Ejection plan c) Main boundary pillars 188 d) Sub pillars 564 e) Creation of barriers including rajor-wire permanent fencing etc. to check biotic interference
Part 2 Chapter 5	NTFP (overlapping) and Bamboo Working Circle	NTFP promotion, sustainable harvesting, database creation	Preservation of threatened NTFPs.
		Bamboo cutting regulations.	Ensure sustained yield of bamboo and maintenance of bamboo habitat for wildlife.
		NTFP plantation	660 hect
		Bamboo plantation	660 hect.
Part 2 Chapter 6	Soil and Water Conservation (overlapping) Working Circle	Micro planning for SMC works and adoption of best practices for SWC.	Ensure conservation of soil and water.
		a) Soil and water conservation intervention b) Proposed treatment area.	a) 3500 hectares.

Part 2 Chapter 7	Wildlife Management and Biodiversity Conservation (overlapping) Working Circle	a) Habitat improvement including plantation of fodder, fruit and other indigenous species. b) Creation and maintenance of patrolling paths 150 km c) Construction of at least 5 protection camps and 2 watch towers spread across the sanctuary. e) Creation of Village Forest Protection Committee/Eco Development Committee in fringe villages Protection of buffer area village forests through Village Forest Protection Committee. f) Training of staff, including exposure visits within and outside the state f) Procurement anti-poaching kits/ equipment and other logistics. g) Procurement of Vehicle and Wireless sets.	a) Enrichment plantations 500 hectares. b) Patrolling paths 150 km c)5 protection camps and 2 watch towers b) Establishment of 2 anti-wildlife depredation unit. e) 160 nos. wildlife awareness camps. f) Procurement anti-poaching kits/equipment and other logistics. g) Procurement of 2 SUV/MUV Vehicle and Wireless sets
		Develop network with local participation, awareness creation, anti depredation unit and promotion of ecotourism.	Ensure Wildlife Management and Biodiversity conservation.

f) Year-wise activities and target to be achieved

1. Chapter 2 : JFMC WC

Prescribed activity	**Physical target over a period of ten years**									
	Y1	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Plantation with nursery and entry point activity: Plantation = 6500 hect	650	650	650	650	650	650	650	650	650	650
Maintenance 22750 hect	-	650	1300	1950	2600	3250	3250	3250	3250	3250
JFMC training and awareness programmes for the period of 2019-2020 to 2028-2029. (4 programs twice a year for ten years, each programme 30 persons). a) 40 training.	4	4	4	4	4	4	4	4	4	4
b) 40 awareness programme.	4	4	4	4	4	4	4	4	4	4
Ecotourism development *etc.*	5	5	5	5	5	5	5	5	5	5

2. Chapter 3 : Plantation and regeneration WC

Activity	**Y1**	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Plantation and regeneration	280	280	280	280	275	275	275	275	280	280

works 10 % of total allotted area of 27806.25 hect. = 2780 hect										
Plantation and regeneration Working Circle (Maintenance)= 12075 hect		280	560	840	1120	1395	1390	1385	1380	1380

3. Chapter 4: Protection WC

Activity	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
a) Intensive protection measures will be taken for protection of those forest areas with over 60 percent canopy cover, grassland of reserve forests. b) Ejection plan. (2000 hect.)	500	500	500	500						
c) Boundary pillars (Main pillars 1 every kilometer and sub pillars 3 every 1 km) = 188 nos	26	26	26	26	26	22	22	14		
d) Sub Pillars = 564 nos	74	70	70	70	70	70	70	70	-	-
Creation of barriers including rajor-wire permanent fencing etc. to check biotic interference wherever necessary. = 20 KM(approx)	4	4	4	4	4	-	-	-	-	-

4. Chapter 5: NTFP WC

Activity	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
a) NTFP Plantation Creation, 5% of total allotted area of 13155.02 = 660 hect.	65	70	65	70	65	65	65	70	65	60
Maintenance = hect.		65	135	200	270	335	335	330	335	330
b) Bamboo Plantation Creation, 5% of total allotted area of 13155.02 = 660 hect.	65	70	65	70	65	65	65	70	65	60
b) Bamboo Plantation Maintenance = hect		65	135	200	270	335	335	330	335	330

5. Chapter 7: WL management and Biodiversity Conservation WC

Activities	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
a) Enrichment plantations = 50 hectares.	10	5	5	5	5	5	5	5	5	-
b) Establishment of 1 anti-wildlife depredation unit.	1	1	1	1	1	1	1	1	1	1
e) 160 nos. wildlife awareness camps.	16	16	16	16	16	16	16	16	16	16
f) Construction of Camps, Watch Tower	4	2	2	2	2	-	-	-	-	-

g) Construction & maintenance of Road 100 km	50	20	10	10	10	-	-	-	-	-
h) Scientific Studies, Monitoring	√	√	√	√	√	√	√	√	√	√
j) Training of staff including exposure visit	20	20	20	20	20	20	20	20	20	20

II. 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
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 and 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

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 Guarantee 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 Implementation 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
RET	Rare, Endangered and Threatened
REWP	Research Education and working plan
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
WGS	World Geodetic Survey
WII	Wildlife Institute of India
WLS	Wildlife Sanctuary
WP	Working Plan
WPO	Working Plan Officer
WPU	Working Plan Unit

III. Glosary 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 stream beds 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 which differentiates it from other such groups. Forest cover types are usually separated and identified by species composition and often also 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, urbanvalues, 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, sub regional, 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 (NTFP)	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.

IV. List of Flora in Hailakandi Division

The Hailakandi forest division habitat of diverse flora. The detail list of different flora is given in table 4.

Table 4: List of diverse flora found in Hailakandi forest division, Assam

Sl. No.	Vernacular Name	Botanical Name
Tree		
1	Agar	*Aquilaria agallocha.*
2	Amra	*Spondius mangifera.*
3	Amloki/ Eonla	*Emblica officinalis .*
4	Aslia/ Kalaujha	*Cordia myxa.*
5	Asok	*Saraca indica.*
6	Aswatha	*Ficus religiosa.*
7	Awal	*Vitex spp.*
8	Badam	*Sterculia alata.*
9	Bohera	*Terminalia bellirica.*
10	Bajrang	*Zanthoxylum budrunga.*
11	Banak	*Schima Khasiana.*
12	Ban am	*Mangiferra Sylmar ca.*

13	Belphai/ Jatpai	*Elaeocarpus floribundus.*
14	Bandar fela	*Dysoxylum binectariferum.*
15	Bandar lathi	*Lasia fistula.*
16	Bon simul	*Bambax insigneo.*
17	Barun	*Crataeva religiosa.*
18	Bat	*Ficus benglensis.*
19	Bella	*Sapium baccatum.*
20	Bhadruk	*Vitex pubescens.*
21	Bhatkur	*Vitex heterophylla.*
22	Bhola	*Mons lacrigata.*
23	Bhubi	*Baccaurea sapida.*
24	Bhuri	*Trewia nudiflora.*
25	Bonsum	*Phoebe goat jarensis.*
26	Buva	*Ailanthus grandis.*
27	Banbojoi	*Heroteria acuminate.*
28	Boroc	*Zizyphus jujuba*
29	Chatim	*Alstonia scholaris*
30	Chakrosi	*Chukrasia tabularis*
31	Chailta ban (Ekush)	*Dillenia pentagyna*
32	Chaitta	*Dillenia indica.*
33	Chalmugra	*Hydnocarpus kurzii.*
34	Cham	*Artocarpus chaplasha.*
35	Chami	*Politica simiamm.*
36	Chamia	*Hibiscus macrophyllus.*
37	Champa	*Magnolia talanuma and Manglietia spp.*
38	Dalmugra	*Gynocardia odorata.*
39	Dephal	*Garcinia xanthochymus.*
40	Dewa	*Artocarpus lakoocha.*
41	Dhuna rata	*Canarium bengalensis.*
42	Damur	*Ficus glomerata.*
43	Fulkat	*Stynex semultum.*
44	Fulujha/ Banmala	*Callicarpa macrophylla.*
45	Fuara	*Hitsea spp.*
46	Gamair	*Gmelina arborea.*
47	Garjan	*Dipterocarpus turbinatus.*
48	Garumara	*Crypteronia paniculata.*
49	Gondroi	*Cinnamomum glanduliferum.*
50	Gulal	*Diospyros toposia*
51	Haldi kat	*Adina cordifolia*
52	Hansh	*Albizia stipulate*
53	Hartaki	*Terminalia chebula*
54	Hatia	*Chukrassia tabularis*
55	Heloch	*Antidesma spp.*
56	Hergoza	*Dillenia pentagyna*
57	Heru	*Bursera serrata*
58	Hinaru	*Albizia odoratissima*
59	Hizal	*Barringtonia acutangula*
60	Hona	*Oroxylum indicum*
61	Hunur	*Stereospermum spp.*
62	Jam	*Eugenia jambos*

63	Jakura	*Macaranga denticulata*
64	Jangli badam	*Sterculia alata*
65	Janul	*Lagerstroemia speciosa*
66	Jhalna	*Terminallia myriocarpa*
67	Jhawa	*Holigarna longifolia*
68	Jhoki	*Bischofia javanica*
69	Jinari	*Podocarpus neriifolius*
70	Kadam	*Anthocephalus cadamba*
71	Kat badam	*Calotropis spp.*
72	Kala-ujha	*Cordia myxa*
73	Kanchan	*Bauhini spp.*
74	Karach	*Pongamia glabra*
75	Kawa thuti	*Cordia fragrantissima*
76	Kayengla	*Garuga pinnata*
77	Koinari	*Miliusa spp.*
78	Koroi	*Albizia procera*
79	Koroi	*Kayea floribunds*
80	Katal	*Artocarpus integrifolia*
81	Kow	*Garcinia cowa*
82	Kum	*Careya arborea*
83	Kuma	*Toona ciliata*
84	Kuroil	*Dipterocarpus turbinatus*
85	Kurta	*Palaquium polyanthus*
86	Larubandha	*Macaranga spp.*
87	Lakiam	*Mangifera sylvatica*
88	Lonchak	*Parkia romburghil*
89	Lukluki	*Flacourtia cataphracta*
90	Madhubura	*Pterospermum acerifolium*
91	Mahal	*Vatica lanceifolia*
92	Mahidal	*Cordia fragrantissima*
93	Madau	*Erythrina indica subarosa etc.*
94	Mathang	*Carallia integerrima*
95	Maralia	*Mallotus peltatus*
96	Mon	*Randia dumetorum*
97	Monawal	*Vitex attissima*
98	Moroi	*Albizia spp.*
99	Muralia	*Mallotus atbus*
100	Nageswar	*Messua ferrea*
101	Newr	*Bursera serrata*
102	Pakhirhar	*Premna bengalensis*
103	Paraia awal	Stereospermum chelonoides
104	Ping	*Cynometra polyandra.*
105	Pipla	*Albizia lucida.*
106	Pisanti	*Grewia microco.*
107	Poma	*Cedrela toona.*
108	Pongta	*Diplospora singularis.*
109	Poreng	*Elaeocarpus spp.*
110	Ramdala	*Duabanga sonneratooides.*
111	Romkota	*Quercus spp.*
112	Rata	*Amoora wallichii.*

113	Rauni poma	*Dysoxylum hamiltonii.*
114	Rudraksha	*Stenocarpus ganitms.*
115	Sanjanel	*Lagerstroemia parviflora.*
116	Stakora	*Citrus hystrix.*
117	Simul	*Bombax ceiba.*
118	Sirik	*Albizia procera.*
119	Sita	*Echinicarpus assamicus.*
120	Sundi, Maricha	*Alscodaphane owdenii*.
121	Sundi, Til	*Tallauma phelocapa.*
122	Sundi, Champa	*Michelia montana.*
123	Satrong	Lophopetatum fimbnatum.
124	Tarua	Endospamum chinensis.
125	Tezhuara	*Myrstica angustifolia.*
126	Tezia	*Cinnamomum obtudifolium.*
127	Tezpata	*Cinnamomum Spp.*
128	Telo	*Calophyllum inophyllum.*
129	Tula	*Tetrameles nudiflora.*
130	Tetul	*Tamarix indica*
131	Udal	*Sterculia alata*.
132	Ukhail	*Talauma hodgsonii.*

Bamboo		
1	Bhulka	*Bambusa balcooa.*
2	Bakail	*Bambusa pallida.*
3	Dalu	*Teinostachyum dullooa.*
4	Daral	*Melocalamus compactiflons.*
5	Kalia	*Bambusa auriculata.*
6	Kail	*Oxytenanthera nigrocilliata.*
7	Kata	*Bambusa arundinacea*
8	Kaligoda	*Bambusa vulgaris.*
9	Karail	*Dendracalamus strictus.*
10	Khang	*Dendrocalamus longispathus.*
11	Lota	Dinochloa sp.
12	Mirtenga, Tulda	*Bambusa tulda.*
13	Muli	*Melocanna baccifera.*
14	Pama	Bambusa teres.
15	Pecha	Dendrocalamus hamittonii.
16	Rupali	Dendrocalamus longispathus
17	Pichlee	Bambusa nutans.

Cane		
Sl. No.	**Vernacular Name**	**Botanical Name**
1	Golla	*Daemonops jenkinsus.*
2	Horna	*Calamus latifolius.*
3	Jail	*Calamus tenuis.*
4	Sundi	*Calamus guruba.*

Herbs & Shrubs		
Sl. No.	**Botanical Name**	**Local Name**

1	*Vicia sativa*	Spring vatch
2	*Crotalaria juncea*	Sunn hemp
3	*Morinda angustifolia*	Anchu plant
4	*Morinda tinctoria*	Anchu plant
5	*Calotropis gigantea*	Madar plant
6	*Trachelospermum fragrans*	Akahu lota
7	*Polygonum barbatum*	Atalari plant
8	*Mimosa pudica*	Lojjawati
9	*Antidesma diandrum*	Abu tenga
10	*Acacia concina*	Amsirika
11	*Rauwolfia serpentina*	Sarpagandha
12	*Cassia tora*	Alokhoni
13	*Phragmites karka*	Common reed, ekora
14	*Imperata cylindrica*	Thatch grass, ulu grass
15	*Amorphophalus campanulatus*	Elephant foot yam
16	*Commelina bengalensis*	Day flower, kona simul
17	*Premna herbacea*	Kotia jamun
18	*Lygodium microphyllum*	Kapou dhekia
19	*Lygodium flexuosum*	Kapou dhekia
20	*Lygodium japonicum*	Kapou dhekia
21	*Ipomoea aquatica*	Kolmon, water bird weed
22	*Mezoneuron enneaphylla*	Koshra thorn
23	*Mimosa himalayana*	Lojjawati
24	*Olax scandens*	Kakran
25	*Mimosa rubicaulis*	Kasoi kait
26	*Dioscorea sativa*	White yam, kath alu
27	*Dioscorea alata*	White yam, kath alu
28	*Grewia elastica*	Kukursuta
29	*Thysanolaena maxima*	Broom, rema
30	*Paspalum conjugatum*	Buffalo grass
31	*Desmostachya bipinnata*	Kush grass
32	*Aeschynomene indica*	Pith plant, kuhila
33	*Ipomea hederacea*	Krishnabija
34	*Fimbristylis miliacea*	Keya bon, lesser fimbristylis
35	*Kyllinga brevifolia*	Keya bon, greater kyllinga
36	*Kyllinga albescens*	Keya bon, goose tongue sedge
37	*Eclipta prostrata*	Keheraj
38	*Vangueria spinosa*	Kutkura
39	*Solanum khassianum*	Kotahi begun, horse nettle
40	*Mukia scabrella*	Kua-vaturi
41	*Anodendron paniculatum*	Kuali
42	*Cassia alata*	Candelabra bush
43	*Dioscorea bulbifera*	Air potato
44	*Glochidion mutlilocular*	Goru-mora
45	*Andropogon pumilus*	Gangjera grass
46	*Cyperus compressus*	Gahori grass
47	*Ageratum conyzoides*	Goat’s weed
48	*Anisomeles ovate*	Gopali
49	*Pavetta indica*	Gobor-hitha
50	*Ischaemum laxum*	Chira grass

51	*Cyrtococum oxyphyllum*	Shining grass
52	*Chloris incomplete*	Shinder grass
53	*Eupatorium odoratum*	Sian wood
54	*Ipomea obscura*	Charulata
55	*Sphaeranthus indicus*	Sagol-mudi
56	*Lasia spinosa*	Spinyarum
57	*Senecio quinquelobus*	Jajori
58	*Chloris barbata*	Jarogi
59	*Licuala peltata*	Chatapatta
60	*Phyllanthus niruri*	Ground ambelic
61	*Saccharum arundinaceum*	Pin reed grass
62	*Aeschynomene aspera*	Cork plant
63	*Saccharum spontaneum*	Thatch grass

Reeds & Grasses		
Sl. No.	**Vernacular Name**	**Botanical Name**
1	Kash	*Saccharum procerum.*
2	Khagra	*Saccharum spontaneum*
3	Ekra	*Erianthus ravennae.*
4	Nal	*Phragmites karka.*
5	Rema	*Thysanolaena maxima.*
6	Khor	*Imperata arundinacea.*

Epihytes		
Sl. No.	**Vernacular Name**	**Botanical Name**
1	Karau	*Loranthus scurrula*.

Climbers		
1	Bat	*Ficus spp.*
2	Chaittalat	*Delima sarmentosa.*
3	Ghilla	*Entrada seadins.*
4	Kuchai	*Acacia pinnata.*

V. List of Fauna in Hailakandi Division

The Hailakandi forest division provides suitable habitat for a diverse fauna. The detail list of different fauna found in this division is shown in table 5.

Table 5: List of diverse fauna found in Hailakandi division, Assam.

Sl. No.	English name	Local name	Zoological name
Mamal			
1	Fruit bat.	Badur.	*Rousettus leschenaulti*
2	The tiger.	Bagh.	*Panthera tigris*
3	The clouded leopard.	Baghdash.	*Neofelis nebulosa*
4	Field mouse.	Baltholoi.	*Mus booduya*
5	Wood rat.	Baltiholoi.	*Blandus blandfordi*
6	The jungle cat.	Ban-biral.	*Felis chaus*
7	The Rhesus.	Bandar.	*Macaca mulatta*

8	Pangolin.	Ban-rui.	*Manis pentadactyla*
9	Sloth bear.	Bhallook.	*Melursus ursinus*
10	Indian civet.	Bham.	*Viverra zibetha*
11	Samber.	Bholangi.	*Cervus unicolor*
12	Bamboo rat.	Boro Endure.	*Cannomys badius*
13	Pipstrelle.	Chamchika.	*Pipistrellus coromondra*
14	Mole	Chika	*Talpa micrura*
16	Tree shrew	Endur	*Tupia glis*
17	Small one horned Rhinoceros	Gandar	*Rhinoceros sondaicus*
18	Small civet	Dhandhagokul	*Viverricula indica*
19	The leopard	Gulbagh	*Panthera pardus*
20	Sun bear	Hailda bhallok	*Ursus malayansus*
21	The common langur	Hanuman	*Presbytis entellus*
22	The Elephant	Hati/Atti	*Elephus maximus*
23	Giant squirrel	Katt bilai	*Ratufa bicolor*
24	Hare	Khorgush	*Lepus nigrocollis*
25	The slow loris	Lajwabati bandar	*Nycticebus coucang*
26	The Assamessemacaque	Lal bandar	*Macaca assamensis*
27	The leaf monkey	Landor	*Presbytis pileatus*
28	The fishing cat	Mach biral	*Felis viverrina*
29	Muntjac	Maya harin	*Cavulus muntjac*
30	Hog deer	Nartini harin	*Cervus porcinus*
31	The mongoose	Neyonl	*Herpestes auropunctatus*
32	The Goral	Pahari chhagal	*Nemorhedus goral*
33	Porcupine	Sajaru	*Hystrix indica*
34	The jackal	Shiyal/ Hiyal	*Canis aureus*
35	Gangetic dolphin	Sishoo	*Platanista gangetica*
36	Wild boar	Suar	*Sus scrofa*
37	Common otter	Ud	*Lutra lutra*
38	The hoolock	Ullook	*Hylobates hoolock*

Birds			
1	Baya	Babui	*Ploceus philippinus*
2	Copper smith	Basanto bouri	*Megalaima haemacephala*
3	Rain quail	Bata	*Coturnix coromandelica*
4	Crested Tree swift	Batasi	Hemiprocne longipennis
5	House swift	Batasia	*Apus affinis*
6	Hawk Crested Honey Buzzard	Baz	*Pernis ptilorhynchus*
7	Blue throated barbet	Bene bon	*Megalaima asiatica*
8	Large Racket tailed drongo	Bhimraj	*Dicurus paradiscus*
9	Indian Eagle owl	Bhutum pecha	*Bubo bubo*
10	Red jungle fowl	Bon murgi	*Gallus gallus*
11	Brain fever bird	Bou katha kou	*Cuculus varius*
12	All but buls	Bul-bul	*Pycnonotus jocosus*
13	Brahminy duck	Chakha	*Tadorno ferruginea*
14	Spoonbill	Chamcha	*Platalea leucorodia*
15	House sparraw	Charul	*Passer domesticus*
16	Small skylark	Chatak	*Aluda gugula*
17	Pariah kite	Cheel	*Milvus migrans*

18	Jungle crow	Darkak/ Kauwa	*Corvus macrorhynchos*
19	White breasted water hen	Dauk	*Amaurornis phoenicurus*
20	Great pied hornbill	Dhanesh	*Buceros bicornis*
21	Magpie Robin	Doyel	*Copsychus saularis*
22	Dabchick	Dub dubi	*Tachybaptus ruficollis*
23	Spotted dove	Duphi	*Streptopelia chinensis*
24	Spotted owlet	Gachh pecha	*Athene brama*
25	Bankmyna	Gang shalik	*Acridotheres gingianus*
26	Spot billed pelican	Goganbha	*Pelecanus philippensis*
27	Green pigeon	Hairtal	*Treron phoenicoptera*
28	Black headed oriole	Hadiya pakhi	*Oriolus xanthornus*
29	Adjutant stork	Hargila	*Leptopilos dubius*
30	Blossom headed parakeet	Hiramon	*Psittacula cyanocephala*
31	Brown Fish owl	Hutum pecha	*Ketupa zeylonensis*
32	Black winged stilt	Jalghora	*Himantopus himantopus*
33	Pheasant tailed jacana	Jalghori	*Hydrophaisanus chirurgus*
34	Blue rock pigeon	Jalali koitor	*Columba livia*
35	Water cock	Jal Ghura	*Gallicrex cinerea*
36	Bronze winged jacana	Jal pipi	*Metopidius indicus*
37	Red rumped swallow	Tel tupi	*Hirundo daurica*
38	Maroon backed imperial pigeon	Junglee paroh	*Ducula badia*
39	Grey headed myna	Janglee shalik	*Sturnus malabaricus*
40	Crow pheasant	Kanakua	*Centropus sinensis*
41	Rufous wood pecker	Kath-Thukra	*Micropternus barchyurus*
42	Grey hornbill	Ketketi dhanesh	*Tockus birostris*
43	White wagtail	Khanjan/ Dhobani	*Motacilla alba*
44	Geese	Khantiya	*Anas penelope*
45	Koel	Kukil	*Eudynamys scolopacea*
46	Barn owl	Lakhi pecha	*Tylo alba*
47	Chestnut bitten	Lalbog	*Ixobrychus cinnamomeus*
48	Red turtle dove	Lalduphi	*Streptopelia tranquebarica*
49	Indian lorikeet	Latkan	Loriculus vernalis
50	Pintail	Lanjo	*Anas acuta*
51	Palla's fishing eagle	Machhmar	*Haliaeetus leucoryphus*
52	Osprey	Machhmar	*Pandion haliaetus*
53	Common king fisher	Mach ranga	*Alcedo atthis*
54	Fire breasted flower peoker	Madhipiya	*Dicacum ignipectus*
55	Whit necked stork	Manikjor	*Ciconia episcopus*
56	Hoopoe	Mohonchura	*Upupa epops*
57	White backed Munia	Munia	*Lonchura striata*
58	Spotted Munia	Munia	*Lonchura punctata*
59	Hill myna	Myna, sonpati	*Gracula religiosa*
60	Nakta duck	Nak thuti	*Sarkidiornis melanotos*
61	Fairy dlue bird	Neelpakhi	*Irena puella*
62	Blue jay/ Indian Roller	Neel kantha	*Coracias benghalensis*
63	Little Cormorant	Pancowri	*Phalacrocorax niger*
64	Darter	Pan duri	*Anhinga rufa*

65	Wire tailed swallow	Pana teltupi	*Hirundo smithii*
66	Mallard	Pati hans	*Anas platyrhynchos*
67	House crow	Pati kak	*Corvus splendens*
68	Black drongo	Pech kunda	*Dicrurus adsimilis*
69	Little green bee eater	Phatringa	*Merops orientalis*
70	Yellow backed sun bird	Phul-tooshi	*Aethopyga siparaja*
71	Painted snipe	Raj chaha	*Rostratula benghalensis*
72	Bar headed goose	Raj hans	*Anser indicus*
73	Indian night jar	Rait kana	*Caprimulgus asiaticus*
74	Scarlet minivet	Raja rani	*Pericrocotus flammeus*
75	King vulture	Raj shakun	*Torgos calculus*
76	Gold fronted leaf bird	Sabaj pheki	*Chloropsis aurifrons*
77	Ring dove/ collared dove	Sada duphi	*Streptopelia decaocto*
78	Pied king fisher	Sada machh-ranga	Ceryle rudis
79	Open bill stork	Samuk bhanga	*Anastomus oscitans*
80	Crested serpent eagle	Sapmar	*Spilornis cheela*
81	All babblers	Sat dhai	*Alcippe poioicephala*
82	Yellow eyed babbler	Sat dhai	*Chrysomma sinense*
83	Redvented bulbul.	Sepai bulbul.	*Pycnotus cafer.*
84	Paradise fly catcher.	Shahi bulbul.	*Terpsiphone paradisi.*
85	Common vulture.	Shakun.	*Gyps bengalensis.*
86	Common myna.	Shalik.	*Acridotheres tristis.*
87	Shama.	Shama.	Copsychus malabaricus.
88	Brahminy kite.	Shankha cheel.	*Heliae indus.*
89	Shikra.	Shikra.	*Acciipiter badius.*
90	Emerald Dove.	Kachua koitor.	*Chalcophaps indica.*
91	Teal.	Soralee.	*Anas crecca.*
92	Harridan.	Swen.	*Circus macrourus.*
93	Palm swift.	Tal choen.	*Cypsiurus parvus.*
94	Black partridge.	Teetier.	*Francolinus francolinus.*
95	Treepie.	Teka chur.	*Dendrocitta vagabonda.*
96	Large parakeet.	Tia.	*Psittacula eupatria.*
97	Lapwing.	Tittive.	*Vanellus indicus.*
98	Tailor bird.	Tun tuni.	*Orthotomus sutorius.*

Snakes, Lizards and Geckos			
1	Indian phython	Ajagar	*Python molurus*
2	Bamboo viper	Bans sap	*Trimeresurus gramineus*
3	Green keel back	Boro laudovga	*Macropisthodon plumbicolor*
4	Wolf snake	Chitti	*Lycodon aulicus*
5	Rat snake	Darais/ Alad	*Ptyas mucosa*
6	Checkered keel back	Dhora	*Natrise piscator*
7	Cobra	Gokhra	*Naja naja*
8	Monitorm lizard	Gosap	Varanus bengalensis
9	Black krait	Kala sap	*Bungarus niger*
10	Common krait	Karait	*Bungarus cacrubus*
11	Gharial	Kumior	*Gavialis gangeticus*
12	Green whip snake	Laudoga	*Dryophis nasutus*
13	Common blind snake	Mati sanp	*Typhlops braminus*

14	King cobra	Rajgokhra	*Najah haab*
15	Banded krait	Shankhini	*Bungarus fasciatus*
16	Water monitor	Sona gui	*Varanus Salvador*
17	Gecko	Takshak	*Gecko gecko*

Amphibians			
1		Gauchha beng	*Bufo melanosticus*
2		Gharu beng	*Rana trigrina*
3		Suna beng	*Hoplobatrachus tigerinus*

Fishes			
1	Fresh water catfish	Ari	*Mystus seenghala*
2		Baam	Mastocembelus armatus
3		Bacha	Eutropiich Chysavcha
4	Goonch	Bag-machh	*Bagarius bagarius*
5		Banspati	*Silonia silonia*
6		Bat	*Labeo bata*
7		Dhola	*Barilius bola*
8	Fresh water shark	Bual	*Wallago attu*
9		Chella	*Oxygaster bacaila*
10	Snake heads	Cheng	*Channa gachua*
11		Chital	*Notopterus chitala*
12		Darkina	*Rasbora daniconius*
13		Ghania	*Labeo gonius*
14		Goilsha	*Mystus carasius*
15		Goria	*Labeo dyocheilus*
16		Goroi	*Channa punctatus*
17	Hilsa	Illish	*Hilsa ilisha*
18		Kajli	*Ailia coila*
19		Kaliara	*Labeo calbasu*
20	Rojar fish	Kangla	*Notopterus notopterus*
21	Catla / babu	Katal	*Catla catla*
22		Khanka bata	*Cirrihina reka*
23	Climbing perch	Koi	*Anabas testudineus*
24		Kuchea	Amphipnous euchia
25	Walking cat fish	Magur	*Clarias bactrachus*
26	Mrigal	Mirgel/Mirgha	*Cirrihina mrigala*
27		Nandina	*Labeo nandina*
28		Pabda	*Ompok pabo*
29		Pakhiranga	*Tor tor*
30		Phul chela	*Oxygaster phulo*
31	Barb	Puti	*Puntius saranus*
32		Rani mach	Trichogaster fasciatus
33	Rohu	Rui	*Labeo rohita*
34		Sal	Channa marulius
35		Silkuri	*Batitora bruai*
36	Cat fish	Singi	*Heteropneustes fossilis*
37		Tengra	*Mystus vittatus*
38	Mahseer		*Tor putitora*

39	Common carp		*Cyprinus carpio*
40	Cilver carp		*Hypophthalmichthys molitrix*
41	Grass carp		*Ctenopharyngodon idella*

List of Other *Biota i*n Hailakandi Division,Assam

The Hailakandi forest division is rich in biodiversity. List of other biota found in this division is shown in table 6 and 7.

Table 6: List of lichen, algae , fungi etc. found in Hailakandi forest division, Assam

Sl. No.	Botanical Name
1	*Erioderma spp.*
2	*Evernia divaricata*
3	*Lepraria spp.*
4	*Lichenomphalia hydsoniana*
5	*Lobothallia spp.*
6	*Parmeliella spp.*
7	*Parmelina spp.*
8	*Asahinea spp.*
9	*Porpidinia tumidula*
10	*Coccocarpia erythritol*
11	*Umbilicaria spp.*
12	*Amanita smithiana*
13	*Clitocybe dealbata*

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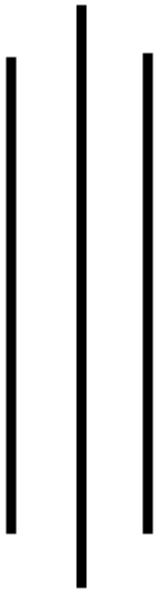

SUMMARY OF FACTS ON WHICH PROPOSALS ARE MADE

CHAPTER I

THE TRACT DEALT WITH

1.1 Name and situation:

This Working Plan covers two RFs and one PRF of Hailakandi Division. The entire division is situated within the geographical boundaries of 92˚25' E to 92˚46'E Longitude 24˚8' N to 24˚53' N Latitude. The Hailakandi Forest division was created during the year 1992 bifurcating the Cachar Forest Division. The division is bordered by Cachar Civil District in the North, Inter-State boundary of Assam-Mizoram in the south, Cachar Civil District and Mizoram State in the east and Karimganj District in the west. The table below shows the geographical area of Hailakandi Forest division.

The maps prepared with geographical coordinates recorded at the site are maintained in the GIS Cell (REWP) Guwahati for reference. Table 1.1 shows the administrative set up of Hailakandi Division forests. The Range, Block, Compartment and RF of Hailakandi Forest Division are shown in the following Figures. The details of the area and compartment wise forest type, growing stock etc.shown in the Appendix.

Table 1.1: Districts and area under jurisdiction of Hailakandi Forest Division

Sl. No.	Name of the civil district	Total Geographical area
1	Hailakandi Civil District (Total)	1327 sq.K.M.
2	Cachar Civil Distict (Pt)	26 sq. K.M.
	Total=	1353 sq. K.M.

Table 1.2: Reserve Forests and its area under the Division

Sl. No.	Name of the Forest Area RF/PRF/USF	Total area in Hect.
1	*Inner line R.F. (Pt.)*	39849.45
2	Katakhal R.F.	13986.29
3	Sultani U.S.F.	1087.74
4	Bokabil USF	9556.70
5	Dinanathpur USF	227.97

Table 1.3 : Administrative setup of Hailakandi Division

Division	Range	RF Name	Block	Compartments	Nos. of compt
Hailakandi	Gharmurah Range	Innerlinel RF	Mukam Block	GMIL(1-12), (16-29)	29 nos.
			Bhairabi South	GMIL(13-15)	3 nos.
	Kukichera Range	Innerlinel RF	Bhairabi North	KCIL(1-12)	12 nos.
		Katakhal RF	Katakhal South	KCKT (1-3)	3 nos.
	Matijuri Range	Innerline RF	Lala Block	MJIL (1-21)	21 nos.
		Katakhal RF	Katakhal North	MJKT(1-18)	18 nos.

Demography: According to the 2011 census Hailakandi District has a population of 6,59,260 of which male and female are 337,890 and 321,406 respectively. The district has a population density of 497 people per square kilometre with sex ratio of 951 females for every 1000 males. Population growth rate as per census 2011 is 21.45%. Average literacy rate is 74.33 %

higher than state average of 72.19 %.

1.2 Configuration of the ground: The configuration of the ground varies from flat to moderate slope and elevated along hills/hillocks. The western side of the district is the extension of the Lucai hiils from Gutguti stream to Chatachura Hills ridge with an elevation up to the 600 mt. Most of the hilly areas are the catchment of the rivers Katakhal, Lalacherra, Baruncherra, and DhaleswariandtributariesJhalnacherra, Paloicherraand Kukicherra. All the water from the Catchment flows through Dhaleswari and Katakhal tributaries and finally drains in the river Borak. Katakhal and Dhaleswari River makes main drainage system in the plain areas. The central flat land of the district is marked with several numbers of Beels/ Wetland. The slopes varies from 7˚ to 15˚ and in Somstrip hill, it goes upto 25˚ to 30˚ gradient.

1.3 Geology, rock and soil: The geological formations are mainly of Tertiary period. The older elevation comprises of pebble beds and river beds of Dhaleswari which gradually increases due to heavy siltation consequent to Jhum Cultivation and un-scientific management of Catchment area. The rocks as found are mostly sand stone containing fossils at some places. There is possibility of finding hydro-carbons but this area has not been mined yet. The oldest rocks found in the area are the soft rocks sandstone. Considering the soil quality and topography, the area is suitable for Tea plantations. The Central alluvial flat land of the division varies from low to high and upto the higher attitude intillas.

The area contains both residual transported soils. The hilly area contains mainly laterite soils. The flat land comprises soil like clay to clayee loam and in some places alluvial (and is light grey to dark grey in colour). The soil of the area is acidic in nature with pH of 4.5 to 5.5. Along all major rivers younger soils or river valley soils are found.

1.4 Climate: The climate of the District bears the characteristics of the climate of Barak Valley. The rainy season is from May to October. During the month of March and April, high velocity winds, hail storms and 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 Haialakndi Forest Division falls under the high humid zone, high humidity and rainfall are the characteristic features of the forests in this division.

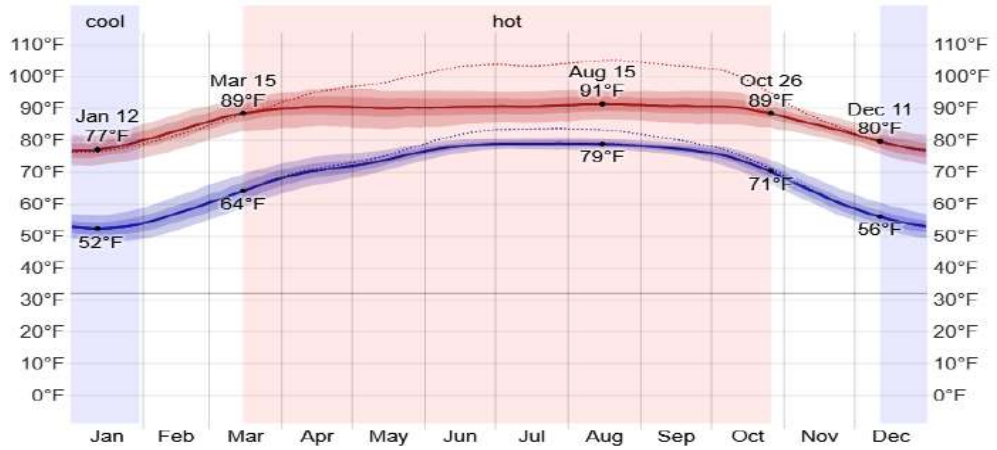

Fig.1.4.a: Averarage high and low temperature

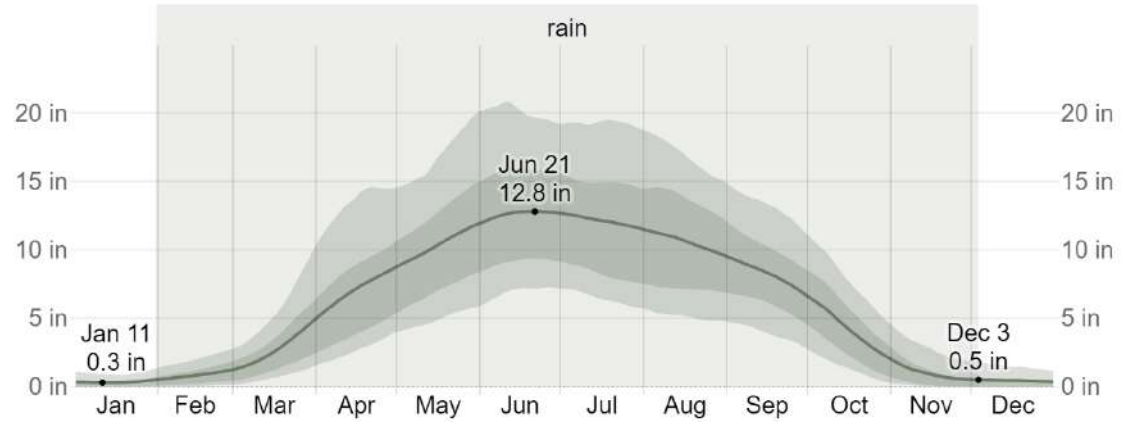

Fig.1.4.b: Average monthly rainfall in hailakandi Division

Fig.1.4.c: Average monthly humidity in hailakandi Division

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CHAPTER 2

MAINTENANCE / INCREASE IN THE EXTENT OF TREE COVER

2.1 Area of Forest under Different Legal Classes: The reserved forests of the Division were first declared under rule 7 of part II of the Bengal Forest Rules, 1871 and Act. VII of 1865. Subsequent to the enactment of Assam Forest Rules, 1876, the reserved forests were notified under rule 8 of the Rules. All the reserves were later, brought under the purview of the Forest Act of 1878. Later on the Assam Forest Regulation, 1891 was enacted. The Reserved Forests, subsequently, were constituted under the Regulation. There are 2 Reserved Forests in the Division under full administrative control of the Assam Forest Department.

The Regulation also defined certain areas as USF, as all those areas that were either not reserved or did not come under village forest and were not allotted or leased. The definition being very broad, all land at the disposal of the Government, including wastelands constitutes the USF. The Un- classed State Forests were jointly controlled by the revenue authorities and the Forest Department. There is one small proposed Reserve Forests (170 ha) called Adarkona, which falls partly under Karimganj district. Steps should be taken to issue final notification as Reserved Forest. The notification nos. of different RFs of the Hailakandi Division are given below:

Table 2.1a: Notified forests area under different legal classes in Hailakandi Division, Assam.

Name of Reserved Forest	Name of Range	Area (Ha.)	Original Notification No.	Subsequent Notification Nos.
Inner Line RF (Part)	Gharmurah Range Kuchichera Range Matijuri Range	39849.45	5 dtd.17-10-1878	928R dtd.20-03-1916 4681Rdtd.08-12-1916 3493Rdtd.21-11-1933
Katakhal (Part)	Kuchichera Range	13986.29	5 dtd.17-10-1878	2665R dtd.04-09-1933

Distribution of the areas: The statement of areas of various RFs and PRFs as follows:

Table 2.1b: Area and perimeter of different compartment under different RFs

Compartment no.	RF Name	Block Name	Area in hactares	Perimeter in mt
GMIL1	Innerlinel RF	Mukam Block	530.94	10582.70
GMIL10	Innerlinel RF	Mukam Block	805.44	17076.52
GMIL11	Innerlinel RF	Mukam Block	1000.54	21702.27
GMIL12	Innerlinel RF	Mukam Block	1133.62	14116.31
GMIL13	Innerlinel RF	Bhairabi South Block	1170.79	18396.96
GMIL14	Innerlinel RF	Bhairabi South Block	804.38	16016.33
GMIL15	Innerlinel RF	Bhairabi South Block	494.18	10660.59
GMIL16	Innerlinel RF	Mukam Block	1372.79	17258.80
GMIL17	Innerlinel RF	Mukam Block	756.15	14441.96
GMIL18	Innerlinel RF	Mukam Block	562.10	11956.98
GMIL19	Innerlinel RF	Mukam Block	553.76	11896.07

GMIL2	Innerlinel RF	Mukam Block	592.48	11318.54
GMIL20	Innerlinel RF	Mukam Block	929.90	17718.20
GMIL21	Innerlinel RF	Mukam Block	883.13	14816.12
GMIL22	Innerlinel RF	Mukam Block	977.60	15503.44
GMIL23	Innerlinel RF	Mukam Block	554.11	10905.05
GMIL24	Innerlinel RF	Mukam Block	725.56	15440.51
GMIL25	Innerlinel RF	Mukam Block	531.90	12264.56
GMIL26	Innerlinel RF	Mukam Block	337.10	10016.32
GMIL27	Innerlinel RF	Mukam Block	912.45	17854.44
GMIL28	Innerlinel RF	Mukam Block	668.61	20199.45
GMIL29	Innerlinel RF	Mukam Block	738.54	15797.18
GMIL3	Innerlinel RF	Mukam Block	1024.49	15570.05
GMIL4	Innerlinel RF	Mukam Block	943.12	16970.79
GMIL5	Innerlinel RF	Mukam Block	405.70	8699.75
GMIL6	Innerlinel RF	Mukam Block	437.94	9385.43
GMIL7	Innerlinel RF	Mukam Block	238.25	6642.08
GMIL8	Innerlinel RF	Mukam Block	451.80	10453.82
GMIL9	Innerlinel RF	Mukam Block	401.04	13174.70
KCIL1	Innerlinel RF	Bhairabi North Block	1130.12	25442.33
KCIL10	Innerlinel RF	Bhairabi North Block	450.00	9775.47
KCIL11	Innerlinel RF	Bhairabi North Block	613.25	11715.13
KCIL12	Innerlinel RF	Bhairabi North Block	548.92	15736.46
KCIL2	Innerlinel RF	Bhairabi North Block	679.65	14481.73
KCIL3	Innerlinel RF	Bhairabi North Block	329.61	8866.38
KCIL4	Innerlinel RF	Bhairabi North Block	455.08	11014.22
KCIL5	Innerlinel RF	Bhairabi North Block	410.37	10273.34
KCIL6	Innerlinel RF	Bhairabi North Block	662.89	14354.91
KCIL7	Innerlinel RF	Bhairabi North Block	553.86	11392.86
KCIL8	Innerlinel RF	Bhairabi North Block	635.17	11058.40
KCIL9	Innerlinel RF	Bhairabi North Block	820.60	14400.62
KCKT1	Katakhal RF	Katakhal South Block	373.2	980.40
KCKT2	Katakhal RF	Katakhal South Block	648.75	15294.67
KCKT3	Katakhal RF	Katakhal South Block	415.87	12668.90
MJIL1	Innerlinel RF	Lala Block	202.35	7957.75
MJIL10	Innerlinel RF	Lala Block	618.81	11851.20
MJIL11	Innerlinel RF	Lala Block	705.95	12452.68
MJIL12	Innerlinel RF	Lala Block	721.72	13378.16
MJIL13	Innerlinel RF	Lala Block	400.66	10510.26
MJIL14	Innerlinel RF	Lala Block	550.12	11359.68
MJIL15	Innerlinel RF	Lala Block	467.25	11419.72
MJIL16	Innerlinel RF	Lala Block	690.21	13380.53
MJIL17	Innerlinel RF	Lala Block	522.68	11154.94
MJIL18	Innerlinel RF	Lala Block	442.67	10465.94
MJIL19	Innerlinel RF	Lala Block	302.13	9929.00
MJIL2	Innerlinel RF	Lala Block	416.91	14413.83
MJIL20	Innerlinel RF	Lala Block	565.60	11588.61

MJIL21	Innerlinel RF	Lala Block	589.23	13639.76
MJIL3	Innerlinel RF	Lala Block	499.29	15713.95
MJIL4	Innerlinel RF	Lala Block	504.80	10898.66
MJIL5	Innerlinel RF	Lala Block	571.52	11341.16
MJIL6	Innerlinel RF	Lala Block	722.14	15621.40
MJIL7	Innerlinel RF	Lala Block	755.99	14124.18
MJIL8	Innerlinel RF	Lala Block	826.70	15398.83
MJIL9	Innerlinel RF	Lala Block	534.02	12478.90
MJKT1	Katakhal RF	Katakhal North Block	522.63	11732.30
MJKT10	Katakhal RF	Katakhal North Block	548.58	11112.31
MJKT11	Katakhal RF	Katakhal North Block	849.32	16162.74
MJKT12	Katakhal RF	Katakhal North Block	468.09	11439.71
MJKT13	Katakhal RF	Katakhal North Block	1011.11	16414.19
MJKT14	Katakhal RF	Katakhal North Block	889.30	16643.57
MJKT15	Katakhal RF	Katakhal North Block	952.77	14380.65
MJKT16	Katakhal RF	Katakhal North Block	764.93	13304.79
MJKT17	Katakhal RF	Katakhal North Block	556.46	12973.48
MJKT18	Katakhal RF	Katakhal North Block	1070.18	16115.08
MJKT2	Katakhal RF	Katakhal North Block	430.63	12109.07
MJKT3	Katakhal RF	Katakhal North Block	840.09	16148.88
MJKT4	Katakhal RF	Katakhal North Block	614.64	13613.77
MJKT5	Katakhal RF	Katakhal North Block	804.31	16248.20
MJKT6	Katakhal RF	Katakhal North Block	482.10	12004.48
MJKT7	Katakhal RF	Katakhal North Block	531.29	13146.27
MJKT8	Katakhal RF	Katakhal North Block	579.26	14975.92
MJKT9	Katakhal RF	Katakhal North Block	627.75	15591.85

Encroachment: The forest area of the division is under encroachments from tea gardens, habitations and jhum cultivation, as explained earlier. The encroachment started from the forest villages that established in the year 1937 by allowing 13 nos. of forest village within Katakhal RF and 21 nos. of forest village with in Innerline RF. The number of forest villages gradualy increased up to the year 1980. Objectives for establishing forest villages were for easy procurement of labour and protection of forests as there was no concept of participatory management at that time. The RF-wise statement of encroached area and area as assessed by the NESAC in their data compilatation shown in the table below.

Table 2.1c: Area showing under encroachment

Sl. No	RF Name	RF Area in hec.	Encroached Area in hec	Agricultural Area in hec	Built Up Area in hec
1	Inner Line (Hailakandi)RF	39849.45	4745.42	3515.95	1218.72
2.	Katakhal RF (Hailakandi) Part	13986.29	4646.66	3428.94	1218.90
	Total	53835.74	9392.08	6944.89	2437.62

The above figure of encroachment is correlated with satellite data and ground reality by NESAC. Only human habitation areas are recorded as encroached and as such actual

encroached area shall be more than the figure shown in table. The abstract of the encroachment shown as below.

Table 2.1d: R.F. & Range Wise Abstract of Encroached Area

Name of Range	Name of R.F.	Encroached Area	Household	Population
Matijuri	Katakhal R.F.	3382.4 ha.	2284 Nos.	11,732 nos.
	Inner line R.F.	865.6 ha	124 Nos.	707 Nos.
	Sub-Total -	4248.0 Ha.	2408 Nos.	12,439 Nos.
Kukicherra	Katakhal R.F.	-	-	-
	Innerline R.F.	2152.0 Ha.	137 Nos.	436 Nos.
	Sub-Total-	2152.0 Ha.	137 Nos.	436 Nos.
	Katakhal R.F.	-	-	-
Gharmurah	InnerLine R.F.	5216.0 Ha.	4613 Nos.	22515 Nos.
	Sub-Total-	5216.0 Ha.	4613 Nos.	22515 Nos.
	Grand Total -	11,616.00	7158 Nos.	35,390 Nos.

District-wise titles accorded under FRA, 2006 in Hailakandi division by the district level FRA committee shown as below Table No. 2.5.

Table No. 2.1e: District-wise titles accorded under FRA

Name of District	Name of R.F	Titles given under Forest Rights Act, 2006	
		No. of titles given	Area of forest land involved (Ha)
Cachar District	Katakhal	76 Nos.	64.09
Hailakandi	Katakhal	108 Nos.	86.60
Hailakandi	Inner Line	103 Nos.	96.20
		287 Nos.	**246.89**

Diversion of Forest Land and Compensatory Afforestation done:

Forest land diverted for non-forestry purpose in the Hailkandi Forest Division and compensatory afforestation done against them is shown in the following table No. 9

Table No. 2.1f: Diversion of Forest Land and Compensatory Afforestation done

Sl No	Purpose for diversion of forest land	Name of RF & year of diversion	Area (Ha)	Approved location of C.A.	GoI approval letter
1	Construction of Lalabazar-Bhairabi M.G. Railway line	Inner Line 2014-15	170.2	170.2 ha non- forest land at Kukichera grant and Dhariarghat grant (Katlicherra) in Hailakandi	8-141/81/FRY (Cons.) Dt.06-10-1982
2	Laying of 132 KV Transmission Line from Badarpur to Kolasib- Aizwal	Inner Line	25.65	25.65 ha non- forest land at Chutolanfar in Karbi Anglong	8-97/93-FC dated 17/6/1994
3	Exploratory Drilling by ONGC in Sonai R.F. (Cachar Division)	Sonai Reserve Forest (Cachar division) 2001-02	7.75	7.75 ha DhariarghatGrant, (Katlicherra) in Hailakandi	8-12-8/98/RO-NE/AS/686 Dt. 30-07-1998

4	Exploratory Drilling by ONGC in Longai R.F. (Karimganj Division)	Longai RF (Karimganj Division) 2001-02	3.641	3.641 ha Dhariarghat Grant (Katlicherra) in Hailakandi	8-2-42/2001/RONE-AS/635-38 dated 26-06-200
5	Silchar-Dowarbond-Gaglacherra-Belaipur-Phaisen road	Katakhal and Inner Line RF 2010-11	26.5	26.5 ha Santipur, dharapur, Krishnapur, Kalyanpur (Katlicherra) in Hailakandi	3 ASC.037/2005-SHI/2371-73 Dated 13/12/2006

2.2. Forest Area under Different Working Circle/Management Plan

The following table shows the area against each working circle in Hailakandi division

Table 2.2a : Area (in Hact.) allotted in different working circles

RF	Compt	Compart area	JFMC	Plantation	NTFP	Soil & Water
Inner Line	GMIL1	530.94	150.00	300.00	80.00	140.00
Inner Line	GMIL2	592.48	190.00	300.00	100.00	140.00
Inner Line	GMIL3	1024.49	-	700.00		300.00
Inner Line	GMIL4	943.12	350.00	400.00	190.00	45.00
Inner Line	GMIL5	405.7	-	300.00		200.00
Inner Line	GMIL6	437.94	200.00	190.00	45.00	
Inner Line	GMIL7	238.25	-	120.00		105.00
Inner Line	GMIL8	451.8	-	300.00		90.00
Inner Line	GMIL9	401.04	-	230.00		
Inner Line	GMIL10	805.44	150.00	400.00	250.00	50.00
Inner Line	GMIL11	1000.54	650.00	-		100.00
Inner Line	GMIL12	1133.62	615.00	300.00	200.00	-
Inner Line	GMIL13	1170.79	250.00	650.00	200.00	100.00
Inner Line	GMIL14	804.38	-	550.00		
Inner Line	GMIL15	494.18	-	300.00		
Inner Line	GMIL16	1372.79	100.00	800.00	300.00	200.00
Inner Line	GMIL17	756.15	100.00	400.00	100.00	20.00
Inner Line	GMIL18	562.1	200.00	300.00	60.00	35.00
Inner Line	GMIL19	553.76	225.00	300.00	25.00	
Inner Line	GMIL20	929.9	-	600.00		190.00
Inner Line	GMIL21	883.13	100.00	600.00	180.00	-
Inner Line	GMIL22	977.6	-	600.00		
Inner Line	GMIL23	554.11	300.00	-		35.00
Inner Line	GMIL24	725.56	425.00	-		100.00
Inner Line	GMIL25	531.9	200.00	320.00	10.00	
Inner Line	GMIL26	337.1	100.00	200.00	30.00	10.00
Inner Line	GMIL27	912.45	-	600.00		-
Inner Line	GMIL28	668.61	250.00	400.00	10.00	60.00
Inner Line	GMIL29	738.54	-	450.00		
Inner Line	KCIL1	1130.12	200.00	620.00	100.00	40.00
Inner Line	KCIL2	679.65	100.00	390.00	100.00	90.00
Inner Line	KCIL3	329.61	-	250.00		25.00
Inner Line	KCIL4	455.08	-	260.00		60.00
Inner Line	KCIL5	410.37	75.00	200.00	100.00	

Inner Line	KCIL6	662.89	75.00	400.00	100.00	15.00
Inner Line	KCIL7	553.86	300.00	-		10.00
Inner Line	KCIL8	635.17	-	275.00		50.00
Inner Line	KCIL9	820.6	-	395.00		75.00
Inner Line	KCIL10	450	100.00	220.00	100.00	100.00
Inner Line	KCIL11	613.25	-	300.00		150.00
Inner Line	KCIL12	548.92	-	325.00		25.00
Inner Line	MJIL1	202.35	-	130.00		-
Inner Line	MJIL2	416.91	-	260.00		
Inner Line	MJIL3	499.29	75.00	380.00	40.00	10.00
Inner Line	MJIL4	504.8	400.00	-		
Inner Line	MJIL5	571.52	-	435.00		
Inner Line	MJIL6	722.14	250.00	470.00		20.00
Inner Line	MJIL7	755.99	300.00	295.00	150.00	90.00
Inner Line	MJIL8	826.7	-	520.00		10.00
Inner Line	MJIL9	534.02	-	415.00		-
Inner Line	MJIL10	618.81	200.00	370.00	40.00	
Inner Line	MJIL11	706.95	200.00	420.00	75.00	30.00
Inner Line	MJIL12	724.72	-	415.00		-
Inner Line	MJIL13	402.66	100.00	215.00	75.00	
Inner Line	MJIL14	554.12	-	300.00		
Inner Line	MJIL15	467.25	200.00	210.00	50.00	
Inner Line	MJIL16	690.98	100.00	500.00	75.00	15.00
Inner Line	MJIL17	522.68	75.00	265.00	100.00	30.00
Inner Line	MJIL18	442.67	100.00	245.00	50.00	25.00
Inner Line	MJIL19	302.13	-	160.00		
Inner Line	MJIL20	565.6	100.00	270.00	100.00	5.00
Inner Line	MJIL21	589.23	-	325.00		-
Katakhal	KCKT1	373.2	75.00	210.00	50.00	-
Katakhal	KCKT2	648.75	150.00	380.00	100.00	
Katakhal	KCKT3	415.87	300.00	-		
Katakhal	MJKT1	522.63	425.00	-		-
Katakhal	MJKT2	430.63	200.00	230.00		-
Katakhal	MJKT3	840.09	150.00	370.00	100.00	30.00
Katakhal	MJKT4	614.64	160.00	315.00	100.00	-
Katakhal	MJKT5	804.31	500.00	300.00		
Katakhal	MJKT6	482.1	430.00	-		-
Katakhal	MJKT7	534.09	450.00	-		-
Katakhal	MJKT8	579.26	510.00	-		20.00
Katakhal	MJKT9	629.95	500.00	-		-
Katakhal	MJKT10	548.58	425.00	-		20.00
Katakhal	MJKT11	849.32	620.00	-		
Katakhal	MJKT12	468.09	50.00	200.00	100.00	-
Katakhal	MJKT13	1011.11	425.00	400.00		-
Katakhal	MJKT14	889.3	400.00	300.00		15.00
Katakhal	MJKT15	952.77	375.00	400.00		65.00
Katakhal	MJKT16	764.96	260.00	420.00	50.00	45.00
Katakhal	MJKT17	556.46	175.00	300.00	50.00	10.00
Katakhal	MJKT18	1070.18	390.00	580.00	50.00	
Total		**53835.74**	**14475.00**	**25240.00**	**3635.00**	**3000.00**

2.3 Percentage of Forest with Secured Boundaries

The Hailakandi Forest Division is located in the interstate border of Assam-Mizoram comprising about 50 km co-terminus boundary with the state boundary and hence, there is continuous tendency of encroachment from the Mizoram state. Moreover, due to the presence of tea garden in the other boundaries along with the revenue areas, a total 11600 ha. i.e 21.6% of the land under encroachment. The interstate boundary required immediate survey with permanent pillars by the survey of India as per state boundary notification exists and the boundary along with the tea garden and revenue area shall also be surveyed by the Assam Forest Department with proper pillaring. In total 60% of the total forest area boundaries are not secured and hence permanent structure are required for clear demarcation of the area.

Summary of Boundary:

The status of Reserve Forest boundaries has only worsened since 1957-58 when P.N. Bhattacharjee had elaborately discussed the issue of boundary, in his Plan. According to him, the northern boundary of the Innerline R.F. right up to Katakhal is under dispute at several places. He mentions about the Sultani Tea garden's unauthorized occupation of area along the Palaicherra within Mukam Block of the reserve. He also mentions of "Mukam Land" on Dholeswari River which has been occupied without any authority. It is not known what action has been taken by the executive authorities in the field. The problem is aggravating day by day, as these are serving as nuclii for further encroachment. The Reserved Forest boundaries need to be resurveyed and 2-3m clear line maintained along the boundary. Such boundary line cutting and maintenance of boundary roads should from part of the annual plan of the Division. Moreover P. N. Bhatacharjee laid emphasis on re-survey and re-notification of the Reserved Forest areas as compact chunks of land. The same recommendation was also made by K. K. Gupta. It is strongly recommended here as well.

The Interstate boundaries:

The Hailakandi Forest division is having a 60 Km inter-state boundary with state of Mizoram. The boundary requires permanent pillars to resist encroachment from the tea garden as well as the threat due to population explosion in the nearby villages. The Govt. of Assam recognizes the boundary notification of 1933 while Govt. of Mizoram insists on the boundary notification of 1875. Many times, even in recent past, this had resulted in a tense relation between the two states.

2.4 Land use, Land use Change and Forestry (LULUCF)

The land use in the Hailakandi forest Division has been changed from the year of its formation (1992) primarily due to the Jhum cultivation, encroachment and Forest Right certificate etc. It is notable that after 2005 there has not been much encroachment but reported but there has been change in the land use attributed to continuous Jhum cultivation and the land allotted to the Forest Right holders. However, the afforestation under RDF (Rehabilitation of Degraded Forest scheme) AVY (Assam Vikas Yojna), CAMPA has enhanced forest cover in the degraded forest area. Moreover, the bamboo forest specifically *Melocanna baccifera* (Muli) that died of gregarious bamboo flowering but area regained the forest cover due to natural re-generation and by bamboo plantation under NBM indifferent.

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 analyzed using and RS/GIS tools applied to map LULUCF. There are visible changes detected in land use, land use change and forestry in Hailakandi division. Detail LULC maps developed at the two time points is shown in Figure 2.4.

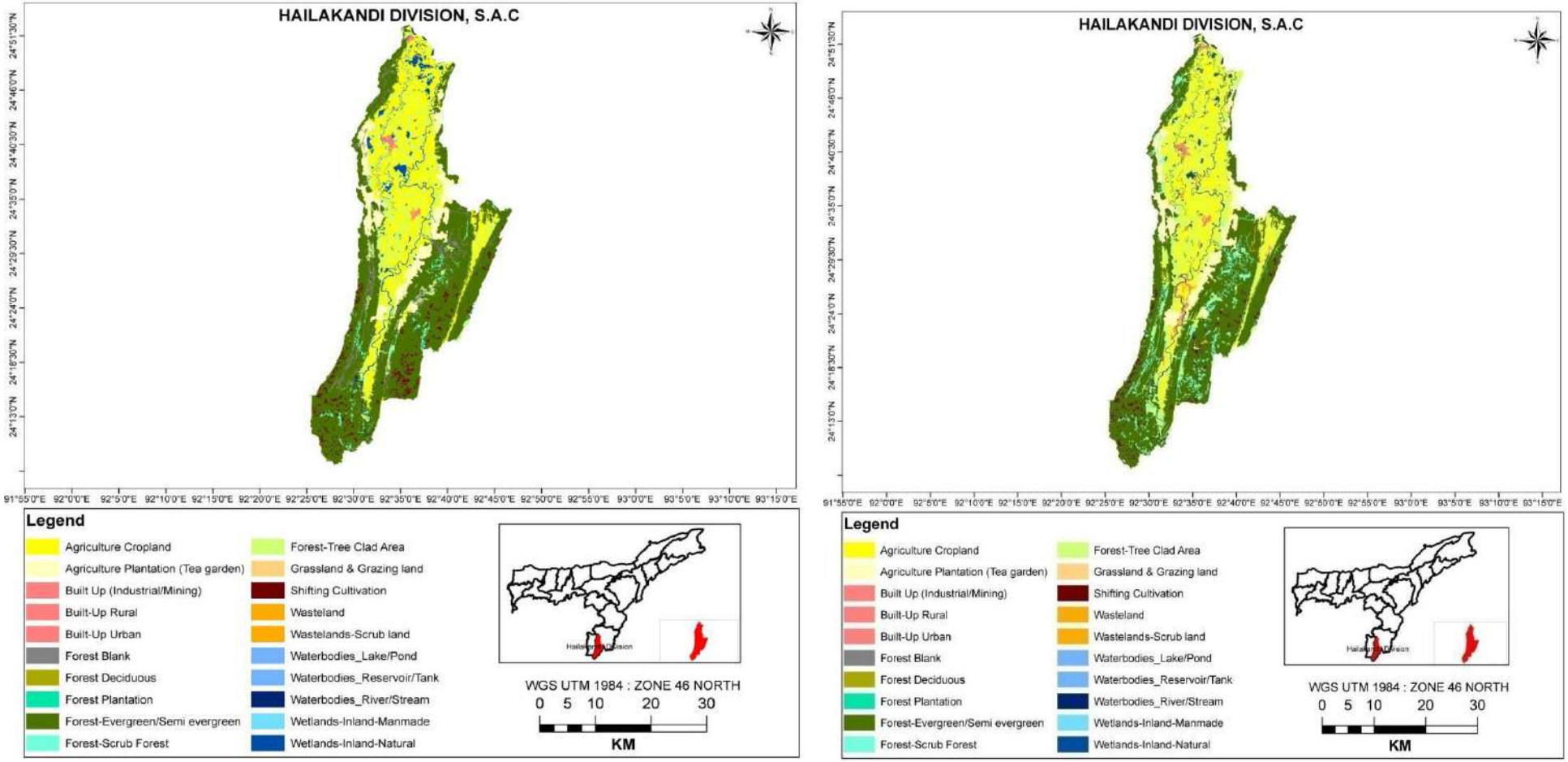


Figure 2.4: Land Use Land Cover Map of Hailakandi division in 2005-2006 and 2015-2016.

2.5 Threats to the forests:

In Hailakandi Forest division, the major threats to the forest area are as below:-

Biotic threats:

Encroachment from Mizoram border by crossing the inter-state boundary in both the interline RF and Katakhal R.F. Besides, recurrent effort for enchroachment and destruction of the forest area by Mizoram side farmers into the Gallacherra area in recent time is a major matter of concern. Many times the forest officials along with District administration and police have to stop and evict the fresh enchrochment in forest area and sent back the enchrochers. The cross border encroachment, other encroachment taking place by the tree growers and by the Reang tribe community coming from Mizoram and Tripura state along with the local people due to the population expansion and consequent demand of both household and agricultural land.

Illegal collection of timber product and other forest produces:

The high domestic timber demand has led people living in the periphery of the forest illegally collecting both the timber, fire wood and bamboos. The other NTFPs like broom stick, flowers, Chatapata, Gandhi root, cane etc. are also being collected illegally.

Cattle grazing:

There are huge number of cattle that comprises cow, goat, buffalo etc. are grazing over the forest area due to the lack of grazing land. This grazing menace is all the more critical during the paddy cultivation season with standing crop, the dependency shifts from agriculture filed to forest area and the entire forest area gets converted into grazing Reserve.

Abiotic threats:

The abiotic threats like intentional fire over the grass land, thatch area, broom stick area are the regular seasonal phenomena in the dry season for encouraging the fresh growth.

Climatic threats:

The climatic threats taking place due to the longer draught period.

Other threats:

The landslide in the hilly area due to Jhum cultivation taking place for the reason non-management of watershed and catchment area over the forest land as the entire forest land is the Catchment of river Dhaleswari, Katakhal along with their large number of tributaries. The major pest and insect attack has not been reported in the natural forest. Though some attack that has been found has been at a young plantation stage.

2.6 Distribution of different foresttypes:

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

(a) Cachar Tropical Evergreen Forest (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 jhumming 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 formations occur in the lower slopes of the hill. The endemic species of the formation are Dipterocarpus terbinatus and Palaquiun polyanthum and these are characteristics species of the formation. The other species found here are given below canopy wise.

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.

(b) Cachar Tropical Semi Evergreen Forest(2/2B/C2):

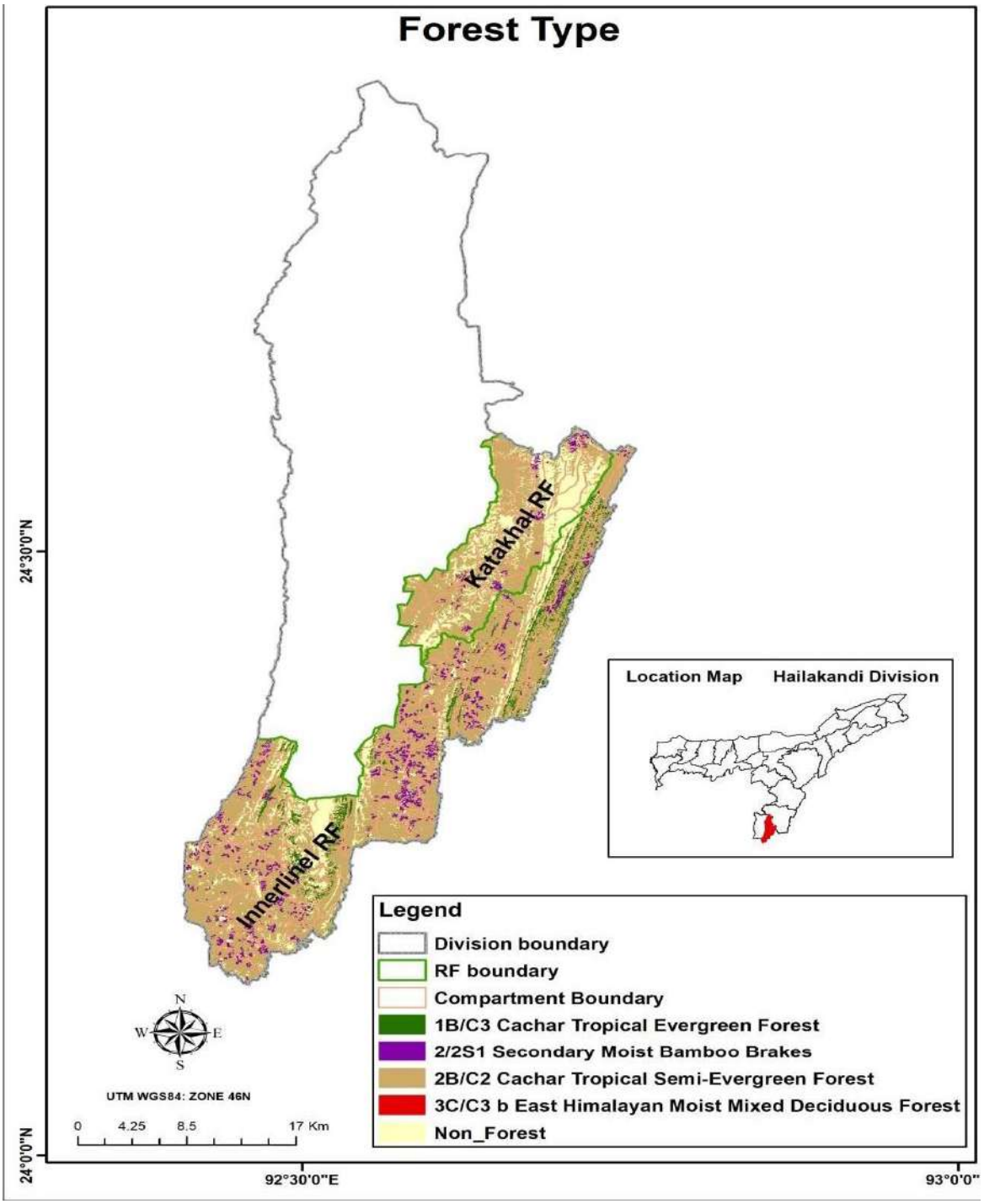
The top hills slopes of the Division were once occupied by the semi evergreen type of formation. The Southern and the Western Slopes are the most favored slopes for this type of formation. *Artocarpus chaplassa* and *Dipterocarpus terbinatus* are characteristic species of this type. In addition, the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

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.

The latest map of forest cover and forest type reveals that there are no major changes except over the area where Jhum cultivation and encroachment took place. The high density forest has been converted to the open forest in some pockets where the Jhum cultivation is a prevalent exercise and also in some pockets where encroachment is taking place for cultivation of crops and also for dwelling.

Fig 2.6a. Forest type map of Hailakandi division



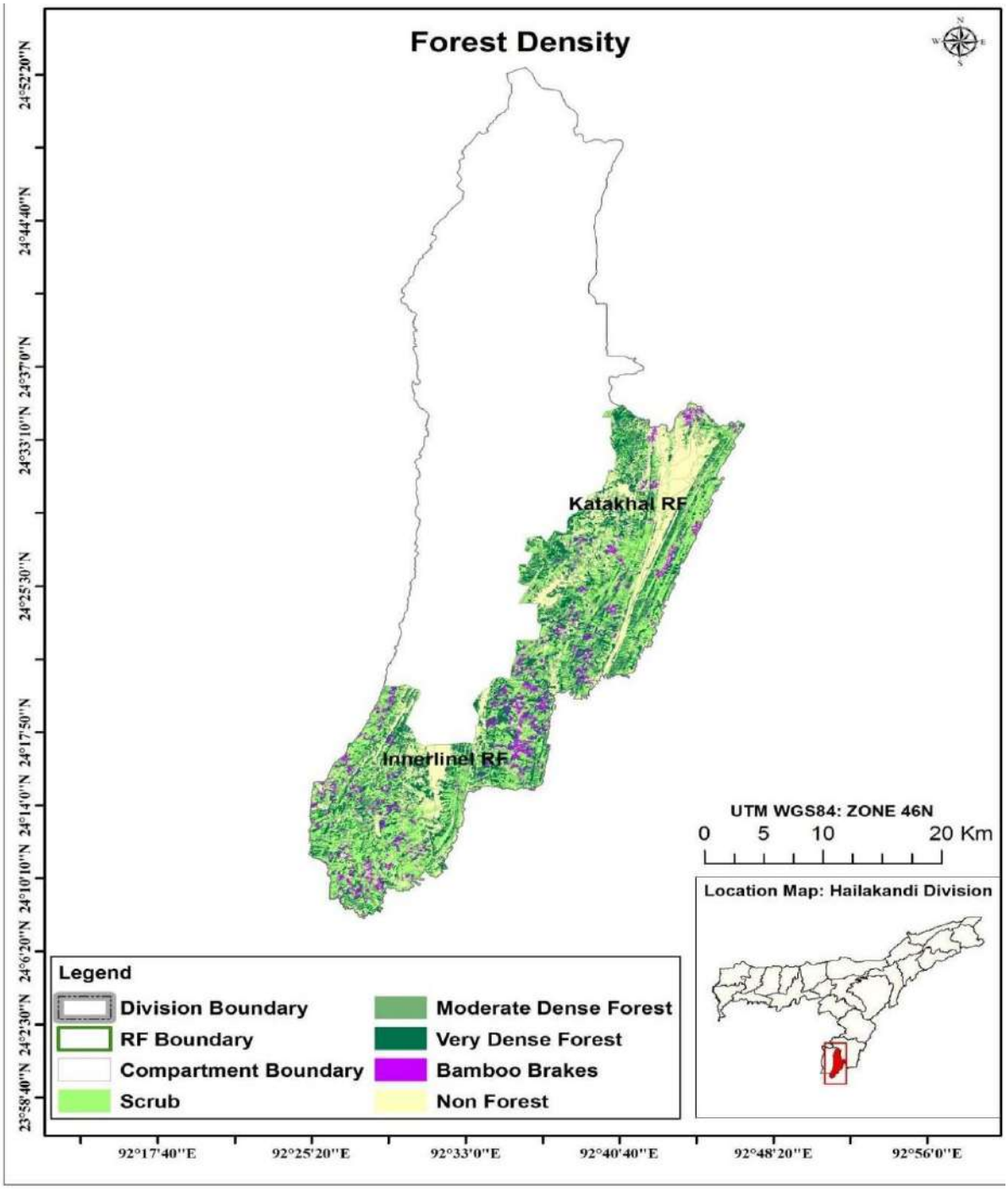


Fig. 2.6b. Forest Density map of Hailakandi Division

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. tThere 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. in Hailakandi Division.

Table 2.7a: 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*

2.7.1 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. These were delineated and mapped (see Figure 2.7a). Detail area of each USF patch and coordinates is shown in ANNEXURE. Please refer Fig.2.7a.

2.7.2 Shifting cultivation (Jhumming): The Jhum practices are the traditional cultivation system by the forest dweller and that further aggravates due to the influx of Riang tribal community from Tripura and Mizoram. As per the Census 2011, only 691 notified tribal people are living in the district. Since the Riang community is not the notified tribe in Assam, therefore they are not entitled for Forest Rights. It is assumed that if there movement and practice is contained, the Jhum area can be rehabilitated by massive plantations.

Table – 2.7.2 Area under shifting cultivation in different RFs in Hailakandi division

Sl. No.	Name of R.F	Area available	Remarks
1	Inner Line R.F.	500.0 Ha.	The area need immediate plantations
2.	Katakhal R.F.	200.0 Ha.	

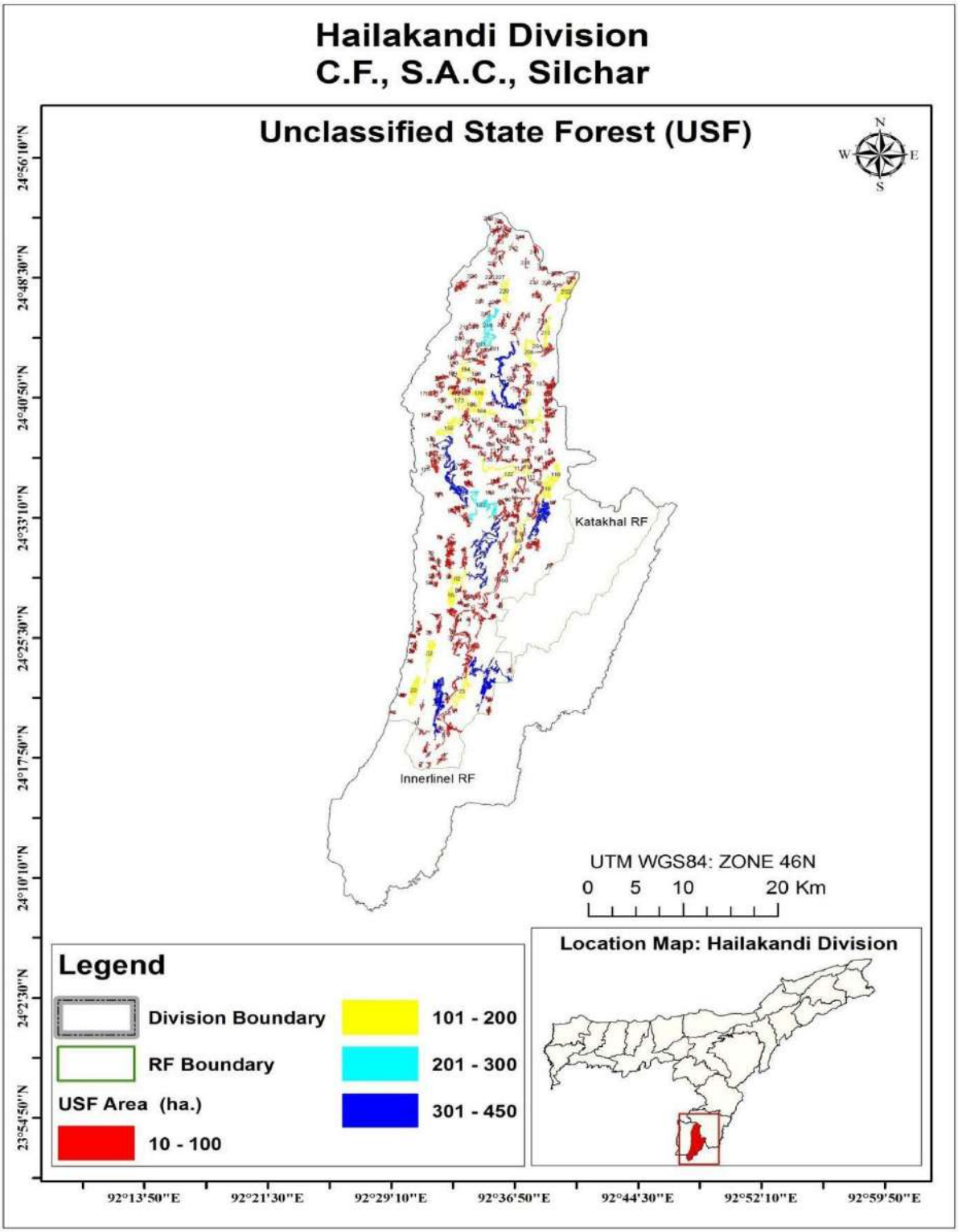


Fig 2.7.a. Unclassified state of forest map in Haialakandi division

2.7.2 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 Hailakandi Division is shown in the figure 2.7.b. The total area of tree outside forest in Hailakandi division is 15,446.65ha.

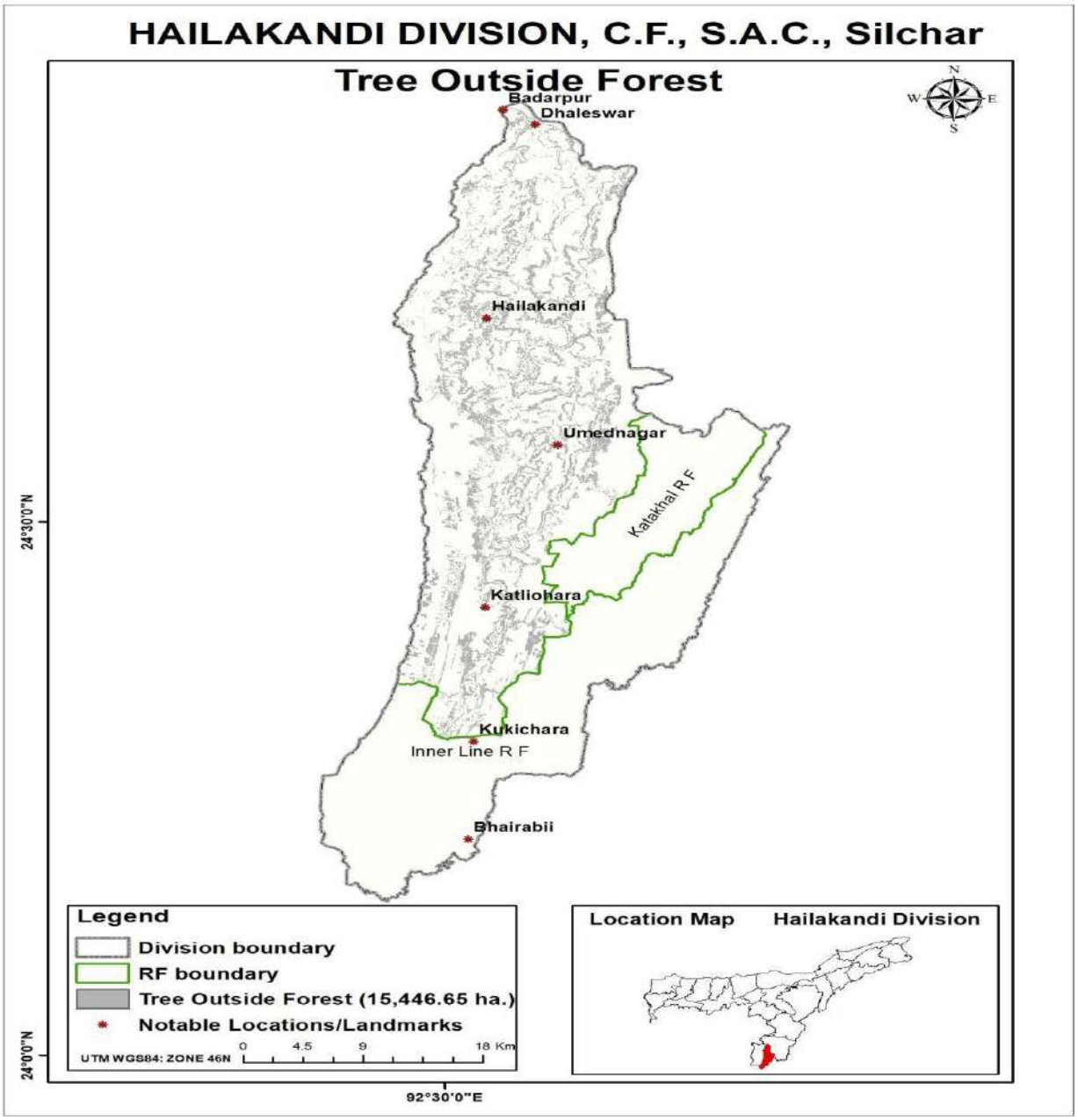


Fig.2.7.b. Tree outside forest map of Hailakandi division

-SSS-

CHAPTER 3

MAINTENANCE, CONSERVATION AND ENHANCEMENT OF BIODIVERSITY

3.1 Forest composition and distribution:

The forest composition and distribution in the Hailakandi Forest Division are basically –

(1) Cachar tropical evergreen forest (1/1/B/C2) : This is a original *Messua, Diptocarpus-Palaquium* formation as specified by Rajkhowa. It is supposed to be climatic climax.

(2) Cachar tropical semi- evergreen forest (2/2 B/C/3) : The top hill slope of forest area under the forest division witness the forest type.

(3) Sub-type : According to forest classification the following forest sub-type exists–

i. Wet Evergreen Cane Breaks(1/BC/3EI)
ii. *Macaranga melonus Trema* association(1/2SI)
iii. Moist Bamboo Break and secondary moist bamboo break(2/2SI)
iv. Trophical Hill Valley Swamp forest(FS2)
v. *Beringtonia* Swamp forest(SS2)

3.1.1 Cachar tropical evergreen forest (1/1/B/C/3): This is an original Messua Dipterocarpus- Pelaquium formation as specified by Rajkua. It is supposed to be the climatic climax that has been severally altered and restricted in occurrence due to long history of jhumming & other biotic interference. Mostly, it is confined to the Northern & Eastern aspect where slopes are steeps and uncultivable due to the rock formations and shades. Major stream banking formations occur in the low slopes in the hills. In this Division, *Dipterocarpas turbinatus, Pelaquium spp., Polymorphum spp.*, are the characteristic species along with other associated species as below-

Table 3.1.1: Major flora in Hailakandi division under different canopy cover

Description of Flora	Canopy	Major Species
Trees	Top &Middle	*Dipterocarpus tarbinatus, Palaquium polyanthus, Artocarpus Chaplasha, Alseodaphne, owdenii,* ***Tallauma*** phellocarpa, *Michelia montana, Sterculia spp, Podocarpus spp Cadamba spp, Garuga pinnata.*
Bamboo	Top &Middle	*Melocanna spp, Dendrocalamus hamittonii, Bambusa vulgaris, Bamboosa balcooa, Teinostachyum dullooa.*
Hub/Shrubs	Lower	*Curcuma, Homalomena rubescens, Phrynium imbricatum, Clinigene. Erianthus ravennae , Licuala peltata.*
Climber	All Canopy	*Ficus spp., Delima saumentosa, Michania micrantha, Daemonops jenkinsus, Calamus lattifolius, Calamus tenuis, Calamus guruba*

3.1.2 Cachar tropical semi evergreen forest (2/2B/C2): The top hill slope of ForestAreaunderthisForestDivisionwasoccupiedbytheSemiEvergreentypeofformation.The

Southern & Western slopes are the most favourable site for this forest type formation. Specieslike*Artocurpas chaplasha, & Dipterocurpas Turbinus* are the major characteristic species of this types alongwith other associated flora as mentioned in the table 14 below:

Table 3.1.2: Major species under different canopy cover

Description of Flora	Canopy	Major Species
Trees	Top & Middle	Gorjan, Kurta, Cham, Sundi, Tilsundi, Muricha sundi, Udhal, Jinary, Kaiyengla.
Bamboo	Top & Middle	Muli, Pecha, Kalgoda,Buluka, Dolu
Herbs /Shrubs	Lower	Bon holdi, Gondi Kachu, Kittapata, Patidai. Ikra, Chattapata.
Climber	All Canopy	Bot lota, Soite lot, Japani Lot(Micania)

3.1.3 Sub-types: According to Revised classification of Forest types of India (C&S, 1968) the above two major types have undergone an enormous change in composition and its formation due to edaphic & biotic pressure. Considering the changes, following sub-types are prevailing in the forest area under this Forest Division.

Table 3.1.3: Different forest sub types in Hailakandi division

Name of the Sub-types	Code	Remarks
Wet evergreen cane breaks.	1/BC3E1	Stock reducing
Macarango Melonus Trema Association.	1/2S1	Do
Moist Bamboo & Secondary moist bamboo breaks	2/2S1	Needs re-stocking
Tropical Hill Valley Swamp Forests.	FS2	Needs re-generation measure
Beringtonia Swamp Forests	SS2	Do

3.2 Plant species diversity:

The geographical location and climatic factors along with soil texture and structure, has led to presence of diversity in the species composition. The Density, Frequency and dominance of major species growing in Hailakandi division are mentioned in the below table 3.2 along with their description:

Table 3.2: Density, Frequency and dominance of major species growing in the division

Sl.No.	Local name	Species	Density	Frequency(%)	Basal area	Dominance	IVI
1	Siris	Albizzia lebbeck	1.48	46.00	0.42	0.07	11.42
2	Koroi	Albizzia procera	1.02	30.00	0.11	0.03	6.83
3	Morai	Albizzia spp	1.40	46.00	10.20	0.05	10.18
4	Chatni	Alstonia scholaris	0.28	10.00	1.28	0.01	2.25
5	Rata	Amoora wallichi	0.10	2.00	2.14	0.01	0.85
6	Kadam	Anthocephalus cadamba	1.04	36.00	0.45	0.04	7.97
7	Cham	Artocarpus chaplasha	3.22	76.00	13.12	0.20	25.65
8	Kathal	Artocarpus integrifolia	0.80	24.00	2.43	0.02	5.28
9	Kanchan	Bauhinia purpurea	0.20	10.00	0.14	0.01	1.95

10	Bolos	Bischofia javanica	1.24	40.00	16.50	0.04	8.96
11	Simul	Bombax ceiba	1.44	38.00	0.09	0.07	10.94
12	Dhumboil	Bombax insigne	0.10	2.00	5.20	0.01	0.82
13	Telo	Calophyllum polyanthum	0.02	2.00	0.46	0.00	0.36
14	Dhuna	Canarium bengalense	0.08	4.00	6.25	0.01	0.86
15	Sonaru	Cassia fistula	0.92	28.00	3.64	0.03	6.16
16	Bogi Puma	Chickrassia tabularis	1.28	46.00	0.01	0.04	9.56
17	Ping	Cynometea polyandra	1.38	40.00	0.02	0.06	9.98
18	Owtenga	Dillenia Indica	0.92	30.00	0.14	0.03	6.36
19	Gorjan	Dipterocarpus indicus	0.36	10.00	9.46	0.02	3.04
20	Rata	Dysoxylum binectariferum	2.14	62.00	1.98	0.11	17.08
21	Jamuk	Eugenia jambolana	2.16	64.00	3.25	0.10	16.43
22	Bat	Ficus benghalensis	0.04	2.00	0.18	0.00	0.33
23	Dengura	Ficus spp.	0.72	22.00	0.25	0.02	4.93
24	Kaiangla	Garuga pinnata	0.64	20.00	1.38	0.02	4.32
25	Gamari	Gmelina arborea	1.68	44.00	0.00	0.09	13.30
26	Chamia	Hibiscus macrophyllus	0.10	2.00	0.03	0.01	0.92
27	Jarul	Lagerstroemia speciosa	0.38	12.00	27.03	0.01	2.71
28	Jakura	Macaranga denticulata	1.22	38.00	5.77	0.04	8.61
29	Am	Mangifera indica	0.16	6.00	0.30	0.01	1.33
30	Bon Am	Mangifera sylvatica	0.34	12.00	19.04	0.01	2.54
31	Nageswar	Mesua ferrea	0.14	6.00	0.04	0.01	1.24
32	Sundi	Michelia champaca	0.36	14.00	2.35	0.02	3.07
33	Misc	Miscellaneous	8.64	96.00	0.82	0.30	46.13
34	Kurta	Palaquium polyanthum	0.78	22.00	0.48	0.03	5.29
35	Madhubura	Pterospermum acerifolium	0.14	4.00	4.39	0.00	0.89
36	selleng	Sapium baccatum	0.02	2.00	0.08	0.00	0.26
37	Amrha	Spondias mangifera	0.14	6.00	0.08	0.00	1.07
38	Udal	Sterculia villosa	1.28	46.00	8.52	0.04	9.38
39	Honor	Stereosparmum cadanlia	0.58	18.00	2.39	0.02	4.14
40	Teak	Tectona grandis	0.82	12.00	6.65	0.03	4.78
41	Bohera	Terminalia belerica	0.74	24.00	0.02	0.02	5.23
42	Horitoki	Terminalia chebula	0.30	10.00	11.64	0.01	2.31
43	Tula	Tetramales nudiflora	1.18	38.00	0.86	0.06	9.79
44	Bhura	Trewia nudiflora	0.72	22.00	12.73	0.02	4.77
		Total	42.70	1124.00	182.32	1.73	300.27

3.3 Status of Biodiversity Conservation in Forests:

In the past working Plan there was no any working circle/ sub-circle regarding bio-diversity conservation and hence, the management with specific reference to bio-diversity conservation not implemented. However, under the protection working circle the bio-diversity has been conserved through in the time creation of plantation.The traditional practices of Jungle clearance/ debris collection took placed which is not at all desirable for conserving the divers species specifically belongs to grass, herb, shrub, climber etc. Therefore, such clearance practice shall be avoided in future. Further the trees species like Sundi, Gorjan, Kurta, Khangla, Jinari, Nageswar needs special care for conservation, regulation, extension etc. The

other species like chalmurga, Dalmurga, Satkora, various varieties of cane required special conservation regeneration, maintenance, extension etc. towards sustainable management of original bio-diversity conservation.

3.4 Status of species prone to over exploitation:

The trees species like Cham, Sundi, Tula, Gorjan, Haldu, Bola, Ramdala etc. are already over exploited due to the huge demand for both commercial and domestic purposes. The cane species like Golla, Horna, Jali, Sundi etc. varieties also over exploited without any proper regeneration or extension and hence required both Conservation andExtension.

Table 3.4: Status of plant species diversity prone to overexploitation

Sl.No.	CommonName	Scientificname	Use
1	Cham	*Artocarpus chaplasa*	Timber, NTFP
2	Sundi	*Michelia champaca*	Timber
3	Tula	*Tetramales nudiflora*	Timber, Firewood
4	Gorjan	*Dipterocarpus indicus*	Timber, NTFP
5	Haldu	*Adina cordifolia*	Timber
6	Bola	*Morus lavigata*	Timber
7	Ramdala	*Duabanga sonneratioides*	Timber
11	Cane/Rattens		for NTFP purpose
12	Koroi	*Albizzia procera*	Timber
13	Bogi poma	*Chikrassia tabularis*	Timber
14	Jamuk	*Rugania jambolana*	Timber
15	Gamari	*Gmelina arborea*	Timber

The other medicinal/ aromatical species belongs to herbs, shrubs, climbers, grass, NTFP etc. required proper management under bio-diversity act-2002. The Government of Assam already formulated the Assam Bio-diversity Rules-2010 which is under implementation and accordingly the Hailakandi forest Division already constituted five members Bio-diversity Management Committee in Block level. The BMC so constituted initiated the management of bio-diversity register. The details of BMC are as below:

Table 3.4a: Bio-diversity Management Committee in Block level in the division

Sl.No.	Name of the BMC	Name of the Block	Remarks
1.	Hailakandi BMC	Hailakandi Block	Initiated the function
2.	South Hailakandi BMC	South Hailakandi Block	Do
3.	Lala BMC	Lala Block	Do
4.	Algapur BMC	Algapur Block	Do
5.	Duarbondh BMC	Duarbondh Block	Do

3.5 Conservation of genetic resources:

There is no Preservation or Sample plots within the forest division. The plantation of medicinal plants created at Garmurah with the local medicinal plants species but required at least two numbers or preservation/ sampled plot of various medicinal plants, NTFP, MFP as *ex-situ* conservation and demonstration plot to the public by assessing the both bio-diversity

and economic valuation. Further, regarding *in-situ* conservation the special protection measures shall be adopted under aided regeneration system in the forest area.

3.6 Fauna and their habitats:

The reserve forest area of the Hailakandi Forest Division comprises mammals, birds, reptiles etc. but due to degradation of their habitat all the species are not secured and hence require special care for improvement of habitat by encouraging the indigenous species of trees and along with ground storey in the forest area. The teak plantations are considered as the threat to the wild life species due to loss of ground storey and hence, it is advised that monoculture of teak should be discouraged. The bamboo forest is the natural habitat of wild elephant which shall be scientifically managed for safe habitat of all fauna, exists with extension.

3.7 Threats and challenges towildlife:

The loss of dense forest, Jhum cultivation and encroachment disturbs the wildlife corridor and their habitat. Accidental death and injury of wild animals in rail tracks and roads cannot be ruled out.In the RF, unclassed state forest and other areas, threat of poaching and man animal conflicts are there. The encroachment over the forest area shall be cleared with creation of vegetative cover by indigenous species.

3.8 Protection and management of fauna:

The fauna can be protected by improving the habitat with extension of forest cover density along with public awareness through the JFMC and also sensitization of Forest Right holder along fringe area, villagers and Civil / Police administration etc. Wild animals are being treated as natural capital of the Division. All protection measures are being taken to prevent hunting and killing. Awareness campaigns are organized time to time especially during Vana Mohotsava, Wildlife Week etc.

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CHAPTER 4

MAINTENANCE AND ENHANCEMENT OF FOREST HEALTH AND VITALITY

Past record on regeneration was not maintained properly. During the tenure of this Working Plan it is proposed to initiate regeneration assessment studies. To assess the present status of forest health and vitality a preliminary survey was conducted over the forest area by the D.F.O. (Territorial) Hailakandi Division during the year 2012 very judiciously by dividing the total area into natural high forest Teak plantation, Mix-plantation, Bamboo forest, Cane and Bamboo mix-plantation, Degraded forest, Encroached land, JFMC plantation Artificial bamboo plantation. The fifty (50) nos. of sample plots measuring plot area 1.0 ha. reveals the present status of forest cover, forest type, composition, diversity of flora, NTFP position, regeneration status, status of degraded forest, encroached area etc. These statistics give fair idea of forest health and vitality. The resultant- status under this chapter narrated below in compiled inventory formats.

4.1 Status of regeneration:

The preliminary survey by the DFO (Territorial) Hailakandi forest Division reveals that the regeneration of the major species like Cham, Sundi, Engla, Gorjan, Gamari, Tula are coming up but due to the heavy intensity of cattle grazing most of the saplings are not able to reach a tree stage. The Cane and other NTFP species shows regeneration, but due to biotic pressure, growth is not reaching a desired stage. The bamboo species are also naturally regenerated but due to unscientific operation by the HPC which violates the prescribed Silvicultural Practices has hampered the regeneration seriously. Therefore, the regeneration areas shall be protected from biotic interferences along with assisted natural regeneration. Further, the area where mother plants do not have their sufficient existence or the area is devoid of any natural regeneration, needs artificial regeneration of the indigenous species under intensification of management with reference to the bio-diversity conservation.

Table- 21 Status of regeneration in Hailakandi diivision

R.F.	Block	Area	Regeneration
Katakhal	--	Katanal, Pagnala and Bara Munsicherra	Degraded Forest. Khasia people practice pan Jhum in this area which has led to destruction of the natural patch to degraded forest type. Species such as Sum, Koroi, Bonam, Tula, Ramdala etc. are noticed. Regeneration of the above species is good in these areas.
Katakhal	--	Hillocks of both sides of Loharbond and Nowagaon	Natural patch of tree species is found. Main species are Ramdala, Koroi, Bonsum, Paroli, Khokan, Sum, Rata, Ping etc. Regeneration of Khokan and Sum was noticed

		Both sides of Malicherra	Natural patch of tree species is found. The area may be treated as dense area. Species found in the area are Paroli, Khokan, Sum, Rata, Ping, Owtenga, Nageswar. Regeneration of Paroli, Khokan, Sum, Rata, Ping,Owtenga was noticed.
		Left part of Baruncherra after junction point of Khaguracherra. Starting point of boundary at Dhalai Tea garden to Baruncherra upto Lalcherra. Upper partof (Northern side) Khajurnala	Dense forest by the side of Baruncherra. Also lie planted species of Agar, teak. Dense forest of Teak planted artificially. Dense forest id present. Bit due to pan Jhum activities by Khasia people, the area is degrading very fast and the regeneration is also poor.
Innerline RF	Mukam	Entire area	Nil. As no tree species are available at all. Few trees are available within intermediate distance of 1 or 2 kms. The areas falling under Mokam block may be treated as scrub forest.
	Bhairabi	Upper part of Bogdacherra till upti R.F. boundaryto Kukicherra.	Sparse Bamboo area. Regeneration is nil in the area. But by the side of Kukicherra there are pure patch of Misc. tree species such as Paroli, Khokan, Sum are observed in the area. Regeneration of Sum, Udal and Khokan is noticed.
		Both sides of Gundhacherra	There are few tree species Paroli, Sum, Udal and Khokan ae noticed which have regenerated naturally.
		Betcherra, Umedgenai, Kaluagenai, Munshiganai, , Muglicherra, Gollachera, Ramnathpur	Regeneration is not noticed except for Khokan. Before reaching Bailung Lui stream from Ramnathour Teak oriented Gamari plantations have been noticed in the left side of the road. The remaining area in the forest can be treated as degraded forest.
	Lala Block	The area falls within Dalcherra, Haticherra and Kukicherra	Degraded forest. Species such as Ramdala, Paroli, Udal , Koroi, Aja etc have noticed to have natural regeneration
		Upper part of Lala Block	Species like Tula, Owtenga, Ramdala and some unknown species have been noticed during field visit. Regeneration of Ramdala and Tula are abundant.

4.2 Area effected by forest fire:

The forest fire in the forest division is generally are of anthropogenic origin for fresh growth of thatch, broom stick, grass, Jhuming etc. The area mostly affected in thatch and broom stick growing pocket along with Jhuming by the Reang Community. These are are listed in the Table below :

Table 4.2: Area affected by forest fire

Sl. No.	Name of the R.F.	Location	Area (in Ha.)
1	I.L.R.F.	Gharmurah Kachurthol Kanchiwala Gendacherra	500.0 Ha. 200.0 Ha. 100.0 Ha. 100.0 Ha.
2	Katakhal R.F.	Lalacherra Bilaipur Loharbond Dholcherra Pecharthol.	100.0 Ha. 100.0 Ha. 200.0 Ha. 200.0 Ha. 50.0 Ha.

The protection measure as adopted here are manual control of the fire by the staff. Since the area is known to have frequent occurrence of fires a continuous vigil by the staff is needed during the dry spell. A further intensification of protection measure shall be adopted by increasing the vigil, engagement of fire protection team and appropriate action against the culprits who encourage the fire for their vested interest. The forest Sub-beat shall be established on the suspected spot with fire control equipment during the dryseason.

MEASURE:

- The Forest Protection Committee & JFMC members through awareness camp.
- Fire line cutting in vulnerable area.
- The watcher one engaged in fire prone area.
- During forest fire the forest staffs with help of Fire Protection Committee & JFMC members to control the fire line cutting.

4.3: Area damaged by natural calamities:

The natural calamities like drought and erosion are occurring in the forest area. The cause of erosion is the Non Scientific management of Watershed and Catchment Area.

The preparedness and mitigation is suggested as below –

- The draught prone area plantation shall be practiced with mulching and the nursery shall have proper watering facility by establishing water pump and suitable pipesystem.
- The erosion can be mitigated by scientific management of watershed and catchment area under a separate Working Circle.

Table 4.3: Statement of area damaged by drought:

Sl. No.	Name of the R.F.	Location	Area (in Ha.)	Mitigation

1	I.L.R.F.	Gharmurah Kachurthol Kanchiwala Gendacherra	200.0Ha. 200.0Ha. 100.0Ha. 50.0 Ha.	Fire line cutting and engagement of watcher
2	Katakhal R.F.	Lalacherra Bilaipur Loharbond Dholcherra Pecharthol.	100.0 Ha. 100.0 Ha. 100.0 Ha. 100.0 Ha. 50.0 Ha	-Do-

4.4 Area protected from grazing:

As per the sample survey of forest villages and fringe area villages, it revealed that huge number of cattle grazing in the forest area due to insufficient grazing land. The socio-economic survey reveals that the major sources of fodder are the forest and there no curb on this practice. The estimation and the records of the animal husbandry department compared with primary data collection on socio- economic survey reflected the estimated figure of the cattle population against the total human population.

Table 4.4: Area protected from grazing

Sl. No.	Type of cattle	Estimated population	Grazing area (Ha.)	Remarks.
1	Buffalo	20000	80%	In the paddy cultivation season 90% of the total
			In forest area.	cattle grazing over the forest area
2	Cow	72000	-do-	
3	Goat	145000	-do-	
4	Sheep	30000	50%	

Table 4.4b: Statement of area damaged by cattle towards open grazing:

Sl.No.	Name of the R.F.	Location	Area (in Ha.)	Mitigation
1	I.L.R.F.	Ramnathpur Dholcherra	200.0Ha. 200.0Ha.	Fencing and engagement of Cattle watcher
2	Katakhal R.F.	Loharbond Belaipur Lalcherra	1000.0 Ha. 500.0Ha. 500.0Ha.	-Do-

Lopping practices:

In Hailakandi Forest Division there is lopping for fodder has not been noticed much except during the flood. The major focus is on NTFP collection specially the thatch, broom stick, Gandhi root, Ban Adha, Ban haldi etc. and hence, not much damages by lopping have been noticed.

4.5 Area infested by invasive weed species inforests:

In Hailakandi Forest Division weeds like *Micania scandan and Acacia pinnata* have generally affected the young regeneration. Moreover, the climber *Micania micranta* hampers the young regeneration mostly in AR and ANR areas. These weeds have affected the forest in

both Innerline and Katakhal R.F. specifically in the open and moderately dense forest area.

4.6 Incidents of pest and diseases:
Insect damage has been noticed in Gamari plantations. Following are the insects causing damage to some of the forest crops in general are:

- *Calopepla leayana* - defoliator forGamari
- *Hyblaea purea* - in Teakplantations
- *Hypsipyla robusta* twig borer - forPoma
- *Margaronia caesalis* - for Simul andJhalna
- *Dihammus cervinus* - for Tealsaplings

There is no such incidence recorded in the last 10 (ten) years for damage of vegetation due to the pest infestation or diseases in the Forest Division.

4.7 Forest degradation and its drivers: In Hailakandi Forest Division the forest area and its cover degraded mainly due to the biotic interference like illegal felling, encroachment, grazing, Jhuming etc. in both the R.F.area.

4.8 Pollution control and protection of environment: There is no such huge pollution of soil, water and air in the forest area from the local agencies but due to Jhuming, encroachment, illegal collection of fuel wood, domestic timber the level of pollution arises. The traditional practices of fishing by the tribal people with poisoning in the water stream causes the water pollution and affecting the aquatic fauna. The Jhuming with burning polluted both soil and air by destroying the carbon stock. The mitigation is to evict the encroachment and cover the area with vegetation along with total stock of Jhuming by legal action and to rehabilitate the area with vegetative cover.

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CHAPTER 5

CONSERVATION AND MAINTENANCE OF SOIL AND **WATER** RESOURCES

5.1 Area treated under soil and water conservation measures: There was neither any watershed and catchment area management nor any water resource harvesting/ management practices in the forest area though 59% of the total geographical area of the forest Division under the notified forest area. Table 26 shows the soil erosion vulnerable area in Hailakandi Division.

Table – 26 : Vulnerable area to soil erosion in Hailkandi Division

Sl. No.	Location	Approximate area (Ha.)	Remarks.
1	Gharmurah Catchment area of Dhaleswari	500.0 Ha.	In both side of the river.
2	Gendacherra Cachment area of river Dhaleswari & its tributiries	300.0 Ha.	-do-
3.	Kukicherra	500.0 Ha.	-do-
4.	Lalacherra	600.0 Ha.	-do-
5.	Baruncherra	500.0 Ha.	-do-
6.	Dhalcherra	400.0 Ha.	-do-

However, no soil and water conservation measures have been adopted so far in any part of the Division. Appropriate measure of soil and water in the forest area and their systematic documentation will be taken up during the tenure of this Working Plan. Also, restricted felling and least disturbance can result in the development of good watershed catchment areas. Microwatershed map of the Division is shown in Figure 5.1.

5.2 Duration of water flow in the selected seasonal streams: The total area covered by the river/stream in the Division is 2177.41 ha. River stream map of the Division is shown in Figure 5.2. Due to anthropogenic impact the soil erosion and loss of vegetative cover is increasing in the Division. This is resulting in decreasing the time of water flowing from top of the hillock to water stream and hence increasing the flood intensity in the rainy season. However, periodic monitoring of river flow pattern with reference to annual rainfall/duration of flow has not been carried out during the last working plan, which will be taken up in the tenure of this working plan.

5.3 Wetlands in forest areas: There is no big wetland located in the forest area. The total area covered by the wetlands in the Division is 1719.94 ha. The wetlands map is shown in Figure 5.3. The wetland depth and circumference are shrinking due to the siltation that can be attributed to the loss of tree cover. Scientific management and planning to monitor, restore and enhance the wetlands area in the Division will be taken up during the tenure of this WorkingPlan.

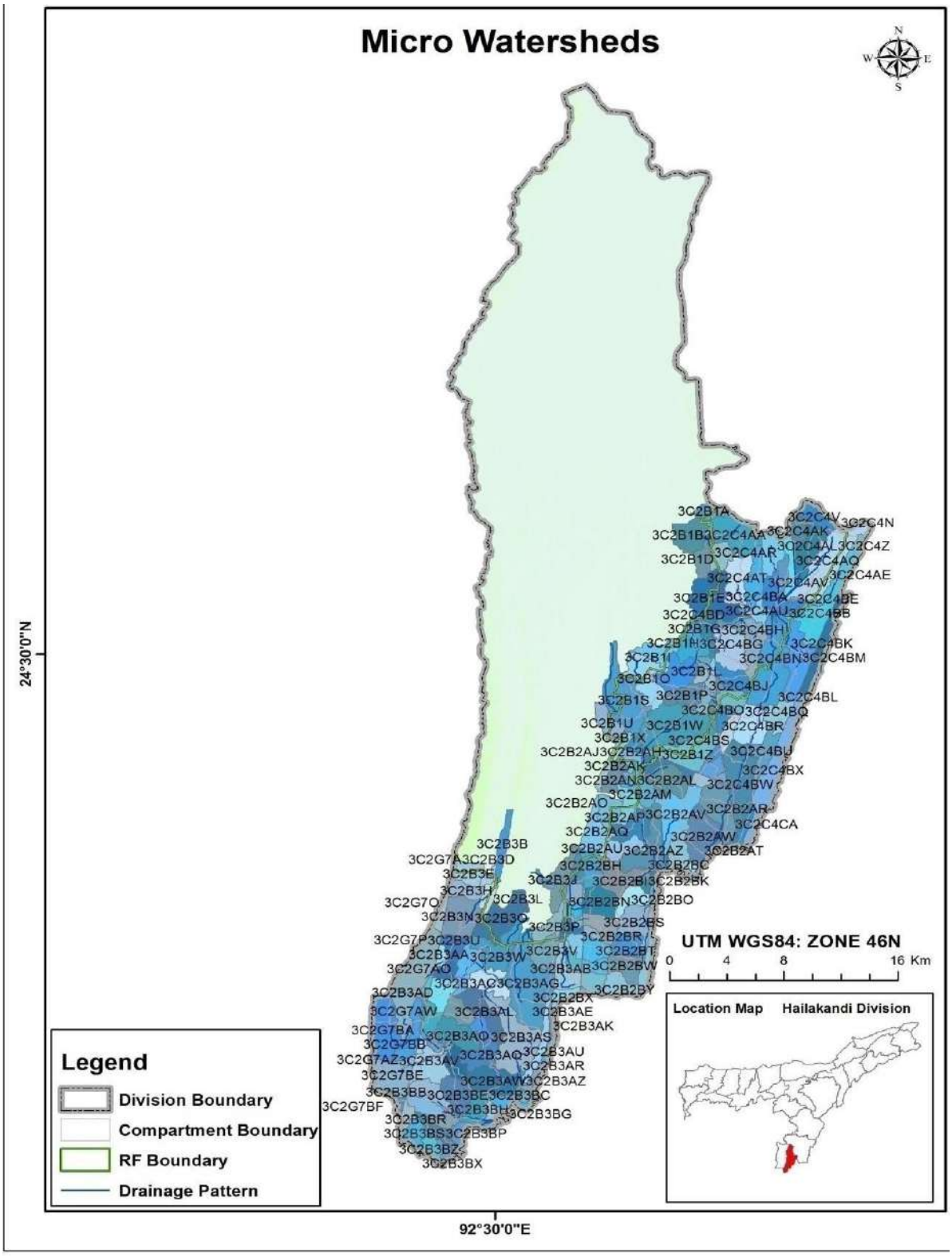
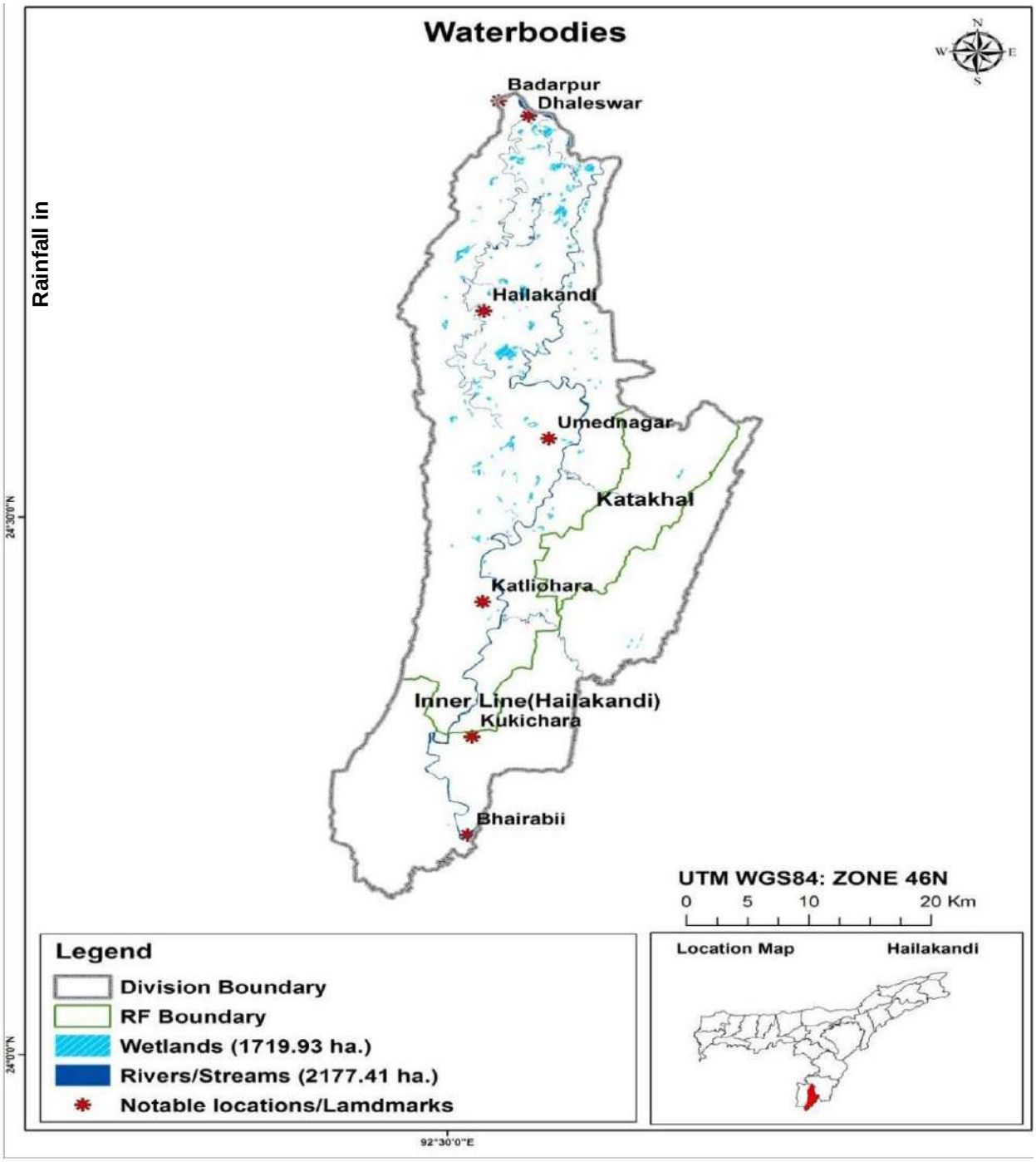


Fig. 5.1. Microwatershed map of Hailakandi Division

Fig. 5.2.b. Map showing waterbodies in Hailakandi Division



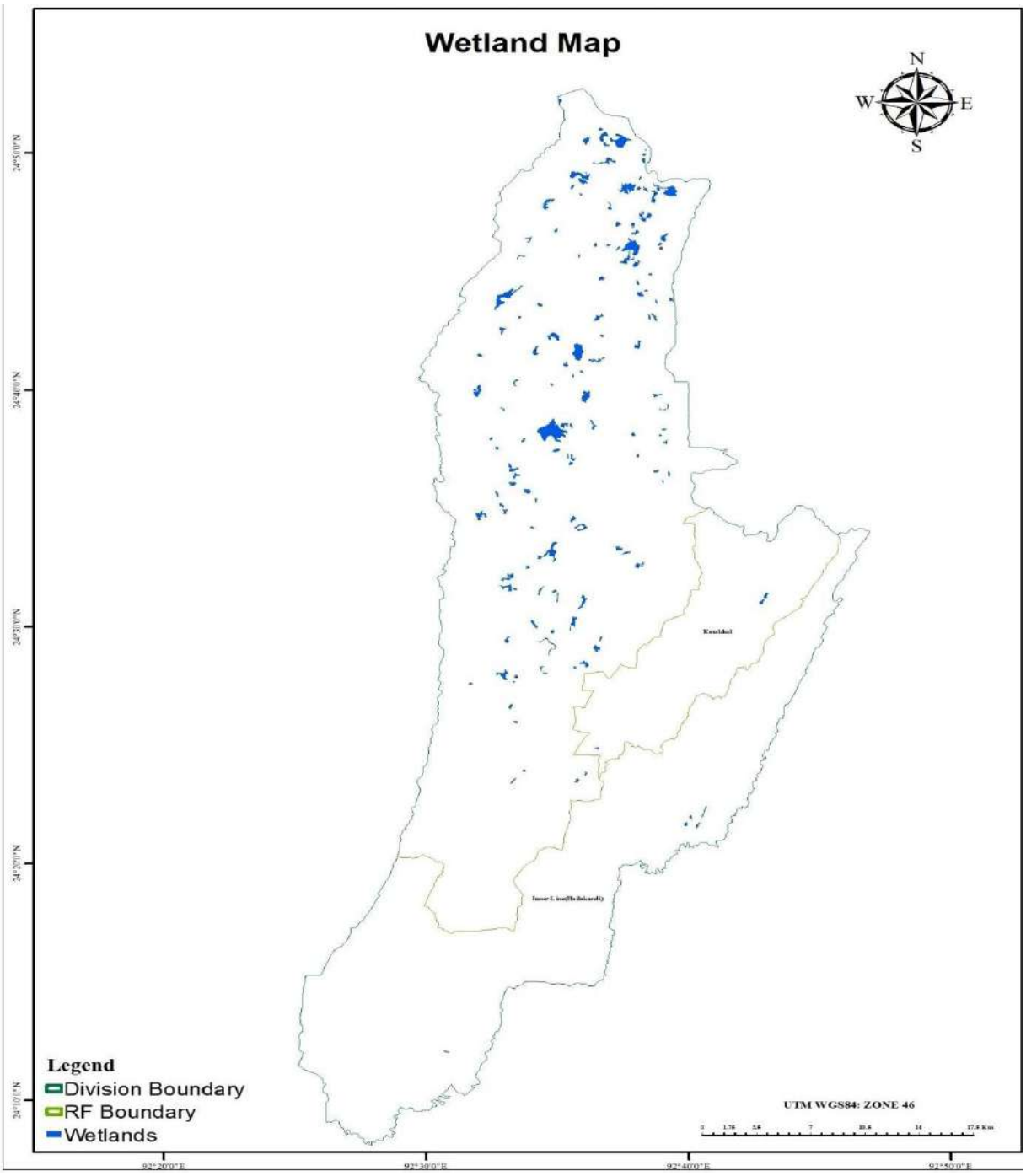


Fig 5.3. Wetland map of Hailakandi Division

5.4 Water level in the wells in the vicinity (up to 5 km.) of forest area: Due to its geographical location and quantum of the rainfall the major source of drinking and irrigation water is the surface water. In the village area the pond is the main source of water facility. Also, as per experts and local people opinion there is no such downfall in the ground water level of this Division. Table 27.a shows the water level in the vicinity (up to 5 km) of forest area in the Division.

Table 5.4 a: Statement of water level in the vicinity of forests area (up to 5 KM)

Sl. No.	Location	Years	Distance from the Forest	Water Level	
				Winter	Rainy
1	Gharmurah	2012	2 KM	20 Ft.	12 Ft
		2013	2 KM	20 Ft.	12 Ft
		2014	2 KM	20 Ft.	12 Ft
2	Kukicherra (Monipur)	2012	4 KM	24 Ft.	15 Ft.
		2013	4 KM	23 Ft.	16 Ft.
		2014	4 KM	25 Ft.	13 Ft.
3	Dholai Molai	2012	5 KM	20 Ft.	13 Ft.
		2013	5 KM	20 Ft.	13 Ft.
		2014	5 KM	20 Ft.	13 t.

5.5 Status of aquifers: Tipam sandstones constitute the principal aquifer in the area and are mostly clayey in nature. The ground water found in the area are rich in iron due to ferruginous nature of Tipam sandstones. Two types of aquifers are found in the region; shallow aquifer (found within 50 mgbl) and deep aquifer (ranges between 50-300 mgbl). In deep tube wells the discharge of the well is 23.6 l/s. Also, detailed monitoring of aquifers in the Division will be carried out and their sustainability will be assessed during the tenure of this WorkingPlan.

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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 ecologicalsecurity.

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. Gird based Systematic Stratified Random Sampling was carried out. Map of the sample plots is provided in Figure 6.1a. 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.

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 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 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.

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

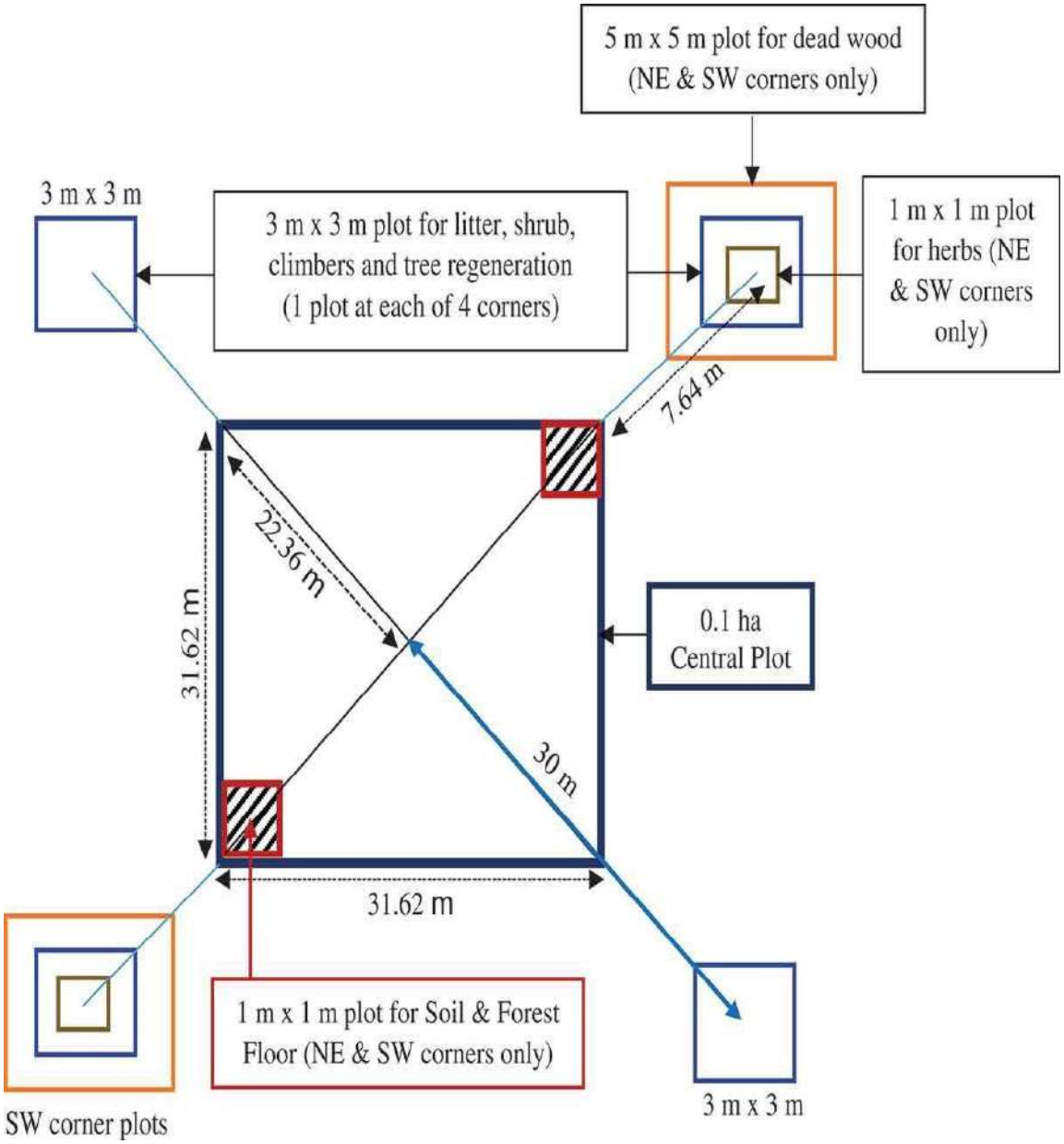

Figure 6.1a: The schematic diagram of field enumeration plots

The observation and assessment reveals that the vegetative cover is reducing due to Jhum cultivation, illegal felling, and encroachment that has also resulted in the degradation of forest area from dense to moderate and moderate to open in some places. However, the forest department is trying to improve the vegetative cover by both artificial and aided natural regeneration and in this respect, the cattle grazing in the forest area is posing a major

challenge. The vegetative cover and forest type map reveals the fact that 20% of the household among 1.25 Lac household have LPG connection and remaining 20% of the family manages their fuel wood from their own land and rest 60% are directly or indirectly dependently on the fuel wood originating from forest.

Growing stock analysis is a representation of 60 different tree species recorded in the sample plots. The most predominant species in terms of number of individuals are *Artocarpus chaplasha Roxb. Bombax cieba L., Dysoxylum binectariferum King. and Syzgium cumini.* Most of the species were recorded in the young age classes of trees in 10-20, 20-30 and 30-40 diameter class. Mature age class trees were found to be deficient in Hailakandi division. Plotting number of trees against the diameter classes as shown in Figure 6.1b.

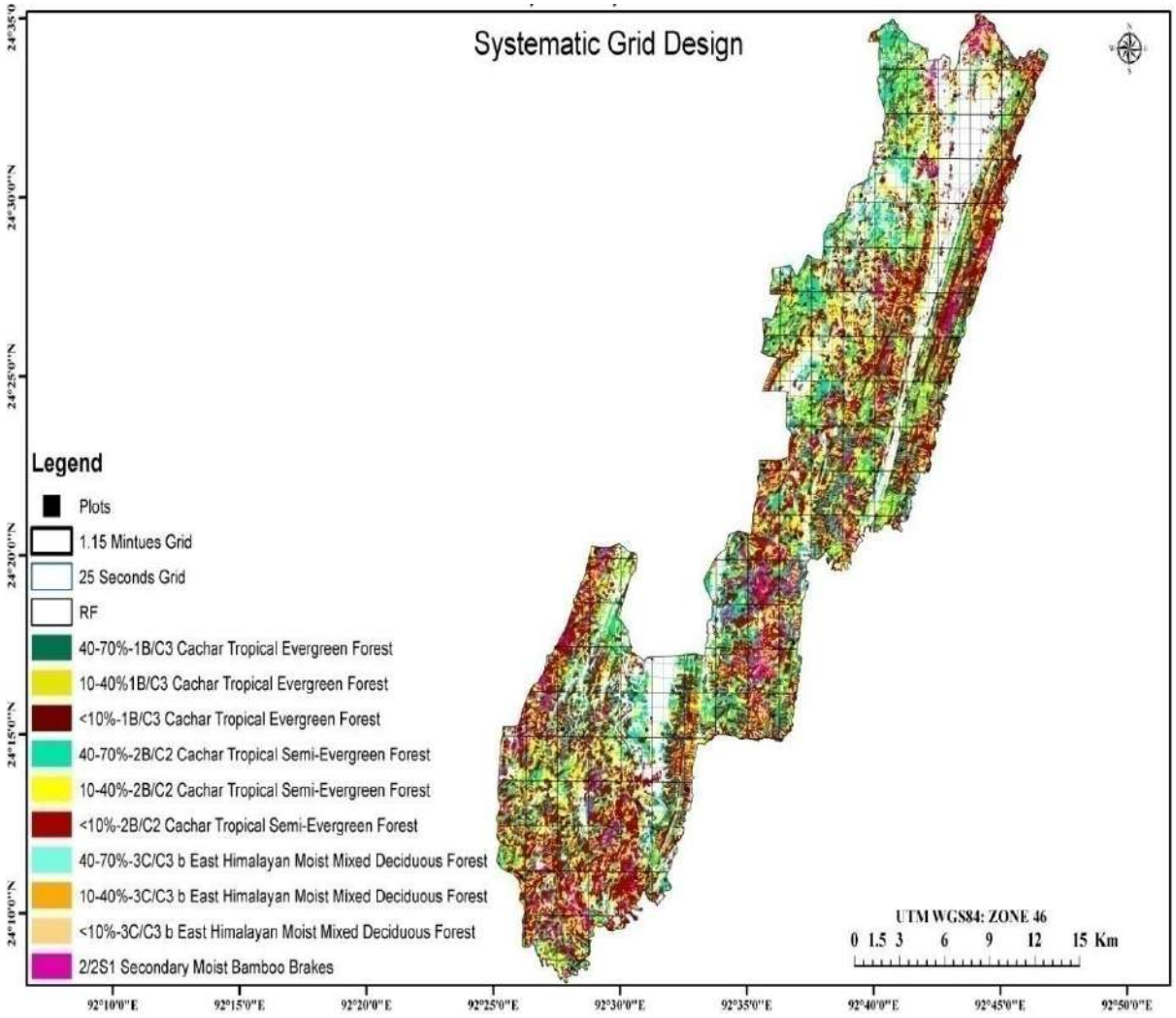

Figure 6.1b: Systematic Grid Design adopted for Forestry Resources Survey Assessment

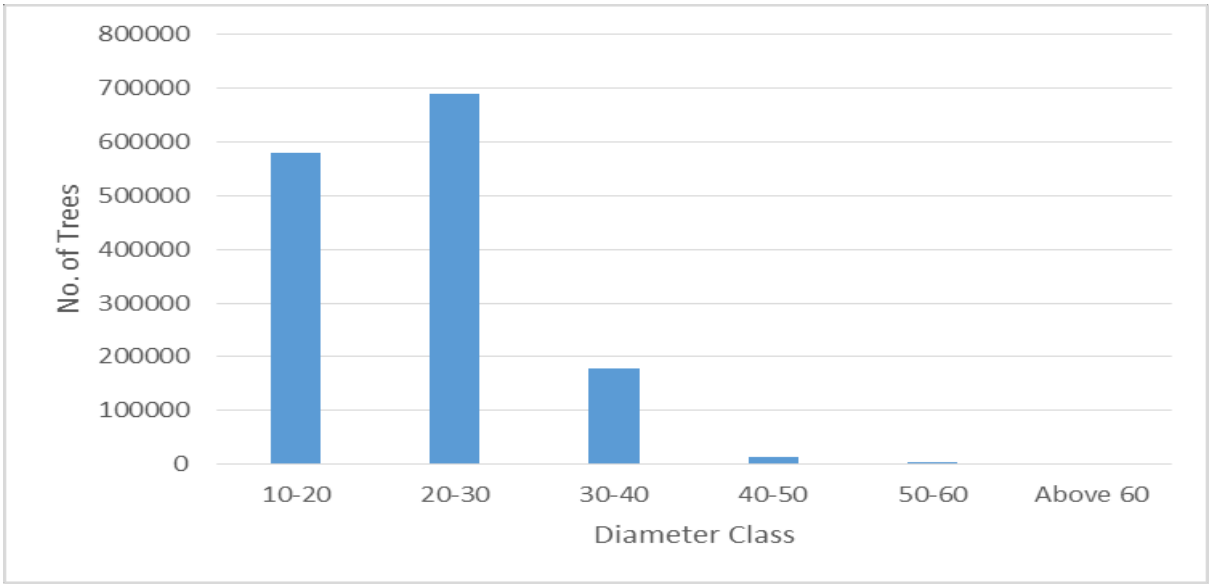

Figure 6.1c: Number of trees in diameter class in Hailakandi division.

Table 6.1d: Compartment wise growing stock in different reserve forest in Hailakandi division

Reserve Forest	Compartment	Area (ha.)	GS (CM per ha)	GS (Cu.m.)
Inner Line RF (Hailakandi)	GMIL1	530.9	5.3	2818.1
	GMIL10	805.4	5.3	4278.5
	GMIL11	1000.5	4.5	4535.5
	GMIL12	1133.6	7.8	8851.8
	GMIL13	1170.7	3.7	4376.5
	GMIL14	804.3	4.5	3633.2
	GMIL15	494.1	4.3	2148.8
	GMIL16	1372.7	6.6	9129.9
	GMIL17	756.1	4.5	3437.2
	GMIL18	562.1	4.7	2691.5
	GMIL19	553.7	3.3	1853.8
	GMIL2	592.4	4.1	2479.7
	GMIL20	929.9	5.2	4860.5
	GMIL21	883.1	6.3	5589.7
	GMIL22	977.6	5.3	5274.9
	GMIL23	554.1	3.8	2160.6
	GMIL24	725.5	4.3	3172.2
	GMIL25	531.9	4.1	2197.7
	GMIL26	337.10	4.5	1541.6
	GMIL27	912.4	8.7	8005.4
	GMIL28	668.6	2.2	1493.0
	GMIL29	738.5	10.7	7969.6
	GMIL3	1024.4	3.7	3804.1
	GMIL4	943.1	3.4	3274.8
	GMIL5	405.7	3.5	1422.4
	GMIL6	437.94	2.3	1033.8
	GMIL7	238.2	2.2	530.4
	GMIL8	451.8	6.1	2776.3

	GMIL9	401.0	5.2	2095.1
	KCIL1	1130.1	7.6	8589.1
	KCIL10	450.00	5.3	2412.3
	KCIL11	613.2	4.3	2690.1
	KCIL12	548.9	5.1	2816.4
	KCIL2	679.6	5.2	3552.4
	KCIL3	329.6	5.3	1751.0
	KCIL4	455.0	7.3	3338.3
	KCIL5	410.3	5.2	2153.1
	KCIL6	662.8	5.9	3948.6
	KCIL7	553.8	3.3	1880.0
	KCIL8	635.1	5.1	3296.7
	KCIL9	820.6	5.9	4918.9
	MJIL1	202.3	3.0	621.0
	MJIL10	618.8	4.6	2894.8
	MJIL11	705.9	5.3	3790.1
	MJIL12	721.7	5.7	4185.9
	MJIL13	400.6	5.5	2211.5
	MJIL14	550.1	7.3	4054.3
	MJIL15	467.2	6.9	3267.6
	MJIL16	690.2	5.7	3941.6
	MJIL17	522.6	6.7	3545.6
	MJIL18	442.6	6.8	3044.4
	MJIL19	302.1	0.3	119.8
	MJIL2	416.9	5.3	2224.0
	MJIL20	565.6	6.2	3526.3
	MJIL21	589.2	6.0	3569.2
	MJIL3	499.2	4.1	2054.4
	MJIL4	504.8	3.9	1993.5
	MJIL5	571.5	4.3	2491.4
	MJIL6	722.1	3.8	2774.2
	MJIL7	755.9	4.3	3303.8
	MJIL8	826.7	4.9	4095.2
	MJIL9	534.0	5.8	3131.3
Katakhal	KCKT1	373.2	9.4	3528.0
	KCKT2	648.7	15.1	9815.3
	KCKT3	415.8	3.9	1641.1
	MJKT1	522.6	11.1	5843.6
	MJKT10	548.5	5.5	3066.1
	MJKT11	849.3	2.1	1837.8
	MJKT12	468.1	10.4	4869.1
	MJKT13	1011.1	7.1	7225.9
	MJKT14	889.3	4.7	4206.0
	MJKT15	952.7	8.5	8167.1
	MJKT16	764.9	7.6	5882.4
	MJKT17	556.4	5.8	3238.8

MJKT18	1070.1	7.3	7883.8
MJKT2	430.6	2.8	1213.6
MJKT3	840.0	9.3	7862.4
MJKT4	614.6	4.7	2947.6
MJKT5	804.3	2.6	2113.0
MJKT6	482.1	2.0	1002.0
MJKT7	531.2	1.2	677.0
MJKT8	579.2	1.0	612.2
MJKT9	627.7	2.5	1606.6

Table 6.1.e: Species wise growing stock in Hailakandi forest division

Sl.No	Species	5-10	10 -20	20-30	30-40	40-50	50-60
1	Albizia chinensis		2.06	6.64	10.39	0.99	
2	Albizia lebbeck		2.98	15.78	7.69		
3	Albizia procera		3.81	17.42	6.81		
4	Alstonia scholaris		0.92	9.91	2.30		
5	Altingia excelsa		3.47	10.60	8.99		
6	Artocarpus chaplasha		10.27	9.84	9.83	1.40	
7	Artocarpus lacucha		2.20	1.89		1.21	
8	Balakata baccata		0.18	0.46			
9	Bauhinia purpurea		0.78	0.76	0.58	1.17	
10	Bischofia javanica		0.28	2.05			
11	Bombax ceiba		14.33	35.09	15.32	1.16	
12	Canarium bengalense		0.27	0.43			
13	Canohyllum inophyllum			0.55			
14	Carallia brachiata			4.37			
15	Careya arborea		2.09	1.86			
16	Cassia fistula		3.28	10.78	9.04	1.34	
17	Chukrasia tabularis		0.21	0.83			
18	Crateva religiosa		0.15	0.77	0.70		
19	Dillenia indica		1.35	6.01	5.98	1.19	
20	Dillenia pentagyna.		4.72	11.76	2.96	1.45	
21	Dipterocarpus indicus		8.44	5.14	0.47		
22	Duabanga grandiflora		5.35	13.19	4.70		
23	Dysoxylum reticulatum		8.80	32.61	19.11		
24	Ficus benghalensis			0.84			
25	Ficus hispida		1.47	9.40	2.57	1.80	
26	Garuga pinnata		0.70	2.95	1.97		
27	Gmelina arborea		3.02	16.86	10.29		
28	Holigarna longifolia			0.90			
29	Knema linifolia		2.19	4.73			
30	Lagerstroemia speciosa		1.33	4.81	1.54		
31	Lannea coromandelica		0.87	2.43	1.34		
32	Lophopetalum wightianum		0.67	3.61			
33	Macaranga peltata		1.28	10.47	4.29		
34	Magnolia champaca		1.32	3.52	1.91		

35	Mallotus tetracoccus		3.87	12.97	7.86	1.17	
36	Mangifera indica		0.67	2.10			
37	Mangifera sylvatica		2.39	5.90	2.49		
38	Maniltoa polyandra		5.35	22.48	2.82		2.90
39	Mansonia dipikae		2.47	8.98	5.20		
40	Mesua ferrea		0.21	2.96			
41	Misc		0.30	0.79			
42	Morus macroura		5.39	21.21	12.31		
43	Neolamarckia cadamba		4.47	16.39	12.16		
44	Nicotiana rustica		0.33	0.28	3.57		
45	Pajanelia longifolia		2.29	10.10	5.94		
46	Palaquium polyanthum		2.08	8.72	2.33	1.61	
47	Premna bengalensis		1.72	5.51	5.95		
48	Rubus biflorus Buch		0.70	1.55			
49	Schima wallichi		0.09	0.56	3.29	1.96	
50	Spondias pinnata		0.59	2.62			
51	Sterculia villosa.		3.90	10.86	10.64		
52	Streblus asper		0.26	0.94			
53	Syzygium anisopetalum		0.89	4.12	3.03		
54	Syzygium cumini		5.71	21.10	6.93		
55	Tectona grandis L.f.		5.04	12.00	1.84		
56	Terminalia bellirica		1.62	4.71	3.06	1.63	4.49
57	Terminalia citrina Roxb		1.12	1.96	0.59		
58	Toona ciliata		2.85	16.75	7.91	4.81	
59	Vatica lanceifolia		0.28	1.71			
60	Vitex pinnata		1.90	11.37	8.89		

6.2 Growing stock of bamboo:

More than one third of the total forest areas are bamboo forest. The growing stock of bamboo in the last assessment was more than one Lac MTAD against which about ten thousand MTAD is the annual yield as harvested by the HPC from the forest area comprising sixteen numbers of Coups. There is further scope of enhancement of the growing stock and annual yield by scientific management like silvicultural operation, aided natural regeneration and artificial regeneration to the open areas and blank pocket.

Table 6.2: Growing stock of Bamboo

RF/FDA	Area	Tons
Innerlinel RF	2749.95	3464.94
Katakhal RF	352.47	444.11
Hailakandi FDA (FDA)	1089	1372.14
Total		5281.19

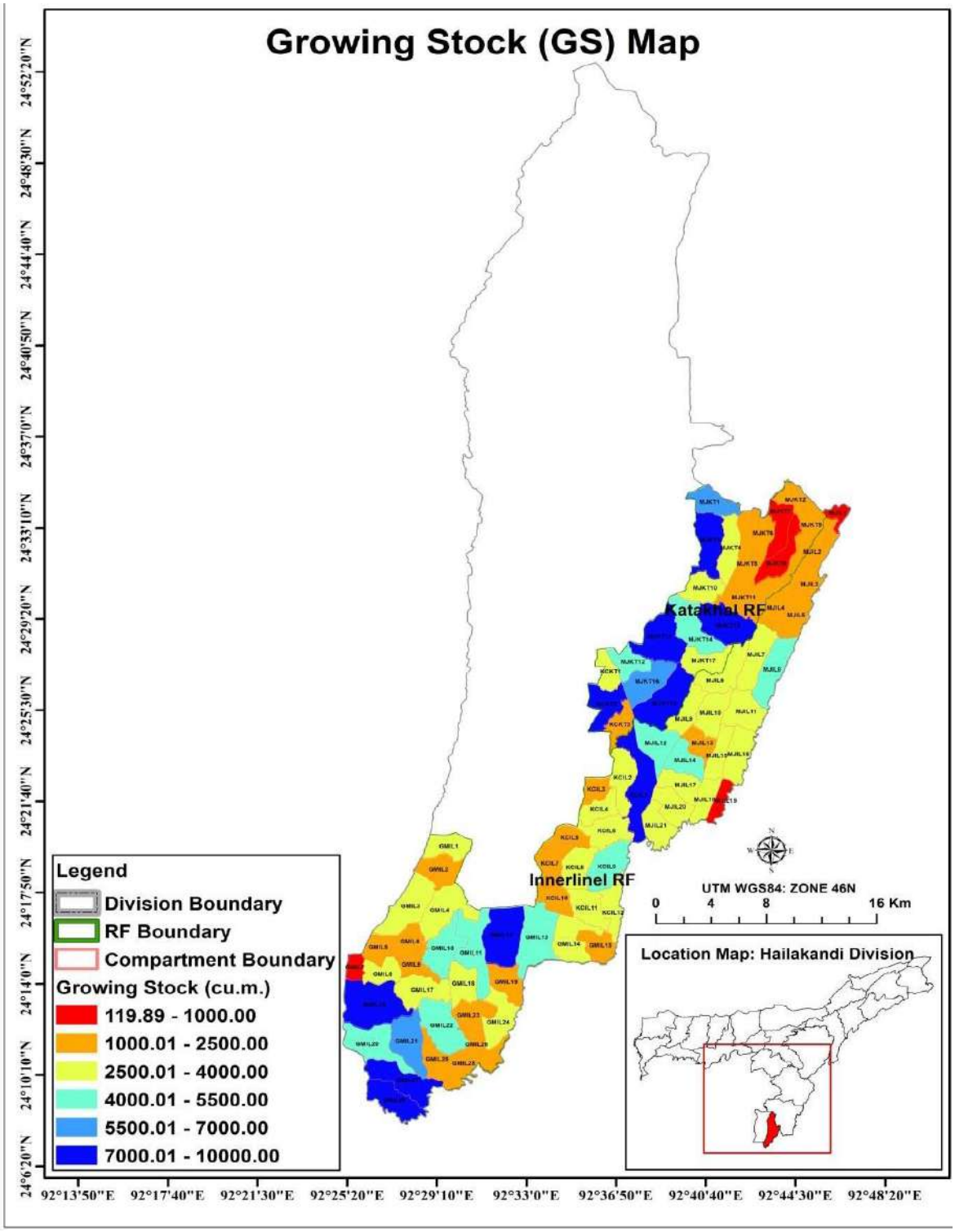

Fig. 6.1f. Growing Stock map of Hailakandi Division

6.3 Increment in volume of identified timber species:

In Hailakandi Forest division, for assessment of increment in volume of timber, neither any sample plots nor any silvicultural experimental plots exists. However, the main planted species of teak and Gamari shows their increment upto the desirable limit but the indigenous species like Cham, Sudni, Tula, Poma, Kurta etc. are at present rare with respect to mother trees through young regeneration was observed and needs special protection from the biotic interference like illegal fuel wood collection, cattle grazing etc. The plantation area observed and in assessment of increment with respect to base year found satisfactory.

Table 6.3a: Local volume table of different species in Hailakandi Forest division.

Species	Volumeincubicmetersfordifferentdiameterclassincm											
	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100-110	110-120	>120
Sopa	0.57	1.02	1.48	1.94	2.42	3.1	4.1	5.40	0.94	8.4	9.97	12.0
Simul	0.35	0.62	0.94	1.32	1.76	2.34	3.38	4.68	6.22	-	-	-
Bonsum	0.29	0.53	0.79	1.12	1.65	2.49	3.32	4.20	5.12	5.98	6.92	8.09
Sida	0.30	0.52	0.77	1.20	1.89	2.60	3.24	-	-	-	-	-
MakriSal	0.21	0.43	0.75	1.25	1.94	2.65	3.34	4.10	4.87	-	-	-
Koroi	0.41	0.74	1.06	1.37	1.78	2.88	3.83	-	-	-	-	-
Poma	0.50	0.85	1.20	1.58	1.99	2.70	3.95	5.45	-	-	-	-
Kuhir	0.19	0.34	0.55	0.84	1.31	1.95	2.57	-	-	-	-	-
Amari	0.38	0.66	0.95	1.38	1.75	2.25	2.93	3.64	4.34	4.94	5.64	6.23
Jia	0.36	0.63	0.91	1.20	1.55	1.86	2.61	3.37	4.43	5.74	-	-
Bogipoma	0.21	0.44	0.72	1.08	1.41	1.94	2.56	3.46	4.40	5.57	6.80	8.06
Aam	0.15	0.36	0.54	0.82	1.11	1.74	2.40	3.17	4.09	5.11	6.10	7.10

6.4 Efforts towards enhancement of forest productivity: Efforts to enhance forest productivity has been initiated through plantation activities carried out in the Division from time to time. Various local bodies, State as well as National agencies have been involved for carrying out plantations. Table 6.4.a represents details of various plantation activities undertaken in the Division between 2004-05 and 2013-14. Abstract of plantation activity undertaken from 2004-05 and 2013-14 in table Table 6.4.b

Table 6.4: Statement of plantation in Hailakandi Forest Division

Year	Regen. of Silvi. works	RDF	ACA	ABY	CAMPA		APFBC		
					AR	ANR	ANR	MHW	NTFP
2004-05	-	-	-	-	-		-		-
2005-06	-	-	-	-	-		-		-
2006-07	-	-	-	-	-		-		-
2007-08	-	-	-	-	-		-		-
2008-09	-	100	-	10	-		-		-
2009-10	30	30	-	-	-		-		-
2010-11	-	30	-	10	26.5		-		-
2011-12	45.9	60	70	10	130.0	25	-		-
2012-13	40	20	-	50	-		-		-
2013-14	-	12	-	-	-		100	130	140
Total:-	**115.9**	**252**	**70**	**80**	**156.5**	**25**	**100**	**130**	**140**

The table above shows that from the year 2004-05 the plantation activities started from the stipulated period and gradually enhanced with time. Further, the effort was not only towards creation of plantation and maintenance but sufficient effort was initiated to combat encroachment, illegal felling, Jhum cultivation and even the staff resorted to fire control, illegal felling and smuggling during the year 2011. However, intensified action is required in comprehensive manner involving the departmental like Home and Civil administration. Besides the legal action awareness camp organized to sensitize the public regarding the affect of deforestation in the junction of environmental crises and climate change.

6.5 Carbon stock:

To enhance the carbon sequestration silvicultural practice improvement, increase of vegetative cover both by area and density under suitable indigenous species of trees, bamboos etc are required. The silvicultural practices may be changed on creation of plantation by avoiding clear felling of the existing ground cover. In case of species selection, the bigger crown species may be preferred instead of monetary economic valuation. The tree species shall be selected considering the biomass quality and ground cover growth. The moderate dense forest shall be converted to very dense forest by aided natural regeneration and the open forest shall be converted to medium dense and dense forest by artificial plantation.

The local people shall be sensitized by organizing awareness camp for protection of forest area and increase the tree cover outside the forest specifically on the Govt. land, community land, individual land along with proper awareness regarding climate change/ carbon sequestration and stock of carbon etc. The available spaces along the road, railway, canal and waste land shall be planted with the trees. The private and community land should be planted with trees belonging to fuel, fodder, fruits and aesthetic value.

Table 6.5: Carbon Stock under different RFs against each compartment

RF	Compartment	Carbon (tons)	RF	Compartment	Carbon (tons)
Innerline RF	GMIL1	2957.8		MJIL1	922.59
	GMIL10	4384.7		MJIL10	3030.37
	GMIL11	4572.3		MJIL11	3841.02
	GMIL12	4402.0		MJIL12	4290.94
	GMIL13	7392.0		MJIL13	2292.58
	GMIL14	4765.6		MJIL14	3754.53
	GMIL15	3159.3		MJIL15	2585.79
	GMIL16	8636.9		MJIL16	4111.10
	GMIL17	5164.8		MJIL17	3654.34
	GMIL18	2789.1		MJIL18	3125.30
	GMIL19	2188.7		MJIL19	1768.73
	GMIL2	3367.9		MJIL2	3005.30
	GMIL20	5364.5		MJIL20	3355.20
	GMIL21	4173.8		MJIL21	3700.35
	GMIL22	4177.8		MJIL3	2417.82
	GMIL23	2231.1		MJIL4	2105.33
	GMIL24	3785.24		MJIL5	2572.71
	GMIL25	2298.5		MJIL6	2955.87
	GMIL26	1612.6		MJIL7	3343.90
	GMIL27	4722.3		MJIL8	4068.02
	GMIL28	2201.5		MJIL9	3051.27
	GMIL29	4466.4	Katakhal RF	KCKT1	2926.47
	GMIL3	4664.60		KCKT2	4320.64
	GMIL4	5546.13		KCKT3	1317.67
	GMIL5	1511.41		MJKT1	4035.70
	GMIL6	2111.12		MJKT10	2465.18
	GMIL7	936.92		MJKT11	2248.22
	GMIL8	2920.50		MJKT12	3960.59
	GMIL9	2150.53		MJKT13	5754.19

	KCIL1	7325.37		MJKT14	4713.64
	KCIL10	2462.02		MJKT15	5472.53
	KCIL11	3143.56		MJKT16	4857.01
	KCIL12	3375.22		MJKT17	2458.85
	KCIL2	3688.88		MJKT18	6318.14
	KCIL3	1892.61		MJKT2	1714.27
	KCIL4	3197.75		MJKT3	6662.51
	KCIL5	2208.00		MJKT4	4455.72
	KCIL6	3841.74		MJKT5	2439.17
	KCIL7	2938.34		MJKT6	835.55
	KCIL8	3318.29		MJKT7	843.76
	KCIL9	4273.64		MJKT8	528.68
	MJKT9	1312.99			

6.6: Carbon sequestration and mitigation:

Carbon sequestration is the process of capture andl 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 complexmixoflive and deadorganicmatterand 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'.

Trees use the energy from sunlight to convert CO2 in the atmosphere to sugars through the process of photosynthesis. Melvin Calvin was awarded the Nobel Prize in 1961 in Chemistry for his research onthe process of carbon dioxide assimilation in plants using carbon isotopes, which proved that the carbon assimilated in trees, are absorbed from atmospheric CO2. This way trees and forests act as a major sink of carbon in the natural carbon cycle. Destruction of forests leads to release of CO2intoatmosphere, which has been calculated to be more than the global vehicular emissions. Harvested wood traps and stores the carbon within it over along 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. 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 emissionand corresponding harmful impacts

Green house Gases (GHG) have the capability to reflect back shorter wave length infrared (IR) radiation. GHGs allow the longer wave length IR radiation from sun to reach earth through the atmosphere. Earth absorbs the IR radiation, and radiates shorter wave length IR radiation back intothe atmosphere, which isreflected back into earth by the GHGs. So,the GHGs(such as water vapor,CO2, CH4, SF6, HFCs, PFCs and O3(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, andchangecoursepatterns 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 Changeor GCC. Since these changes have been brought about due to human action, these are also called anthropogenic climate change. Mitigation strategies include reduction in emissions of GHGs fromsources as well as capture and storage of GHGs overalong period of time (sequestration).

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 agro silvipastoral 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 developing countries 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 and project 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.

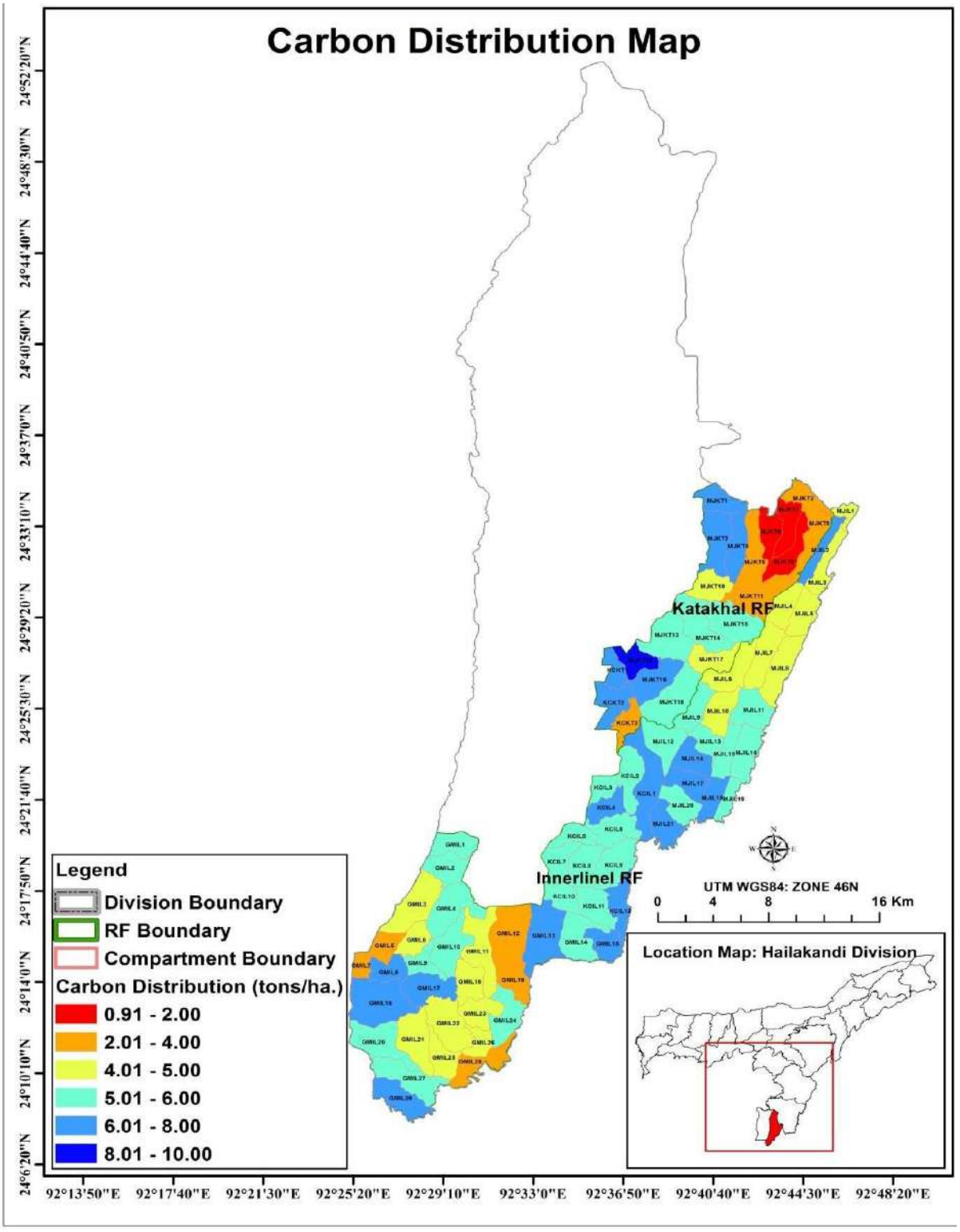

Fig. 6.6. Carbon Distribution map of Hailakandi Division

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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 on Godavaran case 1995, harvesting of timber and other forest produces were stoped and prescription of previous Working Plan was not followed in toto. As such the record of removal of timber is available only from the seized timber and timbers harvested in Pattaland in the Ranges under Hailakandi Division and is shown below (Table 7.1.a). Major portion of timber had been removed by timber smugglers. The following figure is just a tip of iceberg.

Table 7.1.a: Statement of timber availability on various mode

Year	Departmentally Operated (Windfallen) timber	Seized timber removed	Timber removed under cover of C.O.
2001-02	----	217.001 m^3	24.806 m3
2002-03	----	115.935 m^3	-
2003-04	----	457.894 m^3	-
2004-05	----	34.339 m^3	42.835 m3
2005-06	----	401.146 m^3	81.483 m3
2006-07	----	211.018 m^3	29.414 m3
2007-08	----	139.039 m^3	23.616 m3
2008-09	138.43 m3	82.077 m^3	1520.116 m3
2009-10	----	56.019 m^3	27.172 m3
2010-11	----	43.461 m^3	62.832 m3
2011-12	----	87.654 m^3	1752.110 m3
2012-13	----	365.706 m^3	----
2013-14	----	241.292 m^3	----

7.2 Recorded removal of fuelwood:

The fuel woods are traditionally collected by the forest villagers and the revenue village located in the forest fringe area without any record. The fuel wood operation from forest area and from the patta land are as below.

Table 7.2: Statement of fuel wood operation

Year	Quantity available in Deptl. operation	Quantity available in seizure	Quantity operated against patta land
2006-07	14.0 m3	-	-
2007-08	-	-	-
2008-09	-	-	-
2009-10	-	-	-
2010-11	-	-	-
2011-12	-	-	1752.11 St. m3
2012-13	-	-	-
2013-14	-	-	-

7.3 Recorded removal of bamboo/rattans

In case of bamboo, forest villagers/ dwellers and the fringe villagers are removing it for their

domestic purposes without any records. However, the bamboo suppliers to HPC from the forest area are recorded as operated against the bamboo coupes. The statistics of bamboo supplied to HPC are reflected year- wise in the table 7.3 below.

Table 7.3: Statement of bamboo operation

Year	Quantity of bamboo removed (MTG)
2005-06	17891
2006-07	43795
2007-08	21668
2008-09	8580
2009-10	854
2010-11	Nil

There was gregarious bamboo flowering 2006-07 2009-10. The regeneration in bamboo started subsequently after gregarious flowering which got matured in 2012-13. But after closure of Paper Mill at Panchgram, demand for bamboo came down.

7.4 Recorded removal of locally important NTFPs including MAPs:

In Hailakandi forest division forest area is very rich in NTFP/ MFPs and MFP Mahals existed long back. The record reveals that following NTFP/ MFPs are removed besides the local demand of the forest villagers/ forest dwellers/ fringe villagers. Table 7.4 gives the NTFP statistics:

Table 7.4: Statement of NTFP operation

Species	Quantity Operated					Method of harvesting
	2005-06	2006-07	2007-08	2008-09	2009-10	
Broom (in Ton)	400	400	400	400	400	Lease on tender
Gandhi root (in ton)	100	100	100	100	100	-do-
Kithapata (in ton)	50	50	50	50	50	-do-
Hartaki (in ton)	4	4	4	4	4	-do-
Thatch (in bundl)	32	32	32	32	32	-do-
Chalmurga (in ton)	4	4	4	4	4	-do-
Broom (in ton)	50	50	50	50	50	-do-

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

The supply of forest produce specially timber, bamboo, NTFP reflected in the above tables starting from 7.1 to 7.4. The demand of the forest produce in Hailakandi forest division in both the domestic and commercial sectors is very high due to the traditional livelihood system and the living standard in spite of global industrialization

The all India average timber demand on per capita basis if calculated against the total population is averaged to 0.5 m^3/ head. Total demand of fuelwood is 6.65 Lac x 0.5 m3 = 3.325 Lac m^3. The demand of bamboo in the industrial sector i.e. for HPC is 1.5 Lac MTAD from the Borak valley and approximately thirty thousand MTAD of bamboo required from the Hailakandi Forest Division which is approximately more than sixty thousand MTG, but as per the previous record it reveals the highest quantity of bamboo supplied in the year 2006-07 as 43795 MTG and for the other years reflected in the above table. It is notable that besides the industrial demand the field assessment reveals the fact that considerable amount of

bamboo is required for the household construction, household implements and the cottage industry like Bettee, Chati, Chatai etc. as given in the table 7.5 below -

Table 7.5: Statement of demand and supply of forest produces

Year	Betti, Chati & Cut piece.	Chatai	Household implements	Household constructed	Total
2006-07	-	20,000	15,000	30,000	65,000
2007-08	25,000	10,000	15,000	30,000	80,000
2008-09	1,400,000	60,000	30,000	900,000	2,390,000
2009-10	1,500,000	60,000	50,000	1,100,000	2,710,000
2010-11	1,600,000	90,000	60,000	1,500,000	3,250,000
2011-12	2,000,000	80,000	40,000	1,200,000	3,320,000
2012-13	2,400,000	70,000	60,000	1,500,000	4,030,000
2013-14	2,600,000	90,000	80,000	1,500,000	4,270,000

Considering the demand of fuel and fodder that has been reflected in the previous Chapters, the shortage of grazing land in the revenue area has lead to the usage of the total forest area traditionally as the grazing land. Hence, the demand of fodder is very high in comparison with the cattle population as reflected in the previous table.

The fuel wood demand as obtained from the socio-economic survey and the district statistic suggests that about 60,000 nos. of household are dependent on the fuel wood directly or indirectly from the forest area and at least 5 kg. fuelwood is required for 24 hours and the quantity comes as 5 x 60,000= 3.0 Lac kg/day and for the total year 3.0 Lac x 365 = 1095.0 Lac Kg./ year = 300 x 365 = 109500 tons/ year say 1.09 Lac Ton/ year. Besides the domestic fuel wood HPC also requires fuel wood for industrial requirement.

The NTFP supply as reflected in table No. 7.5 considering the traditional uses and commercial demand the requirement is higher than the present supply quantity at least by double of the present supply quantum.

7.6 Import and export of wood and wood product:

There is no such import and export to the division or from the division based on the record.

7.7 Import and export of NTFPs:

The record reveals that there is very little import of NTFP like broom, bamboo, cottage industry products which are going outside the state of Assam from the existing NTFP Mahals in Hailakandi Forest Division.

7.8 Removal of fodder:

There is no system of collecting fodder from the forest area but direct grazing of cattle is traditional practice carried out in the forest division. However, the socio-economic survey reveals that more than 80% of the fodder requirement of forest villagers and the fringe area villagers are met from the forest area of the Hailakandi ForestDivision.

7.9 Valuation of the products:

The valuation of the timber and other forest produce are as per royalty scheduled by the state Govt. and is revised from time to time. The rates of the royalty in the past royalty schedule and the present royalty schedule 2009 are tabulated below against the local market price of the forest produce is reflected where local market price includes operation, harvesting, processing and marketing cost.

Table 7.9: Previous Royalty Schedule and Market Price

Name of the forest Produce	Category	Govt. royalty		Local market Price.
		Belowgirth Rs.per m3	Upgirth Rs. per m3	
Timber	A-I	1,925	3,150	4,200
	A-II	1,575	2,100	2,200
	A-III	875	1,400	1,600
	B-I	630	1,050	1,500
	B-II	350	525	700
	C	245	350	600
	D	175	210	500
	E	140	175	300
Bamboo	Makal	62.00 per 100 nos.		200
	Jatti	125.00		200
	Bhuluka	125.00		200
	Muli	62.00		100
	Others	56.25		100
Cane	Sundi	4.00 per 72 mtr.		15
	Jali	4.00 per 72 mtr.		15
	Horna	4.00 per 72 mtr.		15
	Golla/Raidang	5.00 per 72 mtr.		20
MFP	Broom			10/ Kg.
	Gandi			20/ Kg.
	Kirtapata			10/ Kg.
	Hortaki			3/ Kg.
	Chalmurga			25/ Kg.

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CHAPTER 8

MAINTENANCE OF SOCIAL, ECONOMIC, CULTURAL AND SPIRITUAL BENEFITS

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, wildlife habitat 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 communities.

8.1 Number of JFM committees and area (s) protected by them: There are 20 nos. of JFMC registered with active participation under the Principle of Joint Forest Management. The details of JFMC nos. of family and area protected by them are reflected in the Table below.

Table – 41 Statement of JFMC and area protected

Sl. No.	Name of the JFMC	No. of household	Area Protected (Ha.)
1	Ghamruah	430	1000
2.	Jaccobpur	324	900
3.	Duttapur	92	350
4.	Ramnathpur	18	197
5.	Naxatilla	61	240
6.	New Bagbahar	140	500
7.	Old Bagbahar	155	600
8.	Pratappur	268	950
9.	Naogaang	160	500
10	Dhalcherra	276	950
11.	Dhalcherra Tripra Punji.	90	360
12.	Borthal	279	950
13.	Bilaipur	187	650
14.	Kacharithol	79	310
15	Lalcherra	125	475
16	Lalphani	209	800
17	Nunai	87	348
18	Jhalnacherra	52	350
19	Kukicherra	38	150
20	Baruncherra	99	450

8.2 Status of empowerment of JFMCs: The empowerment of the JFMC enhanced due to the active participation of Forest Rights Committee and the local Panchayat Raj representative. Moreover, the area of plantation created by the various JFMC in the past 10 years is presented in the table below.

Table 8.2: Statement of JFMC and area planted

Sl. No.	Name of the JFMC	Area Planted (in Hact.)		
		Tree	Bamboo	Total
1	Ghamruah	150	152	302
2.	Jaccobpur	160	162	322
3.	Duttapur	65	85	150
4.	Ramnathpur	70	127	197
5.	Naxatilla	85	90	175
6.	New Bagbahar	50	71	121
7.	Old Bagbahar	75	92	167
8.	Pratappur	55	77	132
9.	Naogaang	70	55	125
10	Dhalcherra	65	147	212
11.	Dhalcherra Tripra Punji.	115	65	180
12.	Borthal	95	40	135
13.	Bilaipur	80	67	147
14.	Kacharithol	100	30	130
15	Lalcherra	65	72	117
16	Lalphani	70	72	142
17	Nunai	70	20	90
18	Jhalnacherra	90	75	165
19	Kukicherra	40	70	110
20	Baruncherra	70	90	160
	Total:-	**1640**	**1659**	**3299**

8.3 Labour welfare: For creation and maintenance (such as clearing the site, burning the debris, stacking, hoeing in strips, making planting holes, planting, sowing seeds, weeding, cleaning & thinning etc.) of JFMC's or directly Forest Department's plantation labours from the remote area including the forest dwellers are engaged as a daily labours. The various scheme reflected that against 1.0 ha area of plantation requires (on an average) 150 daily labours (from advance work to 3 year maintenance). Therefore 1.0 ha creates 150 mandays for the rural interior works force besides the other works under Panchayati Raj System, development works, etc. Also, the JFMC member who are working in the plantation works are getting the daily wages (as per the norms) beyond the shared benefits under the JFMCrules.

8.4 Use of indigenous knowledge: The JFMC Committee constituted under the JFMC Rules 1998 are legally bound to prepare the micro-plan against each JFMC for management practices. Recently constituted Biodiversity Management Committee is also playing role in gathering information related to the use of traditional knowledge towards protection and utilization of the various forest produce.The field assessment revealed that the the local people are dependant on the medicinal plants available locally for their needs, the folllowing Table 8.4 shows the list of some of the medicinal plants and their uses.

Table 8.4: Statement of indigenous knowledge and flora

Sl. No.	Local name of the species	Botanical name	Traditional uses
1	Refugee Lota	Micania Micranta	Climber and leaf uses as anticeptic
2.	Kuliban	Upeterium odaratua	-do-
3.		Lantena Camera	-do-
4.	Tukma	……..	Using as alternative to Isabgul to cure the stomach disorder.
5	Amasoi	Anti dycentica	Medicine for dysentery.
6.	Satkora	Citrus Hystrix	Fruits uses as vegetable with meoit for enhancing digestion.
7.	Chatymora (Lojjalota)		Uses as a medicine for ripping the boil
8.	Basak (Batipata)	Clerodendrum Viscosum	Fruits/ flowers and leaf uses as medicine of stomach pain.
9.	Dunband (Dalkalash)	……..	The leaf uses as pain killer in external use only.
10.	Akanpata	……..	The leaf uses as pain killer in external uses only.
11.	Chalmurga	Hydrocarpus Kur Bii	Fruits and bark uses as remedy of skin disease.
12	Dalmurga	Gynocordia odorata	-Do-

8.5 Extent of cultural/sacred groves: There is no such cultural/sacred groves exists in the forest area but traditionally Muslim graveyard, Hindu funeral ground, Christian graveyard having patches of the tree are untouched and are considered sacred. The land and the ownership belong to the local community itself.

8.6 Eco-tourism areas and activities: There is no such important eco-tourism place in the forest area except in the dry season picnic parties are organized at Ramnathpur on the bank of river Dholeswari in the hill view site where the fish mohal exists. The Mirafing located at the Adharkona USF belongs to Muslim pilgrim and Dholcherra at Inter-state border of Assam-Mizoram are also picnic spots. However, details of areas inside and adjoining designated forests, which have ecotourism potential are being visited by tourists, will be identified and systematically documented and the natural attributes viz. landscape, waterbodies and wildlife and also the humanscape will be enlisted and explained for effective ecotourism management during the tenure of this working plan.

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.

8.8 Status of compliance of forest right act (FRA): The Forest Right Acts has been wrongly self interpreted by the Riang community living in the adjoining Mizoram and Tripura State. This community is neither the forest dweller of the locality nor the primitive tribe and not even the notified community by the Govt. of India as per Schedule tribes in the Plain district of Assam. The National census 2011rightly booked the community not as a schedule tribes and it is reflected that only 691 nos. of schedule tribes people residing in the district. However, 10 nos. of recognized forest village has been constituted by the forest department and considering the legal claims being the schedule tribes/ Forest dweller and their dependency on the Forest Right Certificate Confer to 206 nos. of family against 181.5 Hectares. The details reflected in the below table 8.8. It is notable that considering the other non-illegible occupant and the Reang community as an encroacher the ejection operation started by the district Civil –Police-Forest administration but unfortunately due to the undue interference of the local political leader the operation was stopped. In the greater interest of the forest/ environment/ ecology in pursuance of the enforced Acts/ Laws of land all such non illegible occupant under the Forest Right Acts being recognized as encroachers shall be evicted as early as possible. The Hon'ble Gauwhati High Court clearly opined that the encroacher of the forest land shall be evicted from the forest area. The single Bench Judgment against the W.P.(C) No. 5043/08 & 3840/08 challenged in the Double Bench and the double bench also pronounced the judgment on dt. 20-05-2010 against the appeal petition No. 351/09, which has been upheld by the Hon'ble Supreme Court of India also. In view of the all the legal obligation and the enforced forest conservation Acts 1980, Forest Right Acts, AFR (Amended 1995) Acts and in pursuance of the Hon'ble Supreme Court direction against the W.P. (C) No. 202/1995 the encroachment shall be cleared.

Table 8.8: Statement of forest right conferred

Sl. No.	Name of the R.F.	Name of the F.V.	Nos. of right conferred	Total area over which right conferred (Ha.)
1	Katakhal	Borthal	17	16.7
2.	-do-	Belaipur	86	69.4
3.	-do-	Jhalnacherra	76	50.3
4.	Inner Line	Kukicherra	6	
5.	-do-	Gharmurah	11	20.0
6.	-do-	Jaccobpur	10	13.06
7.	-do-	Dhalcherra	-	-
8.	Katakhal	Old Bag-bahar	-	-
9.	-do-	New Bagbahar	-	-
10.	-do-	Noxatilla	-	-
		Total	**206**	**181.5**

8.9 Other rights and concessions: As per the present practices the rights and concession provided to the recognized forest villages, JFMC members are shown in table 8.9.

Table 8.9: Statement of other rights and concession

Nature & Extent of Rights	Rights and concession holder	Remarks
Right to entry in the R.F. area	JFMC beneficiaries and forest villagers along with FRA Rights holders.	Being they are living in the forestarea
Cattle grazing	-do-	-do-

Fuel and fodder collection	-do-	-do-
NTFP for domestic uses	-do-	-do- and along with the fringe villages
Domestic and small wood collection	-do-	-do-

8.10 Dependency of local people on NTFPs: Forest villagers, JFMC beneficiaries and FRA Rights holders are dependent on NTFPs gathered from the forest. They being legally empowered collect NTFPs for their domestic need. They collect fruits of Dillenia spp., Garcinia spp., tuber, medicinal plants, herbs are collected by the local people for consumtion and use as medicine. To meet their domestic need they collect bamboo, cane, jhengu patta. The legally enforced, Assam Forest Regulation Acts beyond the individual demand of the Right holders the local selling and marketing shall be under proper transit pass or challan but due to their traditional practices the provision of T.P/T.C. not yet properly implemented though the same is legally required. The Forest administration shall impose the mechanism for assessing the quantity of domestic uses and also the quantity marketed to the local market. During the constitution of the RFs, certain rights and concessions were allocated to the people living in and around the RFs.

8.11 Other aspects: It is revealed from the records that the Rights and Concession holder enjoying the benefit beyond the legal limit and hence no further Rights is to be provided legally. On careful scrutiny of the records and field assessment it appears that neither any schedule tribe/primitive tribe nor any legally dependent forest dweller are left from the enjoying of the legal or traditional Rights/ Concessions. The present socio- Economic status of the Forest and Fringe villages are given below:

Socio economic survey: The Socio Economic Survey conducted against 20 Nos. of Forest village & 7Nos. of fringe village. It is also notable that 10% of the total Forest & Fringe villages undergone 100% field survey in consultation with the local-self Govt., institutions such as Panchati Raj grass root level system & along with other related grass wood level institutions as exists. The out come of the Socio Economic Survey summarily illustrated in the below table.

Table 8.11: Statement of socio economic survey against the forest village

Sl. No.	Name of Forest Village	Family Member	Cattle Population				Annual Income (Rs. In Lakh)
			Cow	Buffalo	Goat	Other	
1	Belaipur	749	500	100	300	50	3.60
2	Protappur	1280	301	228	180	10	6.14
3	Lalapani	1045	400	227	700	20	5.02
4	Borthal	1277	400	200	209	30	6.13
5	Dhalcherra T. P.	450	99	101	200	58	2.16
6	Dhalcherra	1300	201	100	300	43	6.24
7	New Bagbahar	695	210	104	102	37	3.34
8	Noagoan	1285	260	200	400	12	6.17
9	Noxatilla	376	100	40	100	30	1.80
10	Old Bagbahar	938	201	101	110	35	4.50

11	Nunai	440	98	23	39	100	2.11
12	Kacharithal	402	147	17	30	160	1.93
13	Lalacherra	696	303	17	69	200	3.34
14	Gharmurah	2471	483	35	318	95	11.86
15	Jacobpur	2247	420	35	307	37	10.79
16	Ramnathpur	297	242	18	157	29	1.43
17	Duttapur	537	87	2	45	60	2.58
18	Baruncherra	880	238	10	62	52	4.22
19	Jhalnacherra	3500	200	200	100	400	16.80
20	Kukicherra	1550	90	60	30	110	7.44

N. B: Others mean Sheep/ Pig etc.

Table 8.11 b: Statement of socio economic survey against the fringe village

Sl. No.	Name of Fringe Village	Family member	Cattle Population				Annual Income
			Cow	Buffalo	Goat	Other	
1	N.Bagbahar Fringe Village	1453	1010	50	300	25	8.72
2	Lalacherra Fringe Village	9078	3000	500	1500	500	54.47
3	Loharbond Fringe Village	482	404	32	151	-	2.89
4	Malicherra Fringe Village	102	85	3	30	-	0.61
5	Dholai Fringe Village	81	240	13	42	-	0.48
6	Sonacherra Fringe Village	93	220	5	35	-	0.59
7	Billgaon Fringe Village	86	227	11	23	-	0.52
8	Jugicherra Fringe Village	107	195	-	48	-	0.64
9	Kukicherra Fringe Village	62	36	-	22	-	0.37
10	Jhalnacherra Grant Fringe Vill	3314	536	107	732	69	19.88
11	Nondagram NC Fringe Village	1037	243	28	306	12	6.22
12	Jamira Pt-II Fringe Village	1807	107	20	87	31	10.84
13	Jamira Pt-III Fringe Village	2083	205	29	183	24	12.50
14	Jamira Pt-IV Fringe Village	1802	527	29	438	39	10.81
15	Jamira Pt-V Fringe Village	435	57	7	92	-	2.61

Result of socio economic survey: The Socio Economic Survey results as reflected under the table No. 8.11 & 8.11.b reveals that for domestic use of timber, bamboo, thatch broom stick etc., locals from both the Forest Villages & Fringe Villages are totally dependent on the forest area. This collection practice has never been estimated or recorded. It is also notable that the large nos. of cattle population also depends on the forest area as their traditional grazing land & the stock feeding are not practicing as a result the young re- generation family struggles for their survival from the cattle interferences. The collection of fuel wood & fodder etc is totally from the forest area through a nonscientific manner which has never bee recorded earlier but as per the current Socio Economic Survey, it reveals that huge quantity of fuel wood & fodder species collection by the locals from forest villages as well as from the fringe villages has resulted in the destruction of forest &regeneration.

Table 8.11.c: Yearly consumpsion of Forest produces by the Forest villagers

Nos Forest Village	Nos of population	Yearly consumsion of Forest produces

		Bamboo	Fuel wood	Timber	Thatch	Broom
20	22414	352000 Nos.	438 Ton.	118 cum	8000 Bundle	1Ton

Table 8.11.d: Yearly consumsion of Forest produces by the Fringe villagers

No of Forest Village	Nos of population	Yearly consumsion of Forest produces				
		Bamboo	Fuel wood	Timber	Thatch	Broom
15	22022	336000 Nos.	390 Ton.	120 cum	1000 Bundle	1Ton

The socio economic status of the forest dwellers: The Socio Economic Survey reveals that the economic status of the forest village in-general is below the poverty line and as a result the traditional timber smugglers are using the forest dwellers for the illegal felling & dragging of timbers from the forest area, which is a major issue in this Forest Division. The social status & their customs are not so developing due to the poverty though some Christian Missionary activities the conversion to the Christianity are taking place with adopting the missionary culture in tribal belt.

Socio-economic status of fringe villages: The result of Socio Economic survey of the Fringe Villages reveals that all the villages are totally dependent on the Forest for the fuel, fodder, domestic timber, bamboo, grazing by the cattle population & adopting the practices of cattle cultivation as a means of earning and & as a result the biotic interferences, such as grassing damage, illegal collection of forest produces are the natural phenomena. Moreover, most of the villagers living below the poverty line and taking it an advantage the timber smugglers use them for their shelter along with illegal felling & dragging, storing of the timbers from the reserve forest. The traditional custom is the mode of living in such fringe villages though the Govt. is trying the best for development of their livelihood.

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CHAPTER 9
ADEQUACY OF POLICY, LEGAL AND INSTITUTIONAL FRAME WORK

9.1 Existing policy and legal frame work and their compliance:

There are several Acts, Rules and Regulations enacted by the Govt. of India and the State Government to deal with various issues for protection and management of Forests. These are-

a) Assam Forest Regulation 1891 (Amended Act 1995).
b) Wild Life (Protection) Act1972.
c) The Assam Wildlife Protection Rule 1997.
d) Indian Forest Act 1927.
e) Forest Conservation Act 1980.
f) The Biological Diversity Act-2002.
g) Assam Bio-diversity Rule-2010.
h) The Wood base Industries (Establishment and Regulation) Rules 2000.
i) The Cattle trespass Act 1871.
j) The Assam Forest (Removal and storage of produce) Regulation Act-2000.
k) The Assam (Control of Felling and Removal of trees from Non-forest Land) Rules 2002.
l) Schedule tribe and other traditional Forest Dwellers (Recognition of Forest Rights) Acts 2006
m) The Schedule tribes and other traditional Forest Dwellers (Recognition of Forest Rights) Rules 2007.
n) The Assam Joint (Peoples Participation) Forestry management Rule-1998.
o) The Assam Minor Mineral Concession Rules-2013.

Besides the above Acts, Rules and Regulation, Indian Penal Code and Criminal Procedure Code are also applicable to support the above Acts/Rules depending applicability and jurisdiction. Compliance of all the above Acts, Rules, Regulations are satisfactory in as much as the provisions of such Acts/ Rules are being applied/ enforced towards sustainable management of forest. But enforcing of Assam Forest Regulation 1891 (Amended Act 1995) and Wild Life (Protection) Act1972 for punishment of offenders require much meticulous efforts. Capacity development and training of staffs and officers are becoming an urgent to deal with the legal issues which can, of course, give a positive impact in forest conservation.

9.2 Status of approved working plan and compliance:

The critical comparison of the working Plan prescription and the field practices reveals the following facts.

Plantation and protection Working Circle:

The Comparison reflected that as per prescription total 11562.5 Ha. area in both the Inner Line and Katakhal R.F. is available for plantation in 10 years period but the field record reveals that only 4400 ha. has been covered against all the scheme including JFMC. It is also notable that the Working Plan prescription fixed the target 4063 ha. against the available suitable land.

The Jhum rehabilitation Working Circle:

The comparison reflected that about 500 ha. of old Jhum felled area was covered with plantation but no measures were taken for the Rehabilitation of Jhumiers. It is notable that Jhumier rehabilitation was possible under the Rural Development,but in spite of the approach from the forest Department no such action has been taken.All these Jhumiers are bonafide voters of the Gaon Panchayet. The training/ demonstration to both the staff and the Jhumiers will be useful under the comprehensive policy from the department like Civil administration, DRDA, Veterinary, Horticulture, Agriculture etc.

Energy plantation Working Circle:

Under this working circle,the working Plan prescribes that the species like *Ilenthuns, Exelsa, Acacia, Antrocephelus Kadamba* etc. pulp wood and the fuel wood species like *Albizzia, Casia* etc. along with the *Tectona grandis* shall be planted under the working circle but no such special energy and fuel wood plantation raised where teak has been grown. It is notable that teak growing area accelerated the soil erosion due to lack of under growth and is not suitable under the Biodiversity conception.

Bamboo overlapping Working Circle:

As per prescription 16 nos. of coupes has been created under this working Circle. The growing stock and annual yield has been duly extracted by the paper Industry and extraction was also done as a result of separate bamboo working Plan. But due to the gregarious bamboo flowering from the year 2006 the operation has been stopped since 2009-2010. It appears that the silvicultural operation as prescribed was not properly practiced in the field.

Non Wood forest produce Working Circle (overlapping):

The working circle mainly prescribed the extraction/ harvesting regarding the existing Mohal but neither any extension nor any marketing/ processing/ grading was prescribed. The Mohal was running regularly based on the natural regeneration of broom stick, Gandhi root/Chatapata/ Titapata/ Nageswar flower/ Shookchini etc.

9.3 Number of forest offences

The record reveals that there was illegal felling of the timber and some timber species, which has been removed by the miscreants.The remaining timber has been recovered by the staff.

Table 9.3.a: Statement of timber seized

Sl. No.	Year	Timber Seized (in m3)
1	2001-02	217.00 m3
2	2002-03	115.94 m3
3	2003-04	457.89 m3
4	2004-05	34.34 m3
5	2005-06	401.15 m3
6	2006-07	211.02 m3
7	2007-08	139.04m3
8	2008-09	82.08 m3
9	2009-10	56.02 m3
10	2010-11	43.46 m3
11	2011-12	87.65 m3
12	2012-13	365.706 m3

13	2013-14	241.292 m3

The details of offence drawn along with the seizure of vehicle and confiscation thereof is reflected in the table below.

Table 9.3.b: Statement of forest offences

Sl. No.	Year	No. of Offence drawn	No. of vehicle seized	No. of offender arrested	Nos. of vehicle confiscated
1	2001-02	1	3	--	--
2	2002-03	4	1	--	--
3	2003-04	4	2	--	--
4	2004-05	2	-	--	--
5	2005-06	6	-	--	--
6	2006-07	4	1	--	--
7	2007-08	8	2	--	--
8	2008-09	2	-	--	--
9	2009-10	14	11	18	--
10	2010-11	19	9	24	--
11	2011-12	20	04	21	--
12	2012-13	28	08	39	2
13	2013-14	21	-	7	1

9.4 Status of research and development:

Regarding the research and development no such intensified measures were undertaken. Transfer of technology was done in favour of The Frontline Forest staffs who under went Refresher course at Assam Forest School. The trained staffs organized the village level demonstration/ awareness Camp involving the JFMC members and the fringe villagers/ forest villagers. There is one Silvicultural beat at Loharbond in Hailakandi, under Basistha Range in Guwahati which has carried out a number of experiments and allied activities. It was established in 1969 and has permanent Preservation plot in Katakhal R.F. It also has bamboo plots for study and research.

9.5 Human resource capacity building efforts:

The human resources and capacity building efforts are practiced and exercised by organizing short term training/ refresher course along with the Division and circle level sensitization programmes. The NBM/ JFMC also conduct tours in various places. Such capacity building effort is not sufficient but also requires further extension of training to the staffs.

Table 9.5.a: Statement of training to the staff

Sl. No.	Year	Person imparted training	Title of training	Remarks
1	2001-02	10	Refresher Course	Refresher Course
2	2002-03	5	1no. regular training	4 nos. Refresher
3	2003-04	5	Do	Do
4	2004-05	6	Do	Do
5	2005-06	7	Do	Do
6	2006-07	6	Do	Do
7	2007-08	8	Do	Do

8	2008-09	5	Do	Do
9	2009-10	3	Do	Do
10	2010-11	4	Do	Do
11	2011-12	8	Do	Do
12	2012-13	8	Do	Do
13	2013-14	5	Do	Do

9.6 Forest resource accounting:

No intermediate or annual resource accounting system was practiced after the last working plan survey. The official record reflects that there is no such account of forest resources except there was a available bamboo resource survey conducted by the forest resource and survey division regarding growing stock. The annual yield of bamboo during the year 2009-10 of all the district of Assam according to the survey reveals the following facts.

Table 9.6 Statement of bamboo area and growing stock with yield

Sl. No.	Area of Bamboo		Growing stock		Annual yield
	Forest	Non-forest	Forest	Non-forest	
1	14400 Ha.	509 Hacts.	360000 MTG	6000 MTG	18300 MTG
Total	**14400 Ha.**	**509 Hacts.**	**360000 MTG**	**6000 MTG**	**18300 MTG**

9.7 Budgetary allocation to the forestry sector:

The budgetary allocation to the Hailakandi forest division as reflected from the available record is shown in Table 9.7.The allocation as required is not provided. The intensified management of forest resources of the division while considering the Inter-state boundary, Public demand, status of supply etc. along with optimum mobilization of the staffs to the duties along the logistic support was not up to the optimum level. The equipment such as vehicles/ motor cycle/ Bi-cycle along with the fuel and maintenance cost was not also as per requirement.

Table 9.7.a: Statement of total budgetary allocation (Rupees. in lac)

Year	Plan (in Lac)	Non-Plan	CAMPA	NBM	NAP	Biodiversity
2	**3**	**4**	**5**	**6**		
2001-02	3.83	85.85	-	-	-	-
2002-03	0.92	84.82	-	-	-	-
2003-04	-	85.84	-	-	-	-
2004-05	-	93.25	-	-	-	-
2005-06	34.40	98.84	-	-	35.00	-
2006-07	69.90	129.74	-	-	33.58	-
2007-08	49.12	126.83	-	73.59	44.00	-
2008-09	86.79	133.75	-	22.43	55.00	-
2009-10	56.27	164.50	-	23.95	119.00	-
2010-11	51.97	341.62	1.91	43.87	34.47	-
2011-12	67.02	270.73	50.29	14.87	50.75	-
2012-13	74.56	332.88	92.50	67.90	11.80	Nil
2013-14	21.58	330.99				
2014-15	21.25	320.89	31.88			
2015-16	8.81	342.03				
2016-17	54.99	329.77				
2017-18	0	349.81				
2018-19	0	319.38				

2019-20	0	425.31				

The above plan and Non-plan budget includes the salary component also. The Non-plan amount are mostly against the salary sector which can be seen from the below table

Table 9.7.b: Statement of salary budget allocation

Year	Salary Budget Allocation		Total (in Lac)
	Plan (in Lac)	Non-Plan (in Lac)	
2001-02	1.30	74.00	75.30
2002-03	0.92	71.00	71.92
2003-04	-	77.16	77.16
2004-05	-	83.08	83.08
2005-06	-	86.00	86.00
2006-07	-	106.00	106.00
2007-08	-	110.52	110.52
2008-09	-	114.26	114.26
2009-10	12.02	136.76	136.76
2010-11	-	304.26	316.28
2011-12	-	231.40	231.40
2012-13	-	284.59	284.54
2013-14		287.43	287.43
2014-15		286.95	286.95
2015-16		286.59	286.59
2016-17		289.67	289.67
2017-18		313.11	313.11
2018-19		269.21	269.21
2019-20		384.66	384.66

9.8 Existence of monitoring, assessment and reporting mechanism:

The records reveal that there is transparent monitoring and assessment system for the various work executed. Proper quarterly and annual progress and monitoring report of the various scheme is also exercised. The monitoring and assessment practices are carried mainly by the Forest Range Officer followed by ACF/DFO and CF along with the seasonal inspection by the CCF/ Add. PCCF. In some cases the monitoring and assessment is also done by PCCF and HoFF, Assam

9.9 Public awareness and education:-

The public awareness camps are often organized under the various schemes like NAP/JFMC/NBM. On various occasion specially like World Environment Day, Vana-Mahatsav Week, Wild Life Week, World wet land Day etc. the publicity wing of forest department of Assam communicates with the public places down to the village level. The JFMC meetings are regularly organized involving the participation of stake- holders and other prominent resource persons of the district specially from Education/ Horticulture/ Animal Husbandry / Agriculture/ Civil/ Judiciary/ Rural development/ NGOetc.

9.10 Adequacy of man power in forest division:

The forest division has been created by bifurcating the then Cachar Forest with the existing staffs of Hailakandi then sub-division now district.Hence the cadre strength at various level are below the optimum level. The sanctioned strength of men in position/ vacancy are reflected in the table below.

Table 9.10.a: Statement of Human Resources in Halikandi Forest Division

Sl. No.	Name of the Cadre	Sanctioned Strength	Men in Position	Vacant
1	D.C.F.	1	1	0
2	A.C.F.	2	1	1
3	Forest Ranger	6	3	3
4	Dy. Ranger	4	3	1
5	Forester-I	23	12	11
6	Forester-II	3	1	2
7	Forest Guard	42	19	23
8	Plantation Mali	3	3	0
9	Boatman	6	5	1
10	Chainman	1	1	0
11	Head Assistant	1	1	0
12	Accountant	1	0	1
13	Sr. Asstt.	1	0	1
14	Jr. Asstt.	5	3	2
15	Stenographer	1	0	1
16	Draughtsman	1	0	1
17	Driver	2	1	1
18	Office Peon	3	1	2
19	Chowkidar	2	1	1
20	Sweeper	1	0	1
21	Surveyor	1	0	1
22	Fixed Pay worker	33	31	2

The forest department engages daily wage labourer against the execution of sanctioned work especially in the plantation/ departmental operation etc. The wage rates for plantation in the various schemes like State Plan/ CAMPA/NBM/NAP/ Bio-diversity etc. are different and hence the filed frontline staffs are facing problems. Besides there is more serious issue regarding the wage rate fixed for various plantation scheme which is far lower than the existing market rate and in some schemes the rate is below the MNREGA wage rate also. It is notable that the plantation workers engaged in the tea-garden areas are availing extra facilities beyond the daily wages such as one day weekly holiday with wages, free accommodation/ medical facilities/ subsidy rations/ festival bonus etc. but the forest plantation labours are not getting any extra facilities except the daily wages.The plantation work are seasonal in nature and tea-garden labourers work throughout the year. Therefore, considering all the factors and specially the MNREGA rate the uniform wage rate in forestry Sector is required to avoid the field constraint along with the quality of the work. There is requirement of more skilled labours for plantation and management of the crops.

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CHAPTER 10

FIVE YEARS PLANS

10.1 Environment: Protection of the environment has to be a central part of any sustainable inclusive growth strategy. This aspect of development is especially important in the Eleventh Plan when consciousness of the dangers of environmental degradation has increased greatly. Population growth, urbanization and anthropogenic development employing energy-intensive technologies have resulted in injecting a heavy load of pollutants into the environment. More recently, the issue assumed special importance because of the accumulation of evidence of global warming and the associated climate change that it is likely to bring. An important feature of any environmental strategy is that environmental objectives require action in several areas, which typically lie in the purview of different ministries. The Ministry of Environment and Forests (MoEF) has the important role of monitoring the development process and its environmental impact in a perspective of sustainable development and to devise suitable regulatory structures to achieve the desired results. While this role is crucial, environmental objectives can only be achieved if environmental concerns are internalized in policy making in a large number of sectors. This would require sharing of Hailakandi Forest Division responsibility at all levels of government and across sectors with respect to monitoring of pollution, enforcement of regulations, and development of programmes for mitigation and abatement. Regulatory enforcement must also be combined with incentives, including market and fiscal mechanisms to encourage both industry and people in their day-to-day working to act in a manner responsive to environmental concerns, sustainable use of natural resources also requires community participation with a responsible role assigned to the communities for conservation.

10.2 Management of Forests under Five Year Plans: Forest is a dynamic living entity that is to be managed with a view to conserve the natural capital without any depletion, while catering the present needs of the society. As such, the forest planning becomes a multifaceted, consistent and well integrated affair, where due weightage has to be given to soil and moisture conservation along with satisfaction of the present and future demands of the society and that of the industries utilizing forest produces. The Planning Commission of India, which is approving plans for the most effective and balanced utilization of the Country's resources, for the development of the Country, gave due importance to planning in forestry sector too. Accordingly, special attention was given in the Five Year Plans to enhance the productivity of the Forests by adopting sound schemes, such as rehabilitating the depleted forests and creating valuable man-made forests to cater to the needs of the industrial sector. The successive Five Year Plans have aimed at accelerating the pace of Forestry Development and expansion of the forestry activities in the Country. Forests in the Division have benefitted from these schemes.

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 (1956-61) 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 (1961-66) 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 (1969-74) 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- 91. Mass afforestation and social forestry programme programmes were emphasised during the Sixth Five Year Plan (1980-85). 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 Eighth Plan (1992-97) 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 (2002-07) further emphasized on the important role of forests in achieving environmental and economi c 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 2002-03 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, 2002-07). 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.

10.2.1 Priority in checking biotic interference: Illegal logging, encroachment, collection of fire wood and fodder, hunting are the factors responsible for biodiversity degradation. Regeneration plots, Plantations, are very much exposed to humans and cattle. Environmental conditions including edaphic condition (soil nutrients, moisture, fertility), climatic condition are otherwise very much favourable for regeneration and growth of species. If the forest could be protected from biotic interference (human and cattle) all species will show vigorous regeneration and growth. An example of Nameri wildlife sanctuary where soft releases of captive breeding Pigmy Hogs are done may be cited. The area which has been intensively protected with barrier including power fencing restricting entry of humans and cattle with a view to get the Pigmy Hogs accustomed with natural environment (soft release) is seen to have good forest growing up naturally with diversed floral composition followed by attraction of other wild animals. One more example of unwanted but spontaneous creation of forest could be seen. Micro forest like natural vegetation with natural growth of species could be seen in small plots of land when some people procure land in city and leave it with barriers/walls for some 2/3 years. These are not only examples but substanciate that if our forest could be protected from biotic interference, we can have good forests with diversed flora and fauna.

During the past decade lots of forest development activities including regeneration of forests were undertaken. But in comparison to the investment, result is not satisfactory. Lots of Plantation programmes were undertaken, but survival percantage of these plantations in average are 30-40%. This is a clear example of wastage of Money. These plantations are not encouragingly successful because of biotic interference than any other factors impacted these. Had these plantations were protected by erecting strategic fencing (strong barrier to resist human and cattle entry), these would have shown good result with vigorous growth with 80-90% survival. As such it is advised in this Working Plan that Plantations shall and must be protected from biotic interference. Strong strategic fencing, and wherever required, RCC

Walls shall be erected. This will not only protect the plantations but will protect the forest land from encroachment. There was neither any reflection nor any description regarding the five year plan available in the past working Plan. As Hailakandi Forest division was created during the year 1992 on bifurcating the then Cachar Forest Division, the plan wise and scheme wise budget allocation assessed from the available records is tabulated below.

Table 10.2.1.a: Statement of budget allocation in five year plan

Period	Name of the Plan	Budget Allocation (Rs. in Lac)			
		Rural Dev.	Tribal Dev.	Forest Village	Others
1992 - 1993	Repairing of I.B. at Gharmurah Range	--	--	--	50,000.00
1993 - 1994	Re-construction of Road, check-gate and hut.	--	--	--	20,652.00
	Repairing of Fr.-I Qtr. under Matijuri Range.	--	--	--	7,500.00
1994 - 1995	Repairing of Check-gate under Gharmurah Range	--	--	--	75,000.00
	Repairing of Check-gate under Panchgram Range	--	--	--	6,519.00
	Repairing of Check-gate under Panchgram Range	--	--	--	4,900.00
	Repairing of Range office at Matijuri Range	--	--	--	96,546.00
	Construction of Ring-well at Gharmurah Range	--	--	--	18,000.00
	Construction of Building at Gharmurah Range	--	--	--	80,000.00
1995 - 1996	Maintenance of Loharbond – Aizal Road under Matijuri Range	--	--	--	10,000.00
1996 - 1997	NIL	--	--	--	Nil
1997 - 1998	Maintenance of Lalacherra-Nunai F.V. Road & Belaipur-Loharbond Road under Matijri Range. Maintenance of Bagcherra-Raiflemara Road under Gharmurah Range	--	--	--	10,020.00 10,000.00
1998 - 1999	NIL	--	--	--	NIL
1999 - 2000	NIL	--	--	--	NIL
2000 - 2001	NIL	--	--	--	NIL
2001 - 2002	NIL	--	--	--	NIL
2002 - 2003	NIL	--	--	--	NIL
2003 - 2004	Compensatory Afforestation.	--	--	--	1.09
2004 - 2005	Compensatory Afforestation.	--	--	--	8.53
2005 - 2006	Compensatory Afforestation.	--	--	--	8.67
	NAP (including Maintenance)	--	--	--	2.80
2006 - 2007	Compensatory Afforestation.	--	--	--	1.82
	NAP (including Maintenance)	--	--	--	52.00
	NBM = (Plantation with Maint.) = (Re-stocking)	--	--	--	22.50 12.00
2007 - 2008	Compensatory Afforestation.	--	--	--	2.15
	NAP (including Maintenance)	--	--	--	25.00
	NBM = (Plantation with Maint.) = (Re-stocking)	--	--	--	12.50 0.80

2008- 2009	Compensatory Afforestation.	--	--	--	1.09
	R. D. F.	--	--	--	8.09
	A. B. Y.	--	--	--	27.93
	NAP (including Maintenance)	--	--	--	55.00
	NBM = (Plantation with Maint.) = (Re-stocking)	--	--	--	23.11 7.68
2009 - 2010	R. D. F.	--	--	--	7.13
	A. B. Y.	--	--	--	2.20
	12th Finanace 1. Up-gradation of Dy. Range Qtr. at Kukichera = 1No. 2. Repairing of R.O's Qtr. at Gharmurah =1No. 3. Up-gradation of Old Bagbahar, New Bagbahar ForestRoad. 4. Up-gradation of Culvert- 10.0Rm. 5. Wages to Protection. 6. Maintenace of Vehicle.	--	--	--	15.08
	A. N. R.	--	--	--	2.13
	Building = Panchgram Range Office	--	--	--	9.26
	Amenities to Staff 1. Sinking tubewell 1(one) pipe lineat DFO'sComplex. 2. Construction of Ring-well =Matijuri -2Nos. = Gharmurah -2Nos.	--	--	--	4.20
	NAP (including Maintenance)	--	--	--	119.15
	NBM = (Plantation with Maint.)	--	--	--	15.20
2010 - 2011	R. D. F.	--	--	--	8.12
	A. N. R.	--	--	--	0.63
	Amenities to Staff 1. Installation of tubewell atMatijuri 2. Construction of Ring-well =Matijuri -4Nos. = Matijuri - 3Nos.	--	--	--	4.00
	NAP (including Maintenance)	--	--	--	34.87
	NBM = (Plantation) (including Maintenance) = (Re-stocking) = (Demonstration Plot)	--	--	--	10.40 15.98 0.50
	CAMPA Site specific plantation of Duttapur to Jacobpur F.V. Road via Jhalnacherra.	--	--	--	1.91
2011 - 2012	A. B. Y.	--	--	--	2.16
	R. D. F.	--	--	--	7.98
	Road & Bridge 1. Construction of Duttapur to Jacobpur F.V. Road via Jhalnacherra.	--	--	--	3.00
	A. N. R.	--	--	--	3.69
	Amenities to Staff 1. Construction of sanitary Latrine with Bathroom at I.B.Campus. 2. Construction of Water tank at DFO'sQtr.	--	--	--	2.00 2.00

	NAP (including Maintenance)	--	--	--	--
	NBM = (Maintenance Plantation)	--	--	--	34.81
	CAMPA 1. Nursery at Loharbond at Baruncherra at Chandipur 2. ANR Plantation atLalacherra 3. Site Specific Plantation atVernarpur (Dariarghat) 4. Afforestation work atRamnathpur.	--	--	--	 7.45 2.96 2.96 1.20 1.61 6.23
2012 - 2013	R. D. F.	--	--	--	8.00
	A. B. Y.	--	--	--	10.34
	A. N. R.	--	--	--	2.01
	CAMPA 1. Nursery atLoharbond at Baruncherra at Chandipur 2. ANR Plantation atLalacherra 3. Site Specific Plantation atVernarpur (Dariarghat) 4. Afforestation work atRamnathpur.	--	--	--	 7.45 2.96 2.96 1.20 1.61 6.23
	13th Finance (Construction of DFO's, R.O's Dy. Ranger's Qtr. etc.) Part.	--	--	--	28.38
	NAP (including Maintenance)	--	--	--	--
	NBM = (Maintenance of Plantation) = Intensive Management of Bamboo Plantation & Micro irrigation	--	--	--	39.13 5.00
2013 -2014	R. D. F.	--	--	--	6.46
	Road & Bridge Approach Road at D.F.O's Office & 1No. Culvert.	--	--	--	5.00
	13th Finance (construction of DFO's Office building, R.O's Qtr. Dy. Ranger's Qtr. Forest Barrack etc.)	--	--	--	 66.23
	A.P.F.B.C. (A.N.R) (M.H.W) (N.T.F.P.)	--	--	--	9.86 16.01 14.16
	NAP (including Maintenance)	--	--	--	51.29
	NBM = (Maint. of Plantation). = (Re-stocking). = (Dist. level workshop).	--	--	--	12.50 8.00 1.00
	CAMPA 1. Nursery atLoharbond at Baruncherra at Chandipur 2. ANR atLalacherra 3. Site Specific Plantation atVernarpur 4. Afforestation work at Ramnathpur. 5. Construction of Barrack at Kukichera 6. Construction of A.F.P.F. Campat Lalacherra 7. Improvement of Gharmurah-JacobpurF. Road.	--	--	--	 3.12 1.37 1.37 0.41 1.44 6.46 15.15 52.92 2.00

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CHAPTER 11

PAST SYSTEMS AND MANAGEMENT

11.1 General history of the forest:

The Innerline reserve forest is the largest RF in Assam with an area of mare than 110,000. Katajhal ia contiguous with Innerline. The area is mainly composed of low hills that are the northern promontories of the the Lushai hills. Small patches of plain area found beneath the hills are mostly under human habitation. Dhaleswari, Barak and Sonai are the main rivers. The Forests of the present Hailakandi Forest Division have been managed scientifically under the undivided Cachar Division initiated from the year 1874. Considering the intensification of management the Katakhal & I.L.R.F was created in the year 1978.

11.2 Past system of management & results:

11.2.1 Pre-Plan Management Period (1874-1924): Initially in the than Cachar Forest Division for the management purposes some Revenue station were notified in favour of checking & in realization of revenue against the timber operated from the Forest area by both the price & Govt. agency. In the year 1890-91 the system of pre-marking was introduced for collection of revenue etc. In the year 1903-04 Cavendish prepared the felling scheme for the Cachar Division, where he introduced the system of pre- markiing of trees to fall by fixing the minimum girth limit 6½ feet. This system was supposed to be a failure and consequent upon the prevailing situation Mr. Milroy submitted the report to the then Conservator of Forest during the year 1912 with a suggestion for regular working plan and accordingly in the year 1913- 14 Mr. Pierre formulated another scheme by introducing rough working plan. Subsequently the selection system of marking was introduced in the year 1919-20 for the Katakhal Reserve Forest and initiated the large scale harvesting. The system of leasing was modified during the year 1922 to exploit the timber on royalty basis but the out come was not as per expectation and the then DCF Mr. J. S. Owdens initiated the survey for regular working plan in the year1922-23.

11.2.2 Mr. Owdens Paln Period (1925-37): Mr. Owdens proposed two working circle viz. (a) Harvesting of timber, bamboo & canes (b) Working Circle for regeneration to study silviculture of the trees. However, due to heavy floods during the year 1929 huge quantity of timber were lost which lead to abounding of the of working plan prescription and as a result timber traders were given a free hand causing loss of wooded vegetation. In the initial management stages the interior location of the reserve forest sufferd due to non-avalability of labours and hence during the year 1937 the forests village were established in the difference reserved forest of the state and accordingly in the Borak Valley such forest villages was also established as below and the nos. of forest village increases up to the forest conservation Act enforcement1980.

Table 11.2.2: Forest Village established in 1937 over the Borak Valley

Civil Distric	Name of R.F.	No. of Forest Village
Cachar (Present Hailakandi and Cachar Dist.)	Innerline R.F. Katakhal R.F.	21 nos. 13 nos.

	Upper Jiri R.F. Lower Jiri R.F. Sonai R.F.	3 nos. 1 no. 3 nos.
Sylhet Dist. (Presently Karimgang Dist.)	Longai R.F. Singla R.F. Patharia Hill R.F.	25 nos. 14 nos. 1 no.

11.2.3 Mohanlal Plan's Period (1937-38 TO 1954-55): This was the first plan in true sense and major objective of the plan was to ensure sustainable yield of timber, fuel wood, bamboo & other Forest produces. Mr. K. Mohanlal proposed 4 nos. of working circle considering the then ground realities. He suggested Recuperation Working Circle for felling along the major river channels. He introduced compensatory plan in the area where felling was carried out by fixing the felling cycle at 30 years with exploitable girth as 8 feet for *Artocarpus Chaplasa* & 6 feet for other commercial species. The plan also included the control of felling in USF areas also. Mr. Mohanlal expected 78% of the outturn from the USF area but in practice the major operation continued within the Reserve Forest instead of USF area.

11.2.4 P.N. Bhattacharjee's Plans Period (1957-58 TO 1971-72): This was the 1st working plan for the then Cachar Forest Division after the independence of India. The Re-organization of the then Cachar & Shylet Division took place where the Karimganj Sub-division of the then Shylhet Division was brought under Cachar Division and hence it was the 1stplan covering the present total Barak Valley including the part of I.L.R.F now under the control of Mizoram state. The main objective of the plan was to improve the general health of Forest to-wards sustainable yield. He introduced local trade working circle on annual basis and less accessible area under long terms lease working circle. In addition to that the re- generation overlapping working circle & bamboo working circle was introduced. The Katakhal Reserve Forest was covered under local trade working circle & I.L.R.F presently under Hailakandi Forest Division was brought under long term lease working circle. Mr. Bhattacharjee first time introduced the division of compartment with boundary description by natural features such as streams, river ridges etc. It is important to note that no yield was prescribed in volume & hence over exploitation took place.In order to control the over exploitation the system of selection cum improvement felling with compensatory regeneration was introduced.

11.2.5 Post Bhattacharjee's Plan Period (1972-1997): The records available in the office of working plan Upper Assam Circle, Jorhat reveals that the revision of Bhattacharjee's Plan was initiated in the year 1975 but could not be completed even up to 1981. In the mean time Karimganj Forest Division was created during the year 1983 bifurcating the than Cachar Forest Division. This administrative re- organization required separate working plan for both Cachar and Karimganj Division and accordingly the job was entrusted to Mr. K. K. Gupta DCF, FRS Halflong in the year 1987 and accordingly to submitted the plan for Cachar Forest Division in the year 1990. The revision work of working plan for Karimganj Division was handed over to Mr. V. K. Vishnoi, IFS the then DFO, Karimganj Division, but no revision was completed as per new ground realities. In the year 1992 the Conservator of Forests Working Plan Circle, Assam decided to conduct fresh survey and accordingly Mr. A. M. Singh, IFS the than W.P.O. Jorhat was entrusted for 100% survey but was not completed. The subsequent incumbent initiated the survey during the year 1995-96 to 1997-98 based. on GIS

to revise the plan for Karimganj & Hailakandi Forest Division. However, the plan document of Mr. K. K. Gupta only covered the Hailakandi Forest Division.

11.2.6 K.K. Gupta's Plan Period (1991-2006): Mr. Gupta proposed two working circle viz. Protection Working Circle & Re-generation Working Circle. The Re-generation Working Circle assimilated the areas under previous local trade working circle & re-generation over lapping working circle and accordingly the Katakhal Reserve Forest was brought under Re-generation Working Circle and subsequently 100 ha. of energy plantation & 100 ha. of industrial plantation were raised in the Katakhal Reserve Forest.

11.2.7 M. K. Jadava's Working Plan (Bamboo) Period 1997-98 to 2000-01: This plan was prepared with an objective to supply bamboo to the Hindustan Paper Corporation Ltd. The yield of bamboo & the rate was fixed for the establishment of paper industry & as such the price of bamboo was nominal under heavy concession. The plan suggested for keeping aside 66.8% of bamboo stock considering the environmental protection wildlife habitat & to meet the local demand but practically no bamboo was legally provided to meet the local demand. On the other hand all accessible areas were over harvested by the Hindustan Paper Corporation under coupe system.This resulted in loss of habitat of wildlife. The elephants fled away from Barak Valley causing severe man animal conflict.The over harvesting of bamboo from the river banks resulted in heavy erosion, siltation landslide & ultimately ecological degradation.

It was also required to be mentioned that the Hon'ble Supreme Court of India pronounced the Judgment on dt. 12th December 1996 against the W.P.C No. 202/95 & 171/96 regarding the fixation of price with respect to Forest Produce supply to the any industry as per prevailing market rate, but this was not implemented & even the bamboo working plan expired during the year 2000-2001 which was further extended up to 2010. However, it is high time to revise the bamboo working plan & fix the price of bamboo supply to the industry as per prevailing market price in pursuance to the apex court direction.

11.2.8 Past Re-Generation History: The records reveal that the Artificial Re-generation was initiated over a plot of 5.6 acres during the year 1901 as Rubber plantation. During the year 1904 another plot in the same Lalcherra area was worked under Rubber & Jarul. Subsequently in the year 1908-09 another plot near Loharbond I.B. was also brought under Artificial Re-generation However, the proper restocking of forest area under massive plantation in Taungya system was initiated during the year 1918. The Mohanlal's Plan initiated compensatory plantation & P. N. Bhattacharjee introduced re-generation working circle. But in ground reality all such effort was not justified with the quantum of felling and removal of the timber. Subsequently due to population exploitation, shifting cultivation, heavy biotic interference, etc. the over exploitation of timber was further magnified along with the encroachment.

11.2.9 The M. K. Jadava's Working Plan (1998-99 to 2009-10): This was the 1st complete working plan prepared after creation of this forest Division. This plan comprises the following working circle viz. (a) Plantation & Protection Working Circle, (b) Jhum Re-habilitation Working Plan, (c) Survey Plantation Working Circle, (d) Bamboo Working Circle, (e) Non-wood Forest Produce Working Circle. The plan suggested the silvicultural treatment, yield, operation, plantation target, thinking operation etc. but the field implementation was not done as per prescription. The thinning operation & other silvicultural treatment was not done. The yield as prescribed was not operated. Due to violation of the prescription of Protection Working Circle heavy illegal felling, removal of timber was practiced alongwith the encroachment & enhancement of the Jhum Cultivation. The working plan in detail suggested the intensification of management towards Forest Villages but all such prescription were not implemented and as a result more land was illegally occupied by the Forest Villager beyond their allotted land resulting in encroachment.

This working plan in details prescribed intensive watershed management in favour of intensive & integrated watershed development for soil & water conservation. The fieldsurvey & records reveals that no such practice was initiated in watershed & catchments area and as a result the ecology of the Forest area got disturbed which needs immediate intensification of management over the Reserve Forest area of Katakhal & I.L.R.F . Mr. Jadava working plan suggested the organization of the administrative set-up with enhancement of the cadre strength & specifically prescribed various amenities for the Reserve Forest at interstate Assam- Mizoram Border. But unfortunately the suggestion was not implemented up to the mark though the records reveals the proposal for such administration set-up and amenities submitted by the DFO,Hailakandi Division during the month of May'2010 with subsequent reminder, which require immediate implementation.It is important to note that the two major Range Head Quarter viz. the Kukicherra & Matijuri Range located for away from the Reserve Forest boundary & immediateshiftingof Range Head Quarter is required with re-organization of the subordinate establishment as illustrated under Chapter-VI.

11.3 Joint forest management & community participation: The Joint Forest Management system was initiated in this Division during the year 2005 and till date 20 Nos. of JFMC are established in the forest area, under the Hailakandi FDA. The detailed list of the JFMC is shown in the table No.11.2.10. The JFMC actively participated in creation of plantation along with the major development activities.The community's amenities & plantations created under each JFMC since inception are illustrated in table below.

Table 11.3: Statement of JFMC and community participation in Hailakandi Division.

Sl. No.	Name of the JFMC	Community amenities				Plantation activities			
		Community Hall (In Unit)	Road (In K.M)	Ring Well (Unit)	Market Shed (InUnit)	Bamboo (In Ha.)	A.R (In Ha.)	ANR (Ha)	Other
1	Gharmurah F.V	1	2.40	10	1(Part)	157	110	40	-
2	Jacobpur F.V	1	3.35	8	-	162	85	75	5

3	Duttapur F.V.	-	3.35	2	-	35	30	35	2
4	Ramnathpur F.V.	-	3.35	3	-	97	40	30	-
5	Baruncherra F.V.	1	3.35	2	-	85	40	30	12
6	Jhalnacherra F.V	1	3.35	3	-	65	45	45	12
7	Kukicherra F.V.	-	3.35	4	-	40	30	10	16
8	Nunai F.V.	-	3.35	2	-	40	40	30	5
9	Lalcherra F.V.	-	3.35	4	-	52	30	35	10
10	Kacharithal F.V	1	2.40	3	1(Part)	30	45	55	10
11	Lalpani F.V.	-	2.40	6	1(Part)	52	40	30	7
12	Borthal F.V	1	3.35	6	-	30	45	50	5
13	Bilaipur F.V.	1	3.35	5	-	97	35	45	10
14	Dhalcherra T. P.	1	3.35	4	-	65	80	35	7
15	Dhalcherra F.V	-	2.40	10	1(Part)	143	50	15	10
16	Protappur F.V.	1	3.35	6	-	107	30	25	7
17	Noagong F.V.	-	3.35	7	-	55	45	25	7
18	Noxatilla F.V.	1	3.35	5	-	70	55	30	5
19	Old Bagbahar F.V.	-	3.35	5	-	132	40	35	10
20	New Bagbahar FV	-	3.35	5	-	101	25	25	10

11.4 Special works of improvement undertaken:

The last working plan suggested special improvement work such as fire protection, creation of plantation, soil & moisture conservation, water shed management, control grassing & like stock management, health and family welfare, Silvi-cultural experiment & resource, Paryavaran Vahini & other voluntary institution, Special MFP mohal, development of Assam Forest Force in all the vulnerable strategic points, re-organization of the administrative set-up, digital stock mapping, girth stock estimation, introduction of GIS system etc. but the records as well as field survey reveals that no such special important work was undertaken except creation of some plantation under NBM, NAP, Compensatory Afforestation, RDF. It is also notable that the last working plan that expired specifically suggested for discouragement of Teak plantation & the existing teak plantation shall be converted by selective bamboo plantation in form of Soil & Moisture Conservation. The presentation & suggestion for the improved work is not implemented.

11.4.1 Fire protection: In the last working plan it was prescribed and suggested to improve the fire protection measure considering the traditional Jhum practice, burning of bamboo wastage as collected by the HPC from the coupes along with the usual practices of fire line cutting. The field survey reveal ed that no such activities were undertaken during the last working plan period. In the interstate border areas the joint patrolling of the B.O.P personally & forest staffs required permanent footpath & for which the permanent fire line cum footpath can serve the both purposes of fire protection as well as patrolling footpath.This may further reduce the encroachment activities from the Mizoram side as well as prevention of Jhum cultivation across the border. Other area shall be isolated from the fire proof activities by cutting fire line at last along the block, compartment as well as separator line between the bamboo forests & other timber growing areas. It is also notable that thatch Mohals & broom stick mohals also exist in this Division & hence both the species are very susceptible to fire, therefore the separator cum fire line between the thatch mohal & timber growing area as well as between the broom stick mohal & tree growing area are also required.

11.4.2 Soil & moisture conservation: The last working plan specifically suggested Jhum rehabilitation Plantation & integrated water shed management, soil & moisture conservation, but the field survey & records revealed that no such activities were under taken during the last working plan period. It is also notable that the ecological condition of the reserve forest area has deteriorated resulting in soil erosion, land slide, siltation. The moe vulnerable area on the both side of the river Dholeswari & other water streams like Dholcherra, Lalacherra, Munshicherra, Rupcherra, Kukicherra, Jhalnacherra, Baruncherra, Katlicherra, Bagcherra, Gutgutinala,Kartikcherra, Boldaboldi, Moinanala etc. require intensification of water shed management through vegetative control measure.

11.4.3 Silvi-cultural experiment & research: There was one Silvi-cultural centre at Loharbond under this Division for conducting experiment in Katakhal Reserve Forest with an objective to study the bamboo, *Palaquium polyanthum*, *Pinus keysiana*, *Acquillaria agalocha*, Garjan, Sundi (three types), Cham, Jinary, Kurta, Engla, alongwith the NTFP such as Chalmugra, Dalmugra, Asmani Adha, Kalaholdi, Satkora, Jongli Joytun etc.etc. . But no research & silvi-cultural experiment is yet initiated with reference to I.L.R.F. At least two nos. of Silvi-cultural experiment & research plots measuring 5.0 ha. each is required , one at Loharbond for Katakhal Reserve Forest & other at Gharmurah in I.L.R.F. A permanent nursery (3Ha) is already under creation which can be expanded to 5.0 ha. for conducting such Silvi- cultural experiment & research purposes.Such plots may be also be developed & established at Gharmurah.

11.4.4 NTFP MOHAL: In Hailakandi Division bamboo coupe & thatch broom stick mohal are functioning but the commercialization of other NTFP like cane, Satkara, Chalmugra, Dalmugra, Jongli Joytun, Ashmani Adha, Kalaadha, etc. also have tremendous scope for commercialization. Therefore both aided natural regeneration & artificial re-generation shall be practiced to enhance the NTFTP collection and marketing etc.The broom stick may be cultivated under aided natural re-generation & artificial re-generation to the Jhum cleared area so as to protect soil & moisture. They are originally grown along with various variety of cane, Chattapata, Kittapata, etc. but natural re-generation retarded due to Jhuming & other biotic interferences.

11.4.5 JFMC: The Govt. of Assam set-up the rules called as Assam Joint (peoples participation forest management Rule 1998) based on the guideline under the Govt. of India and national Forest Policy 1988 and accordingly 20 Nos. of JFMC established and undertook various plantation works along with creation of community amenities. But the survey & records revealed that the contribution of JFMC towards protection/conservation/ management of the existing forest were not only poor but no action from JFMC or forest villagers was detected towards curbing the activities of timber smugglers & against other biotic interference such as mass cattle grazing, encroachment, Jhuming, illegal felling etc. it was also found as per records that land was allotted to the forest villagers and other tribals for the enjoyment of rights under Forest Rights Act. 2006, but no specific survey and separation of plots, Dag under permanent records of Jamabondi were adopted. Moreover, these forest dwellers had no contribution to the protection of forest land and forest resources. Therefore it is need of the moment to review the establishment/ expansion of such forest villages and providing the land right within the reserve forest.

11.4.6 Paryavaran vahini and other voluntary institution: The last working plan pointed out the constitution of Paryavaran Vahini (Green Brigade) and involvement of other eco-friendly voluntary organization to-wards protection and Environment of Forest, but neither the Green Brigade was constituted nor any formal involvement of other voluntary institution was deputed on this aspect. Due to the global human cry and the special situation of border encroachment, insurgency activities, organized timber smugglers in this division, the green brigade is most urgent &hence there should be specific direction from the Govt. of Assam for functioning of such Brigade The brigade may include the police & other paramilitary forces existing in the district Jurisdiction for effective functioning alongwith the leading citizen eco-friendly NGO & other development department.

11.4.7 District stock mapping and growing stock estimation: The last working plan though prescribed digital stock mapping and growing stock estimation but in practical field no such device was used & hence implementation of the prescription as per digital stock mapping and growing stock is very important

11.4.8 Application of G.I.S: During the last working plan every activity was to be brought under G.I.S & G.P.S system but the implementation was initiated for specifying the location of plantation establishment of nurseries etc. under G.I.S/ G.P.S. The proper training of the forest staff specifically forest line staffs are required and all physical feature such as river streams ridges various type of forest shall be transformed under the system.

11.4.9 Assam forest protection force: The last working plan specifically mentioned the kind of AFPF at all vulnerable strategic points but only ½ section of AFPF were deployed in this division. About 65 KM. of disputed interstate Assam-Mizoram border boundary passes through the reserve forest covering the remote inaccessible location. The Govt. of Assam has established 8 nos. of B.O.P camp but no Forest Beat is still established adjacent to the such B.O.P during the last working plan period. The D.F.O. of Hailakandi Division submitted the specific proposal for establishing Beats in entire B.O.P complex during the month of May'2011 to facilitate the joint patrolling towards protection of reserve forest land and forest resources.This type of proposal needs immediate implementation which enhances the cadre strength of forest line staffs considering special situation related to the interstate border areas.

11.4.10 Re-organization of administrative set-up: The last working plan specifically suggested for the re-organization of Beats, Sub-beats and Ranges considering the presence of administrative exigency but no such activities were under taken.

11.5 Past yield, revenue and expenditure:

In the last working Plan for the period 1998-99 to 2009 -10 neither any yield prescribed nor any departmental operation was carried out except against the diverted forest land where 94 nos. of trees were operated of 138.43f m^3 volume though the illegal felling The revenue earned during the last working period from the different sources is reflected in the Table below.

Table 11.5 Revenue Statement

Financial Year	Revenue generated (in Lac)	

	Timber	Bamboo	Sand & stone	MFP & others	Grand Total
2000-01	3,108	9,11,000	-	44,570	13,88,078
2001-02	10,76,434	4,55,500	1,33,908	3,67,534	20,33,376
2002-03	23,912	9,11,000	9,29,650	11,16,396	22,66,519
2003-04	12,52,674	36,53,328	5,30,977	1,87,172	56,24,511
2004-05	11,42,494	-	5,51,631	2,41,613	19,35,738
2005-06	3,65,061	-	78,575	6,02,943	1,06,579
2006-07	1,70,250	12,87,934	7,92,165	3,51,348	26,01,701
2007-08	14,18,140	21,94,602	2,74,680	3,65,155	42,52,577
2008-09	1,84,675	9,83,274	9,77,364	12,89,617	34,34,930
2009-10	1,41,577	3,34,204	12,54,130	10,95,188	28,25,099
2010-11	3,19,800	-	7,82,250	5,92175	16,94,225
2011-12	83,622	12,450	9,94,340	4,93,312	16,38,320
2012-13	16,47,208	1,30,133	20,787,02	11,25469	49,81,512
2013-14	8,93,629	2,75,580	11,08,1787	8,74,514	1,31,25,510
2014-15	473895	-	24930730	730498	26135123
2015-16	548647	32000	5537449	779831	6897927
2016-17	1405991	-	5288437	511109	7205537
2017-18	2623630	-	6679147	3771649	13074453
2018-19	1536088	-	5337360	2383816	9257264
2019-20	2577013	-	6562919	1413025	10552957

The year-wise and scheme wise expenditure statement is reflected in the Table in details. In this respect it was observed that the expenditure that incurred during the last working Plan period did not covered certain aspect specially the water shed and catchment area management, Jhum rehabilitation, water resource management and amenities of the staffs.

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CHAPTER 12

STATISTICS OF GROWTH AND YIELD

On verification of the records available in the division it was observed that no statistic of growth and yield was present in the last working plan.

12.1 History of growth statistics: On verification and scrutiny of the documents in Hailakandi, Cachar and Karimganj forest division no growth statistic was available. The past working plan had no growth statistic and refered P. N. Bhattacharjee's Plan 1957-58 to 1971-72 for growth and yield statistics. The field survey reveals that the prominent & major species of the Katakhal & I.L.R.F has been changed by reducing the stock like indigenous propound species of Cham *(Artocurpas Chaplasa)*. Three varieties of sundi i.e. Moricha Sundi *(Micallia Montana)*, Til or Jati Sundi *(Tallauma Phelocarpa)*, Champa Sundi *(Michalia champaca)*, Tula *(Tetrameles nudiflora)*, Garjan *(Diptarocarpus turbinatus)*, Holdi *(Adina Kordifolia)*, Engla *(Lallea grandis)*, Kaengla *(Bursera Serrata)*, Jinari*(Podocarpus nerrifoloa)*, Jarul *(Lagerstroemea flosreginae)*, Kurta *(Palaquium Polyanthus)* etc. However the Cham, Sundi, Garjan young regeneration exists with some mother trees along with the planted species of Teak consists of varies ages. The Silvi-cultural unit of Loharbond & Churaibari also but neither the sample plots exists nor maintaining any time to time data at present. Therefore the growth statistic assessment conducted by calculating and analyzing the various age groups plants belongs to Cham, Sindi, Garjan teak based of the field verification.

12.2 Calculation of growing stock: The Growing stock calculated under the field assessment is illustrated below for the major species of Cham, Sundi, Garjan, Tula & Teak etc.

Table 12.1: Statement of growth and increment of major species in Hailakandi Forest Division

Sl. No.	Age class	Increment & Growth at breast height dia					Remarks
		Cham	Sundi	Garjan	Tula	Teak	
1	2	3	4	5	6	7	8
1	5	0.40	0.45	0.80	0.85	0.30	
2	10	0.70	0.75	0.95	1.00	0.45	
3	15	1.00	1.05	1.15	1.20	0.55	
4	20	1.10	1.15	1.20	1.25	0.60	
5	25	1.20	1.25	1.50	1.35	0.80	

The above periodic increment each diameter determined as per field verification.

12.3 Girth statistic with reference to height: The field verification & assessment of the major species belonging to various age group reveals the following results.

Table 12.3: Statement of age and height of major species

Sl. No.	Age Class	Average height in meter					Remarks
		Cham	Sundi	Garjan	Tula	Teak	
1	2	3	4	5	6	7	8

1	5	3.00	3.10	3.50	3.60	2.50	
2	10	4.00	4.20	4.50	5.00	3.50	
3	15	4.50	4.70	6.50	6.60	4.25	
4	20	5.10	5.30	7.25	7.50	5.00	
5	25	5.50	6.00	8.00	8.20	5.50	

12.4 Growth statistic register & recording: The calculation of growth of each species shall be based on the growth register recordings based on the research & experimental plots. But due to absence of such plots in the Borak Valley growth statistics of the indigenous as well as exotic species are not available. The maintenance of such experimental & research plots is the need of the hour. Further silvicultural treatment, suitability of the species with reference to the heavy changes towards type of forests due to the biotic interference is required. Hence the necessity is elaborately discussed in chapter VII against the species improvement works.

12.5 Analysis of 80 nos. of sample plot were done with the help of NESAC and calculated the estimated timber volume and area against each compartment. The details are summarized below in Tale 12.5.

Table 12.5: Summary of Forest Crown Density and other Landuse Statistic of R.F (Ha)

Name of R.F	Land use Type	Crown Density				Others	Total
		D1	D2	D3	D4		
Inner Line R.F	Semi Evergreen Forest	13293.1	7909.68	7882.8	0		29085.58
	Evergreen Forest	428.42	561.94	1138.56	0		2128.92
	Mixed Moist Deciduous	0	0	0	0		0
	Moist Bamboo Brakes	0	0	0	0	2749.96	2749.96
	Plantation	0	0	0	0		
	Built up	0	0	0	0	1229.47	1229.47
	Agriculture	0	0	0	0	3515.95	3515.95
	Water bodies	0	0	0	0	467.11	467.11
	Riverine Sand	0	0	0	0	467.11	467.11
	Forest Blank	0	0	0	0	630.65	630.65
	Sub Total	**13721.52**	**8471.62**	**9021.36**	**0**	**8634.95**	**39849.45**
Katkhal R.F	Semi Evergreen Forest	2872.81	2744.56	2920.14	0	0	8537.51
	Evergreen Forest	**1.96**	**1.27**	0	0	0	3.23
	Mixed Moist Decidious	0	0	0	0	0	0
	Moist Bamboo Brakes	0	0	0	0	352.46	352.46
	Plantation	0	0	0	0	0	0
	Built up	0	0	0	0	1218.72	1218.72
	Agriculture	0	0	0	0	3428.94	3428.94
	Water bodies	0	0	0	0	445.43	445.43
	Riverine Sand	0	0	0	0	0	0
	Forest Blank	0	0	0	0	0	0
	Sub Total	**2874.77**	**2745.83**	**2920.14**	**0**	**5445.55**	**13986.29**
Total		**16596.29**	**11217.45**	**11941.5**	**0**	**14080.5**	**53835.74**

Table 12.5.a: Statement of estimated timber volume of R.F (CUM)

Nameof R.F.	Forest Type	Forest Density	Girth Class						Total
			G1	G2	G3	G4	G5	G6	
Inner Line Reserved Forest	Semi-Evergreen	D1	25933.40	58160.01	38730.63	5990.01	0.00	0.00	**128814.05**
		D2	18156.78	51353.98	20177.39	1670.05	0.00	0.00	**91358.20**
		D3	14647.82	48384.36	31055.84	3366.77	1354.54	0.00	**98809.33**
		D4	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Evergreen Forest	D1	1170.43	2029.53	1149.91	334.10	0.00	0.00	**4683.97**
		D2	1806.42	3950.35	1320.60	201.85	0.00	0.00	**7279.22**
		D3	2848.15	7274.07	3972.49	815.74	0.00	0.00	**14910.45**
		D4	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Plantation		0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Sub Total		**64563.00**	**171152.30**	**96406.86**	**12378.52**	**1354.54**	**0.00**	**345855.22**
Katakhal Reserved Forest	**Semi-Evergreen Forest**	**D1**	5604.57	12569.14	8370.18	1294.52	0.00	0.00	**27838.41**
		D2	6300.15	17819.19	7001.30	579.49	0.00	0.00	**31700.13**
		D3	5426.18	17923.70	11504.45	1247.21	501.77	0.00	**36603.31**
		D4	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Evergreen Forest	**D1**	5.35	9.28	5.27	0.00	0.00	0.00	**19.90**
		D2	4.08	8.93	2.98	0.00	0.00	0.00	**15.99**
		D3	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
		D4	0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Forest Plantation		0.00	0.00	0.00	0.00	0.00	0.00	**0.00**
	Sub Total		**17340.33**	**48330.24**	**26884.18**	**3121.22**	**501.77**	**0.00**	**96177.74**
	Total		**81903.33**	**219482.54**	**123291.4**	**15499.74**	**1856.31**	**0**	**442032.96**

12.6 Statistics of forest carbon stock: Compartment wise carbon stock contained in different reserve forests of Hailakandi Forest Division are mentioned in Table 66

Table 12.6: Compartment wise carbon stock in Hailakandi forest division

RF	Compartment	Area (in ha.)	Carbon (tons)
Innerlinel RF	GMIL1	530.9	2957.8
	GMIL10	805.4	4384.7
	GMIL11	1000.5	4572.3
	GMIL12	1133.6	4402.0
	GMIL13	1170.7	7392.0
	GMIL14	804.3	4765.6
	GMIL15	494.1	3159.3
	GMIL16	1372.7	8636.9
	GMIL17	756.1	5164.8
	GMIL18	562.1	2789.1
	GMIL19	553.7	2188.7
	GMIL2	592.4	3367.9
	GMIL20	929.9	5364.5
	GMIL21	883.1	4173.8
	GMIL22	977.6	4177.8
	GMIL23	554.1	2231.1
	GMIL24	725.5	3785.24
	GMIL25	531.9	2298.5
	GMIL26	337.10	1612.6

	GMIL27	912.4	4722.3
	GMIL28	668.6	2201.5
	GMIL29	738.5	4466.4
	GMIL3	1024.4	4664.60
	GMIL4	943.1	5546.13
	GMIL5	405.7	1511.41
	GMIL6	437.94	2111.12
	GMIL7	238.2	936.92
	GMIL8	451.8	2920.50
	GMIL9	401.0	2150.53
	KCIL1	1130.1	7325.37
	KCIL10	450.00	2462.02
	KCIL11	613.2	3143.56
	KCIL12	548.9	3375.22
	KCIL2	679.6	3688.88
	KCIL3	329.6	1892.61
	KCIL4	455.0	3197.75
	KCIL5	410.3	2208.00
	KCIL6	662.8	3841.74
	KCIL7	553.8	2938.34
	KCIL8	635.1	3318.29
	KCIL9	820.6	4273.64
	MJIL1	202.3	922.59
	MJIL10	618.8	3030.37
	MJIL11	705.9	3841.02
	MJIL12	721.7	4290.94
	MJIL13	400.6	2292.58
	MJIL14	550.1	3754.53
	MJIL15	467.2	2585.79
	MJIL16	690.2	4111.10
	MJIL17	522.6	3654.34
	MJIL18	442.6	3125.30
	MJIL19	302.1	1768.73
	MJIL2	416.9	3005.30
	MJIL20	565.6	3355.20
	MJIL21	589.2	3700.35
	MJIL3	499.2	2417.82
	MJIL4	504.8	2105.33
	MJIL5	571.5	2572.71
	MJIL6	722.1	2955.87
	MJIL7	755.9	3343.90
	MJIL8	826.7	4068.02
	MJIL9	534.0	3051.27
	KCKT1	373.2	2926.47
	KCKT2	648.7	4320.64
	KCKT3	415.8	1317.67

Katakhal RF	MJKT1	522.6	4035.70
	MJKT10	548.5	2465.18
	MJKT11	849.3	2248.22
	MJKT12	468.1	3960.59
	MJKT13	1011.1	5754.19
	MJKT14	889.3	4713.64
	MJKT15	952.7	5472.53
	MJKT16	764.9	4857.01
	MJKT17	556.4	2458.85
	MJKT18	1070.1	6318.14
	MJKT2	430.6	1714.27
	MJKT3	840.0	6662.51
	MJKT4	614.6	4455.72
	MJKT5	804.3	2439.17
	MJKT6	482.1	835.55
	MJKT7	531.2	843.76
	MJKT8	579.2	528.68
	MJKT9	627.7	1312.99

Table 12.6.a Forest carbon stock under different diameter classes

Dia Class(M)	Count of spp.	Carbon content
<0.1	260	17.59
0.1-0.2	11043	1870.92
0.2-0.3	6677	3251.57
0.3-0.4	1454	1531.70
0.4-0.5	554	1040.16
0.5-0.6	254	656.57
0.6-0.7	87	339.18
0.7-0.8	63	391.50
0.8-0.9	53	289.28
>0.9	62	700.74

VOLUME - I

PART II

FUTURE MANAGEMENT

CHAPTER - I

BASIS OF PROPOSAL

The Working Plan of Hailakandi Forest Division is a technical document prepared to manage the forests under Hailakandi Forest Division on sustainable basis. The overall objective of the Working Plan is to increase area under forest cover, enhance biodiversity, improve growing stocks and maintain the environmental stability in the areas under the Division.

1.1 Objectives of Management: The national goal is to have a minimum of one- third 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 are organized 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 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.

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 watercourses 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: 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. Working in convergence with other line departments for upliftment of socio economic condition of rural people shall be emphasized. Details are mentioned in para 9.15, chapter-9 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) To restock the depleted and degraded forests with its origin indegeneous variety of spaecies (Sal) 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 anthropogenioc factors.
iii) To improve of degraded habitat of wildlife ensuring availability of basic habitat formation criterias e.g, food, water and shelter. Biodiversity conservation shall be one of the prime agendas.
iv) To retain and enrich all the moist deciduous forests of comparatively poor value by raising plantations of more valuable indigenous species.
v) To protect the crests, ridges and steep slopes from the point of view of watershed management and soil conservation.
vi) To protect and preserve some of the miscellaneous forests in its present state to maintain bio-diversity by a system involving least disturbance to the forest cover.
vii) To raise plantations of timber species, fuel wood and minor forest produce with people's

participation for household requirement and economic upliftment of the communities who are bonafide residents of the Reserved Forests of the Division and also those living in the outskirts of the Reserved Forests & proposed Reserve Forests to save the Forests from rampant destruction.

viii) To improve the living conditions of tribals and forest dependent communities through sustainable harvest of non timber forest products.

ix) To protect the forest areas outside the Protected Areas (PA) for protection and conservation of wildlife.

1.2 Methods of treatment to be adopted: To attain at the above objectives and for ecological and silvicultural requirements for sustainable management of different identified forests it is suggested that the sylvicultural system to be adopted is a combination of **Irregular Shelter Wood system and Coppice system** for Sal and Teak Regeneration Working Circles.

Irregular Shelterwood system, structurally different from even-aged and balanced uneven-aged forest, is a silvicultural system most desirable for maintenance or restoration of irregular stand (forest) especially for ecosystem-based management. This silvicultural system is compatible with ecosystem-based management in forest types driven by partial stand mortality and gap dynamics and provides opportunities for maintaining old-growth forest attributes. This is a system involving successive regeneration with a long and indefinite period of regeneration. The aim is to produce more or less even aged crops.

Coppice system is an even-aged silvicultural system for which the main regeneration method is vegetative sprouting of either suckers (from the existing root systems of cut trees) or shoots (from cut stumps). This system is limited to hardwood species management. Artificial regeneration shall also be undertaken for filling vacant patches and gaps. This system is prescribed with the aim to nurture the coppieses coming up after rampant illegal felling occurred during previous couple of decades.

Though both the system are contradictory to each other, implementation of combination of these systems will create forest of heterogeneous nature bestowed with enriching biodiversity in as much as Irregular Shelterwood system deals with uneven-aged stands and Coppice system deals with even-aged forest.

Method of treatment shall be -

All treatments (Tending operation e.g., spacing, pruning, thinning, and improvement cutting) required for improvement of the forest shall be applied as pre-harvest silvicultural treatment. But there shall not be harvesting during this Working Plan period. The other general approach of treatments are-

i) The entire forests will be protected from harvesting.

ii) 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.

iii) Special habitat management for wildlife conservation will receive high priority. There are areas preferred by migrating, straying wildlife especially members of cat family.

iv) Hailakandi Forest Division has quite some riparian zones which need 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.

v) Preference will be accorded to natural regeneration and promising coppice growth will receive suitable tending and soil working to stimulate growth and development.

vi) Artificial regeneration will be used as supplementary activity, at places, where natural regeneration is inadequate or is not likely to succeed.

vii) 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.

viii) Local people will be actively involved in forest management, forest protection, plantations and development of natural resources in the village.

ix) Management of forests close to villages shall primarily be done through JFM committees.

x) Sustainable Non-Timber Forest Produce (NTFP) production will be given high priority in the forest management.

xi) 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.

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

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

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

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

xvi) 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 Preliminary Working Plan Report (PWPR) for Hailakandi Forest Division are as follows:

1. Joint Forest Management Working Circle.
2. Plantation and Regeneration Working Circle.
3. Forest Protection (overlapping) Working Circle.
4. NTFP overlapping Working Circle.
5. Soil and Water Conservation (overlapping) WorkingCircle.
6. Wildlife management overlapping WorkingCircle.

1.3.1 Justification for constitution of the Working Circles:

1. Joint Forest Management (Overlapping) Working Circle: With the prime objective of protecting the forest and its biodiversity**,** involvement of village community living in fringe villages is to be ensured. The past experience has taught a lesson that unless and until the people residing near forest are taken into confidence and their regular requirements are not

met up, there is very less possibility of achieving the desired results of bringing forest cover. This Working Circle has been constituted keeping in view of the dependency of local local people on forest and necessity to cater their domestic needs alongwith exploring employment opportunities for these people. The management of forests will be as per micro-plan prepared by the community through Participatory Rural Appraisal (PRA) with the technical help of the officials of the Forest department. The concept of this working circle will be participatory approach, participatory planning, participatory implementation and sharing of the usufructs as per "*The Assam Joint (Peoples' participation) Forestry Management Rules 1998*."

This Working Circle shall include the entire existing plantation in this division raised with the help of JFMCs under different schemes. The areas allotted to this Working Circle will mainly consist of fringe forest areas that are poorly stocked or encroached or productive blank areas. All the areas treated under this Circle along with the Microplan prescriptions shall be synchronized with the Working Plan prescriptions and the compartment boundaries shall be realigned according to boundary of village/ JFMC unit.

2. Plantation and Regeneration Working Circle

Plantation working circle to cover existing plantations done by the department, blanks and under stocked areas not suitable for ANR, clear felled areas, roadside, riverside, railway side areas and lands under compensatory afforestation etc. which are suitable for plantations have been identified and allocated to different years of plan period. Every effort willbe made to restore the ecology of such areas to their previous status. All the plantation areas focused on enhancement of the carbon stocks, register of such plantations under REDD+ is proposed. Periodic monitoring of carbon stocks in such areas requires support from the State government in the form of instruments and subject matter experts.

All the compartments having natural regeneration of different plant species will be protected. Canopy manipulation to be done to assist proper growth of the upcoming seedlings where the crop density is high or crop is well stocked. Protection measures like erection of fencing or digging of trenches, removal of *Michenia* spp. wherever required protecting the regenerations from biotic interferences.

The forest has been degraded in as much as important tree species have been exploited. Natural regeneration found limited because of various factors including biotic factors. It has become an urgent to restock the forest and as such this Plantation Working Circle has been constituted.

3. Forest Protection overlapping Working Circle

Forests of Hailakandi Forest Division are under tremendous pressure from encroachment, illicit felling, grazing besides other anthropogenic activities. As per Land use change analysis, significant forest area has been lost during last couple of decades.From the view point of forest protection, this Working Circle includes all the forest area compartments of Joypur reserve forest with forest cover above 70%. Such areas 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 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.

Status and health of dominant, predominant and associated species have been impoverized during last couple of decades. Number of mother trees per hectare are has become deficient. It is not feasible to prescribe harvesting in any part of the forest. It is of utmost necessity to preserve these trees for another span of 10-20 years. It is therefore decided to constitute Forest Protection overlapping Working Circle.

4. NTFP (overlapping) and Bamboo Working Circle

The NTFP Working Circle includes all areas allocated to the JFMC Working Circle. These are the forest areas or such other areas, which are fit for extraction of a particular NTFP at a rate, prescribed by the DFO 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. 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. This working circle will be an overlapping working circle covering all the areas where NTFP can be profitably managed in a sustainable manner through scientific managerial. The Main NTFP products that are being extracted are bamboo, Canes, Rattans etc. The collection of the materials from forest areas is proposed to be undertaken as per rules in vogue. Medicinal plant products are presently collected by the people freely from the forests which are not recorded and regulated by the department. All the potential NTFP which have marketable value should be surveyed and their protection and improvement works should be prescribed for sustainable management.

NTFP which includes bamboos, cane, rattans, various medicinal plants, vegetables, thatch are some livelihood needs of local people living in and arround forests. To cater the need of these people production of NTFP is necessary. As such constitution of NTFP (overlapping) and Bamboo Working Circle is justified.

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 inaccessible and difficult areas included as part 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. It is

needless to mention that bamboo can replace timber in most of its uses. The felling series adopted during previous plans shall continue for this plan period as well. The Katakhal-A felling series consists of Katakhal RF and a part of Inner Line RF. The Katakhal-B felling series consists of Dinonathpur, Bokabeel and Sulatani USFs, and a part of Inner LineRF.

5. 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 RF.'s of the Division and many streams and rivers originated from other states pass through the RFs of this Division. There are few wetlands, such as Missimibeel, etc. and many small water bodies within the reserve forests of the Division. 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.

Being the entire forest area of the division is flood prone; it is susceptible for soil erosion. Soil conservation in forest is a prerequisite for management of forest so far as growing of crops are concerned. On the other hand 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. As such the Working Circle namely Soil and Water Conservation Working Circle is constituted.

6. Wildlife Management and Biodiversity Conservation (overlapping) Working Circle

This will be on overlapping Working Circle to cover all the areas of the Division. The plan should prescribe measures for wildlife habitat conservation and identification of corridors for movement of elephants and their protection and management for reducing man-animal conflict. Ever increasing man-elephant conflict in a serious issue for the planners. There is a strong need of developing wild elephant habitat in almost all the RFs and civil areas of the Division to reduce man-elephant conflict. Rising population and shrinking habitat has led to increase in man – animal conflict and also resulted in maximum depredation to paddy and other agriculture crops raised by the people living near the forests. There is also necessity to bring some areas with water bodies and peripheral land mass into some special management under wet land conservation for proper management under this circle.

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 the time allotted for writing the plan.

Wild animals are very much prone to hunting and poaching besides facing survival challanges due to habitat loss. Human animal conflict is another concern to be addressed. There is urgent need to protect the wild animals from such threats. As such this Working Circle namelyWildlife Management and Biodiversity Conservation (overlapping) Working Circle is constituted.

1.4 Period of Working Plans and necessary for intermediate revision: The period of working plan will be for 10 years i.e. from 2023-2024 to 2032-2033. 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.

1.4.1 Implementing Authority: The Divisional Forest Officer, Hailakandi 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.

1.4.2 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 Bank aid or any other fund may also be utilized.

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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 figure 2.1.

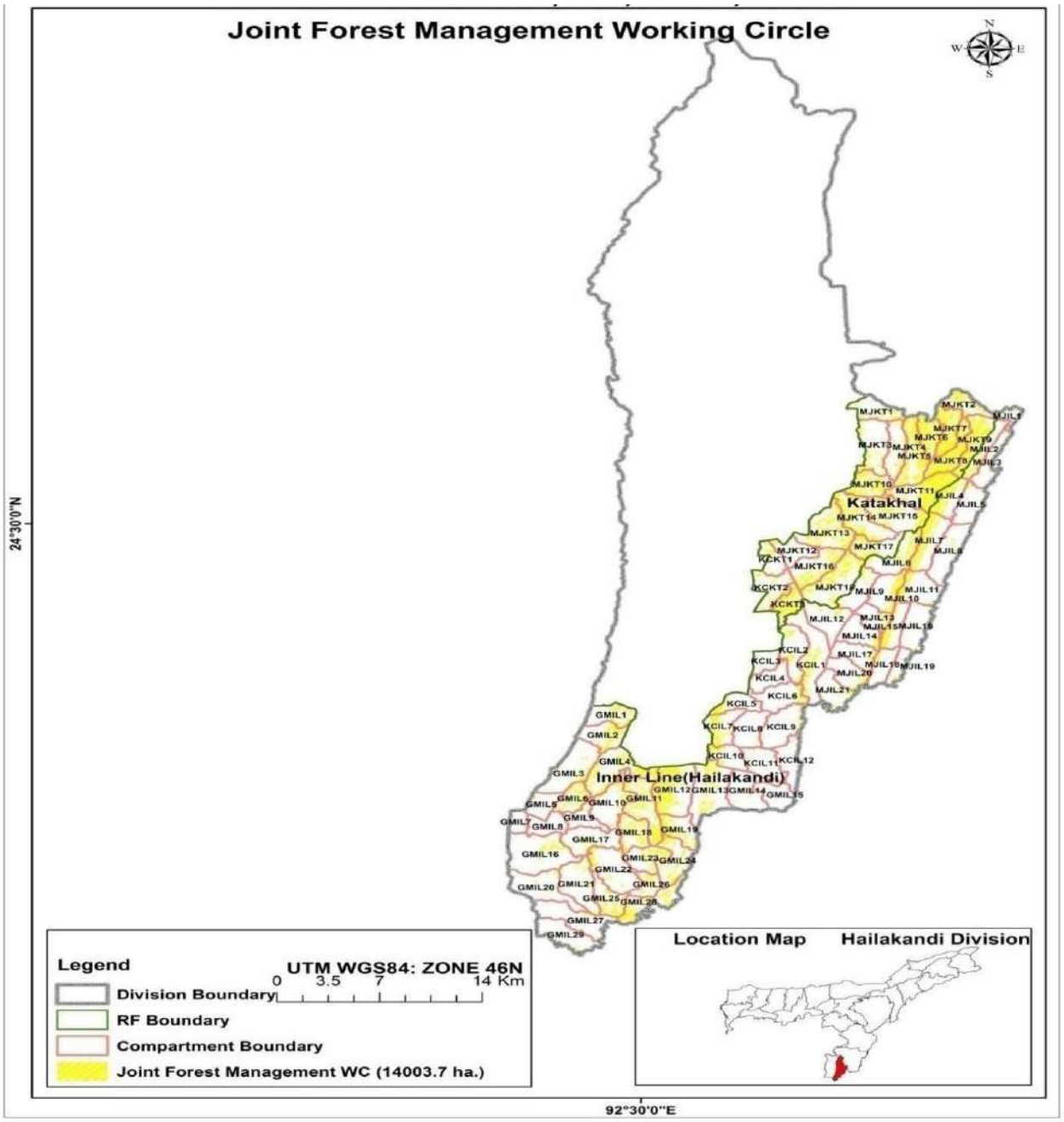


Fig. 2.1 Joint Forest Management Working Circle map of Hailakandi Division

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.

2.2 General constituents of the working circle: FringeVillages located within a span of 200m to 500m from degraded, and/or open forests areas are included in the JFMC Working Circle. In accordance with The National Forest Policy, 1988, local population that intrinsically depends on forest resources for their sustenance participates actively in protection and development of forest from which they derive benefits through the JFMCs. The areas allocated under this working circle adhere JFM principles as outlined by Govt. of Assam vide Notification No. FRW, 8/93/75 dated 10th November 1998, protection, maintenance and creation of plantations, by forming Forest Protection and Regeneration Committee of the willing villagers of the adjacent villages.

2.3 General character of the vegetation: The General characteristic as shown in the FSI map for vegetation and forest type map. The details composition distribution, density, growing stock and status of Regeneration reflected in the map, which has enclosed as sample survey based forest inventory under appendix.

Cachar tropical Evergreen Forest (1/1B/C3)

This is a Mesua – Palaquium- Diptrocurpus formation as classified by Raj Khowa, though in several pocket modified due to Jhuming and other biotic interferences. It is confined to the northern and estern aspects where slopes are steep and uncultivable mostly located in the water stream bench spreaded to the lower slope of the hillock. The endemic species of the formation are *Diptrocurpus terbinatus, Palaquiun polyamthum*. The species compositions narrated as –

Table: 2.3.a Composition of Forest

Sl.No.	Storeys	Species
1	Top & Middle story	*Artocurpus chaplasha, Michelia Montana, Tallauma phelocarpa, Micalia champaca, Diospyras topiosia, cynomentra polyandra, Masua ferria, Euphoria longaua sapium baccatum, Vatica Lancefolia, Canarium Spp., Hydnocarpus Kurzii, duabanga sonneratiodus, quercus spp., Podocarpus nerrifolia, Tetrameles nudiflora etc.*
2.	Bamboo	*Melocanna Vecciferra, Bamboosa Belcoa Teinostachyum dullooa, Oxytenantherra nigrociliata, Oxytenantueia albociliata etc.*
3.	Herbs/Shrubs	*Livistonia jenkinsiana, curucuma spp., clarodendrum spp., Holarrhena entidysendrum spp., Holarrhena entidysenterica, Homalomena rubsescens, Phrynium imbricatum, Licuala peltala, Upeterium spp., Pinanga gracitis, Alpinia nutans etc.*
4	Cane	*Daemonorps Jenkisianus, calamus latifolius, Calamus tenuis,*

		Calamus guruba.
5.	Climber	*Entada phaceoloibes, Delima sarmentosa, Acacia pinnata, Vitis planicaulics etc.*
6.	Grass	*Saccharum procerum, shaccharun spentaneum, Erianthuns rabeneac, Thysanolacna maxima, Impereta cylindrica.*

Cachar Tropical Semi-Evergreen Forest (2/2b/C2)

The top hill slope of the division were once occupied by the both Evergreen and Semi-Evergreen forest but due to the biotic interference some of the area converted to semi-Evergreen. The Southern and western slopes are mostly Semi-Evergreen forest comprising the *Artocarpus and Diptocarpus spps.* The original composition are changing due to Jhum cultivation / Cattle grazing/ illegal felling etc. and the area observe like moist deciduous in the dry reason. But in rainy season the vegetation appears as Semi- Evergreen into the following storeys-wise species.

Table: 2.3.a Composition of Forest

Sl. No.	Storeys	Species
1	Top & Second Canopy storey.	*Palaquiun spp., Cynometra spp., Enginias spp., vitex spp., Pterospermum acerifolium, petrigotalata, chukrasis veluntina, Terameles nudiflora, Adina Cardifolia, Protium Serratum, albizia procera, Premna vengalensis, Melinia arboria, Stuculiaalata, Cinnamomum spp., amoora Wallichii, dysoylum hamiltondi, Albizia Licida, Cedrela toona, cynometra polynandra, Antrocepallus Kadamba, Corbia myxa, Garuga Pinnata, Citrus hysthix, LeLegastromia perviflora, Bursera serrata, Ficus flomerata, Canarium Baglensis, Gicinia spp., Vaccaurea Sapida, Morus laevigata, Bombax spp., Dysoxylum spp., Mengiferra sylvatica, Schima wallichii, Terminalia, Belerica, ficus religiosa, Corium myxa, Astronius scholaris, hydrocaropus Kuurzii, Gynocordia odorata, Arotocarpus lakoocha, Cinnamomum glaudulifema Termilia chebula, Bursera sirrata, Mecaranga denticulate, starculiaalata, Terminialia myrocorpa, Holigarna longifolia, Bischofia jabanica, Banhiniaspp.*
2.	Bamboo	*Melocana besifera, Bamboos Balcoa, Teinosta chyumdullooa.*
3.	Herbs Shrubs	*Livistonia Jankinsiana, currucuma spp., Clarodendrum spp., Holarrhena entidysen teria, Homolomena rubsescens, phrynium imbricatum, Licuala peltala, upeterium spp., Pinanga gracilis, Alpinia nutans etc.*
4	Cane	*Daemonorps Jenkisianus, calamus latifolius, Calamus tenuis, Calamus guruba.*
5.	Climber	*Entada phaceoloibes, Delima sarmentosa, Acacia pinnata, Vitis planicaulics etc.*
6.	Grass	*Saccharum procerum, shaccharun spentaneum, Erianthuns rabeneac, Thysanolacna maxima, Impereta cylindrica.*

The above two major forest type are in very composite in nature and hence to avoid the indistinct differentiation and consequent upon Jhuming and biotic interferences the following local classification has been devised and reflected in the past Working Plan also as below –

Hill Type:

This type occurs on the hill ridges. 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.

Low Hill Type:
The composition found as Tula, Kadam, Awal, Jamuk, Nageswar, Bonak, Ramdala, Bohera, Ping, Sundi spp etc alongwith bamboo in some overlappingarea.

Alluvial Type:
This type occurs on flat land on the both side of the water stream. The most of the area allotted to the forest villagers/ forest right holders and open forest exists with the species sporadically simul, Tula, Kadam, Bohera, Dhuna, Tejpat, Jamuk, Dea cham, Alstonia, Boroi alongwith few patch of bamboo.

Swamp Type:
This type occurs in ecotone zones where the hill ranges marges with the alluvial flats. The species like Tara, Ekra, Nall, Khogra, Mized with Lagastromi, Paruti etc. The wet land also exists in this local type.

Bamboo Brakes:
There are about a numbers of bamboo species exists on this local type spreading over both Evergreen and Semi-Evergreen forest area in some patches only the pure bamboo exists and in some patches mix with the tree species. The bamboo felling series constituted over this local bamboo brakes.

Cane brakes:
There are four important varieties of came i.e. Golla, Horna, Jhali, Sundi, available but the density is less due to over exploitation. On proper protection measures the regeneration will come under aided regeneration system. The open area are covering with various thatch species and specially the broom (Rehma).

2.4 Special objectives 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, agriculture cash crop, animal husbandry, bee keeping etc. for economic development of rural people. 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.

The broad objective of this working circle is to protect forest and biodiversity alongwith socio-economic development of fringe forest villagers. Specific objectives include -

1. To motivate and convince local people about the moto of the forest department to protect the forest and simultaneously to uplift socio-economic condition of the people and

thereby ensure involvement of local people for protection, conservation and management of forests.

2. 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. And 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.
3. To empower village communities to play a crucial role in forest resource conservation and enable them to resolve their issues and problems. People shall be made aware about the benefits of conserving and improving the quality of their plantations against the backdrop of climate change negotiations, particularly, REDD+.
4. To reclaim the degraded forests by promoting natural and artificial regeneration (through plantation activity) with active participation of the villagers.
5. To document the indigenous traditional knowledge and incorporate the same in the micro-plans of the JFMCs.
6. To assess the possibility of converting these areas into production areas in the long run, as envisaged by the NWPC, 2014.
7. To associate the people of JFMCs with identification, documentation and implementation of ecotourism activities.
8. To analyse the past working of JFMC and suggest suitable policy modifications required for more effective functioning of JFMCs.
9. To win over people so that they become willing partners in protection of forests both within and outside the JFMC areas.
10. People interested in taking up plantations that are commercially viable in their private lands would be given technical guidance as well as seedling support to raise such plantations.

2.5 Blocks, compartment and JFM areas: Blocks, compartment and the area to be covered in this working circle is provided in Table 2.5a. Further, Table 2.5b provides the list of JFMCs

Table 2.5.a: Block, compartment area to be protected and covered under the working circle

RF	Compt	Compt area	JFMC
Inner Line	GMIL1	530.94	150.00
Inner Line	GMIL2	592.48	190.00
Inner Line	GMIL3	1024.49	-
Inner Line	GMIL4	943.12	350.00
Inner Line	GMIL5	405.7	-
Inner Line	GMIL6	437.94	200.00
Inner Line	GMIL7	238.25	-
Inner Line	GMIL8	451.8	-
Inner Line	GMIL9	401.04	-
Inner Line	GMIL10	805.44	150.00
Inner Line	GMIL11	1000.54	650.00
Inner Line	GMIL12	1133.62	615.00
Inner Line	GMIL13	1170.79	250.00
Inner Line	GMIL14	804.38	-
Inner Line	GMIL15	494.18	-

Inner Line	GMIL16	1372.79	100.00
Inner Line	GMIL17	756.15	100.00
Inner Line	GMIL18	562.1	200.00
Inner Line	GMIL19	553.76	225.00
Inner Line	GMIL20	929.9	-
Inner Line	GMIL21	883.13	100.00
Inner Line	GMIL22	977.6	-
Inner Line	GMIL23	554.11	300.00
Inner Line	GMIL24	725.56	425.00
Inner Line	GMIL25	531.9	200.00
Inner Line	GMIL26	337.1	100.00
Inner Line	GMIL27	912.45	-
Inner Line	GMIL28	668.61	250.00
Inner Line	GMIL29	738.54	-
Inner Line	KCIL1	1130.12	200.00
Inner Line	KCIL2	679.65	100.00
Inner Line	KCIL3	329.61	-
Inner Line	KCIL4	455.08	-
Inner Line	KCIL5	410.37	75.00
Inner Line	KCIL6	662.89	75.00
Inner Line	KCIL7	553.86	300.00
Inner Line	KCIL8	635.17	-
Inner Line	KCIL9	820.6	-
Inner Line	KCIL10	450	100.00
Inner Line	KCIL11	613.25	-
Inner Line	KCIL12	548.92	-
Inner Line	MJIL1	202.35	-
Inner Line	MJIL2	416.91	-
Inner Line	MJIL3	499.29	75.00
Inner Line	MJIL4	504.8	400.00
Inner Line	MJIL5	571.52	-
Inner Line	MJIL6	722.14	250.00
Inner Line	MJIL7	755.99	300.00
Inner Line	MJIL8	826.7	-
Inner Line	MJIL9	534.02	-
Inner Line	MJIL10	618.81	200.00
Inner Line	MJIL11	706.95	200.00
Inner Line	MJIL12	724.72	-
Inner Line	MJIL13	402.66	100.00
Inner Line	MJIL14	554.12	-
Inner Line	MJIL15	467.25	200.00
Inner Line	MJIL16	690.98	100.00
Inner Line	MJIL17	522.68	75.00
Inner Line	MJIL18	442.67	100.00
Inner Line	MJIL19	302.13	-
Inner Line	MJIL20	565.6	100.00
Inner Line	MJIL21	589.23	-
Katakhal	KCKT1	373.2	75.00
Katakhal	KCKT2	648.75	150.00
Katakhal	KCKT3	415.87	300.00

Katakhal	MJKT1	522.63	425.00
Katakhal	MJKT2	430.63	200.00
Katakhal	MJKT3	840.09	150.00
Katakhal	MJKT4	614.64	160.00
Katakhal	MJKT5	804.31	500.00
Katakhal	MJKT6	482.1	430.00
Katakhal	MJKT7	534.09	450.00
Katakhal	MJKT8	579.26	510.00
Katakhal	MJKT9	629.95	500.00
Katakhal	MJKT10	548.58	425.00
Katakhal	MJKT11	849.32	620.00
Katakhal	MJKT12	468.09	50.00
Katakhal	MJKT13	1011.11	425.00
Katakhal	MJKT14	889.3	400.00
Katakhal	MJKT15	952.77	375.00
Katakhal	MJKT16	764.96	260.00
Katakhal	MJKT17	556.46	175.00
Katakhal	MJKT18	1070.18	390.00
Total		53835.74	14475.00

Table 2.5b: List of JFMC of the Division

Sl. No.	Name of the JFMC	No. of household	Plantation created in past (in Hac.)	Total area initially allotted for management	Area allotted for protection In current WP	Area earmarked for plantation
1	Ghamruah	430	302	1000	1000.00	462
2.	Jaccobpur	324	322	900	1000.00	482
3.	Duttapur	92	150	350	500.00	310
4.	Ramnathpur	18	197	197	450.00	357
5.	Naxatilla	61	175	240	400.00	335
6.	New Bagbahar	140	121	500	650.00	281
7.	Old Bagbahar	155	167	600	750.00	327
8.	Pratappur	268	132	950	1100.00	292
9.	Naogaang	160	125	500	650.00	285
10	Dhalcherra	276	212	950	1100.00	372
11.	Dhalcherra Tripra Punji.	90	180	360	600.00	340
12.	Borthal	279	135	950	1100.00	295
13.	Bilaipur	187	147	650	800.00	307
14.	Kacharithol	79	130	310	600.00	290
15	Lalcherra	125	117	475	625.00	288
16	Lalphani	209	142	800	900.00	302
17	Nunai	87	90	348	550.00	260
18	Jhalnacherra	52	165	350	550.00	325
19	Kukicherra	38	110	150	550.00	270
20	Baruncherra	99	160	450	600.00	320
Total		**3169**	**3299**	**11030**	**14475.00**	**6500**

2.6 JFMCs in Hailakandi Forest Division:

2.6.1 Background: The National Forest Policy 1988 envisages massive people's movement for conservation of forest resources. The Govt. of India issued directions to all the State

Governments vide letter no. 621/89-PP dated 1st June 1990 regarding framework for creating massive people's movement through involvement of village communities in the protection and management of degraded forest lands. The Ministry of Environment & Forests of Govt. of India issued circular no. 22-8/98-FPD dated February 11, 2000 and no. 22-8/2000-JFM (FPD) dated February 21, 2000 in which detailed guidelines are incorporated for the Joint Forest Management Programme. The Govt. of Assam also issued guidelines to constitute "JFM Committees realizing the fact that forest protection can not be achieved without active participation and cooperation of local people. The quality of forests is degraded near human habitations and protection of these areas cannot be achieved unless there is people's participation and cooperation. The villagers with homogenous population and forest areas having sizable population of SC and ST and other economically dependent people shall be given preference to be included in JFM. Details of JFMCs (Name and area projected) are given in table 8.1.a in Chapter-8, Details of empowerment of JFMCs are in Table 8.2.a, Summary of welfare activities are in Table. 8.2.b, details of labour welfare measures taken under forest village development scheme for the year 2007-08 are in Table.8.3.a, allotment of fund for development activities of Hailakandi FDA for the year 2009-10 are in Table.8.3.b,

2.6.2 Need for Implementation of JFM: In consonance with National Forest Policy 1988, special emphasis is given to JFM due to increasing biotic pressure, depletion of soil due to soil erosion and degradation of forests. Demand is increasing for timber and fuel wood. Heavy grazing pressure, diversion of forest land for agriculture, industries, housing and irrigation projects etc are putting strain on forests. To check further loss of forest cover and forest area and to regenerate the degraded forests, the below mentioned aspects are given thrust while implementing JFM Programme.

(1) Protection and management of forests by developing a sense of ownership and belongingness of forests among the local people, to regenerate degraded forest areas with the active participation of local people.
(2) Increasing the vegetation cover and to carry out soil and moisture conservation works with the active co-operation of local people.
(3) Involving local people in forest protection and to provide tangible and intangible benefits in lieu of their cooperation in forest protection.

2.6.5 Details of villages under JFM in Hailakandi Forest Division: Number of JFM committees in division is 20. Area allotted initially for protection Plantation area 11030 hectare. The population depends on agriculture and allied activities for the livelihood and most of the SC, ST population are land less and work as agricultural labourers. The population adjoining forests mostly depend upon forests for day to day needs, naturally causing pressure on forests. The cattle population also cause lot of pressure on forests for grazing. The local people hardly utilize this area for stall feeding of their cattle. In some pockets grazing by sheep and goats is noticed and they cause extensive damage to the regeneration. Apart from local cattle, migratory cattle also exert pressure on forests in this Division. The most important factor for the implementation JFM is willingness of the local people to participate in these activities. In this regard the guidelines stipulated in "The Assam Joint (Peoples Participation) Forestry management Rule-1998" shall be followed. At present out of 20 committees constituted in the division, forest area of 14003.63 hect is allotted for protection and 6500 hect is earmarked for plantation and other activities. Any deviation shall

be required sanctioned from the competent authority. The participation of woman in JFM shall be encouraged.

2.6.6 Compartments and felling series: Implementation of the prescriptions under this WC is completely voluntary and it is based on willingness of the villagers, therefore neither compartments are allotted nor felling series are formed. It is an overlapping WC which encompasses a good forest area of the division. The microplans prepared for the area allotted to a particular village of JFM committee shall be in consonance with the prescriptions given for that area under this working plan. Any deviation from the plan requires permission of the competent authority.

2.6.7 Principles and ethics: Certain principles and ethics should be as follows as per guidelines for the implementation of JFM in any village.

(1) Eco-system conservation and sustainable use of resources is the goal of resource management.
(2) To enable development of strong institutional system in the long run for JFM implementation it is necessary to have participatory and democratic structure.
(3) Open communication system and gender equity is of the prime concern.
(4) Management responsibility and benefit sharing in relation to traditional usage should be ensured.
(5) The community shall take the responsibility to maintain the system.
(6) Effective conflict resolution should be ensured.
(7) Traditional rights and uses shall be respected and rational approach should be adopted in accepting or rejecting same.
(8) Discrete jurisdiction and proper terms of agreements should be ensured.
(9) Effective monitoring and appraisal systems should be adopted.

2.7 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. DFO, Hailakandi Forest Division shall prepare Microplans for the area to be assigned to concerned JFM Committee as provided in the The Assam Joint (Peoples Participation) Forestry management Rule-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.

2.7.1 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.

2.7.2 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 visits to successful areas shall be arranged to explain about the protection of forests and achievements in other villages. A comprehensive fire 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.

2.7.3 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 formalizing participatory management.

2.7.4 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 by JFMC
c) Share in proportion to the period of management in high forests managed by JFMC
d) 50% of net revenues to be reinvested in forestry works - a step towards sustainability of JFMCs.

2.7.5 Proposed activities under JFMC working circle:

1. Raising of grafted fruit plants in forest areas, nearby fringe villages.
2. Raising of fast growing timber yielding species such as Azar, Tita sopa, Kadam, Bandordima, Hatipoliya, etc. endemic to the division.
3. Raising of firewood species - Kadam, Simalu.
4. Development of nurseries for local forest species with technical guidance from the forest department.
5. Training on bamboo and cane based skill development training for providing employment opportunities.
6. Developing participatory catchment area treatment plans in area under Hailakandi Forest Division along the catchment of those *suti's* (river course) flowing from the Khasi and Jaintia hills. DFO should conduct field investigations and initiate watershed development projects. Looking at the sociocultural conditions in that area promotion of fishery, poultry with compulsorily forestry activities in the JFMC villages be initiated under the watershed projects.
7. Developing medicinal plants saplings and its plantation on their homesteads.
8. As entry point activities promotion of improved cooking mechanism - biogas, improved chullas, solar lamps etc.
9. Eco-tourism activities shall be developed in the Eco-tourism spots mentioned in para 8.6 (Part-I).

2.7.6 Additional Prescriptions under JFMC working circle:

i) Forest department staffs with active participation of JFMC conduct PRA exercises and develop microplans for the socioeconomic 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 least quarterly.
iii) NTFPs to be collected and sustainably harvested from forest fringe areas under the JFMC and shall be sold by the concerned JFMC.
iv) Continuous efforts should be made to create and sustain the JFMC movement by creating required awareness among the people and the staff through training programmes.
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 be

cultivated.

vi) JFMC areas to practice minimum tillage, organic formulations.

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 micro plans.

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

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

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

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 followed strictly.

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 land resources.

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

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 this process.

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 other departments.

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

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 other areas.

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

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 planning devices.

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

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 be in conformity with National Forest Policy and Forest Conservation Act.

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 superceded the Working Plan of that area to that extent.

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 their jurisdiction.

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) Act 1980.

Annual targets of JFMC (Overlapping) Working Circle for the Plan period:

Prescribed activity	**Physical target over a period of ten years**									
	Y1	**Y2**	**Y3**	**Y4**	**Y5**	**Y6**	**Y7**	**Y8**	**Y9**	**Y10**
Plantation with nursery and entry point activity: Plantation = 6500 hect	650	650	650	650	650	650	650	650	650	650
Maintenance 22750 hect	-	650	1300	1950	2600	3250	3250	3250	3250	3250
JFMC training and awareness programmes for the period of 2019-2020 to 2028-2029. (4 programs twice a year for ten years, each programme 30 persons). a) 40 training.	4	4	4	4	4	4	4	4	4	4
b) 40 awareness programme.	4	4	4	4	4	4	4	4	4	4
Ecotourism development	5	5	5	5	5	5	5	5	5	5

CHAPTER 3

PLANTATION AND REGENERATION WORKING CIRCLE

3.1 Name of the working circle:

Name of the Working Circle is "Plantation and Regeneration Working Circle". The detail map of this Working Circle is shown in Figure 3.1.

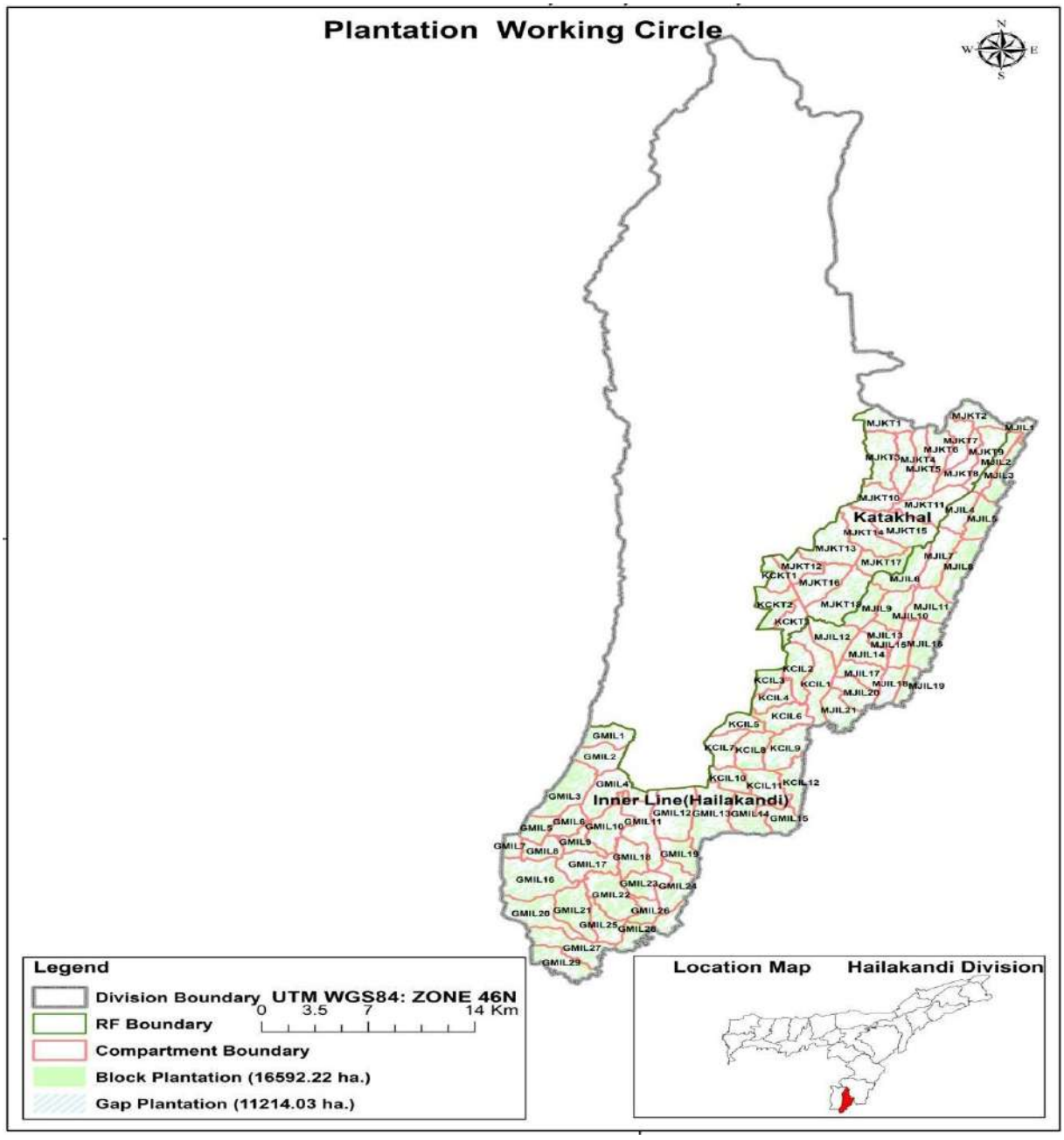


Fig. 3.1. Plantation working circle map of Hailakandi Division

3.2 General constituents of the working circle:

Forest areas with density less than 40% will be covered under this working circle. Catchment and watershed areas, river banks, forest floor and areas susceptible to soil erosion shall be covered in this Working Circle. Existing plantations areas but not been successful, blanks and under stocked areas not suitable for ANR, Road side, Railway side areas and lands under compensatory afforestation etc. which are suitable for plantations will be identified and allocated to different years of plan period. The main objective will be to improve the forest cover with indigeneous tree species. For regeneration special emphasis will be given to improve the status of flagship species, its allied species and endemic species in the Division.

The plan is focused to enhance the growing stock through this Working Circle with an aim to make a significant carbon pool and improve the flow of ecosystems services and also improve socio-economic conditions of the forest fringe populations. Every effort shall be made to restore the ecology of such areas to their previous status. All the plantation areas shall focus on enhancement of the carbon stocks. Efforts shall be made to register such plantations under REDD+.

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.

3.5 Blocks, compartment:

A total of 27,806.25 hectares are allocated under this Working Circle. RFs and compartment and the area under block plantation and Gap plantation to be covered in this working circle is provided in the table 3.5.

Table 3.5: Blocks and Compartment allotted for Plantation and Regeneration Working Circle

RF	Compartment	Compt area	Plant WC
Inner Line	GMIL1	530.94	300.00
Inner Line	GMIL2	592.48	300.00
Inner Line	GMIL3	1024.49	700.00
Inner Line	GMIL4	943.12	400.00
Inner Line	GMIL5	405.7	300.00
Inner Line	GMIL6	437.94	190.00
Inner Line	GMIL7	238.25	120.00
Inner Line	GMIL8	451.8	300.00
Inner Line	GMIL9	401.04	230.00
Inner Line	GMIL10	805.44	400.00
Inner Line	GMIL12	1133.62	300.00
Inner Line	GMIL13	1170.79	650.00
Inner Line	GMIL14	804.38	550.00
Inner Line	GMIL15	494.18	300.00
Inner Line	GMIL16	1372.79	800.00
Inner Line	GMIL17	756.15	400.00
Inner Line	GMIL18	562.1	300.00
Inner Line	GMIL19	553.76	300.00
Inner Line	GMIL20	929.9	600.00
Inner Line	GMIL21	883.13	600.00
Inner Line	GMIL22	977.6	600.00
Inner Line	GMIL25	531.9	320.00
Inner Line	GMIL26	337.1	200.00
Inner Line	GMIL27	912.45	600.00
Inner Line	GMIL28	668.61	400.00
Inner Line	GMIL29	738.54	450.00
Inner Line	KCIL1	1130.12	620.00
Inner Line	KCIL2	679.65	390.00
Inner Line	KCIL3	329.61	250.00
Inner Line	KCIL4	455.08	260.00
Inner Line	KCIL5	410.37	200.00
Inner Line	KCIL6	662.89	400.00
Inner Line	KCIL8	635.17	275.00
Inner Line	KCIL9	820.6	395.00
Inner Line	KCIL10	450	220.00
Inner Line	KCIL11	613.25	300.00
Inner Line	KCIL12	548.92	325.00
Inner Line	MJIL1	202.35	130.00
Inner Line	MJIL2	416.91	260.00
Inner Line	MJIL3	499.29	380.00
Inner Line	MJIL5	571.52	435.00

Inner Line	MJIL6	722.14	470.00
Inner Line	MJIL7	755.99	295.00
Inner Line	MJIL8	826.7	520.00
Inner Line	MJIL9	534.02	415.00
Inner Line	MJIL10	618.81	370.00
Inner Line	MJIL11	706.95	420.00
Inner Line	MJIL12	724.72	415.00
Inner Line	MJIL13	402.66	215.00
Inner Line	MJIL14	554.12	300.00
Inner Line	MJIL15	467.25	210.00
Inner Line	MJIL16	690.98	500.00
Inner Line	MJIL17	522.68	265.00
Inner Line	MJIL18	442.67	245.00
Inner Line	MJIL19	302.13	160.00
Inner Line	MJIL20	565.6	270.00
Inner Line	MJIL21	589.23	325.00
Katakhal	KCKT1	373.2	210.00
Katakhal	KCKT2	648.75	380.00
Katakhal	MJKT2	430.63	230.00
Katakhal	MJKT3	840.09	370.00
Katakhal	MJKT4	614.64	315.00
Katakhal	MJKT5	804.31	300.00
Katakhal	MJKT12	468.09	200.00
Katakhal	MJKT13	1011.11	400.00
Katakhal	MJKT14	889.3	300.00
Katakhal	MJKT15	952.77	400.00
Katakhal	MJKT16	764.96	420.00
Katakhal	MJKT17	556.46	300.00
Katakhal	MJKT18	1070.18	580.00
Total		**53835.74**	**25250.00**

3.6 Special object of Management:

Priority objective cum prescription

● To create and protect the plantation in open/ moderate/ jhum/ degraded forest area encouraging the indigenous species.

● The Carbon stock and REDD conception will be looked into during the creation of plantation.

● To encourage the private individual for creation of plantation in their own land under proper registration.

● To cover up the vacant community land by suitable plantation.

● To make proper planning planting in the available in the road side, river side, canal side, railway side. To assess the existing trees available outside the forest area and creation of people awareness for affective management.

Methodology

● By preparing the active plan with respect to all the areas suitable for plantation.

● To take up the matter with the Panchayat Raj Institution for creation of plantation outside the forest area as the provision exists in the Panchayat RahAct.

● By creating sensitiveness at the district level for creating plantation in all suitable outside the forest area.

● To create awareness regarding Climate change/ Global Environmental crisis and the duties of the citizen under Articles – 51 (A) of the Constitution.

3.7 Regeneration

Natural 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.

3.7.1 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.
i) Silvicultural practices to be adopted to enhance the growing stock and carbon sequestration of the forest.

3.7.2 Method of treatment

Gorjon being a shade bearing species in the early stage prefer diffused light and moist conditions with well drained soils. Two-storeyed 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.

3.7.3 Prescriptions: The following prescriptions are recommended for the 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 given below.

3.8 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 manupulation works may be undertaken subject to mid term deviation with approval of the PCCF.

3.8.1 Thinning:

Thinning is considered as principal tending operation. The aim of thinning is to achieve appropriate stand density and enhance diameter growth. Hailakandi Forest Division, there is provision for thinning in each compartment. The 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 alternative diagonals.
ii. Second mechanical cum silvicultural thinning at the 20th year by retaining about 50% by marking the trees silviculturally in the alternate lines.
iii. First silviculture thinning at the 30^{th}year (leaving about 35% of the balance trees).
iv. Second silviculture thinning at the 40^{th}year (leaving about 15 % of the balance trees).

3.8.2 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.

3.8.3 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 should 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

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 of the same plantation where overall number of trees per ha. is less in that case desirable 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.

Table 3.7.a: Target of Achievement during W.P Period

Activity	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Plantation and regeneration works 25250 hect	2525	2525	2525	2525	2525	2525	2525	2525	2525	2525
Maintenance upto 5th year	-	2525	5050	7575	10100	10100	10100	10100	10100	10100

Table 3.7.b: Overview of month-wise work to be

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 3.7.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

3.9 Associated Regulation and measures:

The associated regulations measures required due to the heavy biotic interference over the forest area in the Hailakandi Forest Division narrated as below:-

- The cattle grazing over the Reserved Forest area shall be totally prohibited for the

cattle belongs to revenue villages.

- The cattle belong to JFMC/ Forest Right holder shall practice control/ stall feeding instead of open grazing over the regeneration fores tarea.
- The illegal fuel wood collection/ NTFP collection by the revenue villagers shall be strictly prohibited.
- The fuel/ fodder/ NTFP/ Medicinal and aromatic plants shall be allowed to the JFMC/ Forest Right holder beneficiaries under the proper record and in pursuance of micro plan/ enforced Acts and Rules with respect to the prescribed silvi-cultural systemonly.
- Regarding soil and moisture conservation the vegetative cover shall not be disturbed and in both side of the water stream there shall not be any felling upto 100metres.
- The encroachers/ illegal occupant shall be ejected immediately.
- The Jhum cultivation shall be stopped under jhum rehabilitation programme to the bonafide forest dweller and mala-fide jhumer shall be evicted.
- The illegal felling shall be dealt seriously under the enforced Acts and Rules with close co- operation from the civil/ Police/JFMC/ Forest Right holder and much public concern.
- There is no such vulnerability of forest fire but the intentional fire over the thatch/ broom area and in the jhum cultivated location. Hence the strict vigil shall be conducted in the dry season specifically over the thatch/ broom and jhum cultivated area. The fire map and mitigation measures shall be formulated under the Annual Action Plan from the DFO Territorial concern.
- The other restriction like top hill/ strips stops/ vulnerable soil eroded area like river/ stream bank shall be practices by restricting the felling/ earth cutting/ mining of any Minor Minerals like sand and stone.

Table 3.7.d: Sequence of regeneration proposed
(Year-wise Plantation activities in Compartments)

RF	Compt	Area of WC	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
Inner Line	GMIL1	300	30	30	30	30	30	30	30	30	30	30
Inner Line	GMIL2	300	30	30	30	30	30	30	30	30	30	30
Inner Line	GMIL3	700	70	70	70	70	70	70	70	70	70	70
Inner Line	GMIL4	400	40	40	40	40	40	40	40	40	40	40
Inner Line	GMIL5	300	30	30	30	30	30	30	30	30	30	30
Inner Line	GMIL6	190	20	20	20	20	20	20	20	20	15	15
Inner Line	GMIL7	120	10	10	10	15	10	10	10	15	15	15
Inner Line	GMIL8	300	30	30	30	30	30	30	30	30	30	30
Inner Line	GMIL9	230	25	25	25	25	20	20	20	20	25	25
Inner Line	GMIL10	400	40	40	40	40	40	40	40	40	40	40
Inner Line	GMIL12	300	30	30	30	30	30	30	30	30	30	30
Inner Line	GMIL13	650	65	65	65	65	65	65	65	65	65	65
Inner Line	GMIL14	550	55	55	55	55	55	55	55	55	55	55
Inner Line	GMIL15	300	30	30	30	30	30	30	30	30	30	30
Inner Line	GMIL16	800	80	80	80	80	80	80	80	80	80	80
Inner Line	GMIL17	400	40	40	40	40	40	40	40	40	40	40
Inner Line	GMIL18	300	30	30	30	30	30	30	30	30	30	30
Inner Line	GMIL19	300	30	30	30	30	30	30	30	30	30	30

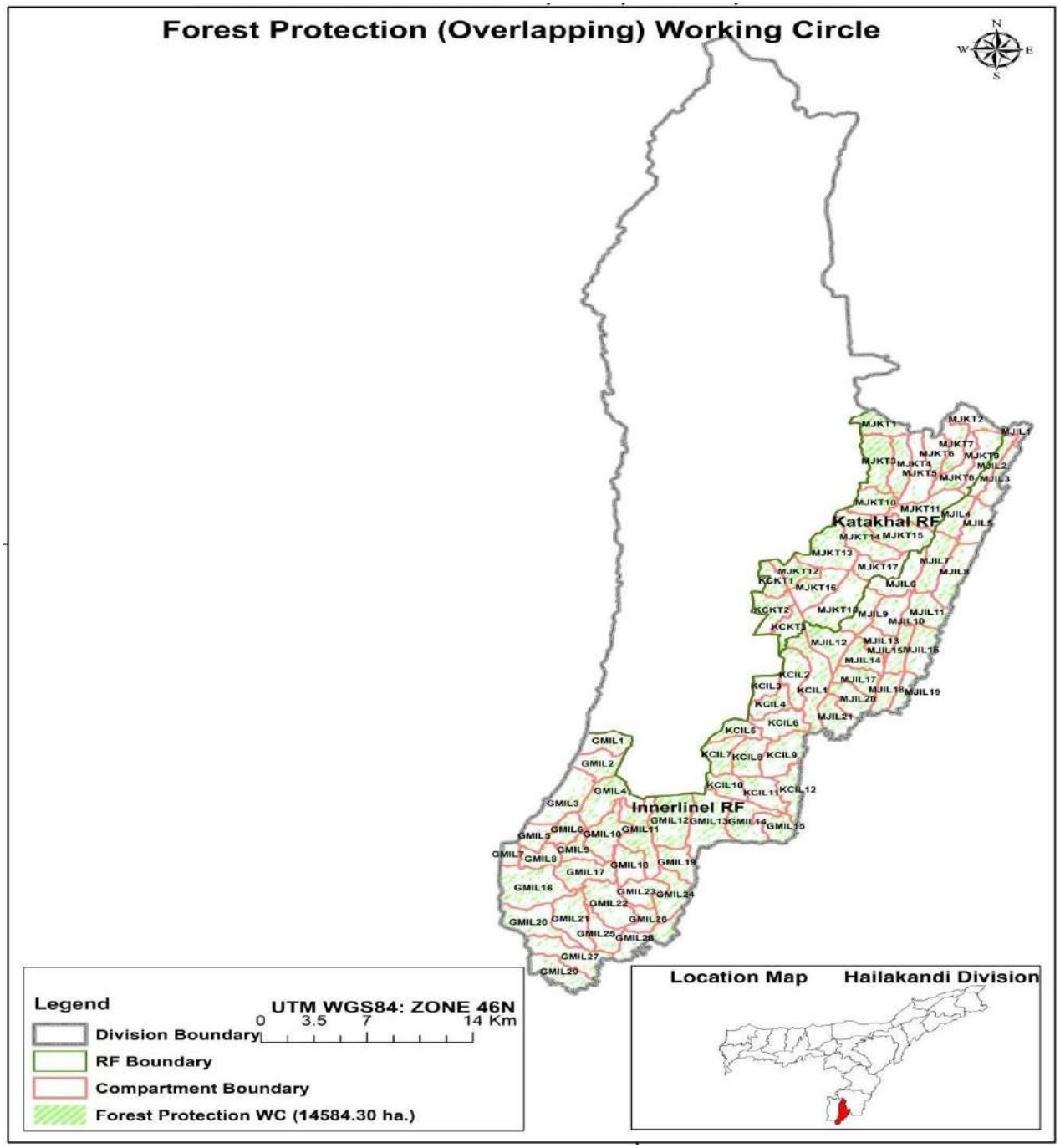
Inner Line	GMIL20	600	60	60	60	60	60	60	60	60	60	60
Inner Line	GMIL21	600	60	60	60	60	60	60	60	60	60	60
Inner Line	GMIL22	600	60	60	60	60	60	60	60	60	60	60
Inner Line	GMIL25	320	35	35	35	35	30	30	30	30	30	30
Inner Line	GMIL26	200	20	20	20	20	20	20	20	20	20	20
Inner Line	GMIL27	600	60	60	60	60	60	60	60	60	60	60
Inner Line	GMIL28	400	40	40	40	40	40	40	40	40	40	40
Inner Line	GMIL29	450	45	45	45	45	45	45	45	45	45	45
Inner Line	KCIL1	620	65	65	60	60	60	60	60	60	65	65
Inner Line	KCIL2	390	40	40	40	40	40	40	40	40	35	35
Inner Line	KCIL3	250	25	25	25	25	25	25	25	25	25	25
Inner Line	KCIL4	260	25	25	25	25	25	25	25	25	30	30
Inner Line	KCIL5	200	20	20	20	20	20	20	20	20	20	20
Inner Line	KCIL6	400	40	40	40	40	40	40	40	40	40	40
Inner Line	KCIL8	275	25	25	30	30	30	30	30	25	25	25
Inner Line	KCIL9	395	40	40	40	40	40	35	40	40	40	40
Inner Line	KCIL10	220	25	25	25	25	20	20	20	20	20	20
Inner Line	KCIL11	300	30	30	30	30	30	30	30	30	30	30
Inner Line	KCIL12	325	35	35	35	35	35	30	30	30	30	30
Inner Line	MJIL1	130	15	15	15	15	15	15	10	10	10	10
Inner Line	MJIL2	260	25	25	25	25	25	25	25	25	30	30
Inner Line	MJIL3	380	40	40	40	40	35	35	35	35	40	40
Inner Line	MJIL5	435	45	45	45	45	45	40	45	45	40	40
Inner Line	MJIL6	470	50	50	50	50	45	45	45	45	45	45
Inner Line	MJIL7	295	30	30	30	30	30	30	30	30	30	25
Inner Line	MJIL8	520	50	50	50	50	50	55	50	55	55	55
Inner Line	MJIL9	415	40	40	40	40	45	45	45	40	40	40
Inner Line	MJIL10	370	40	40	40	40	35	35	35	35	35	35
Inner Line	MJIL11	420	40	40	40	40	45	45	45	45	40	40
Inner Line	MJIL12	415	40	40	40	40	45	45	45	40	40	40
Inner Line	MJIL13	215	25	25	20	20	20	20	20	20	20	25
Inner Line	MJIL14	300	30	30	30	30	30	30	30	30	30	30
Inner Line	MJIL15	210	25	25	20	20	20	20	20	20	20	20
Inner Line	MJIL16	500	50	50	50	50	50	50	50	50	50	50
Inner Line	MJIL17	265	30	30	30	25	25	25	25	25	25	25
Inner Line	MJIL18	245	20	25	25	25	25	25	25	25	25	25
Inner Line	MJIL19	160	15	15	15	15	15	15	15	15	20	20
Inner Line	MJIL20	270	30	30	30	30	25	25	25	25	25	25
Inner Line	MJIL21	325	35	35	35	35	35	30	30	30	30	30
Katakhal	KCKT1	210	25	25	20	20	20	20	20	20	20	20
Katakhal	KCKT2	380	40	40	40	40	35	35	35	35	40	40
Katakhal	MJKT2	230	25	25	25	25	25	25	20	20	20	20
Katakhal	MJKT3	370	40	40	40	40	35	35	35	35	35	35
Katakhal	MJKT4	315	30	30	35	35	35	30	30	30	30	30
Katakhal	MJKT5	300	30	30	30	30	30	30	30	30	30	30
Katakhal	MJKT12	200	20	20	20	20	20	20	20	20	20	20
Katakhal	MJKT13	400	40	40	40	40	40	40	40	40	40	40
Katakhal	MJKT14	300	30	30	30	30	30	30	30	30	30	30
Katakhal	MJKT15	400	40	40	40	40	40	40	40	40	40	40
Katakhal	MJKT16	420	40	40	40	40	45	45	45	45	40	40
Katakhal	MJKT17	300	30	30	30	30	30	30	30	30	30	30
Katakhal	MJKT18	580	60	60	60	60	60	60	60	60	50	50
Total		**25250**	**2560**	**2565**	**2555**	**2555**	**2525**	**2505**	**2500**	**2495**	**2495**	**2495**

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 of Hailakandi Division



4.2 General Constituents of the Working Circle:

This working circle includes the area, which certainly requires specific treatment being susceptible to high degradation due to various biotic, climatic and edaphic factors. From the view point of forest protection, this Working Circle shall include complete forest area of the Division. All the wetland of Reserved Forests shall be a part of this Working Circle. 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 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 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.

4.4 Felling Series, Cutting Section:

As the nomenclature "Forest Protection Working Circle" indicates that the activity of the Working Circle shall limited on protection measures only, there shall not be any felling or cutting and as such felling series or cutting sections are not constituted.

4.5 Blocks, compartment

Entire RF area of 53835.74 hectare area is allocated under this Working Circle.

4.6 Special Objectives of Management:

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:

i) To protect the forests of the Division from all sorts 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.
ii) 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.
iii) To determine the status of existing boundaries/boundary pillars of forests of various categories and to digitise the locations of existing boundary pillars and to locate the missing boundary pillars on ground using distance and bearing values provided in RF/PRF/PF notifications.
iv) Ejection of encroachers from these areas shall be accorded highest priority. Efforts shall be made to restore the evicted areas to their pre encroachment status. Eviction and Post-eviction plans shall be meticulously prepared. Positive efforts shall be made to rehabilitate evicted families.
v) To completely shift grazing, lopping, shifting cultivation and other forms of forest degrading activities to the fringe forests or JFMC working circle areas.

4.6.1 Silvicultural system: The Working Circle shall be treated for protection activities 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 manupulation works may be undertaken subject to mid term deviation with approval of the PCCF.

4.6.2 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. In comparison to the unsecured forest boundary the number of forest staffs is very less 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.

4.6.3 Protection measures:

4.6.3.1 Inspection on 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.

4.6.3.2 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.

4.6.3.3 Protection Squad: There should be a protection squad in each Range. Sufficient Guards should be posted in Protection Squad. Minimum one vehicles shall be at the disposal of Protection Squad. Sufficient fund shall be provided for mobilizing the Squad day and night. Head Quarter of Protection Squad shall be at Range Head quarter. The RO should closely monitor the work of Protection squad and should obtain weekly reports to monitor the protection activities.

4.6.3.4 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.

4.6.3.5 Mobility of staff: In Hailakandi 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.

4.6.3.6 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.

4.6.3.7 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.

4.6.3.8 Fire protection: 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.

4.6.3.9 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.

4.6.3.10 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 53751.034 hectare of forest land in Hailakandi Division 5160.93 hectare (9.6%) of forest land are under encroachment. 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. 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.

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

Out of total 53751.034 hectare of forest land in Hailakandi Division 5160.93 hectare (9.6%) of forest land are under encroachment. Requirement of eviction per year shall be 516 hect and accordingly, the DFO subject to availability of fund execute the eviction operations.

(1) Eviction of encroachers from forest land as per the provisions of Rules framed under section 72(c) of the Assam Forest Regulation' 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, 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) RFO must inspect at least 50% of the boundary demarcation, ACF at least 10% of the

boundary demarcation, DCF 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.

4.6.3.11 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.

4.6.3.12 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 organized 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 organized for training.

4.6.3.13 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.

4.6.3.14 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 Hailakandi Division with supporting staff.

4.6.3.15 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.

4.6.3.16 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 Round Officer in the proformance given below and this register must be updated regularly. A secrete fund to gather intelligence and information is proposed to setup under the control of DFO.

4.6.3.17 Register of habitual offenders Name & address of the offender previous record POR No./qty/Action taken Modus operandi Photograph if available

4.6.3.18 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.

4.6.4 Consolidation of Boundary: It is imperative that the status of existing boundaries/boundary pillars of forests and missing boundary pillars on ground using distance and bearing values provided in RF notifications needs to be surveyed.

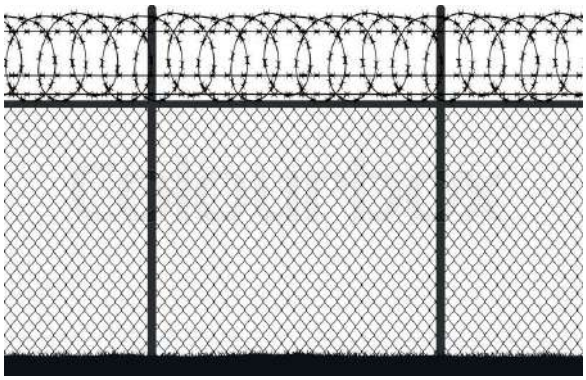
Maintenance of boundaries and Pillars: To avoid legal disputes in the future, maintenance or boundary pillars is necessary especially the State boundaries. Inspection path of 3 m wide all along the boundary should be prepared for inspection and protection. The boundary pillars must be numbered and written. The 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 are 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.

Total Number of Pillars Proposed to be Constructed

SL No	Item	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	1	188	-	188
2	Sub Pillars	3	564	-	564

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.



4.6.4.1 Target of Achievement:

Activity	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
a) Intensive protection measures will be taken for protection of those forest areas with over 60 percent canopy cover, grassland of reserve forests. b) Ejection plan. (2000 hect.)	500	500	500	500						
c) Boundary pillars (Main pillars 1 every kilometer and sub pillars 3 every 1 km) = 188 nos	26	26	26	26	26	22	22	14		
d) Sub Pillars = 564 nos	74	70	70	70	70	70	70	70	-	-
Creation of barriers including rajor-wire permanent fencing etc. to check biotic interference wherever necessary. = 20 KM(approx)	4	4	4	4	4	-	-	-	-	-

4.6.5 Ejection Plan for Hailakandi Division:

DFO will prepare ejection Plan in consultation with Conservator of Forests and accordingly execute the eviction operations.

4.6.6 Associated regulations and measures: The fringe villages around RFs are dependent on forest for grazing and fuelwood. It is not possible to stop grazing or collection of fuelwood due to socio-economic consideration. However, uncontrolled grazing needs to be regulated as it suppresses regeneration and promotes soil compaction and is detrimental to wildlife. Pole, firewood etc. derived from thinning operation may be given to the JFMCs on priority basis.

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CHAPTER 5

NON TIMBER FOREST PRODUCE WORKING CIRCLE

5.1 Name of the Working Circle: NTFP overlapping working circle. The detail map of this working circle is shown in Figure 5.1.

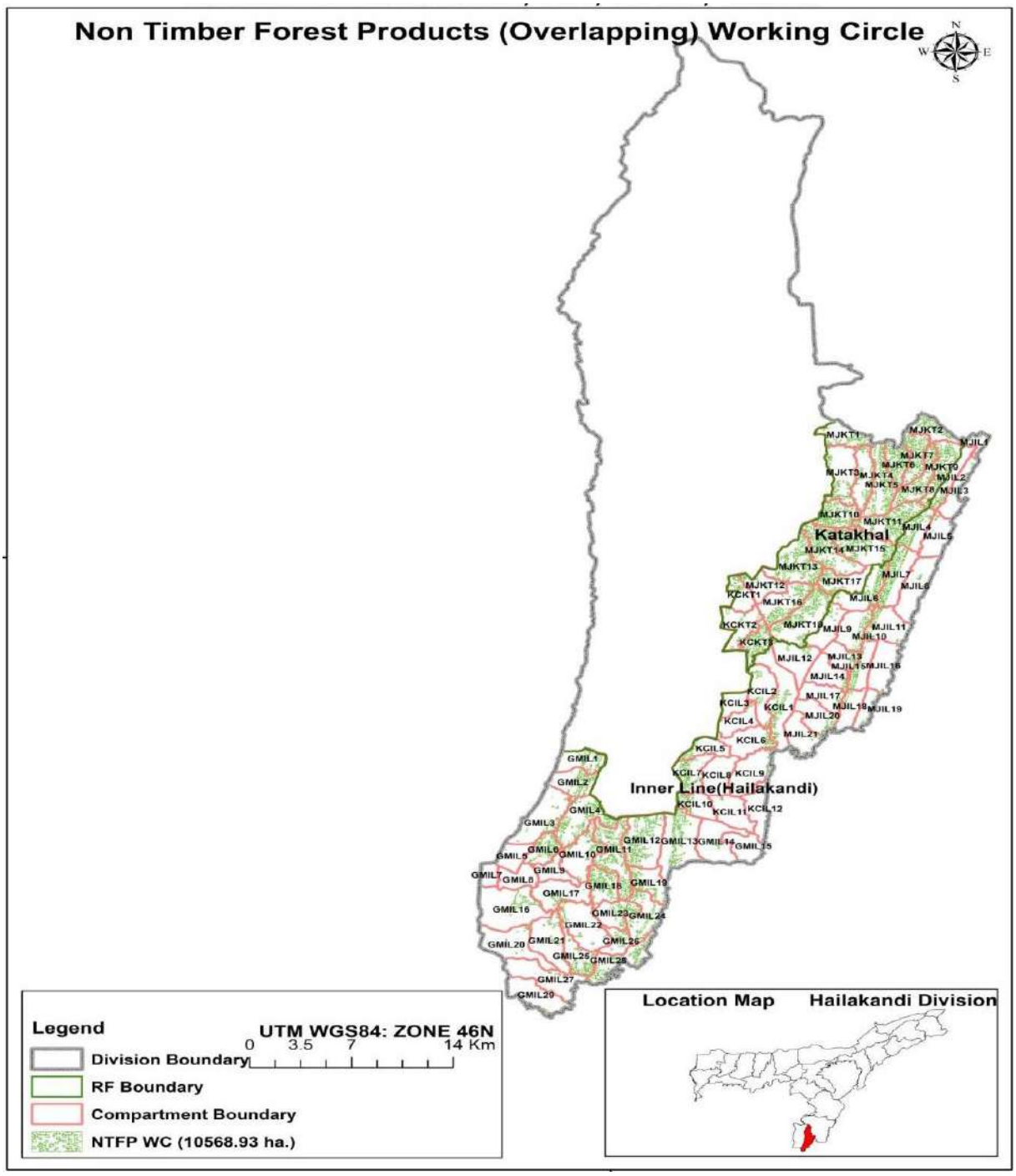

Fig. 5.1. NTFP overlapping working circle map of Hailakandi Division

5.2 General Constituents of the Working Circle:

The NTFP working circle shall comprise largely of fringe forest areas or such other areas, which are fit for extraction of a particular NTFP at a rate 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 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.

Table 5.3.1: Available NTFP and quantity extracted in previous years

Sl. No.	Name of the NTFP	Quantity extracted year-wise.			
		2010-11	2011-12	2012-13	2013-14
1.	Thatch	60 bdle.	60 bdle.	60 bdle.	60 bdle.
2.	Gandhiroot	50 tones	50 tones	50 tones	50 tones
3.	Chalmurga	2 tones.	2 tones.	2 tones.	2 tones.
4.	Broom	200 tones	200 tones	200 tones	200 tones
5.	Kirta pata	50 ton.	50 ton.	50 ton.	50 ton.
6.	Hartaki	4 ton.	4 ton.	4 ton.	4 ton.

5.4 Blocks, compartment & JFM areas

A total of 13155.02 ha is allocated under this working circle. Areas under different RF's and compartment and the area to be covered in this working circle are provided in the table 5.4.

Table 5.4: Area Statement Against each compartment under the NTFP circle.

RF	Compartment	Compt area	NTFP WC
Inner Line	GMIL1	530.94	80.00
Inner Line	GMIL2	592.48	100.00
Inner Line	GMIL4	943.12	190.00
Inner Line	GMIL6	437.94	45.00
Inner Line	GMIL10	805.44	250.00
Inner Line	GMIL12	1133.62	200.00
Inner Line	GMIL13	1170.79	200.00
Inner Line	GMIL16	1372.79	300.00
Inner Line	GMIL17	756.15	100.00
Inner Line	GMIL18	562.1	60.00
Inner Line	GMIL19	553.76	25.00
Inner Line	GMIL21	883.13	180.00
Inner Line	GMIL25	531.9	10.00
Inner Line	GMIL26	337.1	30.00
Inner Line	GMIL28	668.61	10.00
Inner Line	KCIL1	1130.12	100.00
Inner Line	KCIL2	679.65	100.00
Inner Line	KCIL5	410.37	100.00
Inner Line	KCIL6	662.89	100.00
Inner Line	KCIL10	450	100.00
Inner Line	MJIL3	499.29	40.00
Inner Line	MJIL7	755.99	150.00
Inner Line	MJIL10	618.81	40.00
Inner Line	MJIL11	706.95	75.00
Inner Line	MJIL13	402.66	75.00
Inner Line	MJIL15	467.25	50.00
Inner Line	MJIL16	690.98	75.00
Inner Line	MJIL17	522.68	100.00
Inner Line	MJIL18	442.67	50.00
Inner Line	MJIL20	565.6	100.00
Katakhal	KCKT1	373.2	50.00
Katakhal	KCKT2	648.75	100.00

Katakhal	MJKT3	840.09	100.00
Katakhal	MJKT4	614.64	100.00
Katakhal	MJKT12	468.09	100.00
Katakhal	MJKT16	764.96	50.00
Katakhal	MJKT17	556.46	50.00
Katakhal	MJKT18	1070.18	50.00
Total		**53835.74**	**3635.00**

5.5 Special Objectives of Management:

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

1. To conserve and augment existing non timber forest produce including medicinal plants resource in its natural habitat.
2. To increase the yield of NTFPs by encouraging regeneration and supplementing with artificial regeneration by intensive cultivation.
3. To involve the local communities in protection and management of forest resources. To encourage for Sustainable use of forests through sustainable collection, harvesting of NTFP adopting sound silvicultural principles.
4. To encourage cultivation of commercially important species of medicinal plants on private lands.
5. To develop a system of pricing the wild harvest so as to reflect both the conservation costs and the community benefits.
6. To encourage public-private-community partnership for building capacity for cultivation, value addition and processing of raw material before export from the state.
7. To promote the use of commercially viable medicinal plants by the state owned and private pharmaceutical units and subsidiaries engaged in value addition.
8. To maximize yield of medicinal plants through sustainable natural and artificial regeneration and scientific exploitation.

5.6 Analysis of the Crop:

The entire tract has many useful shrubs, herbs, fungi which have been exploited from time to time. The area produces large quantities medicinal species like amla, behera, aam, bel, ritha and so on. A list of commonly used or economically extracted medicinal produce and plants occurring naturally are given in the Table below:

Table 5.6.a List of plants with local name, habit, local name, part used and medicinal use

Sl. No.	Scientific name	Habit	Local name	Parts used	Uses
1.	*Acorus calamus* Linn.	Herb	Bos	Rhizome	Decoction of rhizome is given in abdominal pain during menstruation cycle of women.
2.	*Caesalpinia crista* Linn.	Shrub	Letaguti	Fruits	Cold and cough. Whooping cough.
3.	*Curcuma longa* Linn.	Herb	Halodhi	Rhizome	Swelling of fingers of hands and legs.
4.	*Drymaria cordata* Linn.	Herb	Laijabori	Leaves	Stomach disorder and hairfall.
5.	*Phyllanthus emblica*	Tree	Amlokhi	Fruit	Dysentery, diarrhea, piles,

	Linn.				
6.	*Hydrocotyle sibthorpioides* Lam.	Herb	Horumanimuni	Leaves, Roots	Rheumatism, menstrual Problem and also used as Digestive.
7.	*Centella asiatica Urb.*	Herb	Bor manimuni	Whole plant	Used as digestive, heals Dysentery, diarrhea.
8.	*Litsea salicifolia* (Roxb. Ex Nees) Hook. F.	Tree	Dhigloti	Leaves	Leaf paste is taken twice a day with lukewarm water to cure loose motion
9.	*Leucas aspera*	Herb	Durunbon	Leaves, roots	Lack of appetite, sinusitis, Stomach complaints, headache, roots are used to treat ringworms, boils, swellings, Pneumonia and also in relief of snakebite.
10.	*Macrothelypteris 2quati* (Wall. Ex Bedd.) Ching	Shrub	Bihlongoni	Leaves	Tender leaves are cooked With chicken to feed mother to increase the milk production for newborn baby.
11.	*Mangifera indica* Linn.	Tree	Aam	Leaves, ba	Decoction made of leaves and bark is taken in empty stomach in treatment of dysentery
12.	*Mimosa pudica L.*	Herb	Nilaji bon	Roots	Tooth worm, menstrual problem.
13.	*Ocimum sanctum* Linn.	Herb	Kola tulokhi	Leaves, flowers	Cold and cough.
14.	*Bambusa balcooa Roxb*	Shrub	Bholuka bah	Shoots	Pain killer in insect bites and menstrual problem.
15.	*Musa balbisiana* Colla	Tree	Bhimkol	Fruit, root	Dysentery and other Stomach problems. Roots are used to treat pneumonia.
16.	*Piper nigrum Linn.*	Climber	Jaluk	Fruits	Indigestion, body-ache, also in post labour ailment and in bone fracture and pneumonia.
17.	*Ageratum conyzoides L.*	Herb	Gendhalibon	Leaves	Stops bleeding.
18.	*Ananas comosus L.*	Herb	Matikothal	Tender leaves	Leaf base is crushed and extract is given one time daily for amoebic dysentery and intestinal worms.
19.	*Bambusa tulda Roxb.*	Shrub	Jatibah	Root	Promote flow of urine.
20.	*Cinnamomum tamala* (Nees and Eberm)	Tree	Tezpat	Leaves	Rheumatism, gonorrhea, Diarrhoea, diabetes
21.	*Clerodendrum colebrookianum* Walp.	Shrub	Nephaphu	Tender leaves	Kills intestinal worms, reduce blood pressure.
22.	*Dillenia indica L.*	Tree	Outenga	Sepal of fruit	Fleshy calyx is used for stomach disorder. Jelly like pulp of fruit is applied to scalp for curing dandruff and falling hair.
23.	*Ficus racemosa L.*	Tree	Dimaru	Leaves and latex	Latex is used for piles and diarrhoea.
24.	*Paederia foetida L.*	Shrub	Bhedailota	Leaves	Malaria.
25.	*Naravelia zeylanica*	Climber	Gopsori	Leaves	Wounds and ulcer.

	L.				
26.	*Oldenlandia corymbosa L.*	Herb	Bonjaluk	Whole plant	Plant is diuretic, stomachic and used as liver tonic. It is also used in jaundice.
27.	*Psidium guajava L.*	Tree	Modhuriam	Tender leaves	Amoebic dysentery.
28.	*Sarcochlamys pulcherrima* (Roxb.) Gaud.	Shrub	Mesaki	Leaves	Consumption of young leaves is believed to be protective measure from the tapeworm and fat minimizes agent when cooked with pork. Also leaves are useful for diarrhea, dysentery and also used as digestive.
29.	*Scoparia dulcis L.*	Herb	Senibon	Leaves	Fever, cough, diabetes.
30.	*Zanthoxylum nitidum* (Roxb.)DC	Shrub	Tejmooi	Leaves, stem, bark	Toothache or gum problem. It is stomachic.
31.	*Alocasiaa cuminata Schott*	Shrub	Dalkochu	Leaves, stems	Prevents anaemia.
32.	*Amaranthus spinosus L.*	Shrub	Hatikhutura	Leaves, stems	Constipation
33.	*Azadiracta indica* A. Juss	Tree	Mohaneem	Leaves, stem	Skin itching, boil, pimples.
34.	*Corchorus capsularis L.*	Shrub	Titamora	Leaves	Good digestion and get rid of intestinal worms.
35.	*Diplazium esculentum* (Retz.)SW	Herb	Dhekia	Leaves	Useful for good vision (eye).
36.	*Garcinia cowa Roxb*	Tree	Kujithekera	Tender leaf	Dysentery, reduce blood pressure
37.	*Hibiscus subdarifa L.*	Shrub	Boga Tengamora	Leaves	Dysentery, diarrhea.
38.	*Houttuynia cordata Thunb*	Herb	Mosundari	Fruit, Leaves	Diarrhoea, dysentery.
39.	*Nycthanthus arbor-tristis* L.	Tree	Hewali	Leaves	Malaria, diabetes and cough
40.	*Oxalis corniculata L.*	Herb	Horutengesi	Flowers, Leaves	Indigestion.
41.	*Basella rubra*	Herb	Bortengesi	Whole plant	Indigestion.
42.	*Spinacia oleracealeracea*	Herb	Pirali paleng	Whole plant	Stomach trouble.
43.	*Chenopodium L.*	Shrub	Jilimili	Whole plant	Anaemia.
44.	*Aloe barbadensis*	Herb	Sal kuwari	Leaves	Genital herpes, burns, wounds, skin Infection.
45.	*Ageratun conyzoides*	Herb	Huhonibon	Whole plant	Red spots on tongue. Apply and rub on affected area.
46.	*Eclipta prostrate*	Herb	Keharaj bon	Leaf	Dysentery.
47.	*Bryophyllum calycinum* Salisb.	Herb	Dupor tenga	Flower	Menstrual pain.
48.	*Terminalia chebula*	Tree	Hilikha	Tender leaves	Jaundice, indigestion.
49.	*Alternenthera sessilis L.*	Shrub	Matikanduri	Leaves	Jaundice, indigestion.
50.	*Murrya koenigil*	Tree	Narasingha	Leaves	Stomach trouble.
51.	*Mentha arvensis*	Herb	Pudina	Whole plant	Indigestion.
52.	*Baccupa monnieri L.*	Herb	Brahmi	Tender leaf	Improvement of memory and eye power.

53.	*Citrus limon* L. Burm	Tree	Nemu	Leaves	Black spot in face, indigestion.
54.	*Cajanus cajan*	Tree	Rahar dali	Fruit and tender leaves	Jaundice.
55.	*Sponolias mangifera*	Tree	Amora	Tender leaves, Seed	Tonsilitis.
56.	*Ipomea 3quatic*	Shrub	Pani kolmou	Leaves	Urinary disorder.
57.	*Clerodendron colebrookianum L.*	Tree	Dhopat tita	Leaves	Malaria, hypertension.
58.	*Cannabis sativa*	Shrub	Bhang	Tender leaves	Body ache.
59.	*Catharanthus roseus L.*	Shrub	Nayantora	Flower, Leaves	Diabetes.
60.	*Costus speciosus*	Herb	Jomlakhuti	Rhizome	Burning, Snakebite.
61.	*Ocimum gratissimum L.*	Shrub	Ram tulsi	Leaves	Cough, asthma.
62.	*Phlogocanthus thyrsi florus*	Shrub	Titaphul	Leaves, Flower	Indigestion.
63.	*Pogostemon benghalensis* (Burm.)Kuntze	Tree	Sukloti	Leaves	Diabetes, liver problems, wounds.
64	*Rauwolfia serpentine*		Surpagandha		Sex stimulant
65	*Andrographis paniculata*		Kalmegh		Cancer

5.6.1 Stock Maps: As the medicinal plants are mostly herbs and shrubs found on annual or perennial basis, stock mapping is not possible.

5.6.2 Calculation of Yield: No yield can be prescribed as the most NTFPs are extracted through right holders. However, proper record of all the NTFPs exported through JFMCs and the department, shall be maintained annually and entered in respective compartment history files.

5.6.3 Rotational Extraction: Unscientific and unsystematic extraction of medicinal plants is likely to reduce the yield and quality of the plants and may even lead to disappearance of the species. A four year extraction cycle of the medicinal plants is already in force.

5.6.4 Subsidiary Silvicultural Operations: As no silvicultural system is prescribed, no specific operations are proposed. However, when the medicinal plants are raised in the nurseries or plantations, the regular operations like closure, weeding, bush cutting, protection from fire, grazing etc. are to be carried as in case of tree species.

5.7 Policy on introduction of Medicinal Trees in Forests:

It is now the State policy that in different plantations of the forest department about 30% of the trees being planted need to be of medicinal value and also native to the tract where plantation is being done. There is thus a need to identify and grow suitable medicinal trees for different altitude zones in a particular forest division. It is important that these species need to be grown as Tall plants in the nurseries before being planted out.

5.7.1 Conservation and Development Plan:

For all other NTFP species forest department needs to intervene in the following manner. Important NTFP species should be retained as reserves in coppice coupes while marking. NTFP species should be given due importance in plantation programme. Exclusive NTFP plantations should be raised at suitable sites. Elsewhere 5 to 10% of the seedlings of NTFP species be planted at suitable locations in plantation areas. Healthy nursery stock of such species should be made available to the private people desirous of planting them in their fields.

Villagers should be encouraged to include NTFP species in JFMC micro plans. District administration should be requested to provide all help to the local people in establishment of small scale processing and marketing units for NTFPs. This will help in making collection/ growing of NTFPs remunerative.

5.8 Stakeholders

5.8.1 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.

5.8.2. Difficulties faced are-

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.

5.9 Strategy: 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 cattle 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.

Non timber produces such as Cane, bamboo, jengu leaves, caupats, patidoi, seeds and flowers of different trees, barks, roots, tubers, leaves etc. which have commercial value will be encouraged in JFMC areas. Methodology of 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. will be

adopted. NTFPs shall be managed on JFMC areas, fringe forest areas, community forest areas.

5.10 Method of treatment: Collection of NTFPs including Cane, bamboo, jengu leaves, caupats, patidoi, seeds and flowers of different trees, barks, roots, tubers, leaves, Dhupa Seeds, Dalchini leaves, Soapnut, Seekakai, Punarpuli and Honey will be allowed to communities involved in JFMC with strict adherence of JFMC Rules and under supervision of Forest Officials. Harvesting must be sustainable. Regeneration of NTFPs will be done involving local communities.

5.10.1 NTFP collection by JFMCs: Wherever JFMCs are formed, the collection of NTFP has to be entrusted to JFMCs, so that there can be a stake for the local communities to take interest in their proper collection and protection. No agents, outsider will be allowed to collect NTFPs from the Division.

5.10.2 Method of sale: NTFPs collected from areas other than JFMC areas and surplus NTFPs beyond domestic use will be put to sale in public auction or through tender process. The quantities of NTFPs will be ascertained from past records and auction rates for each NTFP items were fixed on weight basis. The sale will be held in the Range Offices. The entire collection and disposal of NTFPs should be done by JFMCs assisted by the department. Revenue collected from these will be deposited to the JFMC account. Any dispute will be resolved by the Range Officer.

5.10.3 Status of NTFP species: No systematic study of NTFP studies has been conducted. The information regarding their distribution, regeneration and productivity is must before a suitable strategy is involved. During the current Working Plan data on these lines should be collected. Apart from the items tendered by the department, local people do collect NTFP items for food and medicinal purpose. Data on such collections is required to assess the sustainability of removal of those NTFP items.

5.11 Prescriptions: The following prescriptions are suggested for the Working Circle –

a) In consultation with the forest officials, JFMCs are allowed to collect NTFP from the area under JFMCs without damaging any part of the tree or trunk.
b) Collection of bark of any tree is strictly prohibited.
c) Only flowers, leaves, fruit and nuts are permitted to collect.
d) A list of endangered species has to be prepared by the department time to time and collection of NTFP from such trees has to be banned.
e) While collecting NTFP some trees in the area may be identified and left as mother tree./ tree for seed resources.
f) Only authorised member of the VFC with their Identity card are permitted to enter into the forest and collect the NTFP.
g) JFMCs are permitted to collect the NTFP only through the members of the VFCs from the permitted micro plan areas.
h) The collected NTFPs in the VFCs areas should be stored in a declared Godown properly after processing and disposed by tender–cum-auction sale in the presence of the forest officials.
i) JFMCs are to raise NTFP and bamboo species species in their land.

5.12 Target of Achievement:

Activity	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
a) NTFP Plantation Creation, out of total allotted area = 660 hect.	65	70	65	70	65	65	65	70	65	60
Maintenance = hect.		65	135	200	270	335	335	330	335	330
b) Bamboo Plantation Creation, out of total allotted area = 660 hect.	65	70	65	70	65	65	65	70	65	60
b) Bamboo Plantation Maintenance = hect		65	135	200	270	335	335	330	335	330

5.13 Management of bamboo: Bamboo extraction was never taken up in a regular way in this Division, as bamboo exists in pocket. However, as & when required bamboo was extracted to meet the domestic requirement of the people. This can be continued as extraction in such small patches in a scattered manner. If flowering of bamboo is reported harvesting of green bamboo is essential in the patches where it is available. Dead and dried bamboos are susceptible for fire hazards. Bamboo will be harvested from the JFMC area. The bamboo plantations inside the reserve forest meant for enhancement of wildlife habitats are not proposed for harvesting. The following cutting Rules are prescribed for proper management of bamboos.

a) Cleaning and cutting of bamboos should start from uphill side and should progress downward.
b) Cleaning and cutting of bamboos should be carried out at the same time and not be done separately.
c) The cutting should commence from the middle of November and be continued till middle of April and Transportation of extracted bamboos should be completed before onset of monsoon to prevent damage to natural regeneration.
d) All dead and decayed bamboos should be removed. Young and healthy culms are to be retained. This will help in getting good support to younger culms. The current year shoots, one year and two-year–old bamboos should not be cut.
e) Bamboo clumps to be worked from the centre to outer periphery. If the clump is congested it should be opened from one side and worked in horse-shoe pattern.
f) Each clump must be treated as a unit of working and the total number of bamboos to be cut should be such that a minimum of 12 culms are left in each clumps. If the number of culms in the clump is less than 12 it should not be taken up for extraction.
g) Bamboo culms should be cut 6”-18” above ground the cut should be in slanting manner, just above the first node to prevent accumulation of rainy water in it.
h) In case of sporadic flowering the flowered clumps should be cut first but it should be done only after shedding of seed from clumps.
i) All the seeds should be allowed to fall, before taking up extraction of dead bamboos.
j) Complete sweeping of forest floor should be avoided
k) New vehicle paths should not be formed in the area to prevent damage to regeneration
l) Extraction of clumps should be taken up from only one side, instead of working from all sides

m) Extraction should be started after rainy season and be completed as early as possible
n) Strict fire protection measures have to be taken up to prevent occurrences of accidental fires in the forest, casing any damage to dead bamboos and also to protect the young regeneration.
o) Such areas should be kept completely closed from grazing till the clumps are completely established. Normally this period is 12-15 years.

5.13.1 Bamboo felling: The felling series is to be further divided into four annual cutting areas. The areas harvested in the first year will again be harvested in the fifth year. Similarly, the area harvested which will be harvested in the second year will again be harvested in the sixth year. Likewise, all the cutting area will be harvested. Each of the cutting areas will be divided into coupes. The coupes will be annual in operation. The areas where bamboo and other NTFPs grow in continuous stretch are considered for exploitation by the local people and the bamboo based industries.

5.13.2 Felling / cutting rules for bamboo

1. Harvesting should be as per the prescribed yield only.
2. All culms should be cut as low as possible but not above 30 cm from the ground I level. The actual cut should be immediately above a node. This needs to be strictly enforced and regular inspections by officers should be carried out to ensure that this is done. If this is not enforced, the whole clumps will deteriorate in years to come.
3. Only mature culms will be removed. At least six mature culms should be retained it each clump in addition to all the one-year old culms.
4 For large-scale operation the felling should commence in the month of October and shall continue up-to the end of May every year.
5. The culms left out should be uniformly distributed as far as possible.
6. No cutting should be allowed from the periphery except for above 3 (three feet) wide passage for removal from inside the clump. A horse shoe pattern of cutting should be allowed.
7. All the dead bamboo should be cut and removed.
8. Any occurrence of flowering (gregarious) should be reported to the Principal Chief Conservator of Forests, Assam with a copy to Silviculturist, Assam Forest Division, Basistha. The flowered clumps should be extracted by clear felling depending on the extraction facilities and demand.

5.13.3 Method of regeneration of bamboo

Bamboo can be propagated both by conventional and non- conventional methods:

1) Conventional methods:

i) Propagation through seeds

ii) Propagation through rhizome / off- set planting.

2) Non- conventional methods:

i) Propagation culm cutting.

ii) Propagation through branch cutting.

iii) Propagation through macro proliferation.

vi) Propagation through layering and macrotting.

v) Propagation through tissue culture.

Bamboo flowers in an interval of 10-120 years depending upon the species. Viability of seeds gradually decreased after one / two months, if it is not stored with proper aeration for seed respiration and protection from insect and rodents. Therefore, seeds should be sown as soon as possible after collection and processing. The collected seeds are to be cleaned properly, dried in the sun for 2-3 hours then stored in properly aerated gunny bags. Simultaneously, humidity and temperature should be controlled to 8-10% and 10° -14° C respectively. The seeds are soaked in clean water for 10-12 hours to break the dormancy and water is drained out properly 10-20 minutes before sowing. After treatment, the seeds may be sown in nursery bed, polythene bags or pots.

Prepare a raised nursery bed of 10 x 1.5 m. by deep digging or hoeing and fill it with a mixture of soil, sand and fully decomposed FYM in 2:1:1 ratio. The week before sowing, drench the nursery bed with insecticide (Aidrin) and fungicide (Bavistin) to prevent termite and fungal attack for each bed use 40 litres 0.05% Aidrin prepared by adding 0.5 ml. of Aldrex 30 EC per liter of water and 30 liters of 0.05% (a.i) prepared by adding 1 gram of Bevistin 50 wp'per liter of water.

The sowing should be done in bed of overhead shade protected preferably by thatch or bamboo split. Sowing in furrow of 2cm depth is advisable covering with thin layer of top soil and watering lightly once in a day. Seeds start germination after 3-7 days in favorable climatic condition and continue up-to 15-25 days.

a) Propagation through rhizome / off- set planting: Rhizome or off - set planting is the most commonly practiced and age old traditional method in home grown bamboos; however, it has several limitations too. The 1-2 years old culms are selected for off-set / rhizome planting - cut the culm keeping 2-3 internodes (1-2 m) high from ground level with active bed and excavate alongwith portion of rhizome. The rhizome must be separated by cutting from neck carefully to avoid damage. This rhizome should be transferred to the planting site as early as possible to avoid mortality. The planting should be done in well advanced dug pits of size 45 cm x 45 cm x 45 cm for small sized bamboo and 60 cm x 60 cm x 60 cm for large sized bamboos. Prior to one month planting pits should be treated with insecticide and dried FYM or, any well decomposed manure.

b) Propagation though runner / cuttings: The runners of 1-2 years old having viable buds are selected and are excavated very carefully without injuring and disturbance. The selected runners are then cut with sharp secateurs / knife keeping 3-4 internodes are taken in prepared nursery bed of size, 10 m x 1.5 m. Before burying under the soil, rooting hormones are applied by dipping the base of cut end and buried into the nursery bed in a furrow depth of 2-3 cm and covered with top soil. Water the bed lightly daily till it is rooted. The propagules start sprouting and produce shoot after 1-2 months and rooting after 2-3 months.

The well rooted plants are taken out from nursery bed and each node with sufficient rooted plants are separated and transplanted in the poly bags. The polybags are kept overhead protected bed and again watered regularly. After 4-6 months, seedlings are ready for planted in the field. The best time for this method is during dormant period in the month of January-February.

c) Propagation through culm cutting: Propagation by culm is a viable and alternative

method and has several advantages over other methods. This method involves treatment of culm cutting with growth regulation for root induction. The method is applicable for most species of economically importance bamboos.

The 1-2 years old mother plants are selected and trimmed by keeping 10-15 cm. long lateral branches and made the culm cutting keeping 2-3 internodes. Bore / open a hole between chemical solution of IBA or NAA @ 200 ppm up-to the cavity level. Then wrap the hole with polythene bag or, cellotape tightly.

Prepare 2-3 nodded cutting with sharp knife or, hacksaw leaving 5-7 cm on either side of the nodes.

The prepared culms are buried in a furrow at 4-5 cm. depth at a distance of 45-60 cm and covered with top soil in well prepared bed. Shooting takes place after 1-2 months and roots emergence take place 4-5 months. Frequent watering should be given till proper root development. Rooted culms are taken out after flooding the field or during rainy days when bed is loosened. Best time for propagation of bamoo in this method is during rainy season, ie. March-May. Thick walled bamboo such as: *Bambusabambos*, *Bambusabalcooa*, *Dendrocalamus asper*, *Bambusa vulgaris*, etc. can be propagated under this method.

d) Propagation through branch cutting: This method is mostly used in thick walled sympodial bamboos. The 1-2 years old branches with 3-4 internodes to be selected for planting materials. The propagation should be made during active growth stage. Cutting should be placed horizontally below 7-10 cm in sand bed or, mist chamber. Then well rooted plants are transferred to polybags and in green house or, overhead shaded bed, Bamboo species: *Bambusavalgaris*, *Bambusanutans*, *Dendrocalamushamiltonii*, *Bambusa balcooa*, *Bambusa pallida* are recommended for propagation through branch cutting method.

e) Propagation through macro proliferation: The multiplication of bamboo seedling by rhizome separation leading to matter sized planting materials is known as macro-proliferation. This is generally practiced in small seedlings usually raised through seeds.

When the seedlings are of 5-6 months having more than 2 plants with prominent rhizome development it is separated and is repeated every year till it overgrows. The culm with piece of rhizome and roots are carefully separated with the help of sharp knife after washing or, shaking the attached soil. The separated seedlings are planted in the poly bag and stored under proper nursery conditions.

5.14 Subsidiary silvicultural operations: In order to encourage yield, subsidiary silvicultural operations such as cleaning, weeding, soil working should be carried out. The area may be fenced with locally available thorny material. If there are some small streams passing through the site, it is beneficial to construct check dams and vegetative gully checks for moisture conservation. Climber cutting, thinning etc, should be done at regular intervals to have better yield.

5.15 Measures for its protection: No bamboo harvesting is allowed from inside the reserve forest where it is planted for enhancement of wildlife habitat. No collection and harvesting of barks of tree. NTFP should be sustainably harvested. People other than JFMCs are not allowed to collect NTFP from the division.

5.16 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 marginalized 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 brought 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.

5.16.1 Treatment prescribed: Areas allotted under JFMC Working Circle and NTFP Working Circle will be selected for Agarwood cultivation. 30 % of such area shall be brought 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.

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CHAPTER 6

SOIL AND WATER CONSERVATION OVER LAPPING 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 7.1.

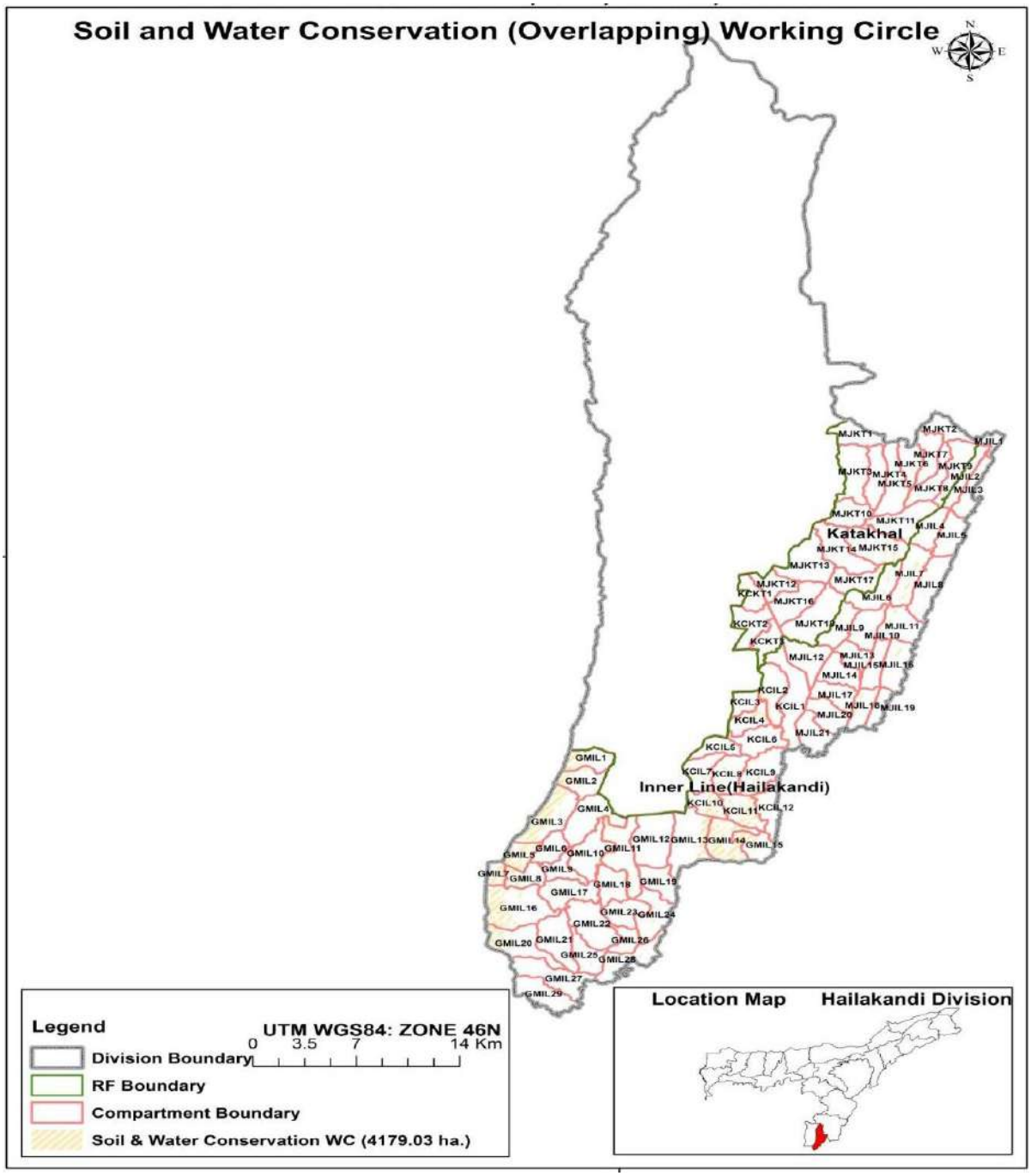

Fig 6.1: Soil and water conservation over lapping working circle

6.2 General constituents 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. Many water streams originate from the RFs of the Division and many streams and rivers originated from other states pass through the RFs of this Division. 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.

6.3 Management Objectives of the Working Circle:

The main objective/ prescription of this overlapping Working Circle reflected as below –

- To assess the erosion vulnerability of the various areas by suggesting the scientific control measures showing in the map.
- To prepare the Project proposal for scientific management of Catchment/ watershed areas by various measures.
- To monitor and evaluate the surface water flow with respect to the rainfall and affect of controlling measures in every season.
- To assess and mapping the wetland located in the forest area under proper management plan towards effective development/ enhancement of water storage capacity/ developing the eco-tourist spot.
- To manage the aquatic flora and fauna of the wetland.
- To monitor and evaluate the ground water level in and around the forest area and preferably upto the 5 Km distance from the forest boundary.
- To manage the watershed and catchment area of the river/ water stream.
- To monitor the ground water level of the various wells.
- To manage scientifically the existing wetland.
- To enhance the soil organic carbon content.

6.4 Blocks & Compartment allotment of areas: Area allocated under different block and compartment in the division under this working Circle.

Table 6.4: Blocks and Compartment areas allotted under the Working Circle

RF	Compartment	Compt area	Soil & water Conservation WC
Inner Line	GMIL1	530.94	140.00
Inner Line	GMIL2	592.48	140.00
Inner Line	GMIL3	1024.49	300.00
Inner Line	GMIL4	943.12	45.00

Inner Line	GMIL5	405.7	200.00
Inner Line	GMIL7	238.25	105.00
Inner Line	GMIL8	451.8	90.00
Inner Line	GMIL10	805.44	50.00
Inner Line	GMIL11	1000.54	100.00
Inner Line	GMIL13	1170.79	100.00
Inner Line	GMIL16	1372.79	200.00
Inner Line	GMIL17	756.15	20.00
Inner Line	GMIL18	562.1	35.00
Inner Line	GMIL20	929.9	190.00
Inner Line	GMIL23	554.11	35.00
Inner Line	GMIL24	725.56	100.00
Inner Line	GMIL26	337.1	10.00
Inner Line	GMIL28	668.61	60.00
Inner Line	KCIL1	1130.12	40.00
Inner Line	KCIL2	679.65	90.00
Inner Line	KCIL3	329.61	25.00
Inner Line	KCIL4	455.08	60.00
Inner Line	KCIL6	662.89	15.00
Inner Line	KCIL7	553.86	10.00
Inner Line	KCIL8	635.17	50.00
Inner Line	KCIL9	820.6	75.00
Inner Line	KCIL10	450	100.00
Inner Line	KCIL11	613.25	150.00
Inner Line	KCIL12	548.92	25.00
Inner Line	MJIL3	499.29	10.00
Inner Line	MJIL6	722.14	20.00
Inner Line	MJIL7	755.99	90.00
Inner Line	MJIL8	826.7	10.00
Inner Line	MJIL11	706.95	30.00
Inner Line	MJIL16	690.98	15.00
Inner Line	MJIL17	522.68	30.00
Inner Line	MJIL18	442.67	25.00
Inner Line	MJIL20	565.6	5.00
Katakhal	MJKT3	840.09	30.00
Katakhal	MJKT8	579.26	20.00
Katakhal	MJKT10	548.58	20.00
Katakhal	MJKT14	889.3	15.00
Katakhal	MJKT15	952.77	65.00
Katakhal	MJKT16	764.96	45.00
Katakhal	MJKT17	556.46	10.00
Total		**53835.74**	**3000.00**

Table 6.4.a: Area identified for management

Sl. No.	Name of water stream/Rivulets	Area identified for management (Ha.)	Location	Remarks.
1	Dhaleswari	800	Both side of the river bank	Most of the area required vegetative control measures
2	Bhairabi	400	-do-	
3	Kukicherra	400	-do-	

4	Baruncherra	400	-do-	with the indigenous species of trees / bamboos.
5	Dhalcherra	350	-do-	
6	Lalacherra	350	-do-	
7	Balicherra	300	-do-	
		3000		

Activities proposed to be undertaken are-

1. Soil and water conservation works Proposed treatment area = 3000.00hect.

6.5 Associated Guidelines: Common Watershed Guidelines and any other guidelines related to conservation of soil and water shall be followed.

6.6 Strategy: Watershed approach to protect soil and water would be undertaken in the Division. The river sand will be protected as it acts as cushion for the meandering waterways. Catchment area treatment will be carried out based on the need to protect the fertile soil of the forest. The concept of springshed sanctuaries will be promoted. Hydrological regime will be maintained and flow of environmental goods and services is to be ensured by maintaining the runoff. The regenerative capacity of the endemic species will be enhanced by maintaining the optimum soil moisture. Activities would be undertaken with involvement of fringe village population. 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 (indegeneous) complementing natural species.Monocrop should be avoided.Natural regeneration should be encouraged and wherever necessary, aided natural regeneration should be taken up. 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 will be sensitized in forest and wildlife protection.Identification of issues relating to protection of forest and wildlife and taking appropriate measures, participatory planning and sharing of responsibility and benefits needs etc. will be taught to the communities. Involvement of local population can ensure control of illegal activities which can cause further degradation of the flora and fauna. For this purpose capacity building programs may be taken up. Application of spatial tools for regular monitoring and updation of any measures shall be taken.

6.7 Measures for its protection: Treatments to be done using the ridge to valley concept. Atleast 60 percent on the ridge should be covered with trees. Preference of vegetative measures over engineering measures is always an ethics of foresters. Emphasis will be laid not to disturb the hydrological regime and not to destroy the habitat of the native and endemic species.Re alteration of any perennial spring water sources inside the reserve forest is strictly be avoided.

6.8 Method of treatment: Prescription for soil and water conservation (SWC) –

a) Identification of SWC related issues during microplanning.
b) Technical and social feasibility of soil and water conservation works.

c) Development of detailed project report.
d) Gully plugging works to check further extension of the gullies.
e) Minor engineering works in eroded areas and in slips prone areas to check the soil erosion and reduce runoff.
f) Create works on the sides of diversion drains to checking further cutting of the drains/channels.
g) Planting of cuttings of soil binding species in vegetative spurs but avoid exotic species.
h) Gabion structures mainly retention walls, diversion drains if required after technical feasibility would be proposed.
i) Proper anchorage of the gabion structures need to be ensured.
j) Creation of continuous trenches across the slope and planting of soil binding species in the pit. The dug out soil will be placed towards the flow of water to checkthe soil erosion and reduce run-off.
k) Riparian species and other less transpiring, water conserving species should be planted on the riparian areas and near waterbodies.

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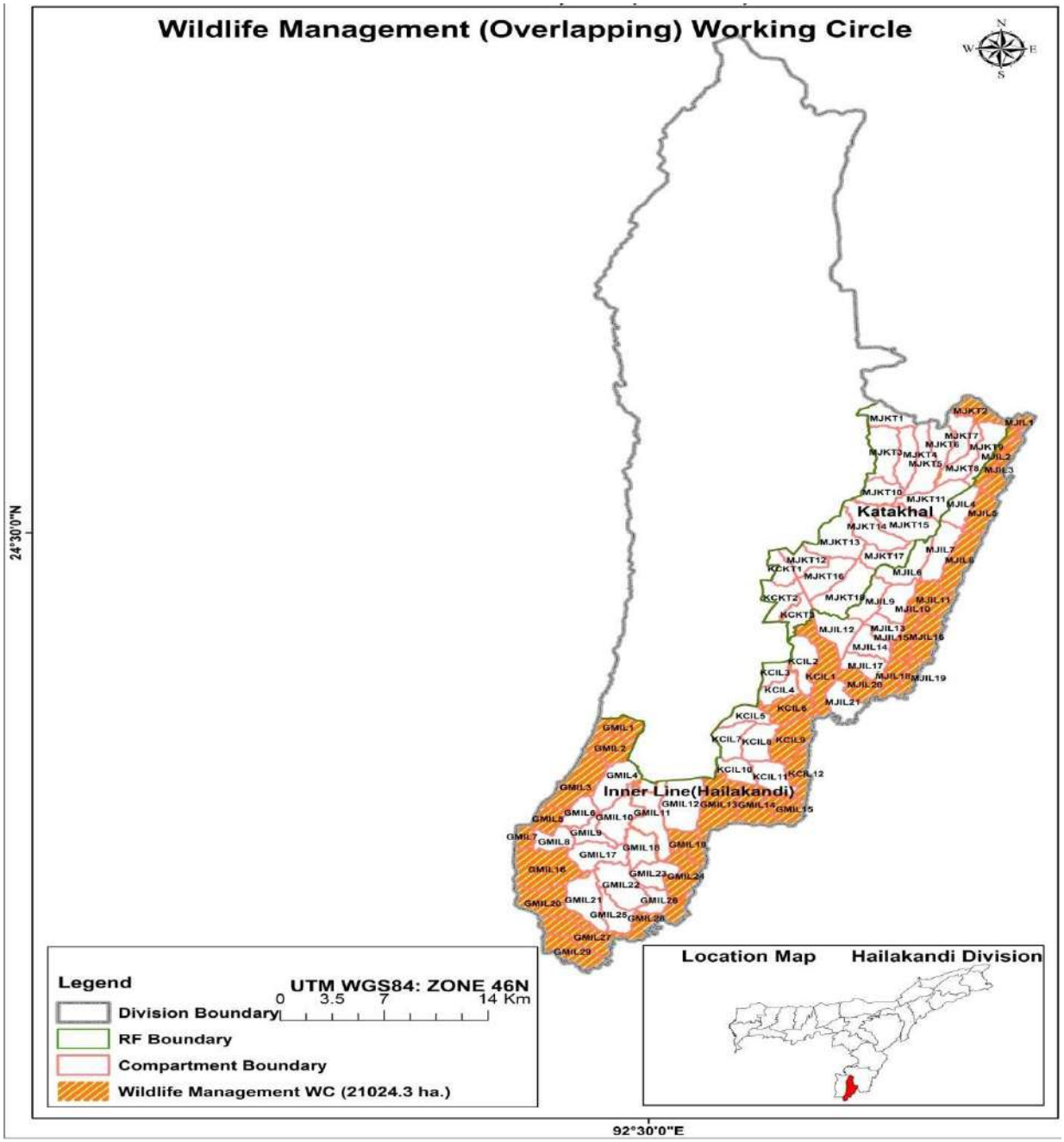
CHAPTER 7

Wildlife Management overlapping Working Circle

7.1 Name of the Working Circle: Wildlife management overlapping Working Circle.

Fig. 7.1. Wildlife management overlapping working circle map of Hailakandi Division



7.2 General constituents of the working circle

The National Forest Policy'1988 aims at conserving the natural heritage of the country preserving the remaining natural capital with the vast variety of flora and fauna, which represent the remarkable biological diversity and genetic resources of the country. Forest management should take special care of the needs of wildlife conservation and forest

management plans should include prescriptions for this purpose. It is especially essential to provide for `corridor` linking of the protected area in order to maintain genetic continuity between artificially separated sub sections of migrant wildlife. For better management of wildlife and to preserve the bio-diversity, creation of protected areas (PAs) and their specific management practices are in force approximately 4% of the forest area of the country.
This will be an overlapping circle to cover all the areas of the Division. The plan should prescribe measures for wildlife habitat conservation and identification of corridors for movement of elephants and their protection. There is a strong need of developing wild elephant habitat in all the RFs of the Division.

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 program with the support from State Biodiversity Board as it may be difficult for the working plan officer (WPO) to do it within the time allotted for writing the plan.

Biodiversity is the totality of genes, species and ecosystem in a region. Richness of biodiversity of a region or country shows its richness of biological heritage, high conservation values and the richness of its population's socio-economic culture, as the biodiversity directly or indirectly affects the living standards of the human populations, health conditions and overall prosperity. In a bio-diversity rich country, there are multiple food choices, multiple choice of medicinal plants and multiple economic avenues. While biodiversity provides the people with a host of organic products, it is the people's duty to conserve the biodiversity which is the product of hundreds of millions of years of evolutionary history. In the recent past, biodiversity as a subject was not given the due importance. It is only after the Earth Summit held in 1992 at Rio de Janeiro, where on "Convention on Biological Diversity" (CBD) was adopted. The CBD having near universal membership has set out commitments for maintaining the biological resources underlining three main goals: (1) conservation of biological diversity, (2) the sustainable use of its components, (3) and the fair and equitable sharing of the benefits from the use of genetic resources. India is a party to the CBD and committed to conserve the natural heritage. The State of Assam has prepared the strategy and Action Plan for Conservation of Biodiversity for the State in 2010 by constituting Assam State Biodiversity Board and also framing Assam Biodiversity Rules,2010. Later with prime goal of preservation of the rich Biodiversity of the State, The Assam Project on Forest and Biodiversity Conservation Society (APFBC Society) was launched by the Govt. of Assam in collaboration AFD French Government on 28th June 2012.

7.3 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.

7.4 Objectives of the working circle: The aim 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: It is necessary to take up protection and conservation measures throughout forests in the interest of wildlife protection and management, keeping this aspect in view the specific objectives of management are as follows.

(1) To protect and conserve wildlife and ensure viable population of wildlife.

(2) To increase the population of wildlife by providing proper habitat management including shelter, water, food etc. and to develop infrastructure facilities for the betterment of wildlife.
(3) To preserve area of biological importance as natural heritage for the benefit of education, research and enjoyment of the people.
(4) To improve and restore the demographic indicator of growth relating to population of all endangered, endemic, rare species of animals and plants.
(5) To involve local people in wildlife conservation and educate and motivate local people for protection and conservation of wild animals there by providing an environment of security to wild animals.
(6) To control illegal trade and poaching in wildlife and their products.
(7) To reduce biotic interference affecting the growth of wildlife and regulate cattle grazing.
(8) Rescue and rehabilitation of wild animal
(9) Ensuring that development of roads, railways in these areas does not create habitat fragmentation.

7.4.2 Biodiversity conservation: The specific objectives towards biodiversity conservation within the Working Circle are-

a) 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.
b) To map herbs, shrubs and climbers, and to make inventories of various NTFPs and Medicinal Aromatic Plants.
c) 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.
d) 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.
e) 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.
f) To take up collaborative projects with local and international Educational Institutes, Academic bodies, Research and other Organizations, agencies.

7.5 Activities proposed to be undertaken are: Activities proposed to be undertaken are-

1. Enrichment plantations = 50 hectares.
2. Establishment of 1 anti-wildlife depredation unit.
3. 160 nos. wildlife awareness camps.

7.6 Monitoring of Wild animals: Presence of wild animals in the Division should be

observed by the following methods–

a) **Sighting:** Near water holes, salt licks, grazing sites, near the roads, actual sightings of wild animals and their photography.
b) **Infrared photography:** Installation of photographic units on probable areas to get picture of the wild animal.
c) **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.
d) **Grazing marks:** Identification of the category of herbivore by analyzing the nature of grazing and browsing, since all herbivores have different grazing.
e) **Feces:** Collection and examination of animal feces for knowing the wildlife and getting idea on their population, food, etc.
f) **Antlers marks:** Before falling of antlers e.g. spotted deers and Sambars rub their antler on some stem.
g) **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.
h) **By sound:** Hearing sounds of wild animals a fair understanding of the wildlife presence, location can be ascertained.
i) **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
j) **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.
k) **And all other direct and indirect evidences.**

7.7 Strategy: For wildlife management the key focus is to ensure maintenance of wildlife preferring 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.

It is necessary to prescribe plantation of the 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.

a) 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 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. Capacity building programmes would be taken up at intervals.

b) 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 be avoided. Even a narrow access road through a forest can act as a barrier to movement of small organisms and effect their habitats.
c) Ecotones between natural communities support a variety of species from both communities. Hence, these should be allowed to develop naturally between adjacent communities.
d) 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 Measures for its protection: Measures for protection in this working circle is elaborated below under proposed wildlife management prescriptions, and proposed biodiversity conservation measures.

7.8.1 Proposed wildlife management prescriptions: The main issues are hunting, poaching, illegal felling, illegal removal of NTFP, encroachment, grazing, man-animal conflict, livestock disease.

7.8.1.1Hunting: There were some cases of hunting of male wild elephants in the past. At present no such incident has taken place. However, forest staffs in the Division should keep vigil on any such activities. 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. Killing of stray out Leopard and other animals by agitatated crowd has found common everywhere. Stringent legal measures need to be taken to apprehend the culprits besides initiation of legal procedure for exemplary punishment is a must. Offenders may be arrested on the basis of video footage and intelligence feedback.

7.8.1.2 Poaching: 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. The Division should take steps to facilitate the process to make suitable amendments in existing forest laws and laws pertaining to wild animals for imposing exemplary punishment including life imprisonment for poachers.

7.8.1.3 Illegal felling: Illegal felling is a challenging problem in the division.The forest staff shall keep vigil through patrolling, information gathering through network develop with the help of local people. Illegal felling to be stopped and illegal doers involved shall be arrested as per the rules and provisions of AFR1891(Amendment) Act1995. Equipments including vehicle, boat etc.used for committing forest offences are to be seized and confiscated.

7.8.1.4 Removal of NTFP: No NTFP which are consumed by wild animals shall be removed from the Working Circle area except that which are cultivated in JFMC areas for domestic consumption of the communities.

7.8.1.5 Encroachment and Other Illegal Activities: A few boundary pillars have been constructed in the protected area proper demarcation during the last management plan period. 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.

7.8.1.6 Grazing: The grazing is negligible in the Division. However, domestic cattle sometimes stray to the forests of the Division. Stray cattle are to be driven away and local people to be made aware on the effect of livestock grazing inside the Division. All domestic cattle need to be immunized from time to time. Initiation in this regard should be taken by facilitating vaccination camps for cattle of the fringe villagers.

7.8.1.7 Degradation of Wildlife Habitat: 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 and its habitat. 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., *Psidium*spp., *Artocarpus* spp., *Mangifera* spp., *Tamarindus* spp., *Phyllanthus* spp. *Eugenia* spp., etc. in wildlife area; plantation of fodder species like *Musa* spp. *Bambusa* spp. *Bauhinia* spp., *Andropogon* spp., *Buchanania* spp., *Cassia* spp., *Dioscorea* spp., *Ficus* spp., *Lagerstroemia* spp., *Saccharum* spp. etc.shall be taken up. 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 suitable 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 anti depredation unit (ADU): A committee willl be constituted 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 conflifct issues. The ADS should be equipped with wireless sets, high beam torch

light, tranquilizers, tranquilizing guns, GPS. Tranquilizers to be carefully used as per the Assam forest department standards in case of only straying small animals like cats, etc. For tranquilization the local veterinarian officer would be consulted. Five watch towers will be constructed. 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. It is proposed to keep four (2) koonkies during planting in the Division as anti depredation measure.

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 Range Offices and be made available to any subordinate officer as and when required.

Awareness: Awareness campaign should be conducted to sensitize the people from not creating chaotic situation when wildlife stray into habitations, agricultural fields etc. Local people should be sensitized that creating such a situation makes wildlife management difficult and the wildlife creates much havoc due to the confusions created. During chasing they should not wound any wildlife and straying wildlife should not be killed by any local people.

7.8.2 Proposed Biodiversity Conservation Prescriptions: Guidelines proposed on treatment prescriptions for preservation and conservation of biodiversity in Hailakandi Division is as follows –

a) **Important Value Index (IVI):** Tree species whose IVI is less than 5.00 will be promoted by planting and preservation.
b) **Fruit trees:** Fruit trees such as Outenga, Mango, Amla, Bel, Jamun, Arjuna, Bahera, Bot, Aahat, Bamboo, etc. will not be felled during any operation. Regeneration of such fruit trees shall be encouraged.
c) **Promoting endemicity:** Areas infested with dense Mikenia micrantha, Lantana spp., 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.
d) **Banning application of inorganic pesticides:** Application of pesticides/ insecticides around a 5 km periphery of the forest in this Division shall 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. It hampers pollination of important tree species and indirectly affects the birds and fish population.
e) **Fire protection measures:** Though there is no report of fires incidences,yet,Fire protection measures, shall done as a precautionary measure to protect the endemic biodiversity.
f) **Disturbances:** During plantation or departmental removal for any wind fallen trees care should be taken not to sacrifice the rarely found species or their regeneration.

g) **Natural regeneration:** Natural regeneration or aided 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.

h) **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 shall be promoted. Capacity building programmes needs to be taken up.

i) **Preservation of good patches:** Efforts shall be made to preserve as many patches of natural communities as possible. This will help to sustain regional diversity. In no case fragmentation of large patches of natural vegetation shall be allowed. 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.

j) **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.

k) **Permanent Preservation Plots:** Due to increasing biotic pressure and imminent climatic change, the natural regeneration of most of the tree species has not been taking place. To preserve the natural floristics of the forest, it is proposed to establish permanent preservation plots of flagship and allied species in the selected compartments. Natural regeneration will be studied, areas will be identified and preservation plots for the above mentioned tree species will be initiated. Mother trees will be identified, marked and used as seed sources for artificial regeneration. The area preserved will be demarcated on the ground with instructions to avoid any disturbances. The various coordinates of longitude, latitude, altitude will be recorded and a map prepared. Preservation plots shall not be less than 3 ha area and will be studied for ecological succession and biodiversity of the area. No grazing shall be allowed in this area nor shall any type of cultural operation be done. Biannual studies on composition and structure of the forest will be done. In case of trees, girth at breast height shall be recorded. The biodiversity will be recorded periodically as per NWPC, 2014 code. The Conservator of Research and Education Circle shall inspect the area annually alongwith the Divisional Forest Officer of Hailakandi Division to record their findings. A copy of the findings should be sent to the Additional Principal Chief Conservator of Forests (RE&WP) for further investigations.

7.8.3 Management of Tree Outside Forests (TOF):

Trees outside the forest (TOF) comprise a heterogeneous and locally very different natural

resource, also referred to as tree resource outside the forest (TROF).In India, TOF is defined as all those trees, which have attained 10cm or more dbh and are available on lands not notified as 'forests' or 'other wooded land'. Trees outside Forests include trees on agricultural lands, in urban and settlement areas, along roads, in home gardens, in hedge rows, scattered in the landscape and on pasture and range lands. The tree resource outside the forest (TROF) is a highly diverse and locally different natural renewable resource. Trees outside forests occur in natural and in cultivated landscapes and serve then a number of ecological, and economic functions. They play a prominent role in securing rural livelihoods like provision of timber, firewood, fodder, fruits, shadow for cattle besides serving important ecological functions, particularly for the conservation of biodiversity, offering shelter and food, and nesting sites for wild animals and other ecological functions like erosion control, water protection and carbon sequestration.

In many regions, the decreasing forest cover, the increasing forest fragmentation, the presence of trees in agroforestry systems and the increasing urbanization with the need for green corridors make the relative importance of TOF grow. The significance of tree resources outside the forest has been emphasized in several contexts and before the year 2000 mainly on a local basis (e.g. Guevara *et al.* 1998, Harvey and Haber 1999). Small forest patches and trees that do not fall under the current forest definition play an increasingly important role, particularly in tropical landscapes, and should be incorporated in regional forestry and natural resource development programs.

Trees outside the forest were addressed as an important resource in the global forest assessments of FAO for the first time in FRA 2000 (Forest Resources Assessment Programme). However, it had not been included in the general data collection part but as one of a series of special studies (FAO FRA 2001a). FAO dedicated a volume of its forestry journal Unasylva to trees outside the forests (Unasylva 200) where there is also a paper addressing issues of large area assessments (Kleinn 2000).

In November 2001, FAO convened an Expert Consultation on TOF (Sadio, *et al.* 2002), titled "Enhancing the contribution of trees outside forests to sustainable livelihoods", where a number of key observations and recommendations were made. An overall observation was that the information base being insufficient and scarce in most regions and that, particularly with respect to management options there are still open questions, geographically differing in character but many of them practically everywhere.

Suggestions:

- Prior to year 2000 TOF were not assessed in the global forest resource assessment (FAO 2000) and the interaction between these categories need to be further investigated. People's participation is a key factor in the sustainable management of TOF. Group consensus should be encouraged in decision, making and also to avoid possible conflicts.
- Research should be undertaken to identify such production systems for TOF that are efficient, ecologically sustainable and financially viable. This includes the development of planning tools, including decision support systems that assist

producers to cope with climate variability. With a proper management of inputs, the productivity of the lands involving trees outside forests can be increased many fold.

- Agro-forestry should be looked upon as a means for improving the socio-economic conditions of the rural poor and should be the main plan of integrated rural development programme. In order to increase fuel, timber, and forage production agro-forestry programmes should be adopted on a large scale, this would include rural woodlots for the rural areas. Such programmes should be time-bound and target-oriented. People participation is a critical factor of success of such programmes.

7.9 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.

Proposed activities

a) Habitat improvement including plantation of fodder, fruit and other indigenous species.
b) Creation and maintenance of patrolling paths 50 km.
c) Construction of at least 2 protection camps and 1 watch tower spread across the sanctuary, more so toward the boundary with fringe villages
d) Creation of Village Forest Protection Committee/Eco Development Committee in fringe villages
e) Protection of buffer area village forests through Village Forest Protection Committee
f) Training of staff, including exposure visits within and outside the state
g) Procurement anti-poaching kits/equipment and other logistics.
h) Procurement of Vehicle and Wireless sets.
i) Creation of need based Ad hoc protection squad comprising villagers
j) To improve communication facilities within PA for better coordination and management.

Table: 7.9: Yearwise activities to be done

Activities	Y1	Y2	Y3	Y4	Y5	Y6	Y7	Y8	Y9	Y10
a) Enrichment plantations = 50 hectares.	5	5	5	5	5	5	5	5	5	5
b) Establishment of 1 anti-wildlife depredation unit.	1	1	1	1	1	1	1	1	1	1
e) 160 nos. wildlife awareness camps.	16	16	16	16	16	16	16	16	16	16
f) Construction of Camps, Watch Tower	4	2	2	2	2	-	-	-	-	-
g) Construction & maintenance of Road 100 km	50	20	10	10	10	-	-	-	-	-
h) Scientific Studies, Monitoring	√	√	√	√	√	√	√	√	√	√
j) Training of staff including exposure visit	20	20	20	20	20	20	20	20	20	20

CHAPTER 8

Miscellaneous Regulations

8.1 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
(ii) Clear felling of natural forest
(iii) Formation of new felling series; and
(iv) 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 alongwith 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 Deviation	Control book, name, form, No. page	Reference to Working Plan		Nature of deviation requiring sanction
		Paragraph	Nature of Prescription	

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 the forwarding letter. The Head, Working Plan Organization, 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.

8.2 Construction of Roads/Link roads: As envisaged in Sec-2 of Forest (Conservation) Act,

1980, no construction of roads/link roads passing through the forests except those which are required for forestry activity including patrolling path etc. shall be allowed without prior approval of MoEF&CC, Government of India.

8.3 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.

8.4 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 are to 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.

8.5 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 month of 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.

8.6 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.

8.7 Preservation Plot: It is proposed to preserve 3.00 ha area of endemic species creating a permanent preservation plot to study the increment of these species in the area and its further prospects. Artificial protection measures around this forest patch shall be taken. 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. Existing preservation plots is any will be maintained.

8.8 Nurseries: To meet the needs of plantation in the area, new nursery for raising tree species, medicinal plants, fruit species shall be created. 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.

8.9 Seasoning and Treatment of Timber: Increasing longivity of wood/timber helps in Carbon sequestration. As a measure for Carbon sequestration, all Wind fallen harvested trees, and seized timbers shall be treated and , seasoned.

8.10 Stone Mahals: All stone mahals should be geotagged.Mining operation shall be done uder strict supervision of forest officer following all rules and regulations stipulated in Assam Minor Mineral Consession Rules. It should be ensured that no environmental and ecosystem degradation takes place.

8.11 Sand Mahals: All sand mahals should be geotagged.Mining operation shall be done under strict supervision of forest officer following all rules and regulations stipulated in Assam Minor Mineral Consession Rules. It should be ensured that no environmental and ecosystem degradation takes place.

8.12 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.

8.13Celebration 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.

8.14 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.

8.15 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, acourse of action that would ensure a safe environment for future generations has become the needof the hour. Sustainable development is a term coined to ensure that development takes place insuch 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 realize 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 organization and demands a strong partnership among governments, the private sector, and development organizations.

Sustainable Development Goals:

Goal 1End poverty in all its forms everywhere
Goal 2 End hunger, achieve food security and improved nutrition and promote sustainable agriculture
Goal 3Ensure 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 5Achieve gender equality and empower all women and girls
Goal 6Ensure availability and sustainable management of water and sanitation for all
Goal 7Ensure 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 10Reduce inequality within and among countries
Goal 11Make cities and human settlements inclusive, safe, resilient and sustainable
Goal 12Ensure sustainable consumption and production patterns
Goal 13Take urgent action to combat climate change and its impacts*
Goal 14Conserve and sustainably use the oceans, seas and marine resources for sustainable development
Goal 15Protect, 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

Hailakandi Forest Division shall contribute for achieving Sustainable Development Goals.

8.16 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.

8.17 Convergence with other Departments:

With a view to achieving achieving the goal of the Working Plan, socio-economic condition

of communities residing 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. DeenDayal 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 FasalBima 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 SamagraGramyaUnnayan 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

8.18 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 Manual and shall be be dutiful to protect and develop the forests.

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CHAPTER 9

Monitoring, Assessment and Reporting

9.1 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:

9.1.1. Bamboo Harvesting Control Form: For cutting bamboo identified for felling and bamboo left out, the Control Form 1 shall be used.

9.1.2 Silvicultural Control Form: For control of all silvicultural operations such as subsidiary cultural operations, cleanings, burnings etc., Form No. 2 shallbe used.

9.1.3 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.

9.1.4 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.

9.1.5 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 control forms and send them, together with the deviation statement in triplicate to the Head, territorial circle. After the entries have been checked and approved, the Head, territorial circle will first get his copies completed and then send it in two copies to the concerned WPO. The later will then complete his copy and finally return the DFO's set for deposit in the latter's office till next year. The WPO will send 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 the WPO, Head, territorial circle and the DFO territorial for their record and the CCF/APCCF (WP) as the case may be, will retain the fourth copy for his set of control forms. The control forms should be submitted by the DFO territorial to the Head, territorial circle by October and the latter should send them to the WPO concerned by December each year (para 129 of the National Working PlanCode-2014).

9.2 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 maintain 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.

9.3 Maintenance of Records: A detailed record of each forestry activity shall be maintained in order to have a solid database for scientific monitoring, evaluation and future planning. In order to avoid any complicacy at any level, the controlling 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

9.3.1 Annual Plan of Operations: An annual plan of operations should be prepared by the Divisional Forest Officer based on the prescriptions and operations to be carried out as per the provisions of the Working Plan. It should be approved by the Conservator of Forests.

9.3.2 Plantation forms and journals: 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 shouldbe 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 wiseand 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 is to be recorded. Instructions of the PCCF/APCCF on checking of plantations issued from time to time should also befollowed.

9.3.3 Nursery register: For each nursery, separate registers need to be maintained. It shall have monthly detail of operations and expenditure incurred, seedling raised, species etc. shall also be recorded in the register. A copy of the nursery statement showing details of species wise nursery stock should be sent to the Divisional office monthly.

9.3.4 Divisional Note-Book: The Divisional Forest Officer should maintain a note-book in which the following information shall be recorded.

a) Flowering of important tree species.
b) Seeding of important tree species including geo cordinates of mother trees
b) Gregarious flowering of bamboos.
c) Climate-rainfall and temperature experienced during this year and its effect 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) Labour 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.

9.3.5 Fire Control Form: The record of forest fires should be maintained without 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.

9.3.6 Deviation statement: To exercise control over progress of various operations at the end of each financial year, the prescriptions of the working plan will be compared with the actual operation done in the field on felling, silvicultural operations and miscellaneous works and any excess or short fall shall be recorded giving reasons for deviation and sanction of the competent authority shall be obtained as per the details given in the Miscellaneous Regulations.

9.3.7 Beat Books: Each beat Officer will maintain a Beat-Book to be prepared and issued by the Divisional Office. The Beat-Book shall contain the following information:

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 and vernacular 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

9.3.8 Registers and Records: The following updated (till previous 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 wildlife conflicts that includes data on human casualities and injuries, loss of domestic animals and crop damage and compensation paid etc.
xii) Register of Government buildings that includes log of the repairs and addition (if any) undertaken in the building.
xiii) Register of registered saw-mills in the Division.

9.3.9 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.

CHAPTER 10

Summary of the Prescriptions

The brief summary of prescription against each Working Circle are narrated in table 10.

Table 10: Summary of prescriptions for each working circle.

Chapter No.	Name of the W.C.	Prescribed activity	Physical target over a period of ten years/ Remarks
Part 2 Chapter 2	Joint Forest Management Working Circle	Preparation of microplans aligned with the working plan and objectives of the JFMC working circle.	Stakeholders engagement in achieving the objectives of JFMC working circle.
		Practice sustainably harvesting of NTFPs	Sustainable NTFP harvesting.
		JFMC participation for anti encroachment	Ensure enhancement of forest cover through community participation.
		Promotion of near to nature agriculture	Maintenance of ecology of the area
		Performance based incentive system	Ensure maximum plantation survival.
		Development of nursery under Joint Forest Management Working Circle for the period of 2023-2024 to 2032-2033.	a) Establishment of 5 community forest nurseries. b) 1,00,000 seedlings in each nursery.
		Plantation under joint forest management working circle for the period of 2023-2024 to 2032-2033.	2100 hectares as production forest. Maintenance= 2100hect.for 5 years
		JFMC training and awareness programmes for the period of 2023-2024 to 2032-2033. (*4 programs twice a year for ten years, each programme 30 persons*).	a) 40 training. b) 40 awareness programme. c) 2400 beneficiaries target.
Part 2 Chapter 3	Plantation and Regeneration Working Circle	Development of database of mother trees	Database and geo tagged location of good seed bearing trees.
		Ensuring availability of quality planting materials from natural stands	To ensure minimum seed losses and enhance maximum seed germination.
		Proposed works under Plantation and regeneration working circle in Hailakandi Division for the period of 2023-2024 to 2032-2033.	2780 hectares Maintenance 2780 hect for 5 years
Part 2 Chapter 4	Forest Protection Working	h) Intensive protection measures will be taken for protection with greater emphasis to forest	a) Strengthening the forest protection squads/personnel with modern equipment,

	Circle	areas with canopy density over 60 percent, grassland of RFs i) Ejection plan. j) Boundary pillars (Main pillars 1 every kilometer and sub pillars 3 every 1 km). k) Creation of barriers includingrajor-wire permanent fencing etc. to check biotic interference wherever necessary.	logistics, vehicle and manpower. b) Ejection plan c) Main boundary pillars 188 d) Sub pillars 564 e) Creation of barriers including rajor-wire permanent fencing etc. to check biotic interference
Part 2 Chapter 5	NTFP (overlapping) and Bamboo Working Circle	NTFP promotion, sustaibale harvesting, database creation	Preservation of threatened NTFPs.
		Bamboo cutting regulations.	Ensure sustained yield of bamboo and maintenance of bamboo habitat for wildlife.
		NTFP plantation	660 hect
		Bamboo plantation	660 hect.
Part 2 Chapter 6	Soil and Water Conservation (overlapping) Working Circle	Micro planning for SMC works and adoption of best practices for SWC.	Ensure conservation of soil and water.
		a) Soil and water conservation intervention b) Proposed treatment area.	a) 3500 hectares.
Part 2 Chapter 7	Wildlife Management and Biodiversity Conservation (overlapping) Working Circle	• Habitat improvement including plantation of fodder, fruit and other indigenous spacies. • Creation and maintenance of patrolling paths 150 km • Construction of at least 5 protection camps and 2 watch towers spread across the sanctuary. • Creation of Village Forest Protection Committee/Eco Development Committee in fringe villages Protection of buffer area village forests through Village Forest Protection Committee. • Training of staff, including exposure visits within and outside the state • Procurement anti-poaching kits/ equipment and other logistics. • Procurement of Vehicle and Wireless sets.	a) Enrichment plantations 500 hectares. b) Patrolling paths 150 km c)5 protection camps and 2 watch towers b) Establishment of 2 anti-wildlife depredation unit. e) 160 nos. wildlife awareness camps. f) Procurement anti-poaching kits/equipment and other logistics. g) Procurement of 2 SUV/MUV Vehicle and Wireless sets
		Develop network with local participation, awareness creation, anti depredation unit and promotion of ecotourism.	Ensure Wildlife Manageent and Biodiversity conservation.

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