

# HIMACHAL PRADESH GOVERNMENT FOREST DEPARTMENT



## DRAFT WORKING PLAN FOR THE FORESTS OF NAHAN FOREST DIVISION

(2023-2024 TO 2032-33)

**Finally submitted by**

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# VOLUME-I

## **ACKNOWLEDGEMENTS**

We extend our heartfelt gratitude and appreciation to all those who have contributed to the formulation and development of the Working Plan for the Nahan Forest Division. This comprehensive document stands as a testament to the collective dedication, expertise, and collaborative spirit of numerous individuals and organizations who have committed themselves to the sustainable management and conservation of our precious forest resources.

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In conclusion, the Nahan Forest Division Working Plan stands as a collaborative triumph, a testament to the power of collective effort and shared goals. As we move forward with its implementation, we remain dedicated to upholding the principles of conservation, sustainability, and community involvement that define this plan. Once again, we express our profound gratitude to all those who have contributed to this endeavour, and we look ahead with optimism and determination to the positive impact that this plan will undoubtedly have on the Nahan ecosystem and its inhabitants.

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## **I. ABBREVIATIONS**

ABEF	Average Biomass Expansion Factor
ACF	Assistant Conservator of Forests
AGB	Above Ground Biomass
ANR	Artificial Natural Regeneration
APCCF	Additional Principal Chief Conservator of Forests
AR/ANR	Artificial Regeneration/Aided Natural Regeneration
ASR	Aquifer Storage and Recovery
BL	Broad Leaf
CA	Compensatory Afforestation
CAMPA	Compensatory Afforestation fund Management and Planning Authority
CAI	Current Annual Increment
CAT	Catchment Area Treatment
CCF	Chief Conservator of Forests
CCTV	Closed Circuit Television
CEC	Central Empowered Committee
CF	Conservator of Forests
CUG	Community User Groups
CGWB	Central Ground Water Board
DBH	Diameter at Breast Height
DCF	Deputy Conservator of Forests
DFO (T)	Divisional Forest Officer (Territorial)
DOM	Dead Organic Matter
DPF	Demarcated Protected Forests
EAFM	Ecosystem Approach to Forest Management
ES	Ecosystem Services
FAO	Food and Agriculture Organization
FCA	Forest Conservation Act
FDA	Forest Development Agency
FPCs	Forest Protection Committees
FRA	Forest Rights Act
FRH	Forest Rest House
FRI	Forest Research Institute

FSI	Forest Survey of India
GHGs	Green House Gases
GIM	Green India Mission
GIS	Geographic Information System
GPS	Global Positioning System
HADP	Hill Areas Development Programmes
HoFF	Head of Forest Force
HPFD	Himachal Pradesh Forest Department
HPSFDC	Himachal Pradesh State Forest Department Corporation
IEC	Information, Education and Communication
IFA	Indian Forest Act
ISFR	India State Forest Report
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
JFM	Joint Forest Management
JFMCs	Joint Forest Management Committees
JFPM	Joint Forest
LULUCF	Land Use and Land Use Change and Forestry
MAI	Mean Annual Increment
MAPs	Medicinal and Aromatic Plants
MAR	Monitoring Assessment and Reporting
MC	Municipal Council
MoEF & CC	Ministry of Environment and Forests & Climate Change
MoU	Memorandum of Understanding
NAP	National Afforestation Programme
NGOs	Non Government Organizations
NGT	National Green Tribunal
NMNR	Nai Rahen Nai Manjilen
NMPB	National Medicinal Plants Board
NTFPs	Non Timber Forest Products
NWFP	Non wood Forest Produce
NWPC	New Working Plan Code
NPV	Net Present Value

PA	Protected Area
PRA	Participatory Rural Appraisal
PB	Periodic Block
PCCF	Principal Chief Conservator of Forests
PCRWC	Protection-cum-Rehabilitation Working Circle
PESA	Panchayats (Extension to Scheduled Areas) Act
PF	Protected Forests
PWPR	Preliminary Working Plan Report
REDD	Reducing Emissions from Deforestation and Forest Degradation
RF	Reserve Forests
RFO	Range Forest Officer
RWH	Rain Water Harvesting
SFDs	State Forest Departments
SHGs	Self Help Groups
SMC	Soil and Moisture Conservation
TD	Timber Distribution
TERI	The Energy and Resources Institute
TOF	Trees Outside Forests
UF	Unclassified Forests
UNFCCC	United Nations Framework Convention on Climate Change
VFDCs	Village Forest Development Committees
VFDSs	Village Forest Development Societies
WC	Working Circle
WHS	Water Harvesting Structure
WP	Working Plan
WPA	Wildlife Protection Act
WPO	Working Plan Officer

## **II. EXECUTIVE SUMMARY**

### **INTRODUCTION**

The working plan for Nahan Forest Division, Himachal Pradesh, for the period 2023-24 to 2033-2034 has been prepared as per National Working Plan Code-2014. The previous Working Plan was written by Sh. Vineet Kumar (1998-99 to 2012-13 and extended up to 2017-18). The plan was for a period of 15 years beginning from 1998-99 to 2012-13 which was extended up to 2017-18 and approved by MoEF&CC. It is also noteworthy that the current Working Plan is the 1<sup>st</sup> being written exclusively for Nahan Forest Division, since previously it was combined with Paonta Sahib Division, having being carved out only in 1984.

Scientific management of forests in H.P. was taken in 1862 by Brandis with forests of Bushaihar and paving the way towards this endeavour, forests of Nahan Division crept into scientific management in 1895 when first working plan was written by Chantamani Joshi, S. Bhattacharya and Ram Chandra (1895-1915) came into operation. Since then, working plan (198-99 to 2012-13) of Nahan prepared by Sh. Vineet Kumar is 6<sup>th</sup> working plan of this division. Since, this working plan was expired and was extended for a period upto 2017-18. It become utmost important to revise the same to maintain continuity in management of forest resources. Besides, there has been a paradigm shift in the concept of forest and natural resource management over the period of time, forests can now no longer be seen just as a source of timber and other forest produce. Management of forest have now envisaged larger realms including carbon sequestration, climate change mitigation, biodiversity conservation and sustaining livelihood of local people and natural resource management.

The current initiative is undertaken to efficiently plan and sustainably manage, improve, conserve and utilize the state forests & the biodiversity. This technical document being prepared for 10 years contains details of information about forest type, flora, fauna, soil and water resources, management practices to be adopted, growth & yield statistics of different forest, interference and interdependence of biotic and abiotic factors etc. Further, the working plan aims to steer processes to guide the increase in the percentage of forest area both in qualitative and quantitative terms. The key driver is also to link the village level development issues (local livelihoods) with the improvement and protection of ecosystem services of the forest. This needs to be done by integrating environmental, social and economic issues into a holistic framework based on the livelihoods of the natural resource dependent community. The data of forest attributes in new working plan code will help foresters in delineation of drivers of degradation

and to implement correct prescriptions in future for improvement and management of ecosystem services of Nahan Forest Division.

Measures to control pressures on forest reserves and enhance the green cover and forest productivity of the division have been emphasized in the working plan.

The total forest area covered by the present plan is 31407.21 ha. The Division comprises of 4 ranges namely Nahan, Kolar, Jamta and Trilokpur Ranges. The area is bounded by Paonta Forest Division in South and Renukaji Forest Divisions in North, Yamunanagar district of Haryana in the west.

#### **A) VISION STATEMENT:**

Revival of scientific forest management in the forests of Nahan Forest Division based on 'Ecosystem Approach to Forest Management', eco-restoration of degraded forest areas and to ensure participation of local communities along with Forest department in controlling and prevention of any degradation of the forests.

#### **B) GOALS AND OBJECTIVES OF MANAGEMENT:**

The objectives of the Working Plan are based on Ecosystem Approach to Forest Management (EAFM) principles: -

- Conservation of forests and reducing the 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.
- Progressive increasing the growing stock and carbon sequestration potential.
- Maintenance of biodiversity.
- Sustainable yield of forest.
- Prevention of soil erosion and stabilization of the terrain; improvement and regulation of hydrological regime.
- People's involvement in planning and management of forests for fulfilling socio-economic and livelihood needs of the people.
- To restore scientific management of the forests and revive forest health.
- To identify the right silvicultural systems for various working circles with the goal to move towards normality of forests and sustainable yield regulation.

- To ensure sufficient carbon sink storage through eco-restoration and plantation meeting India's Sustainable Development Goals.
- To enhance the forest/tree cover through various forestry interventions with the help of local community especially on all degraded and unproductive lands to assist in derivation of all kinds of *provisioning, regulatory and supporting* Ecosystem Services (ES).

### C) SWOT ANALYSIS OF THE DIVISION:

<b>STRENGTHS</b> <ul style="list-style-type: none"> <li>• Biodiverse forest consisting of Sal, Chir, Khair, Eucalyptus working Circle</li> <li>• Rich biodiversity – floral and faunal</li> <li>• Proper forest management and monitoring feasibility</li> </ul>	<b>WEAKNESSES</b> <ul style="list-style-type: none"> <li>• Multiple exit points for illegal activities</li> <li>• Increased anthropogenic interferences</li> <li>• Fragmentation and encroachments</li> <li>• River bank erosion and susceptibility</li> <li>• Inadequate training and lack of firearms with field-staff</li> <li>• Lack of patrolling vehicles and resources for sensitive areas</li> </ul>
<b>OPPORTUNITIES</b> <ul style="list-style-type: none"> <li>• Success of experimental felling for Sal in adjoining Paonta Division– scope for revival of forest health, revenue generation and employment creation in the state</li> <li>• Scope for creation and management of wildlife corridors for safe passage and enrichment</li> <li>• Ecotourism development opportunities, diverse forests, National Park and wetland in the vicinity</li> <li>• Untapped spring sheds and water-conservation potential</li> </ul>	<b>THREATS</b> <ul style="list-style-type: none"> <li>• Bordering areas with Haryana state - high threat of illegal transit of forest produce</li> <li>• Continued ban on scientific management of forests</li> <li>• Illicit mining in <b>Roon</b> and <b>Markanda</b> river systems</li> <li>• Human-elephant conflict scenarios on the rise in recent years</li> <li>• Grazing and biotic pressures</li> <li>• Calamities: Forest fires and landslides</li> </ul>

### D) EXPECTED OUTCOMES:

The expected outcomes of the current Working Plan include: –

1. Improvement of quality of existing forests and movement towards normality and better regeneration

2. Increase in forest cover through various forestry interventions and improved carbon sink in the Division to add to India's commitments under Sustainable Development Goals and REDD+
3. Promotion of people-led participation and SHGs strengthening viz forest protection and conservation through increased livelihood opportunities, ecotourism, and plantations.
4. Mitigation of human-wildlife conflicts through informed practices and cooperation of communities as well as through technical interventions.

## **BRIEF ON THE WORKING PLAN & FORMAT**

The focus of forest management has shifted from forest product harvesting to environmental stability, biodiversity monitoring and management, restoration of ecological balance of the disturbed areas, protective function of the forest resources and Joint Forest Management of village communities. Considering all these aspects of forest management, New Working Plan Code-2014 (NWPC) has been developed by MOEF & CC with the main focus on sustainable forest management, biodiversity conservation, JFM and to initiate action to mitigate climate change.

The New Working Plan Code-2014 has been divided into two parts; PART-I and PART-II. There are 12 chapters in PART-1 of the Working Plan. As per NWPC 2014, the following seven thematic elements of Sustainable Forest Management (Global Forest Resources Assessment, 2005) have been incorporated in the Working Plan of Nahan Forest Division:->

1. Extent of Forest Resources
2. Biological Diversity
3. Forest Health and Vitality
4. Productive Functions of Forest Resources
5. Optimization and utilization of Forest Resources
6. Socio-Economic Functions
7. Legal, Policy and Institutional Framework

The forests are providing ecosystem services to mankind. NWPC 2014 focuses on sustainable management of ecosystem services. The ecosystem services that humans derived from the forests

are provisioning, regulating, cultural and supporting services. The provisioning services are water for drinking and irrigation, food, fuel, timber, fodder and NTFPs of economic importance. The regulatory services are control of diseases and pests, control of soil erosion, control of natural disasters, supply of perennial water, climate regulation, pollination and air quality regulation. The supporting services include soil formation, primary production, nutrient cycling, water cycling, photosynthesis and provision of habitat. The cultural services include cultural habitat, ecotourism, spiritual tourism and social relations in context of nature-dependence.

## **PART-I CHAPTERS OF CURRENT WORKING PLAN:**

**Chapters 1 and 2:** The extent of forest area, forest cover, forest types, land use patterns, supply of water sources, types of soils, rocks, topography, altitudinal variation and climate and threats to the forests. The numbers of forest ranges in Nahan Forest Division are 4. The field data were collected from the compartments of the forest ranges.

**Chapter 3:** The assessment and conservation efforts of biological diversity of Nahan Division. In this chapter various indices of flora in the Nahan forest division has been discussed.

**Chapter 4:** Methods and techniques of protection of forest health from natural hazards (flood, soil erosion, drought etc.) and biotic pressure (grazing, lopping, forest fires, illicit felling, encroachment, invasive species and insects –pests).

**Chapter 5:** Soil and water conservation of the division. The areas treated under soil and water conservation in Nahan forest division has been shown in the chapter. The chapter highlighted the importance of water tables and water harvesting in Nahan Forest Division.

**Chapter 6:** The wealth of the forest is assessed through growing stock. The management of growing stock has given rise to the concept of sustained yield which envisages that during a period the cut from a forest should not exceed its growth. The growing stock of forests of Nahan Forest Division is assessed in this chapter. Carbon stock of Nahan is estimated as per IPCC guideline and formula to mitigate climate change.

**Chapter 7:** Utilization of forest resources of Nahan Division by the people living in close proximity to forests based on rights. Both timber and non-timber products from the forests have real value for these communities. They have market values and also socio-cultural values. Extraction in context of FRA/FCA and salvage removals has also been discussed.



**Chapter 8:** Participation of local communities in protection and conservation of forests under JFM. Utilization of forest resources for livelihood opportunities has been briefed.

**Chapter 9:** Forest policies, acts, rules and guidelines implemented by the State Forest departments help in making various decisions of forest protection and management. The implementation of policies, acts and rules for management of Nahan Forests are highlighted in the chapter. The acts and rules of Central as well HPFD level are addressed in the chapter.

**Chapter 10:** History of India's Five-year plans concomitant with Nahan's Forest working plans has been traced in the chapter.

**Chapter 11:** The chapter revealed the past system of management and their implication on the forests of Nahan Forest Division. This chapter also guides the improvement of works and constitution of working circles for PART-II of the working plan.

**Chapter 12:** The chapter highlighted the growth and yield of forest products and important commercial tree species of Nahan Forest Division.

### **PART-II CHAPTERS OF CURRENT WORKING PLAN:**

Part-II of NWPC reflects the proposals of working circles for the management of forests of Nahan Forest Division. It contained the following elements:

**(i) Object of Management:** For achievement goal of working plan, the following have also been considered:

- A.** Interventions to manage, monitor, protect, and enhance the natural habitats and resources through scientific management of forests of the Nahan Forest Division, and
- B.** Provide an administrative framework to facilitate community participation and enhancement of natural resources.

**(ii) Management Strategy:** The main objective of the management is to maintain and restore ecosystem integrity. Sustainability and ecosystem restoration (or eco-restoration) remains the goal of the management where ecosystem functions have been hampered, forest stocking and biodiversity have been reduced, soil nutrients have depleted due to erosion or forest fires or heavy removal of wood and non-wood forest products. The treatment methods are based on

principles of restoration ecology. It would, however, be not possible to restore the degraded ecosystems to their pristine structure and composition, which may not necessarily a goal. But it is possible to undertake treatment to bring them close to nature which could be done mimicking the nature and learning from similar least disturbed areas of similar forest types elsewhere either in a protected area or outside it.

**(iii) Constitution of Working Circles:** The management is a continuum as are ecosystems. Applying adaptive management principles, the working circles of the previous working plan (by Sh. Vineet Kumar) are readjusted and new working circles are also included in view of new facts and new evolving management approaches. The following Working Circles were proposed:

<b>Sr. No.</b>	<b>Name of Working Circles</b>
1.	Sal Working Circle
2.	Chil Conversion Circle
3.	Khair Working Circle Composite (Established Plantations & Natural Areas)
4.	Eucalyptus Management Plan
5.	Bamboo (overlapping) Working Circle
6.	Protection cum- rehabilitation Working Circle
7.	Plantation (Overlapping) Working Circle
8.	Water Resource Management & Soil Conservation (Overlapping) Working Circle
9.	NWFP (overlapping) Working Circle
10	Forest Protection (Overlapping) Working Circle
11	Wildlife Management (Overlapping) Working Circle
12	Biodiversity Conservation & Development
13	Eco Development(eco-tourism) and Human Resource Management(overlapping) Working Circle
14	Joint Forest Management (Overlapping) Working Circle

### III. LIST OF FLORA

BOTANICAL NAME	HINDI/VERNACULAR/SANSKRIT/TRADE/ENGLISH NAMES
<b>A-TREE</b>	
<i>Acacia nilotica</i> ( <i>Acacia Arabica</i> )	Kikkar, Babul, Indian gum Arabic tree
<i>Acacia catechu</i>	Khair, Khadira, The cutch tree
<i>Acacia modesta</i>	Phulahi
<i>Acer oblongum</i>	Parag, Moli, Putli
<i>Adina cordifolia</i>	Haldu
<i>Aegle marmelos</i>	Bel, Bilva, Indian quince, Holy fruit, Golden apple, stone apple
<i>Albizia lebbeck</i>	Siris, Shirish, Munipriva, Kokko, East Indian Walnut Frywood tree, Woman's tongue tree
<i>Anogeissus latifolia</i>	Chhal
<i>Artocarpus lakoocha</i>	Dhew
<i>Azadirachta indica</i>	Neem, Margosa tree
<i>Bauhinia malabarica</i>	Amlosa
<i>Bauhinia racemosa</i>	Jhinjhora, Gurial, Sveta Kanchan, Kanchan
<i>Bauhinia retusa</i>	Semla, Kandla
<i>Bauhinia variegata</i>	Kachnar
<i>Bombax ceiba</i>	Semal, Salmali, Rakta-pushpa, Kamta-Kadruma, Silk cotton tree
<i>Bombax malabaricumceiba</i>	Red silk cotton tree
<i>Boswellia serrata</i>	Sala or Salai
<i>Butea monosperma</i> ( <i>Butea frondosa</i> )	Parrot tree, Judas tree, Flame-of-the Forest
<i>Callistemon viminalis</i>	Bottlebrush
<i>Careya arborea</i>	Kumbhi
<i>Cassia fistula</i>	Amaltas, Gul-lakri, Argwadha, Rajtaru, Savarnaka, Rajbrikh, Indian laburnum, The purging fistula
<i>Casearia tomentosa</i>	Chila
<i>Cedrela toona</i>	Tun, Red cedar, Moulmein cedar
<i>Celtis australis</i>	Kharak
<i>Cordia dichotoma</i> ( <i>Cordia oblique</i> )	Lassora
<i>Cordia vestita</i>	Bareula or Kum
<i>Dalbergia lanceolaria</i>	Anjan, Takoli Dalbergia Sissoo, Shisham, Tali, Sissoo, Shinsapa, Aguru,
<i>Delonix regia</i>	Gulmohar, Fire tree, Flame tree, Royal peacock, Royal Poinciana. Peacock flower
<i>Diospyros cordifolia</i>	Bis tendu
<i>Diospyros peregrina</i> ( <i>Diospyros embryopteris</i> )	Kala tendu
<i>Diospyros tomentosa</i>	Tendu
<i>Diosregeasia velutina</i>	Tushiari or Singer
<i>Ehretia laevis</i>	Chamror

<i>Emblca officinalis</i> ( <i>Phyllanthus emblica</i> )	Aamla, Amalak, Dhatri, Indian goose berry
<i>Erythrina suberosa</i>	Dhaul-dhak, Mandara, Pangra, Corky coral tree
<i>Erythrina variegata</i>	Mandara, Pangra
<i>Erythrina indica</i>	Indian coral tree
<i>Eucalyptus tereticornis</i>	Eucalyptus/Safeda
<i>Ficus bengalensis</i>	Bargad, Bohar, Vat, Nyagrodha, Bahupadha, Kalp Vriksha, Banyan
<i>Ficus glomerata</i>	Gular, Udumbara
<i>Ficus palmate</i>	Khemri
<i>Ficus religiosa</i>	Pipal, Aswattha, Bodhi tree
<i>Flacourtia jangomas</i> ( <i>Flacourtia cataphracta</i> )	Pachnate
<i>Flacourtia indica</i> ( <i>Flacourtia ramontchi</i> )	Kangoo
<i>Garuga pinnata</i>	Kharpat
<i>Gmelina arborea</i>	Gambhar or Kumbhar
<i>Grewia elastic</i>	Dhaman
<i>Grewia optiva</i> ( <i>Grewia oppositifolia</i> )	Behul, Biul
<i>Hesperethusa crenulata</i> ( <i>Limonia crenulata</i> )	Beli
<i>Holoptelea integrifolia</i>	Papri, Chilbil
<i>Jacaranda mimosifolia</i>	Jacaranda
<i>Lagerstroemia parviflora</i>	Dhauri, Sidha
<i>Lannea coromandelica</i> ( <i>Lannea grandis</i> )	Jhingan
<i>Litsea glutinosa</i> ( <i>Litsea chinensis</i> )	Chandna or Maida-Lakri
<i>Litsea monopetala</i> ( <i>Litsea polyontha</i> )	Karka or markua
<i>Mallotus philippensis</i>	Rohini
<i>Mangifera indica</i>	Aam, Amra, Rasala, Madhuduta, Mango
<i>Melia azedarach</i>	Bakain, Drek, Persian lilac, Bastard cedar, Bead tree, Barbados lilac, Indian lilac, China berry
<i>Michelia champaca</i>	Champa
<i>Mitragyna parvifolia</i> ( <i>Stephegyne parvifolia</i> )	Phaldu or Kaem
<i>Miliusa velutina</i>	Dom-sal
<i>Moringa oleifera</i> ( <i>Moringa pterygosperma</i> )	Sanjna, Sohanjna, Shob-bamjama Sigru, Horse-radish tree, Drum stick tree, Ben tree
<i>Morus alba</i>	Tut, Shahtoot, White Mulbery, Safed Shahtoot
<i>Myrica sapida</i>	Kaphal
<i>Oroxylum indicum</i>	Tarlu or Tat-parangha
<i>Ougeinia oojeinensis</i> ( <i>Ougeinia dalbergioides</i> )	Sandan, Tinsia, Sejandana, Rot
<i>Phoenix humilis</i>	Khajur

<i>Phoebe lanceolata</i>	Tumri or Bhadrol
<i>Pinus roxburghii</i> ( <i>Pinus longifolia</i> )	Chir or Chil
<i>Pistacia integerrima</i>	Kakkar Singi, Pistachio wood
<i>Premna latifolia</i>	Bakar
<i>Prosopis juliflora</i>	Prosopis juliflora, Vilayati babul, The Mesquite
<i>Prosopis juliflora</i>	Aroo
<i>Psidium guajava</i>	Amrood
<i>Punica granatum</i>	Anar
<i>Pyrus pashia</i>	Kainth
<i>Quercus leucotrichophora</i> ( <i>Quercus incana</i> )	Ban
<i>Randia spinosa</i> ( <i>Randia dumetorum</i> )	Maniphal or Rada
<i>Rhododendron arboretum</i>	Bras
<i>Robinia pseudo-acacia</i>	Robinia, Black locust
<i>Salmalia malabarica</i>	Semal, Salmali, Rakta-pushpa, Kamta-Kadruma, Silk cotton tree
<i>Sapindus mukorossi</i>	Ritha, Arishta, Phenila, Soap nut tree of North India
<i>Saraca asoca</i> ( <i>Saraca indica</i> )	Ashok
<i>Schleichera oleosa</i> ( <i>Schleichera trijuga</i> )	Kusum, The lac tree, The Ceylon Oak, Macassar oil tree
<i>Semecarpus anacardium</i>	Bhilawa, Bhallataka, Marking nut tree, Arushkara
<i>Shorea robusta</i>	Sal.Sala,Shal
<i>Spondias pinnata</i>	Amara,Amrotaka, Hog-plum, Bile tree, Wild mango, Traveller's delight
<i>Sterculia villosa</i>	Gudgudala, Udal
<i>Stereospermum suaveolens</i>	Padal
<i>Syzygium cerasoideum</i> ( <i>Eugenia operculata</i> )	Thuthi
<i>Syzygium cumini</i> ( <i>Syzygium jambolanum</i> )	Jamoa, Jaamun,Jamun
<i>Tamarix dioica</i>	Jhau
<i>Tecoma stans</i>	Tecoma
<i>Tectona grandis</i>	Teak
<i>Terminalia arjuna</i>	Arjun
<i>Terminalia bellirica</i>	Bahera, Vibhitika, Bahira, Belliric myrobalan.
<i>Terminalia ehebula</i>	Harar, Haritika
<i>Terminalia alata</i> ( <i>Terminalia tomentosa</i> )	Sain, Saj, Saja
<i>Trewia nudiflora</i>	Gutel or Tumr
<i>Wendlandia exserta</i>	Chili
<i>Wrightia tomentosa</i>	Dudhi

<i>Ziziphus mauritiana</i>	Ber, Badari, Dadara, Jujube.
<i>Ziziphus jujuba</i>	Madhuraphala.
<i>Ziziphus glaberrima</i> <i>Ziziphus xylopyrus</i>	Kathber or Mandher

### B-SHRUBS

<i>Adhatoda vasica</i>	Basooti, Bansa
<i>Aechmanthera gossypina</i> ( <i>Aechmathera Wallichii</i> )	Bharara
<i>Antidesma acidum</i> ( <i>Antidesma diandrum</i> )	Khatla
<i>Ardisia solanacea</i>	Gur-bheli
<i>Asparagus racemosus</i>	Satamuli or Sataron
<i>Berberis spp</i>	Kasmal
<i>Caesalpinia decapetala</i> ( <i>Caesalpinia sepiaria</i> )	Heens
<i>Calotropis procera</i>	AK
<i>Cannabis sativa</i>	Bhaga
<i>Carissa opaca</i>	Kandlai or katrarh
<i>Cestrum nocturnum</i>	Rat ki rani, lady of the night, maxican Jasmine.
<i>Cleroderdrum viscosum</i>	Karu
<i>colebrookea oppositifolia</i>	Bida or Binta-lakari
<i>Debregeasia spp</i>	Singar or siaru
<i>Dodonaea viscosa</i>	Mehandua
<i>Euphorbia royleana</i>	Thor
<i>Flemingia chappar</i>	Chhanchra
<i>Helicteres isora</i>	Marorphali
<i>Holarrhena antidysenterica</i>	Kura or kora
<i>Indigofera pulchella</i>	Kathi
<i>Lantana camara</i>	Varzhita or Phuljari
<i>Maesa indica</i>	Dumani
<i>Murraya koenigii</i>	Gandhela or Mirchu
<i>Nyctanthes arbor—tristis</i>	Harsingar, Kuri, Parijata, Night jasmine
<i>Opuntia dillenii</i>	Nagphon
<i>Orthanthera viminea</i>	Sharar
<i>Osyris wightiana</i>	Lal-lakri
<i>Prinsepia utilis</i>	Bhekhra
<i>Rauwolfia serpentine</i>	Sarphgandha
<i>Rhus cotinus</i>	Tung
<i>Rosa moschota</i>	Jangli-gulab
<i>Rubus niveus</i>	Bhera
<i>Rumex hastatus</i>	Chulmora or Khatibuti
<i>Solanum verbascifolium</i>	Ban Tamaku
<i>Vitex negundo</i>	Shimalu or Bahna
<i>Woodfordia fruticosa</i> ( <i>Woodfordia floribunda</i> )	Bhaura or Dhawi or Dhai

## C-CLIMBERS

<i>Abrus precatorius</i>	Ratti or Gunchi
<i>Acacia pennata</i>	Agla
<i>Atylosia mollis</i>	Ban Sem
<i>Bauhinia vahlii</i>	Malijhan
<i>Caesalpinia decapetatala</i> ( <i>Caesalpinia sepiaria</i> )	Alai
<i>Calamus tenuis</i>	Baint
<i>Celastrus paniculatus</i>	Malkangi
<i>Chonemorpha macrophylla</i>	Dudhi
<i>Cissampelos-pareira</i>	Dali Dudhi or Bakar Bel or Medha Singi
<i>Combretum decandrum</i>	Patindu or Harjori Roel
<i>Dioscorea bulbifera</i>	Githa
<i>Ichnocarpus frutescens</i>	Pilidudhi
<i>Millettia auriculata</i>	Gaj
<i>Mimosa himalayana</i>	Alay
<i>Mucuna pruriens</i> ( <i>Mucuna prurita</i> )	Kaunch
<i>Porana paniculata</i>	Safed Bel
<i>Pueraria tuberosa</i>	Sarali
<i>Smilax macrophylla</i>	Ramdataun
<i>Smilax parvifolia</i>	Ushwa
<i>Tinospora sinensis</i> ( <i>Tinospora malabarica</i> )	Ciloe or Gulj
<i>Vallaris solanacea</i>	Dudhi bel or Safed bel
<i>Vitis latifolia</i>	Panibel
<i>Vitis trifolia</i>	Amal bel
<i>Ziziphus oenoplia</i>	Makoh

## D-GRASSES AND BAMBOOS

<i>Arundo donax</i>	Nal or Nara
<i>Chrysopogon fulvus</i> <i>Chrysopogon montanus</i>	Dhau
<i>Cymbopogon martini</i>	Mirchangandh or makora
<i>Cynodon doctylon</i>	Dub, Durva grass, Haritali
<i>Dendrocalamus strictus</i>	Bans
<i>Dendrocalamus Aamiltonii</i>	Bans
<i>Eulaisopsis binata</i>	Bhabbar
<i>Heteropogon contortus</i>	Kumeria or Sarala
<i>Imperata cylindrical</i>	Dab
<i>Sorghum halepense</i>	Banchari
<i>Seaccharum munja</i>	Munj
<i>Thysanalaena maxima</i>	Prilu or Aunsh
<i>Thamnocalamus falcata</i>	Nigal or Nirgal

#### IV. LIST OF FAUNA

##### A-GAME ANIMALS

LOCAL NAME	ENGLISH NAME	SCIENTIFIC NAME
Bhaloo	Himalyan Black Bear	<i>Selenarctos tibetanus</i>
Guldar Tendua	Leopard	<i>Panthera tigris</i>
En Koryal	Flying squirrel	<i>Belomys pearsoni</i>
Ghoral	Himalayan Ghoral	<i>Narmorhedus goral</i>
Jungle suar	Wild Boar	<i>Sus scrofa</i>
Kakar	Barking deer	<i>Muntiacus muntjak.</i>
Khargos	Common hare	<i>Lepus nigricollis</i>
Lomri	Red fox	<i>Vulpes bengalensis</i>
Sambar	Sambar	<i>Cervus unicolor.</i>
Shail	Procupine	<i>Hystrix indica</i>

##### B-NON GAMES ANIMALS

LOCAL NAME	ENGLISH NAME	SCIENTIFIC NAME
Bandar	Monkey (Lnnngur)	<i>Presbytis pileatus</i>
Chuha	Himalyan marmot	<i>Marmota bobak</i>
Comman house rat	Rattus rattus	<i>Rattus rattus</i>
Gidar	Jackal	<i>Canis aureus</i>
Gilhari	Five stripped Palm squirrel	<i>Funambulus pennantii.</i>
Junglie Billi	Jungle Cat	<i>Felis chaus</i>
Langoor	Common Langoor	<i>Presbytis entellus</i>
Newla	Common Mongoose	<i>Herpestes edwardsii</i>

##### C- GAME BIRDS

LOCAL NAME	ENGLISH NAME	SCIENTIFIC NAME
Bater	Common or grey quail	<i>Coturnix</i>
Chheer, Cher	Cheer pheasant	<i>Catreus Wallichii</i>
Ghugi	The spotted dove	<i>Streptopeliachinena Spp.</i>
Harial	The wedge tailed green Pigeon	<i>Treron sphenurus</i>
Jangli Murga	Red jungle fowl	<i>Gallus gallus murghi</i>
Kubutar	Blue Rock pigeon	<i>Columba livia</i>
Kaljee	White orested kalgee	<i>Lophura leucomelanos (Hamiltoni valenciennes)</i>
Lowwa	Jungle bush quail	<i>Perdicula asiatica</i>
Malyo	The blue rock pigeon	<i>Columba livia</i>
Peora	Hill patridge	<i>Arborophila atrogularis</i>
Sham Kukra	The spotted dove	<i>Streptopelie chinensis</i>
Teetar	Black partiridge	<i>Francolinus francolinus</i>



## D- NON GAME BIRDS

LOCAL NAME	ENGLISH NAME	SCIENTIFIC NAME
Bulbul	White checked bulbul	<i>Pycnonotus leucogenys</i>
Chamgadar	Common yellow bat	<i>Scotophilus heathii</i>
Chegardar	Barbas telle bat	<i>Barbas tellus barbas tellus</i>
Cuckoo	Cuckoo	<i>Cuculus sparverioides</i>
Gidh	The Himalayan Griffin	<i>Gyps himalayensis</i>
Kaua	Crow	<i>Corvus macrohynchos</i> ( <i>corvus culminatus</i> )
Kath phora	Himalya Wood Puker	<i>Dendrocopos himalayensis</i>
Sparrow	The house sparrow	<i>Passer domesticus (indicus)</i>
Tota	Parakeet	<i>Psittacula columboides</i>
Ullu	Owl	<i>Strigidae.</i>

## E-REPTILES

LOCAL NAME	ENGLISH NAME	SCIENTIFIC NAME
Girgit	The common India monitor lizard	<i>Varanus griseus (daudin)</i>
Gobilda	Chameleon lizard	<i>Chameleon calaratus</i>
Kharpa	The India cobra	<i>Naja naja</i>
Karait	The common India karait	<i>Bungarus caeruleus</i>
Sapp	The Himalayan Pit viper	<i>Vipera russelli</i>

## F-FISH

Goonch	<i>Begarius yarrelli</i>
Lanchii	<i>Wallago attu</i>
Rohu	<i>Labeo rohita</i>

## V. GLOSSARY OF LOCAL TERMS

TERM	EXPLANTATION
<i>Bajri</i>	Gravel
<i>Balli</i>	A round pole having a diameter of 10-30 cm at butt end.
<i>Bhediwala</i>	A profession grazier of sheep and goats.
<i>Bigha</i>	A measure of area of land. Equals 5/24 of an acre; 1008.3 square yards.; 0.208 acre
<i>Chak</i>	Demarcated private land in the reserve, Protected, Unclassed or Mushterqa forest
<i>Chhapar</i>	Athatched roof or hut.
<i>Charand</i>	Grazing land.
<i>Chatti</i>	A fuelwood land.
<i>Chauki</i>	An outpost generally the residence of forest guards.
<i>Chowkidar</i>	Watchman.
<i>Coolie</i>	Labourer.
<i>Daat</i>	Log.
<i>Darbar</i>	The Court of the Ruler.
<i>Dastur-UI-Amal rates</i>	Rates of the ssale of various forest produce.
<i>Dat</i>	Darat
<i>Devi</i>	A Hindu goddess.
<i>Dhar</i>	A ridge or spur
<i>Devta</i>	A local diety.
<i>Dochi</i>	Temporary field residence.
<i>Faisala-e-janglat</i>	A forest Settlement report.
<i>Gaddies</i>	Professional sheep and goat graziers.
<i>Ghair Mumkin</i>	Land under building, roads, paths, streams etc.
<i>Gharat</i>	A water mill.
<i>Ghasnies</i>	Grass land
<i>Ghat</i>	Ford along a river
<i>Gorkha labour</i>	Labourers from Nepal
<i>Gujjar</i>	A professional, nomadic buffalo grazier.
<i>Hadbast number</i>	Serial number allotted to a village at the time of revenue settlement.
<i>Harkries</i>	Pieces of unfashioned split wood.
<i>Hectare</i>	Measure of area. Equals 10,000 square meter; 2.471 acre.
<i>Hooka</i>	Smoking
<i>Jagir</i>	An estate/grant.
<i>Jama-bandi</i>	Recor of land, maintained by the revenue Department.
<i>Karam</i>	A linear unit of land meausrment equal to 1.4518 m; 57.157 inches.
<i>Kari</i>	A Scanting
<i>Katha</i>	Extract form khair heartwood.
<i>Kokath</i>	General terms for miscellaneous broad leaved species comparatively low value
<i>Korwa</i>	Pole used in the frame work of Chapter
<i>Mahkma-janglat</i>	Forest Department.
<i>Makbooja</i>	Possession

<i>Mali</i>	Gardener.
<i>Manu</i>	Current year's shoot of bamboo.
<i>Missal haquiyat</i>	Revenue document containing information regarding customs rights and concessions.
<i>Mauza</i>	A unit of revenue.
<i>Nadi</i>	A stream.
<i>Nautor</i>	Government waste land granted to an individual for purpose of cultivation or habitation.
<i>Naquabil</i>	Land not fit for cultivation.
<i>Nullah/Khalla</i>	Water course.
<i>Ogal</i>	Hole or pit dug in the bed of a Nalla to obtain water for below the surface.
<i>Panchyat</i>	A body of panches forming a village management committee.
<i>Parao</i>	Gujjar grazing/halting
<i>Pattie</i>	A section of a village.
<i>Rewana</i>	A license to fell trees.
<i>Sehada</i>	Trijunction pillar or three mauzas.
<i>Shamlat</i>	Village common land.
<i>Shamlat Deh/Taraf</i>	Areas which are not owned individually but owned collectively by the entire village community or by sub-Division of the village concerned as Pattie or Taraf.
<i>Sokhta</i>	Dry fuel
<i>Simla-Mirch</i>	Capsicum.
<i>Takhta</i>	Plank.
<i>Tappar</i>	An open grassy area in the midst of a forest.
<i>Taraf</i>	A sub-Division of village.
<i>Tehsil</i>	Sub-Division of district.
<i>Thach</i>	A grassy blank.
<i>Tibba</i>	Hillock
<i>Tora</i>	Raised edge of a cultivated field.
<i>Wajab-ul-Araj</i>	Revenue settlement record dealing with social customs, rights concession obligation etc.
<i>Zamindar</i>	A landlord or a cultivating land owner

# PART - I

**Summary of facts on which proposals are made**

# CHAPTER 1

## THE TRACT DEALT WITH

### 1.1 NAME AND SITUATION

The present working plan deals with the forests of Nahan Forest Division. There are four forest ranges in this division *viz.*, Nahan, Kolar, Trilokpur and Jamta. Previous working plan of Nahan was outlined by IFS Sh. Vineet Kumar and Sh. Arun Kumar Gupta (1998-99 to 2012-13) which also included Paonta Sahib Forest Division. However, the present Working Plan covers only Nahan forest division and is written as per the Working Plan Code-2014.

The divisional headquarter of this division is located at Nahan, situated on the outermost Shiwalik ridge at an altitude of about 900 mtrs. It is about 135 kms, from Shimla on Shimla-Nahan-Paonta Sahib road. Table-1.1 demonstrates the administrative setup of Nahan forest division.

**Table 1.1 Administrative set-up of the Nahan Forest Division**

Range	Block	Beat
Kolar	Kolar	Kolar
		Jattanwali
		Kodewala
		Jheel
		Haripur
	Bheron	East Bheron
		West Bheron
		Jamratwa
		Brahmanwali
		Mattar
	Sambhlaka	Sambhlaka
		Rampur Gaiinda
		Dhakranwala
		Negiwala
	Lohgarh	Lohgarh-1
		Lohgarh-2
		Lohgarh- 3
		Lohgarh-4
		Lohgarh-5
		Lohgarh-6
Jamta	Jamta	Bohal
		Burman

		Nauni
		Talon
	Banethi	Banethi
		Amta
		Goanth
		Kathara
		Katli
		Saroga
	Panjahal	Panjahal
		Dhagera
		Jaitak
		Patandi
		Sanoga
Trilokpur	Trilokpur	Trilokpur
		Burmapapri
		Gurudwara
		Kandaiwala
		Mainthapal
	Kotla	Churan
		Gumti
		Kotla
		Kundla
		Neron
	Kaulanwala Bhodd	Bhudra
		Jheera
		Kiyari
		Koteri
		Surla

## 1.2 CONFIGURATION OF THE GROUND

The tract of this division is generally hilly with several streams in the tract known as khols.

**Shiwalik Hills:** The forest area of Nahan, Kolar ranges is occupied by Shiwalik hills, which lie between the altitudes 470 mt. to 1500 mt. In these areas, numerous hillocks and spurs run in

every direction, draining into various khols. The southern and western slopes of these hillocks are quite steep and unstable and most of the area is severely eroded. These hills support scrub forests and grasses where bhabbar grass is predominantly present. Several small streams are found in the tract commonly known as khols. They generally remain dry throughout the year except during the rainy season.

**Dharti Dhar:** The prominent hill range starts from Rajgarh Forest Division near Sarahan and run Eastward via Rama, Kansar, Parduni, Chandpur and end near Rajban. It includes area of Jamta, Trilokpur and Nahan range.

### **1.3 GEOLOGY, ROCK AND SOIL**

The geological formation of the area covered in the present working plan can be mainly classified into two distinct formations.

a) Sub Himalayan formation

b) Himalayan formation.

#### **a) Sub- Himalayan Formation:**

The area under the present plan mainly comes under this formation and comprises Shiwalik Hills and Dharti Dhar.

#### **i) Shiwalik Hills:**

The Shiwalik formation covers a major part of the division and forms the outermost part of the Himalayas bordering the plains. It is formed of alternating bed of hard clay, sandstone, conglomerate, and sand. The formation appears in alternating titled bands and can be easily observed at many places in vertical section of the hills exposed after denudation and sliding landmasses. Naked vertical-edged hillocks can be easily spotted throughout these tracts. The soil of this area is poor and shallow with low humus levels and inter bedded with boulders.

#### **ii) Dharti Dhar:**

This tract covers both Shiwalik and the sub-Himalayan formation. Greenish grey sandstone is met with as large rocks or small boulders with reddish sandstone at places. Shales, phylitic shales and slate also occur intermixed with sandstone. Iron pyrite is found in pockets near Sadaura in the Nahan range.

Southern slopes to the west of Nahan have poor shallow soil. The forest vegetation of this area falls under the forest type Northern Tropical Dry Deciduous Forests which shows the presence of scrub forest and bamboo with a low population of Chil towards the east of Nahan town, Southern

slopes bear pure Sal forests on gentle slopes and flatlands and miscellaneous species on slopes. The northern slopes up to Dhaun support Chil population and area from Dhaun to sirmuri- Tal bears Chil and Sal associates. The aspect is well covered with forest vegetation and falls under the forest type Northern Tropical moist deciduous forests/ Himalayan subtropical pine forests. This forest type has fertile private lands that are employed for cultivation.

**b) The Himalayan formation:** The precipitous slopes in this tract lack proper soil and rocks are exposed on steeper slopes. The vegetation of this area is predominantly found as grasses and scrubs due to shallow and poor soil quality. However, pure Sal forests are found at level areas owing to deep clay loam to loamy soil.

## 1.4 CLIMATIC PARAMETERS

**1.4.1 Altitude:** The Altitude varies from 335 m on Kala Amb to 1550 m on the Jamta range.

**1.4.2 Climate:** The climate of the division is mainly subtropical. The year can be divided into three well-marked seasons i.e., winter, summer and rainy. The winter season starts around November, where it is generally not very cool. However, the nights in the months of December and January are extremely cold. The summer weather is not very extreme. May and June are the hottest months but the heat is fairly tolerable. Generally, the monsoon begins from the last week of June and remains till mid-September, brings great relief to the area.

**1.4.2.1 Temperature:** The division exhibits large variation in temperature because of the high variation in altitude and physical features of the tract. The Shiwalik tract has hot summer days and is cooler during the night. A desiccating effect in the area is produced by the hot dust storms. The southern slopes of Dharti Dhara and Doon have very hot summer days but cool and dewy nights. In winter, daytime temperatures are quite cold, and at night they drop below zero or below zero. The Himalayas have mild summer days but cool nights. Average temperature data from 2005 to 2015 are tabulated in Table 1.2.

**Table: 1.2: Temperature data of Nahan from 2005 to 2016.**

<b>Climatic parameter</b>	<b>Jan</b>	<b>Feb</b>	<b>Mar</b>	<b>Apr</b>	<b>May</b>	<b>Jun</b>	<b>July</b>	<b>Aug</b>	<b>Sep</b>	<b>Oct</b>	<b>Nov</b>	<b>Dec</b>
<b>Max. Temp. (in Celsius)</b>	21	24	29	33	36	35	32	31	31	30	27	23
<b>Min. Temp. (in Celsius)</b>	6	9	13	17	21	23	24	23	21	16	12	7
<b>Relative humidity (%)</b>	73	68	59	47	48	62	85	86	81	71	71	73



**Table 1.3: Temperature data of Nahan (2017-2021)**

	2017			2018			2019			2020			2021		
Month	Max temp	Min temp	R.h	Max temp	Min temp	R.h	Max temp	Min temp	R.h	Max temp	Min temp	R.h	Max temp	Min temp	R.h
Jan	24	3	78	26	5	76	24	5	76	23	4	84	26	5	84
Feb	27	7	72	28	6	71	25	7	79	28	5	77	30	6	79
Mar	35	6	59	33	12	58	34	7	69	28	11	74	35	10	62
April	36	9	53	36	15	53	38	15	60	35	14	60	38	12	46
May	39	17	55	40	17	48	40	18	47	39	16	60	37	16	62
Jun	38	20	69	38	20	70	40	19	60	36	20	78	37	20	74
Jul	34	22	85	34	22	86	35	20	86	34	22	87	35	19	87
Aug	33	20	88	33	22	91	35	23	86	34	22	89	34	23	88
Sep	33	20	85	34	20	85	35	20	86	35	20	82	33	22	87
Oct	33	14	74	32	12	74	31	15	79	33	13	73	33	14	80
Nov	29	9	75	29	10	80	29	10	78	29	8	79	27	10	79
Dec	26	6	80	24	4	77	26	13	83	26	4	83	25	5	82

**1.4.2.2 Frost:** Frost is a common occurrence in the valley but no damage to crops and plants has been reported yet. However, tender seedlings in nurseries need some care to avoid any kind of damage due to frost eg. Neem needs special attention during the winter season.

**1.4.2.3 Rainfall:** This region receives most of the rainfall during the monsoons. The average rainfall ranges from 900 mm to 1270 mm. The monsoons start from mid-June to mid-August while, winter rains are received during December, January. The average rainfall data of Nahan from the year 1999- 2019 is tabulated in table 1.4

**Table 1.4 Average rainfall data of Nahan from the year 1999- 2019**

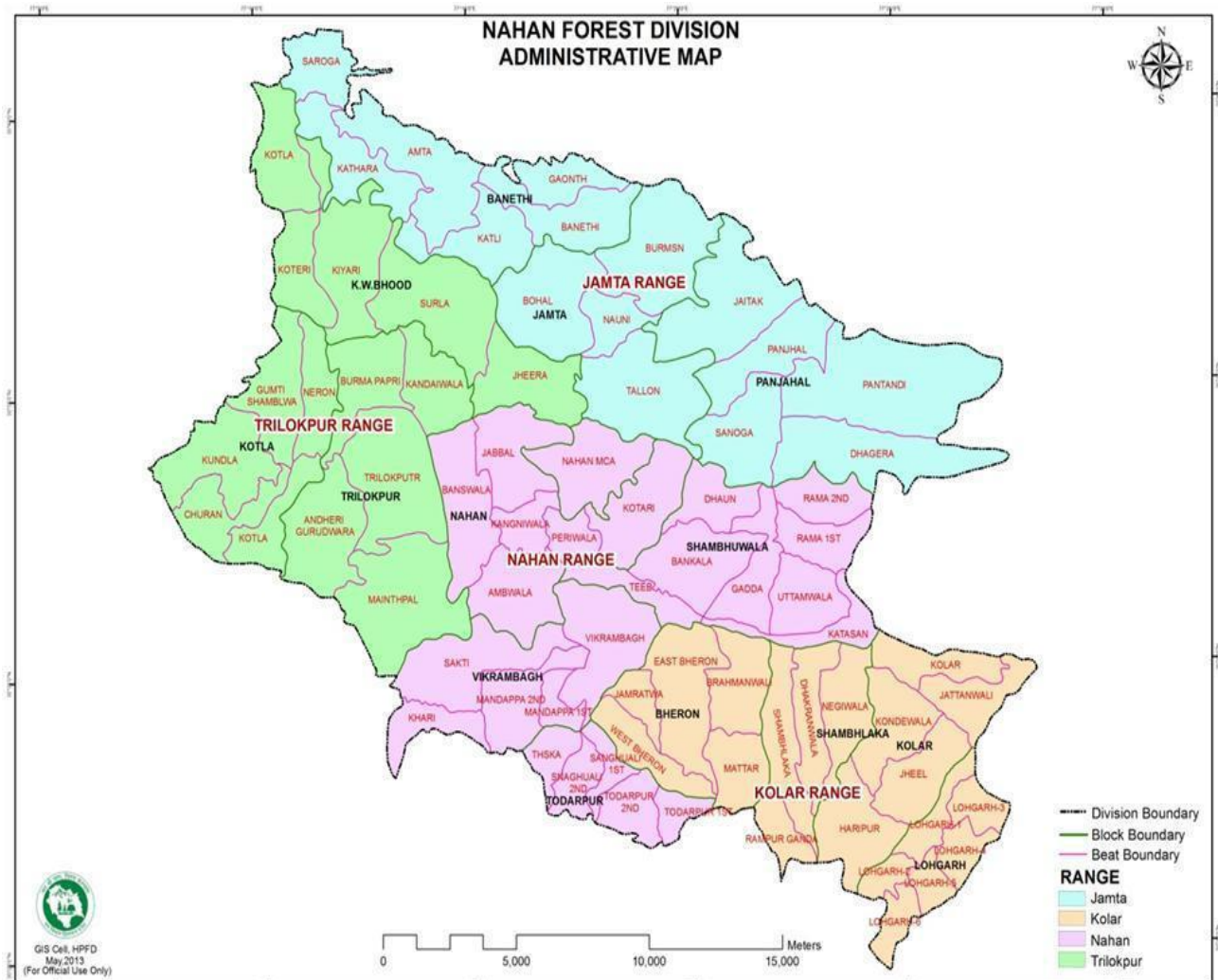
Month	Rainfall (mm)	Rainy days (days)
January	35	3
February	48	4
March	26	3
April	17	2
May	21	4
June	110	8
July	301	17
August	298	16
September	142	9
October	11	1
November	3	1
December	13	2

**1.4.3 Water supply:** The Streams flowing in the division are Bata, Lohgarh khol, Roon, Salani, Jalal. During the summer season, water supply in the area is scarce so many streams either dry up

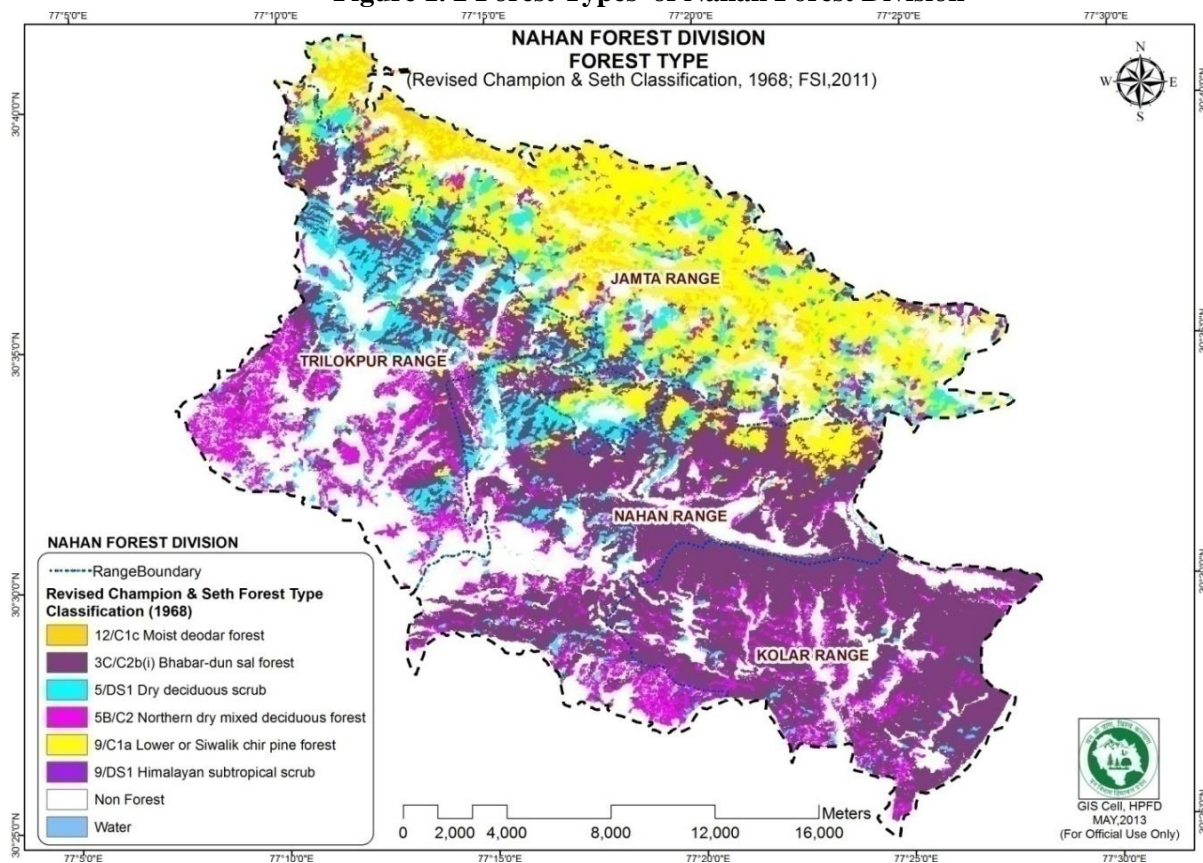
or flow very little water. The 'Nalas' remain dry in this region most of the year. There are many water sources throughout the division, either permanent or seasonal. They are used for drinking water by local people and cattle, wildlife and by nurseries for irrigation. A number of tube wells have been recently dug by the I.P.H authorities in the area.

Earthen dam has been made in the Trilokpur range by the forest division which acts as a catchment of water in an area and regulates the moisture content, recharges the groundwater level and also helps to recharge some dried-up streams. It is made by using soil and stones.

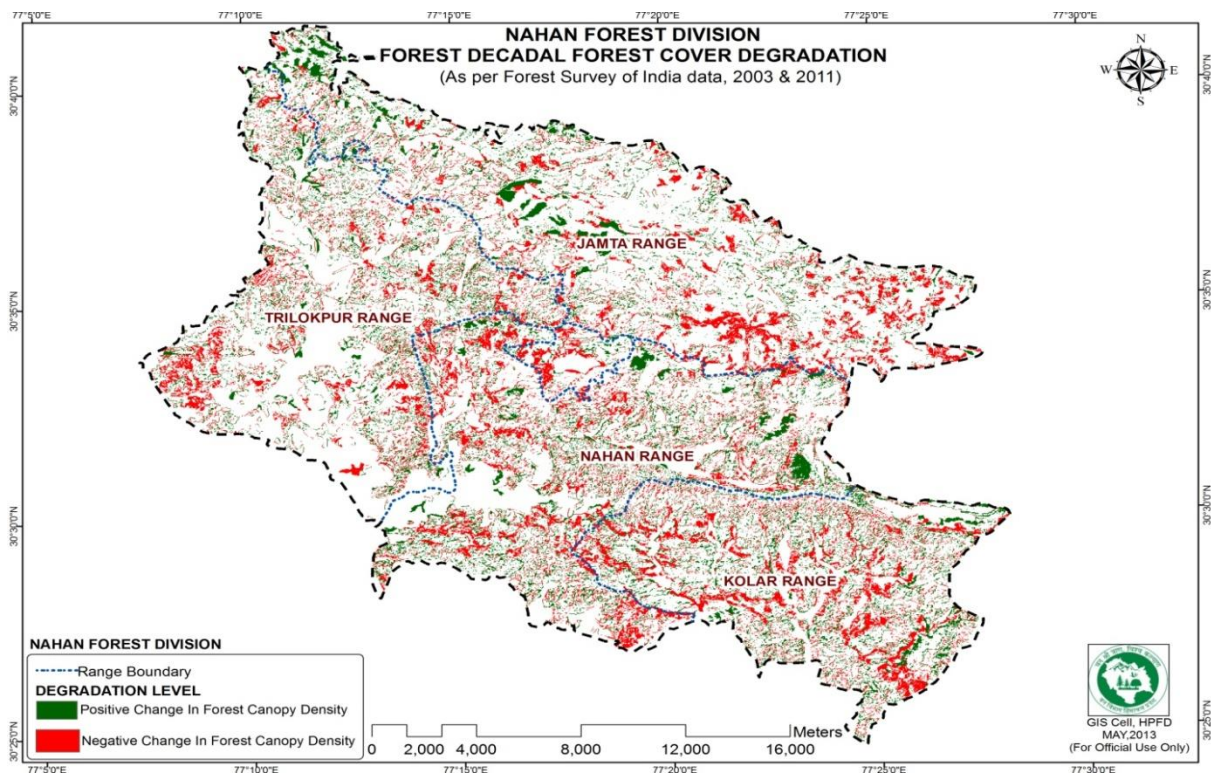
**Figure 1.1 Administrative Map of Nahan Forest Division**



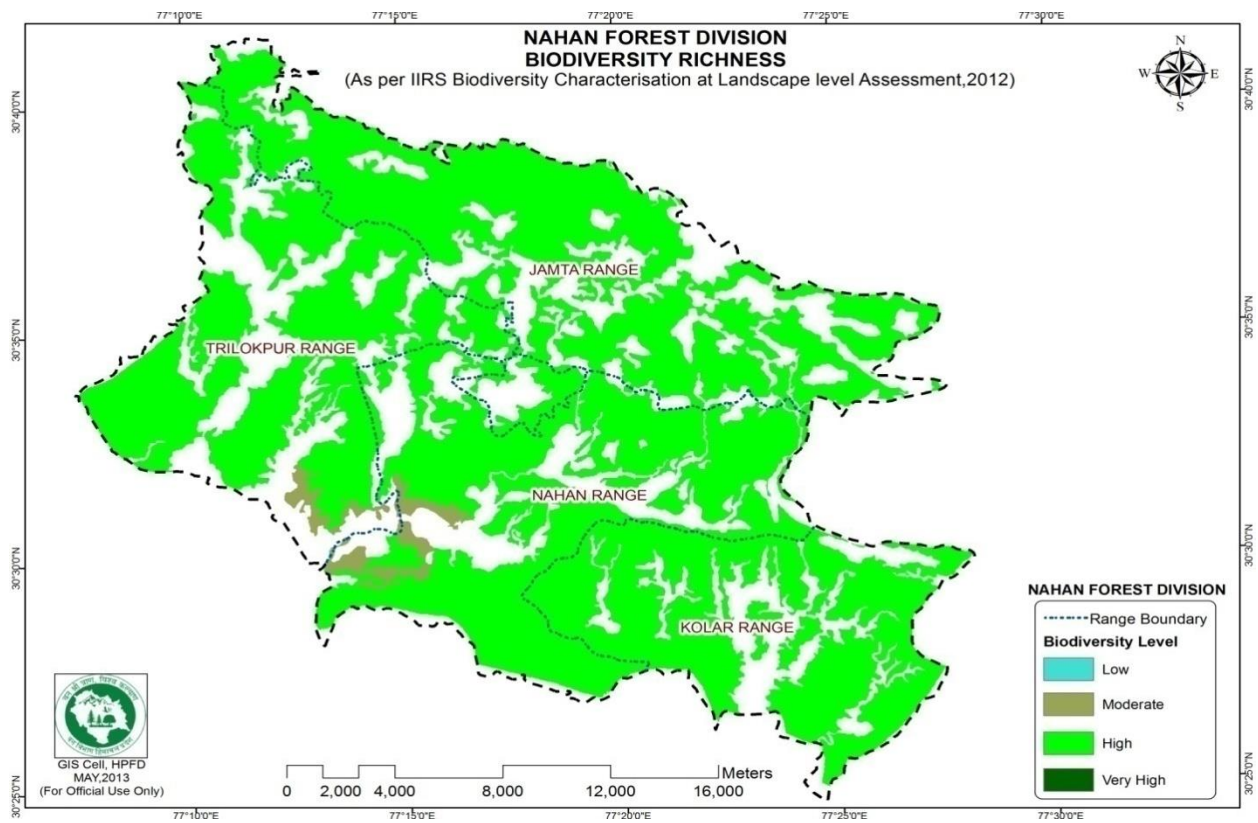
**Figure 1.2 Forest Types of Nahana Forest Division**



**Figure 1.3 Forest Decadal Forest Cover Degradation of Nahana Forest Division**



**Figure 1.4 Biodiversity Richness of Nahar Forest Division**





## CHAPTER 2

### MAINTENANCE/ INCREASE IN THE EXTENT OF FOREST AND TREE COVER

#### 2.1 AREA OF FORESTS UNDER DIFFERENT LEGAL CLASSES (RF, PF, UF AND OTHERS)

All the government forests in Nahan forest Division are “**Reserved Forest**” of erstwhile Sirmour state notified by Sirmour Darbar as Reserve Forest under the Indian Forest Act vide Notification dated *Chait* 1937 & 17th July 1952 *Bikrami*. Afterward, these forests were notified as reserved forest vide HP Govt. Notification No. Ft -29-14 IEB /47/Dated 25-02-1952. This working plan covers Nahan forest division and its four ranges. The details of these ranges with their area (in hectares), number of their respective blocks and beats are mentioned in table 2.1:

**Table No. 2.1. Forest area of Nahan Forest Division**

Name of Division	Name of Range	Area in ha.	No. of Block	No. of Beats.	Legal Status of Area/land
Nahan	Nahan	8962.47	4	24	All the government forests in Nahan forest Division are “ <b>Reserved Forest</b> ”
	Trilokpur	8011.40	3	15	
	Kolar	8002.49	4	20	
	Jamta	6430.85	3	15	
<b>Total Nahan forest Division</b>		<b>31407.21</b>	<b>14</b>	<b>74</b>	

The area figure have been taken from V. Kumar’s and A. K. Gupta’s Plan, originally outlined in Chauhan's and O. P. Sharma's Plan. The forests of Jamta Range were earlier managed as a part of the Rajgarh Working Plan by O. P. Sharma. It has since then come under Nahan forest division and included in the previous Working Plan of Nahan.

#### 2.2 FOREST AREA UNDER DIFFERENT WORKING CIRCLE/MANAGEMENT PLAN

Generally, the forest is made up of large tracts, the small hamlets/villages however, are met with here and there. Table 2.2 provides a list of areas of working circles and range-wise distribution of the area.

**Table 2.2 Forest area under different working circles**

Area	Sal W.C	Khair Composite W.C.		Chil Conversion W.C	Prot. Cum Rehab. WC	Bamboo Working Circle	Eucalyptus Mgt. Plan	Total Area
		Estt. Plantations	Natural Khair (Coppice) Areas					
Nahan	2285.56	187.26	842.33	0	5457.06	0	190.26	<b>8962.47</b>
Kolar	738.98	93.85	5659.69	0	1440.12	0	69.85	<b>8002.49</b>
Trilokpur	0	41.36	2748.72	0	4678.98	542.34	0	<b>8011.40</b>
Jamta	0	22.10	228.90	2926.45	3187.20	0	66.20	<b>6430.85</b>
<b>Total</b>	<b>3024.54 Ha</b>	<b>344.57 Ha</b>	<b>9479.64 Ha</b>	<b>2926.45 Ha</b>	<b>14763.36 Ha</b>	<b>542.34 Ha</b>	<b>326.31 Ha</b>	<b>31407.21 Ha</b>

The plantation has been cultivated in this division for many years. These plantations are not limited to RF and DPF, they are also produced in several Shamlat lands as well. These Shamlat lands were transferred to the government. Further progress related to their status as Forest land is not clear. The Revenue department utilized much of these lands for other purposes apart from forestry. Most of the area is covered by 1:15000 or 4 inches to Mile Scale survey of India map. The management has excluded the private areas which are notified in different forest ranges of division.

### **2.3 PERCENTAGE OF FOREST WITH SECURED BOUNDARIES**

The status of boundary pillars is not proper as they are damaged and broken at many locations due to increase of biotic pressure. The information about the division boundaries like location, bearing, etc. has been prepared for all forests and provided in boundary registers maintained at Range level. Although some of the old Boundary Pillars were repaired and detail of which is given under table 2.3:-

**Table 2.3 Boundary Pillar works in respect of Nahan Forest Division**

<b>Sr. No.</b>	<b>Year of Maintainance</b>	<b>Name of Range</b>	<b>Name of Beat</b>	<b>No. of Boundary Pillars Constructed/Repaired</b>
1	2018-19	Nahan	Mandpa IInd	21
2	2018-19	Nahan	Bikrambag	29
3	2018-19	Jamta	Tallon	97
4	2019-20	Kolar	Lohgath Beat No. 2	10

5	2019-20	Kolar	Lohgath Beat No. 6	15
6	2019-20	Nahan	Mandpa Ist	16
7	2019-20	Nahan	Mandpa IInd	11
8	2019-20	Nahan	Bankala	13
9	2019-20	Nahan	Suketi	10
10	2019-20	Nahan	Toderpur IInd	25
11	2019-20	Nahan	Kotri	30
12	2020-21	Kolar	Mattar	50
13	2020-21	Kolar	Brahmanwali	50
14	2021-22	Kolar	Brahmanwali	45

Since boundaries are not clearly marked at several places due to the absence of boundary pillars; these areas are vulnerable to encroachments. As per the data of the Encroachment cases available in the division from the previous working plan period, Trilokpur and Kolar ranges have encountered the most numbers of encroachment cases, while Jamta faced the least. The total cases of encroachment in the Nahan forest division recorded from 1998 to 2020 are 92 that cover the area of 13.197165 hectares out of which 59 cases had been evicted from the area that covers 9.0376344 hectare land. The following table shows the details of encroachment cases with areas from 1998-99 to 2019-20.

**Table 2.4 Encroachment cases with areas from the year 1998 to 2020**

Year	Nahan		Trilokpur		Kolar		Jamta	
	No. of cases	Area in ha	No. of cases	Area in ha	No. of cases	Area in ha	No. of cases	Area in ha
1998-99	-	--	--	--	--	--	--	--
1999-00	-	--	--	--	--	--	1	1.100115
2000-01	-	--	--	--	1	0.24447	--	--
2001-02	---	---	2	0.973665	---	---	---	---
2002-03	---	---	29	5.686035	---	---	---	---
2003-04	---	---	---	---	---	---	---	---
2004-05	---	---	1	0.577455	---	---	---	---
2005-06	---	---	---	---	---	---	---	---

2006-07	2	0.00843	---	---	30	0.36249	---	---
2007-08	---	---	---	---	---	---	---	---
2008-09	5	3.40572	---	---	4	0.299265	---	---
2009-10	---	---	---	---	---	---	---	---
2010-11	---	---	---	---	---	---	---	---
2011-12	5	0.021075	2	0.021075	---	---	---	---
2012-13	1	0.021075	---	---	---	---	---	---
2013-14	---	---	---	---	---	---	---	---
2014-15	---	---	---	---	---	---	---	---
2015-16	---	---	---	---	---	---	---	---
2016-17	---	---	---	---	2	0.130665	---	---
2017-18	---	---	3	0.316125	---	---	---	---
2018-19	---	---	---	---	---	---	---	---
2019-20	2	0.01686	2	0.012645	---	---	---	---
<b>Total</b>	<b>15</b>	<b>3.47316 Ha</b>	<b>39</b>	<b>7.587 Ha</b>	<b>37</b>	<b>1.03689 Ha</b>	<b>1</b>	<b>1.100115 Ha</b>

Population pressure and poverty are the main two factors stimulating forestland encroachment. Forests provide new areas for agriculture and a range of subsistence products. With increasing population, more families search land for agriculture or look for fuel wood or timber. Larger number of people also means more labor is available for agricultural activities. Forest encroachment results in forest degradation and forest degradation results in land degradation, and this leads to agricultural stagnation and even a lowering of productivity, which in turn promotes further encroachment and completes the vicious cycle. Open market economy most often fails to realize the full benefit of the forest and encourage realization of it. Thus it encourage the conversion of forestland into other economically lucrative land uses.

## **2.4 LAND USE, LAND-USE CHANGE AND FORESTRY (LULUCF)**

The forest area has been diverted for non-forestry purpose on a large scale for developmental works of government. However, over the years, there is a some perceptible change in the forest density classes due to tremendous increase in biotic and abiotic pressure despite these areas being consistently reforested. Area diverted in ten years under FCA 1980 since 2013-2014 is 38.2223 ha. But the status of the land remains forest. Similarly Under FRA during last 10 years 45 hectare area has been diverted.



**Table 2.5: Abstract of Land Use Change under FCA w.e.f. 2013-14 to 2022-23.**

<b>Sr. No.</b>	<b>Year</b>	<b>Name of proposal</b>	<b>FCA Proposal No.</b>	<b>Date of Final approval</b>	<b>Total area diverted (in ha.)</b>	<b>Total No of tress handed over HPSFDC</b>	<b>Volume (m<sup>3</sup>)</b>
1	2013-14	Construction of link road from Bohlion to Haripur via Nalka Samalka road upto village Nalka	FP/HP/ROAD/ 8013/2014	31.07.2020	2.403	0	0
2		Construction of link road from Khajurna to Malonwala road	FP/HP/ROAD/ 8014/2014	15.09.2021	0.624	0	0
3		Construction of link road from village Surla to Bakarla km. 0/0 to 5/0	FP/HP/ROAD/ 7738/2014	20.09.2021	3.979	394	126.733
4		Construction of link road from village Bheron to Adi Badri	FP/HP/ROAD/ 7449/201	10.10.2017	4.765	80	61.766
5	2015-16	Construction of link road from Upper Surla km.	FP/HP/ROAD/ 9676/2015	27.07.2020	1.275	91	25.83
6	2015-16	Construction of link road from Thana Kasoga to Trimali Dayar road km. 0/0 to 15/200	FP/HP/ROAD/ 9738/2015	13.08.2020	1.659	0	0

7		LILO of existing 400kV Double Circuit Karcham Wangtoo- Abdullapur Transmission Line near Kala Amb (HP)	FP/HP/TRANS/ 14566/2015	21.12.2016	4.094	110	11.897
8		Providing LWSS to Nahan Town (From Giri River at Dadahu) in Tehsil Nahan	FP/HP/WATER /16701/2015	23.05.2016	2.4126	215	34.38
9	2016-17	Construction of link road to village Pudla from Banog Surla road km. 0/0 to 3/705	FP/HP/ROAD/ 19486/2016	27.07.2020	2.538	303	110.067
10	2017-18	Construction of link road from Jabbal kanoti to Surla Amta road km. 0/0 to 3/705	FP/HP/ROAD/ 25369/2017	08.05.2020	2.676	497	122.9114
11		Construction of link road from Jhainthal Ghat to Dhandor road km. 0/0 to 8/655	FP/HP/ROAD/ 25365/2017	09.03.2020	2.952	256	50.4207
12	2018-19	Construction of link road from Nahan to Gadda upto vill Kotri km. 0/0 to 3/130	FP/HP/ROAD/ 25378/2017	04.08.2021	2.304	303	110.067

13		C/o 220/132 kV, 2x160/200 MVA Substation at Andheri (Kala Amb), Distt. Sirmour H.P.	FP/HP/Sub-Station/37534/2018	02.01.2020	5.494	208	79.683
14	2019-20	C/o Hospital Block of Dr. YSPGMC, Nahan, Distt. Sirmaur, H.P.	FP/HP/DISP/43 462/2019	25.01.2021	0.8514	58	33.587
15	2021-22	CONSTRUCTION OF 180.00 METRE SPAN BOWSTRING BRIDGE ON MARKANDA AT RD. 64/630 ON NH-72(NEW NH-07)	FP/HP/ROAD/140739/2021	28.10.2021	0.1953	0	0
<b>Grand Total</b>					<b>38.2223 Ha</b>	<b>2515</b>	<b>767.067 m<sup>3</sup></b>

**Table 2.6: Abstract of Land Use Change under FRA w.e.f. 2013-14 to 2022-23.**

<b>Sr. No</b>	<b>Year</b>	<b>Name of proposal</b>	<b>Date of Final approval</b>	<b>Total area diverted (in ha.)</b>	<b>Total No tress handed over HPSFDC</b>	<b>Volume (m<sup>3</sup>)</b>
<b>1</b>	<b>2016-17</b>	Construction of link road Salni to Tedi Baroti.	19.12.2016	0.231	13	2.200
<b>2</b>		Construction of link road from Rain Pirgari to Serbadon	27.01.2017	0.504	29	5.804
<b>3</b>		Construction of link road from Tedi Baroti to Trilokpur.	27.01. 2017	0.655	48	13.220
<b>4</b>		Construction of link road Sher Resla (Gopita) to Ser Badon	17.3. 2017	0.26	14	8.858

5		Construction of link road from Runja Yonn.	17.03. 2017	0.435	25	5.038
6	2017-18	Construction of link Road from Dhaun to Sanoga- Bagrath upto Mandhari Ghat.	22.4. 2017	0.804	29	13.976
7		Construction of link Road from Badion to Pudla.	26.4. 2017	0.56	40	13.853
8		Construction of link road from Ashram Tapad to Teeb via Katalin.	26.4. 2017	0.45	25	14.355
9		Construction of link road from Birla to Dhayali	24.11. 2017	0.564	15	8.424
10	2018-19	Construction of Katcah link road from Rama Dhaun road to Village Bhagoor.	2.7.2018	0.521	39	4.638
11		Construction of GPS. Neron.	4.8.2018	0.159	9	2.585
12		Construction of Katcha link road Lawasa Dosarka to Bhong upto Tuind Bhuid.	6.8.2018	0.752	8	3.0367
13		Construction of Katcha link road Shimla Road to village Sarahan johri to village Sarhan.	21.8.2018	0.23	16	1.2054
14		Construction of link road from village Pipal wala to H/O Sh Lalit Kumar, Deepak Kumar etc.G.P. Surla.	12.9.2018	0.193	12	2.303
15		Construction of link road from salani to bankawara.	20.9.2018	0.877	19	7.7508
16		Construction of link road from Kangar Ghoond to Dagjar G.P. Banethi	6.10.2018	0.9765	13	3.1395
17		Construction of link road Bahrog to Bhorli Ghat.	28.12.18	0.875	27	8.566
18		Construction of link road from Kranwali to Thappal Dhanot.	3.1. 2019	0.570	13	5.201

<b>19</b>		Construction of link road from Sinduria to Dhar Sanoga.	3.1. 2019	0.225	2	0.736
<b>20</b>		Construction of link road from chunjer johri to Kyarta via Aam ka Dhal.	21.2. 2019	0.4455	18	2.788
<b>21</b>		Construction of katch link road from Rama Dhaun to halt of Sh. Kamal Dutt & Bhagat Ram.	23.2. 2019	0.175	6	3.233
<b>22</b>	<b>2019-20</b>	Construction of Skill Up-Gradation Center Nahan.	30.7. 2019	0.318	7	3.214
<b>23</b>		Construction of Community Hall in Ambwala.	5.8. 2019	0.112	13	5.900
<b>24</b>		Construction of link road Gusan Kambal to Badal Amta.	06.11.2019	0.225	6	3.214
<b>25</b>		Construction of link road from Sadorghat to Triboni Temple.	25.11.2019	0.915	29	12.448
<b>26</b>		Construction of link road Jamroti to Nagali.	26.11.2019	0.4235	5	1.2495
<b>27</b>		Construction of link road from main road vill. Pila Khil to Pachhighat.	03.02.2020	0.597	9	2.004
<b>28</b>		Construction of link road from Bheraghat to Gaonth.	03.02.2020	0.994	26	7.8142
<b>29</b>	<b>2021-22</b>	Construction of Industrial Training Institute Kaulanwala Bhoad.	23.4.2021.	0.960	28	21.115
<b>30</b>	<b>2022-23</b>	C/o Link Road from Amb ka Dhal to Dhandoli, Bajyun & Patahar	10.08.2022	0.368	28	3.808
<b>31</b>		C/o Link Road from Nauni Johdidhar to Ganodi Near H/o Upender Singh	15.07.2022	0.389	24	3.3739
<b>32</b>		C/o Link Road from Dakyon to Shirgul Mandir	13.10.2022	0.343	16	6.2432

33		C/o Link Road from Kundli to Najrani	10.10.2022	0.255	13	3.544
34		C/o Link Road from Dagrahan to Amba	13.10.2022	0.16	5	1.6183
35		C/o Link Road from Katal to Mandlahan	14.10.2022	0.897	49	6.4463
36		C/o of Link Road from main Road (Sihard Ghat) to Dagana Gram Panchyat	28.02.2023	0.14	20	3.6372
37		Construction of Link Road from Aam ka Dhal to kanoti	27.02.2023	0.1368	03	0.552
38		Construction of Link Road Chakli to SC Basti Thudkyarkhdi	22.03.2023	0.207	15	3.696
39		Construction of Link Road from Panchayat Ghar Kayari to Amta Katal	28.02.2023	0.385	15	5.799
40		Construction of Link Road from Ladu to Gillat	27.02.2022	0.29	14	1.205
41		Construction of Road from Shimla main road to Baga	27.02.2023	0.3185	25	4.938
42		Construction of Link Road Dagrahan to Sehyat.	04.03.2023	0.192	26	2.1168
43		Construction of Link Road from NH Chabahan to Shillar	28.02.2023	0.788	06	0.978
44		Construction of Link Road from Kundli Najrani to Suin Pudla via Shamshan Ghat	04.03.2023	0.418	05	0.914
			<b>Total</b>	<b>20.2938 Ha</b>	<b>807</b>	<b>236.7388 m<sup>3</sup></b>

## 2.5 THREATS TO THE FOREST

The main threats to forest crops of Nahan forest division are forest fires, grazing pressure, heavy lopping, illicit felling, faulty resin tapping, illegal mining, encroachments, exotic weeds infestation, adverse climatic conditions, etc. Climate change and increasing anthropogenic disturbances have doubled the effects of these agencies on these forests and are prone to significant damages caused by these aforementioned factors. Detailed study of these factors by experts and implementation of proper preventive methods are required by the division to avoid

further damage and ensure the safeguarding of the divisional forests. The factors and their effects are discussed in details below:

#### **i) Area affected by forest fire**

Forest fires are quite common and destructive during the summer season. They are both accidental as well as deliberate. Most of the accidental fires occur when workers or passers throw their lighted butt of cigarette/bidi or match stick unintentionally. Whereas, an intentional forest fire in an area is set up by local inhabitants to get a fresh flush of grass or for collecting honey. However, in most cases, results are extremely dangerous as they are often difficult to contain in an area and spreads to the adjoining forests. Most of the fire incidents are ground or creeping forest fires and sometimes might reach the crown level. This leads to a tremendous loss of forest vegetation, wildlife and microfauna. In view of this fire destruction caused every year, there is a need for training of field staff in modern fire prevention techniques and tools. Public awareness regarding forest fire is also needed to prevent both intentional and unintentional forest fires.

#### **ii) Area damaged by natural calamities**

**Erosion:** The geological formation of the Shiwaliks is loose, unstable and prone to soil erosion. Due to the loss of vegetation cover, soil erosion has increased to dangerous proportions, resulting in destruction and loss of topsoil. This has occurred in Shiwalik hillsides leading to denudation with exposed subsoil. Areas in Trilokpur, Nahan and Kolar Ranges are a testimony to this. Huge slips of loose hills along nala and river banks are a common occurrence. Heavy landslides and soil erosion worsen the situation. Streams like Markanda, Bata, Roon and Khols of Kolar create havoc due to floods during heavy rainfall. The silt and boulders carried by the hill torrents not only scour the bed and deepen it, but also cut, and widen the banks. The debris often spread in the adjoining agricultural fields which adversely affects the crops and soil quality. With the loss of topsoil, nutrient availability for the plants decreases, which further results in degradation. Suitable soil conservation plans are must in the region. The catchments of Yamuna, Giri and Bata have already been surveyed to determine the intensity of soil erosion. Using the available data, areas should be identified and marked to initiate the work to stabilize the eroded areas. Suitable species as per the local conditions can be planted to check further soil erosions by consultation of experts.

**Frost:** Severe frost is not common in this tract. However, mild frost does occur every winter. Young Sal crop is a frost-tender species hence susceptible to damage to a certain extent by frost.

**Storms:** Mild storms occur in the tract during March, April, September and October. These storms cause damage by severing the crowns and branches of trees. However, sometimes Chil and a few other species also get uprooted. Severe storms are rare in these areas.

**Drought:** May and June are extremely hot months in these regions, except, in higher areas of Jamta range. However, these conditions do not seriously affect the standing crop, but they certainly cause damage to the regeneration (especially planted saplings/seedlings). If the drought period prolongs, it results in further damage. The effect is more pronounced on the ridges and spurs.

### **iii) Grazing**

Excessive grazing and movement of domestic cattle adversely affects the forest ecosystem by exceeding the carrying capacity of forests. This not only unfavorably affects the timely regeneration of forest vegetation, both natural and artificial, but also leads to soil compactness. All the forests of the division have rules and regulations stipulating freezing the number of animals that are allowed to graze in a particular area. However, unabated grazing is going on, unchecked and uncontrolled. This challenge is posed majorly by the community of Gaddi, Gujjars and local inhabitants, whose cattle population and frequent migration to these areas increase the grazing pressure in these forests. In effort to control the cattle activity in an area, grazing permits are issued to Gujjars and Gaddies in their respective "Paraos" however, this restriction is hardly followed.

Reports of illicit grazing by the inhabitants of the adjoining state of Haryana in the border areas have also surfaced which needs to be strictly prohibited. The rules and regulations must be properly implemented by forest officials to check and control the degradation of forests due to overgrazing. The staff needs to remain vigilant at every step. They should have a dialogue with the local people and seek their help to report any offense. Chronic offenders should be booked under the law.

### **iv) Lopping practices**

Lopping of miscellaneous trees is allowed with some restrictions. These restrictions are as follows:

- i. The top 1/3rd crown of a tree will be left intact.
- ii. No branch over 3 cm. in dia will be cut out in lopping.



iii. Heavy cutting instruments, like axe will not be used.

iv. No tree below 20 cm. d.b.h shall be lopped.

However, these restrictions are not being followed properly. Trees most of the time are badly lopped for fodder. Sometimes main/leading shoot is also lopped and the (i) restriction mentioned above is seldom followed. This unregulated and faulty lopping leads to several ill-effects such as fungus attacks and stunted growth, malformed and unhealthy crop. This practice must be checked by the field staff. The species which are badly looped are Sal, Sain, Khair, Chhal, etc.

#### **v) Incidences of pest and diseases**

**Parasites:** Parasitic plants withdraw resources from the vascular system of host and prevent its growth and development and sometimes gradually cause its death. Banda (*Loranthus spp.*) is the most common parasitic plant found in Sal forests.

#### **Insect Pests :**

(i) During 1948, Sal heartwood borer (*Hoplocerambyx spinicornis*) attacked good quality Sal areas of the division. This beetle is the most notorious insect pest of Sal trees and breeds in the standing and freshly felled logs. In the recent past, some attacks of Sal borer is observed in the area. The preventive measures have been taken in time hence; at this stage, the situation is not alarming.

(ii) Occasionally swarm of locusts reach these localities and attack the foliage of the trees which causes considerable damage.

(iii) Ordinarily a sporadic attack of geometrid leaf defoliator (*Ascotis selenaris*) occurs every year. This affects the growth of individual trees but there is no repost of large-scale damage.

(iv) Leaf hoppers and scale insects (*Monophlebus stebbingii*) also attack and retard the growth of the young shoots of Sal and other species during the months of March and April. During the attack of the scale insect, the forest floor gets covered with a shining sticky substance exuded by the insect.

(v) Termites are the greatest threat to the vegetation. They attack the young plants in the plantations during post-monsoon days in September and also during spring when the moisture content is favorable for their spread. They also attack the dead bark of the trees and at times penetrate the live bark and thus retard the growth of the trees. The termites damage the coppiced stumps also.

**Fungi:** Developed heartwood of Sal trees are susceptible to attack by the heart rotting fungi and Polyporus species of fungi. The spores of this fungus enter through the wounds while in the coppice origin crop, it spreads from the stumps into the poles. The fungal infection causes rot in

the trees locally termed as "Goj". Forests which are frequently overgrazed, lopped or burnt annually are more susceptible to heart rot disease and show their common occurrence. Both mature and over-mature trees are invariably affected by this rot. This disease not only reduces the quality of timber but also the useful volume of a tree. Khair is lopped heavily for fodder, throughout the tract. Due to heavy lopping, trees become susceptible to attack by heart rot fungi. It has become difficult to find a healthy Khair tree, as almost all the Khair trees are infected by this heart rot.

## **2.6 DISTRIBUTION OF DIFFERENT FOREST TYPES**

Due to the abrupt topography and diverse climatic and edaphic conditions, different types of forest are supported by the Nahan forest division.

### **2.6.1 Forest types and composition:**

As per the classification of Champion and Seth, the forest groups found in Nahan fall under the following types:

#### **(a) Group 3- Tropical Moist Deciduous Forests**

- i. 3C/C2a-Moist Shivalik Sal

#### **(b) Group 5- Tropical Dry Deciduous Forests**

- i. 5B/C1a- Dry Shivalik Shal
- ii. 5B/C2- Northern Dry mixed Deciduous forests
- iii. 5B/E9 -Dry Bamboo Brakes

#### **(c) Group 9- Subtropical Pine Forests**

- i. 9/C1a- Lower or Siwalik Chir Pine Forest
- ii. 9/C1b- Upper or Himalayan Chir Pine Forest

Broadly, a brief description of each forest type is mentioned below:

##### **2.6.1.1 Group 3-Tropical Moist Deciduous Forests:**

**Type 3C/C2a-Moist Shivalik Sal:** This type of forests has sal as the single gregarious species. Sal is generally more aggressive than its associates because of its natural gregarious habit, good

coppicing power, resistance to fire, regeneration potential under burning and grazing, adaptability of Sal to site conditions and its longevity. It even survives where few other species could not even though it is prone to frost. Sal can come up nicely on clayey and sandy soils avoiding the two extremes. Sal is the main species in these forests and forms 70 to 90% of the crop. The other associates in the top storey are sain, chhal. The understorey either missing or is very sparse and consists mostly of suppressed sal, amaltas, rohini, jaman, sandan, amla, etc. The bushy growth is generally luxuriant and consists of rohini, gandhela, dhai, Colebrookia (bida), Flemingia(chhanchra) species. The common climbers are malijhan, gaj, panibel, Dioscorea etc. The quality of sal crop is generally III. Good sal crop, in pole stage, is seen in patches, however, the natural regeneration is deficient. Moderately sloping areas with good soil cover away from habitation having little human interference are having good natural regeneration of sal and sain. This type of vegetation is found in suitable localities in the following areas:

Kolar Range: Kolar bidhanwala, Darranwala, Garhiwala

Nahan Range: Uttamwala-Baraban, Rama, Kalabhood, Nehrla-Bankala, Dhaun, Ganeshwala, Kotri.

#### **2.6.1.2 Group 5 Tropical Dry Deciduous Forests:**

**Type 5B/C 1 a Dry Siwalik Sal:** Sal is again the main specie in this type. The quality of sal is poor and is mostly IV. The proportion of sal varies from 40 to 80 %. The other associates are sain, chhal, jhingan, chirol, khair, Bauhinia spp and sala. Chir pine is also found occasionally. This type is found on the exposed southern slopes of the Siwalik ridge and is exposed to severe hot winds and dry spells. The slopes are fairly steep. Soil is shallow, sandy with clayey pockets and devoid of humus. The soil also has boulders and pebble or beds of sand stones. Sal itself is a middle sized tree in this zone and as such the middle storey is not at all prominent. Undergrowth consists of karonda, chhanchra, rada, dhai, bida etc. Grasses are bhabar and sarala. Climbers found are malijhan, gaj, Dioscorea species etc. Climbers do lot of damage to the tree crop and fastoons the trees, resulting in stuntedness in trees and sometimes leading to death of trees. The regeneration of main gregarious species like sal is deficient. As a result other species like chhal, khair, etc. are increasing in proportion. This forest type is found in the following areas:

Kolar Range: Lohgarh, Haripur, Dhakrnawala, Sambhalka, Rampurgainda, Mattar, Brahamnwali, Kohluwala, East-Bheron, West Bheron. Nahan Range: Teeb, Katasan, Kalabood, Nehrla-Bankala, Kotba, Ganeshwali, Koteri, Periwala.

**Type 5 B/C 2 Northern Dry Mixed Deciduous Forests:** This type of forest is found on the steep Shiwalik ridge and areas close to the plains. This type observes less rainfall as compared to Sal type and the vegetation cover is also poor. Soil is shallow, with loose boulders or beds of clay and sandstone. The main tree species found in this type are Sain, Chhal, Khair, Chiroli, Tendu, Sala, Jhingan, Dhak and occasional trees of Chil and Sal. The small trees found in the understorey are Amaltas, Chamror, Rohini, Bel, Amla, Chila, Mandher, Chili and Bamboo. Bushy growth consists of kandai, dhai, basuti, kuri, kura, bida. The common grasses found here are bhabar and sarala etc. The climbers found in the area are malijhan, gaj, etc. There is heavy pressure on this forest type due to grazing and lopping. Consequently, the natural regeneration of various species is poor in this forest type. *Anogeissus latifolia* comes up nicely in burnt areas and forms a substantial proportion of the crop. Khair and sain also come up naturally if the region is protected against grazing, browsing, lopping and fire. Fires (both deliberate as well as natural) are quite frequent in this region and cause a lot of damage to the vegetation, specially to the regeneration process. The various degradation stages and edaphic climax types particularly of *Boswellia*, *Butea*, *Aegle*, *Phoenix* savannah are also present in small patches. Because they are very limited they will not be discussed independently. This forest type is found in the following areas:

Trilokpur Range: Jheera, Surla, Maidhar, Banswala, Trilokpur, Laidevi, Kala-Amb, Shikardi, Kiari, Tribhauni, Bhogpur-Kotla, Andheri-Gurdwara, Gumti-Sambhalwa. Jamta Range: Talon, Kanoti, Sador, Korar, Thandoli, Katli, Sanoga, Khashoga.

**2.6.1.3 5B/E9-Dry Bamboo Brakes:** *Dendrocalamus strictus* is the only species that forms the main crop in this low and occasionally dense brake. Pure bamboo forests do not occur. Bamboo occurs as an under storey in dry deciduous forests along with miscellaneous species like chhal, jhingan, sain, rohini, bel etc. The undergrowth in these forests consists of basuti kandai and gandhela. The general condition of bamboo forests is very miserable. Healthy and vigorously growing bamboo are rare. While open and over congested stumpy clumps of bamboo as a result of high incidence of grazing and lopping are common. This forest type is found in the following areas:

Trilokpur Range: Jheera, Surla, Maidhar, Banswala, Shikardi, Kiari, Tribhauni.

#### **2.6.1.4 Group 9 Sub-Tropical Pine Forests:**

**9/CI Himalayan Sub-Tropical Pine Forests:** Two categories of Chil Pine forests i.e. Shiwalik Chil Pine and Himalayan chil pine occur in this tract. In these forests, chil is the main crop with under

storey consisting of other broad-leaved deciduous species such as sain, chhal, jhingan, amaltas, khair, ban and bras. Sometimes stunted sal is also found in patches. The bushy growth consists of kandai, kaith, tung, kangoo, gandhela etc. The grasses found here are *Crysopogon* species, *Cymbopogon spp.* and *Dicanthium annualatum* etc. The climbers are few in number but occasionally malijhan, jungli gulab species etc can be seen. Chil regeneration is evident and is adequate in areas of Jamta Range. This type of vegetation is found in suitable localities in the following forests :-

Jamta Range: Barman, Jetag, Nawni, Khashoga, Thandoli, Daghera, Panjhal, Sanoga, Talon, E.Banethi, W.Banethi, Kanoti, Katli, Korar, Dhadu, Amta, Sadov, Saroga.

Nahan Range :Shishamwala, Satkumbha, Bhabbarwala, Rama, Dhhaun, Jabal.

## 2.6.2 Abstract of areas under each Subtype is as under (in hectares):

Nahan Division	
5B/C2	16715.63
9/C1a	2591.48
3C/C2a	3569.57
9/C1b	224.14
5B/C1a	7714.05
5B/E9	592.34

## 2.7 TREE COVER OUTSIDE FOREST AREA (TOF)

TOF refers to all trees growing outside the recorded forest areas irrespective of size of the patch. Tree cover, on the other hand is comprised of tree patches and isolated trees outside the recorded forest which are less than one hectare. The two outputs derived from the TOF inventory are growing stock & Tree Cover. Thus trees included in the tree cover constitute only a part of TOF and thus former is a subset of the latter. TOF estimation was carried out by FSI in Nahan Forest Division but report is still pending with them. The following table shows TOF of Himachal Pradesh from FSI, ISFR(2021) report :->

S.No	State	Area(SQ KM)	TOF(SQ KM)
1	Himachal Pradesh	55,673	5474

To increase tree cover outside forest, distribution of plants through nursery , national agro forestry mission and national bamboo mission must be implemented at large scale. Axing of these trees are not covered under IFA but it is covered under Himachal Land preservation act.

For certain species there is 10 year felling programme approved at Government level mauza wise. Rules governing the axing of these trees are appended as Appendix -XII

## **CHAPTER 3**

### **MAINTENANCE, CONSERVATION AND ENHANCEMENT OF BIODIVERSITY**

#### **3.1 FOREST COMPOSITION AND DISTRIBUTION**

The forest in the area is mostly tropical and subtropical. Sal is the main economic species. Chil is localized in the Jamta range of Nahan division and Dharti Dhar areas. This is the only few region in the state which contains extensive forests of moist deciduous and semi-deciduous forest type. Pure sal forests are found in a belt on the northern side of the main Shiwalik ridge and on the southern side of the outer Himalayan range. The controlling factors such as soil, aspect, altitude, topography, soil mixtures, and biological factors play an important role in the composition of crops. However, pure sal is gradually being replaced by dry mixed deciduous species and scrub on hot, dry and poor conditions of localities. In riverine areas, shisham and khair are in abundance while on the clayey soils, chhal, sain, etc. are the main species. Edaphic factors have local influence in pockets of the forest division. In Nahan and Trilokpur ranges miscellaneous species are found with scattered poor quality sal/sain and chil in the Shiwalik zone. Bamboos are also found scattered in these areas.

#### **3.2 PLANT SPECIES DIVERSITY**

The Shannon Weiner index has been calculated for knowing the Biodiversity of the region. Undoubtedly the plant species diversity creates long term stability. Diverse plant species support long-term stable ecosystem because they exhibit complementary functionality. A healthy ecosystem includes multiple species that serve similar functions or roles– for example, more than one species that fertilizes the soil and more than one that controls the population of a certain predator. This redundancy is crucial to supporting the long-term stability of the ecosystem because natural disturbances– such as fires, disease, or changing climate-can sometimes eliminate entire species unable to survive the change. With redundancy in environmental function, if one species dies off, another species that serves a similar role is more likely able to react and thrive after the disturbance. It can then take the place of the previously dominant species, thereby keeping the ecosystem resilient. Also species diversity is an expression of community structure. The number of species in a community is referred to as species richness. The relative abundance of all species is called Evenness. A community demonstrates high species diversity if many equally or nearby equally abundant species is present. Communities with a large number of species that are evenly distributed are the most diverse. To know the status of diversity Shannon Wiener is calculated as:-

**Table 3.1 Status of diversity Shannon Wiener**

Sp.Name	Number	Pi=Number/Total	ln(Pi)	Pi*ln(Pi)
Khair	333128	0.107618671	-2.22916112	-0.239899357
Chil	530029	0.171228527	-1.76475619	-0.302176602
Sal	536821	0.173422716	-1.75202321	-0.303840624
Sain	309698	0.100049492	-2.30209029	-0.230322964
Mis	1385772	0.447680594	-0.80367526	-0.359789818
<b>Total</b>	<b>3095448</b>		<b>-8.85170607</b>	<b>-1.436029365</b>

H	-Sigma(Pi*ln(pi))= 1.436029365
Hmax	ln(5)=1.61
Eveness(H/Hmax)	0.892

**Interpretation:** Typical values are generally between 1 and 3.5 in most ecological studies, and the index is rarely greater than 4. The Shannon index increases as both the richness and the evenness of the community increase. The fact that the index incorporates both components of biodiversity can be seen as both strength and a weakness. It is strength because it provides a simple, synthetic summary, but it is a weakness because it makes it difficult to compare communities that differ greatly in richness. The above calculations show that Shannon Weiner Index is 1.43602 which is low. This shows that Biodiversity is poor in the division. The future plantations should be done, so that the diversity reaches above 1.5 to 3.5.

The most common plant species in these forests are given below:

<b>Table 3.2 The most common species in the forest</b>		
<b>Species</b>	<b>Family</b>	<b>Habit</b>
<i>Acacia catechu</i>	Leguminosae	Tree
<i>Acacia nilotica</i>	Leguminosae	Tree
<i>Prosopis cineraria</i>	Leguminosae	Tree
<i>Azadirachta indica</i>	Meliaceae	Tree
<i>Butea monosperma</i>	Fabaceae	Tree
<i>Calotropis procera</i>	Apocynaceae	Shrub
<i>Cassia fistula</i>	Fabaceae	Tree
<i>Dalbergia sissoo</i>	Fabaceae	Tree



<i>Saccharum munja</i>	Poaceae	Grass
<i>Eucalyptus hybrid</i>	Myrtaceae	Tree
<i>Ficus benghalensis</i>	Moraceae	Tree
<i>Ficus religiosa</i>	Moraceae	Tree
<i>Melia composita</i>	Meliaceae	Tree
<i>Phoenix sylvestris</i>	Arecaceae	Palm Tree
<i>Syzygium cumini</i>	Myrtaceae	Tree
<i>Terminalia arjuna</i>	Combretaceae	Tree
<i>Ziziphus mauritiana</i>	Rhamnaceae	Middle Sized Tree
<i>Ziziphus nummularia</i>	Rhamnaceae	Shrub

**Endemic, Rare and Threatened Species:** Species recorded were screened for their uniqueness with references in the literature. No species under Red Data Book was recorded. All the species recorded were abundant in nature.

**Medicinal Plants:** Some of the important medicinal plants, encountered are *Adhatoda vesica*, *Aegle marmelos*, *Azadirachta indica*, *Cordia dichotoma*, *Terminalia chebula*, *Terminalia bellirica*, *Moringa oleifera*, *Embelica* and *Acacia catechu*.

**Economically Important Species:** There are many species that are considered important for food, fuel, fodder, fiber, timber, medicinal value, oil, gums and others. On these parameters many economically important species present in these forests are: *Acacia catechu*, *Moringa oleifera*, *Holoptelia integrifolia*, *Aegle marmelos*, *Emblica officinalis*, *Azadirachta indica* and *Terminalia arjuna*.

### 3.3 STATUS OF BIODIVERSITY CONSERVATION IN FORESTS

To conserve biodiversity, the state has prepared action plans and strategies in 2020 named as “Himachal Pradesh State Biodiversity Strategy and Action Plan”. The strategies include restoration of original ecosystem, plantations and afforestation programs, promotion of natural regeneration, removal of invasive weed species, transformation of degraded land for afforestation, soil and water conservation, regulated logging and grazing, etc. To ensure the participation of local communities and more impactful biodiversity conservation at village levels, JFMCs have been established. The involvement of local communities especially women helps in forest and forest resource management and also links with the sustainable use of forest products

and opens more livelihood avenues. These committees also help during the forest fire season for prevention, timely reporting and further actions which are relayed and prevent the major loss of flora and fauna due to forest fires.

### **3.4 STATUS OF SPECIES PRONE TO OVER EXPLOITATION STUDY/DATA SHOWING OVER EXPOITATION OF SPECIES.**

The medicinal plants found in plenty in the forests like Giloe, Neem, Ageratum, Adhatoda and *Murraya koengii* are rarely harvested on commercial lines and therefore not exploited. Even amla (*Emblica officinalis*) fruits are rarely harvested by the local people, though a few entrepreneurs have started its use for making tradable products. As such the population is agrarian hence their dependence on Forest Produce is meagre. Fuel wood is the major produce required by the people living below poverty line. Therefore exploitation of a single species is not evident.

### **3.5 CONSERVATION OF GENETIC RESOURCES**

There are 2 forest nurseries in Nahan forest division, which would help in conservation of genetic resources of important species of this division. A nature park in Kandaiwala beat has been recently opened to support tourism and aware tourists about the local flora and fauna.

### **3.6 FAUNA AND THEIR HABITATS**

The Sub-Himalayan and the Shiwalik hill zone with streams and river tracts are ideal for a wide range of wild animals, wild birds and fishes. When the human population was low the wildlife occurred in abundance. With the increase in population growth, various anthropogenic activities can threaten the natural habitats of wild birds, wild animals and fishes. Loss of habitats resulted in receding of wildlife population to protected forest areas with minimum human interference. However, even in such places, wild birds and wild animals are not entirely safe from poaching.

From a scientific, aesthetic, economic and recreational point of view, the value and importance of wildlife is enormous and recognized throughout the world. All species of wildlife, including some vermin, play an important role in balancing the wildlife populations and the overall functioning of the ecosystem. Ecological and biological studies have proved the value and importance of natural balance for mankind and for the other life forms on earth.

The beauty of nature and wildlife attracts wildlife enthusiasts, bird watchers, biologists, animal and bird ecologists from within and outside the country and promotes tourism. Thus,

ecotourism brings significant revenue to the country. In addition to the state revenue, local people working in the tourism sector like hoteliers, small restaurants and transport services, also get employment and benefit from tourists.

**Table 3.3 IUCN Red List species of fauna**

Scientific name	Common name	WPA Schedule	IUCN category
<b>Mammals</b>			
<i>Selenarctos thibetanus</i>	Himalayan black bear	II	VU
<i>Panthera pardus</i>	Leopard	I	VU
<i>Sus scrofa</i>	Wild boar	I	LC
<i>Muntiacus muntjak</i>	Barking deer	III	LC
<i>Lepus nigricollis</i>	Common hare	IV	LC
<i>Cervuus unicolor</i>	Sambar	III	VU
<i>Hystrix indica</i>	Porcupine	IV	LC
<i>Canis aureus</i>	Jackal	II	LC
<i>Felis chaus</i>	Jungle cat	II	LC
<i>Herpestes edwardsii</i>	Common mongoose	II	LC
<i>Nemorhaedus goral</i>	Himalayan goat	III	NT
<b>Birds</b>			
<i>Corturnix corturnix</i>	Common quail	IV	LC
<i>Gallus gallus murghii</i>	Red jungle fowl	IV	LC
<i>Lophura leucomelana</i>	White orested kaljee	I	LC
<i>Culuba livia</i>	Jungle bush quail	IV	LC
<i>Arborophila atrogularis</i>	Hill partridge	IV	NT
<i>Francolinus francolinus</i>	Black partridge	IV	LC
<i>Gyps himalayensis</i>	The Himalayan griffon vulture	I	NT
<i>Corvus macrohynchos</i>	Crow	V	LC
<b>Reptiles</b>			
<i>Varanus griseus daudin</i>	The common Indian lizard	I	LC
<i>Naja naja</i>	The Indian cobra	II	VU
<i>Bangarus caeruleus</i>	Common Indian krait	II	LC
<i>Vipera ruselli</i>	Himalayan pit viper	II	LC

**WPA**=Wildlife Protection Act 1972 **VU**= Vulnerable **NT**= Near Threatened **LC**= Least Concern

### 3.6.1 Animals, Birds & Fish:

The animals and birds found in this area are described briefly as follows:

**3.6.2 Animals:** The main animal species are briefly described in the following subsections.

**3.6.2.1 Chital or spotted deer (*Axis axis*):** Considered to be the most beautiful deer, chital sometimes comes out to open grassy blanks in the buffer belt. Locally this species of stag is known as "Jhank" in the area. Its body is bright golden in color and profusely spotted with white spots from legs to neck at all ages. The bucks bear three tined antlers. They usually breed during winter months. Chital feeds on grasses and other vegetation and likes grassy open places with plenty of drinking water. An adult spotted deer may weigh up to 85 kgs and attain a height of 90 cm at the shoulders.

**3.6.2.2 Sambar (*Cervus unicolor*):**-Sambar is the largest species of deer that is sometimes found within the sal forest of this division. Their coat of dark short hair is coarse and brown in color with a yellowish tint. This deer has a more nocturnal habit and it retreats into heavy forest cover at dawn. It feeds on coarse vegetation, grass leaves and wild fruits. It attains a height of 140 cm at the shoulder and may weigh up to 300 kg. It is capable of moving very silently even in dense forests. Their breeding mainly takes place in the winter months.

**3.6.2.3 Kakkar Muntjak or Barking deer (*Muntiacus muntjak*):** This deer is commonly known as the barking deer due to its bark-like sound when heard from a distance. These deer are mostly found in thickly wooded areas but they come out for grazing in open grassy blanks. It feeds on grass, leaves and wild fruits. The males have small unbranched antlers which grow up to 5 to 8 cm in length. Their coat is a bright chestnut that darkens in the aged animals. The body length of the barking deer at the shoulder is 50 to 75 cms and a full-grown adult may weigh up to 29 kg. It is believed that they breed throughout the year.

**3.6.2.4 Goral (*Nemorhaedus goral*):** This goat-antelope is found on rugged grassy and rocky hillsides covered with tree growth, in all the ranges of this division. It has a goat-like build, short teeth, cylindrical horns that are ringed or ridged, slightly backward curved up are upto 10 -12 cm long and a short tail. Usually, it is blackish gray in color. In rocky mountainous regions, this animal can be visible in the morning as well as in the evening. It can attain a height of 60 to 70 cm at the shoulders and weighs around 25 to 30 kgs.

**3.6.2.5 Jungli Suar or wild boar (*Sus scrofa*):** Wild Boars are nocturnal wild animals that only come out at night to forage for food. They are omnivorous animals but primarily feed on plants. The majority of their diet is made up of wild roots and tubers, field crops and even insects and snakes. They usually feed during the morning and evening. Wild boars live in grassy, bushy and

also thickly wooded areas. They are black in color and their skin is covered by a sparse growth of bristles.

**3.6.2.6 Indian Porcupine (*Hystrix indica*):** This destructive rodent is found in all areas of this division. The Indian porcupine is highly adaptable to multiple environments but they usually favor rocky hillsides, where it lives in burrows dug by itself. The self-constructed burrow has a long entrance tunnel, and a few bolt holes or emergency exits, sometimes, are 15-18 meters in length.

The characteristic feature of porcupines is the spines borne on the neck, back and hindquarters that are used to alarm predators. The porcupine primarily feeds upon field crops, fruits roots and tubers. They are very much destructive to field crops, and gardens when adequate food is not available in the forests. Their young ones are usually born in spring.

**3.6.2.7 The Indian Hare (*Lepus ruficaudams*):** This rufous tailed hare is found all over the area. It prefers dense forests and usually lives near cultivation and villages. Early wheat and other agricultural crops in the field are heavily eaten by these animals. It may weigh upto 1.5 to 2.5 kg. The back and face are brown with black hairs scattered throughout and behind his face is a brown coat mixed with black hair. It is believed that at the beginning of winter one or two Young ones in numbers are born.

**3.6.2.8 Baghera, Panther or Leopard (*Panthera pardus*):** Leopards prefer to live in dense forest areas or even in open country among rocks. Leopard is a nocturnal animal but can prey during the day if it is unable to catch anything by night. Leopards are an impressive predator that mainly feeds on species of herbivores found in its range such as cattle, sheep, goat, pet dogs, deer, monkeys and even rodents like porcupines. A common tactic that leopards use is to hide or leap out of trees upon their prey; they are stalkers and the habit of climbing trees adds another dimension to their hunt.

It is more dangerous to man and his cattle than a tiger. Average total length varies from 215 cms to about 245 cms, males are usually larger than female, the full grown male may weigh from 50 to 68 kg the females weigh 40 to 50 kgs. Panthers usually breed throughout the year, producing a litter of two to four cubs in a year.

**3.6.2.9 Kala Bhaalu, Richh or Himalayan Black Bear (*Selenarctos thibetanus*):** On the onset of winters, the black bear descends down to the lower altitude in the transgiri area. This is a

matter of concern as the black bear damages the maize, fruit and other agricultural crops grown nearby.

Naturally the animal is diurnal but many bears have largely turned nocturnal in order to avoid any contact with humans. They are found resting during the day in rock caves or hollow trees quite oftenly. Their diet consists of wild fruits, honey and bees and honey insects, etc. The Black bears have long black fur with a v-shaped white patch on the chest which is a typical character of this animal. This animal frequently raids fruit orchards and cornfields and this leads to a great loss to farmers.

**3.6.2.10 Elephant (*Loxodonta and Elephas*):** The elephant is a large land mammal known for its distinct appearance, intelligence, and social behavior. Elephants are the largest land animals, with males, called bulls, reaching heights of up to 13 feet (4 meters) at the shoulder and weighing around 12,000 pounds (5,400 kilograms). Females, called cows, are slightly smaller. Elephants have a thick, gray skin that is sparsely covered with coarse hair. Their most prominent features are their long, curved tusks, which are elongated incisor teeth. Elephants are social animals that live in complex family groups known as herds. A typical herd consists of related females and their offspring, led by the oldest and most experienced female, called the matriarch. Male elephants usually leave the herd when they reach adolescence and form small bachelor groups or become solitary. Elephants are known for their intelligence, empathy, and strong emotional bonds. They display a wide range of behaviors, including communication through vocalizations, body language, and infrasound (low-frequency sounds). Elephants are herbivores and spend a significant portion of their day feeding on grasses, leaves, bark, fruits, and roots..

### **3.6.3 Birds**

**3.6.3.1 Jangli Murga-The Red Jungle fowl (*Gallus gallus*):** It is believed that this bird is the direct ancestor of the domestic chicken. It is found in pairs or parties usually in the sal forests and scrub jungles of this division. Jungle Fowls are mostly found in areas with a mix of both open ground and dense vegetation, and may also travel through forests to other clearings or food sources in the morning and evening. The areas that are intentionally burned to promote bamboo growth also tend to attract jungle fowl.

These birds are naturally very shy of humans as compared to the much tamer domesticated subspecies. The male jungle fowls have a larger body size as compared to their females counterparts.

Their staple diet includes insects, especially termites and winged ants that emerge at dawn and dusk. They also rake the ground in order to consume invertebrates, roots, fruits and seeds. The hen is rusty brown with speckled neck and minimal comb. Their breeding season usually takes place during the month of March to May.

**3.6.3.2 Teeter-The Black partridge (*Francolins francolinus*):** This is a relatively small bird that usually lives on the ground about half of the size of a village hen. They are generally black in colour with white spots. The hens are paler and speckled black and white.

It is found on grassy blanks and cultivated land of sugarcane fields. They feed on grains, grass seeds, white ants and other insects both in the morning and in the evening.

It can run fast and relies upon its legs when it needs to escape. It can live singly or in pairs.

The breeding period of black francolin extends from April up to late July.

**3.6.3.3 Bater-The common or Grey Quail (*Coturnix coturnix*):** Common quails are small with almost no tail partridge like other birds. They have pale reddish brown and black streaked and buffed feathers in brown colour. They are usually found in open spaces that are covered with bushes like grassland and cultivation. They are quick to fly short distances when they feel threatened. Their population increases in the winter season as they migrate to this region from central and western Asia. They mainly eat grains, grass seeds and insects etc. Their breeding season is from March to May. The local migratory Rain quail (*Coturnix coromandelica*) is also found in this area.

**3.6.3.4 Lowwa or Jungle bush quail (*Perdica asiatica*):** They are small birds no bigger than rain quails. The male has fulvous brown, mottled black and buff feathers above and white below. In females the lower parts are pale-pinkish. They live in open deciduous forests and dry scrub forest. They are found in a convoy of 5 to 20 that rest together and rise suddenly when almost trodden. Their diet usually consists of grass seeds, tender shoots, and grains. Their breeding season ranges from August to April.

**3.6.3.5 Kabutar or the Blue Rock Pigeon (*Columba livia*):** This bird is grey in colour with a sheen of metallic green, purple and magenta on its neck and upper breast. These are the most common birds usually seen in old buildings and rock holes. It is also found in open and rocky cliffs. They usually feed on cereals, grasses, pulses etc. Their breeding season is not well defined.

**3.6.3.6 Ghugi, Dove (*Streptopelia* spp):** This is a common dove that is found in pairs or small groups in open areas and cultivated fields. It even approaches houses and verandahs if not scared. Its flight is straight and swift. Its breeding season is not well defined.

Apart from these birds, the national bird of India, Peacock (*Pavo cristatus*) is also found in this area. Other birds of common occurrence are house crows and jungle crows (*Corvus spp.*), tree pies (*Dendrocitta spp.*), the jungle babbler (*Turdoides spp.*), the bulbuls (*Chloropsis* and *Pycnonotus spp.*), magpie-robin (*Copsychus spp.*), king crow (*Dicrurus spp.*), golden oriole (*Oriolus spp.*), common myna (*Acridotheres spp.*), common baya (*Ploceus spp.*), red rumped swallow (*Hirundo spp.*), wood pecker (*Dinopium spp.*), parakeets (*Psittacula spp.*), common kingfisher (*Althene spp.*), vultures (*Gyps spp.*), eagles (*Aquila spp.*), etc. which are equally important from aesthetic forest cleanliness and health, farming and bird watching and balance of nature point of views.

**3.6.4 Fish:** Freshwater fishes are found in Bata, Markanda, Giri, Ton and Yamuna rivers. The species found in these waters are Mahaseer (*Tor spp.*), Rohu (*Labeo spp.*), Lanchii (Fresh water shark wallago spp.) and in Yamuna river sometimes Goonch (*Bagarius spp.*) is also found.

### **3.7 Threats and challenges to wildlife**

Following are the threats and challenges faced by wildlife:

- (i) Depletion of the food for herbivorous animals due to lopping of fodder trees by graziers and local people.
- (ii) Biological interference by humans and livestock, especially livestock near their habitat.
- (iii) Epidemics, the fauna encounters epidemics after coming in contact with infected domestic animals. These diseases spread by coming in contact or grazing with domestic animals or through their residue of grazing.
- (iv) Natural calamities like droughts, storms, landslides, fires, etc.
- (v) Illegal poaching and hunting have always been the biggest threat to wildlife. It affects both herbivores and carnivores in the forest division. Poaching, trapping and killing of wild animals by local inhabitants is also a challenge for wildlife.
- (vi) Anthropogenic activities like, mining, construction of roads, encroachment cases, etc. adversely affect the wildlife and often cause habitat fragmentation and loss.

Due to pressure on their natural habitats or to find food often animals enter into human settlements and villages near the forests. This causes the human-wildlife conflict and some cases



have been surfaced where animals have attacked humans. Forest department of HP gives compensation to the injured persons as per the HP government guidelines. Details of death/Injury to human beings due to wildlife attacks are given in Table 3.4.

**Table 3.4 Injury of human beings due to wildlife attacks**

<b>Year</b>	<b>No. of cases</b>	<b>Range</b>	<b>Animal Attack by</b>	<b>Human injured/died</b>	<b>Compensation Paid (Rs)</b>
2017	1	Nahan	Monkey	Minor injuries	Rs. 1288
2018	1	Trilokpur	Wild pig	Minor injuries	Rs .1774
2019	1	Trilokpur	Leopard	Minor injuries	Rs. 15000

Elephant movement has recently been seen in areas adjoining Kolar Range in Nahan forest division. One lady has been killed by elephant in kolar range in 2023.

### **3.8 Protection and management of fauna**

#### **(a) Protective measures:**

Wildlife protection can be implemented in a forest division by taking appropriate preventive and control measures. For the conservation of wildlife and their habitats, important measures which should be adopted are as follows:

- i) To ensure the participation and cooperation of local people and villagers to protect and conserve wildlife, various programs and awareness campaigns can be organized with the forest department. T.V, Radio, social media, etc., are other important media to aware people of the wildlife. Talks and plays can also be organized in schools to create awareness and inculcate love for wildlife and forests among the students.
- ii) Crop protection licenses should be issued only when they are absolutely necessary. These licensed gun owners if found guilty of shooting animals and birds outside the fields, the license should be cancelled, gun confiscated and should be punished as per the law.
- iii) Local people or villagers can be appointed as Chowkidars on a part-time basis to assist the forest staff in detecting and apprehending poachers, hunters and illegal forest traders.
- iv) Forest fire protection should be assured by laying fire lines, erecting fire towers at strategic points, and deploying firefighters during the fire season. During fire season, continuous observation of fire-prone areas should be a priority. The field post should be well connected to the control center to provide immediate assistance in extinguishing fires in the fire-prone region.
- v) Local domestic animals should be vaccinated from time to time in the area to prevent any transmission of livestock diseases into the wild.

(vi) Individuals who provide information on wildlife crime such as poaching, illegal timber trading, encroachment, etc., to arrest perpetrators should be adequately awarded. Several applicable laws and regulations can be used to control, identify and punish the offenders.

**(b) Development Measures:** As conservation of existing wildlife of forest division is one of the objectives, the second objective includes proper development and improvement of the wildlife habitat of the division. Measures that can be taken are as follow:->

**i) Development Measures for habitat:** As wildlife is a part of the ecosystem, hence there is an association of wildlife with other components like flora, climate, etc. The flora provides food and shelter to the fauna, therefore, healthy and balanced habitat help to flourish wildlife in an area. Thus, there is a need for the improvement of wildlife habitat for the multiplication of wildlife. The maintenance of bushy and thick forests should be done to support more wildlife.

**ii) Development Measures to provide food:** Species that are used by wild animals and birds as a food must be identified. Such species should be planted in various places where wild animals can feed upon. Special attention should be paid to forage bushes and plants. The majority of the wildlife depends on broadleaf species for food in the area. Suitable broadleaf species, for example. Mulberry, *Grewia optiva* as per the local conditions should be a priority during plantations. Grass should not be uprooted, vacant spaces should be planted with good palatable grass. By planting appropriate crops according to climatic conditions, forest food stocks can be replenished in areas where food shortages are a concern. In addition, salts licks should be provided in the proper place.

**iii) Development Measures for water:** There are several rivers, perennial and seasonal streams in the forest. Additionally, nallahs supply water during the rainy season. It is necessary to construct a sufficient number of water holes in the area so that the fauna would have sufficient water availability during periods of drought. Proper catchments and earthen dams should be constructed to harvest rainwater which could be used by wildlife for drinking.

## CHAPTER 4

### MAINTENANCE AND ENHANCEMENT OF FOREST HEALTH AND VITALITY

#### 4.1 STATUS OF REGENERATION

To enhance forest health, reforestation and afforestation programs are critical. Reforestation involves replanting trees in areas where forests have been harvested or destroyed by natural disturbances. Afforestation, on the other hand, involves establishing forests in areas that were previously non-forest lands. Both practices help to restore forest cover, increase carbon sequestration, prevent soil erosion, and provide habitat for wildlife. The status of forest regeneration varies depending on the specific region and the efforts made in terms of conservation and reforestation. Forests around the world face different challenges such as deforestation, illegal logging, wildfires, climate change, and habitat destruction, which can hinder their regeneration.

##### **Parameter to assess regeneration**

- a. Good regeneration, if seedlings are more in numbers than the saplings and likewise Saplings are more than that of adults.
- b. Fair regeneration, if seedlings are more in numbers than the saplings but the saplings are equal or less than that of adults.
- c. Poor regeneration, if a species survives in only sapling stage, but not as seedlings (though sapling may be less, more or equal to adults).
- d. No regeneration, if a species is absent both in sapling and seedling stage, but present as adult.

Planting component in Assisted Natural Regeneration shall include more than 50% seedlings of native broad leaved and multipurpose use species.

##### **Why regeneration is poor?**

Also one of the major reasons for lack of natural regeneration is lack of adoption of silvicultural practices like removal of overstorey or adopting thinning operations.

Natural regeneration is very poor and in some places almost non-existent. At some places, it is patchy. The condition is worse where there is very high biotic pressure and interference.

The conditions which favor regeneration of species can be enumerated as follows:-

- a. Removal of weeds which suppresses the young seedlings.
- b. Complete control of grazing by strictly following closures in the plantation areas.
- c. Soil and water conservation measures in the area to control soil erosion and enhancement

of moisture which helps in regeneration.

- d. Fire control measures (i.e control burning & fire line maintainance)

It is also suggested that research plots may be made in different ecological settings as where soil, water, anthropogenic and crop density variations are present to assess the role of these factors on regeneration.

#### **4.2 AREA AFFECTED BY FOREST FIRE**

Fire is a natural ecological process that can be both beneficial and destructive to forests. Proper fire management involves a combination of practices such as control burning, wildfire prevention, and suppression. Control burning helps reduce the accumulation of forest fuels, stimulates new growth, and enhances biodiversity. When wildfires occur, effective fire suppression strategies are crucial to protect forest health and nearby communities.

During summer months, the forest fires are a regular feature in fire sensitive areas. A constant vigil by field staff is necessary to check these fires.

**Table: 4.1 Below is a list of forest fire in Nahan Forest Division from calendar year 2010-11 to 2021-22.**

<b>Year</b>	<b>No. of incidences</b>	<b>Area in hectares</b>	<b>Loss (in Rs)</b>
2010-11	22	366.41	95700
2011-12	0	0	0
2012-13	123	146	76000
2013-14	7	46.50	0
2014-15	29	166	39500
2015-16	3	21	0
2016-17	43	242	0
2017-18	7	117	30000
2018-19	54	628.84	519000
2019-20	11	133	325000
2020-21	10	61.8	0
2021-22	16	132.5	104500
<b>Total</b>	<b>325</b>	<b>2061.05 Ha</b>	<b>Rs. 1189700</b>

Some of the strategies which can be applied to control fires are:

- Maintenance of fire lines. These fire lines must be maintained annually removing the leaf litter and other degraded biomass.
- Watch towers be posted with fire watchers to keep an eye on the outbreak of smoke in the forests and report to the ground teams for quick response. A system needs to be developed

for detection, reporting, dispatching and fighting fires within the shortest possible time lag.

- c. The right holders and the Joint Forest Management Committees (JFMC) should be educated and trained to take necessary fire control measures in their areas.
- d. Awareness programs, plays and workshops can be organized for the local people, Panchayats, School children, JFMCs/ VFDCs, NGOs, Tourists, etc. to make them aware about the damages by the forest fires to the forest resources, wildlife and environment. Use of social media can also be an effective mode to spread awareness to masses.
- e. Removal of Pine needles and debris from the forest floor.
- f. Construction of water harvesting structures, earthen dams and water storage tanks, etc. to increase the moisture regime of the areas.
- g. Supply of forest fire fighting equipment in fire-sensitive beats.

#### **4.3 DAMAGE BY NATURAL CALAMITIES**

Throughout their existence, forests have been affected by natural forces like fire, drought, floods and storms. These events occur on a random basis and can damage large stretches of the forest. From the surviving remnants of the ecosystem, the forest can usually rapidly regenerate. Within a few years, the forest diversity can return to or exceed the diversity that existed before the disturbance. Every year heavy monsoon rains cause torrential floods in low lying areas which leads to bank erosion.

#### **4.4 DAMAGE FROM GRAZING**

Grazing and browsing is a severe threat to the young plantations in the forests as the adjoining fields are cultivated and cattle have no other place for grazing. The major reason for this grazing pressure is the shrinking of pasture areas in the village common lands due to changed land-use pattern. The animals are usually Cows, buffalo, Sheeps and goats.

Due to incessant grazing and spread of lantana, the growth of palatable grasses has decreased and non-palatable species increased.

Although forest grazing has some advantages, there are some risks involved if it is not properly managed. Most of these risks have to do with forest regeneration. Livestock grazing can impede new tree growth if seedlings are trampled or if excessive browsing takes place. Also, seeding the understory carries the risk of reducing new tree growth because of increased competition for moisture and soil nutrients. Proper management of livestock can prevent trampling and browsing of seedlings, and when seeded vegetation is grazed, its competition with tree seedlings is

reduced. Grazing can also help in exposing the bare mineral soil that is necessary for the regeneration of some tree species.

The graziers in nahan forest division include gujjars, gaddis and local inhabitants. Gujjars and Gaddis are issued grazing permit and there is restriction in increasing the number of cattle in grazing permits as per the Grazing Policy of Himachal Pradesh, 1989. However the number of cattle grazing in the forests exceeds the number permitted by the department.

#### **4.5 LOPPING PRACTICES**

Sal, Sain, Rehni, Khair, Chhal, Amaltas and various species are looped for fodder and fuelwood. The looping is usually carried out in the winter season when grasses are weathering. The loopers do not have consideration for the age of the when found in forestland. Usually, trees are lopped up to top, leaving a few small growing branches at the top are spared. This heavy looping leads to drying of trees in the season of severe cold and frost. Restriction on looping have been imposed like, one third of the crown of the tree will be left intact, no tree below 20cm d.b.h will be looped and no branch over 3 cm dia will be cut in looping. However, these restrictions are not followed in practice.

#### **4.6 AREA INFESTED BY INVASIVE WEED SPECIES IN FORESTS**

Invasive species are any species that are non-native to a particular ecosystem and whose introduction and spread causes, or are likely to cause, socio-cultural, economic or environmental harm or harm to human health.

The increasing global movement of people and products is also facilitating the movement of alien species around the world. In the absence of their natural predators, competitors and pathogens, they can prosper in new environments and spread at the expense of native species, affecting entire ecosystems.

Not all invasive species have been inadvertently introduced; however, particularly challenging to natural resource management are non-native species that have been intentionally introduced into an ecosystem to provide economic, environmental, or social benefits, many species of plants, trees and animals have been introduced outside their native ranges as ornamentals for gardening or for the pet industry. These species have escaped to become serious problems in forests and other ecosystems. This is a considerable concern in the forest sector since many of the tree species used for agro forestry; commercial forestry and desertification control are alien or non-native to the area. It is vital to ensure that such species serve the purposes for which they were introduced and do not escape to cause negative effects on native ecosystems. While the

definitions and impacts of invasive species on the forest sector are still debated and need reviewing in the context of forest management, a number of initiatives, programmes and activities have been initiated. Most programmes focused on damage caused to local forest ecosystems, or to a particular species or group of species, by a given pest over a period of time. There is an overall lack of information on invasive species and the forest sector, even at the global scale. Information sharing is necessary in the planning and implementation of any strategy for the management of invasive alien species.

*Lantana camara* is the main invasive weed species that have infested the Nahan forest division that have overgrown in the area affecting the biodiversity. *Lantana camara* is the most obnoxious weeds of the forests of Nahan. Being an alien species, it has invaded areas so thickly that it has affected the species diversity, productivity of land and thereby changing the ecology of the area. *Lantana camara* has also deleterious effects on the health of animals, particularly cows, when browsed accidentally. The studies showed that in the infested areas, it neither favors palatable nor non-palatable species under its cover. Because of its fast growth, it overtakes the economically important species and negates the effort of afforestation as well. So far, to eradicate Lantana and utilize it for economical conversion to trade in products or biomass energy has failed.

**Table: 4.2 Below is detail regarding Lantana eradaction in Nahan Forest Division from 2010-11.**

<b>Total Area infested with Lanatana in Nahan Forest Division.</b>						
<b>Name of Range</b>	<b>25%</b>	<b>50%</b>	<b>75%</b>	<b>100%</b>	<b>Total Area (Ha)</b>	<b>Balance</b>
Trilokpur	430.84	2131.52	4979.06	469.39	8010.81	
Jamta	1274.9	820.8	1319.4	1420.8	4835.9	
Kolar	1128.45	815.85	237.49	50	2231.79	
Nahan	1439	3035	1709	125	6308	
<b>Total (Ha)</b>	<b>4273.19 Ha</b>	<b>6803.17 Ha</b>	<b>8244.95 Ha</b>	<b>2065.19 Ha</b>	<b>21386.5 Ha</b>	
<b>Total Area in which Lantana have been removed in Nahan Forest Division</b>						
Trilokpur	10	0	291.82	20	321.82	7688.99
Jamta	140	30	0	280.7	450.7	4385.2
Kolar	80	225	102.96	40	447.96	1783.83
Nahan	55	190	230	0	475	5833
<b>Total</b>	<b>285 Ha</b>	<b>445 Ha</b>	<b>624.78 Ha</b>	<b>340.7 Ha</b>	<b>1695.48 Ha</b>	<b>19691.02 Ha</b>

#### **4.7 INCIDENCE OF PESTS & DISEASES**

Infestation of Sal forests by Sal Heartwood borer(*Hoplocerambyx spinicornis*)was last reported

in late 1990's after that no outbreak of the Sal Heartwood borer had been reported. Leaves of Shisham are defoliated by shisham-defoliator (*Plecoptera reflexa*), but no major damage to shisham tree have been reported by this defoliator, *Gandoderma lucidum* causes root rot mortality and *Fomes badius* causes heart rot in scattered Khair trees. Wilt in Shisham has been observed at some places caused by *Fusarium solani* causing the tree to turn leafless.

#### **4.8 FOREST DEGRADATION AND ITS DRIVERS**

There are various forest degrading elements affecting forests of Himachal and Nahan Forest division. Few of them are:-

1. Unsystematic Grazing and tree diseases are source of forest degradation as they lead to a stunted forest development.
2. Incidence of illegal felling has been restricted over the years however still it is a cause for forest degradation.
3. Forest fires
4. Invasion of weeds like *Lantana camara* and *Ardisia solanacea*, the regeneration has significantly reduced.

#### **4.9 POLLUTION CONTROL AND PROTECTION OF ENVIRONMENT**

The impact of pollution on forests of Nahan forest division has not been studied in detail as it requires a scientific assessment and base year comparison. However during field tours there are areas where industrial effluent has been discharged into forest areas.

Biodegradable and Non-biodegradable waste has also been dumped into forest area by MC Nahan and local residents. To prevent this, forest staff regularly impose fine.



## CHAPTER 5

### CONSERVATION AND MAINTENANCE OF SOIL AND WATER RESOURCES

#### 5.1 AREA TREATED UNDER SOIL AND WATER CONSERVATION MEASURE

The Shiwalik hills being geologically younger, suffer from various forms of land degradation as a result of faulty land management practices in the past. The steep slopes and undulating terrain accelerate soil erosion during the monsoon season giving rise to ever deepening gullies and formation of torrents (choes) which further degrade productive lands and causes wide spread damage to infrastructure. Due to this reason, attempts have been made in the past under various schemes to rehabilitate the degraded hills through afforestation and soil conservation measures. The measures included construction of brush wood check dams, dry stone masonry check dams, continuous live hedges, crate wire structures in streams/choes, silt retention dams cement masonry structures and run-off drainage structures. Alongwith this, landslides and land slips are being rehabilitated with vegetative and concrete structures. To recharge the ground water and to improve percolation, renovation of existing ponds is being done in the villages and new pond are being constructed. Ponds are also maintained in the forest areas for the benefit of wild animals. Details of SMC works are given in Table 5.1 and Table 5.2.

**Table 5.1 Soil conservation works carried out in past 5 years**

No. of Dry Stone Check Dam	No. of WHS	No. of Water pond	No. of Crate wire
83	6	27	9

**Table 5.2 Earthen dams**

Year	Detail of work	Capacity	Area	Range
2019-20	Earthen Dam NPV CAMPA	Approx 50 Lakh ltr.	RF Gumti Sambhalwa C-1	Trilokpur

#### 5.2 DURATION OF WATER FLOW IN THE SELECTED SEASONAL STREAMS

There are various streams and other water sources in the division that originate from well established forest usually providing permanent water flow. Some of the permanent streams in the division are Jwala ki bauri, Bauri (sanoga), Bauri of Nawni village, etc. These seasonal streams

either flow less water or dry up during summers and start flowing in the monsoons. The main source of their water is the rainwater from monsoon rainfalls.

**Table 5.3 Detail of existing springs shed in Nahan Forest Division:**

The detail of Spring shed data per liter For the 2022-23																
Sr. No	Name of Range	Name of RF	Name of Spring	Beat	Block	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
1	Jamta	RF Talon C-11	Talon	Talon	Jamta	25 Sec.	1 Minute	1.7 Minute	1.25 Minute	40 Sec.	38 Sec.	42 Sec.	48 Sec.	55 Sec.	1.10 Minute	1 Minute
2	Jamta	RF Talon C-7	Shilled	Talon	Jamta	1 Minute	1.30 Minute	1.45 Minute	2.20 Minute	48 Sec.	42 Sec.	44 Sec.	48 Sec.	55 Sec.	1 Minute	45 Sec.
3	Jamta	RF Burman C-	Katal	Burman	Jamta	56 Sec.	1.15 minute	1.27 Minute	1.4 Minute	49 Sec.	49 Sec.	50 Sec.	56 Sec.	59 Sec.	1.2 Minute	57 Sec.
4	Jamta	RF Nauni C-	Nauni	Nauni	Jamta	59 Sec.	1.7 Minute	1.36 Minute	1.1 Minute	40 Sec.	40 Sec.	43 Sec.	48 Sec.	52 Sec.	57 Sec.	45 Sec.

### 5.3 WETLANDS IN FOREST AREAS

For conservation, management and sustainable use of wetlands Ramsar Convention on wetlands was signed in 1971 in the Iranian city of Ramsar, which came into force in 1975. There are 42 Ramsar Sites in India listed under Ramsar Convention. However, no wetlands are present in the Nahan forest division.

### 5.4 WATER LEVEL IN THE WELLS IN THE VICINITY (UP TO 5 KM) OF FOREST AREA

Major parts of the division are hilly and mountainous with highly dissected and undulating terrains. Ground water potential in such areas is low due to hydro-geomorphic set up. Spring are the main ground water structures that provide water supply for domestic and irrigation. Tube wells are also there in the area of Kala-Amb, Suketi and Bikrambagh area of the Nahan forest division. CGWB has drilled/constructed 11 exploratory wells in the valley area of the district in the depth range of 90.00 to 163.00 m bgl. Static water level of the tube wells ranges from 2 m to 43 m bgl and discharge ranges from 200 to 3220 lpm.

### 5.5 STATUS OF AQUIFERS

The Siwalik and Sirmaur group represent the Tertiary formation in the state. These two groups occur in the western part of the state and have northwest to southeast trend. The Siwalik comprises of boulder, conglomerate, sandstone and clay while, Sirmaur group comprises of shale, sandstone and clay. The primary porosity and permeability in the Tertiary formation is low to moderate and hence, these aquifers do not form high yielding aquifers.

Quality of ground water in shallow aquifer is good for domestic and irrigation purpose in the district. Though contamination of ground water sources has not been reported in the district so far, however, the fast developing industrial area particularly in Kala-amb and Moginand area is vulnerable to pollution from industrial effluents. There is thus need to have proper ETPs and waste disposal system with all the industries and also the town. Proper monitoring is very much required. Fair to moderate quantity of calcium is present in ground water of District Sirmaur.

## **CHAPTER-6**

### **MAINTENANCE & ENHANCEMENT OF FOREST RESOURCE PRODUCTIVITY**

#### **6.1 GROWING STOCK OF WOOD**

Growing stock of wood refers to the total volume of living trees in a specific forest or a larger geographical area. It is an important metric used to assess the health, productivity, and sustainability of forest resources. The growing stock of wood is typically measured in terms of volume (cubic meters or cubic feet).

Forests provide a wide range of goods and services. Goods include timber, fuelwood, as well as food products (berries, mushrooms, etc.) and fodder. In addition to important services, forests and trees play a crucial role in the conservation of ecosystems, maintaining quality of water, preventing or reducing the severity of floods, avalanches, erosion and drought. Forests provide a wide range of economic and social benefits, such as employment, forest products and protection of sites of cultural value (FAO, 2006). The forest like other ecosystems, are affected by climate change. The impacts due to climate change may be negative in some areas and positive in others. However, forests also influence climate by affecting the changes in the quantum of carbon dioxide in the atmosphere. They absorb CO<sub>2</sub> from atmosphere, and store carbon in wood, leaves, litter, roots and soil by acting as “carbon sinks”. Carbon is released back into the atmosphere when forests are cleared or burned. Forests by acting as sinks are considered to moderate the global climate. Overall, the world’s forest ecosystems are estimated to store more carbon than the entire atmosphere (FAO, 2006).

Therefore, analysis of growing stock is necessary to know the capacity and potential of the forest to have tree growth and also to calculate harvestable yield in the working plan and assessing their capacity as carbon sinks. As the objective of forest management is gradually shifting towards regular flow of income and ecosystem services to local community keeping conservation and ecological security as the larger objective, the harvestable yield and the increment of the forest has to be considered to arrive at the crucial decision of sustainable management.

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. Growing stock is mentioned in Table 6.1. Sample plots were laid out and observational assessment of site quality, tree species, and composition, its health, density and crop age etc. were recorded.

Table 6.1: Growing stock year 2023-24 (Nahan Forest Division)															
Species	V-1	V-2	IV-1	IV-2	III-1	III-2	IIA-1	IIA-2	IIB	IA	IB	IC	ID	Total	Cmt
Khair	125309	70863	93741	27675	8175	608	6554	0	203	0	0	0	0	333128	46970.1016
Chil	166808	0	208680	0	87232	0	36581	0	10243	14632	5853	0	0	530029	270647.6027
Sal	19667	0	165027	0	177230	0	102155	0	47958	17832	6952	0	0	536821	663515.7020
Sain	63229	0	94796	0	75837	0	50526	0	18959	6351	0	0	0	309698	282247.7330
Misc	648538	0	381327	0	237258	0	36665	0	71461	10523	0	0	0	1385772	295924.0110
<b>Total</b>	<b>1023551</b>	<b>70863</b>	<b>943571</b>	<b>27675</b>	<b>585732</b>	<b>608</b>	<b>232481</b>	<b>0</b>	<b>148824</b>	<b>49338</b>	<b>12805</b>	<b>0</b>	<b>0</b>	<b>3095448</b>	<b>1559305.1503</b>

## 6.2 VOLUME INCREMENT :

### Increment

Increment is the growth of a tree or a crop with age. By the term increment, one may indicate the physical increase of different parameters that increase with time or age. Thus increment may refer to increase of wood content, or any of the factors increasing with age, like, volume, diameter, height, basal area, price etc.

In Forest Management, the term **increment** refers normally to volume increment of crop.

### Factors that influence increment

Increment of individual trees or crop is influenced by

- **Species** – fast growing species have larger increment than the slow ones in a given period.
- **Site Quality** – it is natural that superior site quality favours higher increment.
- **Silvicultural Treatment** – silvicultural treatment including tending operations have considerable influence on increment.
- **Nature of the crop** – nature of crop, that is whether even-aged or uneven-aged, influences the increment.

### Increment is an important characteristic

Increment is an important characteristic of a forest crop. It is an indicator of the health of the crop, the site quality, and age or maturity of the crop. It is an index indicating suitability of a species at a given site or performance of a silviculture system.

A virgin forest, or a forest which has remained undisturbed for a long time, or a forest which has reached its climax, will not have any net increment. While individual trees may put on increment, other trees decay and die. In fact, the increment may also become negative for a period if there are adverse locality factors. Thus increment may be an indicator for maturity of a crop or impact of locality factors.

**Current Annual Increment – Definition and concept**-The growth that takes place in a particular year is called the Current Annual Increment (C.A.I) for that year. Thus CAI indicates

the increase in girth, diameter, basal area, height, volume of individual trees or a crop in a specific year.

Annual Increment of individual tree or crop of a species is not constant. It is rather a function of age of the tree (crop). In other words, CAI depends on the age. So while mentioning the value of CAI, it is necessary to mention the age of the tree (crop) to which the CAI corresponds.

So,

if  $V_{n-1}$  = volume of wood produced in (n-1) years, i.e. volume at the age of (n-1) years;

$V_n$  = volume of wood produced in n years, i.e. volume at the age of n years,

CAI at the age of n years =  $V_n - V_{n-1}$

It would be apparent from above that to obtain accurate values of CAI, it is necessary to know the values of  $V_{n-1}$ ,  $V_n$ ,  $V_{n+1}$ ,  $V_{n+2}$  etc. it is, however, not feasible to measure and record the volume (or other parameter) of tree (crop) every year. Measurement of a tree parameter is normally done at periodic intervals of 5 or 10 years, and increment over such period is determined, which is called **periodic increment**. When the periodic increment is divided by the years of the period, one obtains **periodic annual increment**, which is taken as CAI for the period.

**Mean Annual Increment – Definition and Concept-** The volume of a tree is built up by the annual increments that the tree puts on in successive years. The CAIs vary from year to year. The mean or average of all CAIs is the **Mean Annual Increment (M.A.I)** which denotes average annual rate of growth upto any given age. M.A.I is thus defined as the total increment upto a given age divided by that age.

In the context of volume increment,

If,  $V_n$  = volume of wood produced in n years, i.e. volume at the age of n years,

$$\text{M.A.I} = \frac{V_n}{nn}$$

It may be noted that MAI for a tree or crop varies with age.

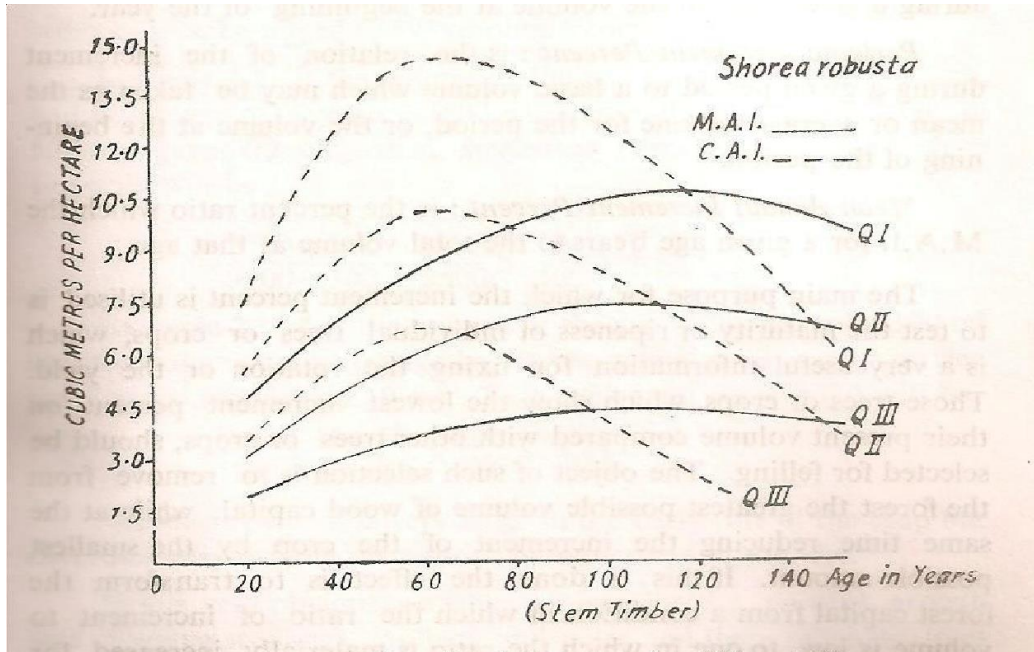
### **Variation of CAI and MAI with age**

Both for individual tree and crop, **CAI is small in the early stages** of growth (seedlings and saplings. However, soon **it increases rapidly to a maximum value**, after which CAI declines and finally ceases with the mortality of tree (crop).

The sum of CAIs of volume put on during a period gives the total volume which when divided by the period (age) gives the MAI. Being a mathematically computed figure the MAI coincides with

the actual values of CAI only on two occasions in the life of the crop – once at the end of the first year, and later when it culminates, that is, reaches its maximum value.

Please see Fig. 6.1 which illustrates the variation of CAI and MAI of Sal crop in three different site qualities. These are typical CAI and MAI curves whose following features may be noted.



**Fig. 6.1 MAI and CAI curves for different site qualities of Sal**

While the crop is young the CAI increases rapidly till it reaches the maximum value at the middle age.

- On account of rise in the value of CAI, MAI also rises but not so steeply as the CAI, as in the calculation of MAI the effect of increasing CAI gets distributed over all the previous years.
- Even after CAI begins to decline, the MAI still continues to rise for a period, as at this stage the declining CAI still remains greater than the average or mean increment.
- The MAI reaches the maximum value where the two curves intersect. In other words, at the age corresponding to the point of intersection, the CAI and MAI equal each other.
- Beyond the point of intersection, both CAI and MAI continue to decline. At this stage, CAI declines faster than the MAI, and CAI is less than the mean.

### **6.3 EFFORTS TOWARDS ENHANCEMENT OF FOREST PRODUCTIVITY THROUGH QUALITY PLANTATION TECHNIQUES**

Efforts towards enhancing forest productivity through quality plantation activities involve various practices aimed at establishing and managing plantations to maximize the production of

desired tree species. These activities focus on improving the quality, growth, and yield of trees in plantation forests. Here are some common practices:

1. **Selection of Suitable Species:** Choosing appropriate tree species that are well-adapted to the site conditions, including soil type, climate, and water availability, is crucial. Species selection ensures that the plantation is established with trees that have a higher likelihood of thriving and producing desired outcomes.
2. **High-Quality Seedlings:** Planting high-quality seedlings is essential for ensuring a successful plantation. These seedlings should be healthy, disease-free, and genetically improved to have desirable traits such as fast growth, good form, and high wood quality.
3. **Proper Site Preparation:** Adequate site preparation involves clearing the land, removing weeds and competing vegetation, and preparing the soil for planting. This helps reduce competition for resources and provides optimal conditions for seedling establishment and growth.
4. **Planting Techniques:** Employing appropriate planting techniques, such as proper spacing and planting density, ensures that trees have enough space to grow and develop without excessive competition. Correct planting depth, watering, and protection from pests and diseases are also critical for successful establishment.
5. **Weed Management:** Regular weed control is necessary to reduce competition for resources and prevent damage to the planted trees.
6. **Thinning and Pruning:** Thinning involves selectively removing some trees from the plantation to reduce competition and allow the remaining trees to grow more vigorously. Pruning is the removal of lower branches to improve the quality and value of the timber produced.
7. **Monitoring and Maintenance:** Regular monitoring of the plantation's health, growth, and overall performance helps identify any issues early on and enables timely corrective measures. Maintenance activities like watering, mulching, and protection from fire and browsing animals are crucial during the early stages of plantation establishment.
8. **Research and Innovation:** Continuous research and innovation play a significant role in enhancing forest productivity. This includes exploring new techniques, technologies, and improved tree varieties that can increase the productivity and resilience of plantation forests.

To enhance the productivity of forests, it is imperative to stock the blank areas by planting with improved planting material with good genetic inputs. Further well drained soils can be planted with Khair and Bamboo. However, the success of the plantation will depend on the eradication of



lantana, which is quite prevalent in our forests. There is a considerable scope to enhance the productivity of these forests with silvicultural measures and providing protection.

## **6.4 CARBON STOCK**

Carbon stock refers to the amount of carbon stored in a particular ecosystem or carbon reservoir, such as forests, soils, vegetation, or the atmosphere. It represents the total quantity of carbon present in living and non-living biomass within a given area or system. Carbon stock is typically measured in metric tons of carbon (tC) or metric tons of carbon dioxide equivalent (tCO<sub>2e</sub>).

The management of terrestrial carbon sinks is of paramount importance to contain and arrest the carbon dioxide from the atmosphere as it is one of the main greenhouse gases contributing to global warming. Thus, forests play a very important role in the dynamics of the global carbon cycle. In order to assist the policy makers in on climate change related issues, an attempt has been made to assess the carbon stocks in living biomass in Nahan forest division.

### **6.4.1 Methodology**

Forest and climate change are intimately intertwined, Forest regulate the climate, rain, groundwater and soil of the earth. Forests are both sources and sinks of carbon. A growing forest captures carbon from the atmosphere and mature forest in a storehouse of carbon. The living portion of biomass carbon is classified in two pools: - the Above Ground Biomass (AGB) and Below Ground Biomass which are stores of significant amount of carbon.

The growing stock (volume) data is first converted into biomass by using specie wise specific gravity of wood.

In forest enormous carbon is stored which is classified into 5 pools by good practices Guide of IPCC. The living portion of the biomass is classified into two parts:

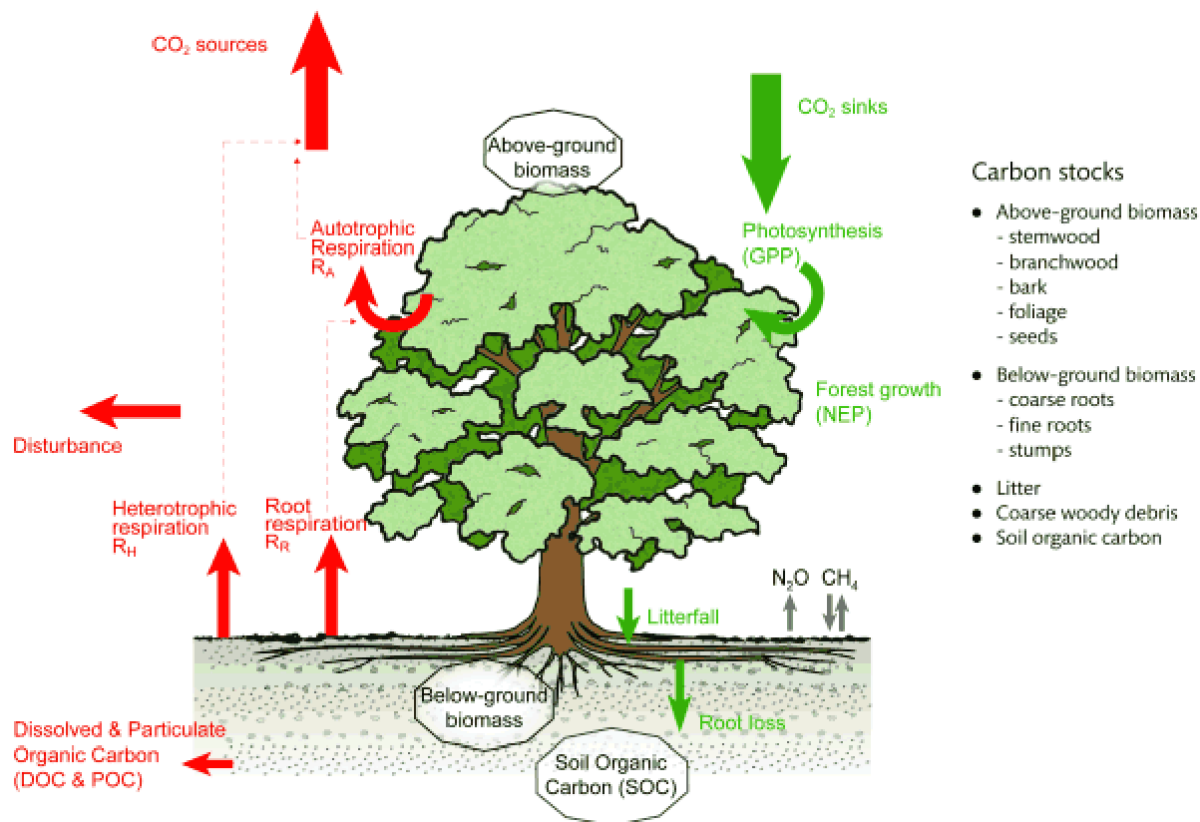
1. Above Ground Biomass
2. Below Ground Biomass

The dead organic matter is also classified into 2 pools:

1. Dead wood
2. Litter

The fifth pool is soil organic matter which contain substantial amount of organic carbon.

**Figure 6.1 Process of Carbon Stock & Biomass**



#### 6.4.2 Carbon Stock & Biomass

**Table: 6.2 DIFFERENT FOREST CARBON POOLS**

Table: 6.2 DIFFERENT FOREST CARBON POOLS		
POOLS	DESCRIPTION	
Living biomass	Above Ground Biomass	All Living Biomass Above the Soil Includes stump , Branches , Bark, Seeds, Foliage Etc.
	Below Ground Biomass	All Living Biomass of Roots. Fine Roots of Less Than 2mm Dia Are Excluded As They cannot Be Empirically Distinguished From Soil Organic Carbon Or Litter
Dead organic matter	Deadwood	Includes all non living biomass not included in litter either standing or lying on the ground. Also includes dead wood and stumps larger than or equal to 10 cm in diameter.
	Litter	Includes all non living biomass having diameter less than 5 cm (FSI) , lying dead in various states of decomposition on ground.
Soil	Soil organic matter	Includes organic carbon in mineral and organic soil to a specific depth chosen by a country

**Table: 6.3 Biomass of Nahan Forest Division**

S.N	Spp	Volume	Density	Woody Bio	ABEF	AGB	R/S	BGB	Total Living
		(M3)	(Kg/	Masses		(kg)	ratio		biomass, (kg)
			M3)	(kg)					
		A	B	C=A*B	D	E=C*D	F	G=E*F	E+G
1	Khair	46970.1016	800	37576081.28	3.4	127758676.4	0.24	30662082.32	158420758.7
2	Chil	270647.6027	600	162388561.6	1.3	211105130.1		50665231.23	261770361.3
3	Sal	663515.7020	750	497636776.5	3.4	1691965040		406071609.6	2098036650
4	Sain	282247.7330	750	211685799.8	3.4	719731719.2		172735612.6	892467331.7
5	Misc	295924.0110	900	266331609.9	3.4	905527473.7		217326593.7	1122854067
<b>Total</b>		<b>1559305.1503</b> m <sup>3</sup>	<b>3800</b> Kg/m <sup>3</sup>	<b>1175618829</b> Kg		<b>3656088039</b> Kg		<b>877461129.4</b> Kg	<b>4533549169</b> Kg

*ABEF (Average Biomass Expansion factor): as per IPCC 'Good Guidance' manual, for tropical climatic zone Pines: 1.3 & BL: 3.4*

The following table gives an idea of the amount of carbon dioxide sequestered in the forests of Nahan Forest Division.

**Table: 6.4 Carbon Dioxide Sequestration Data for Nahan Division**

Species	Total living	Carbon content	Carbon dioxide	Carbon dioxide (tonne)
	biomass (kg)	(0.5/ 50%)	Sequestered (kg)	
	A	B= A/2	C= B*3.6663	C/1000
Khair	158420758.7	79210379.35	290409013.8	290409.0138
Chil	261770361.3	130885180.7	479864337.8	479864.3378
Sal	2098036650	1049018325	3846015885	3846015.885
Sain	892467331.7	446233665.9	1636026489	1636026.489
Misc	1122854067	561427033.5	2058359933	2058359.933
<b>Total</b>	<b>4533549169 Kg</b>	<b>2266774584 Kg</b>	<b>8310675659 Kg</b>	<b>8310675.659 tonne</b>

\* The Above Calculation of Carbon Dioxide Sequestration Data followed as per TERI.

## CHAPTER -7

### OPTIMIZATION OF FOREST RESOURCE UTILIZATION

#### 7.1 RECORDED REMOVAL OF TIMBER

The most desirable timber in the division are sal, sain, shisham, toon and chhal. All species of these timber are extracted in the form of logs except chil which is generally hand sawn into sleepers and round ballies. Timber of sal, sain, shisham, toon and chil is used for construction purposes. Shisham, mango toon are also used in Furniture industry. The demand for khair wood in the katha industry is very high. Logs of sal are debarked before dispatch. Sain logs are exported with bark to avoid any splitting and cracking. Extraction of timber from government forests is being done by H.P state forest corporation Ltd in the Form of Salvage Marking, FCA and FRA cases & TD granted to right holders. During year 1986, green felling in Himachal Pradesh was banned by the State government. Further in the year 1996, Hon'ble Supreme Court of India passed a landmark Judgement in W.P.(Civil) No. 171/96 titled as 'T.N Godavarman V/S Union of India' in which a blanket ban on green felling was imposed in the State. Thus, the forests were never worked according to the prescriptions of the approved working plans.

**Table 7.1 Removal of timber under Salvage marking & TD**

Year	Spp	Removal under Salvage Marking (m <sup>3</sup> )	Removal under TD (m <sup>3</sup> )	Total Vol. (m <sup>3</sup> )
2014-15	CHIL	7727.617	0	7727.617
	Khair	360.58	0	360.58
	Kokat	629.394	0	629.394
	Shisham	0.467	79.309	79.776
	Safeda	35.768	6.06	35.768
	Sain	673.102	108.89	781.992
	Mango	6.52	0	6.52
	Sal	976.272	967.468	1943.74
	<b>Total</b>	<b>10407.72 m<sup>3</sup></b>	<b>1161.727 m<sup>3</sup></b>	<b>11569.447 m<sup>3</sup></b>
2015-16	CHIL	2726.748	0	2726.748
	Khair	271.946	0	271.946
	Kokat	239.994	0	239.994
	Shisham	1.411	0	1.411
	Safeda	8.764	0	8.764
	Sain	283.084	0	283.084
	Mango	0	0	0
	Sal	361.837	0	361.837
	<b>Total</b>	<b>3893.784 m<sup>3</sup></b>	<b>0 m<sup>3</sup></b>	<b>3893.784 m<sup>3</sup></b>
2016-17	CHIL	1982.8	2.708	1985.508
	Khair	387.27	0	387.27

	Kokat	399.27	0	399.27
	Shisham	74.193	0.977	75.17
	Safeda	83.432	0	83.432
	Sain	296.97	1.770	298.74
	Mango	0	0	0
	Sal	837.7	59.576	897.276
	<b>Total</b>	<b>4061.635 m<sup>3</sup></b>	<b>65.031 m<sup>3</sup></b>	<b>4126.666 m<sup>3</sup></b>
2017-18	CHIL	1962.9037	0	1962.9037
	Khair	309.384	0	309.384
	Kokat	264.757	0	264.757
	Shisham	84.597	14.819	99.416
	Safeda	13.02	0.600	13.62
	Sain	254.848	3.030	257.878
	Mango	4.559	0	4.559
	Sal	775.164	210.603	985.767
	Toon	0.467	0	0.467
	<b>Total</b>	<b>3669.6997 m<sup>3</sup></b>	<b>229.52 m<sup>3</sup></b>	<b>3899.2197 m<sup>3</sup></b>
2018-19	CHIL	3710.2955	0	3710.2955
	Khair	357.58	0	357.58
	Kokat	632.512	0	632.512
	Shisham	55.47	0	55.47
	Safeda	32.560	0	32.56
	Sain	380.642	0	380.642
	Mango	0	0	0
	Sal	1274.055	43.21	1317.265
	<b>Total</b>	<b>6443.1145 m<sup>3</sup></b>	<b>43.21 m<sup>3</sup></b>	<b>6486.3245 m<sup>3</sup></b>
2019-20	CHIL	3459.8287	0	3459.8287
	Khair	381.654	0	381.654
	Kokat	378.407	0	378.407
	Shisham	45.058	3.398	48.456
	Safeda	69.008	0.600	69.608
	Sain	389.528	6.570	396.098
	Mango	0	0	0
	Sal	872.358	114.37	986.728
	<b>Total</b>	<b>5595.8417 m<sup>3</sup></b>	<b>126.453 m<sup>3</sup></b>	<b>5722.2947 m<sup>3</sup></b>
2020-21	CHIL	3700.7552	2.7088	3703.464
	Khair	113.285	0	113.285
	Kokat	353.924	0	353.924
	Shisham	37.232	0	37.232
	Safeda	18.496	0.600	19.096
	Sain	134.547	4.80	139.347
	Mango	20.926	0	20.926
	Sal	519.814	92.90	612.714
	Simbal	1.515	0	1.515
	<b>Total</b>	<b>4900.4992 m<sup>3</sup></b>	<b>81.0088 m<sup>3</sup></b>	<b>4981.508 m<sup>3</sup></b>
2021-22	CHIL	2114.0389	0	2114.0389
	Khair	217.082	0	217.082
	Kokat	178.661	0	178.661

	Shisham	31.832	0.977	32.809
	Safeda	9.776	0.600	10.376
	Sain	240.449	18.774	259.223
	Mango	0	0	0
	Sal	644.585	55.218	699.803
	<b>Total</b>	<b>3436.4239 m<sup>3</sup></b>	<b>75.569 m<sup>3</sup></b>	<b>3511.9929 m<sup>3</sup></b>
2022-23	CHIL	1558.1139	3.3494	1561.4633
	Khair	273.498	0	273.498
	Kokat	325.604	0	325.604
	Shisham	0	3.709	3.709
	Safeda	37.468	0.600	38.068
	Sain	168.774	28.004	196.778
	Mango	0	0	0
	Sal	651.894	115.573	767.467
	<b>Total</b>	<b>3015.3519 m<sup>3</sup></b>	<b>151.2354 m<sup>3</sup></b>	<b>3166.5873 m<sup>3</sup></b>

**Table 7.2 Abstract of Land Use Change under FCA w.e.f. 2013-14 to 2022-23.**

Sr. No.	Year	Name of proposal	FCA Proposal No.	Date of Final approval	Total area diverted (in ha.)	Total No of tress handed over HPSFDC	Volume (m <sup>3</sup> )
1	2013-14	Construction of link road from Bohlion to Haripur via Nalka Samalka road upto village Nalka	FP/HP/ROA D/ 8013/2014	31.07.2020	2.403	0	0
2		Construction of link road from Khajurna to Malonwala road	FP/HP/ROA D/ 8014/2014	15.09.2021	0.624	0	0
3		Construction of link road from village Surla to Bakarla km. 0/0 to 5/0	FP/HP/ROA D/ 7738/2014	20.09.2021	3.979	394	126.733
4		Construction of link road from village Bheron to Adi Badri	FP/HP/ROA D/ 7449/201	10.10.2017	4.765	80	61.766

5	2015-16	Construction of link road from Upper Surla km.	FP/HP/ROA D/ 9676/2015	27.07.2020	1.275	91	25.83
6	2015-16	Construction of link road from Thana Kasoga to Trimali Dayar road km. 0/0 to 15/200	FP/HP/ROA D/ 9738/2015	13.08.2020	1.659	0	0
7		LILO of existing 400kV Double Circuit Karcham Wangtoo- Abdullapur Transmission Line near Kala Amb (HP)	FP/HP/TRA NS/ 14566/2015	21.12.2016	4.094	110	11.897
8		Providing LWSS to Nahan Town (From Giri River at Dadahu) in Tehsil Nahan	FP/HP/WATER/16701/2015	23.05.2016	2.4126	215	34.38
9	2016-17	Construction of link road to village Pudla from Banog Surla road km. 0/0 to 3/705	FP/HP/ROA D/ 19486/2016	27.07.2020	2.538	303	110.067
10	2017-18	Construction of link road from Jabbal kanoti to Surla Amta road km. 0/0 to 3/705	FP/HP/ROA D/ 25369/2017	08.05.2020	2.676	497	122.9114

11		Construction of link road from Jhainthal Ghat to Dhandor road km. 0/0 to 8/655	FP/HP/ROA D/ 25365/2017	09.03.2020	2.952	256	50.4207
12	2018-19	Construction of link road from Nahan to Gadda upto vill Kotri km. 0/0 to 3/130	FP/HP/ROA D/ 25378/2017	04.08.2021	2.304	303	110.067
13		C/o 220/132 kV ,2x160/200 MVA Substation at Andheri (Kala Amb), Distt. Sirmour H.P.	FP/HP/Sub-Station/3753 4/ 2018	02.01.2020	5.494	208	79.683
14	2019-20	C/o Hospital Block of Dr. YSPGMC, Nahan, Distt. Sirmaur, H.P.	FP/HP/DISP/ 43462/2019	25.01.2021	0.8514	58	33.587
15	2021-22	CONSTRUCTION OF 180.00 METRE SPAN BOWSTRING BRIDGE ON MARKANDA AT RD. 64/630 ON NH-72(NEW NH-07)	FP/HP/ROA D/ 140739/2021	28.10.2021	0.1953	0	0
<b>Grand Total</b>					<b>38.2223 Ha</b>	<b>2515</b>	<b>767.067 m<sup>3</sup></b>

**Table 7.3 Abstract of Land Use Change under FRA w.e.f. 2013-14 to 2022-23.**

<b>Sr. No</b>	<b>Year</b>	<b>Name of proposal</b>	<b>Date of Final approval</b>	<b>Total area diverted (in ha.)</b>	<b>Total Nos tress handed over HPSFDC</b>	<b>Volume (m<sup>3</sup>)</b>
<b>1</b>	<b>2016-17</b>	Construction of link road Salni to Tedi Baroti.	19.12.2016	0.231	13	2.200



2		Construction of link road from Rain Pirgari to Serbadon	27.01.2017	0.504	29	5.804
3		Construction of link road from Tedi Baroti to Trilokpur.	27.01.2017	0.655	48	13.220
4		Construction of link road Sher Resla (Gopita) to Ser Badon	17.3. 2017	0.26	14	8.858
5		Construction of link road from Runja Yonn.	17.03.2017	0.435	25	5.038
6	2017-18	Construction of link Road from Dhaun to Sanoga- Bagrath upto Mandhari Ghat.	22.04.2017	0.804	29	13.976
7		Construction of link Road from Badion to Pudla.	26.04.2017	0.56	40	13.853
8		Construction of link road from Ashram Tapad to Teeb via Katalin.	26.04.2017	0.45	25	14.355
9		Construction of link road from Birla to Dhayali	24.11.2017	0.564	15	8.424
10	2018-19	Construction of Katcah link road from Rama Dhaun road to Village Bhagoor.	02.07.2018	0.521	39	4.638
11		Construction of GPS. Neron.	04.08.2018	0.159	9	2.585
12		Construction of Katcha link road Lawasa Dosarka to Bhong upto Tuind Bhuid.	06.08.2018	0.752	8	3.0367
13		Construction of Katcha link road Shimla Road to village Sarahan johri to village Sarhan.	21.08.2018	0.23	16	1.2054
14		Construction of link road from village Pipal wala to H/O Sh Lalit Kumar, Deepak Kumar etc.G.P. Surla.	12.09.2018	0.193	12	2.303

15		Construction of link road from salani to bankawara.	20.09.2018	0.877	19	7.7508
16		Construction of link road from Kangar Ghoond to Dagjar G.P. Banethi	06.10.2018	0.9765	13	3.1395
17		Construction of link road Bahrog to Bhorli Ghat.	28.12.18	0.875	27	8.566
18		Construction of link road from Kranwali to Thappal Dhanot.	03.01.2019	0.570	13	5.201
19		Construction of link road from Sinduria to Dhar Sanoga.	03.01.2019	0.225	2	0.736
20		Construction of link road from chunjer johri to Kyarta via Aam ka Dhal.	21.02.2019	0.4455	18	2.788
21		Construction of katch link road from Rama Dhaun to halt of Sh. Kamal Dutt & Bhagat Ram.	23.02.2019	0.175	6	3.233
22	2019-20	Construction of Skill Up-Gradation Center Nahan.	30.07.2019	0.318	7	3.214
23		Construction of Community Hall in Ambwala.	05.08 2019	0.112	13	5.900
24		Construction of link road Gusan Kambal to Badal Amta.	06.11.2019	0.225	6	3.214
25		Construction of link road from Sadorghat to Triboni Temple.	25.11.2019	0.915	29	12.448
26		Construction of link road Jamroti to Nagali.	26.11.2019	0.4235	5	1.2495
27		Construction of link road from main road vill. Pila Khil to Pachhighat.	03.02.2020	0.597	9	2.004
28		Construction of link road from Bheraghat to Gaonth.	03.02.2020	0.994	26	7.8142

29	2021-22	Construction of Industrial Training Institute Kaulanwala Bhood.	23.04.2021	0.960	28	21.115
30	2022-23	C/o Link Road from Amb ka Dhal to Dhandoli, Bajyun & Patahar	10.08.2022	0.368	28	3.808
31		C/o Link Road from Nauni Johdidhar to Ganodi Near H/o Upender Singh	15.07.2022	0.389	24	3.3739
32		C/o Link Road from Dakyon to Shirgul Mandir	13.10.2022	0.343	16	6.2432
33		C/o Link Road from Kundli to Najrani	10.10.2022	0.255	13	3.544
34		C/o Link Road from Dagrahan to Amba	13.10.2022	0.16	5	1.6183
35		C/o Link Road from Katal to Mandlahan	14.10.2022	0.897	49	6.4463
36		C/o of Link Road from main Road (Sihard Ghat) to Dagana Gram Panchyat	28.02.2023	0.14	20	3.6372
37		Construction of Link Road from Aam ka Dhal to kanoti	27.02.2023	0.1368	03	0.552
38		Construction of Link Road Chakli to SC Basti Thudkyarkhdi	22.03.2023	0.207	15	3.696
39		Construction of Link Road from Panchayat Ghar Kayari to Amta Katal	28.02.2023	0.385	15	5.799
40		Construction of Link Road from Ladu to Gillat	27.02.2022	0.29	14	1.205
41		Construction of Road from Shimla main road to Baga	27.02.2023	0.3185	25	4.938
42		Construction of Link Road Dagrahan to Sehyat.	04.03.2023	0.192	26	2.1168
43		Construction of Link Road from NH Chabahan to Shillar	28.02.2023	0.788	06	0.978

44		Construction of Link Road from Kundli Najrani to Suin Pudla via Shamshan Ghat	04.03.2023	0.418	05	0.914
			<b>Total</b>	<b>20.2938 Ha</b>	<b>807</b>	<b>236.738 m<sup>3</sup></b>

## 7.2 RECORDED REMOVAL OF FUEL WOOD

The locals have been granted rights and concessions as per the Settlement report for collection of dry fallen fuelwood for bonafide use. However, no such record is maintained. The use of fuelwood for cooking has also reduced due to popular Government schemes like Pradhan Mantri Ujjwala Yojana.

Fuel wood is one of the daily needs of inhabitants for cooking. However In the recent past, electricity and cooking gas are made available in these areas still, inhabitants have to rely on the woody species from the forests to meet their fuel demand, particularly during winter. The households in the villages use multiple sources of household energy including LPG, fuelwood, electricity, solar energy, and dried animal dung. Due to the power cuts during winter and erratic supply and high cost of LPG cylinders, village households still use fuelwood. In the areas where electricity was available, electric heaters were occasionally used. The women are the primary collector of the fuelwood and fodder from the forest area.

## 7.3 RECORDED REMOVAL OF LOCALLY IMPORTANT NTFPS INCLUDING MAPS

The right holders have the right to collect NTFPs/ minor forest products for their own use as well as for sale as per settlement record.

Several Non-Timber Forest Products (NTFPs) can be found in the Nahan Forest Division includes:

- 1. Medicinal Plants:** The Nahan Forest Division is home to a variety of medicinal plants. These plants have traditional medicinal properties and are used in Ayurveda and other traditional healthcare systems. Some examples include Aloe vera, Amla (*Indian gooseberry*), and Bael (*Aegle marmelos*).
- 2. Wild Edibles:** The forests in the Nahan Forest Division offer a range of wild edibles. These include various fruits, nuts, and tubers. Examples include wild berries, mushrooms, chestnuts, and bamboo shoots.
- 3. Honey:** The forest division has a significant population of bees that produce honey. Beekeeping and honey extraction are common practices in the region. The honey collected from the forests is often of high quality and has unique flavors based on the floral sources.

**4. Resins and Gums:** Certain trees in the Nahan Forest Division produce resins and gums with commercial value. For example, Chir (*Pinus roxburghii*) produces resin that is used in the production of varnishes, paints, and incense.

**5. Bamboo and Cane:** The forest division has a considerable bamboo and cane population. Bamboo is used for various purposes such as construction, furniture-making, handicrafts, and paper production. Cane is utilized for making baskets, furniture, and other handicrafts.

**6. Fodder and Grazing Resources:** The forest division provides grazing resources for livestock. Livestock owners rely on the forest area for fodder, including grasses, leaves, and other vegetation.

It is also important to note that sustainable harvesting practices should be followed when collecting NTFPs to ensure the conservation of these resources and the maintenance of ecological balance in the forest ecosystem. Their extraction being minimal in the division, no record of NTFP harvest is maintained in the division.

### **Measures for Sustainable Management of Non-timber Forest Products (NTFPs)**

Sustainable management of non-timber forest products (NTFPs) is essential for the conservation of biodiversity, the well-being of local communities, and the long-term viability of forest ecosystems. Nahan Forest Division, known for its rich biodiversity and diverse range of NTFPs, as shown above, requires careful planning and effective management strategies to ensure the sustainable utilization of these resources. Here are some recommendations for the sustainable management of NTFPs in this Forest Division:

**1. Resource Assessment and Monitoring:** Conduct a comprehensive assessment of NTFPs in the forest division to identify the species, abundance, and distribution of various products. Regular monitoring should be carried out to understand the ecological impacts of harvesting and ensure that extraction rates do not exceed sustainable levels.

**2. Establish Sustainable Harvesting Practices:** Develop guidelines for sustainable harvesting practices that take into account the life cycles and regeneration capacities of NTFP species. This includes setting quotas, defining harvesting seasons, and promoting selective extraction methods to minimize damage to the forest ecosystem.

**3. Strengthen Community Engagement:** Involve local communities, indigenous groups, and relevant stakeholders in decision-making processes related to NTFP management. Promote community-based forest management initiatives that empower local communities to participate in sustainable harvesting, value addition, and marketing of NTFPs. This can help ensure equitable benefits and enhance local livelihoods.

**4. Enhance Livelihood Opportunities:** Support the development of alternative livelihood opportunities for communities dependent on NTFPs. This can include promoting sustainable agro forestry practices, ecotourism initiatives, or facilitating skill development programs for value addition and marketing of NTFPs. Diversifying income sources can reduce pressure on NTFP extraction and contribute to sustainable forest management.

**5. Strengthen Legal and Regulatory Frameworks:** Review and update existing policies, laws, and regulations related to NTFP management to ensure their alignment with sustainable practices. Strengthen enforcement mechanisms to deter illegal harvesting and trade of NTFPs. Encourage the participation of forest department personnel, local authorities, and law enforcement agencies in implementing and monitoring regulations.

**6. Promote Research and Knowledge Exchange:** Invest in research and studies to understand the ecological, economic, and social aspects of NTFPs in the Nahan Forest Division. This can help identify new species with commercial potential, improve processing techniques, and explore market opportunities. Foster collaboration and knowledge exchange between researchers, practitioners, and local communities to promote sustainable NTFP management practices.

**7. Raise Awareness and Education:** Conduct awareness campaigns to educate local communities, forest users, and visitors about the importance of sustainable NTFP management. Promote the conservation of endangered species and discourage the extraction of vulnerable or threatened plants. Encourage responsible tourism practices that respect the ecosystem and support sustainable NTFP-based livelihoods.

**8. Collaboration and Partnerships:** Foster partnerships between government agencies, non-governmental organizations, research institutions, and local communities to promote sustainable NTFP management. Collaborative efforts can enhance knowledge sharing, capacity building, and resource mobilization, leading to more effective conservation and sustainable use of NTFPs.

By implementing these, Nahan Forest Division can achieve a balance between the conservation of its biodiversity and the sustainable utilization of NTFPs. This will not only safeguard the ecosystem services provided by the forests but also support the well-being and livelihoods of local communities for generations to come.

## **7.4 REMOVAL OF FODDER**

The removal of fodder from the forests is a common practice as it provides a vital source of nutrition for livestock. Livestock owners, particularly those residing in nearby villages and communities, often depend on the forest areas for fodder collection. Fodder includes various

types of grasses, leaves, and other plant material that serve as feed for domesticated animals. However no such data is maintained in division.

### **7.5 DEMAND AND SUPPLY OF TIMBER AND IMPORTANT NON-TIMBER FOREST PRODUCTS:**

Local timber market is established. Khair is traded for its heartwood. A local katha factory in Trilokpur Range has demand for Khair wood. It also imports timber from other states.

Road network being extensive, timber and non-timber products are traded far and wide. The rates of timber have increased manifold in the past decade due to increased demand and inadequate availability of timber

#### **1. Detail of Katha factories registered in Nahan Forest Division -:**

<b>Sr. No</b>	<b>NAME &amp; ADDRESS</b>	<b>RANGE</b>
1	Sagar Katha Udyog Village Johron P.O Kala-Amb Tehsil Nahan District Sirmour H.P	Trilokpur

#### **2. Number of Saw mills and depots registered under Himachal Pradesh (Sale of Timber Act, 1968)**

<b>Sr. No</b>	<b>Name of Range</b>	<b>Total No. Of Saw Mills</b>
1	Nahan	11
2	Kolar	6
3	Jamta	0
4	Trilokpur	3
	<b>Total</b>	<b>20</b>

#### **3. Number of Imported Sale Depots Registered Under H.P (Sale of Timber Act, 1968)**

<b>Sr. No</b>	<b>Name of Range</b>	<b>Total No. Of Imported Sale Depots</b>
1	Nahan	3
2	Kolar	0
3	Jamta	1
4	Trilokpur	0
	<b>Total</b>	<b>4</b>

#### 4. Number of Furniture Shops Registered

<b>Sr. No</b>	<b>Name of Range</b>	<b>Total No. Of Furniture Workshops</b>
1	Nahan	19
2	Kolar	4
3	Jamta	1
4	Trilokpur	1
	<b>Total</b>	<b>25</b>



## CHAPTER -8

### MAINTENANCE & ENHANCEMENT OF SOCIAL, ECONOMIC, CULTURAL AND SPIRITUAL BENEFITS

#### 8.1 NUMBER OF JFM COMMITTEES AND AREAS PROTECTED BY THEM

The state government issued the first JFM Notification in 12.05.1993 for the constitution of Village Forest Development Committees (VFDCs). In 2001, Himachal Pradesh Participatory Forest Management Rules were issued for registration of Village Forest Development Societies (VFDSs) under the Societies Registration Act, 1860. From 2002-03 onwards, JFMCs were constituted and federated into FDAs (Forest Development Agencies) at the Forest Division level. The JFMCs are registered with HPFD as per the provisions of the NAP (National afforestation programme) guidelines, whereas FDAs are registered as Societies. The SFDA was established in 2010 in accordance with the central guidelines. Their duties and responsibilities include forest protection and conservation, preparation and consultation on plans for the development of the respective areas and benefits (forest resources, NTFPs, grazing rights, etc.) sharing with the people.

**Table 8.1 - List of Joint Forest Committee/Village Forest Committee**

Sr. No.	Year	Name of Scheme	Name of Range	Name of JFMC
1	2008-09	N.B.M.	Nahan	Mohilia Jamnawala
2			Kolar	Devwla Mehtawla
3				Jamnighat
4				Kandaiwala
5	2009-10	Fire Protection	Trilokpur	JFMC Mai
6				Burmapari
7				Trilokpour
8				Devkapurla
9				Surla
10				Kiary
11				Kaulawala Bohood
12				Pallion
13				Kundla
14				Churan
15				Neron
16				Gumti
17			Kolar	Kolar

18				Haripurkhol
19				Shambhalka
20				Logarh
21				Bheron
22			Jamta	Banethi
23				Sen-Ki-Ser
24				NAuni
25				Chakli Shiyar
26	2010-11	NMPB	Trilokpur	Kandaiwala
27			Nahan	JMFC Jamanwala
28			Kolar	JMFC Matter Bheron
29			Jamta	JMFC Nauni
30	2010-11	F.D.A.	Kolar	JMFC Jheel Bankabara
31				JMFC Bheron
32				JMFC Shambhalka
33				JMFC Lohgarh
34			Nahan	Rama-II
35				Satiwala
36				Uttamwala
37	2011-12		Nahan	JMFC Bikrambag
38			Jamta	JMFC Sen Ki Ser
39			Trilokpur	JMFC Jheera
40			Kolar	JMFC Sambhalka
41				JMFC Bheron
42	2012-13	SHG	Jamta	Mahila Swayam Sahayta Samuh, Nauni
43	2016-17	NMPB	Nahan	JMFC Meerpur Kotla

## 8.2 STATUS OF EMPOWERMENT OF JFMCS

To ensure cooperation from fringe communities, the panchayats of nearby villages are motivated to form Self-help/Volunteer Groups to reduce the pressure on the forests and to make the process of natural regeneration sustainable. To enhance the income of the local people, alternative

sources of income in the vicinity of forests are of vital importance. These self-help groups motivate the poor people for generating additional income through activities like poultry, rope making, basket making, toy making, etc. to decrease the pressure on the forests. Whenever labor is needed it is preferred from the nearby villages. The Panchayats are motivated to keep the people well aware to conserve the forests.

JFM guidelines cover and regulate the constitution of FPCs and management committees, their duties and responsibilities towards forest protection and conservation, preparation of micro plans for the development of the respective areas, and benefits sharing with the people. The involvement of VAs has also been specified for carrying out afforestation and ancillary works that are not intended to be carried out by FPCs. The FPCs are entitled to usufruct and non-timber forest produce (NTFP), rights in the assigned areas provided these FPCs discharge their duties and responsibilities as per the regulations contained in JFM guidelines. In the case of NTFP, FPCs are entitled to collection/ removal of grasses, fruits, palm leaves, etc. and lease of commercial NTFP.

The guidelines confer half of the income generated/ obtained by FPCs through sale/ revenue of forest produce will be ploughed back by FPCs into the JFM areas by investing this amount in conservation, protection, and regeneration of forests. The balance is to be utilized for other development and welfare activities for the common benefit of the FPC members or in the form of direct distribution of appropriate share among its members.

In addition to the above, JFM provides for carrying out entry point activities/ development activities in the JFM areas to establish close and constructive support with the village committees. These development activities include improvement of school/panchayat buildings, repairs of traditional water resources like baulis, village ponds, etc. provision of training to women, landless, and SCs to help them earn their livelihood through income generation activities like basket weaving, rope making, beekeeping, etc. However none of the JFMC is active as of now in the Nahan forest division ,efforts will be made in current plan to revive them.

### **8.3 LABOR WELFARE**

All wages paid to labor are based on notified wage rates by Himachal Forest Department from time to time. The JFMC members, fringe forest dwellers are employed in all forestry related works both inside and outside RF area. Works include plantations, nursery maintenance, soil and moisture conservation works etc. Forest Villagers should be engaged in all forestry and non-forestry operations of Forest Department.

It is also to be highlighted that the departmental rates for daily wage as per state policy are also maintained in a seniority list which is taken into account during regularization of services of a daily wage employee, making the labour scenario in forest department very conducive to work in.

#### **8.4 USE OF INDIGENOUS KNOWLEDGE**

Forests have a rich source of traditional knowledge. However there is no proper record keeping of these practices although these practices are still prevalent. In this regards it is recommended that in every FIELD BOOK maintained by Forest guards there has to be a mention of the indigenous practices vis-à-vis forestry that will be tabulated at Division level at the end of each year. The earmarking of retail outlets selling such indigenous products should be done in field books. Lastly local bodies should be encouraged to form bio diversity management committee so that their traditional knowledge products can be protected from external markets forces.

#### **8.5 EXTENT OF CULTURAL/SACRED GROVES**

There are no documented reports of the presence of any sacred grove in the Division's forests. However, Maharishi Markandey temples in Nahan Forest Division falling within reserved forest have a high spiritual value among local people, therefore the forests nearby hold cultural and sacred importance. During the tenure of this Working Plan, the exact extent of cultural/sacred groves will be identified and systematically documented.

#### **8.6 ECOTOURISM AREAS AND ACTIVITIES**

Himachal Pradesh Forest Department formulated the Eco-tourism Policy in 2001 which was subsequently revised in 2005. All the three forest rest houses of Nahan Division are under ecotourism society for online booking. A nature park in Kangniwala beat has been recently opened to support tourism and aware tourists about the local flora and fauna. Beautification of Mantra Mata track under NMNR scheme is also being done.

There are many areas that have ecotourism potential in the division based on the natural attributes viz. landscape, waterscape, wildlife and also unique cultures, practices and traditions. Such places will be developed by the division to promote tourism from sustainable point of view during the tenure of this working plan. For example: Cycling track from Banethi to Jamta.

Eco-tourism is helpful in bringing proximity between citizens and nature. There is huge potential of eco-tourism in this tract for which people may be encouraged to explore so that they also contribute towards conservation of forests. Therefore facilities for eco-tourism which blend with

the environment can be constructed. Walking trails, camping sites & Gazebos with requisite facilities for eco-tourists can be developed in suitable areas.

### **8.7 STATUS OF COMPLIANCE OF FOREST RIGHTS ACT (FRA)**

The Scheduled Tribes and other Traditional Forest Dwellers (Recognition of Forests) Act, 2006 also known as the Forest Rights Act (FRA) recognizes the 'rights' of the forest dwellers (mainly scheduled tribes) to access and use the forest and its resources by providing legal sanctity to their rights. The act also vests responsibility to these communities to sustainably use, conserve and manage the forest resources and contribute towards strengthening the conservation of these vital natural resources. Table 7.3 of previous chapter provides the detail of FRA cases sanctioned for development activities.

### **8.8 OTHER RIGHTS AND CONCESSIONS**

All forests (except Shamlat areas) in Nahan Forest Division are Reserved Forests. Some concessions are incorporated in the settlement report “FAISLA-E-JANGLAT” later notified by Himachal Pradesh Govt. Notification No. Ft43-241B/49-3 dated Feb.25-1952. The following rights have been included:

Grazing of cattle and other domestic animals, lopping of miscellaneous tree species for fodder, salvage timber trees for house construction & cowsheds, dry fallen fuelwood for bonafide use, approach to drinking water sources for human being and cattle, and collection of dry wood for cremation.

## CHAPTER -9

### ADEQUACY OF POLICY, LEGAL & INDUSTRIAL FRAMEWORK

#### 9.1 EXISTING POLICY AND LEGAL FRAMEWORK & THEIR COMPLIANCE

The National Forest Policy, 1988, guides the management of forests in India. The main principles of the policy are forest conservation and management of forests through the participation of people, for the welfare of the people leaving behind the revenue.

Legal protection is provided to the forests through various acts and regulations. The Forest (Conservation) Act, 1980 is being implemented in the State. Similarly, Wildlife (Protection) Act, 1972 is being implemented in the state. The Indian Forest Act, 1927 was adopted in the state before independence. The Act provides the procedure for declaration of protected and reserved forests and also control over forests, timber and other forest produce. It also lays down the penalties and procedure for contravention of the Act and gives certain powers to the forest officers to deal with the situations while implementing the Act.

The Indian Forest (Himachal Pradesh Second Amendment) Act, 1991 has enhanced the punishments under Section 26, 33 and 42 to two years of imprisonment or fine which may extend to five thousand rupees or both. It also prescribes procedure for confiscation of seized property under Section 52.

The saw mills are registered under the provisions of River Rules, 1971 and Sale of Timber Rules, 1969 to regulate wood based industries in the state.

Recently with the advent of Environmentalism NGT has passed various order with respect to Himachal forest dept and timely compliance is being done with that as well.

However as far as adequacy of the legislation is concerned there is ample scope for further addition to make forest governance more effective like synergy between forest and environment vis a vis district level, Dedicated Armed personnel with field staff specially in encroachment drives , increase in compensation rates in consonance with inflation.

#### 9.2 STATUS OF APPROVED WORKING PLAN AND COMPLIANCE

**Table 9.1 The prescriptions and their compliance of last working plan area (Vineet Kumar)**

Status of Prescriptions and their Compliance			
Sr. No.	Prescription	Working Circle	Status
1	Closure for grazing	All circles	Not strictly implemented
2	Soil and water conservation measures	All Circles	Carried out under the NPV and CAMPA and general head.

3	Felling programme	All Territorial Working Circles excluding PCR W.C	Felling could not be done in accordance with the prescriptions due to ban on felling of green trees. Only salvage extraction of the dead and dry trees was allowed and such extraction was mainly done through HPSFDCL.
4	Active participation of Forest Protection Committees	All circles	Efforts have been made to develop JFMC in previous working plans.
5	Construction of new buildings	Misc-regulation	Buildings are constructed under NPV and general state head budget.

### 9.3 NUMBER OF FOREST OFFENCES

The forest offences commonly committed in the forests include illicit felling of trees, lopping of trees for fodder and for fuel wood without grant of permission, grazing of animals in the forests areas, Encroachment of forest land, etc.

**Table 9.2 - Status of offence cases under IFA**

Sr. No.	Year	No. of Cases Detected	Compensation Amount (Rs.)
1	2017-18	330	Rs. 1773285
2	2018-19	157	Rs. 347542
3	2019-20	159	Rs. 1264167
4	2020-21	265	Rs. 1025128
5	2021-22	265	Rs. 1411576
6	2022-23	260	Rs. 1106223
	<b>Total</b>	<b>1436</b>	<b>Rs. 6927921</b>

**Table 9.3 - Status of offences under IFA for grazing**

Sr. No.	Year	No. of Damage Reports Issued for Grazing	Amount (Rs)
1	2017-18	10	Rs. 16500
2	2018-19	21	Rs. 26400
3	2019-20	15	Rs. 20400
4	2020-21	16	Rs. 14760
5	2021-22	10	Rs. 11920
6	2022-23	17	Rs. 9810
	<b>Total</b>	<b>89</b>	<b>Rs. 99790</b>

## 9.4 STATUS OF RESEARCH AND DEVELOPMENT

There is a need to establish research plots in forest to develop germplasm bank of different species, to suggest better productivity of these forests in different sites with different soil and weather conditions and also to afforest the badly affected areas. Positive efforts have been made on this front in planting species on experimental basis.

Research Institutions like the Forest Research Institute Dehradun, the Y.S. Parmar University of Horticulture and Forestry may be invited for conducting research and development activities in forest domain.

## 9.5 HUMAN RESOURCE CAPACITY BUILDING EFFORTS

For human resource development on a sustainable basis, importance of regular training of staff at all levels cannot be overemphasized. The Forest training institute at Chail is equipped with modern training tools and teaching aids to impart training to staff members. In the past years, special training have been imparted to the field staff on diverse subjects such as uses of GPS, forest fire protection, root trainer technology, disease and pest control management, protection of germplasm and biodiversity. Refresher courses for the frontline staff are also conducted under State and centrally sponsored schemes.

## 9.6 FOREST RESOURCE ACCOUNTING

Tangible benefits from forest are timber, NTFPs, fuelwood, fodder, livelihood, ecotourism, biodiversity, etc. The non-tangible benefits of forests are carbon sequestration, soil erosion control, water recycling, oxygen production, control of air pollution, animal habitat, etc. During the tenure of this Working Plan positive efforts will be made to quantify intangible benefits.

## 9.7 BUDGETARY ALLOCATIONS TO THE FORESTRY SECTOR

The budgetary allocations to the forestry sector have traditionally been at the low level as compared to agriculture, irrigation and rural development departments.

The budget accounts can be subdivided into State plan, state un-planned.

**Table 9.4 - Overall Past Revenue and Expenditure-Nahan Division**

Sr. No.	Year	Non Plan		Plan	
		Allotment	Expeniture	Allotment	Expeniture
1	2016-17	Rs. 75385100	Rs. 75385073	Rs. 8577300	Rs. 8577300
2	2017-18	Rs. 81829500	Rs. 81829334	Rs. 8672390	Rs. 8272390
3	2018-19	Rs. 100421600	Rs. 79230071	Rs. 17500045	Rs. 16509195



4	2019-20	Rs. 91109800	Rs. 86729989	Rs. 37470244	Rs. 26508106
5	2020-21	Rs. 118193557	Rs. 112811542	Rs. 16151752	Rs. 14394734
6	2021-22	Rs. 132429683	Rs. 112864172	Rs. 3057288	Rs. 2894388
7	2022-23	Rs. 130056302	Rs. 127200519	Rs. 5134769	Rs. 4794749

## 9.8 EXISTENCE OF MONITORING, ASSESSMENT & REPORTING MECHANISM

For monitoring of works under different schemes, the department has a cell under the control of Chief Conservator of Forests Monitoring and Evaluation, who has support of the Conservator of Forests and Divisional Forest Officer and their officials to perform the fieldwork. An instruction manual for monitoring and evaluation of plantations, salvage checking, soil & water conservation works, nurseries and other field works has been issued vide Technical order No. 01/2018 dated 24-03-2018 by Pr. Chief Conservator of Forest (HoFF) HP. The external monitoring of works can be given to the Forest Research Institute, Dehradun which carries out the work as per the guidelines of the Government of India.

## 9.9 PUBLIC AWARENESS & EDUCATION

Publicity and extension education are an important part of the Forest Department. At present, one Division based at Shimla is providing extension services to the people. Forest education and awareness is provided through distribution of literature in the form of posters, pamphlets, manuals and handouts on forest laws to the public. Awareness regarding Conservation of Environment and forest is provided to the people during public gatherings at local fairs, and Van Mahotsav Wildlife week, World Environment Day, World Biodiversity Day and Earth Day. Awareness meeting are also conducted in context of forest fires, water conservation, forest protection, handling human-animal conflicts related to monkeys, elephants, leopards etc.

## 9.10 ADEQUATE MANPOWER IN FOREST DIVISION

In general, adequate manpower is available to manage the forests. Against all the sanctioned posts, there are some vacancies as shown below:->.

**Table 9.5- Statement showing cadre and position of divisional forest office Nahan -2023-24**

S.No.	Name of Post	Posts sanctioned (No.)	Existing (No.)	Vacant (No.)
1	DCF	01	01	0
2	ACF	01	00	-1
3	Supdt. Gr.II	01	01	0
4	Sr.Asstt.	03	01	-2

5	Clerk/Jr.Asstt	06	04	-2
6	Kanungo	01	0	-1
7	Naib Tehsildar	01	0	-1
8	Forest Ranger	05	04	-1
9	Deputy Ranger	22	17	-5
10	Forest Guard	91	79	-12
11	Junior Engineer	01	00	-1
12	Patwari	00	00	0
13	Peon/Khalasi	10	08+1 daily wage	-1
14	Dak Runner	02	00	-2
15	Driver	01	00	-1
16	Chowkidar	15	10+2 daily wage	-3
17	Mali	05	05	0
18	Forest Worker	75	31	-44
19	Sweeper	00	01	+1
20	Mali-cum-plantation worker	00	02	+2
21	Mali-cum-nursery worker	00	02	+2
22	Chowkidar-cum-cook	00	01	+1
23	MPW	02	02	0
	<b>Total</b>	<b>243</b>	<b>172</b>	<b>71</b>

Fire watchers on seasonal basis are engaged by Nahan forest division for protection of forests from fire incidents as per rates notified by the state Govt. time to time.

## **CHAPTER 10**

### **FIVE YEAR PLANS**

#### **10.1 INTRODUCTION**

The economy of India since independence till the year 2014 has been based on planning through its five-year plans, which were developed, executed and monitored by the Planning Commission of India. Planning in India derives its objectives and social premises from the Directive Principles of State Policy enshrined in the Constitution of India, Article 38 and Article 39 (a), (b) and (c) are cited in the resolution of 15<sup>th</sup> March, 1950 by which the Planning Commission was setup. These are: -

“The State shall strive to promote the welfare of the people by securing and protecting, as effectively as it may a social order in which justice, social, economic and political, shall inform all the institutions of natural life” (Article 38 of Constitution)

The State shall in particular, direct its policy towards securing: -

- a) That the citizens, man and women, equally, have the rights to an adequate means of livelihood,
- b) That the ownership and control of the material resources of the community are so distributed as best to sub-serve the common good.
- c) That the operation of economic system does not result in the concentration, if wealth, and means of production to the common detriment.

The national planning process was started in 1951 in India with the formulation of First Five Year Plan. The first three five year plans laid thrust on the promotion of agriculture and industrialization, environment-related issues pertaining to the improvement of human environment such as sanitation, public health, nutrition, water supply and housing got due priority in national programmes under the three five-year plans. However, environment protection did not receive significant recognition under the development planning.

The brief description of the Working Plans implemented in the Division during the respective Five-Year Plans of Indian economic planning is given as under: -

**10.2 First Five Year Plan (1951-56):** - The First Five Year Plan showed maximum concern about rehabilitation of forest areas, which had been over exploited to meet the Second World War needs. Little efforts were made to help stabilize soil in highly eroded areas through Afforestation. In response to the Forest Policy of 1952, the Central Board of Forestry, constituted in 1950 to provide guidance to the Central Government in the formulation of policy and

programmes in the field of forestry. The wastage in conversion and felling of trees was minimized. Besides, manmade forests of economic species were raised.

After the merger of states in 1949, the forests were densely stocked and exploited commercially. By enlarging the scope of 1894 forest policy, the new National Forest Policy which was formulated in 1952 i.e. during First Five Year Plan, the forests of this division were also managed as per the prescription of the Working Plan. In this Division, **Sewal's Working Plan (1933-34 to 1952-53, and Sharma & Tikku's Working Plan 1953-54 to 1962-1963)** fall in the first five-year plan. Under Sewal's Working Plan the main objects of management were to

- Preserve, improve and extend the existing Sal, Chil and miscellaneous forests.
- Satisfy the demands of local population in respect to forest produce.
- Ensure sustained annual yield to and attain the normal forest and establish normal re-generation.
- Maintain and improve the forest cover along the slopes adjoining the Giri and on the bare outer hills of the Shiwaliks which are particularly liable to erosion.

Keeping in view the large-scale import of food grains and inflationary pressures on the economy, the First Five Year Plan (1951-56) accorded the highest priority to agricultural including irrigation etc. rather than forestry operation. However, the country adopted a national festival of tree planting 'Van Mahotsava', in 1950 which was started with the objective of creating mass awareness about the value of forests in human well-being. At the same time, the drawback of the Forest Policy of 1894 necessitated a fresh look at the forest policy. The earlier forest policy was revised in 1952 and a new National Forest Policy was formulated. The main objectives of the policy were: -

- a) Cover one-third of total geographical area with forests, 60% in hilly regions and 20% in the plains.
- b) Functional classification of forests viz, "Protection Forests, National Forests and Village Forests.
- c) Guarding National interests on top priority basis.
- d) Curbing indiscriminate extension of agriculture.

It is interesting to note that Forest Policy of 1952 retained the concept of 'reserved forests' which was enunciated under the earlier Forest Policy of 1894 and placed them under the exclusive control of State Government. Although, the policy accepted the category of "Village

Forests” to serve the needs of people in surrounding villages, but it did not grant them the right to manage these forests.

### **10.3 Second Five Year Plan (1956-57 to 1960-61): -**

The Second Five Year Plan laid stress to rebuild rural India, built the foundations of industrial progress, and aimed to secure to the greatest extent feasible opportunities for weaker and under-privileged sections of our people and the balanced development of all parts of the country. Both the First and Second Plan put considerable emphasis on preservation processes, improvement of communication, rehabilitation of degraded forests, establishment of new plantations, especially of fast-growing species, application of modern systems of intensive forest management, improvement of inferior varieties by seasoning and preservation processes, and introduction of modern techniques. Large tracts of degraded forests situated in the former Zamindari estates and princely States came under Government control. Schemes for the demarcation of such areas and preparation of maps were taken up.

During this period two working plans viz, **Sharma and Tikku’s Working Plan (1953-54 to 1962-1963)** was being implemented in this Division. The objects of management set forth were the same as envisaged in **Sewal’s Plan**. Demarcation of forests was carried out and the old iron pillars were replaced by masonry boundary pillars. But the entire work of demarcation and construction of boundary pillars was not completed. During this period quite a large number of useful buildings, roads and paths were constructed.

### **10.4 Third Five Year Plan (1961-62 to 1965-66): -**

The Third Five Year Plan aimed to give a more precise content to the social objectives of the Constitution. It takes account of the successes and failures in the first two Plans and sets the tasks to be fulfilled in the perspective of development over the next fifteen years and more. The plan incorporated the development of forest resources as an integral part of the programme for optimum land utilization. During this period, **Sharma and Tikku’s Working Plan** was implemented one year and for rest of the period of the five-year plan i.e. from 1963-1964 to 1965-1966 the felling programme were framed by the **Conservator of Forests, Nahan** and approved by the Chief Conservator of Forests, Himachal Pradesh. Allotment remained the same as in Sharma and Tikku’s Working Plan. The prescription was also the same. During this five-year plan lot of emphasis was laid on industrial plantations. Under this programme, a total area of 2163 ha. in Sal belt (Nahan & Paonta Sahib combined) and in the miscellaneous forests (leaving some standards) was felled. These areas were further planted with *Eucalyptus tereticornis*.

Grazing policies remained unimplemented and increasing cattle population continued to affect forestry's conservation principles. By and large, forests were accorded low priority in the States on account of other needs of more immediate concern. The indiscriminate use of forest land for non-forestry purposes increased considerably.

#### **10.5 Fourth Five Year Plan (1969-70 to 1973-74): -**

The main objectives of the Fourth Plan in forestry sector were: -

- (i) To increase the productivity of the forests,
- (ii) To link up forest development with various forest-based industries
- (iii) To develop forests as a support rural economy. The increase per hectare production per annum of forests in India was estimated at about 0.53 cubic meters as against the world average of 2 cubic meters. Emphasis was laid on measures to meet the immediate and long-term agricultural and industrial requirements, since the demand for various forest products, timber, domestic fuel and raw materials for industries has rapidly increased.

To increase forest production, the Fourth Plan envisaged further efforts at creating large scale plantations of valuable quick-growing species and species of economic and industrial importance. A concerted effort at regenerating areas, where forest produce was removed for industrial uses was taken. The basic principle of Government policy was that the minor forests, pastures and grazing grounds must be managed mainly in the interest of the population of the tract and particularly to serve their requirements of fuel and fodder requirements.

The year 1972 marks a watershed in the history of environment management in India. It was the year in which a conference on Human Environment was held in Stockholm under the aegis of the United Nation. Late Mrs. Indira Gandhi, then Prime Minister, addressed the conference wherein she attracted the attention of the world community towards our peculiar environmental problems. Pointing out the causes of environmental degradation, she asserted that 'poverty and need' are the biggest polluters. She added that "the environmental problems of developing countries are not the side effects of excessive industrialization, but reflect the inadequacy of development. The rich countries may look upon development as a cause of environmental destruction, but to us it is one of the primary means of improving the environment for living or providing food, water, sanitation and shelter, of making the desert green and the mountain habitable".

In 1972, a comprehensive national law, the Wild Life (Protection) Act, 1972 was enacted intended solely to protect wild life. A Centrally sponsored scheme "Project Tiger" was launched in 1973 to ensure maintenance of a viable population of tigers in India for scientific,

economic, aesthetic, cultural and ecological values and to preserve for all times, areas of such biological importance as the national heritage for the benefit, education and enjoyment of the people. During this period also only one Working Plan of **Arya's Working Plan (April 1968-March 1978)** was implemented. The General objects of management were

- to preserve and improve the vegetational cover all over especially on the Shiwaliks,
- to replace the inferior miscellaneous patches with suitable and more economic plantation preferably of fast growing pulp wood species,
- to meet the legitimate and bonafide requirements of the local population, of timber, fuel wood, grazing, fodder and other forest produce and fuel requirement.
- To attain, as far as practicable, normal forest and normal regeneration in due course of time.

Consistent with the above objectives to obtain maximum annual yield in perpetuity (of various forests products including timber fuel-wood, bhabbar grass and bamboo etc.) Arya constituted four Working Circles in respect of Nahar Forest Division namely, Sal conversion Working Circle, Selection Working Circle, Protection Working Circle and Plantation (Over lapping).

#### **10.6 Fifth Five Year Plan (1974-75 to 1978-79): -**

The fifth plan was formulated against the backdrop of severe inflationary pressures. The major objectives of the plan were to achieve self-reliance and adopt measures for raising the consumption standard of people living below the poverty line.

The major objective identified in forestry in the fifth plan was the creation of large scale manmade forests through institutional financing. The plan proposed a network of State Forest Corporations for establishment and management of manmade forests. The birth of Forest Corporation and the economic considerations further pushed the ecological consideration to secondary place. The second important objective of the fifth plan was to develop farm forestry and to improve degraded forests so as to increase the fuel and timber supply in rural areas. Wild Life Protection also was attended during this plan. Programmes for development of national parks, strengthening of research on endangered animals including project tiger were taken during this plan.

The Constitution originally did not make any specific provision to deal with the environment, forest protection and wild life of the country. The Constitutional 42<sup>nd</sup> Amendment is also significant from environmental protection point of view as it was through it that the natural commitment of environment protection and improvement was explicitly incorporated into

our Constitution. The overriding concern for environmental protection with this amendment has now been inserted Articles 48 A and 51 A (g) in the Constitution of India.

The subjects mentioned in the Concurrent List, inter alia, include forests, protection of wild animals and bird's population control and family planning, minor ports, factories and boilers – these were inserted in the Concurrent List by the Constitution (42<sup>nd</sup> Amendment) Act, 1976. Earlier these subjects were found in State List. Thus, during 1970s, the genesis of environment policy and planning in India had taken place.

During this period **Arya's Working Plan (1968-1978)** was in operation. Felling of Sal was conducted for earning revenue for the State's economic prosperity. Proper demarcation exercises in form of laying down of 247 boundary pillars were conducted and there was a massive improvement in the infrastructure as forests roads and quarters for the staff were constructed during this plan period. The HP State Forest Corporation Limited also came into existence w.e.f 25-3-1974, registered under **The Companies Act, 1956**. The timber extraction was gradually transferred to corporation since 1976 onward.

### **10.7 Sixth Five Year Plan (1980-85)**

'Development without destruction' was the theme of the sixth five-year plan, which laid emphasis on the ecological and social security, the major thrust of the plan as regards forest management and protection was saving the natural forests from further depletion, formation of new fuel and fodder reserves to meet the growing needs of local population and creation of more National Parks and Wild Life Sanctuaries.

The sixth five-year plan framework document as approved by the National Development Council States, "It is imperative that we carefully harvest our renewable resources of soil, water, plant and animal life to sustain our economic development. A full chapter on 'Environment and Development' has been included in the sixth plan. This chapter was devoted to the discussion on problem of environmental degradation such as land use, agriculture, forestry, wildlife, water, air, marine environment, minerals, fisheries, renewable resources, energy and human settlement, with a view to evolve sound environmental and ecological principles.

On the basis of Tiwari Committee recommendations, the Govt. of India setup a Department of Environment (DOE) with effect from November 1<sup>st</sup>, 1980, some States namely Karnataka, Uttar Pradesh, Punjab & Madhya Pradesh also established separate department of Environment at the State Level. In 1985, the Department of Environment was replaced by an Integrated Department of Environment, Forest and Wild life. In addition to this, two powerful agencies were created to tackle specific environmental problem; namely, the National Waste



Land Development Board and the Central Ganga Authority, to further improve the implementation of environmental law and policy decisions.

With a view to meeting the basic and economic needs of community, the programme of social forestry initiated in 1981-82 remained continuing. The social forestry programme which inter-alia includes Farm Forestry, Extension Forestry, and Reforestation on degraded forests and Recreation Forestry; those programmes were assisted by several external agencies, including the World Bank, United State Agency for International Development and Overseas Development Agency of United Kingdom. The 20 Point Economic Programme also included Afforestation Social Forestry and Farm Forestry programmes. **Arya's plan** expired during 1977-1978 and for a period of four years, till 1982 prescriptions of Arya's Working Plan were implemented actual removal were much in excess prescribed yield. **B.S. Chauhan's plan** from **1982** to 1992 was then implemented.

#### **10.8 Seventh Five Year Plan (1985-90):-**

The seventh five-year plan was envisaged in the development strategy of generation of productive employment. Given the twin emphasis on employment and productivity in the Seventh Plan, the objective was to expand employment opportunities consistent with increase in productivity. The basic approach to the Seventh Plan was also, sustainable development in harmony with the environment. Towards this end, it would have to be ensured that all development programmes, in all sectors, will take environmental considerations fully into account. Environmental management, a term encompassing environmental planning, protection, monitoring, assessment, research, education, conservation and sustainable use of resources, was now accepted as a major guiding factor for national development in India.

As regards, the policy perspective on forest management, the seventh plan envisaged "Forest for survival" as its theme. The plan, giving highest priority to restore the forest cover with 33% of the geographical area of the country being brought under forests from the present level of about 23%: asserted for preserving biological diversity, increase the vegetal cover by massive Afforestation and development Afforestation into a people's movement (Social Forestry) enhance the productivity of existing forest areas, etc.

The failure of the National Forestry Policy, 1952 particularly inadequate management of forests, negligible efforts made to improve the availability of fuel wood and fodder to forest dwellers which resulted in social conflicts on forest resources use, the short comings of social forestry programme and dwindling forest cover, necessitated a fresh look at the Forest Policy of 1952. The States came under increasing pressure in order to involve people in the protection and

management of forests resources and therefore to re-orient its earlier policies. In **1988, a National Forest Policy** was formulated with principle aim of ensuring environmental stability and maintenance of ecological balance.

Since forestry is a Concurrent List subject, a State forest policy under the ambit of the National Forest Policy was enunciated by the Government of Himachal Pradesh in 1988. Fellings of Eucalyptus and Sal were carried out as per prescription upto 1987-1988, 1986-1987 respectively. Restrictions on green felling were imposed by the state government after 1986-1987. Thus fellings were discontinued and only salvage marking were carried out. No working of Khair was done according to prescription but during 1991-1992 green Khair was felled after taking special approval from the State Government. Thus prescription given in the Working Plan was not followed. The Afforestation programme under the social forestry has failed to achieve its objectives of people's movement for Afforestation due to less public participation in this scheme. During this period **Chauhan's Working Plan (1982-1992)** remained operative in this division.

### **10.9 Eighth Five Year Plan (1992-97)**

The Eighth Plan was aimed to undertake re- examination and reorientation of the role of the Government as well as the process of planning. The plan was to work out the ways and means of involving people in the developmental task and social evolution. The emphasis was to strengthen the people's participatory institutions.

To ensure the protection of natural environment the plan suggests preventive and regulatory strategies. The strategy of prevention involving raising of public awareness, strict enforcement of laws, statutory assessment of environmental impact of projects, and efforts to regenerate the productivity of ecosystem, can be useful in many cases of environmental degradation. Stringent laws, rigorously implemented, through stringent punitive measures and by making an undesirable action expensive for the offender, can prevent environmental destructions. The plan calls for the necessity of statutory environmental impact assessment of all projects and activities before their implementation, as such would prevent environmental degradation by making it obligatory on the part of executing agencies to undertake compensatory measures.

A number of programmes of afforestation were taken up to secure people's participation. Under this scheme, priority was given to: -

- a) Establishment of decentralized nurseries and school nurseries.
- b) Block plantations especially on community land and lands of SC/ST and people living below the poverty line.

- c) Pasture development through people's institutions and involvement, and
- d) Assistance in the implementation of the Tree Patta Schemes.

The scheme of decentralized people's nurseries was initiated in 1986-87 to encourage seedling production by farmers, especially small and marginal farmers to establish small, dispersed nurseries to cater to local needs of planting material and provide income generating activities to the beneficiaries.

An appraisal of the Afforestation schemes undertaken during the plan period has appeared some deficiencies. They have no specific plan of action for meeting fuelwood and fodder requirements except for the continuance of the scheme for rural fuel wood plantation, which does directly address these issues. Under the social forestry programme, the efforts have already been departmental mode. During this period **no functional Working plan** existed in this division, considering the ban on green felling in the State and no working was undertaken in the forest.

#### **10.10 Ninth Five Year Plan (1997-2002)**

The Ninth Five Years' Plan was launched in the 50<sup>th</sup> year of India's Independence, and the aim was to take the country into the new millennium. The emphasis was given to the Integrated Watershed Approach. Since the smallest viable geographical unit is the watershed, it was therefore, imperative that the integrated watershed approach should be followed. The watershed is a geo-hydrological natural unit which has evolved through interaction of rain water with the topography. The measures such as conserving rain water, through treatment of drainage lines in the micro-watersheds and promoting in-situ moisture were proposed. This includes 3-tier appropriate vegetation consisting of grasses, shrubs and trees for fodder, fuel, timber and fruit in a topo sequence which is in consonance with soil depth and moisture. The objectives were:

- i. Eco-restoration and Eco-preservation
- ii. Involvement of the local population
- iii. Gender sensitive planning
- iv. Use of appropriate technology
- v. Redevelopment of traditional agro-eco-systems based on traditional knowledge and technology
- vi. Scientific approach to agriculture, animal husbandry and horticulture in order to raise productivity
- vii. Development of ecologically sustainable industries and tourism.

The need to conserve natural resources and the environment particularly to prevent damage to fragile and irreplaceable eco-systems, the Hill Areas Development Programme (HADP) during the 5<sup>th</sup> Plan was introduced. The programmes implemented during the 5<sup>th</sup> Plan period were mainly beneficiary oriented. While emphasizes shifted to eco-development in the 6<sup>th</sup> Plan, the general tenor of HADP remained substantially the same as that of the normal State Plan following the same sectoral approach. In the 7<sup>th</sup> Plan laid particular emphasis on the development of ecology and environment as summed up in three phrases, namely, **eco-restoration, eco-preservation, and eco-development**. It aimed at evolving plans and programmes to take care of socio-economic growth, development of infrastructure and promotion of ecology of the areas covered by the HADP. During the 8<sup>th</sup> Plan attention was focused on productive sectors of the hill economics especially in modernizing agriculture practices and small-scale industries at household, cottage and village levels. For this involvement of people was considered of paramount importance. The aim was to meet actual basic needs of the people through improved management of the land and water resources.

The major environmental problems being faced by Hills were deforestation and soil erosion, which was leading to the drying up of water resources, flash flood, cloud bursts and decline in the yield of food and cash crops, fodder, fuel and other minor forest produce. Besides water retention capacity and productivity of land had been adversely affected. Similarly, poverty in the hills, intensive human & livestock pressures along with encroachment on forest land and indiscriminate felling of trees for commercial purposes in hill areas had already led to loss of soil and rapid depletion and destruction of forest cover. Development activities like construction of buildings, roads, hydro power projects, large and medium industries and mining etc. had aggravated environmental problems. Consequently, perennial sources of water such as springs and small streams have dried up in many hill areas.

The strategy for Himachal Pradesh stated that the degraded forest lands, the village common lands and waste lands will be rehabilitated through various state plans/centrally sponsored and externally aided projects schemes so that a forest cover of 50% by 2000 AD as per policy of the State Govt. is arrived at". The National Forest Policy, 1988 has also recommended that at least 2/3<sup>rd</sup> of the total geographical area of Himachal Pradesh should be under forests.

On an average, an area of 172.5% Sq. Km. was planted every year. Recent trends show a continuous decline in the area planted each year, because of paucity of funds and a ban on silviculture and Working Plan operation in the State under an order of the Supreme Court in T.N.

Godavarman case dated 12-12-1996, except for the right holders. However dry and fallen trees i.e. salvage marking can be removed through the H.P. State Forest Department Corporation Ltd.

The Govt. of H.P. Constituted the Forest Corporation in 1974, the only agency responsible for the harvesting and exploitation of forests, including resin extraction. Earlier, private contractors carried out all activities related to forests.

The most valued forest product in 2001-02 was timber, followed by medicinal plants and herbs and resin. The total forest produce was worth Rs. 231.30 Crore. Until 1970, timber removal from the forests was more than the annual prescribed yield, which was unsustainable. Since 1985, the annual removal from the forest has always remained below the prescribed yield due to ban imposed by the Govt. on silvicultural operation and also under an order of the Supreme Court dated 12-12-1996. During this plan period **Vineet Kumar's Working Plan (1998-1999 to 2012-13)** was applicable, however no silvicultural operation as prescribed in the Working Plan had been carried out due to ban on green felling and blank/open areas were also not taken up planting/regeneration in planned way. Plantations as prescribed had been carried out under various departmental schemes. Ban on green felling kept the green cover intact but the regeneration in the forests suffered.

#### **10.11 Tenth Five Year Plan (2002-2007):-**

The Tenth Five Year Plan (2002-07) has been prepared against a back drop of high expectations arising from some aspects of the recent performance. GDP growth in the post-reforms period has improved from an average of about 5-7% of the 1980 to an average of about 6.1% in the Eighth and Ninth Plan period, making India one of the ten fastest growing countries in the world.

These positive developments are, however, clouded by other features which give cause for concern. The situation in this regard is much worse in the rural areas. Land and forest degradation in hills areas and over exploitation of ground water is seriously threatening sustainability of rural livelihood and food production.

The country's forest resources are under tremendous pressure. Intensified shifting cultivation, indiscriminate removal of timber, fuelwood, fodders and other forest produce, forest fires and encroachment has led to forest degradation and deforestation. Forests meet nearly 40% of the country's energy needs and 30% of the fodder needs. It is estimated that about 270 MT. of fuelwood, 280 MT. of fodder, over 12 million m<sup>3</sup> (cubic meter) of timber and countless non-Timber forest products (NTFPS) are removed from forests annually. The future management need for meeting the requirements of the community.

Forest plays an important role in environmental and economic sustainability. They provide numerous goods and services, and maintain life support systems essential for life on earth. Some of these life support systems of major economic and environmental importance are:

- (i) Supply of timber, fuel wood, fodder and a wide range of non-wood products.
- (ii) Natural habitat for bio-diversity, and repository of genetic wealth.
- (iii) Provision of recreation and opportunity for ecotourism.
- (iv) Playing an integral part of the watershed to regulate the water regime, conserve soil, and control floods.
- (v) Carbon sequestration and carbon sink.

Despite significant resource flows and national concern, the potential of forests to reduce poverty, realize economic growth, and their contribution to the local and global environment has not been fully realized. A combination of market and institutional failures has led to forests falling to contribute as significantly to rural incomes and poverty alleviation and economic growth as would be possible under good economic and technical management.

The following strategies were proposed in order to address the concerns of forests sector and to achieve the objectives of sustainable forests management:

- i) The role of forests to maintain the hydrological balance is complementary. Successful models of watershed development have helped conserve soil and moisture, improve ground water recharge and the water regime and mitigated the adverse impacts of drought. The watershed approach should be universally adopted for the maintenance and development of forests.
- ii) Due to the increase in human and cattle population, the existing forest resource is under intensive pressure to meet the demands for various forest produce, i.e food, fodder, fuel, fertilizer, timber, bamboo, medicinal plant, etc. About 41% of the forest area is degraded due to over exploitation of forest produce. However, no strategy to conserve the forest eco-system would be successful unless the basic needs of the society are met. The future management strategy must, therefore, take into account this compelling need of the community to meet their requirements.
- iii) The forest areas near population centre's/villages have degraded faster due to over-exploitation and the forest resources has become impoverished. It has adversely affected the livelihood security and employment opportunity of people dependent on forests. Therefore, a special programme needs to be drawn up for development of such villages and to provide alternative sources of income.

**10.11.1 Forest Plantations:** -The following initiatives were proposed for improving the productivity of forest plantation:-

- i) The plantation strategy should be based on creating new forest resources that help reduce pressure on natural forests and preferably reverse the negative impact of deforestation while meeting the increasing demand. India can benefit from the experience of other countries, which have developed policies and incentives to promote private sector participation in accelerating the pace of Afforestation.
- ii) At present, the performance of forest plantations in terms of survival, growth and yield is poor. The mean annual increment (MAI) of forest plantations varies from about 2m<sup>3</sup>/ha/year for valuable timber species to about 5-8 m<sup>3</sup>/ha/year for eucalyptus and other fast-growing species. This is far below the MAI of over 10m<sup>3</sup> and about 50m<sup>3</sup>/ha/year for good quality plantations in different countries.
- iii) The productivity and success of plantations can be improved by appropriate site selection, site species matching, planting of elite clones, proper maintenance and protection, timely tending, thinning, irrigation, application of manures and pesticides, etc.
- iv) Reduction in harvesting and post harvesting losses should be achieved by adopting improved technologies.

**10.11.2 Green India Programme:** Out of the 328.27 m ha total geographical area of the country; around 300 m ha is the available productive land. The actual forest cover is 63.73 m ha of which only 37.73 m ha has good forests. About 20 m ha is covered under tree plantations (agro-forestry, farm forestry, social forestry and other plantations). Thus, in order to bring one-third area under forest/tree cover,  $(100 - 37.73 - 20 = 42.27)$  43 m ha of area should be covered under the greening programme over 10 years. The detail programme should be as follows:

- \* 15 m hac. of degraded forest land to be covered under JFM.
- \* 10 m hac. of irrigated area to be brought under commercial agro-forestry.
- \* 18 m hac. of rain-fed area to be brought under subsistence agro-forestry.

Significant efforts are required for greening India to address the food security and environmental challenges. The country is facing the problem of surplus food production on one hand and unemployment, poverty and food deficiency on the other. The implementation of Greening Programme through “food for work” scheme will ensure meeting the basic needs of people, environmental protection, food accessibility and productive employment generation to 10 crore people (mainly tribals, dalits, backwards, other backward classes, landless and women).

Participatory arrangements have existed in Indian Forestry for several years, in the form of forest labour co-operatives, resin tappers, NWFP Collector's Co-operatives societies and other associations. The JFM programme has led to several positive outcomes in many states in India. The major ones are (i) change in the attitude & relationship of local communities and forest officials towards each other and the forests, (ii) improvement in the condition of forests (iii) reduction in encroachments but in this division results are not encouraging as compared to low lying areas of Himachal Pradesh. Similarly, tree plantation has been expressed over the low productivity of plantation due to several factors such as steep slope, FRA, and Nautor claims, inadequacies in the site selections and site species matching, poor plantation stock, lack of proper maintenance and protection, fire hazard, financial and capacity constraints etc. During this period the **Vineet Kumar's Working Plan (1998-2012)** was in vogue and continued to exist in this division.

**10.12 Eleventh Five Year Plan (2007-08 to 2011-12):** - India entered the Eleventh Plan period with an impressive record of economic growth. After a lacklustre performance in the Ninth Plan period (1997-98 to 2001-02), when gross domestic product (GDP) grew at only 5.5% per annum, the economy accelerated in the Tenth Plan period (2002-03 to 2006-07) to record an average growth of 7.7%, the highest in any Plan period so far. Besides, there was acceleration even within the Tenth Plan period and the growth rate in the last four years of the Plan has averaged 8.7%, making India one of the fastest growing economies in the world.

National Forest Policy, 1988 acknowledged the importance and primacy of local communities and provided for a sustainable management approach with maintenance of environmental stability as the prime objective. Commitment to conservation of nature was highlighted by the targets of maintaining one-third of land under the forest/tree cover.

Plan investment in forestry and wildlife sector so far, including State and Central plan, was about 1% of the total plan outlay. The National Forestry Commission (2006) had recommended an investment of 2.5% of the plan outlay in the forestry and wildlife sector. Our total plan outlay of the State and central plan in forestry and wildlife sector was 1% only.

The Integrated Forest Protection Scheme was redesigned to aid the states for building capacity and basic infrastructure for modern forest management. Improving Management Planning and Survey (land records) set-up was the first priority for Central assistance. The following components were provided for modernization of the State forest management:

- i) Modernization of the management planning (Working Plan) units with equipment, infrastructure, and manpower. This may include forest inventories, training and satellite



imagery processing, and GIS facilities. This included professional services such as ecologists and sociologists for relevant inputs.

- ii) Forest Land Information System for land records, with modern and empowered survey, and land record maintaining mechanisms for documenting the legally recognized individual rights, concessions, ownerships including those under the Scheduled Tribes and other Forest Dwellers (Recognition of Forest Rights) Act, 2006.
- iii) Forest boundary demarcation by providing assistance for the state-of-the-art infrastructure, training/outourcing survey work, fixing permanent boundary pillars, updating the forest block indices and compartment histories.
- iv) Installation of forest fire surveillance and warning systems, along with fire management planning in participatory mode.
- v) Assistance for general infrastructure for accommodation in remote areas, communication, improvement of road network, etc. was a part of this programme. During this period the **Vineet Kumar's Working Plan (1998-2012)** was in vogue and continued to existence to this division. Timber removals from the area allocated to different Working Circle were essentially on account of salvage removal, timber distribution to local right holder and removals under Forest Conservation Act, 1980. No silviculture removals were carried out during the approved plan period due to moratorium on green felling in the State. The incidental timber removal from the forest were far below from the prescribed annual yield under various Working Circle, except in the case Chil Working Circle and Eucalyptus Working Circle where removal are in excess of the prescribed yield due to salvage removals.

#### **10.13 Twelfth Five Year Plan (2012-17):-**

The objectives of the Twelfth Plan were faster, sustainable and more inclusive growth and the initiatives taken in Eleventh Plan period had resulted in substantial progress towards these objectives. Inevitably, there were some weaknesses that need to be addressed and new challenges that need to be placed. However, available evidence suggested that there have been significant gains on many of these fronts, even though there are shortfalls in some areas on which further work is needed.

Several issues have been flagged during the Planning Commission consultations with different stake holders which deal with hand, mining, forest and wild life management, climate change, waste management, reduction of pollution, conservation of forests and biodiversity etc. These must be viewed in the light of the enormous inter connection that exist within the broader

dynamics of environmental management. Important issues that required focused attention during the Twelfth Plan are:-

- i) Securing ecology of watershed and catchment.
- ii) Cumulative Environmental Impact Assessment (CEIAs) for vulnerable regions.
- iii) Carrying capacity studies in selected river basins.
- iv) Maintaining acceptable water quality and quantity through pollution control of water resources.
- v) Restoration of wet lands & lakes etc., and
- vi) Management of waste water discharge from Industrial and Commercial establishment into major water bodies.

#### **10.14 NITI AAYOG (The National Institution for Transforming India):-**

The twelfth five years plan (2012-2017) ended during 2017 and the central government had decided to discontinue with the five-year plans set. Thereafter, the NITI Aayog, (National Institution for Transforming India) has replaced the Planning Commission in 2015. The central body created a platform to monitor, evaluate and review various schemes and also to specify targeted results through Key Performance Indicators.

Niti Aayog aims to replace Five years plan with a 15-year blueprint with a shorter seven-year strategy, as part of its National Development Agenda. The National Development Agenda will include a seven-year action plan, with a focus on defense and internal security, besides social and development goals.

In the recent years, with the realization of forests as a key solution for combating global issues of climate changes, India has strengthened its commitment towards fighting global environmental challenges as well as fulfillment of Sustainable Development Goals.

India's commitments in its 'Nationally Determined Contributions' post Paris agreement include:

- reducing emissions intensity of its GDP by 45 per cent by 2030, from 2005 level
- to create **additional carbon sink of 2.5-3 billion tonnes of CO<sub>2</sub> equivalent through additional forest and tree cover by 2030**
- achieving 50 per cent cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030

**Paris Agreement:** Paris agreement is a legally binding international treaty on climate change, it was adopted by 196 parties at COP-21 in Paris on 12.12.2015 entered into force on 4.11.2016. Its goal is to limit **global warming** well below 2<sup>0</sup>C, preferably to 1.5 <sup>0</sup>C compared to pre industrial level. Climate change action needs to be massively increased to achieve the goal of Paris

agreement years, giving into new concepts of carbon based solutions and new market. Countries, region and cities are establishing carbon neutrality targets. Zero carbon solution is becoming competitive across economic sector representing 25% of emission. The strategy involve energy and climate policy including the 20/20/20 target namely reduction of CO<sub>2</sub> emission by 20% , increasing renewable energy market share to 20% and increase in 20% in energy efficiency. Paris deal is world's first comprehensive climate agreement.

**Paris Agreement:** What are India's climate commitments?

In 2015 ahead of UN significant climate conference in Paris, India announced three major voluntary commitments called the National Determined Contributions.

- Improving the emission intensity of its GDP by 30-35% by 2030 over 2005 level.
- Increase share of non-fossil fuels-based electricity to 40 % by 2030.
- **Enhancing forest cover, thereby absorbing 2.5 to 3 billion ton of CO<sub>2</sub>.**

India's progress in fulfilling its climate commitment:

- India has reduced emission intensity by 21% over 2005 level.
- Massive plantation activities across states YoY to increase forest cover and highlighting ToF (Trees Outside Forests).
- Solar capacity has grown from 2.63 GW in 2014 to 36GW in 2020.
- Renewable energy capacity is the 4<sup>th</sup> largest in the world and will reach 175 GW before 2022.
- India has set new target of 450 GW by 2030.
- Onward stage India has pioneered two major initiatives:

ISA (International Solar Alliance)

Coalition for Disaster Resilient Infrastructure

In this context, recent initiatives in expanding green cover, carbon sequestration include expanding plantation areas, National Mission for Green India (GIM), Nagar Van Yojana, Lifestyle for Environment (Mission LIFE), National Clean Air Program, CAMPA (Compensatory Afforestation) and State schemes like Samudayik Van Samvardhan Yojana, Ek Buta Beti ke Naam and Van Samridhi Jan Samridhi have all laid stress on the importance of forests and their role in mitigating global issues like climate change and conservation of biodiversity at all levels.

## **CHAPTER-11**

### **PAST SYSTEMS OF MANAGEMENT**

#### **11.1 GENERAL HISTORY OF THE FORESTS**

For more than a century (1895-2002) the forests have experienced periods of extreme events. Until 1895 there was no definite record of forest management, in fact, 1890, regarding the type of vegetation and forest management in the tract dealt with is available. Like other parts of the country, the forests of Sirmur District had richness, vastness and were a coveted place for wildlife hunting. Mr. John Northem in his book, "Guide to Masuri," (1884) says "Nearly the whole of the dominions of the Raja of Sirmur is one vast forest, the open valleys, a dense jungle of high grass, and the consequence is, that instead of thousands and thousands of happy and contented villagers, the land is given to the beasts of the field and the birds of the air. It is useless to dwell on the short-sightedness of a policy so manifestly opposed to every principle of political economy. Timber might pay a contractor; it never paid a nation. If the population is the wealth of a country, it is useless to ask it to feed on timber. The earnings of a prolific population pay the most to the State in a hundred ways". With this description, it is clear that the tract was once occupied by dense forests inhabited by wild animals like Elephant, Tiger, Panther, Sambar, Chital, Barking deer, etc.

With the passage of time, it seems that the policy of the Government changed and clearance of woods to bring more and more land under agriculture continued unabated. Land revenue being the main source of revenue to the State, agriculturists like bahaties and sainies were invited from Hoshiarpur areas of Punjab to clear the forest of Dun valley during the regime of Raja Shamsher Prakash. At one stage in the late nineteenth century, it was felt that there has been extreme destruction of forests leading to high floods in the Markanda river. Shri Bal Gobind in 1901 has mentioned in the biography of Raja Shamsher Singh Parkash, Once upon a time when the Markanda flood washed away many villages, roads and bridges, the railway company wrote to the Raja, holding him responsible for this loss of life and property, as being the result of his carelessly ordering the cutting of the forests on the banks and the source of the River Markanda, which is not more than seven miles from Nahan". On reading the letter, Raja Shamsher Parkash, took vigorous measures for the preservation of the forests.

After the Gorkha war of 1804-1815, forests were leased to traders at a fixed annual income not exceeding Rs. 20,000/-. There was no restriction regarding the number of trees to be felled.

Traders removed best quality sal, sain, haldu, khair and shisham trees ruthlessly, which led to the deterioration of the quality of forests.

First step to manage the forests on some scientific principles was taken by the Enlightened Maharaja Sir Shamsheer Parkash (1856-1898) who introduced in 1890 the rawana system to control the felling and extraction of trees. He also took steps to demarcate and declare the forests as Reserved Forests under Chapter II of the Indian Forest Act. During this very period, Forest Settlement and Revenue Settlement were also carried out. The Forest Settlement was termed as Faisla-e-janglat. No rights were admitted to the local people but numerous concessions were allowed. Practically nothing was done in the direction of regenerating the forests. Despite the fact that the main emphasis was on controlling the fellings, selected good quality trees of important species which were in great demand, continued to be felled on large scale leading to depletion of the stock and quality of the forests. It was only in 1895 that the first regular working plan for the tract was prepared.

The overall period of management of the Nahan Forest Division can be covered into the following WP:

**Table 11.1: Name of Authors in previous Working Plan**

<b>S. No.</b>	<b>Author and Name of Working Plan</b>	<b>Period</b>
1	Chintamani Joshi / R.Bhattacharya Working Plan	1895 - 1915
2	The Period without working Plan	1916-1932
3	Sewal's Working plan	1933-34 to 1952-53
4	Sharma and Tikku's Working Plan	1953-54 to 1962-63
5	Period without working Plan	1963-68
6	Arya's Working Plan	1968-69 to 1977-78
7	Period without working Plan	1978-82
8	Chauhan's Working Plan	1982-83 to 1991-92
9	Period without working Plan	1992-98
10	Vineet Working Plan	1998-99 to 2012-13

## **11.2. PAST SYSTEM OF MANAGEMENT AND THEIR RESULTS:**

### **11.2.1 Chintamani Joshi/ R Bhattacharya Working Plan: (1895-1915)**

The first working plan for the area was prepared by Chinta Mani Joshi, S. Bhattacharya and Ram Chandra who were trained from Forest College Dehradun. This working plan was prepared for 20 years. By that time the entire state of Sirmour was divided into two Forest Divisions viz: Paonta and Nahan. The remaining area was under Nahan Forest Division. Each range was termed as Working Circle and further divided into 3 sub-circles based on the type of crop. They were then divided into Sub-blocks and compartments. Improvement-cum-selection

fellings for sal and miscellaneous forests were provided. For chil and ban areas, a selection system was provided. However, no scientific management for bamboo areas was provided.

**Result:** The sequence of felling prescribed in the working plan for a period of 20 years had to be revised after the expiry of 8 years and this revised felling programme was followed till 1915. This working plan did not provide any silvicultural system but only systematized the extraction of trees and some control/record regarding the fellings. The result of these felling was that selected trees of commercial important species like sal, sain, haldu, shisham, khair, chil etc. were felled. Large-scale fellings were carried out in easily accessible areas with the result that the remaining crop was malformed and congested. Wherever regeneration came up naturally, it was not tended. The overall result of working in sal forests was depletion of bigger diameter class trees and neglect of young crop. No silvicultural operations were done in miscellaneous scrub forests. No working was done in bamboo forests and these areas also remained neglected. Shifting cultivation was being practiced in chil areas. Profuse natural regeneration of chil came in when such areas were abandoned, which was not tended properly.

**11.2.2 Period from 1916-1932:** There was no regular working plan during this period. Forest officials/officers selected the annual coupes. During this period generally retired Forest Officers from British India were employed. These officers selected the best and easily approachable areas to provide higher revenue to the State exchequer. This resulted in depletion of good quality healthy trees of valuable species like sal, sain, shisham, khair and chil. Gregarious flowering of bamboo occurred in 1915. These bamboo areas were effectively and timely closed resulting in good regeneration and helped in the bamboo rehabilitation in these areas.

**11.2.3 Sewal's Working Plan (1933-34 to 1952-53):** Sewal's Working Plan provided management for the entire tract of Nahar Forest Division. Sewal's Working Plan was in fact the first working plan of the area prescribing scientific management of the forests. Under this working plan following general objects of management were aimed at:

- i) To preserve, improve and extend the existing Sal, Chir Bamboo and miscellaneous forests wherever the soil and other factors are suitable for the species.
- ii) To satisfy the legitimate demands of the local population for forest produce and grazing in accordance with the Faisla-e-Janglat.
- iii) To ensure a sustained annual yield and to attain the normal forest and establish normal regeneration
- iv) To maintain and improve forest cover on the Bairuni dhar, along the slopes adjoining the Giri and on the bare outer hills of the Siwaliks which are particularly liable to erosion.

Sewal anticipated difficulties like encroachments, poor quality and extreme limit of the habitat of sal lack of demand for ballies, fuel, grazing by local people and grazing and lopping by migratory gujjars for achieving the objects of management. To achieve the objects of management following Working circles were constituted

The Sal Conversion Working circle	16032 Ha
The Bamboo Working Circle	13456 Ha
The Miscellaneous Working Circle	41156 Ha
The Chil Working Circle	8519 Ha
Unallotted areas	17139 Ha
Total	99302 Ha

**A ) The Sal Conversion Working Circle :** All pure sal forests fit for conversion to uniform under shelterwood fellings were allotted to this working circle. Some pure sal forests which offered difficulty in regeneration and conversion to uniform were excluded. The total area allotted was 16032 ha. The silviculture system adopted was Conversion to Uniform under Shelterwood with natural regeneration rotation and conversion period of 100 years, with regeneration period of 25 years was adopted. Four periodic blocks (PB's) were formed P.B.I was allotted and the remaining area was grouped as P.B. unallotted.

**Result of Working:** There was an epidemic attack of sal borer (*Hoplocerambyx spinicornis*) causing serious destruction of sal trees and thus upsetting all the prescribed fellings. The area allotted to PB1 had established regeneration and the trees DBH 30 cms were retained as advanced growth. All the dead dry, dying, and unsound trees were to be marked for felling. After felling all the areas were closed for grazing for 10 years. The PB unallotted were allotted into 20 felling coups. In these areas thinning with marking rules was prescribed.

**B ) The Bamboo (Overlapping) Working Circle:** Bamboo was to be worked on 4 years felling cycle. Simple marking rules prohibiting the Uprooting of rhizome, cutting of one year old clumps, cutting of clumps not above 15 cm. to 30 cm. ht were prescribed. Artificial regeneration by one year old nursery seedlings of bamboo was also prescribed. Overwood of miscellaneous species was to be topped thinned to help regeneration and protection of bamboo. It was envisaged that the demand of bamboo for paper pulp shall increase in near future and thus making the bamboo forests a paying proposition Possibilities of further extension of bamboo were to be explored Exclusion of gujar grazing was suggested Control over the grazing of state elephants was suggested.

**Result of Working:** The rules of working prescribed were not followed Bamboo forest being inaccessible were not worked Digging of rhizomes by contractors and local people continued. Lopping of bamboos by local people and gujjars and damage by wild animals continued unabated. All this led to malformation and congestion of clumps. The proportion of bamboo from these miscellaneous forests went on decreasing at a rapid pace. Due to mismanagement, bamboo disappeared from many areas. No artificial regeneration was done. However, areas where gregarious flowering occurred during 1921-22, were closed to grazing for 10 years and were successfully restocked. As a whole, the condition of the bamboo forest deteriorated.

**C) The Miscellaneous Working Circle: (41,156 ha.).** More than 50% of the total area covered under Sewal's Working plan was allotted to this working circle. Pure or mixed sal forests considered unsuitable for working under a Uniform system and areas under miscellaneous species without extensive blanks were allotted to this working circle.

Selection-cum-improvement fellings were prescribed with a view to meet local demands and improve the existing crop. It was envisaged that due to lack of demand, sale of marked trees may not be feasible 50 annual coupes were formed. Marking rules prescribed for marking of sal and sain trees over 37.5 cm and 45 cm dbh. respectively for improving the existing crop. No tree was to be marked for felling unless As removal benefited the existing crop. Climber cutting was prescribed. Gujjars grazing was to be excluded except in the areas near Nahan town, where it was to be accommodated for the supply of milk to town. No closure to grazing was prescribed due to heavy burden of grazing by local people and gujjars.

**Result of Working:** The marking rules and sequence of felling was not followed. Heavy felling was carried out in certain accessible areas. Overgrazing continued The proportion of valuable species was reduced due to selective fellings. No cultural operations were carried out During this period the condition of these forests deteriorated leading to the depletion of bigger sizes trees of valuable species.

**D) The Chil Working Circle (8,519 ha.):** Few forests of Paonta Range viz Samon, Kanon, Kando-Bharog and chil forests of Jamta Range (Nahan Division), were covered and allotted to this working circle.

**E) Unallotted Areas (17,139 ha.):** These areas comprised mostly precipitous, blank, hillsides, nalah beds, grassy blanks, scrub forests and isolated patches of sal chil or kokat forests. Most of the areas were heavily grazed.



**Special Works of Improvement Under-taken:**

- (a) Sowing and Planting: No sowing and planting on any large scale was done. Deodar was successfully planted in Nigali and natural regeneration of deodar protected in Sanog (Sewa) forests. Propagation of bhabar was undertaken in Siwaliks. Planting under Tongia system was undertaken in Dondli-tapper and Khojar forests of Bhagani Range. Area has been permanently occupied by the Tongia cultivators. (b) Fire Protection: Fire lines were planned and control burning was carried out 5 metres wide, Block line separating good quality sal forests of Majra and Paonta Ranges from miscellaneous and poor quality sal was cleared.
- (c) Demarcation: All the forests reserved under chapter II of Indian Forest Act were demarcated. Boundary separating Ambala district was demarcated by constructing large lime mortar masonry pillars.
- (d) Building: New Forest Guard-huts were constructed at Gurdwara, Matter, Pilhori, Bohal and Dhandla.
- (e) Roads: No new roads were constructed.
- (f) Forest Settlement: Forest settlement was also carried out simultaneously with the revision of working plan. A detailed record of right (Faisla-e-junglat) for each forest was Prepared.

**Results:** The objects of management set forth were not even partially achieved. The prescriptions of working led to the preservation and improvement of sal forests allotted to Sal Conversion Working Circle. In case of other forests, there were unregulated fellings leading to deterioration of the growing stock. No regeneration operations were carried in any forests and thus no extension of the forest area took place.

**11.2.4 Sharma and Tikku's Working Plan (1953-54 to 1962-63):**

Sewal's Working Plan expired in 1952-53 Revision of the working plan was taken up in 1953-54 and the final draft of this working plan was submitted to Chief Conservator of Forests in 1961-62. Thus the entire period of Working Plan was over when the working plan was finalised. In this working plan, the objectives of management set forth were the same as envisaged in Sewal's Plan with the addition of meeting the requirement of fuel for Nahan town. To achieve the objectives of management following Working circles were constituted:

A) The Sal Conversion working circle	13,357 Ha
B) The Selection Working Circle	26,987 Ha.
C) The Protection Working Circle	26,987 Ha.
D) The Plantation Working Circle	2,981 Ha.
E) The Bamboo (O.L.) Working Circle	7,305 Ha.

**A) The Sal Conversion Working Circle (13,357 ha.):** All good sal forests suitable for conversion to uniform crop were allotted to this working circle. In Sewal's plan the area allotted to this Working circle was 16032 ha. Malgi, Garibnath Garhi, Banswali, Pipalwali, Bherewali, Jamotwa, Paniwali, Kiarda, Katapather, Surajpur, Mahadev-ka-khala, Kothewali, Ambwali and Katasan forests allotted to sal conversion Working Circle in the previous plan, were not allotted to this working circle. Kandhela and Uttamwala-baraban forests were added to this working circle.

Silvicultural system, rotation, regeneration period adopted were the same as in the last plan definite areas were allotted to P.B. I, II and V. P.B. III and I were grouped together and termed as P.B. inter. The area allotted to each P.B. was

P.B. I	1 2,362 ha.
P.B. II	2,837 ha
P.B. Intermediate	5,839 ha.
P.B. V	2,319 ha.

The entire growing stock in this working circle was enumerated in 10 cm d.bh. classes down to 20 cm. d.bh sal and sain were enumerated separately and other species were grouped together as kokat The yield from P.B. I. was prescribed by volume and annual yield prescribed was 3002 cum. No definite annual coupes were formed, but the sequence of felling was suggested. Definite marking rules for P.B.L. were prescribed and those were the same as in the previous plan. C/D grade thinning was also prescribed in advance growth which was not prescribed in the previous plan. Subsidiary silvicultural operation after fellings in P.B.I. areas was also prescribed.

**P.B II:** Definite areas with middle-aged to mature crops capable of putting on appreciable increment with deficient or no advance growth were allotted to P.B.11. The object of treatment of these areas was to enable middle-aged crop to put on maximum increment and to induce natural regeneration. It was to be ensured that small openings are done in the canopy to induce regeneration but the mature stock was not to be depleted till the areas are transferred to P.B.I. As per yield calculations, 40% of the selection trees (50 cm. dbh) were to be felled in the felling period. Openings were to be created in the canopy (Pepper Pot) by felling the selection trees and D grade thinnings. The felling cycle of 10 years was fixed. Subsidiary silvicultural operations were also prescribed.

**P.B. Intermediate:** The middle-aged crops not allotted to other P.B. were allotted to this P.B. Controlled fellings with thinnings were prescribed. As per yield calculations, 33% of selection trees were to be felled in the felling period of 10 years. Definite fellings coupes were laid down

and C/D thinnings were prescribed. Subsidiary silvicultural operations were also prescribed which included felling of marked trees and climber cutting.

**P.B.V:** Those areas which were having established regeneration were allotted to this P.B. Removal of overwood and cleaning and thinnings in young crop were prescribed. The yield was prescribed damaged regeneration and climber cutting was prescribed in subsidiary silvicultural operations.

**Results:** The working plan was finalized only two years before the expiry of the working plan period and as such, it is not expected that the prescription of the working plan was followed even before the plan was finalized. As per the details of fellings given in the succeeding working plan by Arya, no over fellings were done in P.B.I. The pace of regeneration was poor as the areas could not be effectively closed. Although the regeneration period was suggested as 35 years but closures of P.B.1. felled areas were suggested for only 10 years. Even this could not be enforced Subsidiary silvicultural operations were ignored.

**B)The Selection Working Circle (23282 ha):** Sal areas not considered suitable for conversion to uniform crop due to poor quality and steep slopes and chil forests were allotted to this Working circle. The area of chil forests allotted was 1174 ha. Mature groups of sal were to be opened for obtaining regeneration. Such areas were to be closed to grazing. Cutting back of malformed and suppressed advance growth was prescribed. Cleaning in chil regeneration was prescribed.

**Results:** Neither the sequence of fellings prescribed was followed nor the entire area prescribed for felling was felled. Felled areas were not closed to grazing. Marking rules were not followed properly. The result was the depletion of mature trees and lack of regeneration. On siderable damage was done to the crop by indiscriminate lopping. Due to continued grazing, new regeneration was not allowed to come up. There are gujjar paraos in these forests and these gujjars did considerable damage to trees in the paraos and adjoining areas.

**C) The Protection Working Circle (26,986 ha.):** Forests having mixed miscellaneous kokat species with poor quality sal and open blanks, steep and precipitous terrain were allotted to this working circle. Some bamboo forests were also included in this working circle. No commercial fellings were prescribed. Afforestation and soil conservation measures were prescribed to be carried out. Bhabber planting was also to be done. The area to be tackled annually was prescribed as 101 ha. This was very small keeping in view the total area of 36,986 ha. of the Working circle.

**Results:** Against the prescribed area of 1010 ha, during the working plan period, 1711 ha. area was closed and soil conservation measures were carried out. Forests closed were Mandpa, Haripur, Lohgarh, Shishamwala, Thaska, Saketi, Trilokpur, Gumti Sambhalwa, Paniwali, Rampur Gainda, Andheri, Gurdwara, Sangholi and Toderpur. Parts of these forests were closed due to which vegetation was improved. Bhabber grass planting was successful. Natural regeneration of other species, especially khair came up. Fencing of the closed area was done by thorny bushes. The closure was not very effective but still, there was an improvement in the vegetation. Since the extent of the area treated was very small (not even 0.5% of the total area) results of working were not very prominently visible. There were forest fires which further reduced this is Most of the areas treated were along the Haryana border and subjected to heavy illicit grazing.

**D) Plantation Working Circle: (2,981 ha):** Existing plantations of ban and deodar riverain areas and grasslands with scanty trees growth were allotted to this working circle. 40 ha area was prescribed to be planted annually. Deodar, walnut, simbal, khair, shisham, ailanthus, chil, kikkar willows, tur and mulberry were to be raised in sites suited to these species. Thinnings in the existing deodar plantation in Nagali were prescribed.

**Results:** Plantations were carried in a total area of 162 ha. Nothing was carried out in the deodar plantation. With the closure, natural regeneration also came in. Plantations carried out were encouraging although the closures were not very effective. Plantations were attempted in Giri, Rampur Bed Yamuna and Jamotwa, Rajpur, Naurangabad and Gorakhpur. Plantations of Giri, Rampur Beli and Yamuna which form the beds of Giri and Yamuna were damaged by floods grazing and lopping.

**E) The Bamboo (Over Lapping) Working Circle (7,386 ha.):** Bamboo-bearing forests Nahan Range which could be profitably exploited for bamboo extraction were allotted to this working circle. These areas were overlapping in Selection and Protection Working Circle. Four-year felling cycle was prescribed and one-fourth of the total area was to be felled annually. Definite annual coupes were prescribed. Detailed cutting rules and prescriptions were prescribed. Artificial regeneration of bamboo was also suggested.

**Results:** These forests could not be worked as prescribed. Gregarious flowering of bamboos took place in 1958. No steps could be taken for the planting of bamboo. Only about 100 ha. of the area closed in Maidhar forest. This area was regenerated adequately. Congested clumps of bamboo were not felled by the purchasers. A lot of damage was done by grazing and indiscriminate

lopping. Large number of basket makers are living in the vicinity of bamboo forests. These people took part in the random felling of new bamboo shoots which lead to the degradation of bamboo crop. The overall result has been that bamboo areas were covered by poor-quality bamboo. It became difficult to sell these bamboo forests at any price.

#### **F) Special works of Improvement Undertaken:**

**(a) Roads:** Following roads and paths were constructed during the period of this plan:

- (i) Rajban-Mehrar motorable road 25.3 km
- (ii) Mehrar-Rama motorable road 7.8 km.
- (iii) Surajput-Simbalbara motorable road 11.00 km.
- (iv) Khadar-ka-Bagh to Bikecambagh 6.9km motorable road.
- (v) Dunga Forrest to Jalmusa Forests 10.4 km motorable road.
- (vi) Dhaula Kuan to Birla Jeepable Road 21.4 km.
- (vii) Bikerambagh-Sangholi inspection path. 12.00 km

**(b) Buildings:** Following buildings were constructed during the working plan period.

- (i) DFO Residence at Nahan
  - (ii) Range Quarters- Paonta and Nahan
  - (iii) Forest Rest House/Inspection huts-Bhagani, Simbalbara, Trilokpur and Khara.
  - (iv) Forester Quarters-Majra, Nahan and Paonta
  - (v) F.G.Huts -Danda, Khodri, Tibri, Koti, Majri, Majra and Kilaur.
  - (vi) Labour/Mali huts-Kandon, Simbalbara, Dhudla
  - (vii) Clerk Quarters - 4 Nos. Nahan
  - (viii) Peon Quarters -2 Nos. Nahan
- During this period quite a large number of useful buildings were added at a total cost of Rs. 2,37,305/

**(c) Demarcation:** Demarcation of forests was carried out and the old iron pillars were replaced by masonry boundary pillars. 9,631 pillars were constructed at a total cost of Rs. 1,10,536/-. The entire work of demarcation and construction of boundary pillar was not complete

**(d) Fires and Fire lines:** No new fire lines were laid. 2,388 ha area was burnt in 16 fires during the plan period.

**(e) Grazing:** Grazing incidence increased due to the increase in cattle population. Migratory graziers of sheep and goats did illicit grazing in Govt. forests and damaged the trees by lopping.

**(f) Resin tapping:** Resin was extracted from the forests as per past practice.

**(g) Bamboo park:** Bamboo parks were established at Ramuwala Dhudia and Simbalbara. Bamboo did well only in Dhudla and some remnants are visible. Bamboos have failed in Ramuwala and Simbalbara.

**11.2.5 Period From 1963 to 1968:** Sharma and Tiku Plan expired in 1963 and Arya's plan was operative from 1968. During this felling period program was framed by the Conservator of Forests, Nahan and approved by the Chief Conservator of Forests, Himachal Pradesh. Allotment remained the same as in Sharma and Tiku's Working plan. The prescriptions were also the same. The result of working was also the same as described in the preceding paragraphs, while discussing the result of past management under Sharma and Tiku Plan. The only additional feature was the fellings for eucalyptus plantations.

**A) Eucalyptus Plantations:** During III Five Year Plan lot of emphasis was laid on industrial plantations. Under this crash programme, a total area of 2165 ha. in Sal belt and in the miscellaneous forests (leaving some standards) was felled during 1963-68 to 1967-68 and was planted with Eucalyptus, (mostly Mysore hybrid). The species was later identified as *Eucalyptus tereticornis*. The break up of this area falling in each working circle is as under:

Sal Conversion Working Circle	353
Selection Working Circle	731
Protection Working Circle	820
Plantation Working Circle	261
Total	2165 ha.

**Results:** Eucalyptus planted in localities with deep soil and good moisture regime grew very well but it failed in sloping land with poor soil. Further planting of eucalyptus was stopped keeping in view its poor growth.

**11.2.6 Arya's Working Plan (April, 1968 to March 1978):** Shri SR Arya revised the Working Plan for Nahan Forest Division and his working plan was for a period of 10 years from April 1968 to March 1978.

The General objectives of management were:

- i) To preserve and improve vegetation cover all over, especially on the Siwaliks and soil erosion and conserve the moisture.

- ii) To cover the blank hillsides with tree cover and replace the inferior miscellaneous patches with suitable and more economic plantations preferably of fast-growing and pulpwood species.
- iii) To prevent erosion by afforestation and other soil conservation measures.
- iv) To meet the legitimate and bonafide requirements of the local population, of timber fuelwood, grazing, fodder and other forest produce and fuel requirement of Nahan and Paonta Sahib.
- v) To attain, as far as practicable, normal forest and normal regeneration in due course of time.
- vi) Consistent with the above, to obtain maximum annual yield in perpetuity, of various forests products timber fuelwood, bhabber grass and bamboo, etc.

With these objects of management in view, he constituted the following Working circles:

A) Sal Conversion Working Circle	(10866 ha.)
B) The Selection Working Circle	(21780 ha.)
C) The Protection Working Circle	(28104 ha.)
D) The Plantation (overlapping) WC	(4109 ha.)
E) The Bamboo (overlapping) WC	(2000 ha.)

The result of management of the forests allotted to different working circles is discussed herein after:

**A) The Sal Conversion Working Circle (10,866 ha.):** All forests containing almost pure sal and situated on gentle slopes were allotted to this Working Circle. The system of management adopted was Modified Uniform System for converting the existing irregular crop into a more or less uniform crop. A rotation period of 125 years was adopted. The area was divided into 5 P.B's. The entire growing stock of this working circle was enumerated into different dia classes down to 10 cm d.b.h. for sal, sain and other species grouped as kokat.

**Results:** The overall result was improper marking without following the marking rules, subsidiary silvicultural operations were not carried out leading to lack of regeneration.No area of nahan forest division was felled.

**B) Selection Working Circle(21,780 ha.):** All Sal forests which were not considered suitable for conversion into uniform and mixed forests with a good proportion of sal were allotted to this working circle. Areas with Chil as the main crop were also allotted to this working circle. The objects of management were (i) to improve and increase the growing stock (ii) To nurse the young crop (iii) To meet the requirements of locale people for timber, fuel, fodder, etc. (iv) To obtain progressively increasing yield. The total area allotted to this Working circle was 21,780 ha. Enumeration of the entire growing stock in 10 cm. diameter classes upto 10 cm d.bh. was done. The forests were prescribed to be worked under the Selection system with thinnings in

groups of young crop. Exploitable diameter for sal, sain, shisham was fixed at 40 cm, and that for chil as 60 cm coupes for felling were prescribed. The entire area was to be gone over in 10 years. Some suggestions to dbh, for khair 30 cm., and for all other species as 40 cm. dbh. 10-year felling cycle was fixed. Annual restriction in grazing and enforcement of lopping rules were incorporated in the plan, but they could not be followed in letter and spirit. Resin tapping in the chil forest continued.

**Result:** There was no prescription for regeneration in this working circle. Natural regeneration was deficient due to excessive biotic pressure. Fellings led to depletion of growing stock. In general the forests were badly neglected. The Standard of resin tapping was poor and very deep channels were made leading to uprooting and death of trees.

**C) Protection Working Circle (28,104 ha):** All mixed miscellaneous type of forests were allotted to this working circle. The objects of management were (i) To improve the vegetation cover (ii) To carry out sowings and planting (iii) To check soil erosion and conserve moisture (iv) To conserve and improve bhabber grass (V) To raise chil and deodar in blank areas of Kamrao-Bharli dhar. The total area ported to this working circle was 28104 ha. No enumerations were done. No fellings were prescribed and treatment of soil conservation and plantation was suggested.

**Results:** Small patches were treated and planted. Due to continuous grazing and lopping by loc. I people, gujjars and illicit grazing by migratory graziers, the conditions of these forests deteriorated. Planting activities was negligible. About 42% of the area was not even touched.

**D) Plantation Working Circle (4,109 ha.):** Forests allotted to this working circle overlapped with the conversion, Selection and Protection Working Circles.

**Nilgali plantation:** Deodar planting in Nigali forests was taken up in early thirties and it was continuing Deodar plantations were doing very well. Thinning was prescribed but not carried out. This plantation, however, now fall in Renuka, forest Division.

**New Plantations:** About 3514 area was taken under plantations in different forests from 1968-69 to 1977-78. The annual target of 50 ha planting was fixed.

**Results:** Eucalyptus plantations were not attended to. The success of planting in other areas planted was very good. Flood in giri and Yamuna damaged the plantation in R.F's, Giri, Yamuna, kaunchbeli and Rampurbeli.

**E) The Bamboo Working Circle (2000ha):** Miscellaneous scrub forest with predominantly bamboo bearing patches located in Nahan range was allotted to this working circle. The total area



of bamboo predominant patches was assessed as approx. 2000 ha. This was confined to Jabal, Maidhar Shikardi, and Tribhuni forests. The objects of management were to carry out operations to improve the stocking and rehabilitate the flowered areas to meet the genuine needs of the people and cottage industry. Method of treatment, felling cycle, and marking rules were prescribed. The annual yield was also assessed as about 235 tones.

**Results:** After 1974-75, no felling of bamboo was done due to pressure for fodder etc. was an overall depletion in the growing stock and clumps became congested. The quality of bamboos deteriorated to such an extent that commercial fellings were not possible. Efforts made during 1981-82 to sell bamboo coupes did not succeed and no offer was received. In general both the extent and quality of bamboo areas deteriorated.

#### **11.2.7 Period from 1978 to 1982**

Arya's Plan expired during 1977-78. Chauhan's Plan was prepared and made operative from 1982-83 onwards for a period of 10 years. The intervening gap of 4 years from 1978-79 to 1981-82 was covered by prescription given in Arya's Plan/ draft plan of Chauhan. The result of working was the same as described in the preceding paras while discussing the result of Past management under Arya's Plan. One of the additional features was that at the beginning of Chauhan's Plan, actual removals were in excess than the prescribed yield with the only exception being the removals carried out in P.B.1. The condition of regeneration and the crop remained much the same as described in the analysis of Arya's Plan. The growing stock continued to deplete. There were heavy pressures on forests.

**11.2.8 B.S. Chauhan's Plan (1982-92):** This plan was for a period of ten years beginning from 1982 83. However the approved working plan was available only in 1992, ie, after the expiry of the plan period. Late approval of working plan created a lot of confusion in the working of forests. The copy of the draft working plan available in the forest divisions prescribed following Working circles in the Plan:

- A) Sal Conversion Working Circle
- B) Coppice Working Circle
- C) Protection cum afforestation Working Circle
- D) Chir Working Circle
- E) Eucalyptus (O.L.) Working Circle
- F) Bamboo (O.L.) Working Circle

The forests were to be worked in accordance with the prescriptions of the draft plan. However, the approved plan actually has the following Working circles:

- A) Sal Conversion Working Circle
- B) Protection-cum-afforestation Working Circle
- C) Chir Working Circle
- D) Eucalyptus (O.L.) Working Circle
- E) Bamboo (O.L.) Working Circle

Thus, the forests coming under "Coppice Working Circle", as shown in the draft plan, were finally allotted to "Protection-cum-afforestation Working circle" in the approved plan. Although some of these forests were actually worked as coppice lots in accordance with the prescriptions of draft plan. However, the results of these workings were highly discouraging. Not even a single forest worked under coppice has regenerated fully. The Misc. Broad leaved/ khair areas of the present Trilokpur Nahan and Kolar ranges which were felled are in a very bad shape. The main reason for this sorry state is the total neglect of subsidiary operations. No felled area was fenced properly. This resulted in heavy grazing in these areas due to which no regeneration could come up. At present these areas give a very eroded look. The control forms for the years 1982-92 were also approved in accordance with provisions/guidelines contained in the draft plan. This, however, requires modifications that are actually carried out in this current plan.

**A) Sal Conversion Working Circle (18298.89 ha):** All pure sal forests of comparatively good quality, growing in flatlands and gentle slopes were allotted to this working circle. Some of the sal forests allotted to Selection Working Circle in Arya's plan, were also allotted to this working circle. The main criteria of allotment were that the forests contained mostly pure sal crop and the conditions being such that natural regeneration of sal could be obtained. The main object of constituting this Working circle was to convert the existing irregular crop into more or less uniform crop. . The silvicultural system adopted was a "Uniform system with fixed periodic blocks". No enumerations were carried out in this plan.

**Result of Sal Conversion Working Circle:** The overall result was improper working, ignoring of subsidiary Silvicultural operations: restrictions on green felling after 1986-87, variance in the prescriptions of draft plan over-prescription of yield. The overall yield of this Working circle was prescribed as 41000 cum, which was gross overestimation and it was not achieved. All this led to lack of regeneration. Some damage was caused due to migratory as well as local graziers.

**B) Protection cum Afforestation Working Circle (40,925.17 ha.):** All areas excluding the areas allotted to Sal Conversion Working Circle, Chil Working Circle and pockets of Eucalyptus plantation, were allotted to this working circle. This included poor quality sal forests which were allotted to Selection Working Circle in Arya's Plan. All miscellaneous scrub forests were also included in this Working Circle. The total area of this working circle was 40,925. 17 ha, out of this about 27,612 ha. had moderately stocked miscellaneous broad-leaved forests or moderately stocked poor quality sal forests. This area was initially allotted to Coppice Working Circle in the draft working plan, and a definite yield by area (552 ha per annum) was prescribed. A few forests like R-86 East Bheron C2 and R-103 Rama C2 were infact been worked as coppice lots as prescribed in the sequence of fellings for Coppice Working Circle in the draft plan. However, later on in the approved plan, the entire area was put into Protection cum Afforestation Working Circle This was a serious lapse and mistake which resulted due to late approval and receipt of the approved Chauhan's plan. The main objectives of management of this working circle were (i) To improve vegetative cover (ii) To maintain existing forests for aesthetic reasons (iii) To carry out planting of timber, fuel, fodder and other species (iv) To protect and introduce bhabbar grass (v) To conserve soil and water by carrying out suitable conservation measures.

**Results:** There was a lot of variation in the prescriptions of the draft plan and approved plan. There was confusion in working as well. Although R.F. Maidhar C-5 was felled during 1982-83 and R.F. Dhandla C-11 & Danda Amboya C-5 during 1984-85 under coppice system but they should not have been felled because coppice system was done away with in the approved plan. Although these areas were felled as coppice lots but no attention was given on subsidiary silvicultural operations for regenerating the felled areas. As the result, the areas could not be regenerated effectively. There was heavy biotic interference in these areas which badly affected the regeneration. Other prescriptions too were not followed strictly. The plantation program was not followed properly. The forest was continuously subjected to heavy biotic pressures. The new plantations were not very successful. Soil erosion went on unabated. As a result, the forest continued to degrade and growing stock got depleted. No regeneration came up in the felled areas listed above. This was mainly due to ineffective and untimely closure and heavy grazing, browsing and lopping.

**C) Chil Working Circle : (1027.04 ha):** Chauhan's Plan included the chil areas of Nahan and Paonta Sahib Forests Divisions in this working circle. Chil was however confined to Kansar Block of Girinagar Range. The forests contained good quality chil with poor stocking. The main object of constituting this working circle was to improve the stocking of existing forests. Since

the area under chil was limited, no regular working on the principles for chil management was prescribed. Salvage marking and markings of trees to meet the requirement of local right holders was prescribed. Biannual plantation program in blanks was suggested. Resin tapping in accordance with the Punjab Forest Leaflet no. 13 was to be carried out.

**Results:** Since no specific working prescriptions were given, nothing specific work was carried out. Planting programme was not followed. However, certain areas were taken up for planting without any significant achievement. T.D. was also given from these forests. This together with heavy salvage removals resulted in depletion of overall growing stock. Resin tapping was carried out in gross violation of the instructions on the subject and deep channels were dug. Consequently, several trees got uprooted or died. In nutshell, the basic objective of improving the stocking could not be achieved at all.

**D) Eucalyptus (Over Lapping) Working Circle (727.62 ha):** This Working circle overlapped the areas of Sal Conversion Working Circle and Protection cum Afforestation Working Circle. Eucalyptus was planted from 1964-65 to 1977-78. The main objectives of management include (i) Felling of stagnating eucalyptus plantations, regenerating the area with coppice crop supplemented with planting of fodder species. (ii) To fell eucalyptus to meet the local requirement of fuelwood and small timber. No enumerations were carried out in this working circle. Specific marking rules were framed. Specific subsidiary silvicultural operations such as bush cutting, fencing, singling of coppice shoots in the 2nd year, planting of suitable species, etc. were suggested. Miscellaneous regulations were prescribed. It was provided that management of these areas should be reviewed after the first rotation of 10 years. (The entire area was to be felled in a period of 10 years)

**Results:** No area was felled after 1987-88. Even before that areas were not felled strictly in accordance with the prescriptions. However, all the areas felled have regenerated well with coppice crop which has almost reached pole stage. It is sad to point out that no subsidiary silvicultural operations were carried out as per the provisions. Coppice shoots were not singled out. The regeneration has not put up the desired growth. The crop has become quite congested. There is a thick bushy growth of rohini, lantana, gurbheli, etc. besides the regeneration, which has hampered the growth of the crop. Thus, despite the fact that felled areas have regenerated, the objectives of management were not achieved fully.

**E) Bamboo (O.L.) Working Circle [ 1132 ha ]:** This Working circle included the Bamboo bearing areas, which overlapped Protection cum Afforestation Working Circle. They mainly fall

in Nahan and Trilokpur Ranges. Bamboo forests included in this working circle were mostly found in areas mixed with other broad-leaved species such as sain, chhal, amaltas, amia, jhingan etc. These areas have been subjected to continuous lopping, illicit and unscientific cutting of bamboos, reckless hacking, etc. This has resulted in congested clumps and poor quality crop of bamboo. Main objects of management of this working circle include, Rehabilitate the bamboo forests which were congested and heavily lopped (i) To improve the stocking of inferior species of bamboos by better species (i) To preserve and propagate bamboos in suitable areas to meet the genuine demand of local people. The entire area of the working circle was to be worked on 5 years rotation. The yield was prescribed in terms of area. However, no effort was made to have an equal annual yield. Felling rules were prescribed. Specific Subsidiary Silvicultural Operations were also provided. Several miscellaneous regulations were suggested. However, all of these prescriptions were badly ignored. Bamboo was never felled strictly in accordance with the prescribed plan. Fellings rules were overlooked. Subsidiary Silvicultural operations never followed. This resulted in an overall degradation of bamboo crop.

**Results:** As already discussed, felling program was not followed strictly. Fellings rules were not followed. Subsidiary silvicultural operations were overlooked. Miscellaneous regulations were badly ignored. This resulted in an overall degradation of the bamboo crop. It became congested. The areas were subjected to excessive grazing and unscientific cutting. The quality of bamboos became extremely poor. The objectives of management received a severe jolt on account of bad working and lack of silvicultural operations.

**11.2.9 Vineet's Working Plan ( 1998-99 to 2012-13):** The general objective of management was to improve the forest cover of Nahan Forest division. The following Working Circles were prescribed in this WP:

**Forest area under different working circles:** The statement showing the area of working circle and their range-wise distribution is given in the table 11.1 below.

**Table 11.2 Statement showing the area of working circle**

	Sal WC	Coppice WC	Chil WC	Prot. cum Reh. WC	Bamboo (OL) WC	Eucalyptus WC	Khair WC	Total Area
Nahan	2265.56	2733.61	0	154.6	120	254.94	433.76	8962.47
Kolar	738.98	6575.48	0	505.97	0	88.21	93.85	8002.49
Trilokpur	0	3337.67	0	3465.35	859.48	14.46	334.44	8011.40

Jamta	0	373.2	2926.45	2968.76	0	66.20	96.24	6430.85
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**A) Sal Working Circle:** It generally covered all the Sal forest of the area .The main criteria for allotment to this was the presumption that Sal regeneration can be obtained there. The poor Sal forest which were allotted in Chauhan's WP under Protection cum Afforestation WC were also included in Sal WC. The density & quality of Sal crop Forest varied from site to site. This was due to biotic pressure on each forest. Natural regeneration was also very poor due to poor viability of Seed. The Sal forest was bifurcated into two aategories:

**1) Type A:** It included Sal Forest having predominant mature Sal trees. Coppice Regeneration was deficient. Such forest has been specially mentioned as Type A.

**2) Type B:** It included the area where regeneration is mainly from coppice. It was supplemented by artificial planting. All the areas not categorized in type A were presumed as TYPE B.The total area of WC in Nahan Division allotted was 3004.54 Ha. Only one Series was formed. Stock maps were prepared on 1:15000 scale and were filed in CH files. Complete enumeration has been carried out in PB I & PB IV areas. Growing stock in others PB's has been assessed randomly by sample technique. The class-wise, forest-wise, species-wise, details are given in CH files.

**Table 11.3 Showing Range-wise area under Sal WC**

Name of Range	Sal WC				Total Area (Ha)
	PB I	PB II	PB II	PB IV	
Nahan	32.64	1150.12	1082.8	0	2265.56
Kolar	0	245.26	448.44	45.28	738.98
Trilokpur	0	0	0	0	0
Jamta	0	0	0	0	0

Shelterwood system with fixed periodic block has been adopted for this WC. Preference was given to regeneration with coppice origin in TYPE B forest. Emphasis was given to regeneration of seed origin and artificial sowing /planting of Sal and associates in Type A category areas. The main species was Sal. The local species were also desirable due to various reasons. Sain, Mulberry, Jamun were planted as per site quality. The proportion of Sal and other species was about 60 % & 40%. The common associate species like Sandan, Arjun, Behra, Neem, Jamun, etc were also given space. Keeping in view the rate of growth, the exploitable diameter was fixed as 40 cms. In Sal forest of quality class III Dia class of an average 40cms is attained in 118 years. Thus, rotation is kept 120 years with regeneration period of 30 years. The working circle was divided into 4 periodic blocks. P B1 areas having mature & over mature over wood having some

regeneration with low crown density. PB II areas included supporting nearly mature over wood without regeneration or scanty regeneration. The PB III included all other areas which were not included in any of the PB's discussed above. The detail of allotment of forest in PB's was also tabulated. The felling cycle was 30 years as the regeneration period was 30 years.

The yield was regulated by volume, PB-wise, Species-wise, Class-wise as per the **Von Montel** Formula.

Annual Yield: PB 1 areas = 25000 cum

P B 1V areas = 3000 cum

Total Yield = 28000cum

Other regulations like Closure, lopping, and Grazing, Fire Protection, Right Holders requirements, Prevention against Sal Borer attack, Special treatment for various Small Blanks, Regeneration assessment Survey, Regeneration Programme, and study of Regeneration growth and technique were also described in detail.

**Results:** Due to the ban on green felling, the forests were never worked in accordance with the prescription of the plan. Planting programs were also not adhered to. There was heavy biotic pressure on the forests of the division. Soil erosion went on unabated.

## **B) COPPICE WORKING CIRCLE:**

### **1. GENERAL CONSTITUTION & CHARACTER OF VEGETATION :**

This Working Circle was carved out of the areas of protection and Sal WC of Erstwhile Chauhan's WP. It covered preliminary miscellaneous BL forest species Khair, Chhal, Amaltas, Tendu, Jhingan, etc and the poor quality Sal areas which are not fit to be managed under Sal WC.

**Table 11.4 Showing Range-wise area under Coppice WC**

<b>Name of Range</b>	<b>Coppice WC Total Area (Ha)</b>
Nahan	2733.61
Kolar	6575.48
Trilokpur	3337.67
Jamta	373.20
Total	13019.96

The total area allotted to this WC is 13019.96 Hac. Only one Felling series was constituted. All the forests allotted to this WC has been mapped. A complete enumeration of only Khair trees had been done in 5cms dia classes down to 10 cms dia. The density was 0.1 to 0.5. Coppice with a reserve system supplemented by artificial planting was prescribed. The local species were preferred with emphasis on fuel & fodder. A dia of class 20 cms and 20 to 30 cms DBH of

rotation 30 years for coppice & 60 years for standard had been adopted. Two thinning were done during rotation at intervals of 10 years, Felling cycle was of 10 years. Yield was prescribed by areas. The total yield was 500 ha. Calculation of yield was not done by volume. A deviation of (+) 30 % in a year, and (+) 20 % cumulative at the end of each five-year block was permissible. The sequence of the felling program was prescribed in the WP & it can be changed with the approval of CCF WP keeping in view the yield & Deviation. In these areas closure against grazing may be done in the Year of felling before 28th Feb So as to take full advantage of Coppice shoot.

**Result:** Prescriptions of working plan were not followed which resulted in poor crop.

**C) CHIL WORKING CIRCLE:** This WC covers Chil forests of Jamta range. An area of 2926.45 ha was included in the current WP. Only one Felling series was constituted. The stock Map has been prepared on a 1: 15000 scales.

**Table 11.5 Showing Range-wise area under Chil WC**

Name of Range	Sal WC				Total Area (Ha)
	PB I	PB II	PB II	PB IV	
Nahan	0	0	0	0	0
Kolar	0	0	0	0	0
Trilokpur	0	0	0	0	0
Jamta	846.20	1184.05	791.20	105.0	2926.45

The complete enumeration was done in PBI and PB IV areas. Random sampling was adopted for enumeration in other PBs. Density varied from 0.3 to 0.6. Site quality was generally II / III. The forests were managed under the Indian Irregular Shelterwood system. Keeping in view the MAI and CAI & out turn of standard size timber the exploitable dia was kept 55 cms. Rotation of 100 years was prescribed. The regeneration period was 25 years. Four Periodic blocks that have been constituted should also discuss the same. The allotment of areas to PB's be checked. The crop was open, thus felling cycle was kept as 25 years. The yield has been prescribed from PB I areas & of chil spp only. There were two types of fellings:

1. Seeding felling
2. Final felling.

Annual yields were also prescribed based on the yield regulation under the Indian irregular shelterwood system. However, following a ban on the green felling in the hills, these Chil forests could not be worked in accordance with prescriptions laid down in the working plans. Thus only salvage extraction of the dead and dry trees was allowed and such extraction was mainly done through the HPSFDC Ltd. As no final felling could be carried out due to the ban, the canopy could not be opened that would have favored the forest to be fully stocked with well-established



regeneration. Hence, generally, there is a lack of natural regeneration in these forests. However, in some chil forests, one can come across small patches of natural regeneration of chil. 2000 m<sup>3</sup>/year was fixed for PB I areas for both types of felling. The yield was controlled by volume. An annual deviation of 10 % was allowed.

**SEEDING FELLING:** About 20-24 healthy vigorous growing trees with clear tall bole and good crown are retained as seed bearer per ha. The distance was kept between 20 to 22 meters and on warm aspect 19 to 20 meter & the number to retain are 24 to 28 trees as seed bearer. The mother trees were prescribed to be kept at uniform space. The isolated poles were to be removed. But due to ban on green felling during WP period no such activities be carried out.

**FINAL FELLING:** It applied to fully regenerated areas having height above 5 Meters and regeneration has been control burnt at least thrice. All the seed bearers were to be removed except the ones standing over unregenerated small gaps exceeding 20ha. But due to ban on green felling during WP period no such activities be carried out. The WPO should discuss & keep this in mind while finalising the same. The sequence of felling program is prescribed in the WP.

**SUBSIDIARY SILVICULTURAL OPERATION:** The detail of subsidiary silvicultural operations like slash disposal, cutting of bushy growth, etc. shall be carried out in seeding felling area. For the initial first 3 years, the natural regeneration is relied upon, then gaps be filled by artificial regeneration. Fencing and closer of areas for grazing for 10 years, a complete ban on lopping, Bush cutting, and removal of unwanted bushes, etc.

**OTHER REGULATION:** The other regulations proposed were as under :

**a. Fire protection:** This can be correlated to a number of fire incidences and hence can show that these steps were useful / not useful in controlling fire in the chil forests and hence shall form the basis of prescriptions in the new WP with reference to fire management.

**b. Controlled Burning:** Fires during the dry summarise May / June. Measures to check the menace of forest fires in chil were prescribed in different working plans. These measures included clearing of fire lines, controlled burning and removal of inflammable chil pine needles from the forest floor besides ensuring public awareness and participation in recent times. Fire lines have been cleared and are being maintained in these chil forests. Control burning is carried out periodically in the chil forests.

**c. Resin Tapping:** Prior to 1984, resin tapping was done by the conventional French cup and lip method. This was found to have a damaging effect on the trees and the injury caused led to mortality of the tree and also affected the quantity and quality of extractable timber. Besides, resin could be extracted for a comparatively short period in the lifetime of the tree. This method was gradually replaced by the improved Rill method of resin extraction devised by FRI which induced sustainability in resin extraction and also ensured that the tree is not subject to destructive means for resin extraction. From 1997 onwards, the tappable diameter for chil trees which would be under tapping for the first time was fixed at 35 cm DBH.

**Results:** Following a ban on felling of green trees in the hills these chil forests could not be worked in accordance with the prescriptions. Only salvage extraction of the dead and dry trees was allowed and such extraction was mainly done through HPSFCL. As no final felling could be carried out due to ban, the canopy could not open up to favour natural regeneration. Hence, there is generally a lack of regeneration in these forests.

#### **D) PROTECTION CUM REHABILITATION WORKING CIRCLE:**

The working circle covers poor quality Misc. B. L. Forests situated on moderate or steep eroding formations, poor/ refractory soil generally inferior for supporting good forest growth. The forest falls in the following category of Champion's revised classification of the forest type of India.

1. 5B / C1 a –Dry Shiwalik Sal Forest.
2. 5B / C 2 \_ Northern Dry Mixed Deciduous Forest.
3. 5 B / I E 9 – Dry Bamboo brakes.
4. 5B / IS2 - Khair Sisoo Forest.
5. 9 /C1a - Lower Himalayan Chir Pine Forest.

**Table 11.6 Showing Range-wise area under Prot. cum Reh. WC**

<b>Name of Range</b>	<b>Prot. cum Reh. WC Total Area (Ha)</b>
Nahan	154.60
Kolar	505.97
Trilokpur	3465.35
Jamta	2968.76
<b>Total</b>	<b>10094.68</b>

The total area is 10094.68 ha under this WC. The stock map has been prepared on 1: 15000 scale map in respective CH files. No enumeration has been carried out in this WC. Crop density varied greatly in these areas from its eroded to well-stocked forest. Natural regeneration was almost

absent. No commercial fellings were prescribed. Although no scientific felling was prescribed salvage removal of dry, dead, fallen trees was prescribed to be carried out. No yield, exploitable dia, regeneration/rotation was prescribed. The forests were mainly divided into 3 categories:

a) Badly eroded areas: To protect them effectively denudation be prevented, no removal was allowed & for soil conservation measures, small vegetative measures, the introduction of good quality grass species; the selection of areas by ACF/ RO was prescribed.

b) Grassy Blank: They were proposed to be planted with local species.

c) Wooded areas: The forests were merely for protection purposes. Gap planting was proposed with small vegetative measures. Other regulations were effective closer, grazing, Lopping and Planting. Fire protection and Right holder Requirements.

**Results:** Due to heavy biotic pressure and the absence of effective closure the condition of the forests further deteriorated. No specific planting program was followed.

#### **E) BAMBOO (OVERLAPPING) WC:**

Nahan Forest Division was considered in this WC Bamboos in the dry mixed deciduous forests occur as a middle storey and upper storey.

**Table 11.7 Showing Range-wise area under Bamboo (OL) WC**

<b>Name of Range</b>	<b>Bamboo (OL) WC Total Area (in ha)</b>
Nahan	120.00
Kolar	0
Trilokpur	859.48
Jamta	0
<b>Total</b>	<b>979.48</b>

Forests under this WC are of very low quality and neglected state. This working circle is an overlapping working circle and the units are not separated into independent compartments/sub-compartments. Density is low to very low and no enumerations have been done.

**Results:** There has been no regular cutting and no cleaning of the clumps. Heavy ngrazing and non-closure in the rainy season still remain the problem. This has caused congestion and poor crop.

#### **F) EUCALYPTUS (OVERLAPPING) WC:**

**GENERAL CONSTITUTION/ CHARACTER OF VEGETATION:** This was a result of plantation raised during the third five-year plan under crash programme of raising large scale plantations of industrial pulpwood. The detail of areas where these were carried out fell in Sal Conversion WC, Selection WC, Protection WC and Plantation WC. The Sal belts with blank patches were selected for this purpose. The working of eucalyptus was first prescribed by Chauhan WP (1982-83 to 1991-92). In the Vineet's WP, the areas generally overlap with the forest falling under Sal Working circle & Coppice WC. The successful plantations have resulted in small compact patches. Only compact patches were taken in this WC. Scattered Sal, Sain, Khair, Shisham, and other natural species. were found along with Eucalyptus in these areas. The eucalyptus patches were existing in blocks and compartments which have been allotted to their respective WC. This was overlapping WC. So it was not separated into an independent compartment. The total area is 423.81 ha. Coppice with Standard System was to be adopted. The eucalyptus is regenerated by coppice. In case of failure, other indigenous species were proposed to be planted. No dia was fixed. However, dia of 20 cm DBH were found suitable for pulpwood. The coppice attained 20 cms DBH in 15 years. So 15 years was fixed for coppice & 30 years for Standard. 15 years felling cycle was fixed. Yield was controlled by area. The eucalyptus was to be felled within the next 15 years. The detail of forest due for felling was tabulated in the WP which can be changed with the approval of CCF WP.

**OTHER REGULATION:** Extension of eucalyptus crop over an area having alternative crop was proposed to be avoided. If the coppice crop does not respond favourably the area was to be planted with other fast-growing indigenous species.

**Results:** Following a ban on felling of green trees in the hills these forests could not be worked in accordance with the prescriptions.

#### **G) KHAIR (OVERLAPPING) WORKING CIRCLE:**

It included various established Khair plantations all over the tract. The area supports pure even-aged khair crop (above 75 %). The old record is procured from the record /Plantation Journal. Over the period of time opening have occurred in these plantations mainly due to salvage / illicit felling. Some shows sign of heart rot (*Fomes badius* Berk) and Witches Broom. However, no serious diseases were noted. Due to attack of bushes like *Lantana*, *Adathoda*, *Carissa*, etc natural regeneration was absent. A severe protection problem for the staff, especially in the border beats adjoining to Haryana State is faced. The standing volume, heartwood volume, weight of chips

and katha quantity has been prescribed as per Nurpur Forest Division Working Plan by Sh. Nanak Chand. The detailed list of areas allotted to this WC is clearly tabulated in the current WP.

**Results:** After 1996-1997 no green felling of Khair trees has been carried out from Govt. forest. Presently a large number of mature and over mature trees are standing in the forests. These are not only getting affected by the rot and hollowness of the heartwood but are also a severe protection problem for staff in border areas.

## **CHAPTER-12**

### **STATISTICS OF GROWTH AND YIELD**

#### **12.1 THE MAIN SPECIES:**

The main species found in the region are sal, sain Chil, Khair, Shisham, Eucalyptus etc. Apart from these spps, several miscellaneous spps, also exists in the areas, which are generally termed as Kokat. No fresh studies were carried out to determine local volume tables, diameter growth, mortality rate and relationship of volume and diameter with age in respect of different species while preparing this working plan. Instead, as per the guide lines in the approved preliminary working plan report, all the data regarding statistics of growth and yield has been adopted from working plan by Sh. Vineet Kumar IFS (2003-04 to 2012-13). The same is reproduced here in detail incorporating a few changes in enumerations, stock mapping etc. The statistics of growth, volume and yield of these species is discussed below:

#### **12.2 SAL (*Shorea robusta*):**

Following references were consulted in the case of Sal in the previous working plans:

- (i) Yield and stand table for sal, Indian Forest records (N.S) Silviculture vol. 4-A No.4, 1643 by Griffith and Bakshi Sant Ram.
- (ii) Stand tables for Sal even aged forest and coppice, Indian Forest records, Silviculture series, Volume X part XVI 1935.
- (iii) General volume table for Sal, Indian Forest records, Silviculture series, Vol. X part VI, 124 by S.H. Howard.
- (iv) Volume and out turn tables for Sal, Indian Forest Record, Silviculture Series Vol XII part I, 1925 by S.H. Howard.

**12.2.1** Generally, the forests of this area support Sal of quality III. In some portions (dry and exposed ridges), the quality recedes to III/IV or even IV. However in good areas, the quality class goes up to II. In general, the standard Volume factors for quality class III are applicable and would be applied for preparation of control forms. The total Volume figures of the tree, including small wood have been adopted. Volume table is produced ahead:

**Table 12.1 Showing standing volume of Sal (As applicable)**

Dia Class	D.B.H. Class (Over Bark)	Total Standing Volume (M <sup>3</sup> )
V	Over 10 to 20 cm.	0.127
IV	Over 20 to 30 cm.	0.368
III	Over 30 to 40 cm.	0.835
IIA	Over 40 to 50 cm.	1.770
IIB	Over 50 to 60 cm.	3.030
IA	Over 60 to 70 cm.	4.587
IB	Over 70 cm.& above.	6.385

**12.2.2** Calculation of the total standing volume, taking into account the quality class of the individual forest will give a better idea of the yield expected and for this reason, the total volume factors for the various quality classes found in the region are reproduced as follow:

**Table 12.2 Showing Standing Volume of Sal (Quality Classes wise)**

D.B.H. Class (Over Bark)	Standing Volume for the Quality Classes (M3)		
	II	III	IV
Over 10 to 20 cm.	0.156	0.127	0.113
Over 20 to 30 cm.	0.425	0.368	0.347
Over 30 to 40 cm.	0.913	0.835	0.772
Over 40 to 50 cm.	1.890	1.770	1.692
Over 50 to 60 cm.	3.235	3.030	2.924
Over 60 to 70 cm.	4.878	4.587	4.389
Over 70 cm. & above.	6.385	6.385	6.074

**12.2.2.1 Outturn tables for different quality classes for Sal are given as under:**

*Shorea Robusta* (Sal)

**Table 12.3 LOCALITY QUALITY I**

Diameter Class	Stem Length of Commercial bole	Stem commercial timber in round sound trees	Stem sawn timber absolutely sound straight boles	Stem Sawn timber normal good coupe	Stem sawing factor absolutely sound straight boles	Stem sawing factor normal good coupe	Add for branches column 4&5
1	2	3	4	5	6	7	8
(Cm D.B.H)	(meters)	Cum	Cum	Cum			Cum
Over 20-30	10.66	0.28	0.1	0.09	.40	.35	-
Over 30-40	14.63	0.76	0.35	0.35	.47	.46	-
Over 40-50	16.45	1.38	0.76	0.65	.55	.47	-
Over 50-60	17.67	2.17	1.28	1.04	.59	.48	0.01
Over 60-70	18.28	3.11	1.92	1.49	.62	.48	0.05
Over 70-80	18.89	4.13	2.60	2.03	.63	.49	0.14
Over 80-90	19.20	5.15	3.29	2.53	.64	.49	0.21

*Shorea Robusta* (Sal)

**Table 12.4 LOCALITY QUALITY II**

Diameter Class	Stem Length of Commercial bole	Stem commercial timber in round sound trees	Stem sawn timber absolutely sound straight boles	Stem Sawn timber normal good coupe	Stem sawing factor absolutely sound straight boles	Stem sawing factor normal good coupe	Add for branches column 4&5
1	2	3	4	5	6	7	8
(Cm D.B.H)	(meters)	Cum	Cum	Cum			Cum
Over 20-30	7.62	0.22	0.08	0.08	.40	.37	-
Over 30-40	10.66	0.62	0.28	0.26	.47	.45	-
Over 40-50	13.10	0.013	0.62	0.52	.55	.46	-
Over 50-60	14.63	1.21	1.04	0.83	.59	.47	0.01



Over 60-70	15.54	2.54	1.58	1.23	.62	.48	0.05
Over 70-80	16.15	3.45	2.17	1.69	.63	.49	0.14
Over 80-90	16.15	4.41	2.83	2.17	.64	.49	0.21

*Shorea Robusta* (Sal)

**Table 12.5 LOCALITY QUALITY III**

Diameter Class	Stem Length of Commere ial bole	Stem commercial timber in round sound trees	Stem   sawn timber absolutely sound straight boles	Stem Sawn timber normal good coupe	Stem sawing factor absolutely sound straight boles	Stem sawing factor normal good coupe	Add for branches column 4&5
1	2	3	4	5	6	7	8
(Cm D.B.H)	(meters)	Cum	Cum	Cum			Cum
Over 20-30	5.18	0.16	0.07	0.05	.40	.33	-
Over 30-40	8.53	0.48	0.22	0.22	.47	.47	-
Over 40-50	10.66	0.87	0.48	0.48	.55	.47	-
Over 50-60	11.27	1.38	0.82	0.82	.59	.46	0.01
Over 60-70	11.88	2.00	1.24	1.24	.62	.46	0.05
Over 70-80	12.19	2.74	1.72	1.72	.63	.48	0.14
Over 80-90	12.19	8.53	2.26	2.26	.64	.50	0.21

Shorea Robusta (Sal)

**Table 12.6 LOCALITY QUALITY IV**

Diameter Class	Stem Length of Commercial bole	Stem commercial timber in round sound trees	Stem sawn timber absolutely sound straight boles	Stem Sawn timber normal good coupe	Stem sawing factor absolutely sound straight boles	Stem sawing factor normal good coupe	Add for branches column 4&5
1	2	3	4	5	6	7	8
(Cm D.B.H)	(meters)	Cum	Cum	Cum			Cum
Over 20-30	3.96	0.14	0.05	0.04	.40	.30	-
Over 30-40	7.01	0.36	0.16	0.16	.47	.46	-
Over 40-50	9.14	0.70	0.39	0.33	.55	.48	-
Over 50-60	10.05	1.16	0.67	0.55	.59	.48	0.01
Over 60-70	10.66	1.69	0.04	0.80	.62	.48	0.05
Over 70-80	10.66	2.26	1.42	1.10	.63	.49	0.14
Over 80-90	19.20	5.15	3.29	2.53	.64	.49	0.21

### 12.3 SAIN: (*Terminalia tomentosa*)

Reference: General standard and commercial volume tables for Terminalia tomentosa. Indian Forest records, (N.S.) Silvicultural vol. 4A No. 5, 1947 by A.I. Griffith and Bakshi Sant Ram.

Majority of the Sain trees are found scattered along with Sal, forming a very small composition of the crop (roughly about 10%). For convenience, therefore, for the preparation of control forms, the volume figures for Sal of quality class III Shall be applicable

### 12.4 CHIL (*Pinus roxburghii*)

References:

- (i) The yield and Stand Tables for Chil by S.K. Seth, S.N. Dabral and M.L. Lala, Indian Forest record Vol. II No. 8.

- (ii) Growth and yield statistics of common Indian Timber Species (Himalayan region)  
Vol.I.
- (iii) Growth and yield statistics of common Indian Timber species (Plain region) vol. II.

Since the forests of the area are generally un-evenaged, under stocked and not subjected to regular thinning in the past, Local volume Tables were prepared by felling 219 trees by Sh. O.P. Sharma for Rajgarh working plan. This volume table will be adopted for the purpose of calculations in the present plan. It is reproduced below:

**Table 12.7 Local Volume Table For Chil**

Diameter in Cm	Av. Breast height diameter (o.b) in m.	Volume in m <sup>3</sup>
10-20	0.15	0.0504
20-30	0.25	0.2499
30-40	0.35	0.6846
40-50	0.45	1.3544
50-60	0.55	2.2593
60-70	0.65	3.3994
70-80	0.75	4.7746
80-90	0.85	6.3849
90& over	0.95	8.230

**Table: 12.8 Age-dia relationship**

Sr. No.	Age in years	Height (In mtr)	Diameter (In cm)
1.	10	5.8	6.0
2.	20	8.3	11.5
3.	30	10.8	17.2
4.	40	13.3	22.8
5.	50	16.9	28.3
6.	60	18.3	33.6
7.	70	20.6	39.0
8.	80	22.7	44.3
9.	90	24.5	49.60

10.	100	25.4	54.4
11.	110	26.2	58.7
12.	120	26.8	62.3
13.	130	27.1	65.0

## 12.5 KHAIR (*Acacia catechu*):

**12.5.1 Volume Table:-** In Chauhan's plan the volume factors as given in Arya's plan were followed. Arya followed the factors given in the Indian Forest Records. In these volume factors volume of Vth Class was not given. Moreover, these were in 10 cm. dia class. But keeping in view increasing prices of Khair wood and the low exploitable diameter, it is felt that the volume factors should be based on 5 cm. dia classes down upto 10 cm dia. These are derived from the volume factors given in Chauhan's plan graphically and are tabulated below for use in the current plan.

**Table: 12.10 Volume Factors of Khair**

Dia Class in round. (cum)	Heartwood (cum)	Commercial timber (cum)
10-15 (V-1)	-	0.083(Small wood)
15-20 (V-2)	0.068	0.115
20-25 (IV-1)	0.093	0.149
25-30 (IV-2)	0.139	0.218
30-35 (III-1)	0.206	0.343
35-40 (III-2)	0.337	0.530
40-45 (IIA-1)	0.503	0.768
45-50 (IIA-2)	0.660	1.047
Above 50 (IIB & abpve)	0.883	1.283

Due to fact that the trees of size IIA-2 are generally hollow so the volume factors have been given only upto IIB class and for higher classes too, the volume factors of IIB will be followed.

**12.5.2 Yield:-** The Yield of dry katha as given in Rajgarh Working Plan by O.P. Sharma (from 1976-77 to 1990-91) is reproduced below for information.

**Table: 12.11**

Diameter class in cm.	Yield in units of 8 kgms.	Remarks.
20-30	1.00	
30-40	3.00	

40-50	7.00	
50-60	11.00	*
60-70	15.00	*
60-70	15.00	*

- These figures are of academic interest only because sound/healthy trees 45cm. & over d.b.h are usually found to be hollow and rotten.

**12.6 Eucalyptus:** Volume tables for Eucalyptus have been prepared by F.R.I. These are being used by adjoining forest divisions of Haryana forest department. These volume tables will be adopted in the present plan. These are re-produced below:-

**Table: 12.12**

Dia Class	D.B.H. (O.B) (Cm)	Standing Volume (Cum)
Below V	0-10	NIL
V	10-20	0.114
IV	20-30	0.312
III	30-40	0.500
IIA	40-50	0.600

Eucalyptus trees having D.B.H over 50 Cms are not available in the area. In case of any exception, the volume shall be taken same as for diameter class IIA.

## **12.7 Shisham & Kokat:-**

**12.7.1 Volume Table:-** The volume factors as given in Chauhan's plan will be continued. These are reproduced below:-

**Table: 12.13**

Dia Class(cm)	Shisham (m <sup>3</sup> )	Kokat (m <sup>3</sup> )
10-20 (V)	0.064	0.064
20-30 (IV)	0.176	0.184
30-40 (III)	0.467	0.418
40-50 (IIA)	0.977	0.885
50-60 (IIB)	1.523	1.515
60-70 (IA)	2.265	2.294
70 & over (IB)	2.265	3.193

**12.7.2 Growth:-** No local data was collected to show the growth rate of miscellaneous broad leaved species. However, the data collected elsewhere may give some idea about growth of broad leaved species. As per the Growth and Yield Statistics of Common Indian Timber Species published by the FRI Dehradun, the growth rate of some of the species as under:

**Table: 12.14**

Age in years	Crop Dia (Cm.)					
	Chhal	Shisham (Av quality)	Simbal	Sal(SQIII)	Sal (SQIV)	Sain
10	8.832	5.08	-	5.84	4.22	8.64
20	13.208	9.65	13.72	10.16	7.62	14.22
30	17.272	22.35	21.34	13.37	10.82	20.32
40	20.828	31.24	28.70	17.53	13.57	27.43
50	23.875	38.12	35.56	21.08	17.02	29.48
60	26.416	46.23	39.12	24.38	17.27	33.27
70	28.702	-	41.92	27.69	22.61	36.83
80	30.480	-	43.69	30.73	23.18	40.13

# PART-II

**Future Mangement Discussed & Proposed**

## **CHAPTER-I**

### **BASIS OF PROPOSAL**

#### **1.1 INTRODUCTION**

Forest has always since their inception served the humanity which in turn has interacted with exploitative attitude over the time. This renewable resource has played a pivotal and significance role in the fabric of National economy in general and social economic condition of rural population in particular. The give and take relationship with the forest has however at no point of time struck a balance. In fact human interests have always outweighed the necessary obligation towards the forests.

With the changing socio economic scenario at the national level, the forests have witnessed an exposure to an over expanding range of their utility. In concurrence with this, efforts have always been there to replenish this resource. Such package of efforts have been embedded in the National Forest Policy of 1952 which during 1988 stand further tailored to the changing needs and reaction of public with a principle aim of ensuring environmental stability and maintenance of ecological balance which are vital for sustenance of all life forms human, animal and plants.

This division being mostly in the foot hills of Shiwalik zone has a very fragile geological formation which in the absence of any vegetation erodes easily. Thus soil conservation measures supplemented by Afforestation form an important tool to restore the green cover and prevent any soil erosion. While the Forest Conservation Act, 1980 has largely halted the process of alienation of land form the control of Forest Department, but this has not put halt to the condition of vegetation cover of forests.

#### **1.2 OBJECTIVES OF MANAGEMENT:**

All the forests of Nahan are Reserved Forests. However in the recent past, they have been subjected to very heavy pressures and exploitation, both legal and illegal. There has been the problem of regeneration. The principles of sustainable forest management wherein thrust is laid on conservation of the forest resources vis-à-vis utilization of forest usufructs shall be the underlying objective of the revised working plan. At the macro level, they are in consonance with the National Forest Policy of 1988. The various guidelines issued by the H.P. Government for the protection and betterment of the forests have also been kept in view. The general objects of management, therefore, are:->

1. To ensure continued provision of specific product of services from forests to the public without harm to the ecosystem.



2. To maintain environmental stability by conserving national heritage of biologically diverse floral and faunal resources.
3. To check soil erosion and denudation in the catchment area of river lets draining into the reservoirs.
4. To enhance the Forest cover and productivity of the Forest through the through silviculture techniques.
5. To Endeavour for attaining normalcy of the forests by supplementing natural process with artificial techniques.
6. To generate motivational campaign in the public for conserving and increasing the Forest Wealth through Joint Forest Management.
7. To take effective Measures for safeguarding against encroachments in Forest land and reduce illegal deforestation.
8. To take effective Measures for Eco restoration of forest land infested with invasive species.

### **1.3 CONSTITUTION OF WORKING CIRCLES AND GENERAL TREATMENT:**

Keeping in view the treatment essential for different species as per their silvicultural characteristics the overall physiographic condition and objects of management following working circles have been constituted:

<b>Name of Working Circles</b>
Sal Working Circle
Chil Conversion Working Circle
Khair Composite Working Circle (Established Plantations & Natural Khair {Coppice} Areas)
Eucalyptus Management Plan
Bamboo working circle
Protection cum- rehabilitation Working Circle
Plantation Working Circle
Joint Forest Management (Overlapping) Working Circle

Water Resource Management & Soil Conservation (Overlapping) Working Circle
NTFP (Overlapping) Working Circle
Forest Protection (Overlapping) Working Circle
Wildlife Mangement (Overlapping) Working Circle
Eco tourism & Human Resources Management (Overlapping) Working Circle
Biodiversity Conservation & Development

**1. Sal working circle (3024.54 ha).** All Sal forests have good quality sal and situated on comparatively gentle slopes or on flat lands have been allotted to this working circle. The silviculture system adopted here is irregular shelterwood system.

**2. Chil Conversion working circle (2926.45 ha).** This working circle will comprise all Chil forest areas of Nahan Forest Division. This includes Chil areas of previous working plan. The silvicultural system here would be selection. Main focus here would be to replace Chil with native broad leave species, especially oak in the suitable region.

**3. Khair Composite working circle (Established Plantations = 344.57 ha & Natural Khair (Coppice) Areas = 9479.64 ha).** Khair existed naturally in the division since long. Most of it was in dry mixed deciduous forests in mixture with other species. A small proportion, however, existed in new formation in river beds in the serial stage. This working Circle includes the monoculture plantations of Khair raised in previous working plan. Sub compartment of these plantations will be carved out from the original compartment in the current working plan. The silviculture system adopted here would be coppice with standards and main aim of this working circle would be sustainable harvest of Khair trees. Second objective of this working circle would be conversion of existing monoculture Khair plantations to mixed plantations (50 % Khair and 50% Indigenous).

**4. Eucalyptus Management Plan (326.31 ha):** This Plan includes the areas where eucalyptus plantation has been carried out in the past and has become well established. The main aim here is to replace Eucalyptus with native broad leave species.

**5. Bamboo working circle (542.34 ha):** All predominantly bamboo bearing areas of Trilokpur Ranges have been allotted to this working circle. The main thrust would be to improve the existing crop and propagate and induce bamboo in suitable areas.

**6. Protection-cum-Rehabilitation working circle (14763.36 ha):** This Working Circle covers poor quality miscellaneous scrub forests situated on steep eroding formation with poor and scanty vegetative cover. Open areas and also closed areas where plantations have not established so far are also included in this working circle. Soil conservation measure and Afforestation work is prescribed for such areas.

**7. Plantation Working Circle:** This working circle includes all those moist, dry deciduous forests consisting mainly of degraded areas and is overlapping with other Working Circles. These are areas, situated either in foothills, riverine tracts or in plains, where the soil depletion is considerable. Soil condition is good but these areas have lost their capacity to sustain good vegetation capable of regenerating itself because of excessive anthropogenic activities. All the blanks close to encroachments, fallow lands, and degraded forests are included in this working circle. It extends to the whole of the division.

**8. Joint Forest Management Working Circle:** This will be another overlapping working circle giving role to community participation in management of forest areas through village level joint forest management committees. Sharing benefits with community in a sustainable manner shall be the objective of this Working Circle. The framework for JFM in HP is provided by the Government of HP Order of 12 May 1993, which followed the June 1990 Government of India (JFM) Circular enabling the spread of JFM. The concept of Joint or Participatory Forest Management is an intervention to evolve organized and collective thinking on the issues of forest management keeping in view the fact that the forest resources are limited and the claim over these are varied, no single solution can satisfy the needs of all.

**9. Water Resource Management & Soil Conservation (Overlapping) Working Circle:** This will be overlapping Working Circle comprising areas of forests which need to be protected against water management. Water resource management is the process of planning, developing, and managing water resources, in terms of both water quantity and quality, across all water uses. Water management is important since it helps determine future Irrigation expectations. The areas needs to be protected against soil erosion and needs water conservation. The overarching theme would be that based on identifying the recharge zones and spring-sheds, forest management would be linked with watershed management. The object is to basically enhance the hydrological regime building on the success models implemented in the past.

**10. NTFP (Overlapping) Working Circle:** This working Circle includes the management of all Non Forest Produce with sustainable utilization and equitable distribution.

**11. Forest Protection (Overlapping) Working Circle:** This Working Circle includes all forests which overlaps with other Working Circles and is constituted to address the forest protection problems like Fire, Illicit felling, Encroachment, Illegal mining etc. The forest areas which are vulnerable to fire, status of damage reports, progress in prosecution/ compounding and illicit removal of forest produce, mining etc. along with their future strategies are also discussed in detail under this Working Circle.

**12. Wildlife Management (Overlapping) Working Circle:** This will be an overlapping working circle comprising all forest areas. The objective will be to identify important areas for wildlife and conservation, to reduce the man-animal conflict and address associated problems including the recent increase in elephant movement in the Division. This Working Circle is constituted for emphasizing the necessity of conservation of wildlife and collection of information for better management of wild life. The whole tract has a variety of wild animals and birds since Nahan Forest Division lies in the vicinity of several contiguous wildlife protected areas including Colonel Sher Jung National Park, Renukaji Wildlife Sanctuary and Kalesar National Park of Haryana. Therefore, this working circle overlaps all other working circles and becomes crucial in the area of extensive wildlife management and conservation.

**13. Eco Tourism and Human Resource Management (Overlapping) Working Circle:** The Working Circle will look into the multiple aspects of ecotourism prospects and natural resource conservation in the Division with the eventuality of developing an ecotourism circuit. The existing and future proposed hotspots along-with mode of operation, sustainability and associated issues like livelihood generation shall be discussed.

**14. Biodiversity Conservation & Development:** Biodiversity conservation and development in Nahan Forest Division are intertwined endeavors that reflect a delicate balance between safeguarding the region's rich ecological heritage and fostering sustainable socio-economic growth. Nahan Forest Division is renowned for its remarkable biodiversity, hosting diverse ecosystems. To conserve this wealth, the division emphasizes wildlife protection, afforestation, and habitat restoration. Initiatives to safeguard endangered species like leopards and various deer species are paramount, as is the protection of key habitats and corridors.

#### **1.4 PERIOD OF WORKING PLAN AND NECESSITY FOR INTERMEDIATE REVISION:**

This working plan will be in place for 10 years w.e.f. 2023-24 to 2032-33. A mid-term review shall be undertaken for mid-course correction by the consultative committee under the chairmanship of the PCCF (HoFF) with representation from the Regional officer (MoEF&CC).

## **CHAPTER 2**

### **SAL WORKING CIRCLE**

#### **2.1 GENERAL CONSTITUTION AND GENERAL CHARACTER OF VEGETATION:**

This working circle covers practically all the Sal forests of the area, both on level land and on gentle slopes. The main criteria for allotting any particular Sal forest to this working circle is the presumption that sal regeneration (whether of coppice or seed origin) can be obtained there. Field observations indicate that the main regeneration in Sal forests is of Coppice origin. The natural regeneration of seed origin is relatively much less vigorous and profuse as compared to the regeneration of coppice origin. Planting of sal has been tried in the past, but without any significant achievement for want of proper techniques, The natural associates of sal found in the forests include Sain, Jamun, Chiroli, Tendu, Rohini, Chhal, Haldu etc. However in some of the Sal forests, extensive planting of khair has been done in the past. This, however, defies silvicultural principles and practices. The density and quality of Sal crop varies from area to area. There are forests where number of stems per ha. is considerably low. This is due to enormous pressure of right holders. Natural regeneration is almost absent in such areas. Special efforts will be required to restock such areas. Also, due to a long period of non-working of forests, abnormality has set in with preponderance of mature trees affecting regeneration. This working circle is constituted to manage the irregular Sal forests as well as the abnormality in age-class gradation so as to maintain the sustainability of forests.

#### **2.2 SPECIAL OBJECTIVES OF MANAGEMENT:**

Following are the objectives of management:->

- i) To convert the irregular crop into more or less uniform crop
- ii) To protect and regenerate the existing Sal Crop, giving preference to natural regeneration of seed origin wherever possible and also tapping the potential of coppice regeneration.
- iii) To progress towards attaining normal forest having normal series of age classes.
- iv) To obtain sustained yield of timber in consonance with the above objects.
- v) To meet the genuine and bonafide needs of local people for fuel wood and timber.

#### **2.3 BLOCKS AND COMPARTMENTS:**

Area Statement: The total area of the working circle is 3024.54 Ha Range wise and P.B. wise breakup is as follows:

**Table 2.1: Range wise and P.B. wise breakup of area( Ha) of the working circle**

<b>Name of Range</b>	<b>P.B.I</b>	<b>P.B Floating</b>	<b>Total Area (Ha)</b>
Kolar	125.21	613.77	738.98
Nahan	777.94	1507.62	2285.56
<b>Total</b>	<b>903.15</b>	<b>2121.39</b>	<b>3024.54 Ha</b>

## **2.4 ANALYSIS AND EVALUATION OF CROPS:**

### **2.4.1 Stock Maps:**

Stock maps have been prepared on appropriate scale as per area of compartment and attached in respective Compartment history files.

**2.4.2 Enumerations:** Layout of sample plot was adopted in accordance with National Working Plan code 2014 and the data is used to calculate the total estimated growing stock. The results are compiled and Consolidated in various tables as shown ahead.

**Table 2.2:**

<b>Sr. No.</b>	<b>Periodic Blocks</b>	<b>No. of Plots</b>	<b>Total area counted ( Ha)</b>
<b>1</b>	PB-I	10	1.0
<b>2</b>	PB Floating	15	1.5
	<b>Total</b>	<b>25</b>	<b>2.5</b>

It is also pertinent to mention here that **100% enumerations** were decided by the Monitoring Committee during the Experimental Silviculture Felling Program which were carried out in 284.71 ha of Sal Working Circle (PBI & PB IV) in adjoining Paonta Division in 2018-20 under IA 3840 of 2014 in WP(Civil) No. 202/1995 with directions from the Hon'ble Supreme Court. A good idea of floristic composition was obtained, even though the exercise was exhausting. Therefore, for the actual execution of felling in forests, this may be adopted considering the forest areas are accessible and the Division size is also small. For the Working Plan prescriptions however, the sample data has been analyzed.

**2.4.3 Mean of Quality:** Generally the forests of this region support Sal of quality III. In some portions (dry and exposed ridges), quality recedes to III/IV or even IV. However, in good areas the quality class goes upto II. In general, the standing volume factor for quality class III is applicable as shown in table 2.3.

**2.4.4 Density:** The crown density is variable and varies from 0.3 to 0.9, the average being 0.7 as per ocular estimation.

**Table 2.3: Table showing standing volume of Sal (As applicable)**

Diameter class	DBH in cm	Total Standing Volume(m <sup>3</sup> )
V	10-20	0.127
IV	21-30	0.368
III	31-40	0.835
IIA	41-50	1.770
IIB	51-60	3.030
IA	61-70	4.587
IB	71-80	6.385

#### 2.4.5 Assessment of Growing stock of PB- I :

**Table 2.4 a Number of trees per Ha of PB I**

	Tree Classes									
Species	V	IV	III	II-A	II-B	I-A	I-B	I-C	I-D	Total
Sal	3	33	44	24	18	8	3	0	0	133
Misc. spp.	6	1	5	3	0	3	0	0	0	18
<b>Total</b>	<b>9</b>	<b>34</b>	<b>49</b>	<b>27</b>	<b>18</b>	<b>11</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>151</b>

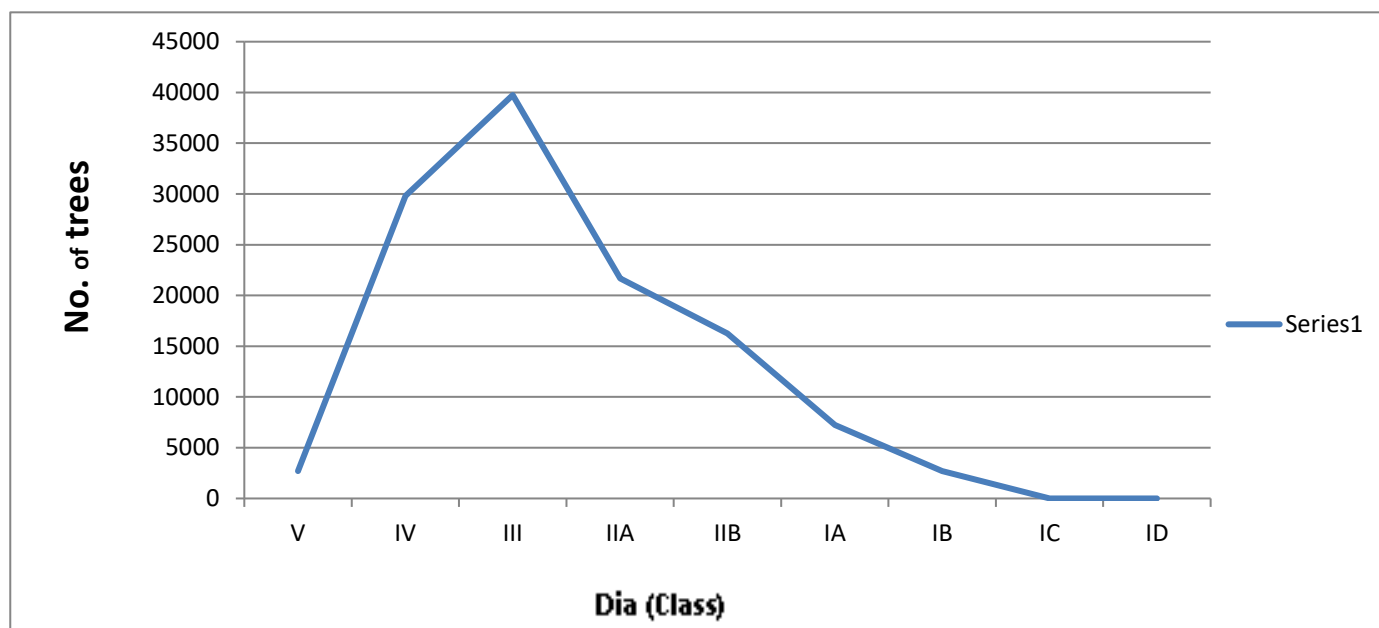
**Table 2.4 b Number of trees in PB-I ( 903.15 Ha)**

Species	V	IV	III	II-A	II-B	I-A	I-B	I-C	I-D	Total
Sal	2709	29804	39739	21676	16257	7225	2709	0	0	120119
Misc. spp.	5419	903	4516	2709	0	2709	0	0	0	16257
<b>Total</b>	<b>8128</b>	<b>30707</b>	<b>44254</b>	<b>24385</b>	<b>16257</b>	<b>9935</b>	<b>2709</b>	<b>0</b>	<b>0</b>	<b>136376</b>

**Table 2.4 c Growing Stock in terms of Volume (cu m) in PB I ( 903.15 Ha)**

	Tree Classes									
Species	V	IV	III	II-A	II-B	I-A	I-B	I-C	I-D	Total
Sal	344.043	10967.87	33182.07	38366.52	49258.71	33141.08	17296.97	0	0	182557.3
Misc. spp.	346.816	166.152	1887.688	3196.62	0	12426.18	0	0	0	18023.46
<b>Total</b>	<b>690.859</b>	<b>11134.02</b>	<b>35069.75</b>	<b>41563.14</b>	<b>49258.71</b>	<b>45567.26</b>	<b>17296.97</b>	<b>0</b>	<b>0</b>	<b>200580.7</b>





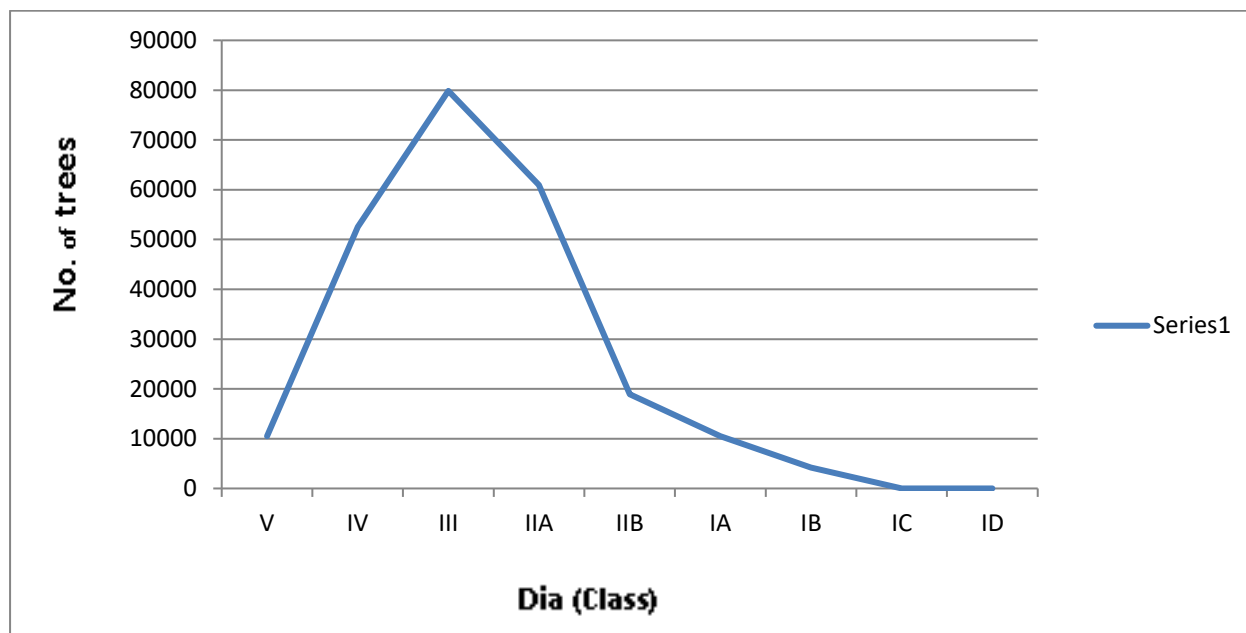
**Figure 2.1. Number of Sal trees in Different Diameter Classes in PB-I**

**Analysis of PB-I :** The total area of Periodic Block I consists of **903.15** ha as per current plan. The ND curve of PBI revealed that there are maximum Sal trees in higher diameter classes (II A to IB classes). Number of trees in IIA show a clear abnormality in distribution of age-classes. The N-D curve of this PB reveals that due to non-opening of canopy since more than 30-40 years due to ban on green felling, the regeneration potential of the Sal has been reduced and there is maximum number of preponderance of mature trees. Removal will be less than increment, hence the forest will be sustained in future. The trees in lower diameter classes will then grow in and will take place of trees in higher diameter classes if higher diameter trees are to be removed.

The felling in PB I was not done since imposition of ban on green felling since 30-40 years, but Hon'ble Supreme Court vide its order in February, 2018 ordered HPFD that Experimental Silvicultural felling in Sal forest can be taken up to observe the impact of silvicultural felling on Sal crop with the recommendation of Central Empowerment Committee (CEC). An area of 184.71 ha under PB-I was worked under with 100% enumeration of trees in adjoining Paonta Division.

Sal is the predominant species with proportion of 81% by volume. There is an inter-specific competition of miscellaneous species of Rohini, Chamror, Kala tendu etc. (table 2.2 b) and weeds like *Ardisia solanacea*, *Lantana camara*, *Ageratum conyzoides* etc.

**Analysis of PB Floating:** It is clear from figure 2.2 below that there is preponderance of immature crops of Sal mostly in classes V, IV and III as compare to PB-I. The area of the PB floating is **2121.39** ha.



**Figure 2.2. Number of Sal trees in Different Diameter Classes in PB Floating**

**Table 2.5 a. Number of trees per Ha of PB Floating**

Species	Tree Classes									Total
	V	IV	III	II-A	II-B	I-A	I-B	I-C	I-D	
Sal	5	25	38	29	9	5	2	0	0	170
Miscellaneous spp.	5	5	7	5	3	0	0	0	0	37
<b>Total</b>	<b>10</b>	<b>30</b>	<b>45</b>	<b>34</b>	<b>12</b>	<b>5</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>207</b>

**Table 2.5 b. Number of trees in PB Floating (2121.39 Ha)**

Species	Tree Classes									Total
	V	IV	III	II-A	II-B	I-A	I-B	I-C	I-D	
Sal	10607	53035	80613	61520	19093	10607	4243	0	0	239718
Misc.spp.	10607	10607	14850	10607	6364	0	0	0	0	53035
<b>Total</b>	<b>21214</b>	<b>63642</b>	<b>95463</b>	<b>72127</b>	<b>25457</b>	<b>10607</b>	<b>4243</b>	<b>0</b>	<b>0</b>	<b>292753</b>

**Table 2.5 c. Growing Stock (cu m) of PB Floating in terms of Volume of trees (2121.39 Ha)**

	Tree Classes									
Species	V	IV	III	II-A	II-B	I-A	I-B	I-C	I-D	Total
Sal	1337.089	19516.88	67311.855	108890.40	57851.79	48654.309	27091.555	0	0	330653.878
Misc. spp	678.848	1951.688	6207.30	9387.195	9641.46	0	0	0	0	27866.491
<b>Total</b>	<b>2015.937</b>	<b>21468.568</b>	<b>73519.155</b>	<b>118277.595</b>	<b>67493.25</b>	<b>48654.309</b>	<b>27091.555</b>	<b>0</b>	<b>0</b>	<b>358520.369</b>

#### 2.4.6 Comparison of Growing Stock with previous data

Comparison of previous working plan Growing Stock with current growing stock is as follows:-

**Table 2.6. Comparison of Growing Stock with previous data**

Dia Class	Numbers of Stems per Ha.			
	Previous Plan		Current Plan	
	No's per Ha.	Volume per Ha.	No's per Ha.	Volume per Ha.
V	82.5	10.377	8	1.016
IV	69.2	25.105	58	21.344
III	56.4	46.645	82	68.470
IIA	31.4	55.630	53	93.810
IIB	12.1	37.093	27	81.810
IA	4.3	19.939	13	59.631
IB & above	2.8	18.356	5	31.925

Above Comparison indicates an increase in the number per ha. and volume per ha. in higher diameter classes where as a decrease in lower classes .This indicate lack of regeneration. The increase in higher diameter classes is due to increment as well as ban on green felling.

#### 2.5 SILVICULTURAL SYSTEM AND REGENERATION:

India Irregular Shelter wood system with floating Periodic blocks has been adopted for this working circle. The regeneration will be in areas felled for seeding felling as well as in blanks in PB Floating areas. Preference will be given to regeneration of coppice origin, without ignoring the seed regeneration. The PB I areas should be taken up for intensive regeneration operations invariably from the year of felling itself in order to take advantage of the coppice shoots. It is also

advisable to give control burning in un-felled PB I areas in the year of good seed years to induce regeneration in advance.

## 2.6 ROTATION PERIOD:

From Sal forests of quality III, diameter class of an average diameter of 40 cm is attained in 120 years. Thus the rotation has been kept as 120 years with a regeneration period of 30 years. An established regeneration will be considered as saplings which are reasonably straight, apparently sound and vigorously growing and more than 3m in height.

### 2.6.1 Harvestable dia:

Keeping in view the rate of growth and market favored size as well as CEC guidelines; the exploitable diameter is fixed as 40 cm dbh.

### 2.6.2 Division into Periodic blocks:

The working circle has been divided into two Periodic blocks PB-I and PB Floating.

**Table 2.7 Sal working Circle Species wise**

Sr. No.	Spp.	Numbers(per ha)			
		PBI	PB Floating	Total	Proportion (%)
1	Sal	133	170	303	84.63
2	Other	18	37	55	15.37
	<b>Total</b>	<b>151</b>	<b>207</b>	<b>358</b>	<b>100.00</b>

**Sal working Circle Species wise**

Sr. No.	Spp.	Volume(per ha)			
		PBI	PB Floating	Total	Proportion ( %)
1	Sal	202.136	155.87	358.006	89.40
2	Other	19.959	22.472	42.431	10.60
	<b>Total</b>	<b>222.095</b>	<b>178.342</b>	<b>400.437</b>	<b>100.00</b>

The results from above table indicate that Sal constitutes the major crop of the working circle. Its proportion being 84.63% by number and 89.40% by volume. Rest are other B.L. figures i.e 15.37% by number and 10.60% by volume .Other B.L. include Kokat (general term for comparatively less valuable miscellaneous species ) and sal associate like sain.

**Allotment of areas:**

**Table 2.8. The areas allotted to this WC are as under :**

<b>Name of Range</b>	<b>Name of Forest</b>	<b>Compt./Sub Compt No.</b>	<b>Area (in ha) allotted to Sal W.C (Compt./ Sub Compt.)</b>
<b>List of PB-I Areas</b>			
Kolar	R-73 Bidhawala	2	16.00
		3	26.72
	R-74 Krondewali	3	37.22
		4	45.27
Nahan	R-101 Katasan	9	37.60
	R-102 Uttamwala	2	32.64
	R-104 Kala-Bhood	1	77.92
	R-104 Kala-Bhood	2a	49.60
	R-104 Kala-Bhood	3a	43.64
	R-104 Kala-Bhood	4a	40.24
	R-104 Kala-Bhood	6	82.88
	R-104 Kala-Bhood	7	25.12
	R-104 Kala-Bhood	8a	54.22
	R- 105 Bankala	2	27.36
	R- 106 Dhaun	2	85.92
		4	94.08
	R- 108 Ganeshwala	1	64.72
	R-110 Periwala	3	62.00

	<b>Total Area of P.B I W.C</b>	<b>RFs</b>	<b>903.15</b>
<b>List of P.B Floating (II, III, &amp; IV)Areas</b>			
Kolar	R-73 Bidhanwala	1	36.16
		4	22.72
		5	24.64
		6	31.20
	R- 74 Krondewali	2	15.09
	R-75 Dardawala	1	12.57
		2	23.89
		3	14.88
		4	27.36
		5	31.52
		6	25.44
		7	40.80
		8	20.16
	R-76 Garhiwala	1	11.82
		2	10.56
		3	23.84
		4	19.84
		5	20.16
		6	40.48
		7	32.64
		8	45.28
		9	55.36
		10	27.36

Nahan	R-100 Teeb	2	48.16
		3	41.60
		4	52.80
	R-101 Katasan	1	17.60
		2	40.16
		8	41.44
	R-102 Uttamwala	1	35.20
		3	40.16
		4	58.32
		5	9.92
		6	20.56
	R-104 Kala-Bhood	5	50.40
		9	55.84
	R-105 Bankala	1	71.36
		3	18.88
		6	72.48
		7	67.52
		8	42.88
		9	41.16
		10	75.46
	R-106 Dhaun	1	108.64
		3	61.12
		6	89.60
		7	110.88
	R-107 Kotba	1	80.96
		4	25.60

	R-108 Ganeshwala	2	54.12
	R-109 Kotri	1	37.08
		2	37.72
	<b>Total Area of P.B Floating W.C</b>	<b>RFs</b>	<b>2121.39</b>
	<b>G.Total</b>	<b>RFs</b>	<b>3024.54 Ha</b>

## 2.7 REGULATION AND CALCULATION OF YIELD

As per Von Montel's Formula yield comes as under :-

$$\text{Annual Yield} = 2 \times \frac{\text{Total Growing Stock (Vol.)}}{\text{Rotation period}}$$

$$\text{Here, Total Growing(Vol.)} = 559101.069 \text{ m}^3$$

Rotation period = 120 Years

Calculation

$$\text{Annual Yield} = 2 \times \frac{559101.069}{120}$$

$$= \frac{1118202.138}{120}$$

$$= 9318.351 \text{ m}^3$$

**Table 2.9. Current Annual Increment Table**

<b>Dia Class</b>	<b>Mean Dia</b>	<b>C.A.I/tree</b>	<b>Total No. of Sal trees</b>	<b>Total C.A.I of the dia class (m<sup>3</sup>)</b>
10-20	15	0.007	13316	93.212
20-30	25	0.018	82839	1491.102
30-40	35	0.025	120352	3008.8
40-50	45	0.025	83196	2079.9
		<b>Total</b>		<b>6673.014</b>

### 2.7.1 Yield From P.B.-I

The yield from PBI will be mainly from seedling felling. In seedling felling the trees are retained mainly as seed bearers and as advance growth. Number of seed bearer to be retained per ha. can



be taken as 60 on average basis. Out of these 30 can be presumed of III class and remaining 30 of IIA. The volume comes to  $30 \times 0.85 + 30 \times 1.770 = 78.15$  cum. / ha. The total area of PB I is 903.15 ha. Considering the regeneration period of Sal as 30 years, and the working plan period of 10 years, the workable area has been taken on conservative side as approximately 525 ha. Thus, the yield from final felling of PB I can be derived as: -

The total workable area of PB-I in current working Plan is 525 ha. The annual coupe area in P.B.-I is Estimated as  $525 / 10 = 52.5$  ha. For the purpose of advance growth, it is estimated occularly that 80% trees of Vth & IVth class will have to be retained. Thus the yield from seedling felling areas of PBI can be derived as.

Annual Yield :-

(Total Gowing Stock in Sal **P.B.I.**  
seedling felling areas down to 10  
cm.d.b.h ) – (Volume of  
seed bearers to be retained at the  
average rate of 60 trees (78.15 cum.)  
per ha over an. area of 525 ha. +  
80% of Vth & IV class crop )  
Working Plan period

$$\begin{aligned}
 &= \frac{106121.40 - ((78.15 \times 525) + 80\% \text{ of } 6575.10)}{10} \\
 &= \frac{106121.40 - (41028.75 + 5260.08)}{10} \\
 &= \frac{106121.40 - 46288.83}{10} \\
 &= \frac{59832.57}{10} \\
 &= 5983.257 \text{ m}^3 \\
 &= \mathbf{5980 \text{ m}^3}
 \end{aligned}$$

### 2.7.2 Prescribed Yield :

Data for C.A.I above 40-50 cm, d.b.h class is not available in yield tables. The rate of increment in trees above so 40-50 cm is also low; as such the increment (C.A.I) of trees above so 40-50 cm d.b.h. has been ignored. Thus, we note the C.A.I. comes out to be 6673.014 m<sup>3</sup> for Sal.

It is, therefore, clear that harvest prescribed of 5980 m<sup>3</sup> is less than annual increment i.e. 6673.014 m<sup>3</sup> annually.

The Von Mantel yield (9318 cum) is rejected on the basis that it exceeds the CAI value of Sal. Therefore, **final annual prescribed yield for Sal Working circle as a conservative measure is 5980 m<sup>3</sup>.**

### 2.7.3 Method of Executive Felling:

**Felling in PB I:** Following general guidelines are laid down for marking and felling in PB I including recommendations of CEC:

- i) Over mature trees standing over established regeneration or over advance growth if any, be removed.
- ii) All trees over 40 cm d.b.h. should be marked unless their retention is required for soil conservation reasons for providing cover against frost.
- iii) All dry (completely dry) and fallen trees should be marked for felling.
- iv) Very conservative marking should be done on steep slopes and along nalas.
- v) Where suitable Sal seed bearers are not available, Sain seed bearers may be retained. In cases where Sain too is not available, other suitable associated species be retained.
- vi) All the retained trees over 10 cmd.b.h. should be enumerated and listed.
- vii) Miscellaneous species like Rohini, Jamun etc. should only be marked where they are obstructing the openings. This is prescribed keeping in view the fact that such species are gradually disappearing from Sal forests and their mixture is essential for biodiversity considerations and as prevention against the Sal borer (*Hoplocerambyx spinicornis*, Newman) attack.
- viii) All unhealthy malformed saplings should be cut back.
- ix) Climber cutting should be done along with marking.
- x) 80% of compact groups of poles (Vth and IVth) upto 30 cm d.b.h. shall be retained as advance growth.
- xi) In Borer affected PB I areas, felling of over mature (IIB and above) borer infested trees can be carried out.

**Treatment of Floating PB:** The forests allotted to floating Periodic block is generally supporting middle aged crop with medium proportion of mature trees. Salvage removals can be carried out as per instructions. Felling for right holders may be done from these forests. The extent of thinning should be site-specific according to stand table, if required. Removal from thinning will be counted towards yield.

#### 2.7.4 Sequence of Felling in P.B. –I

**Table 2.10: Sequence of Felling in P.B. –I**

S. No.	Year of Felling	Name of Range	Name of Forest	Compt./ Sub Comptt. No	Total Area (in Ha) prescribed for felling
1	2023-24	Kolar	R-73 Bidhawala	3	26.72
		Nahan	R-104 Kalabhood	7	25.12
				<b>Total</b>	<b>51.84</b>
2	2024-25	Kolar	R-73 Bidhawala	2	16.00
		Kolar	R-74 Karondewali	3	37.22
				<b>Total</b>	<b>53.22</b>
3	2025-26	Kolar	R-74 Karondewali	4	45.27
				<b>Total</b>	<b>45.27</b>
4	2026-27	Nahan	R-108 Ganeshwala	1	64.72
				<b>Total</b>	<b>64.72</b>
5	2027-28	Nahan	R-104 Kalabhood	2a	49.60
				<b>Total</b>	<b>49.60</b>
6	2028-29	Nahan	R-104 Kalabhood	3a	43.64
				<b>Total</b>	<b>43.64</b>
7	2029-30	Nahan	R-110 Pariwala	3	62.00
				<b>Total</b>	<b>62.00</b>

8	2030-31	Nahan	R-104 Kalabhood	4a	40.24
				<b>Total</b>	<b>40.24</b>
9	2031-32	Nahan	R-104 Kalabhood	8a	54.22
				<b>Total</b>	<b>54.22</b>
10	2032-33	Nahan	R-102 Uttamwala	2	32.64
		Nahan	R-105 Bankala	2	27.36
				<b>Total</b>	<b>60.00</b>
				<b>G.Total</b>	<b>903.15 Ha</b>

**Note:**

1) Although the above felling program can, however, be changed with the approval of CCF Working Plan keeping in view the yield, deviation provisions and to incorporate recommendation of CEC in IA 3840.

The felling program supposes the satisfactory regeneration of the already felled areas. In case, however, the regeneration is not keeping pace then felling program have to be deferred till the felled areas are brought to satisfactory regeneration stage. For it regular review of the regeneration status is a must. In fact the felling program suggested above should not be taken for granted rather its approvals may be sought from the competent authority every year.

**2.8 SUBSIDIARY SILVICULTURAL OPERATIONS, CLEANING AND THINNING:**

Subsidiary silvicultural operations are very important for successful regeneration of Sal areas. They have to be carried out in Sal regeneration areas. They have to be carried out in the year following the felling year. The subsidiary Silvicultural operations will be:

- 1) All damaged, malformed, stunted and diseased saplings should be cut back.
- 2) The bushy growth and climbers should be cut and removed.
- 3) The miscellaneous tree growth likely to suppress the regeneration should be thinned and lopped.
- 4) Effective closure is perhaps most important key to regeneration. This will continue for atleast 12 years till Sal establishes.

- 5) In the 3<sup>rd</sup> year after main felling, coppice shoots should be singled out. Two to three healthy, vigorous shoots should be retained on each stool.
- 6) Areas which are moist and lack regeneration, should be control burnt in the winter.
- 7) Bush cutting of *Lantana* can be done for three years. It has to be cleared before regeneration felling. For *Ardisia* (Gudbeli), this has to be done **vigorously** each year till Sal seedlings establish otherwise it will be affecting regeneration as discussed above.
- 8) The miscellaneous tree growth will be removed when considered necessary to enhance growth of regeneration.

## **2.9 OTHERS REGULATIONS:->**

**i) Fire Protection :** Effective fire protection measures are required in these areas. Fire watchers should be engaged in the fire season.

**ii) Right holders requirements:** The right holder's requirement can be continued in all areas except where the exercise of rights is to be suspended due to silvicultural reasons like regeneration. T.D. can be granted in PB floating areas.

**iii) Prevention against Sal borer (*Hoplocerambyx spinicornis*, Newman) attack:** In recent years the borer attack in Sal trees is observed. The incidence however is below normal. Still the preventive measure should attract due attention. Regular removal of the borer attacked trees subjected to silvicultural principles should be followed.

**iv) Special Treatment for various small blanks:** The possibilities of raising plantations of species like Bamboo, Sain, Tun in various suitable places without causing hardship to local people for grazing be examined and suitable action be taken.

**v) Soil erosion treatment:** In some areas, various nallas are susceptible to further expansion. They can be tackled by adequate soil and moisture conservation measures in regeneration areas.

## **2.10 Regeneration Program:**

Regeneration program be prepared by territorial DFO and got approved from the competent authority. These should invariably form a part of the regular Annual Plan of Operations. Necessary funds be also demanded regularly. It be also ensured that the felling have to keep pace with regeneration. Previously felled PB I areas are not showing desired results in many cases. The partially regenerated / un regenerated portions be selected and regenerated in phased manner, if necessary. The regeneration program should include such areas also, if necessary. Regeneration assessment survey must be done in felled areas till 12 years to ensure timely regeneration of the areas.

## CHAPTER 3

### CHIL CONVERSION WORKING CIRCLE

#### 3.1 GENERAL CONSTITUTION AND GENERAL CHARACTER OF VEGETATION:

This working circle covers Chil forests of Nahan Forest division. It covers only Jamta range. Other miscellaneous species growing with chil in the area include sain, chhal, jhingan, amla etc. The bushy growth seen here is mainly karonda, kainth, kangu and lantana. The chil forests of Jamta range as of today contain not so good quality chil with generalized poor stocking. Some forests have low density, mainly due to large scale salvage removals. Frequent forest fires and defective resin tapping is the primary cause of this phenomenon. This has created considerable openings in the forests. Human interferences alongside with changing climatic conditions have considerably disturbed the natural biological cycles within the Chir pine forest stands. Open Chir Pine forests without the natural understory of deciduous tree species and shrubs are prone to invasion of lantana and thus reducing the natural resilience capacity of climate change. The quality of Chil trees varies from one forest to another. Some patches have stunted tree growth, whereas in other areas chil is growing well. Mostly the young age class predominates.

#### 3.2 SPECIAL OBJECTIVES OF MANAGEMENT:

- i) To convert the existing open, degraded Chir pine forest to mixed broad-leave stands.
- ii) Rehabilitation of Lantana infested Chir pine stand and planting of Multi-purpose mixed broad leave species in the rehabilitated area.
- iii) To extract resin subject to the condition that no permanent harm is caused to the tree or the crop.
- iv) To obtain the sustainable yield of timber from Chir pine forest.

#### 3.3 AREA STATEMENT:

The total area covered under this working circle is 2926.45 ha is as follows:->

**Table 3.1: Total area covered under Chil conversion WC**

Range	Class of Forest	Total (Ha)
Jamta	RF	2926.45
	<b>G. Total</b>	<b>2926.45 Ha</b>

### 3.4 CONVERSION SERIES :

Conversion series has been constituted as shown in table 3.7.

### 3.5 ANALYSIS AND EVALUATION OF THE CROP:

#### 3.5.1 Stock Map:

Stock maps have been prepared on appropriate scale as per area of compartment and attached in respective Compartment history files

#### 3.5.2 Density of the Crop:

Density is variable and has been assessed occularly that varies from 0.2 to 0.5 with the average being 0.4.

#### 3.5.3 Site Quality:

The site quality of each compartment and sub compartment has been assessed and noted in compartment history file. It is generally II/III

### 3.6 ENUMERATIONS:

The technique of Survey and Assessment of Forest Resource using Grid and Quadrants method (Sample Plots) has been adopted and complete counting of all tree species class wise has been done in sample plots.

**Table 3.2: Number of Chil trees per Hectare**

	Classes of Trees									
Species	V	IV	III	II-A	II-B	I-A	I-B	I-C	I-D	Total
Chil	57	67	26	13	4	5	2	0	0	173
Misc. spp.	106	34	8	2	1	1	0	0	0	150
GT	163	101	34	15	5	6	2	0	0	323

**Table 3.3: Total number of Chil trees in different classes (2926.45 Ha)**

	Classes of Trees									
Species	V	IV	III	II-A	II-B	I-A	I-B	I-C	I-D	Total
Chil	166808	196072	74624	36581	10243	14632	5853	0	0	504813
Misc. spp	310204	98036	21948	4390	1463	1463	0	0	0	437504
GT	477012	294108	96572	40971	11706	16095	5853	0	0	942317

**Table 3.4: Growing stock (m<sup>3</sup>) in terms of volume of Chil in different classes (2926.45 Ha)**

Species	Classes of Trees									Total (m <sup>3</sup> )
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	8407.1056	48998.4303	51087.9156	49544.7985	23141.0497	49740.8707	27945.2563	0	0	258865.4266 m <sup>3</sup>
Misc. Spp	19853.037	18038.638	9174.421	3884.862	2216.786	3356.638	0	0	0	56524.382 m <sup>3</sup>
GT (m <sup>3</sup> )	28260.1426	67037.0683	60262.3366	53429.6605	25357.8357	53097.5087	27945.2563	0	0	315389.8086 m <sup>3</sup>

**3.7 SILVICULTURAL SYSTEM:**

The silvicultural system adopted shall be selection cum gap planting with exploitable dia of Chil is to be taken as 55 cm. Along steep nalas and erosion prone area no green felling should be done. Dead, dying, Diseased, damaged and malformed trees of Chil and Miscellaneous B.L. should also be removed irrespective of exploitable diameter. No green felling of miscellaneous B.L. should be allowed (except for dying, Diseased and malformed trees) as their density is less and our main aim is conversion of chil to predominantly other B.L species.

**3.8 ALLOTMENT OF AREAS:****Table 3.5: The areas allotted to Chil Conversion W.C are as under :**

Sr. No.	Name of Range	Name of Forest	Comptt. No.	Area(in ha) allotted to Chil Conversion W.C
1	Jamta	R-127 Burman	3	23.40
		R-127 Burman	4	19.50
		R-127 Burman	5	42.20
		R-127 Burman	8	32.50
		R-127 Burman	9	20.50
		R-127 Burman	11	11.70
		R-127 Burman	13	35.10
		R-127 Burman	14	32.50
		R-127 Burman	16	19.50
		R-127 Burman	12	40.30
2	Jamta	R-128 Jaitak	1	57.95
		R-128 Jaitak	2	34.55



		R-128 Jaitak	3	63.30
		R-128 Jaitak	5	57.20
		R-128 Jaitak	6	22.10
		R-128 Jaitak	7	24.70
		R-128 Jaitak	8	24.70
		R-128 Jaitak	9	27.30
		R-128 Jaitak	10	22.10
3	Jamta	R-129 Nauni	4	11.40
		R-129 Nauni	7	26.30
		R-129 Nauni	8	46.60
		R-129 Nauni	9	52.00
		R-129 Nauni	10	46.80
		R-129 Nauni	11	32.50
		R-129 Nauni	12	26.40
4	Jamta	R-130 Kasoga	5	13.00
5	Jamta	R-132 Dhagera	1	20.80
		R-132 Dhagera	2	28.60
		R-132 Dhagera	3	18.20
		R-132 Dhagera	5	33.80
		R-132 Dhagera	6	36.40
6	Jamta	R-133 Panjahal	2	33.80
		R-133 Panjahal	3	26.00
		R-133 Panjahal	4	37.70
		R-133 Panjahal	5	39.00
		R-133 Panjahal	6	28.60
7	Jamta	R-134 Sanoga	8	26.00

8	Jamta	R-136 E/Banethi	2	26.00
		R-136 E/Banethi	3	26.00
		R-136 E/Banethi	4	31.70
		R-136 E/Banethi	5	29.60
		R-136 E/Banethi	6	33.40
		R-136 E/Banethi	7	29.75
		R-136 E/ Banethi	8	29.60
		R-136 E/Banethi	9	28.90
		R-136 E/Banethi	10	20.80
		R-136 E/Banethi	11	13.00
		R-136 E/Banethi	12	31.20
		R-136 E/Banethi	15	31.20
		R-136 E/ Banethi	16	15.60
		R-136 E/Banethi	17	17.50
		R-136 E/ Banethi	18	27.30
		R-136 E/Banethi	19	48.80
		R-136 E/Banethi	22	27.30
		R-136 E/ Banethi	23	18.20
		R-136 E/ Banethi	25	43.10
		R-136 E/Banethi	27	20.80
		R-136 E/Banethi	28	26.00
		R-136 E/Banethi	29	52.00
		R-136 E/ Banethi	30	26.00
		R-136 E/ Banethi	31	26.00
9	Jamta	R-137 W/Banethi	1	38.50
		R-137 W/Banethi	2	16.90
		R-137 W/ Banethi	3	20.80
		R-137 W/Banethi	4	29.80
		R-137 W/ Banethi	5	23.40
		R-137 W/Banethi	6	19.50
		R-137 W/Banethi	7	31.20

		R-137 W/Banethi	8	27.10
10	Jamta	R-138 Kanoti	1	5.20
		R-138 Kanoti	2	35.20
		R-138 Kanoti	4	18.20
		R-138 Kanoti	5	35.10
		R-138 Kanoti	6	18.20
		R-138 Kanoti	7	22.10
		R-138 Kanoti	8	26.00
11	Jamta	R-139 Katli	2	5.50
12	Jamta	R-141 Dhadu	1	41.60
		R-141 Dhadu	2	45.50
		R-141 Dhadu	3	19.50
		R-141 Dhadu	4	24.70
		R-141 Dhadu	5	36.40
		R-141 Dhadu	6	33.00
		R-141 Dhadu	7	17.70
		R-141 Dhadu	8	31.20
		R-141 Dhadu	9	28.60
		R-141 Dhadu	10	23.40
		R-141 Dhadu	11	23.40
		R-141 Dhadu	12	33.80
13	Jamta	R-142 Amta	1	31.10
		R-142 Amta	2	27.30
		R-142 Amta	3	48.10
14	Jamta	R-144 Saroga	1	13.30
		R-144 Saroga	2	52.00
		R-144 Saroga	3	22.00

		R-144 Saroga	4	26.00
		R-144 Saroga	6	27.30
		R-144 Saroga	7	14.30
		R-144 Saroga	8	13.00
		R-144 Saroga	9	19.50
		R-144 Saroga	10	26.30
		<b>Grand Total of Chil Conversion Working Circle</b>		<b>2926.45 Ha</b>

*Total area of Chil Conversion WC = 2926.45 Ha.*

*Total Growing Stock ( m<sup>3</sup>) = 315389.8086 m<sup>3</sup>*

*Total Growing Stock of Chil( m<sup>3</sup>) = 258865.4266 m<sup>3</sup>*

### 3.9 CALCULATION OF YIELD:

(i) Harvestable Dia 55 cms. (Chil)

(ii) Total Forest land under Chil Conversion WC = 2926.45 ha

(iii) Annual area to be felled =292 ha

**Table 3.6: Yield calculation**

<b>Yield Calculations</b>	<b>Vol. (m<sup>3</sup>)</b>
Total Growing Stock (V1)	258865.4266
Less : (Vol. of Class V <sup>th</sup> to IIA)	158038.2500
Balance Total Growing stock (V1)	100827.1766
Growing Stock Reservation by ecological conditions (20% of total harvestable**): V2= (0.2 x V1)	20165.4353
Total GS of trees to be harvested V3=V1-V2	80661.7413
<b>Annual Yield V4 = V3/10</b>	<b>8066.1741 m<sup>3</sup></b>
<b>Or Say</b>	<b>8066 m<sup>3</sup></b>

### 3.10 CONVERSION SERIES:

**Table 3.7: Conversion Series for Chil Conversion Working Circle**

Sr. no.	Year	No. and Name of Forest	Comptt. No.	Total Area ( Ha.) prescribed for Conversion
1	2023-24	R-127 Burman	3	23.40
		R-127 Burman	4	19.50
		R-128 Jaitak	2	34.55
		R-129 Nauni	4	11.40
		R-129 Nauni	7	26.30
		R-132 Dhagera	2	28.60
		R-132 Dhagera	3	18.20
		R-133 Panjahal	4	37.70
		R-136 E/Banethi	11	13.00
		R-137 W/Banethi	6	19.50
		R-138 Kanoti	6	18.20
		R-138 Kanoti	7	22.10
		R-141 Dhadu	7	17.70
		R-144 Saroga	1	13.30
			<b>Total</b>	<b>303.45 Ha</b>
2	2024-25	R-127 Burman	5	42.20
		R-128 Jaitak	6	22.10
		R-129 Nauni	11	32.50
		R-132 Dhagera	1	20.80
		R-138 Kanoti	4	18.20
		R-136 E/ Banethi	2	26.00
		R-136 E/ Banethi	17	17.50
		R-136 E/ Banethi	28	26.00
		R-137 W/Banethi	2	16.90
		R-144 Saroga	7	14.30
		R-144 Saroga	9	19.50
			<b>Total</b>	<b>256.00 Ha</b>

3	2025-26	R-127 Burman	13	35.10
		R-129 Nauni	8	46.60
		R-138 Kanoti	2	35.20
		R-128 Jaitak	5	57.20
		R-133 Panjahal	3	26.00
		R-136 E/Banethi	7	29.75
		R-136 E/Banethi	18	27.30
		R-137 W/Banethi	3	20.80
		R-141 Dhadu	3	19.50
			<b>Total</b>	<b>297.45 Ha</b>
4	2026-27	R-127 Burman	11	11.70
		R-128 Jaitak	7	24.70
		R-130 Kasoga	5	13.00
		R-132 Dhagera	5	33.80
		R-136 E/Banethi	8	29.60
		R-136 E/Banethi	9	28.90
		R-136 E/Banethi	30	26.00
		R-136 E/Banethi	31	26.00
		R-137 W/Banethi	8	27.10
		R-141 Dhadu	4	24.70
		R-142 Amta	2	27.30
		R-144 Saroga	3	22.00
			<b>Total</b>	<b>294.80 Ha</b>
5	2027-28	R-127 Burman	16	19.50
		R-129 Nauni	12	26.40
		R-138 Kanoti	5	35.10
		R-134 Sanoga	8	26.00
		R-136 E/Banethi	3	26.00
		R-136 E/Banethi	22	27.30
		R-136 E/Banethi	23	18.20
		R-137 W/Banethi	5	23.40
		R-141 Dhadu	6	33.00

		R-142 Amta	1	31.10
		R-144 Saroga	6	27.30
			<b>Total</b>	<b>293.30 Ha</b>
6	2028-29	R-127 Burman	14	32.50
		R-138 Kanoti	8	26.00
		R-128 Jaitak	9	27.30
		R-133 Panjahal	5	39.00
		R-136 E/Banethi	5	29.60
		R-136 E/Banethi	6	33.40
		R-136 E/Banethi	15	31.20
		R-141 Dhadu	9	28.60
		R-144 Saroga	2	52.00
			<b>Total</b>	<b>299.60 Ha</b>
7	2029-30	R-127 Burman	8	32.50
		R-127 Burman	9	20.50
		R-129 Nauni	9	52.00
		R-133 Panjahal	2	33.80
		R-136 E/Banethi	12	31.20
		R-136 E/Banethi	25	43.1
		R-141 Dhadu	1	41.60
		R-142 Amta	3	48.10
			<b>Total</b>	<b>302.80 Ha</b>
8	2030-31	R-127 Burman	12	40.30
		R-128 Jaitak	1	57.95
		R-136 E/Banethi	4	31.70
		R-136 E/Banethi	10	20.80
		R-136 E/Banethi	29	52.00
		R-139 Katli	2	5.50
		R-141 Dhadu	8	31.20
		R-141 Dhadu	12	33.80
		R-144 Saroga	10	26.30
			<b>Total</b>	<b>299.55 Ha</b>

9	2031-32	R-129 Nauni	10	46.80
		R-128 Jaitak	3	63.30
		R-132 Dhagera	6	36.40
		R-133 Panjahal	6	28.60
		R-137 W/Banethi	7	31.20
		R-141 Dhadu	10	23.40
		R-144 Saroga	4	26.00
		R-144 Saroga	8	13.00
			<b>Total</b>	<b>268.70 Ha</b>
10	2032-33	R-138 Kanoti	1	5.20
		R-128 Jaitak	8	24.70
		R-128 Jaitak	10	22.10
		R-136 E/Banethi	16	15.60
		R-136 E/Banethi	19	48.80
		R-136 E/Banethi	27	20.80
		R-137 W/Banethi	1	38.50
		R-137 W/Banethi	4	29.80
		R-141 Dhadu	2	45.50
		R-141 Dhadu	5	36.40
		R-141 Dhadu	11	23.40
			<b>Total</b>	<b>310.80 Ha</b>
			<b>G.Total</b>	<b>2926.45 Ha</b>

The above felling programme can, however, be changed with the approval of CCF Working Plan keeping in view the yield and deviation provisions (as per NWPC 2014) and to incorporate recommendation of CEC in IA 3840.



### 3.11 PROCESS FOR CHIL CONVERSION:

- 1). First of all, area taken up for conversion shall be clearly demarcated by giving bands on the trees along the periphery.
- 2). Removal of Lantana and other weeds in the area taken up for conversion.
- 3). The markings in chil trees are to be done on selection principles. Here the trees of 55cm and above dbh standing over young crop are to be removed.
- 4). A white band at breast height on all the trees which are not to be felled is to be put.
- 5). No felling will be done in precipitous and eroding slopes.
- 6). Subsidiary felling of damaged, malformed trees and ill developed crop.
- 7). Disposal of felling of debris - controlled burning or distribution of fuel wood to right holders.
- 8). Gap planting in the conversion area with tall fast growing multipurpose broad leave species. Bamboo should be preferred in depression & nallah area. Species are depicted in Table 3.8, which can be used for plantation.
- 9). Control burning and fire control: annual cleaning of fire lines and road sides.
- 10). Development of market for chil pine needles for burning of furnaces and making charcoal briquettes.
- 11). Proper SMC works should be done to maintain the moisture in the area.

**Table 3.8**  
**Multipurpose Broad leave Species**

Sr. No.	Scientific Name	Local Name	English Name	Uses
1	<i>Acacia catechu</i>	Khair	Khair	Fodder, Fuel, MFP
2	<i>Aegle marmelos</i>	Bel	Aegle	Fruit, Timber
3	<i>Albizia lebbek</i>	Kala Siris	Siris	Fodder, Fuel, Timber
4	<i>Azadirachta indica</i>	Neem	Neem	Timber, MFP
5	<i>Bauhinia variegata</i>	Kachnar	Kachnar	Fodder, Fuel, Timber
6	<i>Bombax ceiba</i>	Semal	Cottonwood tree	Timber, MFP
7	<i>Toona ciliate</i>	Toon	Toon	Fodder, Fuel, Timber
8	<i>Dalbergia sissoo</i>	Shisham	Shisham	Fodder, Fuel, Timber
9	<i>Emblica officinalis</i>	Amla	Amla	MFP

10	<i>Grewia optiva/ G. oppositifolia</i>	Bihul/Dhaman	-	Fodder, Fuel, Timber
11	<i>Mangifera indica</i>	Mango	Mango	Fruit, Timber
12	<i>Melia azadirachta</i>	Drek	Drek	Timber
13	<i>Morus alba</i>	Shehtoot	Mulberry	Fodder, Fuel, Timber
14	<i>Pongamia pinnata</i>	Pongamia	Pongamia	Fodder, Fuel, Timber
15	<i>Quercus leucotrichophora</i>	Ban	Ban Oak	Fodder, Fuel, Timber
16	<i>Sapindus mukorossi</i>	Ritha	Ritha	Fodder, Fuel, Timber
17	<i>Syzygium cuminii</i>	Jamun	Jamun	Fodder, Fuel, Timber
18	<i>Terminalia bellerica</i>	Behra	Behra	Fodder, Fuel, Timber
19	<i>Terminalia arjuna</i>	Arjuna	Arjuna	Fodder, Fuel, Timber
20	<i>Terminalia chebula</i>	Harar	Harar	Fodder, Fuel, Timber
21	<i>Artocarpus lakoocha</i>	Dheoun	Dheoun	Fodder, Fuel, Timber
22	<i>Dendrocalamus spp</i>	Bans	Bamboo	Timber, MFP
23	<i>Terminalia tomentosa</i>	Sain	Sain/ Alsan	Timber, MFP
24	<i>Butea monosperma</i>	Dhak	Dhak	Fuel, Timber

### 3.12 RESIN TAPPING:->

Resin is an important source of revenue from chil forests. Every year thousands of blazes are tapped in the chil forests of Jamta Range. However, Resin tapping has been done most recklessly, unscientifically and in total disregard to the instructions/guidelines on the subject. Deep channels were dug and the blazes were generally oversized and defective. This coupled with illicit tapping had a very negative effect on the health of chil forests, especially in Jamta range. Large number of trees got dried and uprooted. The forests have become quite open. Nowadays, however, the resin tapping is being done by rill method since mid eighties. But the trees should be tapped depending upon their present condition. Thus the tapping of trees of 35 cm diameter can be

continued for 20 years only. Rotational rest has to be given to the trees after 20 years. It is suggested that a fresh inspection/survey should be carried out of all forests, at least by ACF of the division, and only then it should be decided as to a particular forest has to be tapped or not.

The minimum tap-able dia for resin tapping for new trees is 35cm. The tapping is to be done by Rill method or by Bore hole method only. The enumeration has to be carried out every 5 years as per prevailing instructions.

Generally trees for resin taping are taken after joint inspection of HPSFDC and HPFD but from past few years 2020 onwards there is a disagreement between HPSFDC & H.P Forest Department regarding the allotment of areas for resin extraction. As per the field staff of Nahan Forest Division there is no space in the trees for resin taping which are under continuous process of resin extraction from past 30 to 35 years. Continuous tapping of these trees without rotational rest may permanently harm the trees. This conflict between HPFD & HPSFDC needs to be resolved.

In case drying up of trees due to resin tapping is observed in some forests it should be immediately closed for tapping.

### **3.13 SALVAGE REMOVAL:**

Only dry and fallen trees are to be marked as salvage. The fire burnt chil trees should not be taken dry or dead until there is no sign of revival till end of September of the year of fire.

## CHAPTER 4

### KHAIR COMPOSITE WORKING CIRCLE

#### INTRODUCTION:

The working Circle consist of various areas of established Khair plantations and areas of Natural Khair along with miscellaneous deciduous species. Now there will be two prescriptions & two felling series, one for the established khair plantation and one for the natural occurring khair (Coppice area). Range wise breakup of area is shown in the table below:

Sr. No.	Range	Estt. Plantation Areas ( Ha)	Natural Khair (coppice) Areas (Ha)	Total Area (Ha.)
1	Kolar	93.85	5659.69	5753.54
2	Nahan	187.26	842.33	1029.59
3	Trilokpur	41.36	2748.72	2790.08
4	Jamta	22.10	228.90	251.00
	<b>Total</b>	<b>344.57 Ha</b>	<b>9479.64 Ha</b>	<b>9824.21 Ha</b>

#### KHAIR WORKING CIRCLE (ESTABLISHED PLANTATION)

#### 4.1 GENERAL CONSTITUTION & CHARACTER OF VEGETATION:

These are the areas of established Khair plantations that were raised in suitable pockets all over the tract. These Compartments have been further sub compartmentalized. The main crop in the compartment is different from khair. It is generally misc, B/L scrub & in some cases Sal also. The areas support pure even aged khair crop above (50 %). This has come out mainly as a result of plantations. In many areas khair was planted pure whereas in some of them it carried a mixture of Shisham, Amla, Bahera and other broad leaved species. In some areas trees like Sal and Sain are also found. These occur naturally as khair planting was also undertaken in some suitable pockets in sal /scrub forests. At some places Leucaena, Kachnar, Prosopis, Drek etc. are also found mixed. These species were also planted there along with Khair.

Over a period of time, openings have occurred in the plantations. These are mainly due to salvage removals / illicit felling. By and large, the crop is not congested.

Some trees show signs of heart rot (*Fomes badius* Berk.) and witch's broom. No serious attack of any disease is, however, noted. Lopping is common throughout the area. Among the bushes,

prominent is Lantana which has invaded the openings and forms a complete cover there. Others are *Murraya* (Gandhela or Mmirchu), *Carissa* (Kandlai or Katrarh) and *Adhatoda* (Basooti or Bansa).

#### 4.2 SPECIAL OBJECTIVES OF MANAGEMENT

- (i) To change the characteristic of pure khair plantations to native indigenous biodiverse species (50% khair and 50 % other).
- (ii) To augment supply of khair wood for katha manufacture and Fuelwood .
- (iii) To maintain ecological balance by planting a mixture of native species along with Khair.

#### 4.3 AREA STATEMENT:

The Range wise break-up of the area is tabulated below.

**Table 4.1: Range wise area of Khair W.C (Estt. Plantation)**

Range	Area (Ha.)
Kolar	93.85
Nahan	187.26
Trilokpur	41.36
Jamta	22.10
<b>Total</b>	<b>344.57 Ha.</b>

#### 4.4 AREA ALLOTMENT:

The area allotment to Khair W.C (Estt. Plantation ) is given as under:

**Table 4.2: Area allotment to Khair Working Circle (Estt. Plantation)**

Sr. No.	Range	No. & Name of Forest		Comptt. /Sub Compt.	Area in Ha
1	Kolar	R-78	Haripur	C-9b	10
2	Kolar	R-80	Dhakaranwala	C-4b	79.38
3	Kolar	R-83	Matter	C-5b	1.58
4	Kolar	R-86	East Bheron	C-1b	2.89
	<b>Kolar</b>	<b>RF</b>	<b>Total</b>		<b>93.85</b>
5	Nahan	R- 97	Mandpa	C-2b	92.65
6	Nahan	R- 97	Mandpa	C-6b	18.38
7	Nahan	R-101	Katasan	C-3b	10
8	Nahan	R-101	Katasan	C-4b	13.5
9	Nahan	R-101	Katasan	C-5b	10
10	Nahan	R-104	Kala Bhoo	C-2b	7.36
11	Nahan	R-104	Kala Bhoo	C-3b	10
12	Nahan	R-104	Kala Bhoo	C-4b	10
13	Nahan	R-111	Ambwala	C-4b	15.37
14	<b>Nahan</b>	<b>RF</b>	<b>Total</b>		<b>187.26</b>

<b>15</b>	Trilokpur	R-117	Maidhar	C-3b	19.6
<b>16</b>	Trilokpur	R-117	Maidhar	C-4b	13.76
<b>17</b>	Trilokpur	R-118	Trilokpur	C-2b	8
	<b>Trilokpur</b>	<b>RF</b>	<b>Total</b>		<b>41.36</b>
<b>18</b>	Jamta	R-131	Thandoli	C-1	22.10
	<b>Jamta</b>	<b>RF</b>	<b>Total</b>		<b>22.10</b>
			<b>Total area under Khair W.C. (Estt. Plantations)</b>		<b>344.57 Ha.</b>

#### 4.5 ANALYSIS AND EVALUATION OF THE CROP:

**4.5.1 Stock maps-** Stock maps have been prepared on appropriate scale as per area of compartment and attached in respective Compartment history files.

**4.5.2 Enumerations-** As the crop is uniform complete enumerations are not felt necessary. Therefore sampling was done to assess the crop diameter, the most important pre-requisite for framing felling program and for ascertaining growth rate / site quality. The technique of Survey and Assessment of Forest Resource using Grid and Quadrants method (Sample Plots) has been adopted and complete counting of all tree species class wise has been done in sample plots.

#### 4.5.3 Volume Table:

Table below reveals the statistics of growth of Khair. Due to higher value of Khair tree and low exploitable diameter (25 cm) ,the volume factor is based on 5 cm diameter class as was adopted in previous working plan by Sh. Vineet Kumar and reproduced as follows:

**Table: 4.3: Volume (cum) of Khair in different diameter classes**

<b>Diameter Classes (cm)</b>	<b>Quality of Crop</b>	<b>Commercial timber in round (m<sup>3</sup>)</b>	<b>Heartwood (m<sup>3</sup>)</b>
10-15	V-1	0.083	-
15-20	V-2	0.115	0.068
20-25	IV-1	0.149	0.093
25-30	IV-2	0.218	0.139
30-35	III-1	0.340	0.303
35-40	III-2	0.530	0.405
40-45	IIA-1	0.768	0.503

45-50	IIA-2	1.047	0.660
50 & above	IIB & above	1.283	0.883

#### **4.6 SILVICULTURAL SYSTEM:**

The silvicultural system will be Coppice with Standards system. Khair trees will be harvested (25 cm dbh & above) by retaining 25% of mature and healthy trees as mother trees (in line with CEC approved guidelines). Young trees will also be retained for the future crop. The Khair forests are mixed with Shisham, Semal, Eucalyptus, Jhingan, etc. However, they will not be exploited as per recommendations of CEC with regard to Khair Working Circle.

#### **4.7 REGENERATION:**

The coppice regeneration shall have to be supplemented by artificial plantation of native species. This will have to be done immediately in the year next to the year of felling. The natural regeneration by seed, if comes shall has to be well protected.

#### **4.8 CHOICE OF SPECIES:**

Khair has to be the main species (50%). However, mixture of Shisham, Toon, Semal, Dhak (Palash), Kachnar, Siris, Drek, Behul etc. be also introduced. In shady places particularly below standards mulberry can be tried. In some suitable pockets, trees of religious / medicinal/ aesthetic importance should also be planted to improve the biodiversity.

#### **4.9 HARVESTABLE DIA:**

The exploitable diameter is fixed at 25 cm for Khair trees. No felling of other broadleaved species be permitted in the compartment/Sub-compartment.

#### **4.10 ROTATION:**

The rotation period is fixed as 30 years during which the crop is expected to attain dbh of 25 cm.

#### **4.11 FELLING SERIES:**

Plantation felling series of Established Khair Plantation areas has been constituted as shown in Table 4.6.

**4.11.1 Enumerations:** The technique of Survey and Assessment of Forest Resource using Grid and Quadrants method (Sample Plots) has been adopted and complete counting of all tree species class wise has been done in sample plots. The detail of sample plots are as under:-

**Table 4.4**  
**Growing Stock Estimation Results**

**Table 4.4. a:**

<b>Total Number of Khair trees per Ha.</b>										
<b>Spp</b>	<b>V-1</b>	<b>V-2</b>	<b>IV-1</b>	<b>IV-2</b>	<b>III-1</b>	<b>III-2</b>	<b>IIA 1</b>	<b>IIA 2</b>	<b>IIB</b>	<b>Total</b>
<b>Khair</b>	33.529	40.588	33.529	25.294	5.294	1.765	0.588	0	0.588	141.176
<b>GT</b>	<b>33.529</b>	<b>40.588</b>	<b>33.529</b>	<b>25.294</b>	<b>5.294</b>	<b>1.765</b>	<b>0.588</b>	<b>0</b>	<b>0.588</b>	<b>141.176</b>

**Table 4.4 b:**

<b>Total number of Khair trees in 344.57 ha.</b>										
<b>Spp</b>	<b>V-1</b>	<b>V-2</b>	<b>IV-1</b>	<b>IV-2</b>	<b>III-1</b>	<b>III-2</b>	<b>IIA 1</b>	<b>IIA 2</b>	<b>IIB</b>	<b>Total</b>
<b>Khair</b>	11553	13985	11553	8716	1824	608	203	0	203	48645
<b>GT</b>	<b>11553</b>	<b>13985</b>	<b>11553</b>	<b>8716</b>	<b>1824</b>	<b>608</b>	<b>203</b>	<b>0</b>	<b>203</b>	<b>48645</b>

**Table 4.4 c:**

<b>Total Volume of Khair in 344.57 ha.</b>										
<b>Spp</b>	<b>V-1</b>	<b>V-2</b>	<b>IV-1</b>	<b>IV-2</b>	<b>III-1</b>	<b>III-2</b>	<b>IIA 1</b>	<b>IIA 2</b>	<b>IIB</b>	<b>Total (m<sup>3</sup>)</b>
<b>Khair</b>	958.918	1608.331	1721.431	1900.000	625.699	322.274	155.665	0	260.049	7552.366 m <sup>3</sup>
<b>GT (m<sup>3</sup>)</b>	<b>958.918</b>	<b>1608.331</b>	<b>1721.431</b>	<b>1900.000</b>	<b>625.699</b>	<b>322.274</b>	<b>155.665</b>	<b>0</b>	<b>260.049</b>	<b>7552.366 m<sup>3</sup></b>

#### **4.11.2 Calculation of Yield:**

Total Forest land under Khair WC (Estt. Plantation) = 344.57 ha. Calculation of yield is shown in Table 4.5.

**Table 4.5: Calculation of yield**

<b>Yield Calculation</b>	<b>Vol.(m<sup>3</sup>)</b>
Total Growing Stock	7552.366
Less : (Vol. of Class V <sup>th</sup> -I , V <sup>th</sup> -2 & IV <sup>th</sup> -I )	4288.680
Balance Total Growing stock (V1)	3263.687
Growing Stock of Trees to be retained from slopes & along nallas(10% of total remaining): V2	326.368
Growing Stock available for harvesting V3= (V1-V2)	2937.319
<b>Annual Yield V5 = V4/10</b>	<b>293.731</b>
<b>Or Say</b>	<b>293 m<sup>3</sup></b>



**Table 4.6 Plantation Felling Series Of Khair Estt. Plantations**

<b>Sr. No.</b>	<b>Year of felling</b>	<b>Range</b>	<b>No. &amp; Name of Forest</b>		<b>Compt./Sub Comptt. No.</b>	<b>Total Area (in Ha) prescribed for felling</b>
<b>1</b>	2023-24	Nahan	R-104	Kala Bhood	C-2b	7.36
		Nahan	R-101	Katasan	C-4a	13.50
				<b>Total</b>		<b>20.86</b>
<b>2</b>	2024-25	Kolar	R-83	Matter	C-5b	1.58
		Kolar	R-86	East Bheron	C-1b	2.89
		Trilokpur	R-117	Maidhar	C-3b	19.60
				<b>Total</b>		<b>24.07</b>
<b>3</b>	2025-26	Nahan	R-97	Mandpa	C-2b	92.65
				<b>Total</b>		<b>92.65</b>
<b>4</b>	2026-27	Kolar	R-80	Dhakaranwala	C-4b	79.38
				<b>Total</b>		<b>79.38</b>
<b>5</b>	2027-28	Nahan	R- 97	Mandpa	C-6b	18.38
				<b>Total</b>		<b>18.38</b>
<b>6</b>	2028-29	Nahan	R-111	Ambwala	C-4b	15.37
				<b>Total</b>		<b>15.37</b>
<b>7</b>	2029-30	Nahan	R-101	Katasan	C-3b	10.00
		Nahan	R-104	Kala Bhood	C-4b	10.00
				<b>Total</b>		<b>20.00</b>
<b>8</b>	2030-31	Kolar	R-78	Haripur	C-9b	10.00
		Trilokpur	R-117	Maidhar	C-4b	13.76
				<b>Total</b>		<b>23.76</b>
<b>9</b>	2031-32	Nahan	R-104	Kala Bhood	C-3b	10.00
		Nahan	R-101	Katasan	C-5b	10.00
				<b>Total</b>		<b>20.00</b>
<b>10</b>	2032-33	Trilokpur	R-118	Trilokpur	C-2b	8.00
		Jamta	R-131	Thandoli	C-1	22.10
				<b>Total</b>		<b>30.10</b>
				<b>G.Total</b>		<b>344.57 Ha</b>

#### **4.12 METHOD OF EXECUTING FELLING:**

The State of Himachal Pradesh has filed I.A No. 87648 of 2020 in Writ Petition (C) No. 202 of 1995 seeking permission of Hon'ble Supreme Court to allow the State to carry out silviculture felling of Khair (*Acacia catechu*) trees in the forest areas of the State in accordance with the approved Working Plans. The recommendations that will be followed in felling are : -

- (i) rotation age of Khair be kept at 30 years with minimum diameter of 25 cms at breast height.
- (ii) regeneration of Khair is undertaken through coppice with standards as well as artificial planting. 50 trees per ha or 25% of the total number of trees enumerated whichever is less is retained as mother trees.
- (iii) rotation age of Khair be kept at 30 years with minimum dia of 25 cms at breast height in respect of natural forests. However, in respect of pure plantations of Khair same rotation age of 30 years be followed without a limit on the girth of trees and such plantations are regenerated through coppice for at least another two rotations and supplemented with artificial regeneration.
- (iv) as far as possible the felling operations in the adjoining forest compartment of the already felled area/compartment in Khair Working Circle are to be taken up only after 5 years of regeneration felling in the given compartment and after ensuring that the regeneration is established in the already cleared forest area. This will ensure that the large tracts of the forest in a given locality are not closed for grazing at a given time and also large gaps are not created within the forests.
- (v) the removal of Lantana weed to be an integral component of regeneration felling and the removal of Lantana has to be completed before the felling operations commence, so that the regeneration of the felled area is taken up forthwith.
- (vi) no felling of broad leaved species be permitted in the compartments to be taken up for regeneration felling of the above approved working plans.
- (vii) The eradication operations of Lantana shall continue during 2<sup>nd</sup> and 3<sup>rd</sup> years of operations so as to ensure total elimination of the weed.
- (viii) the mother trees/seed bearers trees are to be identified in advance i.e. at least one or two years prior to the proposed felling in the compartment and labelled as mother trees or standards and these trees are not permitted to lopped by locals thereafter.
- (ix) the demarcation and survey of boundaries and fencing of the area are to be scrupulously carried out as prescribed in the Reports of the Monitoring Committee and as prescribed in the schedule.
- (x) planting component in Assisted Natural Regeneration shall include at least 50% seedlings of native broadleaved and multipurpose use species and the rest shall be of Khair.
- (xi) all the un-authorized occupation of forest land within the forest area are to be evicted before undertaking planting of the compartments selected,

- (xii) the felling operations in the adjoining forest area/compartment of the already felled area/compartment be taken up only after five years of regeneration felling in the given compartment and after ensuring that the regeneration is established in the already cleared forest area,
- (xiii) adequate soil and moisture conservation measures are to be undertaken in regeneration area;,,
- (xiv) no green felling are to be carried out in steep slopes and along streams and nallas as per the standard prescription in the Working Plan code and in the forest areas falling under Protection cum Rehabilitation Working Circle;
- (xv) the forest department should ensure that videography of each beat where felling is to be done, is done separately at regular intervals to clearly indicate the condition and state of the forest before felling, during felling and after felling;
- (xvi) in addition to the conditions laid down in the Working Plan and those laid down by the CEC, the CCFs/CFs/DCF/DFOs shall ensure that adequate funds are sought immediately and re-afforestation is done either simultaneously or if it is not possible, immediately after felling is completed.
- (xvii) It should be ensured that these forest areas are kept free from grazing and are protected.

#### **4.13 REGENERATION:**

The coppice regeneration shall have to be supplemented by artificial regeneration. This will have to be done immediately in the year next to the year of felling. The natural regeneration by seed, if appears, shall have to be well protected. Regeneration of the felled forests will be undertaken during the rainy season (planting season) using tall seedlings, more or less of same species, naturally occurring in the district. The regeneration of the area is achieved through coppice growth, artificial planting and natural regeneration to ensure development of broadleaved mixed forest. While taking up plantation it is ensured that at least 50% of the seedlings are used other than the Khair species. The number of plants to be planted per hectare will be decided on the basis of site requirement and ranged from 200 to 800 plants per ha. The principal species Khair in these forests should constitute the major proportion in case of enrichment planting. Artificial regeneration operations which meant planting of tall nursery grown plants will be done on priority in the felled areas which have to be fenced. In respect of pure Khair plantations the first two rotations regeneration is achieved through coppice supplemented by planting seedlings in gaps.

The regeneration areas should be protected from forest fires. All the fuels/debris in the peripheral felled areas will be controlled burnt before fire season. All the necessary arrangement will also be made for control of forest fires. All regeneration areas are to be inspected at CCF and DFO level.

#### **4.14 ASSOCIATED REGULATIONS AND MEASURES:**

**i. Closure:** All finally felled areas shall be closed for grazing till the crop is completely established i.e. becomes beyond the danger of being grazed/browed/trampled by cattle. A period of about 7-8 years is required for the purpose. Five strands of barbed wire fencing including one cross strand using concrete pillars strongly anchored in the ground with side supports should be used for closing of area. Fencing of the proposed regeneration compartments is mandated to be done before the re-generation work commences. Lopping and grazing will be suspended till the establishment of regeneration. T.D. can be sanctioned in areas other than those under closure.

**ii). Boundary Demarcation:** As per CEC guidelines, felling compartments will be identified with GPS demarcation and polygons of felled compartments/sites will be prepared.

**iii) Fire Protection:** Effective fire prevention measures are to be ensured in regeneration areas. As also recommended by CEC, there will total ban on burning of debris arising from felling and weeding operations to encourage natural regeneration. Cleaning/clearing of fire lines along the boundary fence is to be undertaken to protect the natural regeneration and plantation from damages of fire.

**iv) Adequate soil and moisture conservation measures:** The SMCs works will have to be undertaken in regeneration area. Creation of small water storage structures and check dams to strengthen water regime can go a long way in enriching soil and regulating soil moisture regime.

#### **KHAIR WORKING CIRCLE ( NATURAL KHAIR {Coppice} AREA)**

#### **4.15 GENERAL CONSTITUTION & GENERAL CHARACTER OF VEGETATION:**

These areas cover primarily miscellaneous deciduous forests, having adequate vegetative cover of broad leaved species like Khair, Sain, Semul, Sandan, Dhak, Chhal, Amaltas, Tendu, and Jhingan.etc. Sporadic poor quality Sal areas generally of dry Shivalik type which are not fit to be managed under the Sal Working Circle and having a substantial proportion of miscellaneous species have also been included in this Working circle. In general, the crop consists of poor quality Sal, Sain, Khair, Chhal, Amaltas, Jhingan, Tendu & Papri as the main species with other kokath species. In most of the areas, there is a dense undergrowth of Karonda, Lantana,

Gandhella, Karu, Woodfordia etc. In depressions and along the nalas, Jaman, Mango and Bamboos are also found. Climbers like Maljhan and Gaug are commonly seen.

#### 4.16 SPECIAL OBJECTIVES OF MANAGEMENT:

The special objectives of management are as follows:

- (i) To exploit the natural available khair trees and augment supply of khairwood for katha manufacture.
- (ii) To replenish the felled area with biodiverse species including khair.

#### 4.17 AREA STATEMENT:

The total area allotted to this Working circle is 9479.64 Ha. Range wise breakup is as follows:

**Table 4.7: Range wise breakup of Khair WC (Natural Khair {Coppice} Areas) in Ha**

Name of Range	Area in Ha.
Kolar	5659.69
Nahan	842.33
Trilokpur	2748.72
Jamta	228.90
<b>G. Total</b>	<b>9479.64 Ha</b>

**Table 4.8: The different areas allotted to Khair working Circle (Natural Khair {Coppice} Areas) are as follows:**

Name of Range	Name of Forest	Comptt. No./Sub Compt No.	Area (in ha)
Kolar	R-77 Lohgarh	1	32.8
		2	70.08
		3	65.36
		4	48.00
		5	42.24
		6	54.04
		7	25.12
		8	48
		9	54.04
		10	45.44
		11	50.24
		12	43.68

		13	48
		14	65.28
		15	85.76
		16	44.86
		17	44
		18	42.72
		19	50.2
		20	20
		21	16.32
		22	68.8
		23	69.12
		26	55.2
		27	52.48
		28	67.84
		29	71.36
		30	41.6
		31	60.48
		32a	64.24
	R-78 Haripur	3	69.08
		5	82.88
		6	100.2
		7	115.16
		8	26.88
		9a	43.48
		10a	5.74
		11	91.72
		12	59.72
		14	81.48
		15	52.8
		16	78.6
		17	70.4
		19	48
		20	25.12
	R-79 Negiwala	1	97.92
		2	158.29
		3	91.04
		4	60.64
		5	58.56

R-80 Dhakranwala	1	54.4
	2	81.92
	3	79.04
	4a	8.62
R-81 Sambhalka	1	101.44
	2	93.76
	3	58.4
	4	79.04
	5	80.48
R-83 Mattar	3	130.78
	4	124.64
	5a	123.06
R-84 Brahamanwali	2	126.92
	3a	137.41
R-85 Kohluwala	1	52.43
	2	64.7
R-86 E/Bheron	1a	59.67
	2a	217.82
	3a	155.36
	4	121
	5	114.24
R-87 W/Bheron	1	76.48
	2	38.72
	3	77.92
	4	100.32

	R-88 Jamretwa	1	59.11
		2	45.27
		4	55.08
		5	78.56
		6	98.09
	<b>Total</b>		<b>5659.69</b>
Nahan	R-92 Shishamwala	1	124.25
		3	131.8
	R-97 Mandapa	1a	100.54
		2a	11.72
		4a	62.95
		6a	36.98
	R-99 Bikram Bag	1a	5.27
	R-100 Teeb	6	45.28
		7	36.32
		8a	32.08
	R-101 Katasan	3a	14.12
		4a	9.06
		5a	15.12
	R-104 Kala Bhod	10a	61.1
	R-110 Periwala	1a	85.51
	R-111 Ambwala	4a	70.23
	<b>Total</b>		<b>842.33</b>



Trilokpur			
	R-115 Jheera	5	81.92
	R-116 Surla	2	95.07
		3	50.24
	R-117 Maidhar	3a	30.84
		4a	91.14
		5	76.82
		6	188.64
	R-118 Trilokpur	2a	53.12
		3	181.12
		4	144.8
		5	107.84
	R-121 Shikardhi	1	84.4
		3	89.56
		4a	78.9
		5	65.12
		6	73.92
	R-122 Kiyari	1	37.1
		2	53.3
		3	28.5
		4	94.05
		5	94.4
		6	109.6
		7	118.8
	R-123 Tribuni	4	140.1
		5	214.8
		6	89
		8	73.7
	R-124 Bhogpur Kotla	6	94.56
		7	107.36
	<b>Total</b>		<b>2748.72</b>

Jamta	R-135 Tallon	2	27.3
		3a	55
		4a	22.4
		5a	32
		10	67.6
		11a	24.6
	<b>Total</b>		<b>228.90</b>
	<b>G.Total</b>		<b>9479.64 Ha</b>

#### **4.18 REDUCED AREA:**

The areas are not reduced.

#### **4.19 FELLING SERIES:**

Coppice felling series for Natural occurring khair is depicted in Table 4.12.

#### **4.20 ANALYSIS AND EVALUATION OF CROP:**

**4.20.1 Stock Maps:** Stock maps have been prepared on appropriate scale as per area of compartment and attached in respective Compartment history files.

**4.20.2 Enumerations:** Assessment of growing stock has been done by sampling technique. Among the species, the Kokath (general term for less valuable miscellaneous B/L spp.) constitutes the largest proportion. Analysis of species has been given in table 4.10

**4.20.3 Density:** The areas are generally of density 0.1 to 0.5

#### **4.21 SILVICULTURAL SYSTEM AND REGENERATION:**

Coppice with standards system supplemented by artificial planting has been adopted for this Working circle. Since the chances of coppice regeneration may fail, therefore, reliance has to be placed on artificial planting. For this purpose nursery stock should be quite sturdy.

#### **4.22 CHOICE OF SPECIES (PLANTATION):**

The species occurring and predominating locally available should be preferred with emphasis on katha, fuel, fodder and other NTFP yielding species. Bamboo should be planted in soil erosion prone areas.

#### **4.23 EXPLOITABLE DIAMETER:**

The exploitable diameter is fixed at 25 cm for Khair trees.

#### 4.24 ROTATION:

The rotation period is fixed as 30 years during which the crop is expected to attain dbh of 25 cm.

**Table 4.9 a. Number of trees per Ha.**

Class	V-1	V-2	IV-1	IV-2	III-1	III-2	IIA-1	IIA-2	IIB	IA	IB	IC	ID	Total
Sal	0.67	0.00	8.67	0.00	6.00	0	2.00	0	1.33	0.00	0	0	0	18.67
Sain	6.67	0.00	10.00	0.00	8.00	0	5.33	0	2.00	0.67	0	0	0	32.67
Khair	12.00	6.00	8.67	2.00	0.67	0	0.67	0	0.00	0.00	0	0	0	30.01
Chil	0.00	0.00	1.33	0.00	1.33	0	0.00	0	0.00	0.00	0	0	0	2.66
Kokat	34.00	0.00	28.67	0.00	20.67	0	2.00	0	0.67	0.67	0	0	0	86.68
<b>Total</b>	<b>53.34</b>	<b>6.00</b>	<b>57.34</b>	<b>2.00</b>	<b>36.67</b>	<b>0</b>	<b>10.00</b>	<b>0</b>	<b>4.00</b>	<b>1.34</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>170.69</b>

**Table 4.9 b. Total number of Trees in Khair WC (Natural Area) (9479.64 Ha)**

Class	V-1	V-2	IV-1	IV-2	III-1	III-2	IIA-1	IIA-2	IIB	IA	IB	IC	ID	Total
Sal	6351	0	82188	0	56878	0	18959	0	12608	0	0	0	0	176984
Sain	63229	0	94796	0	75837	0	50526	0	18959	6351	0	0	0	309698
Khair	113756	56878	82188	18959	6351	0	6351	0	0	0	0	0	0	284483
Chil	0	0	12608	0	12608	0	0	0	0	0	0	0	0	25216
Kokat	322308	0	271781	0	195944	0	18959	0	6351	6351	0	0	0	821694
<b>Total</b>	<b>505644</b>	<b>56878</b>	<b>543561</b>	<b>18959</b>	<b>347618</b>	<b>0</b>	<b>94795</b>	<b>0</b>	<b>37918</b>	<b>12702</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1618075</b>

**Table 4.9 c Growing stock in terms of Volume (m<sup>3</sup>) (9479.64 Ha)**

Growing stock in terms of Volume (m <sup>3</sup> )														
Class	V-1	V-2	IV-1	IV-2	III-1	III-2	IIA-1	IIA-2	IIB	IA	IB	IC	ID	Total Vol. (m <sup>3</sup> )
Sal	806.5770	0.0000	30245.1840	0.0000	47493.1300	0	33557.4300	0	38202.2400	0.0000	0	0	0	150304.5610
Sain	8030.0830	0.0000	34884.9280	0.0000	63323.8950	0	89431.0200	0	57445.7700	29132.0370	0	0	0	282247.7330
Khair	9441.7480	6540.9516	12246.0120	4133.0620	2178.3930	0	4877.5680	0	0.0000	0.0000	0	0	0	39417.7346
Chil	0.0000	0.0000	3150.7392	0.0000	8631.4368	0	0.0000	0	0.0000	0.0000	0	0	0	11782.1760
Kokat	20627.7120	0.0000	50007.7040	0.0000	81904.5920	0	16778.7150	0	9621.7650	14569.1940	0	0	0	193509.6820
<b>Total</b>	<b>38906.1200</b>	<b>6540.9516</b>	<b>130534.5672</b>	<b>4133.0620</b>	<b>203531.4468</b>	<b>0</b>	<b>144644.7330</b>	<b>0</b>	<b>105269.7750</b>	<b>43701.2310</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>677261.8866 m<sup>3</sup></b>

**Table 4.10: PROPORTION (Per Ha)**

Sr. No.	Spp	Numbers	Volume in ( m <sup>3</sup> )	Proportion %	
				No.	Vol. ( m <sup>3</sup> )
1	Sal	18.67	15.8556	10.52	22.19
2	Sain	32.67	29.7745	18.14	41.68
3	Khair	30.01	4.1582	20.00 (approx)	5.82
4	Chil	2.66	1.2429	1.56	1.74
5	Kokat	86.68	20.4134	49.78	28.57
	<b>Total</b>	<b>170.69</b>	<b>71.4445</b>	<b>100.00</b>	<b>100.00</b>

#### 4.25 REGULATION AND CALCULATION OF YIELD OF KHAIR:

The total area of is 9479.64 ha. The average annual area to be felled comes to 947 ha. The total yield by volume is shown in table below:-

**Table 4.11: Calculation of yield**

<b>Yield Calculation</b>	<b>Vol.(m<sup>3</sup>)</b>
Total Growing Stock	39417.7346
Less : (Vol. of Class V <sup>th</sup> -I , V <sup>th</sup> -2 & IV <sup>th</sup> -I )	28228.7116
Balance Total Growing stock (V1)	11189.023
Growing Stock of Trees to be retained from slopes & along nallas(10% of total remaining): V2	1118.902
Growing Stock available for harvesting V3= (V1-V2)	10070.121
<b>Annual Yield V5 = V4/10</b>	<b>1007.0121</b>
<b>Or Say</b>	<b>1007 m<sup>3</sup></b>

#### 4.26 METHODS OF EXECUTING FELLING:

The State of Himachal Pradesh has filed I.A No. 87648 of 2020 in Writ Petition (C) No. 202 of 1995 seeking permission of Hon'ble Supreme Court to allow the State to carry out silviculture felling of Khair (*Acacia catechu*) trees in the forest areas of the State in accordance with the approved Working Plans. The recommendations that will be followed in felling are : -

**1) Khair:**

- (i) rotation age of Khair be kept at 30 years with minimum diameter of 25 cms at breast height;
- (ii) regeneration of Khair is undertaken through coppice with standards as well as artificial planting. 50 trees per ha. or 25% of the total number of trees enumerated whichever is less is to be retained as mother trees.
- (iii) as far as possible the felling operations in the adjoining forest compartment of the already felled area/compartment in Khair Working Circle are to be taken up only after 5 years of regeneration felling in the given compartment and after ensuring that the regeneration is established in the already cleared forest area. This will ensure that the large tracts of the forest in a given locality are not closed for grazing at a given time and also large gaps are not created within the forests.
- (iv) no felling of broad leaved species be permitted in the compartments to be taken up for regeneration felling of the above approved working plans.

- (v) the removal of Lantana weed to be an integral component of regeneration felling and the removal of Lantana has to be completed before the felling operations commence, so that the regeneration of the felled area is taken up forthwith.
- (vi) The eradication operations of Lantana shall continue during 2<sup>nd</sup> and 3<sup>rd</sup> years of operations so as to ensure total elimination of the weed.
- (vii) the mother trees/seed bearers trees are to be Identified in advance i.e. at least one or two years prior to the proposed felling in the compartment and labelled as mother trees or standards and these trees are not permitted to lopped by locals thereafter.
- (viii) the demarcation and survey of boundaries and fencing of the area are to be scrupulously carried out as prescribed in the Reports of the Monitoring Committee and as prescribed in the schedule.
- (ix) planting component in Assisted Natural Regeneration shall include at least 50% seedlings of native broadleaved and multipurpose use species and the rest shall be of Khair.
- (x) all the un-authorized occupation of forest land within the forest area are to be evicted before undertaking planting of the compartments selected.
- (xi) the felling operations in the adjoining forest area/compartment of the already felled area/compartment be taken up only after five years of regeneration felling in the given compartment and after ensuring that the regeneration is established in the already cleared forest area.
- (xii) adequate soil and moisture conservation measures are to be undertaken in regeneration area.
- (xiii) no green felling are to be carried out in steep slopes and along streams and nallas as per the standard prescription in the Working Plan code and in the forest areas falling under Protection cum Rehabilitation Working Circle;
- (xiv) the forest department should ensure that videography of each beat where felling is to be done, is done separately at regular intervals to clearly indicate the condition and state of the forest before felling, during felling and after felling;
- (xv) in addition to the conditions laid down in the Working Plan and those laid down by the CEC, the CCFs/CFs/DCF/DFOs shall ensure that adequate funds are sought immediately and re-afforestation is done either simultaneously or if it is not possible, immediately after felling is completed.
- (xvi) It should be ensured that these forest areas are kept free from grazing and are protected.

#### **4.27 SEQUENCE OF FELLINGS:**

The sequence of felling during the working plan is prescribed as follows:-

**Table 4.12: Coppice felling series of Natural occurring Khair**

Year	Range	Name of Forest	Compt./Sub Comptt. No	Total Area (in Ha)
<b>2023-24</b>	Kolar	R-77 Lohgarh	1	32.80
	Kolar	R-77 Lohgarh	6	54.04
	Kolar	R-77 Lohgarh	9	54.04
	Kolar	R-77 Lohgarh	11	50.24
	Kolar	R-77 Lohgarh	13	48.00
	Kolar	R-77 Lohgarh	15	85.76
	Kolar	R-77 Lohgarh	19	50.20
	Kolar	R-77 Lohgarh	26	55.20
	Kolar	R-79 Negiwala	1	97.92
	Kolar	R-81 Sambhalka	4	79.04
	Nahan	R-92 Shishamwala	1	124.25
	Trilokpur	R-115 Jheera	5	81.92
	Trilokpur	R-118 Trilokpur	5	107.84
			<b>Total</b>	<b>921.25</b>
<b>2024-25</b>	Kolar	R-77 Lohgarh	27	52.48
	Kolar	R-77 Lohgarh	30	41.60
	Kolar	R-80 Dhakranwala	1	54.40
	Kolar	R-83 Mattar	3	130.78
	Kolar	R-84 Brahmanwali	2	126.92
	Kolar	R-85 Kohluwala	2	64.70
	Kolar	R-86 E/Bheron	2a	217.82
	Nahan	R-97 Mandapa	2a	11.72
	Nahan	R-97 Mandapa	4a	62.95
	Nahan	R-101 Katasan	5a	15.12
	Nahan	R-111 Ambwala	4a	70.23
	Trilokpur	R-116 Surla	2	95.07
			<b>Total</b>	<b>943.79</b>
<b>2025-26</b>	Kolar	R-78 Haripur	3	69.08
	Kolar	R-78 Haripur	5	82.88
	Kolar	R-78 Haripur	7	115.16
	Kolar	R-78 Haripur	9a	43.48
	Kolar	R-78 Haripur	15	52.80
	Kolar	R-88 Jamretwa	2	45.27
	Kolar	R-88 Jamretwa	5	78.56

	Nahan	R-100 Teeb	6	45.28
	Nahan	R-104 Kala Bhood	10a	61.10
	Trilokpur	R-122 Kiyari	5	94.40
	Trilokpur	R-122 Kiyari	7	118.80
	Trilokpur	R-124 Bhogpur Kotla	7	107.36
			<b>Total</b>	<b>914.17</b>
<b>2026-27</b>	Kolar	R-77 Lohgarh	3	65.36
	Kolar	R-77 Lohgarh	22	68.80
	Kolar	R-77 Lohgarh	32a	64.24
	Kolar	R-78 Haripur	11	91.72
	Kolar	R-79 Negiwala	3	91.04
	Kolar	R-80 Dhakranwala	3	79.04
	Kolar	R-81 Sambhalka	1	101.44
	Kolar	R-86 E/Bheron	5	114.24
	Kolar	R-87 W/Bheron	3	77.92
	Nahan	R-99 Bikram Bag	1a	5.27
	Nahan	R-101 Katasan	3a	14.12
	Trilokpur	R-117 Maidhar	3a	30.84
	Trilokpur	R-117 Maidhar	6	188.64
			<b>Total</b>	<b>992.67</b>
<b>2027-28</b>	Kolar	R-78 Haripur	17	70.40
	Kolar	R-78 Haripur	20	25.12
	Kolar	R-79 Negiwala	5	58.56
	Kolar	R-86 E/Bheron	1a	59.67
	Kolar	R-87 W/Bheron	1	76.48
	Nahan	R-100 Teeb	8a	32.08
	Trilokpur	R-121 Shikardhi	1	84.40
	Trilokpur	R-121 Shikardhi	4a	78.90
	Trilokpur	R-122 Kiyari	1	37.10
	Trilokpur	R-122 Kiyari	4	94.05
	Trilokpur	R-123 Tribuni	5	214.80
	Jamta	R-135 Tallon	2	27.30
	Jamta	R-135 Tallon	10	67.60
			<b>Total</b>	<b>926.46</b>
<b>2028-29</b>	Kolar	R-77 Lohgarh	4	48.00
	Kolar	R-77 Lohgarh	16	44.86
	Kolar	R-77 Lohgarh	28	67.84
	Kolar	R-77 Lohgarh	31	60.48
	Kolar	R-78 Haripur	8	26.88

	Kolar	R-78 Haripur	10a	5.74
	Kolar	R-78 Haripur	12	59.72
	Kolar	R-78 Haripur	16	78.60
	Kolar	R-78 Haripur	19	48.00
	Kolar	R-79 Negiwala	2	158.29
	Kolar	R-80 Dhakranwala	4a	8.62
	Kolar	R-81 Sambhalka	2	93.76
	Kolar	R-81 Sambhalka	5	80.48
	Kolar	R-83 Mattar	4	124.64
	Kolar	R-85 Kohluwala	1	52.43
	Jamta	R-135 Tallon	4a	22.40
			<b>Total</b>	<b>980.74</b>
<b>2029-30</b>	Kolar	R-77 Lohgarh	2	70.08
	Kolar	R-77 Lohgarh	21	16.32
	Kolar	R-77 Lohgarh	23	69.12
	Kolar	R-77 Lohgarh	29	71.36
	Nahan	R-92 Shishamwala	3	131.80
	Nahan	R-97 Mandapa	1a	100.54
	Nahan	R-97 Mandapa	6a	36.98
	Nahan	R-110 Periwala	1a	85.51
	Trilokpur	R-117 Maidhar	5	76.82
	Trilokpur	R-122 Kiyari	6	109.60
	Trilokpur	R-123 Tribuni	8	73.70
	Trilokpur	R-124 Bhogpur Kotla	6	94.56
			<b>Total</b>	<b>936.39</b>
<b>2030-31</b>	Kolar	R-77 Lohgarh	5	42.24
	Kolar	R-77 Lohgarh	8	48.00
	Kolar	R-77 Lohgarh	10	45.44
	Kolar	R-77 Lohgarh	14	65.28
	Kolar	R-79 Negiwala	4	60.64
	Kolar	R-80 Dhakranwala	2	81.92
	Kolar	R-81 Sambhalka	3	58.40
	Kolar	R-86 E/Bheron	3a	155.36
	Kolar	R-87 W/Bheron	4	100.32
	Kolar	R-88 Jamretwa	6	98.09
	Nahan	R-100 Teeb	7	36.32
	Trilokpur	R-116 Surla	3	50.24
	Trilokpur	R-118 Trilokpur	4	144.80
			<b>Total</b>	<b>987.05</b>



<b>2031-32</b>	Kolar	R-77 Lohgarh	7	25.12
	Kolar	R-77 Lohgarh	12	43.68
	Kolar	R-77 Lohgarh	17	44.00
	Kolar	R-77 Lohgarh	20	20.00
	Kolar	R-78 Haripur	6	100.20
	Kolar	R-78 Haripur	14	81.48
	Kolar	R-84 Brahamanwali	3a	137.41
	Kolar	R-86 E/Bheron	4	121.00
	Kolar	R-88 Jamretwa	1	59.11
	Nahan	R-101 Katasan	4a	9.06
	Trilokpur	R-118 Trilokpur	3	181.12
	Trilokpur	R-121 Shikardhi	5	65.12
			<b>Total</b>	<b>887.30</b>
<b>2032-33</b>	Kolar	R-77 Lohgarh	18	42.72
	Kolar	R-83 Matter	5a	123.06
	Kolar	R-87 W/Bheron	2	38.72
	Kolar	R-88 Jamretwa	4	55.08
	Trilokpur	R-117 Maidhar	4a	91.14
	Trilokpur	R-118 Trilokpur	2a	53.12
	Trilokpur	R-121 Shikardhi	3	89.56
	Trilokpur	R-121 Shikardhi	6	73.92
	Trilokpur	R-122 Kiyari	2	53.30
	Trilokpur	R-122 Kiyari	3	28.50
	Trilokpur	R-123 Tribuni	4	140.10
	Trilokpur	R-123 Tribuni	6	89.00
	Jamta	R-135 Tallon	3a	55.00
	Jamta	R-135 Tallon	5a	32.00
	Jamta	R-135 Tallon	11a	24.60
			<b>Total</b>	<b>989.82</b>
			<b>G.Total</b>	<b>9479.64 Ha</b>

#### 4.28 REGENERATION:

The coppice regeneration shall have to be supplemented by artificial regeneration. This will have to be done immediately in the year next to the year of felling. The natural regeneration by seed, if appears, shall have to be well protected. Regeneration of the felled forests will be undertaken during the rainy season (planting season) using tall seedlings, more or less of same species, naturally occurring in the district. The regeneration of the area is achieved through coppice growth, artificial planting and natural regeneration to ensure development of broadleaved mixed forest. While taking up plantation it is ensured that at least 50% of the seedlings are used other

than the Khair species. The number of plants to be planted per hectare will be decided on the basis of site requirement and ranged from 200 to 800 plants per ha.

The regeneration areas should be protected from forest fires. All the fuels/debris in the peripheral felled areas will be controlled burnt before fire season. All the necessary arrangement will also be made for control of forest fires. All regeneration areas are to be inspected at CCF and DFO level.

#### **4.29 ASSOCIATED REGULATIONS AND MEASURES:**

- i. Closure:** All finally felled areas shall be closed for grazing till the crop is completely established i.e. becomes beyond the danger of being grazed/browed/trampled by cattle. A period of about 7-8 years is required for the purpose. Five strands of barbed wire fencing including one cross strand using concrete pillars strongly anchored in the ground with side supports has been prescribed for closing of area. Fencing of the proposed regeneration compartments is mandated to be done before the re-generation work commences. Lopping and grazing will be suspended till the establishment of regeneration. T.D. can be sanctioned in areas other than those under closure.
- ii). Boundary Demarcation:** As per CEC guidelines, felling compartments will be identified with GPS demarcation and polygons of felled compartments/sites will be prepared.
- iii) Fire Protection:** Effective fire prevention measures are to be ensured in regeneration areas. As also recommended by CEC, there will be total ban on burning of debris arising from felling and weeding operations to encourage natural regeneration. Cleaning/clearing of fire lines along the boundary fence is to be undertaken to protect the natural regeneration and plantation from damages of fire.
- iv) Adequate soil and moisture conservation measures:** The SMCs works will have to be undertaken in regeneration area. Creation of small water storage structures and check dams to strengthen water regime can go a long way in enriching soil and regulating soil moisture regime.

## CHAPTER 5

### EUCALYPTUS MANAGEMENT PLAN

#### 5.1 INTRODUCTION:

Eucalyptus is a species of exotic origin. During third five year plan lot of emphasis was laid on Industrial plantation. During this plan area of 2165 ha (including Paonta forest division) in Sal and miscellaneous forests was felled and planted with Eucalyptus (mostly Mysore hybrid). The specie was later identified as *Eucalyptus tereticornis*. Eucalyptus was introduced on experimental basis as it finds use as pulp, fuel wood , small timber and extensive use in various industries such as paper and pulp. Eucalyptus has deleterious effect on regeneration of native species and also bad for ecology and biodiversity. Moreover growth of Eucalyptus is also poor. **Hence current working plan will focus on eco restoration of eucalyptus planted areas (Previously referred to as Eucalyptus Overlapping WC in Vineet kumar's plan) with the native species to increase the biodiversity.**

#### 5.2 SPECIAL OBJECTIVES OF MANAGEMENT:

Eucalyptus, apart from being invasive, is also known for allelopathy. It refers to the negative effects of biotoxins released by the leaves of Eucalyptus on the growth of native species. Hence special objectives of eco restoration of eucalyptus planted areas shall be as under:->

1. Replacement of Eucalyptus by native species in a scientific way.
2. To meet the local requirement of small timber and fuel wood etc.
3. To fulfill the demand of CA areas required for FCA areas.
4. To increase the natural regeneration of Sal, Sain, Shisham and other natural occurring species found along with Eucalyptus planted areas.

#### 5.3 AREA STATEMENT:

Total area of Eucalyptus Management Plan is 326.31 Ha. The range wise break up is as follows:

**Table 5.1: The range wise area (Ha) break up of Eucalyptus Managment Plan**

Division	Range	Area ( Ha)
Nahan	Kolar	69.85
	Nahan	190.26
	Trilokpur	0
	Jamta	66.20
	<b>Total</b>	<b>326.31 Ha</b>

#### 5.4 PAST MANAGEMENT OF EUCALYPTUS AREAS:

Eucalyptus was first introduced in the forest of Nahan division during 1963-1968. In this period no working plan was operative. Eucalyptus was also planted in the late 70's.

During the tenure of B.S. Chauhan's working plan period (1982-1992), Eucalyptus Overlapping Working Circle was formed consisting of 772 ha. This working circle overlapped the areas of Sal conversion and protection cum Afforestation Working Circle. The main objectives of management include (i) Felling of stagnating eucalyptus plantations, regenerating the area with coppice crop supplemented with planting of fodder species. (ii) To fell eucalyptus to meet the local requirement of fuel wood and small timber. No enumerations were carried out in this working circle. Specific marking rules were framed. Specific subsidiary silvicultural operations such as bush cutting, fencing, singling of coppice shoots in the 2nd year, planting of suitable species, etc. were suggested. Miscellaneous regulations were prescribed.

**Results:** No area was felled after 1987-88. Even before that areas were not felled strictly in accordance with the prescriptions. Coppice shoots were not singled out. The regeneration has not put up the desired growth. The crop has become quite congested. There is a thick bushy growth of rohini, lantana, gurbheli, etc. which has hampered the growth of the crop. Thus, despite the fact that felled areas have regenerated, the objectives of management were not achieved fully. Only 205.53 ha area (including paonta forest division) was felled during the tenure of working plan. It includes the areas :->

Year of felling	Forest Felled	Range
1983-1984	R.F. Sainwala C1,C3,C4	Nahan
1983-1984	R.F. East Bheron C1,C2,C3	Kolar
1986-1987	R.F. Mandapa C1	Nahan

During Vineet Kumar plan (1997-2012) Eucalyptus working Circle area was same as Chauhan's Plan. Exploitable Eucalyptus was a result of plantation raised during the third five-year plan under crash program of raising large scale plantations of industrial pulpwood. The working of eucalyptus was first prescribed by Chauhan WP (1982-83 to 1991-92). In the Vineet Kumar WP, the areas generally overlap with the forest falling under Sal Working circle, Coppice WC and Protection WC. The successful plantations have resulted in small compact patches. Only compact patches were taken in this WC. Scattered Sal, Sain, Khair, Shisham, and other natural species

were found along with Eucalyptus in these areas. The total area is 423.81 ha(Nahan Forest Divison). Coppice with Standard Silvicultural System was to be adopted. The eucalyptus is regenerated by coppice. In case of failure, other indigenous species were proposed to be planted. 15 years felling cycle was fixed. Yield was controlled by area. Exploitable dia was fixed as 20 cm.

**Results:** Following a ban on felling of green trees in the hills these forests could not be worked in accordance with the prescriptions of Vineet kumar's Plan.

### **5.5 MANAGEMENT IN CURRENT WORKING PLAN:**

The main objective of this plan is to replace Eucalyptus with native indigenous species. The total area in the current management plan is 326.31 ha.

The Management of Eco-Restoration of Eucalyptus planted areas should be as following:-

1. Proper survey of selected Eucalyptus area.
2. Four strand barbed wire fencing with RCC Fence Posts.
3. Removal of Lantana according to lantana eradication policy of HP Forest Departement.
4. Plantation with native indigenous fast growing species.
5. In order to prevent re-emergence of young Eucalyptus saplings, weeding will be carried out twice a year. Pre monsoon weeding will be carried out in June and Post monsoon weeding will be carried out in October.
6. Control burning and SMC works in the vicinity of managed area.

### **5.6 REGENERATION ASSESSMENT SURVEY:**

Regeneration assessment survey will be carried out every year till the area is fully regenerated with native species.

**Table 5.2: Statement of Areas Alloted to Eucalyptus Management Plan**

<b>Sr no</b>	<b>Name of Range</b>	<b>Name of Forest</b>	<b>Compt. No./Sub Compt No.</b>	<b>Area (in ha) allotted to Eucalyptus Management Plan (Compt./ Sub Compt.)</b>
1	Kolar	R-77 Lohgarh	32b	8.56
		R-78 Haripur	10b	34.90
		R-84 Brahmanwali	3b	6.33
		R-86 E/Bheron	1c	5.60
		R-86 E/Bheron	2b	6.78
		R-86 E/Bheron	3b	7.68
			<b>Total</b>	<b>69.85</b>
2	Nahan	R-97 Mandapa	1b	46.66
		R-97 Mandapa	2c	36.43
		R-97 Mandapa	4b	37.66
		R-99 Bikram Bag	1b	19.20
		R-100 Teeb	8b	13.36
		R-104 Kala-Bhood	3c	5.40
		R-104 Kala-Bhood	8b	3.70
		R-104 Kala-Bhood	10b	4.50
		R-110 Periwala	1b	23.35
			<b>Total</b>	<b>190.26</b>
3	Jamta	R-135 Talon	3b	15.20
			4b	40.00
			5b	7.00
			11b	4.00
			<b>Total</b>	<b>66.20</b>
	<b>Grand Total Nahan Forest Division</b>			<b>326.31 Ha</b>

**Table 5.3: ECO RESTORATION SERIES OF EUCALYPTUS MANAGEMENT PLAN**

<b>Year of Management</b>	<b>Name of Range</b>	<b>Name of Forest</b>	<b>Compt./Sub Comptt. No</b>	<b>Total Area (in Ha) prescribed for felling</b>
2023-24	Kolar	R-78 Haripur	10b	34.9
			<b>Total</b>	<b>34.9</b>
2024-25	Nahan	R-104 Kala Bhlood	8b	3.7
		R-104 Kala Bhlood	10b	4.5
		R-99 Bikram Bag	1b	19.2
			<b>Total</b>	<b>27.4</b>
2025-26	Nahan	R-110 Periwala	1b	23.35
	Nahan	R-104 Kala Bhlood	3c	5.4
			<b>Total</b>	<b>28.75</b>
2026-27	Kolar	R-77 Lohgarh	32b	8.56
	Kolar	R-84 Brahmanwali	3b	6.33
	Nahan	R-100 Teeb	8b	13.36
			<b>Total</b>	<b>28.25</b>
2027-28	Nahan	R-97 Mandapa	1b	46.66
			<b>Total</b>	<b>46.66</b>
2028-29	Kolar	R-86 E/Behron	1c	5.6
		R-86 E/Behron	2b	6.78
		R-86 E/Behron	3b	7.68
			<b>Total</b>	<b>20.06</b>
2029-30	Nahan	R-97 Mandapa	2c	36.43
			<b>Total</b>	<b>36.43</b>
2030-31	Nahan	R-97 Mandapa	4b	37.66
			<b>Total</b>	<b>37.66</b>
2031-32	Jamta	R-135 Tallon	5b	7
	Jamta	R-135 Tallon	3b	15.2
			<b>Total</b>	<b>22.2</b>
2032-33	Jamta	R-135 Tallon	11b	4
		R-135 Tallon	4b	40
			<b>Total</b>	<b>44</b>
			<b>G.Total</b>	<b>326.31 Ha</b>

## **CHAPTER 6**

### **BAMBOO WORKING CIRCLE**

#### **6.1 GENERAL CONSTITUTION AND GENERAL CHARACTER OF VEGETATION:**

Bamboos are found in areas of Trilokpur Range. All these areas, which either predominantly bear bamboos or have bamboo crop mixed with other broad leaved species and where bamboos can be introduced successfully, are allotted to this Working circle. The bamboo forests of Trilokpur ranges are in a very dilapidated and neglected state and the clumps have become very congested. This is due to continuous lopping, illicit exploitation, unscientific or practically no working of bamboos. Bamboos in this area flowered gregariously during late twenties, fifties and early sixties. Majority of the clumps have died, dried and got uprooted since then. No serious attempt has been made after that to induce good quality bamboos. Now bamboos Occur as an under storey in miscellaneous forests with species like Sain, Chhal, Amaltas, Bahera, Harar etc. Pure patches of bamboos exist only in some of the compartments of R.F. Maidhar and RF. Tribhuni. Even these areas have been subjected to heavy grazing and lopping. With the result, bamboo crop has become congested and poor in quality. Bamboo cutting was done in total disregard to the felling rules in the past.

#### **6.2 SPECIAL OBJECTIVES OF MANAGEMENT:**

Bamboo is also an important raw material for paper making and other cottage industries. People earn money by making baskets, cot frames, showroom items etc. It is also used for construction of sheds & shelters. Apart from these, bamboo is also used as fodder. Keeping in view the importance of bamboo and the fact that if not exploited, it will die or get dried, bamboo exploitation becomes a must. Therefore in view of above, following special objectives of management are prescribed.

- (i) To carry out operations necessary for rehabilitation of bamboo forests in order to improve the stocking and quality of bamboos.
- (ii) To propagate and extend bamboo crop in suitable areas.
- (iii) Consistent with the above, to obtain progressive annual yield of bamboos for industrial and other uses.

#### **6.3 AREA STATEMENT:**

Total area of Bamboo overlapping working circle is 542.34 Ha. The range wise break up is as follows:



**Table 6.1: The range wise area (Ha) break up of Bamboo working circle**

<b>Division</b>	<b>Range</b>	<b>Area in Ha</b>
Nahan	Kolar	0
	Nahan	0
	Trilokpur	542.34
	Jamta	0
	<b>Total</b>	<b>542.34 Ha</b>

The different areas allotted to this working circle are as follows:-

**Table 6.2: Statement of Areas Alloted to Bamboo Working Circle**

<b>Sr no</b>	<b>Name of Range</b>	<b>Name of Forest</b>	<b>Compt. No./Sub Compt No.</b>	<b>Area (in ha) allotted to Bamboo W.C (Compt./ Sub Compt.)</b>
1	Trilokpur	R-117 Maidhar	1	99.04
			2	116.96
			3c	71.00
			4c	50.00
		R-121 Shikardi	4b	25.00
		R-123 Tribhauni	3	180.34
			<b>G.Total</b>	<b>542.34 Ha</b>

## **6.4 ANALYSIS AND EVALUATION OF CROP:**

**6.4.1 Stock Maps:** Stock maps have been prepared on appropriate scale as per area of compartment and attached in respective Compartment history files

**6.4.2 Density:** The density is generally low to moderate

### **6.4.3 General Condition of Crop:**

Bamboos in the dry mixed deciduous forests occur as a middle storey and under storey. The canopy consists of Sain, Chhal, Jhingan, Amla, Amaltas etc. Generally the bamboo clumps are

very scattered (except in few cases) and also bear poor quality crop which is not likely to yield much revenue in the coming few years. More stress, therefore, has to be given to special objects of management.

## 6.5 SILVICULTURAL SYSTEM & CHOICE OF SPECIES:

The silvicultural system will be selection -cum- improvement felling. The regeneration will mainly be natural but as the forests have become very open hence stocking shall have to be increased by artificial planting. *Dendrocalamus strictus* will be the bamboo suitable for the areas. Broad leave species like (Sain, Amla, and Amaltas) can also be planted in gaps to maintain the biodiversity.

## 6.6 FELLING CYCLE:

A 3-year cycle for bamboo working is prescribed.

## 6.7 ANNUAL YIELD:

The yield will be controlled by area as prescribed in the sequence of felling. The output will depend upon the stocking in a particular area. In case of gregarious flowering, the felling be done after seed fall and the entire area flowered gregariously is to be felled irrespective of its prescribed year of felling.

## 6.8 SEQUENCE OF FELLING:

The entire area under bamboo is to be worked on 3 years felling cycle. The following sequence of felling is as laid down:

**Table 6.3: Felling Sequence Of Bamboo Working Circle**

Year of felling	Sr no	Name of Range	Name of Forest	Compt./Sub Comptt. No	Total Area (in Ha) prescribed for felling
2023-24	1	Trilokpur	R-117 Maidhar	1b	99.04
			R-117 Maidhar	3c	71.00
			R-121 Shikardhi	4b	25.00
				<b>Total</b>	<b>195.04</b>
2024-25	2	Trilokpur	R-117 Maidhar	2	116.96
			R-117 Maidhar	4c	50.00
				<b>Total</b>	<b>166.96</b>
2025-26	3	Trilokpur	R-123 Tribhauni	3	180.34
				<b>Total</b>	<b>180.34</b>
				<b>G.Total</b>	<b>542.34 Ha</b>

Note: This sequence shall be repeated for the remaining working plan period. The above felling program can, however, be changed with the approval of CCF Working Plan.

## **6.9 FELLING RULES:**

1. The felling should commence in the middle of October and should be completed by the end of February. Any felling done before mid October is liable to injure the new culms whereas those done after February may cause borer attack.

2. The maximum number of culms (individual bamboos) to be cut in clump (entire cluster), except in case of dry or flowered clumps, should not exceed the number of culms which have come up in the last three years. This should approximately be the number of manus (current year's shoots) plus twice the number of chaals (last year's shoots). This is maximum number which can be cut. However, the actual number to be cut will be determined after retaining the culms as prescribed below from (a) to (e).

(a). All the manus and chaals are to be retained. These are not only an important source of rhizome growth but also raw and unfit for sale. Sometimes, manus are cut for binding the bundles. This practice should be stopped.

(b). In addition to manus and chaals, old healthy culms, not less than the number of manus should also be retained as support but the minimum number of old culms to be retained should be four. These should be distributed uniformly all over the clump. Their non-retention increases the chances of young tender shoots being toppled/broken by winds. The retention also helps in food supply to rhizome.

(c). The total number of manus, chaals and old culms retained should not be less than six. If there are less manus/chaals, more number of old culms should be retained. If the number of culms in a clump is less than six, all culms are to be retained.

(d). The clumps present on the periphery of the clump are to be retained, as they are conducive to the main (outer) growth of the rhizome.

(e). Single/some flowering culms in a clump will be retained till seeds are shed.

3. The cut should be as low as possible, preferably within 30 cms from ground level and should be just above a node (preferably the first one) so as to avoid accumulation of water in the internodes, which is generally hollow. However, if support is required for some adjoining manus, the cut may be higher.

4. The cut should be clean and made with a sharp instrument in one stroke so as to avoid splitting/tearing of culms. It should be in slanting position.

5. The total dry clumps will be clear felled. A clump which is two third or more dry will be considered total dry.
6. Clumps which have flowered will be cut (clear felled) only after seed fall.
7. The culms flowering during the current season will not be cut, these will be cut after the seed fall. The rest of the clump will be worked as per usual rules.
8. Cleaning, comprising of the removal of dead and dry clump should invariably be done.
9. Digging of rhizomes should be prohibited.
10. Climbers infesting the clumps should be cut.

#### **6.10 SUBSIDIARY SILVICULTURAL OPERATIONS:**

Following Subsidiary Silvicultural operations should be timely carried out :

- (a) There will be total ban on burning of debris.
- (b) All split nodes will be cut back to next node.
- (c) All climbers interfering with the growth of the culms will be cut.
- (d) Bush cutting and complete removal of lantana before felling operation commence.
- (e) Soil and moisture conservation works in suitable area to be undertaken.

#### **6.11 IMPORTANT REGULATIONS:**

##### **(a) Artificial regeneration:**

Natural regeneration of bamboo comes up profusely if the area worked is closed to grazing. However, since the bamboo clumps are generally scattered in the forests, artificial regeneration becomes a necessity. It is prescribed that at least one tenth of the area felled annually should be closed and restocked with artificial planting of good quality bamboo (*Dendrocalamus strictus*). Broad leaved species at a distance of about 30X30 be also planted, if not already existing in these areas as well as elsewhere. Suitable nurseries will be raised well in advance.

##### **(b) Grazing and lopping:**

The areas under bamboo have been subjected to heavy grazing and lopping. Every rhizome is potentially a culm bearer but during development, it frequently happens that some mechanical obstructions or other adverse influence is encountered which checks growth and prevents the production of above ground stem which should otherwise have developed. The buds on rhizomes which do eventually develop are usually one year old, often two years old but, seldom older than that. They start growing just before the monsoon, so that they appear above ground with the onset of or during the monsoon. The period of underground growth is most critical in the life of a culm.

Any small shock or injury by insects or by mechanical means may result in the immediate death of the tender growing part. It is, therefore, desirable that grazing be suspended from June to October as far as possible in all the areas. Bamboo clumps are lopped (cut) most unscientifically, resulting in a sickly stumpy clump. This has to be effectively checked and prevented. For otherwise, the objectives of management will not be achieved even partially.

**(c) Fire protection:**

Fire protection measures are adopted to avoid fire in these forests. Fire causes a lot of damage to bamboo forests. This must be checked effectively.

**(d) Provision in case of gregarious flowering/ fire damage:**

In case gregarious flowering occurs in any area the area has to be artificially regenerated with bamboo. In case of gregarious flowering, the felling be done after seed fall.

**(e) Lantana cutting:**

Most of the bamboo areas are heavily infested with Lantana. It is therefore, desirable that lantana removal should be done according to lantana removal policy of the HP Forest Department.

**(f) Requirement of right holders:**

The requirement of right holders has to be met with. However, this should be done strictly according to the laid down felling rules under the watchful supervision of the field staff. No laxity should be tolerated on the part of staff, if they fail to supervise the removals.

## CHAPTER 7

### PROTECTION- CUM- REHABILITATION WORKING CIRCLE

#### 7.1 GENERAL CONSTITUTION:

The working circle generally covers poor quality Misc. B.L forests situated on moderate or steep eroding formations, poor/refractory soil generally inferior for supporting good forest growth. Some good quality Sal forests on the foothill of Nahan town have also been allotted to this working circle from the point of view of protection and aesthetics. A couple of good forest on steep slopes, felling of which will lead to soil erosion (E.g. Compartment No. 5 of RF Rama) have also been put in this working circle.

#### 7.2 GENERAL CHARACTER OF VEGETATION:

The forest sub-types vary from Northern Dry Mixed Deciduous Forests (along the Western and South western sides of Trilokpur and Nahan Ranges) to lower Himalayan chir pine Forests.. These areas have quite variable vegetation. On the gentle slopes, chir pine occurs scattered singly or in groups with deciduous species. In moist and shady areas Sal is present. In rest of the areas Misc. B.L forest is present.

#### 7.3 SPECIAL OBJECTIVES OF MANAGEMENT:

The special objectives of management proposed are :

- (a) To improve the vegetative cover by protecting the existing growth.
- (b) To supplement the existing growth by providing proper closures to encourage natural regeneration supplemented by artificial planting of suitable species.
- (c). To prevent and stabilize soil erosion by constructing vegetative measures/masonry structures.
- (d). To raise plantations in gaps and blank areas.

#### 7.4 AREA STATEMENT:

The Total area of this working Circle is 14763.36 Ha. Range wise breakup is as under :

**Table 7.1 Range wise breakup of Protection- cum- Rehabilitation WC**

<b>Range</b>	<b>Area under PCR W.C ( Ha.)</b>
Kolar	1440.12
Nahan	5457.06
Trilokpur	4678.98
Jamta	3187.20
<b>Total</b>	<b>14763.36 Ha</b>

The following areas are allotted to this working circle.

**Table 7.2: Statement of Area Allotted to Protection-Cum- Rehabilitation Working Circle.**

Sr. No.	Name of Range	Name of Forest	Compt. No.	Area(in ha) allotted to PCR WC (Compt.)
<b>1</b>	<b>Kolar</b>	R-74 Kolar –Kraundewali	1	9.97
		R-77 Lohgarh	24	41.44
			25	47.20
		R-78 Haripur	1	39.84
			2	51.04
			4	86.00
			13	62.88
			18	67.84
		R-81 Sambhalka	6	145.60
		R-82 Rampur Gaiinda	1	124.75
			2	63.91
			3	75.74
		R-83 Mattar	1	70.82
			2	142.00
		R-84 Brahmanwali	1	87.90
		R-87 W/Bheron	5	90.56
			6	88.00
		R-88 Jamretwa	3	69.17
			7	75.46
			<b>Total</b>	<b>1440.12</b>
<b>2</b>	<b>Nahan</b>	R-89 Toderpur	1	92.30
			2	145.88
			3	171.03
			4	153.43
		R-90 Sangholi	1	128.28
			2	156.48
			3	156.96
			4	146.88
		R-91 Thaska	1	145.88
			2	120.48
		R-92 Shishamwala	2	155.95
		R-93 Khari	1	35.97
			2	35.21
		R-94 Satkumbha	1	45.03

			2	84.77
		R-95 Bhabbar Wala	1	34.21
			2	41.50
			3	127.02
		R-96 Suketi	1	17.10
			2	2.51
		R-97 Mandapa	3	129.28
		R-97 Mandapa	5	83.04
		R-98 Khair Wala	1	93.06
			2	117.46
		R-99 BikramBag	2	44.70
		R-100 Teeb	1	45.12
			5	47.68
		R-101 Katasan	6	28.08
			7	25.12
		R-103 Rama	1	82.72
			2	54.56
			3	158.40
			4	110.00
			5	111.68
			6	107.68
			7	125.76
			8	92.96
		R-105 N/ Bankala	4	40.64
			5	37.60
		R-106 Dhaun	5	125.26
		R-107 Kotba	2	75.52
			3	90.40
		R-108 Ganashwala	3	79.52
		R-109 Kotri	3	22.72
			4	45.56
		R-110 Periwala	2	90.04
		R-111 Ambwala	1	88.22
			2	65.28
			3	161.60
		R-112 Kangni wala	1	100.00
			2	81.48
			3	103.04
			4	53.28
		R-113 Jabbal	1	160.96



			2	114.40
			3	58.36
			4	35.40
		R-114 Banswala	1	157.44
			2	69.77
			3	146.40
			<b>Total</b>	<b>5457.06</b>
<b>3</b>	Trilokpur	R- 115 Jheera	1	145.70
			2	82.20
			3	104.30
			4	106.66
			6	114.72
		R-116 Surla	1	37.34
		R-117 Maidhar	7	100.64
			8	82.56
		R-118 Trilokpur	1	182.56
		R-119 Lai Devi	1	37.92
			2	53.80
			3	60.66
		R-120 Kala Amb	1	93.76
			2	131.04
			3	42.72
			4	66.72
		R-121 Shikardhi	2	16.60
		R-122 Kiyari	8	150.20
		R-123 Tribhuni	1	162.00
			2	81.74
			7	208.75
		R-124 Bhogpur Kotla	1	197.72
			2	184.60
			3	108.16
			4	138.40
			5	108.44
		R-125 Andheri Gurudwara	1	112.12

			2	104.75
			3	64.28
		R-126 Gumti Sambhalwa	1	202.88
			2	334.40
			3	215.78
			4	222.56
			5	121.92
			6	237.02
			7	263.36
			<b>TOTAL</b>	<b>4678.98</b>
<b>4</b>	Jamta	R-127 Burman	1	14.30
			2	17.00
			6	20.10
			7	31.50
			10	31.20
			15	28.60
			17	14.30
		R-128 Jaitag	4	18.20
		R-129 Nauni	1	9.10
			2	19.50
			3	27.70
			5	19.00
			6	26.00
		R-130 Kashoga	1	53.30
			2	65.00
			3	31.20
			4	39.00
			6	39.00
			7	29.90
			8	57.20
			9	14.30
		R-131 Thandoli	2	40.30
			3	35.10
		R-132 Dhagera	4	14.30
			7	22.10
			8	28.60
			9	29.50
			10	14.30
			11	5.20
		R-133 Panjahal	1	36.40
		R-134 Sanoga	1	80.60
			2	81.90

			3	9.10
			4	70.20
			5	55.90
			6	66.30
			7	48.10
		R-135 Tallon	1	35.10
			6	42.90
			7	36.40
			8	58.50
			9	50.70
			12	13.00
		R-136 E/Banethi	1	42.60
			13	21.70
			14	32.40
			20	14.30
			21	18.50
			24	54.60
			26	19.50
		R-138 Kanoti	3	92.30
			9	20.80
			10	36.40
			11	57.20
			12	85.80
			13	61.10
			14	6.50
		R-139 Katli	1	26.00
			3	27.30
			4	16.90
			5	81.20
			6	92.30
			7	97.50
			8	5.20
		R-140 Korar	1	28.60
			2	44.20
			3	70.00
			4	39.00
		R-142 Amta	4	66.50
			5	31.20
			6	39.00
			7	42.90

			8	67.60
			9	52.00
			10	30.00
		R-143 Sadaur	1	65.30
			2	31.10
			3	27.00
			4	64.00
			5	22.10
			6	62.40
		R-144 Saroga	5	14.30
			<b>Total</b>	<b>3187.20</b>
			<b>G.Total</b>	<b>14763.36 Ha</b>

## 7.5 ANALYSIS AND EVALUATION OF THE CROP:

**7.5.1 Stock Maps :** Stock maps have been prepared on appropriate scale as per area of compartment and attached in respective Compartment history files.

**7.5.2 Enumerations :** No enumerations have been carried out in this working circle.

**7.5.3 Density:-** The crop density varies greatly in these areas from eroded blanks to fairly well stocked Forests. The forests falling in Trilokpur & Nahan Range area are generally eroded and open. This is mainly due to heavy biotic interference.

**7.5.4 Weeds:** Some of the forests have a thick cover of lantana and other bushes like *woodfordia*, *Colebrookea* and *Mallotus spp.*

## 7.6 SILVICULTURAL SYSTEM:

No commercial felling are prescribed in this working Circle.

## 7.7 SALVAGE REMOVALS:

Although no scientific felling are prescribed but salvage removals of only dry and fallen trees can be carried out.

## 7.8 YIELD, EXPLOITABLE DIA. ROTATION/ REGENERATION PERIOD:

No yield, exploitable dia, rotation or regeneration period is prescribed as these are not required here. However, salvage removals can be done, these removals will appear in the control form also.

## 7.9 METHODS OF TREATMENT:

The forests of this working circle are divided into three categories- viz, (a) Badly eroded areas (b) Grassy Blanks (c) Wooded areas. Their description and treatment is as follows :-

- (a) **Badly eroded areas:** Such areas are mainly confined to Trilokpur, Nahan & Kolar ranges. These are to be protected very effectively so that further soil erosion and denudation is prevented. Suitable soil conservation measures should be carried out here. Small vegetative measures and check dams may be constructed to check soil erosion. The areas may be closed to grazing and suitable species should be planted. Good quality bamboo and grasses should be introduced here.
- (b) **Grassy Blanks:** These areas are very limited and are mostly confined to sub Himalayan region of Jamta Range. Such areas are covered by grasses or small shrubs. Lantana and Eupatorium is slowly and gradually increasing in this area. These grassy blanks can be planted with Beul, Amaltas, Bhera, Sain, Shisham, Kachnar etc after removal of weeds.
- (c) **Wooded Areas:** These areas include forests, which are to be kept in this working Circle for mere protection and aesthetics. Although they bear moderate to well stocked crop, but they must be protected for one or the other purposes cited above. Gap planting and soil moisture conservation works, as and when required should be carried out.

## 7.10 OTHER REGULATIONS:

- (i) **Closure :** All areas, which will be taken up for planting will remain closed for at least eight to ten years keeping in view the establishment of plantations.
- (ii) **Grazing & Lopping :** The Existing state of the areas falling under this working circles is mainly due to excessive uncontrolled grazing and lopping. This has to be checked at all costs. Stall feeding should be promoted in villages around such areas. Strict preventive measures should be adopted by Field staff to stop/check grazing & lopping.
- (iii) **Fire :** Accidental and deliberate fires occur every summer in some of the areas. Effective and strict fire control measures should be adopted by the field staff.
- (iv) **Right Holders requirements:** Right holders requirements can be met with from the forests of this Working Circle as per the rights admitted in the Settlement.
- (v) **Soil conservation:** Adequate soil and moisture conservation measures are to be undertaken in suitable areas.

## CHAPTER 8

### PLANTATION (OVERLAPPING) WORKING CIRCLE

#### 8.1 CONSTITUTION OF WORKING CIRCLE:

This working circle includes all those moist, dry deciduous forests consisting mainly of degraded areas and is overlapping with other Working Circles. These are areas, situated either in foothills, riverine tracts or in plains, where the soil depletion is considerable. Soil condition is good but these areas have lost their capacity to sustain good vegetation capable of regenerating itself because of excessive anthropogenic activities. All the blanks close to encroachments, fallow lands, and degraded forests are included in this working circle.

There are substantial areas in the forests which are under-stocked, have less than 40 percent canopy density and areas with lantana infestation which need to be brought under tree cover of economical, indigenous, medicinal and fruit trees depending upon their suitability, ecological conditions. In the past, plantations of various species have been raised, some of which are successful and others not successful. Such areas can be treated under this Working Circle. The overall purpose of creation of this Working Circle is to stop the degradation of forests and help the natural process to increase the tree cover and its density by intensive treatment methods and application of external inputs and protection measures.

#### 8.2 SPECIAL OBJECTIVES OF MANAGEMENT:

The following are the special purposes of management of this circle:

1. To identify and afforest the blank or under stocked areas with suitable indigenous plant species as per the site conditions.
2. To increase the overall density of the forests and enhance their productivity from ecological point of view.
3. To control the growth of lantana and other invasive weed species.
4. To stop the degradation of forests and ameliorate their conditions.

Plantation detail from 2014-15 to 2022-23 is given in Table 8.1.

**Table 8.1 Year wise Detail of Area Planted in Nahan Forest Division**

YEAR	TOTAL AREA IN HA.
2014-15	353.00
2015-16	359.15
2016-17	214.00
2017- 18	349.27
2018-19	207.00

2019-20	330.00
2020-21	151.028
2021-22	105.00
2022 -23	112.00
<b>Total</b>	<b>2180.448</b>

### 8.3 REASONS FOR FAILED PLANTATION IN THE PAST:

Natural regeneration is sparse because of the intense biotic pressure, illicit felling and grazing and the calamity of forest fires. The solution is to artificially afforest the blank areas, to enhance the growing stock per unit area and also to enhance the biodiversity. In the past, sporadic attempts of plantation have shown some good results where the young plantations were protected against biotic factors. However, by and large, repeated attempts of raising plantations have had moderate results. Therefore, it becomes necessary to analyze the factors responsible for failure of past efforts before attempting afresh. Some of these factors are as following:->

- 1) **Suppression by Lantana:** Some of the plantations were done in lantana infested areas without complete removal of Lantana by CRS method.
- 2) **Delay in Timely Planting:** In the Shiwalik hills, the crucial point for success lies in the timely planting during the first showers of monsoon. Late planting owing to budgetary delays or mismanagement by field staff fails to give adequate growth for survival against dry and winter-spells.
- 3) **Grazing and forest fires:** Inadequate protection against grazing and forest fires has also taken considerable toll on plantations in the past.
- 4) **Poor nursery stock:** Nursery stock without optimum height and collar diameter was planted in field, which affected the overall success of plantation.

### 8.5 LIMITING FACTORS OF PLANTATION:

The limiting factors of a plantation to be successful are listed below. They should be properly addressed before taking up any new plantation activity.

- i. Timely plantation targets
- ii. Selection of suitable plantation sites
- iii. Choice of species as per the sites
- iv. Complete eradication of Lantana before Plantation.
- v. Timely release of budgetary grant

vi. Seed procurement from plus and candidate trees

vii. Healthy and hardy nursery stock

viii. Full protection from biotic-interference. Cattle proof fencing with 3/5-strand barbed wire and RCC Pillars for Protection of Plantation and maintenance for minimum of 3-7 years depending on tall/normal plants. The choice of the species to be planted shall depend upon the area suitability of the species.

## 8.6 METHODS OF TREATMENT:

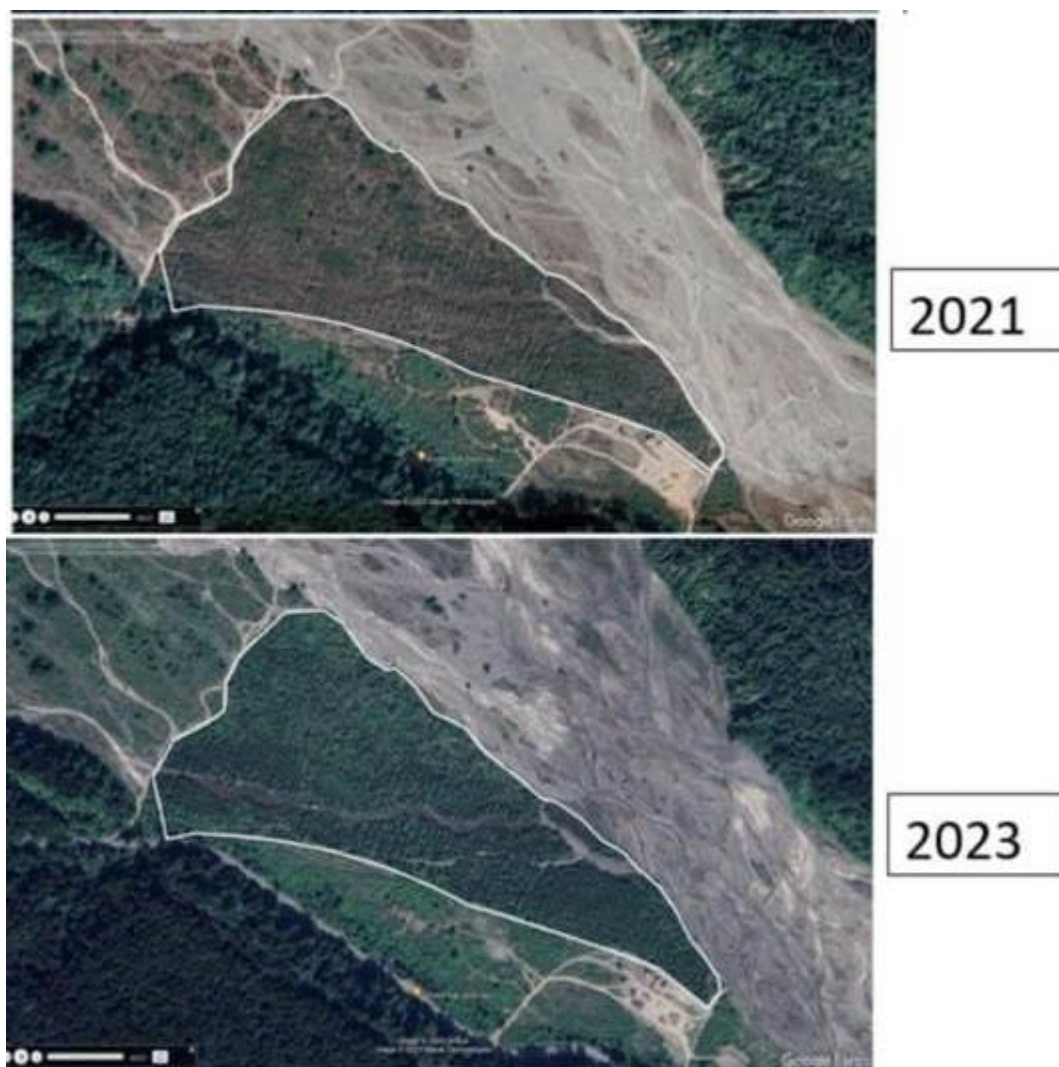
Plantations will be carried out under Enrichment or Afforestation norms as per site canopy density with native and indigenous species specific to the sites of planting. The plants will be raised in nurseries for this purpose. The choice of species will be based on:

- ❖ Edaphic and topographic factors
- ❖ Ecological conditions
- ❖ Canopy density
- ❖ Bonafide requirements of local communities for fuelwood/fodder etc.
- ❖ Mixed forests to ensure biodiversity (Monoculture will be avoided)

Some plantations in the recent past have established themselves well with due regard for protection, site selection, choice of species and other pertinent factors including proactiveness of field officers in site-studies and monitoring and forest guards regular interventions in maintenance. Some of these include the plantation as shown in (fig 8.1) in 12 ha area in RF Karondewali C-1, Kolar Beat and Kolar Range.







**Figure 8.1 12 ha area plantation, 2017-18, Sunkar Khad River bed near RF Karondewali C-1, Kolar Beat, Kolar Range**

**Importance of Nursery:** Healthy nursery plantable stock with the optimum height and collar diameter is also a crucial criterion for ensuring survival of these plants in the forests. The Division currently has 2 nurseries in Salani, and Sehat with a capacity of 3.5 lakh plants in single year.

In addition to ensuring the basic infrastructure including vermicompost adequacy, it is also necessary for proper maintenance, shifting and grading of the plants being raised as per Nursery protocols. Monitoring by officers (CF, DFO, ACF, RO) as per Monitoring protocols must be ensured to keep track of growth and give technical inputs required, if any, at proper time.

Species diversification is another aspect that has to be laid stress upon, especially to avoid monoculture planting and in order to create true mixed forests that are in line with biodiversity

considerations. The rare and endangered species, slowly reducing from the native forests *Sandan* (*Ougenia dalbergioides*), *Tatpatanga* (*Oroxylum indicum*), *Mahua* (*Madhuca indica*), and *Artocarpus lacuchua* (*Dehu*) must be raised in nurseries. The plants of medicinal and ethano-botanical values that serve the purpose of public distribution well and give Forest Department a positive interface with communities must also be raised.

**Figure 8.2 Salani Nursery, Nahar Range**



**Figure 8.3 Sehat Nursery, Jamta Range**







**Figure 8.4 Sehat Nursery, Jamta Range**

### **8.7 CHOICE OF SPECIES:**

The choice of species shall be guided by the following principles, however overall stress to be given only to **native/indigenous** species of the region:

- (a) **Adaptability and Resistance:** Resistance to extreme weather, frost, drought and forest fires and against pest and diseases are important factors for consideration. Obviously, indigenous & native species are more adaptable and resilient as against exotic species. The growing stock of these forests indicates that the indigenous species such as *Acacia catechu*, *Holoptelia integrifolia*, *Diospyros* species, *Bombax ceiba*, *Grewia optiva*, *Syzygium cumini* etc. have resisted the hostile factors and survived.
- (b) **Growth rate:** In highly lantana infested areas, species which compete with the growth of Lantana in the beginning can only succeed. Among such species are Bamboo, Shehtoot, Sahjan, Dhak, Shisham, Khirak, Semul etc.
- (c) **Livelihood value:** Species having livelihood values, NTFP fuel wood or fodder value should be preferred over other species. Species such as, *Acacia catechu*, *Embllica officianalis*, *Bauhinia variegata*, *Cassia fistula*, *Terminalia belerica* etc. meet these criteria. Local communities and right-holders can be taken into confidence while selecting such species for them to have a sense of ownership and responsibility as well.

(d) **Biodiversity Conservation Value/RET:** Species having importance for wildlife, and species declining in numbers such as *Sandan (Ougenia dalbergioides)*, *Tatpatanga (Oroxylum indicum)*, *Mahua (Madhuca indica)*, *Amla (Emblica officinalis)* and *Artocarpus lacuchua (Dehu)* etc. should be considered.

### 8.8 YEAR WISE ALLOTMENT OF AREAS FOR PLANTATION:

Forest of Nahan Division have been degrading for the past many years and have been heavily infested with lantana and other weeds. These degraded and some blank areas in forest can be utilized for plantation. Rough estimate of area available for plantation under various scheme is shown in table 8.3. More areas can be available in future due to natural disasters like fire, etc. Moreover regeneration compartments of territorial working circle can be taken up for plantation, if green felling occur in those areas, according to prescriptions.

**Table 8.3 Area available for planting next 10 years**

Sr. No.	Name of Range	Area in Ha.
1	Nahan	10
2	Trilokpur	400
3	Kolar	10
4	Jamta	50
	<b>Total</b>	<b>470(ha)</b>

### 8.9 PLANTING AND OTHER MISCELLANEOUS RULES:

The following guidelines for successful plantation shall be observed:->

- Areas must be properly demarcated and cleared of weed growth before plantation. Canopy density should be considered while deciding plantation norms for enrichment or afforestation.
- No heavy machinery shall be used for cutting/removal of lantana instead CRS Method to be adopted (Cut-Root-Shoot Method)
- Fencing on the boundary of the plantation with cut down bushes and live hedge fencing including *Ipomeia*, *Agave* etc. to be encouraged as much as possible.
- Planting should start with the onset of monsoon and be completed by first week of August.
- Proper inspection paths to be maintained in hilly tracts for access and monitoring.
- Mulching to be encouraged.
- The plantation shall be maintained for a period of 3-7 years depending on the scheme/norm the plantation gets covered in.
- Protection against grazing and Forest Fires: Areas planted in a year shall be protected

strictly against grazing and fire control. Grass cutting however shall be allowed for the villagers as per rights in *Faisla-e-Junglaat*. Damage reports to be issued if grazing is seen inside plantation areas

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## CHAPTER-9

### WATER RESOURCE MANAGEMENT & SOIL CONSERVATION (OVERLAPPING) WORKING CIRCLE

#### 9.1 CONSTITUTION OF WORKING CIRCLE

The working circle is overlapping in nature and will include all working circles

Water resource management is the activity of planning, developing, distributing and managing the optimum use of water resources. It is an aspect of water-cycle management. The field of water resources management will have to continue to adapt to the current and future issues facing the allocation of water. With the growing uncertainties of global climate change and the long-term impacts of past management actions, this decision-making will be even more difficult. It is likely that ongoing climate change will lead to the situations that have not been encountered. As a result, alternative management strategies, including participatory approaches and adaptive capacity are increasingly being used to strengthen water decision-making.

Ideally, water resource management planning has regard to all the competing demands for water and seeks to allocate water on an equitable basis to satisfy all uses and demands. As with other resource management, this is rarely possible in practice so decision-makers must priorities issues of sustainability, equity and factor optimization to achieve acceptable outcomes. One of the biggest concerns for water-based resources in the future is the sustainability of the current and future water resource allocation.

Sustainable Development Goal no. 6 has a target related to water resources management: *"Target 6.5: By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate."*

Like water, soil is an extremely valuable natural resource that is indispensable for supporting plant and animal life, including forests. In the absence of vegetal cover, soil gets lost through the process of erosion. In the forest estate under study, water erosion is the dominant form of erosion. Water erosion takes place through the formation of rills and gullies. The situation has been exacerbated by uncontrolled grazing, lopping, forest fires and defective extraction paths that make soil more vulnerable towards erosion. When the land is left barren, the flow of water results not only in the loss of soil cover, but also reduces water percolation, resulting in the depletion of water table and drying of water sources such as wells, ponds and springs. This working circle therefore also aims to prioritize critical areas that require immediate and effective preventive and

remedial measures for water conservation and the control of soil erosion. It tries to stabilize the erosion infected areas by the use of vegetative cover and / or mechanical measures. On the preventive front, it also tries to minimize troublesome anthropogenic activities in and around forested areas. Concomitantly, it endeavors to evolve an acceptable strategic methodology for diverse soil and water conservation works to be executed throughout the forest estate. All the areas of forest which are prone to soil erosion would also be part of this Working Circle. The main emphasis is to reduce top soil erosion and minimize soil loss during floods. The effective soil conservation measures along with the catchment and watershed management are the pre-conditions for a sustainable forest management. The forests are also sources of water (surface, sub-surface and ground water). Over exploitation of the ground water resources results in a decline in ground water levels; there is an urgent need to augment the ground water resources through suitable management interventions. It is desirable to have forest management practices with the principles of watershed-based development approach especially in the source areas of water. Such areas should have restrictions on tree felling but there should be operations to improve the water regimes and natural regeneration. Special provisions shall be made in the working plan to sustain water resources and to address the livelihood issues of the people living in and around the natural inland water sources. Further, areas susceptible to soil erosion such as steep slopes and areas in the vicinity of perennial streams shall be focused for soil and water conservation using mechanical or vegetative control measures.

## **9.2 SPECIAL OBJECTIVES OF MANAGEMENT:**

The special objectives of Management are as under

1. To survey and identify the available source of water in the jurisdiction of working plan area'
2. To identify the recharge zones
3. To prepare and implement spring shed management plan.
4. To link forest management with watershed management.
5. To develop forest as to increase percolation and to reduce run-off.
6. To prioritize critical areas that requires immediate and effective preventive and remedial measures for water conservation and the control of soil erosion.
7. To stabilize the erosion infected areas by the use of vegetative cover and / or mechanical measures.

8. To periodically monitor the river flow pattern with reference to annual rainfall/duration to show the status of improvement due to various control measures proposed.

### 9.2.1 Core Strategy

Watershed approach to protect soil and water would be undertaken in the Division. The stream/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 (indigenous) 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 youth, women from the forest and fringe villages will be sensitized in forest protection.

### 9.3 Identification of spring sheds

The field survey was conducted and different springshed information was compiled as depicted below:-

The detail of Spring shed data per liter For the 2022-23																
Sr. No	Name of Range	Name of RF	Name of Spring	Beat	Block	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan
1	Jamta	RF Talon C-11	Talon	Talon	Jamta	25 Sec.	1 Minute	1.7 Minute	1.25 Minute	40 Sec.	38 Sec.	42 Sec.	48 Sec.	55 Sec.	1.10 Minute	1 Minute
2	Jamta	RF Talon C-7	Shilled	Talon	Jamta	1 Minute	1.30 Minute	1.45 Minute	2.20 Minute	48 Sec.	42 Sec.	44 Sec.	48 Sec.	55 Sec.	1 Minute	45 Sec.
3	Jamta	RF Burman C-	Katal	Burman	Jamta	56 Sec.	1.15 minute	1.27 Minute	1.4 Minute	49 Sec.	49 Sec.	50 Sec.	56 Sec.	59 Sec.	1.2 Minute	57 Sec.
4	Jamta	RF Nauni C-	Nauni	Nauni	Jamta	59 Sec.	1.7 Minute	1.36 Minute	1.1 Minute	40 Sec.	40 Sec.	43 Sec.	48 Sec.	52 Sec.	57 Sec.	45 Sec.

Efforts will be made in current working plan to identify new springs and Springshed management system will be followed for their rejuvenation.



#### 9.4 SUCCESS MODEL OF AMRIT SAROVAR

Amrit Sarovar (Pond) were constructed in collaboration with MGNREGA to celebrate 75 years of Independence in Nahar Forest Division. Elaborate consultative meetings apprising ground-water and forest degradation issues/ workshops on technical aspects were held among all stakeholders and sites were identified for Amrit Sarovar. Following are some of the pictures of Amrit Sarovar:-

##### Pictures of Amrit Sarovar



## **9.5 SUCCESS MODEL OF EARTHEN DAM:**

Earthen Dam built in Trilokpur Range in 2020-21 financial year is an excellent model of conserving water thus reducing erosion and enhancing moisture in the area. It has a capacity of 50 lakh litre. It was built under NPV Scheme. Range Forest officer of Trilokpur Range has also received an award for building this structure. Following are some of the pictures of Earthen Dam:-

### **Pictures of Earthen Dam**







## **9.6 PROPOSED FUTURE TREATMENT:**

1. The recharge zone of water resource area be protected from biotic interferences
2. The forest cover around spring shed area should be increased by planting suitable tree, herb, shrubs and grasses species.
3. The rights and concessions of local right holders in recharge zone areas should be exercised in exigencies and in minimum quantities.
4. The measures like contour bunding, Contour trenching, percolation trenches etc. should be included in annual plan operations.
5. The engineering structures like water harvesting structures, farm ponds, percolation tanks /wells be included in annual plan of operations
6. The funding be ensured from various schemes like State plan, centrally sponsored schemes, CAMPA, CSR etc.

Summarily, for soil and water conservation works, the following model should be followed :-

- Identification of SWC related issues during micro planning.
- Technical and social feasibility of soil and water conservation works.
- Development of detailed project report.
- Gully plugging works to check further extension of the gullies.
- Minor engineering works in eroded areas and in slips prone areas to check the soil erosion and reduce runoff.
- Create works on the sides of diversion drains to checking further cutting of the drains/channels.
- Planting of cuttings of soil binding species in vegetative spurs but avoid exotic species.
- Gabion structures mainly retention walls, diversion drains if required after technical feasibility would be proposed. Proper anchorage of the gabion structures needs to be ensured.
- 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 check the soil erosion and reduce run-off.
- Riparian species and other less transpiring, water conserving species should be planted on the riparian areas and near water bodies.

## CHAPTER 10

### NON-TIMBER FOREST PRODUCE (OVER LAPPING) WORKING CIRCLE

#### 10.1 GENERAL:

Non-Timber forest products are useful foods, substances, materials and/or commodities obtained from forests other than timber. Non-Timber forest products (NTFPs) include fruits, nuts, fungi, fibers, medicinal and ornamental plants, mosses, dyes, resins, gums, fuel-wood, charcoal, leaves as fodder, poles for local construction, honey, syrup, fish, and game, as well as other animal products.

With the thrust of forest management shifting from being tree centered to people centered forests are now being viewed as a source of not only commercial timber but of valuable timber forest product as well. There is a need to emphasize on the study exploitation and marketing of valuable medicinal plant found in this division.

The pressure on the forest is mostly from the inhabitants for the supply of small timber, fodder and fuel wood. Babhar grass is basically used for paper and pulp industries. Munj Fiber etc. are also used for paper pulp and rope. Leaves of *Bauhinia-vahili* are used to make leaf plates and dishes.

Non-Timber Forest Products (NTFPs) are resources collected from wild for direct consumption/income generation on a small scale. The market is highly unregulated with much raw materials extracted and exported out of HP State unreported and unrecorded. Market demand outstrips supply as Ayurveda / natural and organically produced herbs for health and medicinal purposes are rapidly growing.

#### 10.2 SPECIAL OBJECTIVES OF MANAGEMENT:-

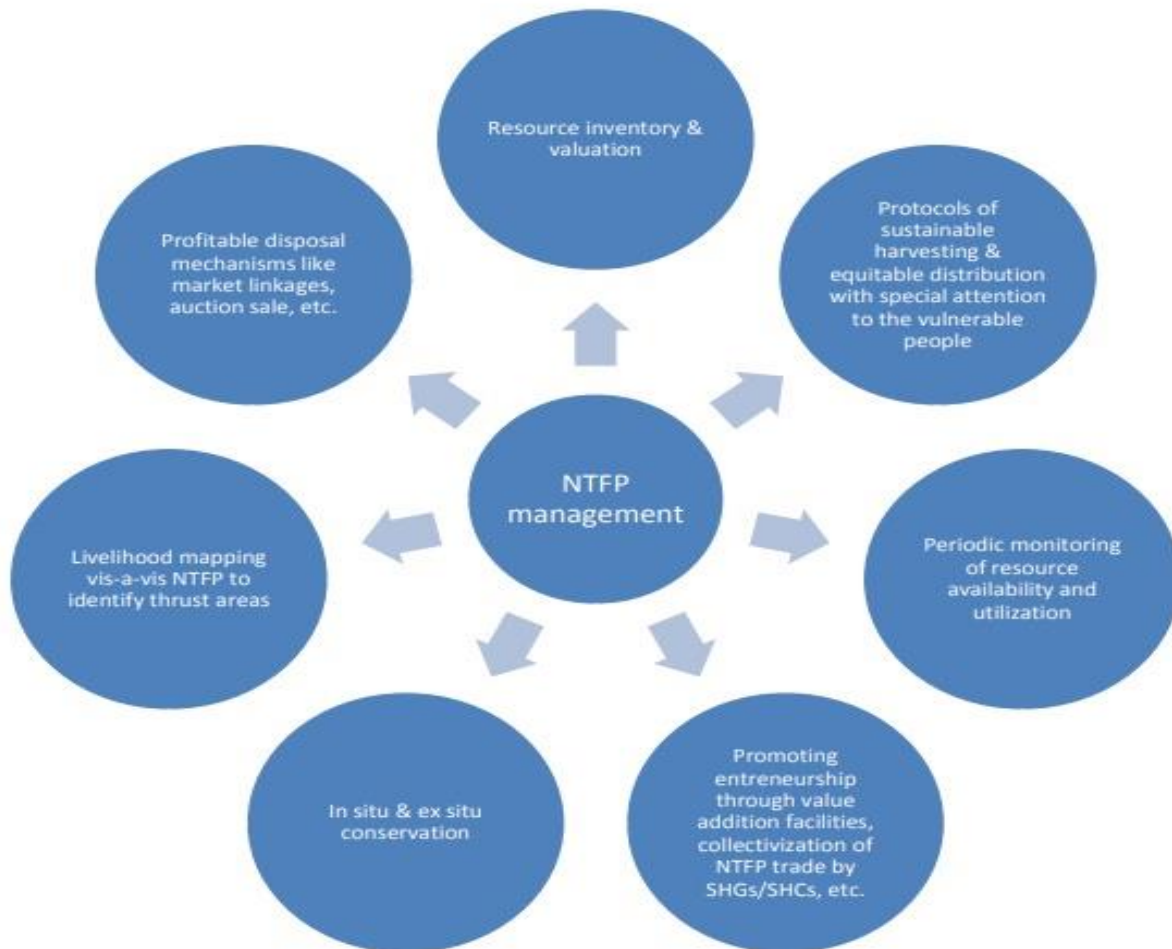
- To document rare/endangered NTFP species found in the division in People Biodiversity Register in respective BMCs.
- To preserve and improve the quantity and quality of important NTFP in the division and manage them on a sustainable bases.
- To conserve and develop the vast & diverse potential that the NTFP resources have to critically contribute to the food security & livelihood of the forest dwellers and other dependent disadvantaged communities.
- To preserve & develop the resource base for food security of wildlife.



### 10.3 ASPECTS OF NTFP MANAGEMENT:

NTFP management should mean an overall responsibility of conserving & developing the resource with sustainable utilization and equitable distribution. The following chart would indicate different dimensions of NTFP management:

**Figure 10.1**



Management needs to consider both the conservation of forest functions on the long term as the quality of local livelihood.

#### • **Develop sustainable harvesting methods**

‘Sustainable forest management is the process of managing permanent forest land to achieve one or more clearly specified objectives of management with regards to the production of a continuous flow of desired forest products and services without undue reduction of its inherent values and future productivity and without undue undesirable effects on the physical and social environment.

NTFP (Non Timber Forest Product) are defined as all tangible forest products other than industrial wood which can be collected from forests for subsistence as well as for trade.

In order to develop sustainable harvesting methods a number of key-ecological questions has to be answered (e.g. phenology, ecology, reproduction biology) in order to determine best harvesting practices, species and best suiting areas. The determination of a sustainable harvesting level depends on information on volume and reproduction. The lack of NTFP resource assessment methodologies in the tropics hampers the determination of such sustainable harvesting levels. Some of these methods incorporate existing local knowledge with inventory methods from wildlife management, horticulture and other disciplines. On the other hand the existing scientific inventory methods are not easily adjustable to local circumstances and are not easily understood and interpreted by local management. Therefore research should relinquish the need for inventory methods, which include traditional knowledge as well as some extent of scientifically rigour.

#### **10.4 Market and marketable products.**

Markets: Yamunanagar and Dehradun are the chief markets for sale of timber and non timber products. Dehradun is about 90 kms from Nahan and Yamunanagar is about 65 kms. Both are connected by pucca roads. All the timber and fuelwood is transported by roads. The main outlets for the export of Product are Yamuna vide (Paonta), Kala-Amb (Nahan), Haripur (Kolar), Behral (Majra) and Dak Pather (Bhagani).

#### **Marketable Produce.**

The chief marketable produce are as follows:->

**Bamboo:** - Bamboos Flowered gregariously during late fifties and early sixties and most of it is dead now. Only few forest of Trilokpur and Nahan ranges bear commercially exploitable bamboos. Bamboo clumps are generally badly hacked, lopped and unhealthy. They have been exploited ruthlessly in the past. This has resulted in a poor growth of bamboo. They are used for cot frames, Mosquito nets, basket making etc.

**Bhabar Grass:** Bhabar is one the most important Non Timber Forest Produce (NTFP) in this area and is used in the paper industry as well as for rope making by local people. Most of the Villagers are dependent on the forests for their livelihood and are involved in 'Baan Making' or Rope making from Bhabar grass which is brought by the local community from the forests.

**Katha Extraction:-** Khair trees are in great demand for the manufacturing of Katha. Katha is manufactured from khair wood by distillation process. Sapwood is removed from the khair logs and the heartwood is exported to the place of manufacturer of Katha.

**Resin:-** Chil pine grows extensively in Jamta Range. The resin extraction work in the forests is being done by the H.P. State Forest Corporation since 1977-78. Resin lots are auctioned by Forest Corporation during January for resin extraction and carriage upto road side depot. The extraction work begins from 15th March and ends by 15<sup>th</sup> November. Final collection is carried out till 30th November. Work is generally carried out for 20 years on 35 cm dia tree, after that rest is essential to the tree. It is used in cosmetics, paint and pharmaceutical industries.

#### 10.5 IMPORTANT NTFP IN NAHAN FOREST DIVISION:

In the rural setup, NTFP form an integral part of the daily lives of the villagers, varying from personal hygiene, cosmetics, nutrition, and use for livestock medicine and even at times are a source of additional income to rural households. The important Non Timber Forest Produce found in Nahar Forest Division are given in Table 10.1 below:-

**Table 10.1: Important NTFPs found in Nahar Forest Division:**

Sr. No.	Common/ Local Name	Botanical Name	Type	Part used	Uses
1.	Khair	<i>Acacia catechu</i>	Tree	Heart wood	Katha used as astringent, digestive, useful in cough & diarrhea, Externally applied to boils & eruptions on skin.
2.	Babul, Kikar	<i>Acacia nilotica</i>	Tree	Bark	Used for its demulcent effect. An ingredient of bases is used for pastilles & Lozenges.
3.	Puthkanda	<i>Achyranthes aspera</i>		Entire plant	Used in cough, & its decoction is given in renal dropsy & bronchial infection.
4.	Bansa, Basuti	<i>Adhatoda vasica</i>	Herb	Leaves Flowers	Used in treatment of Cough, Asthma & Ophthalmia
5.	Bel	<i>Aegle marmelos</i>	Tree	Fruit	Fruit is chiefly used in



					chronic diarrhea & dysentery, sweet drinks-sharbat, soothing for intestines.
6	Ramban	<i>Agave americama</i>	Shrub	Leaves & stem	Fibre for rope making
7	Kachnar	<i>Bauhinia variegata</i>	Tree	Bark	Astringent to bowels, tonic to liver, cures leucoderma, leprosy, asthma, wounds and ulcers.
8	Maljhan	<i>Bauhinia vahlii</i>	Climbing Shrub	leaves	As fodder, making container( Pattals, cups, etc) for food stuff.

## 10.6 CHALLENGES:

Current challenges in NTFP sector are:-

- Low priority at the policy & planning level, and hence low investments for developing this sector.
- Being unorganized in most part(except for few like Bidi leaves and bamboo) there is a lack of clarity on the actual collection, trade, pricing and other related aspects like the number of primary collectors.
- Inadequate value addition & storage.
- Dwindling resource base.
- Poor interest of entrepreneurs in commercial farming of NTFPs (this is chiefly due to the insecure market)
- Unsustainable harvesting practices.
- Bio-Piracy of NTFP by commercial Giants.

The current working plan will continuously aim to work on the challenges in the NTFP sector during its tenure. The working circle is overlapping in nature and will include all working circles.

## CHAPTER 11

### FOREST PROTECTION (OVERLAPPING) WORKING CIRCLE

#### 11.1 INTRODUCTION:

The Nahan Forest Division is a unique and diverse ecosystem, encompassing vast stretches of forested land, rich biodiversity, and critical natural resources. As a custodian of this precious natural heritage, it is essential to implement effective measures for forest protection and fire prevention. This chapter focuses on the strategies and initiatives undertaken in the Nahan Forest Division to ensure the conservation and safeguarding of its forests and combat the threat of forest fires

Forest Protection is defined as that branch of forestry that deals with measures aimed at prevention and control of damage to forests caused by man, animals, insects, fungi, injurious plants and adverse climatic factors. Despite the wide range of benefits -direct and indirect- provided by the forests to the human society, forests worldwide are under severe threat. Although there is growing awareness about the services that forest ecosystems provide and hence more and more people now realize the crucial linkage of forests to existence of man on this planet. This forest working circle overlap all other working circle.

#### 11.2 FOREST PROTECTION IN NAHAN FOREST DIVISION:

The Nahan Forest Division, located in a region known for its rich biodiversity and natural beauty, is committed to the protection and conservation of its forests. With its diverse ecosystem, the division implements various measures to safeguard the forests from threats such as illegal logging, encroachment, and unsustainable practices. Table 11.2 and 11.3 shows the list of illegal activities and action taken by Nahan Forest Division.

**Table 11.2: Last five year mining cases detected in Nahan forest division:-**

Year	Mining cases detected	Cases compounded	Amount
2018-19	7	7	30403.00
2019-20	17	17	86956.00
2020-21	118	118	917879.00
2021-22	41	41	231410.00
2022-23	50	50	311560.00

**Table 11.3: Last five year Illicit felling cases detected in Nahan forest division:-**

Year	Case detected during the year
2016-17	19
2017-18	7
2018-19	4
2019-20	3
2020-21	7
2021-22	12
2022-23	-

In addition, it is pertinent to mention here that challan/chargesheet are not filed within time bound manner by the police department in which FIR lodged by the forest department under IFA and cases become weak due to delaying the investigation process.

**Table 11.4: Illicit felling Prone Beats of Nahan Division**

Sr. No	Name of Range	Sensitive beats
1	Jamta	Patandi
2	Nahan	Toderpur 1 <sup>st</sup>
3		Toderpur 2 <sup>nd</sup>
4		Sangholi
5		Bikrambag
6		Katasan
7	Kolar	Lohgarh Beat No-1
8		Lohgarh Beat No-2
9		Lohgarh Beat No-3
10		Lohgarh Beat No-4
11		Lohgarh Beat No-5
12		Lohgarh Beat No-6
13		Haripur
14		Rampur Ganda
15		Sambhalka

16		W/Bheron
17		Kolar
18		Jattanwali
19		Mattar
20		Maintjapal
21		Gurudwra
22		Trilokpur
23	Trilokpur	Kotla
24		Churan
25		Kundla
26		Gumti

Besides this there are 137 encroachment cases in Nahan forest division.

#### **11.4 FOREST PROTECTION MEASURES:**

##### **11.4.1. Strengthening Forest Law Enforcement:**

Enforcing forest laws and regulations is vital to combat illegal activities that pose a threat to the forests of Nahan. The division collaborates with law enforcement agencies, such as forest rangers, local police, and wildlife authorities, to strengthen vigilance and surveillance. Regular patrolling, checkpoints, and intelligence networks are established to detect and deter illegal logging, encroachments, and wildlife crimes. Offenders are prosecuted to the full extent of the law, sending a strong message against forest offenses.

##### **11.4.2. Community Engagement and Participation:**

Recognizing the significance of local communities in forest protection, the Nahan Forest Division actively involves them in conservation efforts. Community participation programs are conducted to raise awareness about the importance of forests, their role in livelihoods, and the need for sustainable practices. This includes organizing workshops, training sessions, and awareness campaigns to educate communities about forest conservation, responsible forest use, and the impacts of illegal activities. By involving local communities as stakeholders, the division fosters a sense of ownership and responsibility towards the forests.

##### **11.4.3. Sustainable Livelihood Alternatives:**

Providing sustainable livelihood alternatives to communities living near the forests is crucial in reducing their dependence on forest resources. The Nahan Forest Division promotes income-

generating activities such as eco-tourism and non-timber forest produce collection. By creating avenues for sustainable economic development, the division helps alleviate pressure on the forests and encourages local communities to become partners in forest conservation.

#### **11.4.5. Research and Monitoring:**

To effectively protect the forests, the Nahang Forest Division invests in research and monitoring programs. These initiatives help gather valuable data on forest health, biodiversity, and the impacts of human activities. Regular forest inventories, species surveys, and ecological studies are conducted to assess the overall condition of the forests and identify areas requiring immediate attention. This scientific approach enables evidence-based decision-making and the implementation of targeted conservation measures. Census by ZSI is conducted to assess the population of leopard and black bear. Nahang Forest Division also participated in assessment of TOF (Tree outside forest) by FSI.

#### **11.4.6. Collaboration and Partnerships:**

Forest protection efforts in the Nahang Forest Division are strengthened through collaborations and partnerships with various stakeholders. This includes cooperation with government agencies, non-governmental organizations, academic institutions, and local communities. Collaborative projects focus on research, capacity building, awareness campaigns, and sharing best practices in sustainable forest management. By leveraging collective expertise and resources, these partnerships enhance the effectiveness of forest protection measures.

#### **11.4.7. Anti-Poaching Efforts:**

Poaching poses a significant threat to the wildlife in the Nahang Forest Division. To combat this menace, dedicated field staff is regularly trained in wildlife related matters. These units consist of well-trained forest guards who patrol the forests, conduct regular surveillance, and take swift action against any poaching activities. Additionally, awareness campaigns and community involvement programs are conducted to educate local communities about the importance of wildlife conservation and the detrimental effects of poaching.

### **11.5 FOREST OFFENSE MONITORING AND CONTROL:**

Efforts to monitor and control forest offenses, such as illegal logging and timber smuggling, are paramount in the Nahang Forest Division. Forest officials and law enforcement agencies work together to identify and apprehend offenders. The division employs modern technology, such as MOFES (software to monitor illegal encroachment), CCTV checking to detect illegal activities

and enhance the effectiveness of surveillance. Strong penalties and legal action are imposed on those involved in forest offenses to serve as a deterrent.

The Nahan Forest Division's commitment to forest protection is evident through its comprehensive strategies and initiatives. Through sustainable forest management, law enforcement, community engagement, research, and partnerships, the division strives to ensure the conservation and sustainable use of its forests. By adopting a holistic approach and involving all stakeholders, the Nahan Forest Division sets a positive example for forest protection and inspires the preservation of natural resources for future generations.

### **11.6 FIRE PROTECTION:**

Fire is potentially a deadly enemy of both forests and wildlife. Rapid running forest fires particularly crown fires are very destructive to wildlife. If it occurs in the nesting season of birds, breeding stock may be destroyed. The wild animals are usually trapped in the thick lantana bushes in case of fire. The rodents and reptiles are usually the bigger casualties as they are holed up. Therefore, strict fire protection measures should be adopted.

#### **Fire influences:->**

- Geomorphic and hydrologic processes of hill slopes and stream channels;
- Physical and chemical properties of soil;
- Nutrient loss;
- Biomass accumulation;
- Genetic adaptations of plants;
- Plant composition and diversity, mortality, regeneration, growth and succession;
- Wildlife habitat and wildlife population dynamics;
- Presence and abundance of forest insects, parasites, and fungi

### **11.7 CAUSES OF FOREST FIRES:->**

#### **There are two causes of forest fire:->**

- (1) Natural and
- 2) Man-made, that is, fires caused by humans.

**11.7.1 Natural Causes** – The natural causes that prompt fire are lightning, rubbing of dry bamboos, etc. The major among these causes is the lightning. Between 70 and 100 lightning flashes are estimated to occur every second worldwide, but not all strike the ground. In our country the numbers of fires that may be caused by all the three natural causes are not more than 5 % of the total number of fires caused in a year.

**11.7.2 Fires caused by humans** – Throughout the world humans have been the most significant causes of fires. About 95% of fires in this country are caused by man. Fires caused by humans may be due to carelessness or could be a deliberate action.

**11.7.2.1** Accidental fires due to carelessness may be caused by any of the following

Incidents: –

- Leaving fire burning after cooking in forest camp
- Throwing burning match stick or bidi or cigarette
- Throwing torch wood by the travelers at night
- Burning of fields or grass lands adjoining to forests
- Accidental spread of fires while burning fire lines

**11.7.2.2** Deliberate or intentional fires are caused normally in the following cases–

- Burning the undergrowth to collect minor forest produce;
- Inducing new shoots of grass by burning the dry grass;
- Scaring away wild animals from the villages in the forest fringe;
- Destroying or charring the stumps of illicitly-felled trees.

**11.7.3 Types of forest fires:** According to the level at which they occur, forest fires are of the following types-

- Ground fire – it burns the ground cover only, i.e. the carpet of herbs and low shrubs which cover the soil.
- Surface fire – It burns not only the ground cover but also the undergrowth. This is the most common type; it consumes litter, killing aboveground parts of herbs and shrubs, and typically scorching the trees. Surface fire is very sensitive to wind speed. It tends to kill young trees of all species (often, however, just the aboveground portion) and most of the trees of less resistant species of all sizes
- Crown fire – It spreads through the crowns of trees and consumes all or part of upper branches and foliages. This usually occurs in coniferous forests.

## **11.8 EFFECT ON FORESTS:**

**Forest fires cause the following damage to forests:**

- **Damage to plants** – The ground flora of shrubs and herbs and the undergrowth are most vulnerable to surface fire, which is most common. Trees, in the upper storey, however, depending on species and age, suffer in varying proportion due to forest fire. The species which have thick corky bark are less prone to damage than those with thin bark. The broad-leaved species are less affected by forest fire than the conifers.

- **Damage to regeneration** – Forest fire causes enormous damage to regeneration of plants and young plantations. Even a ground or surface fire of moderate intensity can totally destroy the regeneration.

- **Damage to soil** – Fire bares the forest soil to eroding agents like sun, wind and rain. Soil erosion thus gets enhanced. Forest fire also depletes organic matter and nitrogen reserve. Fire also makes the soil more compact and impervious.

- **Damage to productive potential** – Fire reduces the productive potential or capacity of forests. Repeated fires may change the type of forests, for example, an evergreen forest may turn into a deciduous forest of poorer quality. Owing to natural adaptive character of the plants, valuable species may be replaced by inferior fire-hardy species. Fires also adversely affect the crop density and yield. Thus on repeated occurrence of fires, forest yield suffers both in terms of quality and quantity.

- **Damage to conservation potential** – Even as ground and surface fire burns down the ground flora and undergrowth, there is considerable increase in the runoff. As a result, the capacity of forest to conserve soil and ground water is reduced. The streams passing through forested watershed witness sudden spurt in channel flow, if the watershed is burnt. Studies have revealed that stream flow from a watershed with protected ground vegetation is more uniform and steady than from a watershed whose soil and protective cover has been damaged.

- **Damage to wild animals** – Forest fire destroys the eggs and young ones of wild animals. Sometimes the bigger animals also become victims of fire. Fire thus inflicts an enormous damage to wild animals and the biological diversity of forest.

## **11.9 PREVENTIVE MEASURES:**

Preventive measures are those which reduce the chances of occurrence of fire. There are many factors that create an environment where fire becomes a likely phenomenon. The aim of the preventive measures is to address those causal factors. Broadly, preventive measures can be grouped into two major classes, namely,

- (1) Indirect measures and
- (2) Direct measures.

**11.9.1 Indirect Measures** – Indirect measures are those which, although not directly confronting the causal factors of fire environment, reduce the fire risk by containing the factors. Examples of indirect measures are –

- **Cooperation of forest fringe villagers** – Since most of the forest fires are man-made, either by way of carelessness or by deliberate actions, the foremost measure is to sensitize the fringe



villagers to the danger of forest fire and obtain their cooperation in prevention of accidental or deliberate fires caused by humans. Cooperation of the villagers can be best obtained by deliberating the issue of forest fire in JFMC meetings. JFMC can take an effective role in making the fringe population aware of the destructive potential of forest fires, and of their responsibility in prevention of man-made fires.

- **Education of people in general** – Besides the forest fringe population, people in general need be educated. They should be convinced that uncontrolled or repeated forest fires deplete the potential of ecosystem services of forests. In other words, fires cause a decline in the ability of forests to produce timber, non-wood forest produce, and other benefits. People should be educated that it is their responsibility to protect forests from all damaging factors including fires. Such education can be imparted through **press, radio, television, workshops and educational institutions**. One of the effective means will be **to involve the students of schools and colleges** and spread through them the importance of conserving forests and the role they play for human existence.

- **System of incentive and disincentive** – There may be in place a system of incentive and disincentive for forest personnel in the matter of detection and prevention of forest fires. Forest personnel who do a good job in this regard may be suitably rewarded. The system of reward may also include community group. At the same time, there should be provision of suitable punishment for forest functionaries for dereliction of duty.

**11.9.2 Direct preventive measures** – these are those measures which directly address the factors of fire environment. Following are some examples.

- **Forecast of forest fire** -. Forecast potential of fire can alert the forest personnel and help them take precautionary measures. Forest fires are a significant concern in the Nahan Forest Division, particularly during the dry season. To mitigate this risk, early warning systems can be implemented. Weather monitoring stations, satellite imagery, and ground-based sensors can be used to detect fire-prone conditions and potential fire hotspots. These systems provide timely alerts to forest officials, enabling them to respond swiftly and prevent the spread of wildfires.

- **Reduction of risk** – Risk of forest fires can be reduced by limiting the exposure of forests to fire. This can be done by the following measures–

- **Control burning** – The objective is to burn the inflammable materials such— as grass, shrubs, fallen leaves and wood in identified blocks or strips under controlled conditions and thus reduce the risk of later fire damage. Ideally, such controlled burning should be done before the advent of dry season. The blocks or strips which undergo controlled burning are less likely to catch fire

during the dry season and they restrict fires from spreading across them. Control burning is done patch by patch beginning from the patch which has most of the grass dry. Control burning is done to protect plantations, natural regeneration areas, timber depots and other valuable forest resources. A belt of sufficient width round such areas is subjected to control burning so that fire, caused accidentally or otherwise, cannot cross this belt and damage the plantations, depots etc. inside. It is advisable to take up controlled burning after the dusk because the flame in the dark is easily visible and it is much easier to control the extent of burning within the envisaged boundary. In bright sunlight flame of fire is often not visible and there is risk that fire may spread beyond the limits without getting detected.

- **Fire line** – Fire line is defined as a cleared permanent fire break (a barrier from which all or most of the inflammable materials have been removed) intended to prevent fires from crossing from one area to another. In other words, It is a permanently clear-felled strip in a forest which is burnt every year before the commencement of hot weather to destroy all inflammable materials so that it may prevent the spread of an accidental fire. Fire lines are carefully aligned so as to divide the forest into small blocks. Thus fire, even if originated at a block accidentally, remains localized within the block and does not spread to other blocks easily. Even when fire is intense enough to spread across fire line, it permits time to start fire fighting operations and contain the damage. Fire lines 3 to 5 meters wide are optimum. Fire lines should be maintained motor able so as to permit easy and quick movement of fire-fighting squads. New fire line in RF Dhadu C-12 can be made for restoration of degraded forest patch (25 hectare) taken up under Mukhya Mantri Van Vistar Yojana.

**Table 11.5: The fire lines in Nahar Forest Division:**

Sr. No.	Name of Fire Line	GPS Location			
		Starting Point		Ending Point	
1	Dhadog - Jaithal Dhadhog Dhgera	N 30.613055°	E 77.291388°	N 30.620877°	E 77.29444°
2	Katorar Jalala Ka Khala	N 30.62242 °	E077.31277 °	N 30.61717 °	E 077.32634 °
3	Katorar Ghambar Nadi	N 30.62717 °	E077.31511 °	N 30.63385 °	E 077.31623 °
4	Dagrahan Dhira	N 30.644162 °	E 77.272880 °	N 30.654291 °	E 77.283321 °
5	Nihog Dhar Behra Ghat Gambar	N 30.588825 °	E 77.372716 °	N 30.5867 °	E 77.394052 °
6	Katorar Sarahan Nauni	N 30.600583 °	E 77.344441 °	N 30.616869 °	E 77.35008 °
7	Kulchet Gambar Nadi	N 30.687222 °	E 77.319166 °	N 30.668611 °	E 77.407777 °

8	Katorar to Patnala Khala	N 30.90277 °	E 77.385 °	N 30.891666 °	E 77.356111 °
9	Gang Hut Gambar Nadi	N 30.6925 °	E 77.250277 °	N 30.7125 °	E 77.27166 °
10	Khaltu Bain ki Dhar	N 30.626036 °	E 77.299605 °	N 30.638811 °	E 77.31025 °
11	Sarahan Gambar Nadi	N 30.63833 °	E 77.277078 °	N 30.641177 °	E 77.289401 °
12	Sathdi Gambar Nadi	N 30.799166 °	E 77.323333 °	N 30.815277 °	E 77.343611 °
13	Kango Johri Gusan	N 30.627163 °	E 77.290561 °	N 30.646111 °	E 77.313358 °
14	Near MC area, village Kotri	N 30.55085 °	E 77.301041 °	N 30.554636 °	E 77.316402 °
15	Dhaduwala to Katasan	N 30.530052 °	E 77.284472 °	N 30.510558 °	E 77.400077 °
16	Dhauhi Dhang to Shishamwala (up to Bithanwali Dhang)	N 30.469419 °	E 77.328902 °	N 30.466763 °	E 77.260180 °
17	Suketi to Shishamwala	N 30.500327 °	E 77.236458 °	N 30.478741 °	E 77.256702 °
18	Suketi to Thaska	N 30.497058 °	E 77.241036 °	N 30.468938 °	E 77.316244 °
19	Judda to Periwala	N 30.544347 °	E 77.287952 °	N 30.535811 °	E 77.284775 °
20	Devi Ka Bag to Gausadan	N 30.557016 °	E 77.260705 °	N 30.555875 °	E 77.2715 °
21	Jogikhet (SatKumbha Khad) to Shishamwala RF (up to Bithanwali Dhang) on the Boundary of Haryana State.	N 30.488286 °	E 77.231605 °	N 30.466763 °	E 77.260180 °
22	RF Andheri Gurudwara C-1	N 30.541619 °	E 77.180811 °	N 30.541397 °	E 77.195705 °
23	RF Kala Amb C-2 to C-4	N 30.533919 °	E 77.217300 °	N 30.532777 °	E 77.230277 °
24	RF Gumti Samhnalwa C-1, C-2	N 30.549475 °	E 77.139227 °	N 30.5535 °	E 77.129694 °
25	Lohgarh	N 30.41689°	E 77.40823 °	N 30.421901 °	E 77.415928 °
26	Mattar	N 30.460056 °	E 77.341927 °	N 30.46094 °	E 77.36058 °
27	West Bheron	N 30.481873 °	E 77.298586 °	N 30.464712 °	E 77.332423 °

Table 11.6 Fire Sensitive Beats in Nahan Forest Division		
S.No.	Name of Range	Name of Beat
1	Nahan	Toder Pur-1

2		Toder Pur-2
3		Sangholi 1
4		Sangholi 2
5		Thaska
6		Khari
7		Suketi
8		Mandapa-1
9		Mandapa-2
10		Bikram Bag
11		Kotri
12		Banswala
13		Kangniwala
14		Periwala
15		Teeb
16		Jabal
17		Ambwala
18	Jamta	Nauni
19		Burman
20		Bohal
21		Patandi
22		Panjahal
23		Daghera
24		Jaitak
25		Banethi
26		Gaunth
27		Katli
28		Saroga
29		Amta
30	Kolar	Lohgarh Beat No-1
31		Lohgarh Beat No-2
32		Lohgarh Beat No-3
33		Lohgarh Beat No-4

34		Lohgarh Beat No-5
35		Lohgarh Beat No-6
36		Haripur
37		Rampur Ganda
38		Sambhalka
39		W/Bheron
40		Jamretwa
41		Kolar
42		Jattanwali
43		Mattar
44	Trilokpur	Burma Papri
45		Kotla
46		Kundla
47		Churan
48		Mainthapal
49		Gurudwara
50		Kandaiwala

#### **11.10 COMMUNITY PARTICIPATION AND AWARENESS:**

Engaging local communities in fire prevention and management plays a vital role in protecting forests. The Nahan Forest Division conducts awareness campaigns and training programs to educate local communities about the causes of forest fires, their ecological impact, and preventive measures. Communities are encouraged to report any potential fire hazards promptly and participate in firefighting activities under the guidance of forest officials. This collaborative approach fosters a sense of ownership and responsibility among the local population towards forest protection.

#### **11.11 CONCLUSION:**

Forest protection and fire prevention are of utmost importance in the Nahan Forest Division to ensure the preservation of its diverse ecosystems and valuable resources. Through a combination of protected area management, anti-poaching efforts, monitoring systems, and community involvement, the division strives to safeguard its forests from illegal activities and the devastating impact of wildfires. Continuous adaptation and improvement of strategies, along with effective

enforcement of forest laws, are essential to maintaining the integrity and sustainability of the Nahan Forest Division.

## **CHAPTER 12**

### **WILDLIFE MANAGEMENT (OVERLAPPING) WORKING CIRCLE**

#### **12.1 GENERAL CONSTITUTION OF WORKING CIRCLE:**

This Overlapping Working Circle is created for emphasizing the importance of conservation of wildlife and related issues. Reserve forest of this division supports diverse wild animals and birds as the forest occupies a diverse geomorphic and geological conditions. Therefore, this Working Circle overlaps all other Working Circles. The landscapes and vegetation present in these areas along with the water sources and grasslands create a suitable habitat for wildlife especially for Sambar, Leopard, Wild boars, monkeys, etc. Although the department has a separate wildlife wing to administer protected areas but DFO (Territorial) are declared as wildlife wardens in their respective jurisdiction. Hence DFO(Territorial) is also responsible for protection and enforcement of rules and regulation related to wildlife and space.

#### **12.2 IMPORTANCE OF WILDLIFE:**

Wild life includes both flora and fauna. They are inseparable constituent of forest ecosystem. Faunal and Floral (Biodiversity) play a significant role in maintaining the balance of nature. Any breach in this balance may be detrimental to human interests.

Every living thing is connected. If even just one organism becomes threatened or extinct, it has a domino effect on an entire ecosystem. It disrupts the food chain, sending shockwaves through the environment. It's also important to know that threats to species rarely happen in isolation. The things that threaten, say, honeybees also threaten other pollinators. For ecosystems to thrive, all wildlife must be protected. The value and importance of it from scientific, aesthetic, economic and recreational point of view is immense and is recognized all over the world and therefore, adequate protection, and scientific management of it is absolutely necessity.

In the past few decades the habitat of wild animals in this division has been greatly affected by intensive agriculture, urbanization, tourism, diversion and fragmentation of forest.

#### **12.3 OBJECTIVES OF MANAGEMENT:**

The following are the objectives of management:

1. To improve wildlife habitat.
2. To reduce man-animal conflict.
3. To identify and develop new water holes and mineral lick in the forest.
4. To conserve and protect wildlife in their natural habitat.

#### 12.4 CHARACTER OF VEGETATION:

The forests in the area comprise Northern Tropical Moist deciduous forests, Northern Tropical Dry deciduous forests and Himalayan Sub-Tropical types with predominance of trees such as Sal, Rohini, Khair, Simul, Siris, Amaltas, and Kangu etc. A number of fruit and fodder trees for wildlife importance occur in the areas of which the following are important:

- Bel (*Aegle marmelos*)
- Amaltas (*Cassia fistula*)
- Mango (*Mangifera indica*)
- Guava (*Psidium guajava*)
- Jamun (*Syzigium cumini*)
- Dhak (*Butea monosperma*)
- Gular (*Ficus glomerata*)
- Pipal (*Ficus religiosa*)
- Kangu (*Flacourtia indica*)

The following palatable grasses are found: Bhabhar (*Eulaliopsis binata*), Khabbal (*Cynodon dactylon*), Panni (*Dicanthium annulatum*), Dholu (*Chrysopogon montanus*), Sariala (*Heteropogon contortus*), Sarkanda (*Saccharum munja*) etc.

Therefore, there is a variety of tree and grass forage found in these forests. However, there is persistent scarcity of water in dry and winter month as no perennial source of water exist in area.

#### 12.5 ANALYSIS AND EVALUATION OF WILDLIFE AND HABITAT:

Wildlife Institute of India in its bio-geographical classification has recognized Shiwalik region as one of the regions of biological significance. In this Shiwalik region, animals like Pangolin and Pythons are rare which are included in the International Red Data list of I.U.C.N. Sambar, barking deer and hog deer which are included in the schedule III of Wildlife (Protection) Act, 1972 are also found in these forests. Leopards are found in the area. Apart from above, the list of recorded animals in these forests is given in the following tables. The habitat is quite suitable for the faunal biodiversity of Nahan Forest Division, as tract of this division comprises of diverse geomorphic and geological conditions.



**TABLE 12.1 LIST OF FAUNA**  
**COMMON MAMMALS OF NAHAN**

Local Name	English Name	Scientific Name
Bagh	Royal Bengal Tiger	<i>Panthera tigris</i>
Bandar	Monkey (Rhesus Macaque)	<i>Macaca mulatta</i>
Bhaloo	Himalayan Black Bear	<i>Salenarctos thibetanus</i>
En Koryal	Flying Squirrel	<i>Belomys pearsoni</i>
Ghoral	Himalayan Goat	<i>Nemorthadeus goral</i>
Gidar	Jackal	<i>Canis aureus</i>
Gilhari	Five striped Palm squirrel	<i>Funambulus pennantii</i>
Hathi	Asiatic Elephant	<i>Elephas maximus</i>
Jungli Billi	Wild Cat	<i>Felis chous</i>
Jungli Suar	Wild Boar	<i>Sus scrofa</i>
Kakar	Barking deer	<i>Muntiacus muntjak</i>
Khargosh	Common Hare	<i>Lepus nigricollis</i>
Langoor	Common Langoor	<i>Presbyts entellus</i>
Lomri	Red Fox	<i>Vulpes bengalensis</i>
Newla	Mongoose	<i>Urva edwardsii</i>
Nilgai	Bluebuck	<i>Boselaphus tragocamelus</i>
Sambar	Sambar	<i>Cervus unicolor</i>
Shail	Porcupine	<i>Hystrix indica</i>
Tendua	Leopard	<i>Panthera pardus</i>

#### **BIRDS OF NAHAN**

A variety of birds are also found in the area of which are peacock, koel, pied-crested cuckoo, red jungle fowl, blue rock pigeon, doves, lapwings, babblers, hoopoe, bulbuls, jungle mynas, grey tit, golden backed wood pecker, king crow, shama, common grey hornbill and grey partridges are important occurring in numbers. The main bird species which are not seen in other parts of the state but found in this tract include Himalayan slaty headed parakeet, Blue headed Rock thrush, yellow backed sunbird and paradise flycatcher. The list of birds found in the tract are given below:

Local name	English name	Scientific name
Bater	Common or Grey Quail	<i>Coturnix coturnix</i>
Bulbul	Crested bulbul	<i>Pycnonotus jocosus</i>
Cheer	Cheer Pheasant	<i>Catreus wallichii</i>
Cuckoo	Large hawk-Cuckoo	<i>Hierococcyx sparverioides</i>
Ghugi	Spotted Dove	<i>Spilopelia chinensis</i>
Gidh	Himalayan Griffin	<i>Gyps himalayensis</i>
Goraiya	House sparrow	<i>Passer domesticus indicus</i>
Harial	Yellow-footed green Pigeon	<i>Treron phoenicopterus</i>
Jangli Murga	Red Jungle Fowl	<i>Gallus gallus</i>
Kabutar	Blue Rock Pigeon	<i>Columba livia</i>
Kala Teetar	Black Francolin	<i>Francolinus francolinus</i>
Kaleej	Kalij pheasant	<i>Lophura leucomelanos</i>
Kath phora	Woodpecker	<i>Pinodes auriceps</i>
Kaua	Crow	<i>Corvus splendens &amp; culminates</i>
Lowwa	Jungle Bush Quail	<i>Perdica asiatica</i>
Peora	Hill Partridge	<i>Arborophila torqueola</i>
Tota	Parakeet	<i>Psittacula columboides</i>

#### REPTILES OF NAHAN

Local name	English name	Scientific name
Ajgar	Indian Rock Python	<i>Phytos molurus</i>
Biskhopra	Monitor lizard	<i>Varanus griseus daudin</i>
Bronzeback	Bronzeback	<i>Dendrelaphis tristis</i>
Cat snake	Common Cat Snake	<i>Boiga trigonata</i>
Common Trinket	Common Trinket	<i>Coelognathus Helena</i>
Common wolf	Common Wolf	<i>Lycodon capucinus</i>
Daboiya	Russell Viper	<i>Vipera russelli</i>

Dhamman	Indian Rat	<i>Ptyos mucosa</i>
Dhodiya	Checkered Keelback	<i>Xenochrophis piscator</i>
Domuha	Red Sand Boa	<i>Eryx johnii</i>
Gobilda	Chameleon	<i>Chameleon calcaratus</i>
Harantal	Common Vine	<i>Ahaetulla nasuta</i>
Hurhur Snake	Striped Keelback	<i>Xenochrophis vittatus</i>
King Cobra	King Cobra	<i>Ophiophagus hannah</i>
Kharpa	Indian Cobra	<i>Naja naja</i>
Krait	Common Indian Krait	<i>Bungarus caeruleus</i>
Kukri Snake	Common Kukri	<i>Oligodon arnensis</i>
Retila snake	Common Sand Boa	<i>Eryx conicus</i>
Russel Kukri	Russel's Kukri	<i>Oligodon taeniolatus</i>
Teliya/Andha snake	Brahminy Worm	<i>Indotyphlops braminus</i>

#### BUTTERFLIES OF NAHAN

ENGLISH NAME	SCIENTIFIC NAME
Baronet	<i>Symphaedra nais</i>
Blue Tiger	<i>Tirumala limniace</i>
Cheshtnut Angle	<i>Odontoptilum angulate</i>
Chocolate Pansy	<i>Junonia iphita</i>
Club Beak	<i>Libythea myrrha</i>
Common Baron	<i>Euthalia aconthea</i>
Common Castor	<i>Ariadne merione</i>
Common Gull	<i>Cepora nerissa</i>
Common Jester	<i>Symbrenthia lilaee</i>
Common Leopard	<i>Phalanta phalantha</i>
Common Palmfly	<i>Elymnias hypermnestra</i>
Common Peacock	<i>Papilio bianor</i>
Common Woodbrown	<i>Lethe sidonis</i>
Glassy Bluebottle	<i>Graphium cloanthus</i>
Glassy Tiger	<i>Parantica aglea</i>
Grass Demon	<i>Udaspes folus</i>

Grizzled Skipper	<i>Spialia galba</i>
Himalayan Five-Ring	<i>Ypthima sacra</i>
Indian jezebel	<i>Delias eucharis</i>
Indian Tortoiseshell	<i>Aglaia caschmirensis</i>
Lemon Emigrant	<i>Catopsilia Pomona</i>
Lime Swallowtail	<i>Papilio demoleus</i>
Orange Oakleaf	<i>Kallima inachus</i>
Painted Lady	<i>Vanessa cardui</i>
Plain Tiger	<i>Danaus chrysippus</i>
Psyche	<i>Leptosia nina</i>
Red Pierrot	<i>Talicauda nyseus</i>
Sorrel Sapphire	<i>Heliophorus sena</i>
Yellow Pansy	<i>Junonia hierta</i>
Zebra Blue	<i>Leptotes plinius</i>

## FISHES

Local name	Scientific name
Goonch	<i>Bagarius sp.</i>
Lachi	<i>Wallago sp.</i>
Mahseer	<i>Tor sp.</i>
Rohu	<i>Labeo sp.</i>

### 12.6 MANAGEMENT IMPERATIVES:

**Human Wildlife Conflicts:** -Usually in winters and in the hot months of April- June when there is a scarcity of water and fodder inside the forests, the wild animals move out of the forests and raid adjoining fields as well as causing loss to livestock. Primarily, the conflict cases pertain to leopards and bears, in addition, wild boars damage and snake-bites are also reported occasionally.

Monkey menace is also another ensuing issue in Himachal Pradesh under which monkey-sterilization program is being carried out annually by all the Divisions.

Given below are the human-animal conflict cases along with compensation disbursed:

**TABLE 12.2: Compensation details since 2023-24 in Nahan Forest Division**

<b>Wild life Compensation Cases in respect of Nahan Forest Division</b>						
Sr. No	Year	No. of cases sanctioned	Livestock (deaths) (Nos.)	Human beings (injuries & death) (Nos.)	Compensation ( in Rupees)	
					Livestock	Human beings
1	2018-19	102	102(leopard)	0	679000	
2	2019-20	69	68(leopard)	1(injury) (Monkey)	786000	15000
3	2020-21	170	170(leopard)	0	1550000	
4	2021-22	145	145(leopard)	0	1852000	
5	2022-23	143	142(leopard)	1(death) Elephant	1662000	15000

The ex-gratia rates as notified by HP Forest Department are annexed in Appendix –XIV.

**Analysis :->**

**i) Leopard (*Panthera pardus*):**- Leopard is the most widely distributed large cat in India, but due to expansions of human influence and ever increasing pressure on natural resources has greatly intensified the issue of human leopard conflict in a wide variety of situations. Human-leopard conflict is a complex issue influenced by political and social attitudes, the biology of the species, and management action. Effective management of conflict will have to strike a balance between minimizing serious conflict (attacks on people) and the long-term conservation of the leopard species. Although, the leopard is commoner and more resilient than other large cat species that occur in India, it is poached in the largest numbers to meet the demand of the illegal wildlife trade. The leopard is very adaptable, and can live close to human habitations. The presence of a species like the leopard in a human dominated landscape will invariably lead to some predation on domestic animals in form of livestock killing. Table 12.2 summarizes the attack of leopard on livestock.

**ii) Monkey (*Rhesus macaque*)** :- Monkey is widely distributed animal in the tract dealt with. However, the population has increased more in human habitations than forests. The main cause of increased population near human habitation is increasing availability of garbage with food discards. The population has increased manifold in the lower part of the division and there are a lot of complaints of crop depredation by them. All along the National highways, State Highways and even in the link roads and paths, the monkeys can be seen in

herds and pose a threat to tourists, passersby and local inhabitants. The monkey also destroys the young seedlings of plants as they suck the roots of the seedlings and in this process they uproot the seedlings. They have left the interiors of the forests and are seen near human habitation. However, the efforts of Forest Department are in progress to reduce number by way of sterilizing male ones. Monkey Population is also slowly declining in Nahan Forest Division. The details of sterilization carried out in Nahan Forest Division are tabulated below:

**TABLE 12.3: Monkey Sterilization details in Nahan Forest Division**

Year	Monkeys Captured	Monkey Sterilization		
		M (Male)	F (Female)	Total
2017-18	410	120	80	200
2018-19	512	158	162	320
2019-20	693	176	206	382
2020-21	417	137	145	282
2021-22	296	119	93	212
2022-23	202	65	90	155

(Out of the total monkeys captured, only those monkeys were not sterilized that include young in age and already sterilized before.)

**iii) Elephant (*Elephas maximus*):**-> In the recent past, the issue of elephant movement from Uttarakhand has emerged as a new challenging issue. Although the issue pertains more to the adjoining paonta division but there are incidences of human-elephant conflict in adjoining kolar range of Nahan forest division. This happens mainly due to interstate movement of elephants from Uttarakhand and UP border to Himachal Pradesh and subsequent movement in human habituated areas. It has been observed that movement of elephants across border from Uttarakhand to Himachal Pradesh is directed towards reaching Simbalbara National Park through forest areas, but due to habitat fragmentation, after crossing Uttarakhand border and coming to Himachal Pradesh, elephants do not have any continuous forest area for the above movement. This leads to their movement in human habitations. One lady in Kolar was killed by elephant attack in 2023. Elephants also destroy the crops of farmers.

## **12.7 MANAGEMENT INITIATIVES REQUIRED TO ADDRESS HUMAN-WILDLIFE CONFLICTS:-**

- Database Development and Maintenance: - The basic step towards understanding and developing mitigation strategies for reducing human conflicts in this Division and elsewhere, in the State would be the development and maintenance of a database. The patterns of human-animal conflicts in a large landscape both in spatial and temporal scales will be extremely important to understand underlying causes and preventing conflicts. It is extremely important for the Forest Department of Himachal Pradesh to develop and maintain a database on conflicts for its different regions using GIS.
- Creation of Conflict Management Team:- A fully equipped, well trained and motivated 'Conflict Management Team'/ Rapid Response Teams comprising of wildlife staff, veterinarians, staff of related line departments or institutions, and wildlife NGOs has to be formed at the Division/Circle Level to respond to conflict situations, including animal rescue, treatment (if required), translocation and monitoring. Efficient and effective response to complaints is more feasible when rapid communication is possible from and to the conflict site and between the personnel of the Conflict Management Team and when duties are shared amongst the members of Team.
- Awareness Creation:- Knowledge on Black Bear/ Leopard behavior is essential for the villagers who live near bear/leopard habitats and suffer crop losses and are also vulnerable to bear attacks. Awareness creation through elected bodies at the village or block levels, religious or educational establishments, and other government or non-governmental agencies needs to be explored. Simple precautionary measures such as avoiding moving singly during dawns and dusks in crop fields or orchards or forests during summer and autumn could greatly reduce bear attacks on humans. Another crucial factor that can reduce bear attacks is providing a safe passage or escape route for a stranded bear, particularly in the villages. These 'dos' and 'don'ts' should be widely circulated through posters in local language. T.V and print media should also used for awareness creation for villagers in conflict area.
- Reducing Livestock Depredation by Black Bear/Leopard:-As most of the livestock killings have taken place at the night shelters in the villages, it would be necessary to strengthen the doors, windows and other vulnerable portions of these night shelters to reduce loss by predation to black bear and common leopard. Supervised livestock grazing by at least 3-4 villagers will reduce livestock depredation by black bear and leopard.

Villagers who were affected by livestock depredation by black bear and leopards should be advised to use iron doors and proper lighting at their cattle sheds or night shelters as both have been found to be very effective in reducing livestock loss.

- **Guarding of Crop from Damage:-** A Village level cooperative effort for guarding of crop fields and orchards on rotational basis could be tried. Using guard dogs while patrolling and keeping them in villages would be of added advantage. Proper lighting in the corners or boundaries of crop fields particularly the vulnerable points lying close to forest fringes may be another option that may help to reduce crop depredation as observed in a few cases.
- **Translocation and Marking of Problematic Animals:-** The problem animals that are captured and translocated from the conflict areas should be marked by radio collar, florescent collar or, by ear tags prior to their release back into the wild so that the movement and the ranging patterns of these animals could be studied. This will be very helpful in better understanding of problematic animals and ultimately help in mitigating the problem.
- **Aversive Conditioning of Problematic Animals:-** Aversive conditioning of problematic animals (habituated to people or raiding crops) is very much essential so that the problematic animal learns to associate ‘undesirable activities’ such as entering a village, crop field or orchard with ‘negative events’. Such problematic animal could be subjected to one or more of the following treatments prior to release back into the wild. The treatments include: being hit or rubber bullets, loud noise by bursting of crackers, and barking and/or chased by specially trained guard dogs.
- **Strengthening of Local and Traditional Deterrent Methods:-** The traditional methods of burning red chillies mixed in cow dung can also be experimented in villages which were located in the periphery of forested areas in harvest seasons. Burning of crackers can also be done.
- **Compensation for Damages Caused by Wild Animals:-** The loss of cattle and human beings due to attack by wild animals are compensated by the forest department to victims vide notification No. FTS-(F)-6-7/82 Shimla-2, LOOSE dated 9-4-1996 and Fts. (F) 6-7/82-II dated 28th August, 2001 But still there is no provision for compensation to the loss of cultivated field crops due to damage by wild animals in the State of Himachal Pradesh which need attention of the State Government in this regard. Therefore, necessary step may be taken up with Govt. in this regard.



## 12.8 POACHING:

*Poaching* is the illegal trafficking and killing of wildlife. Although incidents of poaching has significantly reduced in this division, but it has not been completely eliminated. There are 2 incidences of Sambar being poached in recent years ,in both the cases FIR has been filed in the respective police station. Police doesn't take these cases seriously therefore there is need for improving investigating and legal skills of our field staff so that they can file chargesheet again the culprits on their own and case can be defended properly. Most common poached animal of this division are sambar, leopard and monitor lizard.

**Table 12.4: Poaching cases detected in Nahan Forest Division**




Sr. No.	Year of Detection	Description of case	FIR No.	Remarks
1	2020	Carcass of Sambhar	FIR No. 17 /2020 dated 02.03.2020	Case detected by Forest Department and handed over to Police Department for investigation
2	2020	Carcass of Sambhar	FIR No. 15	Case detected by Forest Department and handed over to Police Department for investigation

## 12.9 MANAGEMENT PRESCRIPTIONS:



**Water Holes:** Water holes are essential for management of wildlife. Water availability, or the lack of it, is one of the major factors that decides the health of the habitat. Its non-availability at sufficient places in the forests also increases probability of animals being found on the limited water holes and thereby increases their susceptibility to poaching.

Development of waterholes even in managed forests therefore becomes essential. It would be desirable to map all the perennial as well as ephemeral water holes. The activity of developing the water holes should consist of augmenting sub surface water level through nala bunds, underground bunds and similar other methods as part of general soil and moisture conservation measures. Although water ponds are created in this division under regular state scheme but no water holes from wildlife perspective has been made in the past. List of water ponds that can act as water holes in shown in table 12.5. Efforts will be made in this division during the current tenure of working plan to develop water holes.





**Table 12.5 List of water pond/holes in Nahan Forest Division**



Sr. No.	Range	Block	Beat	RF	Location	Waterpond/Holes
						Photos
1	Nahan	Bikram bag	Mandpa 1st	RF Mandpa C-1	N 30.50131° E 077.29704°	
2	Nahan	Bikram bag	Mandpa 2nd	RF Mandpa C-4	N 30.503722° E 077.266602°	
3	Nahan	Bikram bag	Khari	Khari C-1	N 30°28'20" E 077°12'58"	





4	Nahan	Shambhuwala	Ramma 2nd	RF Ramma C-4	N 30°32'49" E 077°23'31"	
5	Nahan	Shambhuwala	Ramma 2nd	RF Ramma C-3	N 30.54286° E 077.38323°	
6	Nahan	Shambhuwala	Uttamwala	Kalabhood C-5	N 30.52349° E 077.38035°	
7	Nahan	Shambhuwala	Ramma 1st	RF Ramma C-8	N 30°32'40" E 077°22'28"	





8	Nahan	Shambhuwala	Dhaun	RF Dhaun C-7	N 30°32'39" E 077°19'47"	
9	Nahan	Shambhuwala	Dhaun	RF Dhaun C-7	N 30°32'43" E 077°19'43"	
10	Nahan	Nahan	Ambwala	Ambwala C-4	N30.534723° E 77.255383°	
11	Nahan	Nahan	Kangniwala	Kangniwala C-3	N30.540554° E 77.259341°	









12	Nahan	Nahan	Kotri	Kotri C-1	N 30°32'26" E 077°17'56"	
13	Kolar	Kolar	Kolar	Krondewali C-3	N 30°50'21" E 077°41'8194"	
14	Kolar	Kolar	Kolar	Bidhawali C-5	N 30°50'21" E 77°41'8194"	
15	Kolar	Bheron	Matter	RF Matter C-5	N 30.486152° E 077.354145°	

16	Kolar	Kolar	Jatanwali	RF Dardwala C-2	N 30.495047° E 077.433644°	
17	Kolar	Bheron	Jamretwa	RF Jamretwa C-6	N 30.506542 E 077.304902	


18	Trilokpur	Kaulanwala Bhood	Kayari	RF Kayari C-2	N 30.642968° E 077.197916°	 <small>Latitude: 30.642968 Longitude: 77.197916 Elevation: 842.4533 m Accuracy: 13.5 m Time: 09/08/2023 10:46</small>
19	Trilokpur	Kaulanwala Bhood	Kayari	RF Kayari C-7	N 30.611956° E 077.204593°	 <small>Latitude: 30.611956 Longitude: 77.204593 Elevation: 851.63126 m Accuracy: 7.5 m Time: 09/08/2023 13:02</small>
20	Trilokpur	Kaulanwala Bhood	Kayari	RF Kayari C-7	N 30.615913° E 077.208694°	 <small>Latitude: 30.615913 Longitude: 77.208694 Elevation: 851.63126 m Accuracy: 7.5 m Time: 09/08/2023 13:02</small>
21	Trilokpur	Kaulanwala Bhood	Kayari	R F Kayari C-7	N 30.617711° E 077.206101°	 <small>Latitude: 30.617711 Longitude: 77.206101 Elevation: 851.63126 m Accuracy: 7.5 m Time: 09/08/2023 13:02</small>

22	Trilokpur	Kaulanwala Bhood	Kayari	RF Kayari C-7	N 30.618087° E 077.20548°	
23	Trilokpur	Kaulanwala Bhood	Bhudra	RF Tribhoni C-6	N 30.658863° E 077.176889°	
24	Trilokpur	Kaulanwala Bhood	Bhudra	RF Tribhoni C-4	N 30.646136° E 077.177726°	
25	Trilokpur	Kaulanwala Bhood	Surla	RF Sikardi C-3	N 30.615913° E 077.208694°	
26	Trilokpur	Kaulanwala Bhood	Surla	RF Sikardi C-3	N 30.613081° E 077.211191°	
27	Trilokpur	Kaulanwala Bhood	Surla	RF Sikardi C-4	N 30.613383° E 077.222697°	





28	Trilokpur	Kaulanwala Bhood	Surla	RF Surla C-2	N 30.604324 <sup>0</sup> E 077.230368 <sup>0</sup>	
29	Trilokpur	Kaulanwala Bhood	Kotri	RF Tribhoni C-2	N 30.628854 <sup>0</sup> E 077.179534 <sup>0</sup>	
30	Trilokpur	Kaulanwala Bhood	Kotri	RF Tribhoni C-3	N 30.619385 <sup>0</sup> E 077.18358 <sup>0</sup>	
31	Trilokpur	Kotla	Kotla	R F Bhogpur Kotla C-1	N 30.540041 <sup>0</sup> E 077.163909 <sup>0</sup>	
32	Trilokpur	Trilokpur	Kandaiwala	R F Maidhar C-4	N 30.586617 <sup>0</sup> E 077.223837 <sup>0</sup>	
33	Trilokpur	Trilokpur	Kandaiwala	R F Maidhar C-5	N 30.590479 <sup>0</sup> E 077.230183 <sup>0</sup>	




34	Trilokpur	Trilokpur	Kandaiwala	R F Maidhar C-4	N 30.584573° E 077.239229°	
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35	Jamta	Banethi	Saroga	RF Saroga C-7	N 30°41'47" E 77°11'94"	
36	Jamta	Banethi	Saroga	RF Saroga C-2	N 30°40'59" E 77°10'40"	
37	Jamta	Banethi	Amta	RF Dhadu C-11	N30.653262° E 77.235151°	
38	Jamta	Banethi	Amta	RF Dhadu C-3	N 30.66699° E 77.20722°	
39	Jamta	Banethi	Banethi	RF E/Banethi C-8	N 30°37'39" E 77°18'03"	

40	Jamta	Banethi	Banethi	RF E/Banethi C-10	N 30°37'30" E 77°17'38"	
41	Jamta	Banethi	Kathara	RF Amta C-6	N 30°38'57" E 77°12'42"	
42	Jamta	Banethi	Kathara	RF Amta C-10	N 30°39'25" E 77°11'38"	
43	Jamta	Banethi	Katli	RF Katli C-5	N 30°36'59" E 77°14'20"	
44	Jamta	Banethi	Gounth	RF E/Banethi C-19	N 30°38'47.0" E 77°17'58.6"	
45	Jamta	Banethi	Gounth	RF E/Banethi C-30	N 30°38'33.5" E 77°16'28.6"	

46	Jamta	Panjahal	Jaitak	RF Jaitak C-6	N 30°36'37" E 77°21'33"	
47	Jamta	Panjahal	Dhagera	RF Dhagera C-1	N 30.5648° E 77.3769°	
48	Jamta	Jamta	Nauni	RF Nauni C-7	N 30°36'41" E 77°18'45"	
49	Jamta	Jamta	Talon	Tallon C-2	N 30°33'46.18" E 77°17'54.66"	
50	Jamta	Jamta	Tallon C-2	RF Talon C-1	N 30°34'31.26" E 77°18'38.61"	
51	Jamta	Jamta	Bohal	RF Kanoti C-2	N 30°37'26" E 77°18'45"	



52	Jamta	Jamta	Burman	RF Burman C-15	N 30°37'50" E 77°20'35"	
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**Habitat Management:-** Reversing the process of degradation of forests as prescribed by itself improves the habitat of wild life. The vegetation cover over the natural water bodies in the wilderness should be left undisturbed, as the water holes without vegetation cover do not attract wild life. Dead and dying trees will be retained as snags for smaller species of mammals and birds. In known wildlife habitats the biotic interference in the form of collection of forest produce also will be discouraged. The availability of food, water and shelter for wildlife has to be improved. Fire protection is one of the best accelerating steps towards better habitat. Augmenting the fodder resources of herbivores through artificial regeneration of fodder species such as grass, herbs and trees help in multiplication of prey species, which in turn, support predators and scavengers. As per the policy of the State Govt. that out of the total plantations to be done in an area, at least 30% plants are to be of fruit bearing species, the species to be planted in a particular area is to as per the requirement of the wild life species specifically found in that areas. Protection of micro wildlife habitats from forest fire especially during breeding season is essential.

Habitat especially for the endangered species and the species in the schedule-I of the Wildlife (Protection) Act, 1972 requires to be protected by all means. The areas where schedule-I animals are found, needs to be specially protected and entry of domestic animals should be stopped so that wild animals get the required forage and shelter. Regular monitoring of their habitat should be done.

There should be no felling amounting to alteration of crop composition near the water holes and on the paths frequented by the wild animals. Planting of species such as Amla, Bahera, Jamun, Ber, Mallah, Bel, Kinu, Bauhinia and Dhak should be carried out in pockets.

**Solid waste (kitchen waste management):** In most of the Municipal corporation areas and other areas specifically having large number of human habitations, the door-to-door garbage collection

and kitchen waste management has probably forced sizable macaque populations to migrate to the forests. More efforts are required in this direction so that the kitchen waste and the waste generated by various eateries are well managed.

**Weed treatment/habitat improvement:** Lantana weed is the biggest hazard for deterioration of wildlife habitat. Measures to control its further spread, and eradication should be vigorously adopted. Trees providing roosting and nesting for birds are to be left intact. One dead tree preferably of low commercial value per hectare should be retained for shelter and resting of wildlife. Unsound and hollow logs are to be left in the forest as shelter for wildlife provided they are not fire hazard.

**Fire Protection:** Fire is potentially a deadly enemy of both forests and wildlife. Rapid running forest fires particularly crown fires are very destructive to wildlife. If it occurs in the nesting season of birds, breeding stock may be destroyed. The wild animals are usually trapped in the thick lantana bushes in case of fire. The rodents and reptiles are usually the bigger casualties as they are holed up. Therefore, strict fire protection measures as prescribed in the Forest Protection Working Circle should be followed. The fire watch towers should be used for detection of fire outbreaks.

**Rescue Equipment adequacy:** The Rapid Response Teams at Division and Circle levels should be well-equipped with all the rescue items including ropes, trap cages, transfer cages for large/small mammals, snake-handling hooks, torches, GPS sets, tranquilizing guns etc. as notified by Chief Wildlife Warden of Himachal Pradesh from time to time.

**Veterinary Care:-** Veterinary care in areas rich in wildlife may be ensured by:-

- i) Wildlife health monitoring through post-mortem examinations and direct and indirect observations
- ii) Free vaccination and preventive measures like de-worming to grazing domestic livestock and special Veterinary care campaign for foot and mouth disease in nomadic livestock.
- iii) Extension education to owners of domestic livestock.

**Training:-** For carrying out multidimensional activities, ranging from routine protection to social services, a new breed of staff with entirely different perceptions has to be made available. The available talent can be sharpened only through training. On the job training

will be given to staff for capacity building. Trainings in weaponry, unarmed combat, participatory exercises, first aid, veterinary care, intelligence gathering, investigation, public relations, wildlife sciences etc. will be provided in various reputed institutions. A part from that staff should be well versed in investigation, adducing evidence and material, dealing with wildlife offences/offenders, compoundable and non-compoundable cases under the Wildlife (Protection) Act, 1972. Staff should be imparted training in matters like trapping of wild animals, rescue operation, snake handling, post-mortem of animals, collection of samples of vital organs for histo-pathological, viral and bacterial examination, their preservation and dispatch, sign and symptoms of common wild life diseases, external indicators of health, etc.

**Research and Monitoring:-** Sudden outbreak of diseases, suitability of a given area for a particular species, carrying capacity of the forests, crop raids and methods to check the excessive breeding of a particular species are some of the problems that need research inputs. These problems can be addressed by appointing qualified persons for research and monitoring or by entrusting the same to specialized research organizations like ZSI, WII and local universities. It is essential to monitor the growth and development of wildlife in a given area to assess the impact of management practices, so as to make the needed corrections to suit the objective.

**Awareness Program and Peoples' Participation:** - Educating the local population about the importance of wildlife in the ecosystem and creating awareness about their conservation will go a long way in protecting our forests as well as reducing man-animal conflicts. Such awareness can be brought through nature camps, birding trails etc. for different target groups such as panchayats, students, fringe dwellers etc coupled with seminars, workshops and guest lectures.

**Mitigating Man Animal Conflicts:** - Some of the recommendations to mitigate the conflict at the man-animal interface are: -

- i) Encouraging stall-feeding among fringe dwellers may reduce the number of livestock within forests
- ii) To explore and promote alternate income generating source for forest dependent population.

- ii) To explore LPG connection on subsidies rates for forest dependent population so that dependence on forest pressure for fuelwood could be reduced.
- iv) Proper lightning of cow sheds near forest fringe areas.
- v) Improving the degraded forest habitat for wildlife.

viii) Establishment of Elephant Corridor to restrict their movement to Simbalwara National Park. Establishment of Anti-Depredation Squads(ADS) at circle level that covers the staff of paonta and nahan division. Moreover action can be taken according to “PROJECT ELEPHANT” guidelines 2013 of MOEFCC.

**Census of Animals:** - The Monkey census has been carried out in Himachal Pradesh. Proper documentation of the population trends i.e. pre-sterilization and post-sterilization of monkeys are needed for management. This will help in studying the impact of sterilization and making decision for further improvements in future. Census detail of monkey are shown in table 12.6 & 12.7.

**TABLE 12.6: Monkey Census details in Nahan Forest Division**

Density(Macaque group per sq km)	No. Of Groups	Standard Deviation	Average Group Size	Population	Urban Population	Total Population
0.13	185	0.09	39	2534	1736	4270

**Table 12.7: Change in the population of rhesus macaque between 2015 and 2019**

Division	Average Group Size	2015	2019	Intrinsic rate(r)
Nahan	39	5743	4270	-0.07

**i) Improving existing population control:** Himachal Pradesh Forest Department has established 9 sterilization centres where laser assisted tubectomy and vasectomy is performed on captured macaques. Since year 2006, total of 1,55,257 macaques have been sterilized. Monetary incentives are given to locals for capturing and re-releasing of the macaques. As macaques are captured from far away locations and brought to sterilization centres, reach of each centre is limited, and also further the random re-release of them probably has affected their social organisation and

unexpected over crop raiding pattern. To avoid this, the proper release of them at their original locations has to be ensured. However, the massive sterilisations drive has been effective in regulating population growth of macaques through prevention of subsequent births of progenies.

**ii). Monkey-Human Interface:-** The monkeys have become a problematic for the last 20 years in Himachal. Whether, it is the townships or the rural areas now monkey menace is quite common as they move out of the forests in search of food and convenience. Not many efforts were made to address this problem in the past as this problem was never considered a public or administrative problem. The efforts made for last 10 years at Forest Department level are inadequate unless the larger issues including garbage dumping are resolved by all stakeholders.

Census exercise was also initiated in 2022 with zoological survey of India for black-bears and leopard . With the help of this data once the report is published, further clarity into their numbers, movement and habitat with remedial measures will be clear. Such census need to be made a regular feature to better management of Wildlife and reduce human animal conflict.



## CHAPTER 13

### BIODIVERSITY CONSERVATION & DEVELOPMENT

#### 13.1 INTRODUCTION:

“Biodiversity is the variation among living organisms from different sources including terrestrial, marine and desert ecosystems, and the ecological complexes of which they are a part.” Biodiversity describes the richness and variety of life on earth. It is the most complex and important feature of our planet. Without biodiversity, life would not sustain. The term biodiversity was coined in 1985. It is important in natural as well as artificial ecosystems. It deals with nature’s variety, the biosphere. It refers to variabilities among plants, animals and microorganism species. Biodiversity includes the number of different organisms and their relative frequencies in an ecosystem. It also reflects the organization of organisms at different levels. Biodiversity holds ecological and economic significance. It provides us with nourishment, housing, fuel, clothing and several other resources. It also extracts monetary benefits through tourism. Therefore, it is very important to have a good knowledge of biodiversity for a sustainable livelihood.

**Importance of Biodiversity:** Biodiversity and its maintenance are very important for sustaining life on earth. A few of the reasons explaining the importance of biodiversity are:

**Ecological Stability:** Every species has a specific role in an ecosystem. They capture and store energy and also produce and decompose organic matter. The ecosystem supports the services without which humans cannot survive. A diverse ecosystem is more productive and can withstand environmental stress.

**Economic Importance:** Biodiversity is a reservoir of resources for the manufacture of food, cosmetic products and pharmaceuticals. Crops livestock, fishery, and forests are a rich source of food. Wood, fibres, perfumes, lubricants, rubber, resins, poison and cork are all derived from different plant species. Biodiversity provides people with basic ecosystem goods and services. it provides goods such as food, fibre and medicine, and services such as air and water purification, climate regulation, erosion control and nutrient cycling. Biodiversity also plays an important role in economic sectors that drive development, including agriculture, forestry, fisheries and tourism. More than three billion people rely on marine and coastal biodiversity, and 1.6 billion people rely on forests and non-timber forest products (e.g. the fruits from trees) for their livelihoods. Many people depend directly on the availability of usable land, water, plants and animals to support their families. In fact, ecosystems are the base of all economies.

**Ethical Importance:** All the species have a right to exist. Humans should not cause their voluntary extinction. Biodiversity preserves different cultures and spiritual heritage. Therefore, it is very important to conserve biodiversity.

### **13.2 STRATEGIES FOR BIODIVERSITY CONSERVATION:**

- Biodiversity use and conservation education.
- Legal remedies
- Afforestation
- Communities involvement in Biodiversity Conservation
- Traditional agro-ecosystems and biodiversity conservation

#### **13.2.1. Biodiversity use and conservation education:**

- People should be aware about the direct and indirect benefits from the forest and their change in attitude is needed.
- Initiation of educational programs that comprises teaching of conservation topics can help in biodiversity conservation.

#### **13.2.2 Legal remedies:**

The Biological Diversity Act, 2002 is an act for preservation of biological diversity in India, and provides mechanism for equitable sharing of benefits arising out of the use of traditional biological resources and knowledge. As per the act BMCs are created for “promoting conservation, sustainable use and documentation of biological diversity by local bodies across the country. The main function of BMC is to prepare People’s Biodiversity Register in consultation with local people. This Register entails a complete documentation of biodiversity in the area plants, wildlife, medicinal sources, etc. Efforts will be made in current working plan to make BMC in every local body.

#### **13.2.3. Afforestation:**

- Multipurpose tree including legumes are marvellous, multipurpose resources that can protect and stabilize the soil, save water, symbiotically fix atmospheric nitrogen, produce valuable wood and fodder, and certain proteins and lipids for diet.
- In the most degraded areas where trees are difficult to grow, attention should be given to the shrubs which are highly palatable to cattle.

#### **13.2.4. Communities involvement in Biodiversity Conservation:**

- Promotion of the community-based resource management systems of indigenous people will help in accomplishing the conservation of indigenous knowledge for biodiversity

conservation.

- Promotion of JFMCs and community user group near forest fringe areas can help in forest protection and hence conserving the biodiversity.

#### **13.2.5. Traditional agro-ecosystem and biodiversity conservation:**

- Recent patterns of agricultural development are depleting soils, genetic diversity, species diversity both in managed fields and surrounding habitats. Further, due to introduction of imported seed of crops, fertilizers and pesticides, traditional agro-ecosystems are under threat. A decline in the crop yield has been gradually noticed in lack of sufficient chemicals which the country imports. To maintain the diversity and productivity of traditional genetic resources of agriculture, the government should promote and encourage the farmers to maintain traditional agro-ecosystems.

#### **13.3 PRESERVATION PLOTS FOR BIODIVERSITY ASSESSMENT:**

In order to carry out biodiversity analysis from conservation point of view, preservation plots must be identified by the DFO for the areas with rich biodiversity presence. The beats having ecotone areas should be preferred so as to study the biodiversity presence of two ecosystems and their cusps. This includes Rama Dhaun, Panjhal, Lohgarh, etc beats of Nahan Forest Division. This preservation plot shall not be less than 1 ha area and will be studied for ecological succession and biodiversity of the area. Neither grazing shall be allowed in this area nor any type of cultural operations will 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 studied by laying out 3m×3m and 1m×1m quadrats as explained in the methodology of Resource Assessment Survey. The Research Wing of Himachal Pradesh Forest Department along with field biologists shall inspect the area annually along-with the Divisional Forest Officer of Nahan Division to record their findings.

## **CHAPTER 14**

### **ECOTOURISM & HUMAN RESOURCE DEVELOPMENT (OVERLAPPING) WORKING CIRCLE**

#### **14.1 GENERAL CONSTITUTION:**

The working circle is looking into identification of various ecotourism destinations holding future potential for sustainable ecotourism development as well as creating livelihood generation opportunities for different stake holders in forest and natural resources management and conservation. The training, capacity building of identified stake holders in effective management of ecotourism assets is also to be ensured.

#### **14.2 SPECIAL OBJECTIVES OF MANAGEMENT:**

1. To identify eco-tourism sites and methods to develop them into self-sustaining entities and to develop regional ecotourism circuits
2. To identify training needs of different stakeholders in the functioning and ensure capacity-building
3. To create public awareness (Information, education and communication) and nature education through the ecotourism assets and areas using tools of marketing, branding and destination-specific campaigns
4. To promote low-impact nature tourism which ensures ecological integrity of the ecotourism sites and its environment;
5. To promote biodiversity, traditional ecological knowledge and heritage values of Himachal Pradesh

#### **14.3 GUIDELINES ON SUSTAINABLE ECO-TOURISM IN FOREST AND WILDLIFE AREAS, 2021:**

In order to regulate and encourage planned development of areas in and around protected areas, the Ministry of Forest, Environment and Climate Change has notified “Guidelines on Sustainable Eco-Tourism in Forest and Wildlife Areas” in October 2021.

Considering the need for a participatory approach for conservation of wildlife and its habitats, the guidelines emphasizes the engagement of local communities in a manner that enriches local economies and encourage sustainable use of indigenous material through financial viable value chains to help local communities become independent and promotes partnership among

stakeholders in development of ecotourism as well as equitable sharing of benefits with local communities.

Creation of foundations/societies in protected areas and sharing of revenue with local communities has also been underscored in the guidelines. Besides, the guidelines provide for identification of ecotourism sites, zonation and making an ecotourism plan which shall be part of approved management plan/working plan for forest/protected area and tourism master plan in case of eco-sensitive zone. It also provides for monitoring mechanism at district level, state level and national level.

#### **14.4 ECO-TOURISM IN HIMACHAL PRADESH:**

Himachal Pradesh is renowned worldwide for its rich natural heritage and landscapes, tourist places and striking scenic views. Also known as ‘Devbhoomi’, the state attracts on an average, close to 1.7 crore tourists annually, which is far greater than its own population. In wake of post Covid times, the state has begun to draw even more visitors who come seeking the beauty and tranquility of nature from the plains below. Ecotourism is basically sustainable, nature-based tourism, that is environmentally conservative while maintaining local culture and contributing to the well-being of the host community. Keeping this in view, the goal is to develop a list of best practices and recommendations for sustainable tourism and ecotourism that are specific to Himachal Pradesh, India.

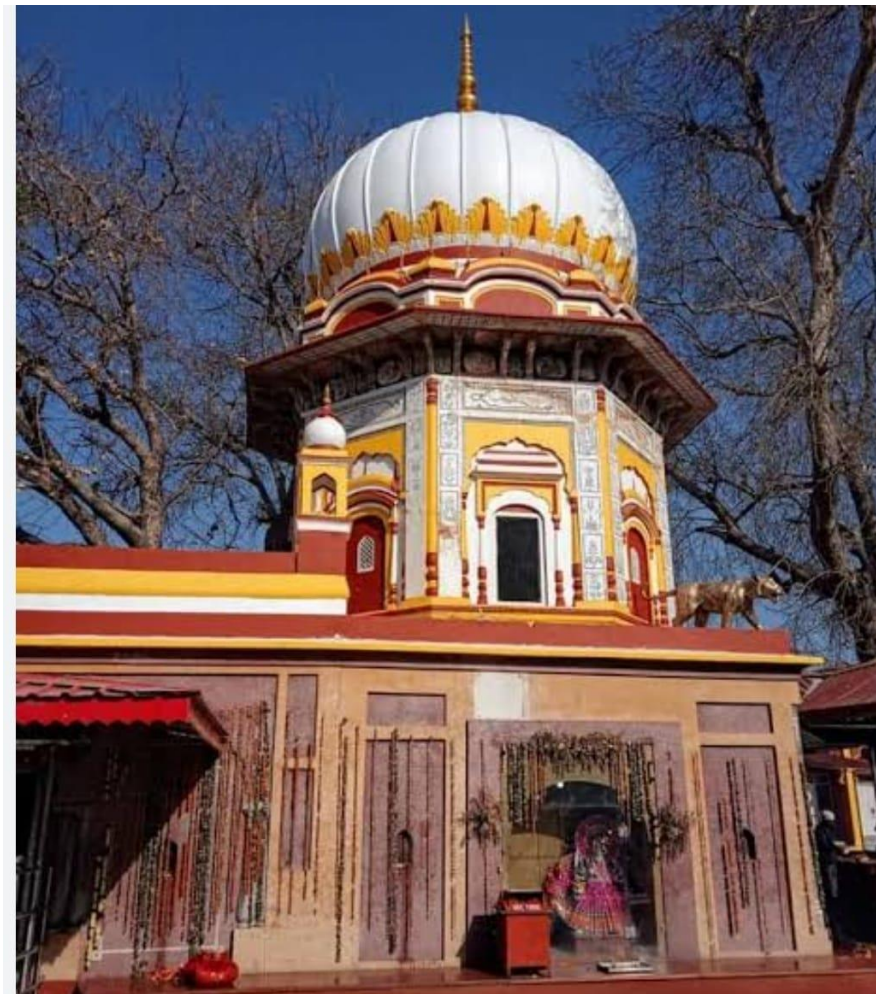
Himachal Pradesh Forest Department formulated the Eco-tourism Policy during 2001 which was subsequently revised in 2005. A re-revised Draft Ecotourism Policy was also proposed in the year 2017. The central theme of the 2005 policy is to ‘decongest and disperse over flowing city tourist destinations and bring the tourists closer to nature and ensure adequate economic return to the State and livelihood opportunities to the local communities.

To fulfill this objective H.P. Ecotourism Society has been constituted with its Headquarters at Aranya Bhawan Talland Shimla (H.P.). It is a registered Society under the Societies Registration Act.

The Society’s apex decision making body is the Governing body headed by Hon’ble Chief Minister, Himachal Pradesh and Principal Secretary (Forests) as its Member Secretary. The affairs of the Society are administered by an Executive Committee headed by Principal Secretary (Forests) and CCF Eco-tourism as its Member Secretary.

#### **14.5 ECO-TOURISM SITES IN NAHAN FOREST DIVISION:**

Nahan town occupies a strategic location bordering with Haryana and is richly bestowed with Sal forests, riverine tracts of Markanda and Shiwalik hills in the landscape. Simbalwara National Park, Renukaji wetland and sanctuary, Asan Bird Conservation Reserve are famous attractions of natural wealth in the vicinity. Serving as the gateway to Himachal Pradesh, Nahan holds a lot of potential for sustainably tapping ecotourism in the area. Eco-spiritual tourism can also be tapped with various spiritual centres located in and around the town.



Camping sites, nature parks, nature trails, cycling track are all various facets of ecotourism that can be tapped in the Division. In 2020-2021, the Division's first Eco-Park was opened in Kangniwala area of Nahan Range with nature trails, landscaping, nature-awareness boards spread across. The park has been gaining traction among youngsters of the town. The park has become the cynosure of activities in Nahan town and is now frequently thronged by locals. To make the park self-sustaining, revenue generation models will be taken through cafeteria serving local cuisine. Entry ticket of Rs10 per head is being charged. Currently more than 500 tourists visit the



park per month. The Complete list of assets/activities for Development of **‘Nature Park at Kangniwala’** are annexed in Appendix- XV of Volume II



#### **14.6 ECOTOURISM SITES IDENTIFIED FOR FUTURE DEVELOPMENT IN NAHAN FOREST DIVISION:**

Another project for Ecotourism is taking shape under the scheme ‘Nayi Rahein, Nayi Manzil’ as **‘Mantra Mata Trek’** in Bheron block of Kolar Range. The Components to be developed are 3 gazebos, viewpoint, signages, solar lights, benches, Gate, Path, Toilets, Urinals, Tank, etc. The trek is used to reach Mantra Mata temple located on top of hills. Devotees from Himachal and Haryana come in huge number during the festival season. The Complete list of assets/activities for Development & Beautification of **‘Mantra Mata Trek’** are annexed in Appendix- XV of Volume II



The following eco-tourism sites have also been identified in Nahan Forest Division and hold potential to be sustainably managed in the future while people seek nature-getaways from the mundane pace of city-lives.

Sr. No.	Name of Site	Type (Trekking trail/camping site)	Range	GPS Coordinates	Elevation
1	Jamta-Banethi Trek	Trekking, Cycling, Camping	Jamta	N 30° 37.76' N 77° 16.569'	1368 mtr

#### 14.7 TRAINING AND CAPACITY BUILDING OF FIELD STAFF:

The frontline staff is real human resource who shall ultimately implement the prescriptions of the working plan and any other related to nursery, plantation, soil and water conservation, protection, team building etc. It has been generally noted that the field staff lack the skills and knowledge in certain fields like JFM, use of modern technology like GPS and computers, forest and allied laws, new concepts in forest and natural resource management etc. Therefore, short term refresher and orientation courses of forest field officers/officials and training capacity building modules based on interactions with the field staff should be conducted in the two training institute namely as HPFA (Himachal Pradesh Forest Academy) and FTI Chail.

##### **Mandate of HPFA Sundernagar, HP is as under:**

1. Induction Course for Forest Ranger Officers of HP (18 months).
2. Short term, refresher and orientation courses of forest officers/officials and Ministerial staff.
3. Induction Course for Deputy Rangers of HP (3 Months).

##### **Mandate of Forest Training Institute Chail, District Solan Himachal Pradesh:-**



1. Induction Course for Forest Guard of HP (6 Months)
2. Short term, refresher and orientation courses of forest guards and Ministerial staff.

**Conclusion:-**During the tenure of this working plan , it must be ensured that all the field staff are trained according to rules & regulations of H.P Forest Department.

#### **14.8 ADMINISTRATION OF ECOTOURISM SITES:**

Since the ecotourism assets fall in the reserve forest area of Nahan Forest Division, the execution of the project as well as the subsequent administrative command shall rest with the forest department. The governance of the site can be done in the society mode at the level of Conservator of Forests, Nahan Forest Circle. A pre-existing Eco-tourism Society at the level of Forest circle Nahan has the participation of the Divisional Forest Officers, representative of District Tourism Development Officer, District administration as well as civil society. The same may be inculcated with participation of representatives from local gram panchayat(s). The executive body of the site headed by the concerned Divisional Forest Officer (DFO) shall be responsible for day to day running as well as planning on the sites.

The forthcoming plans as well as annual site-running report (including cash-book maintenance, administrative actions etc.) of the shall be tabled for the ratification of the governing body. After the initial establishment capital, the long-term running of the site shall be done in society mode itself whereby the recurring cost to maintain the sites as well the wages of the personnel engaged at the sites shall be managed from the proceeds of the entry ticket and other chargeable (refreshment/adventure/stay activities) entities specific to the sites. Focus will be on engaging local people for livelihood generation as also envisaged in Guidelines on Sustainable Eco-Tourism in Forest and Wildlife Areas, 2021. The sites (or a part) may also be supported through Corporate Social Responsibility of the industrial units in Nahan.

## **CHAPTER 15**

### **JOINT FOREST MANAGEMENT (OVER LAPPING) WORKING CIRCLE**

#### **15.1 GENERAL:**

Joint forest management is concept of developing relationships between fringe forest groups and forest department on the basis of mutual trust and jointly defined roles and responsibilities for forest protection and development.

Accordingly, JFM tries to harness the strengths and energy of local rural communities for protecting and managing forests through JFM Committees/ Eco Development Committees, and helps to meet their needs for subsistence and livelihood as well as generates local environmental services. JFM has the potential to meet local subsistence needs, of fuel wood, fodder, other non-timber forest produce, small timber, etc., to provide livelihood through sale of produce, while at the same time, preventing degradation of the forests that provide local, national and global environmental benefits.

The state government issued the first JFM Notification in 12.05.1993 for the constitution of Village Forest Development Committees (VFDCs). In 2001, Himachal Pradesh Participatory Forest Management Rules were issued for registration of Village Forest Development Societies (VFDSs) under the Societies Registration Act, 1860. From 2002-03 onwards, JFMCs were constituted and federated into FDAs (Forest Development Agencies) at the Forest Division level. The JFMCs are registered with HPFD as per the provisions of the NAP (National afforestation programme) guidelines, whereas FDAs are registered as Societies. The SFDA was established in 2010 in accordance with the central guidelines. Their duties and responsibilities include forest protection and conservation, preparation and consultation on plans for the development of the respective areas and benefits (forest resources, NTFPs, grazing rights, etc.) sharing with the people.

#### **15.2 THE NEED FOR JOINT FOREST MANAGEMENT:**

The Indian Forest Policy of 1988 (MoEF, 1988) and the subsequent government resolution on participatory forest management (MoEF 1990) emphasize the need for people's participation in natural forest management. The local communities should be motivated to identify with the development and protection of forest form which they derive benefits. Thus the policy envisages a process of joint management of forests by the State Government and the local people, which would share both the responsibility for managing the resource and the benefits that accrue from this management.

Forest is an area having woody as well as non-woody vegetation, dominated largely by trees. But to meet the needs of the increasing population, deforestation is on rise. Many forest lands are being cleared for developmental works such as construction of roads, bridges, dams, etc. resulting into loss of forest cover. Where a large population depends on forest for their daily requirements, importance of forest is being increasingly recognized, and more so particularly in the context of ongoing changes in global climate.

The success of afforestation depends on identifying suitable multipurpose trees for the specific location, using quality planting stock and after care or management of the plantations on participatory mode. In order to reduce the deforestation and forest depletion, a new paradigm has recently emerged, called “Joint Forest Management” (JFM).

The government of Himachal Pradesh has issued a notification No. Fts-II (B)15-10/87 dated 23<sup>rd</sup> August 2001, called the Himachal Pradesh Participatory Forest Management Regulation, 2001. These rules shall be applicable to such government forest and lands, including common land, where participatory management envisaged. This is the activity which involves participation of people in managing forest Village committees to take part in safe guarding the forest. Forest department collaborate with the village people and share ownership and benefits arising from forest. Thus JFM is a forestry practice or a management which sustains forest and produce social, environmental and economic benefits.

Various JFMC formed in previous decades in Nahar Forest Division have been discussed in part 1 of this working plan. But most of them are inactive.

### **15.3 DETAIL OF ACTIVE CUG OPERATING IN NAHAN FOREST DIVISION:**

**Table 15.1: Active CUG in Nahar Division**

<b>Name of CUG</b>	<b>Works</b>
Matter- Bheron	Soil work, Plantation, Awareness Camp, Fire protection work.
Van Samridhi Jan Samridhi Ambwala Sainwala Women Group	Plantation of Aloe-vera in 3 hectare area. (70,000 aloe-vera plant)

### **15.4 FUTURE SCOPE OF JFMCs IN NAHAN FOREST DIVISION:**

There is reasonable scope for the JFM activities in the division, provided a 360-degree approach is ensured in engaging, consulting, working and monitoring with the stakeholders. The JFM/PFM

committees can be the future agencies of forest development, conservation and expansion. The potential activities to be executed through JFMCs can be:

- ❖ Afforestation and plantation activities
- ❖ Soil & water conservation through treatment of micro watersheds in a catchment.
- ❖ Water Resource management: Recharging of water bodies like baulis, ponds and groundwater.
- ❖ Minor construction work of road, paths and buildings.
- ❖ Awareness programmes for forest protection, fire protection, propagation of medicinal herbs
- ❖ Livelihood options like bee keeping, mushroom cultivation, vermicomposting, cutting & pruning etc. through effective training
- ❖ Maintenance and management of ecotourism sites and potential ones (Kangniwala Nature Park)
- ❖ Human-animal conflict mitigation
- ❖ Forest-fire control and briquette-making
- ❖ Forestry and conservation related awareness activities

JFMCs can decide for several income generation activities for alternative livelihood particularly low-income group of community. They can make Self Help Groups (SHGs) and the front line staff of the forest department can assist them to form the groups.

In order to reduce dependence of these people on forest resources by ensuring them alternate livelihood, SHG groups are formed so that they can earn money to meet their daily requirements by pursuing some economic activity. SHGs also help them to inculcate habit of savings for bad days from own savings rather than incurring loan from money lender and being in a perennial debt trap. Self Help Groups (SHGs): The guidelines in “A Handbook on Forming Self Help Group, National Bank for Agriculture and Rural Development” may be followed for formation and regulation of SHGs.

As mentioned previously, in order to expand the JFMC concept further in Nahan Forest Division, It is of prime importance to engage stakeholders and mobilize communities through proper communication and dialogue for new formation of active JFMCs. The following strategies can be implemented for new formation of active JFMCs :-

### **1. Selection of JFM Working Areas**

The following broad guidelines have been devised for selection of potential areas:

- ❖ Interest of local forest staff in involvement in joint forest planning and management;
- ❖ Interest of local people in involvement in joint forest planning and management;
- ❖ Existence of ongoing ‘successful’ collective land management systems;
- ❖ Relatively homogenous local communities.

The information will be gathered from village-level PRA studies; workshops held with range officers and forest guards, in conjunction with village visits and meetings to determine local people’s perception of problems and possible intervention.

## **2. Participatory Rural Appraisal (PRA):**

Participatory Rural Appraisal (PRA) will be used as a way to facilitate communication between users and the Forest Department and to determine problems and priorities. At this initial discussion stage it is likely that only partial information will be obtained from the village, so it will be necessary to repeat the PRA exercise. Repeated PRAs would be used to continue the dialogue and build on the information base. PRA will be used to identify particular area needing more detailed socio-economic research.

### **Specifically, PRAs will be used to:**

- i) Finalize village selection
- ii) Build up baseline information
- iii) Identify forest users and their priorities
- iv) Provide the context for experimental learning for the staff and to create the basis for effective interaction between the department and forest users
- v) Identify local option for institution building
- vi) Draw up village level agreements.

### **The key objectives of this PRA would be:**

1. To document existing land use practices and management as a basis of their development.
2. To document current interaction between forest, farm and pasture, type of usage, division of labour.
3. To build a detailed picture of the socio-economic context of villages; identify different categories of household ( i.e. household profiles); to identify and assess effectiveness of village institutions and leaders; to identify different levels of decision making in resource use and their relative importance.
4. To identify user’s priorities and means of reaching consensus.

5. To identify different users' constraints to participation, for example women's labor time, poorer people's lack of access to decision making.
6. To identify and assess effectiveness of existing village level institutions, cooperative action between villages as a means to build more effective village or user group organizations.

### **PRA Technique**

- (a) The PRA technique to be used in joint forest planning and management will include review of data and existing information
- (b) Direct observation
- (c) Semi-structured interviews
- (d) Group interviews (casual, focused, village).
- (e) Use of key information's, local experts.
- (f) Use of local researchers
- (g) Ranking: wealth ranking, pair-wise ranking, direct matrix ranking
- (h) Livelihood analysis
- (i) Seasonal diagramming (firewood, fodder, NTFPs, labour etc.)
- (j) Transects (systematically walking through an area with a group of local people).
- (k) Participatory mapping, modeling; people's mapping and modeling.
- (l) Linkage chart (showing links between village organizations, between villages, and forest resources).
- (m) Case studies and stories.
- (n) Ethno-histories.
- (o) Brainstorming (especially joint sessions with villagers)

### **3. Role of Front-Line Staff**

Forest Guards will coordinate all inputs to the village and will act as the interface between villager and the department. They will be conduit for the flow of information both up and down the system. They will establish links with other village-level organizations and government extension agents where appropriate. The departments most likely to be involved are Animal Husbandry, Agriculture and Rural Development.

Forest Guards will have the following responsibilities:

- i) To establish effective and representative Village Forest Development Committees;

- ii) To maintain contact with joint forest management groups (VFDCs);
- iii) To provide technical advice as required;
- iv) To arbitrate between groups if conflict arises and requested;
- v) To collect information through PRAs;
- vi) To provide feedback to the department;
- vii) To facilitate the full participation of women and poorer people;
- viii) To liaise between villagers and the department.

Although these activities are all additional to the current work of forest guard; the experience elsewhere indicates that as the JFPM process strengthens the more onerous protection workload of the guard will reduce.

#### **4. Field level Training**

Field level training will be carried out through participatory workshops which encourage an experience based learning approach. At outset these workshops may be facilitated by some JFPM Training specialist. Each person participating in the workshop should share his experience and knowledge with other participants including the facilitators. A series of workshops should be organized at different levels, such as:

- Circle-level workshops
- Divisional-level workshops
- Range-level workshops

#### **5. Villagers Reorientation**

Reorientation is not essential for the staff only, villagers will also need to be reoriented in their approach to the management of local natural resources, and in their perception of the role of the staff. The joint forest planning and management system forms a major part of this reorientation. Workshops should be organized for local leaders (local politicians, ehaviors leaders, teachers, other key persons); and VFDCs. This will provide a forum where VFDCs can share experiences, learn from each other, and develop combined strategies and approaches to JFPM.

#### **6. Micro Plan Making**

Before a VFDC can manage a forest, it will be required to prepare a micro plan. The micro plan will be prepared jointly by Executive Body of the VFDC and the Range staff, and will

be discussed with the General House. It will be finally approved by the concerned DFO. The information's gathered during the PRA exercise will be helpful in preparation of the micro plan. Locally drawn maps of the area may be useful to ensure that everyone understands what areas are to be managed. The micro plan should include:

- i) Detail which households and villages have access and right to the forest lands and forest products;
- ii) Include detail on protection and decision-making mechanisms;
- iii) Detail forest management prescription;
- iv) Detail soil conservation measures if considered necessary by the VFDC
- v) Detail grassland management measures if considered necessary by the VFDC
- vi) Demarcate the responsibilities of the department and the villagers (forest users);
- vii) Detail unambiguous rights to the usufruct and harvesting of common plantation, grassland and forest area;
- viii) Detail clear rules and mechanisms for the distribution of benefits: intermediate and the final harvest, among users.

## **7. Duties and Responsibilities of JFM Committees**

To make the JFMCs active and functional, each member of JFMC should shoulder certain duties and responsibilities. Following can be the duties & responsibilities of JFM committees ;-

- To persuade the villagers to give available areas for plantation.
- To assist the Forest Department in planning, protection, afforestation.
- To help the F.D. in judicious use, of all existing rights, eco-development of the area as per approved management plan.
- Just and fair distribution of the usufructs derived.
- Ensure its management as per prescribed norms.
- Settlement of all disputes between villagers

## **8. Power to JFMCs**



The committee should make its own bye-law with the concurrence DFO. The concerned DFO should carry out necessary procedure for granting powers of a forest officer as mentioned in HPPFM regulations, 2001.

- i) Power to register Damage report in JFMC areas.
- ii) Power to summon the accused to the general house of JFMC.
- iii) Make recommendations to Range officer regarding compounding of damage in respect of offences committed in JFMC areas.

## **9. MOU between Forest Department and JFMCs**

In the participatory mode, the scheme is being implemented by setting up Forest department agency (FDA) at Forest division level and JFMC at village level. As per the notified regulation titled HPPFM regulations, 2001 notified vide no. Fts. IIB/15-10/87 dated 23.8.2001, MOUs were signed between State Govt. represented by DFO of Forest Division in which FDA is being implemented and JFMC through its president during November 2009. Govt. of H.P has approved this MOU after getting vetted from the law Department . This MOU shall be valid for a period of five years from the date of signing as per terms and conditions detailed in the MOU for proper protection, maintenance, regeneration and management of plantation created under FDA and other forestry schemes within the jurisdiction of the JFMC.

In addition, MOU may also be signed between Forest Department and JFMCs for fire protection. Further, a provision of honorarium/ assistance has been made to be paid to JFMCs for doing excellent works in fire fighting.

## **10. JFMC Role in Eco-Tourism**

There is need to develop specific sites for eco-tourism in JFM localities. Through eco-tourism the villagers not only get employment but self-business will raise their income and it will become a source of livelihood. Some potential and established sites include Kangniwala Nature Park, Mantra Mata Trek, etc. Stress should also be laid on making the sites self-sustaining to benefit local live hood generation and add to the tourism potential of the Division.

## **11. Monitoring and evaluation**

The monitoring of the progress and performance of the activities taken under this working circle under different schemes should be done at the Divisional level. Evaluation of the schemes should be planned periodically through ‘Social auditing’

## CHAPTER 16

### WEED MANAGEMENT

#### 16.1 INTRODUCTION:

Weed management is the practice of preventing, controlling, or eradicating unwanted plants, commonly known as weeds, in various environments such as agricultural fields, gardens, lawns, parks, and natural areas. Weeds are plants that grow aggressively and compete with desired plants for resources such as water, nutrients, and sunlight. They can cause significant damage to crops, reduce agricultural productivity, and impact the overall health and aesthetics of landscapes. Effective weed management involves employing a range of strategies and techniques to minimize weed infestation and control their spread. These strategies can include cultural, mechanical, biological, and chemical methods, often used in combination, depending on the specific circumstances and goals of weed control. Cultural methods of weed management involve implementing practices that promote the growth and vigor of desired plants, making it difficult for weeds to establish and compete. Examples of cultural techniques include proper crop rotation, maintaining healthy soil fertility, utilizing cover crops, and employing suitable planting densities. Mechanical methods involve physically removing or reducing weed populations. This can be achieved through techniques such as hand-pulling, hoeing, mowing, tilling, or using various types of weed control equipment. Mechanical methods are commonly used in smaller-scale settings, like gardens or lawns. Biological methods involve using living organisms to control weeds. This can be achieved by introducing or encouraging natural enemies of weeds, such as insects, pathogens, or grazing animals that selectively target and suppress weed populations. Biological control methods are often implemented in natural areas or large-scale agricultural settings. Chemical methods, known as herbicides, involve the use of specific chemicals that are designed to kill or inhibit the growth of weeds. Herbicides can be selective, targeting specific types of weeds while leaving desired plants unharmed or non-selective, affecting all plants they come into contact with. Herbicides are widely used in agriculture, landscaping, and other areas where weed control is essential. Only mechanical methods will be used for weed removal in Nahan Forest Division.

#### 16.2 HARMFUL WEEDS OF NAHAN FOREST DIVISION ARE MENTIONED BELOW:

**Lantana (*Lantana camara*):** Lantana (*Lantana camara*) is an invasive plant species that poses a significant threat to biodiversity, particularly in areas with favorable climatic conditions such as Himachal Pradesh. The plant has the ability to spread rapidly, forming dense thickets that

outcompete native vegetation and reduce biodiversity. Lantana (*Lantana camara*) is a pan-tropical weed. It occurs in diverse habitats and grows to 1.2-2.4 meters (or even more). It has a strong root system and it gives out a new flush of shoots even after repeated cuttings. Lantana is native to the tropical and sub-tropical regions of Central and South America. In India, it was first introduced in the early eighteenth century as an ornamental plant. Since then it has invaded almost all the tropical areas across the country including Himachal Pradesh. It encroaches 13.2 million hectares besides forests and fallow lands. Its management costs per hectare are very high. *Lantana camara* is the main invasive weed species that have infested the Nahan Forest Division. Being an alien species, it has invaded areas so thickly that it has affected the species diversity, productivity of land and thereby changing the ecology of the area. *Lantana camara* has also deleterious effects on the health of animals, particularly cows, when browsed accidentally. The studies showed that in the infested areas, it neither favors palatable nor non-palatable species under its cover. Because of its fast growth, it overtakes the economically important species and negates the effort of afforestation as well. So far, to eradicate Lantana and utilize it for economical conversion to trade in products or biomass energy has failed. Policy for Managing Lantana (*Lantana camara*) in Himachal Pradesh, was notified vide Government notification No. FFE-B-F(5)-6/2009 Dated 20.04.2018.

**Table 16.1: Below is detail regarding Lantana eradication in Nahan Forest Division from 2010-11.**

<b>Total Area infested with Lanatana in Nahan Forest Division.</b>						
<b>Name of Range</b>	<b>25%</b>	<b>50%</b>	<b>75%</b>	<b>100%</b>	<b>Total Area</b>	<b>Balance</b>
Trilokpur	430.84	2131.52	4979.06	469.39	8010.81	
Jamta	1274.9	820.8	1319.4	1420.8	4835.9	
Kolar	1128.45	815.85	237.49	50	2231.79	
Nahan	1439	3035	1709	125	6308	
<b>Total</b>	<b>4273.19</b>	<b>6803.17</b>	<b>8244.95</b>	<b>2065.19</b>	<b>21386.5</b>	
<b>Total Area in which Lantana have been removed in Nahan Forest Division</b>						
Trilokpur	10	0	291.82	20	321.82	7688.99
Jamta	140	30	0	280.7	450.7	4385.2
Kolar	80	225	102.96	40	447.96	1783.83
Nahan	55	190	230	0	475	5833
<b>Total</b>	<b>285</b>	<b>445</b>	<b>624.78</b>	<b>340.7</b>	<b>1695.48</b>	<b>19691.02</b>

***Ardisia solanacea* (Gudbhel):** It spreads in Sal forests and has a very strong and complex root system which can affect regeneration of Sal. It requires continuous removal till establishment of regeneration of Sal. The bushy growth and climbers should be cut and removed continuous removal till establishment of regeneration annually. The man-days involved in removal of this particular weed is higher since expertise is required to protect the regeneration of Sal growing in close proximity to Gudbheli. It is seen that despite yearly removal, the weeds have been growing back though their density and height is substantially lesser as compared to untreated areas. Clearing of weeds for five to seven years post-felling is recommended to be continued. It is stressed here that the budget for bush cutting be provided in time so that the same is done well before the monsoon season. Field Studies may also be conducted with FRI/UHF Nauni University for finding a scientific solution to the removal as well.

***Eupatorium:***

*Eupatorium* is an invasive weed that poses a threat to native plant species in many regions, including this division mainly in areas of Dharti Dahr, near highway. Effective management of *Eupatorium* is important to prevent its spread and minimize its negative impact on local ecosystems. Here are some potential approaches to *Eupatorium* management.

**Early detection and rapid response:** Establishing a system for early detection of *Eupatorium* infestations is crucial. Regular monitoring should be conducted to identify new infestations and respond quickly to prevent its spread.

**Mechanical control:** Hand-pulling or cutting *Eupatorium* plants can be effective for small infestations. However, this method may not be practical for large-scale management due to the extensive nature of the weed.

**Public awareness and education:** Creating awareness among the local community, farmers, and landowners about the threats posed by *Eupatorium* and the importance of its management can help prevent its spread. Training programs, workshops, and educational campaigns can be organized to promote responsible management practices.

**Habitat restoration:** Restoring disturbed habitats can help prevent *Eupatorium* invasion by establishing native plant communities that are more resistant to the weed. This can be done through reforestation, erosion control measures, and promoting the growth of native species.

It is important to note that the specific management strategies and approaches may vary depending on the local context, severity of infestations, and available resources. Consulting with local agricultural or environmental authorities, research institutions, and experts in invasive

species management can provide more detailed and tailored guidance for Eupatorium management.

## **CHAPTER 17**

### **CLIMATE CHANGE**

#### **17.1 INTRODUCTION:**

Climate change refers to long-term shifts and alterations in Earth's climate patterns due to human activities, primarily the emission of greenhouse gases (GHGs) into the atmosphere. The primary driver of current climate change is the burning of fossil fuels, such as coal, oil, and natural gas, which release carbon dioxide (CO<sub>2</sub>) and other GHGs into the atmosphere. Deforestation, industrial processes, and agricultural practices also contribute to GHG emissions.

Widespread improvements in the quality of life of many of the world's populations have gone hand-in-hand with increased demands on natural resources. The planet is struggling to keep up, with increases in the average global temperature and the frequency of extreme weather events transforming ecosystems around the world and threatening entire species of plants and animals. Forests are drying up, there is less rainfall and more fires, and the glaciers of both the North and South Poles are shrinking.

The increase in GHGs, particularly CO<sub>2</sub>, traps heat in the Earth's atmosphere, leading to the greenhouse effect and global warming. This causes a range of significant impacts, including rising global temperatures, melting ice caps and glaciers, sea-level rise, altered precipitation patterns, more frequent and intense extreme weather events (such as hurricanes, droughts, and heatwaves), and shifts in ecosystems and biodiversity.

Climate change poses various risks to human societies and natural systems. It threatens food and water security, exacerbates poverty and inequality, and affects human health and well-being. It also impacts ecosystems, leading to the loss of biodiversity and disruptions in ecological balances.

Addressing climate change requires a multifaceted approach involving mitigation and adaptation strategies. Mitigation involves reducing GHG emissions by transitioning to renewable energy sources, increasing energy efficiency, promoting sustainable land use practices, and implementing policies to limit emissions. Adaptation involves building resilience to climate change impacts by enhancing infrastructure, implementing early warning systems, and developing strategies to protect vulnerable communities and ecosystems.

The international community has recognized the urgency of climate action and has come together under the United Nations Framework Convention on Climate Change (UNFCCC) to negotiate global agreements, such as the Paris Agreement. The Paris Agreement aims to limit global temperature rise well below 2 degrees Celsius above pre-industrial levels and pursue efforts to

limit the temperature increase to 1.5 degrees Celsius. It also emphasizes the need for financial and technological support to assist developing countries in their climate change efforts.

Climate change is a complex and pressing issue that requires collective action at various levels, from individual actions to global cooperation. Governments, businesses, communities, and individuals all have a role to play in reducing emissions, promoting sustainability, and adapting to the changing climate to ensure a more sustainable and resilient future.

Forestry plays a crucial role in mitigating climate change as well as adapting to its impacts.

## **17.2 SOME KEY STRATEGIES TO REDUCE CLIMATE CHANGE THROUGH FORESTRY:**

**17.2.1 Afforestation and Reforestation:** Planting new forests (afforestation) and restoring degraded forests (reforestation) can help sequester carbon dioxide from the atmosphere. Trees absorb carbon dioxide during photosynthesis, storing it in their trunks, branches, and roots. This process helps reduce greenhouse gas concentrations, mitigating climate change.

**17.2.2 Sustainable Forest Management:** Implementing sustainable practices in forest management is vital. This includes carefully planning logging operations to minimize carbon emissions, protecting old-growth forests, maintaining biodiversity, and promoting natural regeneration. Sustainable practices also ensure that harvested trees are replaced, maintaining the carbon sink capacity of forests.

**17.2.3 Avoiding Deforestation:** Preventing deforestation is crucial for climate change mitigation. Deforestation accounts for a significant portion of global greenhouse gas emissions. Governments, organizations, and individuals should work together to protect forests from activities such as illegal logging, conversion to agriculture, and urbanization.

**17.2.4 Improved Forest Fire Management:** Forest fires release substantial amounts of carbon dioxide into the atmosphere. Implementing effective fire prevention strategies, such as early detection systems, controlled burns, and community involvement, can help reduce the occurrence and severity of wildfires.

**17.2.5 Agroforestry:** Integrating trees into agricultural landscapes through agroforestry practices provides multiple benefits. Agroforestry systems can sequester carbon, enhance biodiversity, improve soil health, and provide additional income streams for farmers.

**17.2.6 Forest Carbon Offsetting:** Forest carbon offset projects can help compensate for emissions from other sectors. These projects involve conserving existing forests or planting new trees to absorb carbon dioxide equivalent to the emissions produced elsewhere. It's essential to ensure that offset projects follow rigorous standards and provide long-term carbon storage.



**17.2.7 Forest Conservation and Restoration:** Protecting and restoring natural forests are critical to climate change mitigation. Forest ecosystems store vast amounts of carbon and support biodiversity. Conservation efforts should focus on preserving intact forests and restoring degraded areas, allowing them to function as effective carbon sinks.

**17.2.8 Sustainable Wood Products and Bioenergy:** Promoting the use of sustainable wood products and bioenergy can help reduce emissions from fossil fuel-intensive industries. Sustainable forest management practices ensure that harvested trees are replaced, maintaining a renewable resource for construction, furniture, and energy production.

**17.2.9 International Collaboration and Policies:** International cooperation is essential to address deforestation and climate change. Governments, organizations, and communities need to work together to develop and implement policies that protect forests, promote sustainable practices, and provide incentives for forest conservation and restoration.

**17.2.10 Public Awareness and Participation:** Raising public awareness about the importance of forests in mitigating climate change is crucial. Encouraging individuals to participate in tree planting initiatives, supporting sustainable products, and making informed choices about forest-related activities can contribute to reducing climate change.

It is important to note that these strategies should be implemented in conjunction with efforts to reduce emissions from other sectors, such as energy, transportation, and industry, to achieve comprehensive climate change mitigation.

These Strategies will be implemented in current working plan of Nahan Forest Division.

## CHAPTER 18

### GENERAL FINANCIAL FORECAST & FINANCIAL PLAN OF OPERATION

#### 18.1 GENERAL:

The costs and prices are influenced by market forces and depend on supply and demand. It further depends on the principles of management and pattern of exploitation adopted from time to time. Therefore, it is not possible to estimate with reasonable accuracy the expenditure and revenue during the period of this working plan. The estimates given below are based on the current prices of various items of forest produce and the cost involved in carrying out the prescriptions of the plan at current rates.

#### 18.2 PAST REVENUE AND EXPENDITURE:

The details of past revenue and expenditure have been given in the following table 19.1.

**Table 18.1: Past revenue & expenditure from 2016-17 to 2022-23 in Nahan Forest Division**

<b>Year</b>	<b>Revenue (Rs.)</b>	<b>Expenditure</b>	<b>Deficit (Rs.)</b>
2016-17	4122957	83962373	79839416
2017-18	2601403	90101724	87500321
2018-19	2517372	95739266	93221894
2019-20	2517372	113238095	110720723
2020-21	2552749	127206276	124653527
2021-22	2974763	115758560	112783797
2022-23	3092516	131995268	128902752
<b>Gr. Total</b>	<b>20379132</b>	<b>758001562</b>	<b>737622430</b>

\*\*\*\*The revenue amounting to **Rs. 2,33,74,472/-** has been recovered and deposited in account of HOD, HP Forest Dept. from HPSFDC on account of royalty of timber of salvage trees during last 07 years.

**Table 18.2: Projected Revenue details for 2023-24 (excluding Working circles prescriptions)**

<b>Sr. No.</b>	<b>Sources of revenue</b>	<b>Revenue projected for 2023-24 (Rs.)</b>
1	101-02- Timber and other Forest Produce removed from forest by consumers and purchasers	4800000
2	101-04-Other Forest Produce removed from Forests by Govt Contractors.	0
3	101-07-Receipt from Grazing and Grass.	7000
4	102-01- Receipt from registration fees	0
5	102-02- Receipt from societies	0
6	800-01- Receipt from penalty damage bill other than HPSFC	0
7	800-02-Receipt from sale of tree to Right Holder	5000
8	800-03-Comp U/s 68 of IFA,1927	20000
9	800-04-Receipt from rent of Govt. building Treasury/Deptt.	75000
10	800-05-Receipt from Registration fee	5000
11	800-07-Receipt from Passing of Timber	0
12	800-09-Receipt from export permit fee	60000
13	800-10- Receipt from seized timber	20000
14	800-12-Receipt from other deptt/organization for CA plantation	8000000
15	800-16-Receipt from penalties/damage bills from HPSFDC.	30000
16	800-17-Receipt from distribution of seedlings	0
17	800-18-Other misc. receipts treasury/Deptt.	400000
	<b>Total</b>	<b>Rs. 13422000</b>

\*The approximate amount of timber royalty from Salvage trees is estimated at **Rs. 4800000/-**.

This will be generated as revenue under revenue head '101-02- Timber and other Forest Produce removed from forest by consumers and purchasers

### **18.3 OTHER FUTURE EXPENDITURE:**

Average expenditure basis APO projected for 2023-24.

**Table 18.3: Estimated expenditure**

<b>Item</b>	<b>Qty</b>	<b>Rate(inRs)</b>	<b>Estimated expenditure projected for 2023-24</b>
<b>JFMC/ Ecotourism</b>			
Raising Plantations/Regeneration	5 Hac	43900	219500
Maint. of plantation	13 hac	Ls	36160
lantana Eradication			
JFMC Training	0	0	0
Promotion of ecotourism	1	7000000	7000000
<b>Plantation and regeneration</b>			
Plantations and regeneration			
Maint. of plantation	535	Ls	2125300
Cost for maintenance of Nurseries	2	Ls	2070832
<b>Forest Protection Working Circle</b>			
Cost for implementing the protection plan			
Road and Bridges			
Intensive protection measures including patrolling, staff mobilizing etc.	4	50000	200000
Maint of Boundary Pillars (Large)			
Soil & Water Conservation & Other Engineering measures	Ls	Ls	4000000
<b>Wildlife &amp; Biodiversity Conservation WC</b>			
Establishment of anti-wildlife depredation unit & patrolling vehicle	1		300000
Elephant proof trenches			
Safe Elephant corridors 4 Nos.			
Sterlization of Monkeys	200	700	140000
160 Nos. wildlife awarness camps			
Construction of Camps, Watch Tower			
Construction & Maint. of Road	5	200000	1000000
Eco Tourism Activities	1	7000000	7000000
Scientific Studies, Monitring			
Training of Staff incluing exposure visit			1000000

**Table 18.4: Salary Expenditure:**

Rank	Scale	Average Pay	DA 34%	C.A	No.	Total Amount
DFO	67700-208700	74000	23698	200	1	99360
ACF	56100-165000	56100	19074	200	1	75374
Supdt Gr-II	48200-152400	51400	17476	200	1	69076
FRO	38500-122700	67800	23052	200	5	91852
Sr. Astt.	43000-136000	48900	16626	200	3	66126
Jr. Astt.	28900-91600	36400	12376	200	6	49976
Dy. Ranger	38100-120400	48200	16388	200	22	68988
Fgd	21300-67700	37400	12716	200	91	68316
Peon	18400-58500	26000	8840	200	10	36840
FW	18400-58500	31400	10676	200	75	57076
Chowkidar	18400-58500	26000	8840	200	15	37840
Mali	18400-58500	26000	8840	200	5	35840
Dak Runner	18000-56900	19700	6698	200	2	26798
Multi-cum-W	18000-56900	19700	6698	200	2	26798
Sweeper	18000-56900	42200	14348	200	0	56548
Driver	21300-67700	21300	7242	200	0	28542
Kanungo	43000-136000	43000	14620	200	1	57820

**18.4 Traveling Allowance:**

The expenditure is worked out on the basis of daily allowance and number of days an officer/official is expected to tour to discharge his duties. This is tabulated as under: -

**Table 18.5: Travelling Allowances**

Official	Average Pay	Rate of Daily Allowance	No. of day in year	No. of Posts (Sanctioned)	Amount Required Annual Rs.
DFO	69700	200	180	1	36000
ACF	56100	200	120	1	24000
Supdt Gr-II	51400	160	60	1	9600
FRO	67800	160	100	5	16000
Sr. Astt.	48900	160	60	3	9600
Jr. Astt.	36400	140	60	6	8400
Dy. Ranger	48200	160	100	22	16000
Fgd	37400	140	30	91	4200
Peon	26000	130	80	10	10400
FW	31400	130	20	75	2600
Chowkidar	26000	130	20	15	2600
Mali	26000	130	10	5	1300

Dak Runner	19700	130	100	2	13000
Multi-cum-W	19700	130	80	2	10400
Sweeper	42200	130	10	0	1300
Driver	21300	130	300	0	39000
Kanungo	43000	160	200	1	32000
			<b>Total</b>	<b>240</b>	<b>236400</b>

### 18.5 MEDICAL, SALARY AND LIVERIES:

The expenditure on medical, uniform and liveries can best be worked out on the basis of last three years experiences as tabulated below: -

**Table 18.6: Medical, Salary and Liveries:**

Item				Total (Rs.)	Average (Rs.)
	2020-21	2021-22	2022-23		
Salary	84100685	87562732	104777337	276440754	92146918
Medical	560000	639680	694100	1893780	631260
Livery	0	0	200000	200000	66667

### 18.6 COST OF THE PREPARATION OF THE WORKING PLAN:

The actual expenditure incurred on the preparation of this Working Plan during 2020-21 to 2022-2023 is given in table 18.7

**Table 18.7: Showing the cost of preparation of the working plan**

Details	Expenditure incurred during financial year in Rs.			
	2021-22	2022-23	2023-24	Total
Other expenditure (Field data collection from sample points, plantation survey, boundary survey, socioeconomic survey, encroachment survey for the forest areas of 2000 ha and travel cost of forest staff)	400000	200000	300000	90000
<b>ONGOING:</b> Miscellaneous expenses for printing, stationary, binding, pending liability of vehicle used for final ground-truthing in silviculture areas for Working Plan			300000	
<b>Total</b>				

### 18.7 POSSIBLE FUNDING AGENCIES:

Normally the forestry activities are funded through various schemes under District, State & Central sector. In the state, the district & state sector schemes include:

**Table 18.8: Showing the funding sources**

Sr. No.	Funding Agency	Schemes involved	Nature of works
1.	Ministry of Forest & Environment, Government of India	Campa (NPV, CA) Schemes	Miscellaneous (Plantation, Soil Conservation work, Wild life conservation, Raising of nursery, Lantana Eradication, infrastructure work in Forest area, development of degraded forest area, Biodiversity etc.)
2	Ministry of Forest & Environment, Government of India	CSS Scheme	a) Forest Fire Control and Management Scheme. b) Human conflict with elephant project.
3	Government of Himachal Pradesh	Samudayik Van Samvardhan Yojana	Community based forestry works (Plantation, Soil Conservation work, lantana eradication etc.) in forest area.
4	Government of Himachal Pradesh	Ek Buta Beti ke name Scheme	Distribution of 5 plants with Kit to each newly born girl-child
5	Forest Department, Himachal Pradesh.	Forestry developmental work	Buildings, Roads, Silvicultural operations, marking, etc.
6.	HP Tourism Department	Nayi Rahen Nayi Manzilen	Beutification of Mantra Mata Temple Track
7.	HP Pollution Control Board	National Clean Air Programme	Vertical Garden at Kala-Amb forest check post.

### 18.8 PRIORITIZATION OF WORKS:

All the works prescribed in this plan are important for effective forest management. Hence, funds should be made available to carry out all the prescriptions prescribed for the sustainable management of the forest. However, scarcity of financial allocation is often felt while working plan prescriptions are followed in the division. Therefore, priority of works has been fixed to guide DFO while preparing annual budget & sending his demand. It is also suggested that DFO should carry out top priority works with the available budget:

**Table 18.9: Table showing the priority of works**

<b>Priority</b>	<b>Nature of works to be carried out</b>
I	Silviculture operations
II	Forest Protection i.e. protection from forest fire, encroachment, illicit felling, etc.
III	Wildlife conflict management and under Project Elephant
IV	Plantation and regeneration
V	Soil & Water Conservation works
VI	Construction and Maintenance of buildings & other infrastructure (Nursery etc.) in the Division
VII	Strengthening the knowledge of field staff by imparting training & exposure visits
VIII	Community based schemes, Samudayik Van Samvardhan Yojana etc.



## **CHAPTER 19**

### **MISCELLANEOUS REGULATIONS**

#### **19.1 PETTY FELLING:**

The following kind of trees may be marked for petty felling:

- (i) Trees required for scientific investigations at the Research Circle, The FRI, Dehradun.
- (ii) Trees required to be felled for establishing new nurseries, extension or alteration of nurseries.
- (iii) Trees required for establishing new fire-lines.
- (iv) Trees required to be felled that are dangerous to human life and property.

The petty fellings will be shown in the Control forms if the trees which count towards yield are felled. The trees which do not count towards yield will not appear in the control forms and their felling shall be regulated by the Conservator of Forests, Nahan Circle.

#### **19.2 RIGHTS AND CONCESSIONS:**

##### **(a) Right with permission**

- 1. Timber trees for building.
- 2. Trees for agricultural implements.
- 3. Fuel (Dry or Green) for marriage or death ceremonies.
- 4. Wood for charcoal.
- 5. Grass on payment of fixed charges.
- 6. Green leaves for fodder on payment of fixed charges.
- 7. Thorny shrubs for fencing.

##### **(b) Rights for the exercise of which no permission is necessary**

- 1. Dry wood for daily domestic use collected by hand.
- 2. Fuel for burning the dead.
- 3. Grass and leaves for fodder removed from outside the ghasnis.
- 4. Dry fallen leaves, chil needless and green basuti for compost.
- 5. Leaves for tanning.
- 6. Earth for making pots and plastering the houses.
- 7. Honey collection.

#### **19.3 RESEARCH PLOTS:**

At present there is no research plot in this division.

#### **19.4 CONSTRUCTION OF ROADS/LINK ROADS:**

**Road:-**The construction of large number of roads has already been under taken by P.W.D. department in the tract dealt within under FCA and FRA.

**Path:-**

Number of bridle and inspection paths covering all important forests has been constructed in the past. The existing roads and paths are detailed in Appendix-X (A). These should be kept well maintained. The inspection path should be constructed as far as possible along contours in such a way that whole of the forest is covered.

**Buildings:-**

Buildings have been constructed in the past. The existing buildings are detailed in Appendix- X.

## CHAPTER 20

### TREES OUTSIDE FOREST (TOF)

#### 20.1 INTRODUCTION:

Trees outside of forests refer to individual or groups of trees found in non-forest areas such as urban environments, agricultural lands, parks, gardens, or along roadsides. These trees play a significant role in improving the aesthetic appeal of the surroundings, providing shade, and offering various environmental benefits. Here are some common examples of trees found outside forests:

- **Street Trees:** Trees planted along streets and sidewalks in urban areas to enhance the beauty of the cityscape, reduce noise pollution, absorb carbon dioxide, and provide shade.
- **Park Trees:** Trees planted in public parks and recreational areas to create green spaces, offer shade for park visitors, and promote biodiversity.
- **Orchard Trees:** Trees cultivated in agricultural settings, such as apple orchards, citrus groves, or vineyards, for the production of fruits.
- **Garden Trees:** Trees planted in private or public gardens for landscaping purposes, adding beauty to the surroundings, and providing a habitat for birds and insects.
- **Shelterbelt Trees:** Rows or groups of trees planted to serve as windbreaks and protect farmland or residential areas from strong winds.
- **Avenue Trees:** Trees planted along roadsides or avenues, often forming a canopy over the road, providing shade, and improving air quality.
- **Trees in Residential Areas:** Trees found in residential neighborhood, contributing to the overall ambiance, providing shade, and attracting wildlife.

#### 20.2 IMPORTANCE OF TREES OUTSIDE FOREST (TOF):

Trees outside the conventional forest boundaries play a vital role in the ecosystem. They are found in village common lands, along roadsides, in agricultural fields, and even on private properties. These trees provide a myriad of ecological, economic, and social benefits to the local communities and the environment.

#### 20.3 ECOLOGICAL SIGNIFICANCE:

TOF species contribute to soil conservation, preventing erosion in hilly terrains like those in Nahan Forest Division. Their roots hold the soil together, preventing landslides during heavy

rainfall. Additionally, TOF species aid in maintaining water quality by acting as natural filters, reducing sedimentation and pollutants from entering water bodies.

#### **20.4 SOCIO-ECONOMIC BENEFITS:**

The local communities in Nahan Forest Division rely on TOF species for various resources. Fodder from these trees serves as a critical source of nutrition for livestock. Moreover, fruits, nuts, and leaves collected from TOF species often supplement the diets of villagers. Additionally, non-timber forest products like resins, gums, and medicinal plants found in TOF contribute to the local economy.

#### **20.5 CHALLENGES IN TOF MANAGEMENT:**

Despite their ecological and socio-economic significance, managing TOF comes with its own set of challenges. Encroachment on common lands and roadside trees for urban expansion poses a threat to these resources. Lack of awareness among local communities about sustainable harvesting practices can lead to overexploitation of TOF species. Balancing the extraction of resources with the conservation of these trees is a complex task.

#### **20.6 SUSTAINABLE MANAGEMENT STRATEGIES:**

Following strategies can be implemented to address the challenges associated with TOF management:->

**20.6.1 Community Engagement and Awareness:** Creating awareness among local communities about the value of TOF resources is essential. Workshops, seminars, and educational campaigns are conducted to highlight the ecological, economic, and social benefits of TOF species. Engaging communities in the decision-making process fosters a sense of ownership and responsibility towards TOF management.

**20.6.2 Sustainable Harvesting Practices:** Promoting sustainable harvesting practices is crucial to prevent overexploitation. Implementing guidelines for the collection of non-timber forest products ensures that the ecological balance is maintained. Local communities are educated about selective harvesting methods that allow the trees to regenerate naturally.

**20.6.3 Legal and Policy Frameworks:** The forest department collaborates with local authorities to enforce legal protection for TOF species. Policies are formulated to regulate the use of TOF resources, preventing illegal felling and ensuring that only permitted activities are carried out.

**20.6.4 Agroforestry and Reforestation:** Promoting agroforestry practices encourages the integration of trees into agricultural landscapes. This not only enhances soil fertility but also provides an alternative income source for farmers. Additionally, reforestation initiatives are undertaken to restore degraded TOF areas and improve biodiversity.

## **20.7 CONCLUSION:**

Trees outside forest areas are a valuable asset that contributes to the well-being of both nature and communities. Through community engagement, sustainable practices, and policy support, TOF resources can be conserved and harnessed for the benefit of present and future generations.

## CHAPTER 21

### MONITORING, ASSESSMENT AND REPORTING

#### 21.1 CONTROL FORMS:

The Control forms provide for performance parameters /targets /annotations /norms for all prescriptions /suggestions for every working circle to be monitored, assessed and reported on annual basis during the period of the working plan. Control forms should be prepared to include each of these prescriptions. The following control forms will be used for monitoring all the important operations prescribed and suggested in this working plan:

##### 21.1.1 FELLING CONTROL FORM:

For controlling and maintaining the record of all trees marked for felling and trees retained.

Working circle- periodic block		Felling series- cutting section		Localities prescribed localities suggested (with areas)				Coupe control form	
								Coupe No.	Page
Range wise	Area	Species	Diameter class	Trees marked	Unit factor	Volume marked	Trees retained	% Trees retained	Remarks
1	2	3	4	5	6	7	8	9	10

##### 21.1.2 SILVICULTURAL CONTROL FORM:

For the control of all silvicultural operations such as fellings, subsidiary cultural operations, cleanings, thinnings, burnings, etc., which may be prescribed or suggested to be carried out in a given management unit for the duration of the working plan.

Working circle- periodic block-		Felling- series cutting section	Localities prescribed localities suggested				Coupe control form		
							Coupe No.		Page
			As carried out				Excess(+) or deficit (-)		
Prescription in brief	W.P. para	Year due	Year	Block/ Compt.	Area	Volum e	Area	Volume	Remarks and Sanction
1	2	3	4	5	6	7	8	9	10

#### 21.2 DEVIATION STATEMENT:

Any large and unusual operation, variation from yield and target for plantation/regeneration and or other activities provided in control forms of the working plan constitutes a deviation. These also should be spelt out. The check is through control forms and reporting is through deviation

statements. Deviation beyond 20% of target is considered to constitute a major deviation. Following is the format of Deviation Statement.

### **Statement showing deviations from working plan prescriptions**

Year.....

Division.....

Serial 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. All minor deviations, which do not permanently alter the basis of management, may be approved and sanctioned by the Head, Working Plan Organization on behalf of the PCCF (HoFF) provided he agrees with the necessity of these deviations. One copy of the statement will be returned to the DFO territorial through the Head, territorial circle after the deviations have been sanctioned by the Head, Working Plan Organisation and the other copy will be sent to 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.

For all major deviations with respect to prescriptions where sanction of the MoEF is mandatory, an explanatory note along with request for regularization has to be sent by PCCF (HoFF) to RAPCCF (MoEF). In case where there is difference of opinion between the PCCF (HoFF) and RAPCCF (MoEF), the former will refer the matter to DGF&SS (MoEF), whose decision shall be final. The PCCF (HoFF) will countersign the deviation statement for reporting to the MoEF.

### **21.3 REGISTERS AND RECORDS INCLUDING SPATIAL DATA:**

The following updated (till last financial year) registers and records will be maintained by the division:

1. Compartment history file
2. Divisional notebook
3. Fire records and registers
4. Register of boundary pillars
5. Plantation journals (along with list of plantation raised area and location last five years)
6. Nursery register (location, permanent nursery)
7. Register of rights and concessions

8. Record of forest produces harvested
9. Free grants
10. Register of land transferred to other departments or under FC act and FRA
11. Register of soil and water conservation works (along with list of plantation raised, area and location last five years)
12. Register of invasive species eradication e.g., Lantana eradication, etc.
13. Register of wildlife management may include detailed record of human-wildlife conflicts that includes data on human casualties and injuries, loss of domestic animals and crop damage and compensation paid etc.
14. Register of government buildings that includes log of the repairs and addition (if any) undertaken in the buildings.
15. Register of licensed gun holder(s) in the division.
16. Register of places of religious significance that has been historically been given recognition (However, mention must be made of the fact that mere mention in the register does not automatically give legal sanctity to the structure).
17. Register of registered saw-mills in the division.
18. The divisional note book must have record of water table and springsheds at various places in the division.

#### **21.4 ANNUAL INSPECTION:**

Annual inspection of DFO territorial office by CF/CCF and Range office by DFO territorial is mandatory within three months of completion of financial year to have checks on annual statements in control forms and deviation statements and maintenance of registers and records.



## CHAPTER 22

### SUMMARY OF PRESCRIPTIONS AND SUGGESTIONS

#### 22.1 IMPORTANT PRESCRIPTIONS:-

The important prescriptions and suggestions of the working plan are as under:-

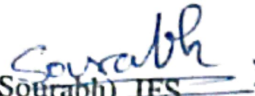
**Table 22.1: The important prescriptions and suggestions of the working plan**


Sr. No.	Heading	Prescription/suggestion	Para	Page
<b>Sal Working Circle</b>				
1.	Felling Series	Only one Felling series has been constituted.	2.7.4	151
2.	Silvicultural System	Shelter wood System or Indian irregular Shelter wood System with floating PBs has been adopted.	2.5	143
3.	Rotation period	120 years	2.6	144
4.	Harvestable Dia.	As CEC Guidelines the exploitable dia is fixed at 40 cm DBH	2.6.1	144
5.	Division into Periodic Block	PB1 and PB floating	2.6.2	144
6.	Prescribed Yield	5980 m <sup>3</sup>	2.7.2	150
<b>Chil Conversion Working Circle</b>				
1.	Area Statement	2926.45 ha	3.3	154
2.	Conversion Series	Only one Conversion series has been constituted	3.4	155
3.	Silvicultural System	Selection cum gap planting with exploitable dia 55 cm	3.7	156
4.	Calculation Of Yield	8066 m <sup>3</sup>	3.9	160
5.	Process for Chil Conversion	Guidelines	3.11	165
<b>Khair Composite Working Circle</b>				
1.	Area Statement	Estt. Plantation: 344.57 ha Natural occurring Khair (Coppice) : 9479.64 Ha	-	
2.	Blocks & Compartments	Range wise breakup listed	4.4 & 4.17	169 & 175

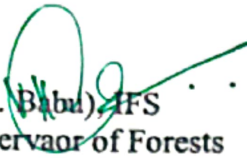
3.	Silvicultural System	Coppice with standards system	4.6 &	171
4.	Regeneration	Natural regeneration supplemented by plantation of native spp.	4.7	171
5.	Choice Of Species	Khair (50%) and other BL mixed native & medicinal species (50%).	4.8 & 4.22	171 & 182
6.	Harvestable Dia	25 cm	4.9 & 4.23	171 & 182
7.	Rotation	30 years for coppice and 40 years for standards	4.10 & 4.24	171 & 183
8.	Felling Series	Two Felling Series has been constituted :	-	
		(i). Plantation Felling Series	4.11	171
		(ii). Coppice felling Series	4.19	182
9.	Calculation of Yield	Estt. Plantation : 293 m <sup>3</sup>	4.11.2	172
		Natural Khair (Coppice) : 1007 m <sup>3</sup>	4.25	184
Eucalyptus Management Plan				
1.	Special Objectives Of Management	i). Replacement of Eucalyptus spp. By native spp. In scientific way. ii). To meet the local requirement of small timber and fuelwood etc. iii). To fulfill the demand of CA areas required for FCA areas. iv). To increase the natural regeneration of Sal, Sain, Shisham and other natural occurring species found along with Eucalyptus planted areas.	5.2	191
2.	Management In Current Working Plan	Prescriptions to replace Eucalyptus (clear felling) with native indigenous spp.	5.5	193

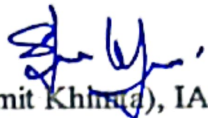
<b>Bamboo Working Circle</b>				
1.	Special Objectives Of Management	Rehabilitation of Bamboo forest, Propagate & extend Bamboo crop and to obtain progressive yield for industrial uses	6.2	196
2.	Area Statement	542.34 ha	6.3	196
3.	Silvicultural System & Choice Of Species	Selection -cum- improvement felling silvicultural system	6.5	198
4.	Felling Cycle	3 years	6.6	198
5.	Felling Rules	Guidelines	6.9	199
6.	Subsidiary Silvicultural Operations	Guidelines	6.10	200
7.	Important Regulations	Artificial regeneration, Grazing and lopping, Fire protection, Provision in case of gregarious flowering/ fire damage, Lantana cutting, Requirement of right holders,	6.11	200
<b>Protection cum-Rehabilitation working circle</b>				
1.	Area Statement	14763.36 ha	7.4	202
2.	Silvicultural System	No commercial felling are prescribed	7.6	208
3.	Salvage Removals	Dry and fallen trees only	7.7	208
4.	Yield, Exploitable Dia. Rotation/ Regeneration Period	No yield, exploitable dia, rotation or regeneration period is prescribed here	7.8	208
5.	Others Regulations	Closure, Grazing & Lopping, Fire, Right Holders requirements, Soil conservation	7.10	209

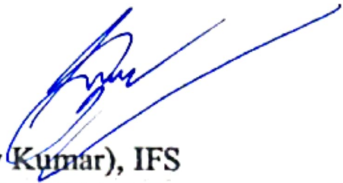
## NAHAN FOREST DIVISION WORKING PLAN

  
(Sourabh), IFS  
Working Plan Officer  
Nahan

  
(Pradhep Thakur), IFS  
Additional Principal  
Chief Conservator of Forest (WP&S) 23.3.24

  
(V.K. Babu), IFS  
Conservator of Forests  
Nahan Circle, Nahan

  
(Sumit Khanna), IAS  
Deputy Commissioner,  
District Sirmour H.P.

  
(Rajiv Kumar), IFS  
Principal Chief Conservator of Forests (HoFF)  
Himachal Pradesh  
Shimla  
Principal Chief Conservator of Forests (HoFF)  
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