

HIMACHAL PRADESH FOREST DEPARTMENT



WORKING PLAN FOR THE NURPUR FOREST DIVISION

Part 1
(2025-26 TO 2034-35)

SUBMITTED BY
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ABBREVIATION	
AR	Artificial Regeneration
ANR	Aided Natural Regeneration
APO	Annual Plan Operation
BWC	Bamboo Working Circle
CAMPA	Compensatory Afforestation Management & Planning Authority
CFS	Co-operative Forest Societies
CFS	Co-operative Forest Felling Series
CSWC	Chil shelter wood Working Circle
CWC	Copies Working Circle
DPF	Demarcated Protected Forest
DBH	Diameter at Breast Height
EC	Environment Clearance
EAP	Externally Aided Project
FC	Forest Clearance
FCA	Forest Conservation Act
FRA	Forest Right Act
FSI	Forest Survey of India
GPS	Global Positioning System
GIS	Geographic information System
HPFEM & LIP	Himachal Pradesh Forest Eco- system Management & Livelihood Improvement Project
HPFECF	Himachal Pradesh Forest Eco- system and Climate Proofing Project
HPFD	Himachal Pradesh Forest Department
IGA	Income Generating Activity
IVI	Importance Value Index
JEM	Joint Forest Management
JICA	Japan International Cooperation Agency
KWC	Khair Working Circle (over lapping)
KFW	Kreditanstalt Fur Wiederaufbau
LFS	Legal Felling Series
MoEF	Ministry of Environment and Forest
MoU	Memorandum of Understanding
NPV	Net Present Value
NTFP	Non Timber Forest Produce
PB	Periodic Block
RF	Reserve Forest
SHG	Self Help Group
SWC	Soil Water Conservation
UPF	Undermarketed Forest
VFS	Voluntary Felling Series
VFMS	Village Forest Management Society
VFDS	Village Forest Development Society
WP	Working Plan
WPO	Working Plan Officer
WPU	Working Plan Unit

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INTRODUCTION

This working plan is revision of Sh. J. C. Katoch plan of Nurpur Forest Division covering the period of 2012-13 to 2021-22 and includes all the areas under the plan. This working plan covers an area of 53177.81 ha out of total 1,25,723 ha (1257.23 Kmx2) of geographical area. This plan deals with RFs, DPFs & UPFs & CFS forests of Nurpur Forest Division.

Range wise breakup of the forest area (in hac.) under previous working plan is as under: -

Range	RF		DPF		UPF		UC		CFS		Total No.	Area (ha)
	No	Ha	No	Ha	No	Ha	No	Ha	No	Ha		
Nurpur	8	1826.03	19	1593.47	17	5836.91	9	3029.19	6	1892.76	59	14178.36
Kotla	6	1016.00	7	562.80	9	3115.50	5	3830.45	-	-	27	8524.75
Jawali	2	242.77	9	1799.37	12	3624.67	5	1082.48	3	683.78	31	7433.07
Rey	2	588.70	2	103.99	14	5670.88	6	2064.79	5	1485.73	29	9914.09
Indora	1	210.43	12	1198.08	37	7759.27	2	261.02	10	3698.74	62	13127.54
Total (ha.)	19	3883.93	49	5257.71	89	26007.23	27	10267.93	24	7761.01	208	53177.81

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The emphasis in the present working plan is on conservation and many changes have been made in this plan based on the present crop constitution, silvicultural requirements of the crop, guidelines of the national working plan code 2014 and lessons learnt from the past management. Accordingly, chapters on the activities of Wildlife management, Eco-Tourism, JFM have been included. Eucalyptus working circle has been included as separate working circle with the prescription to replace existing Eucalyptus forest with native species in this working plan period.

Since the PB-I areas are heavily infested with lantana, the detailed lantana eradication programme have been proposed under plantation (overlapping) working circle. Keeping in view the guidelines of National working plan code 2014, new mandatory working circles namely NTFP (overlapping) working circle, Joint forest management (overlapping) working circle, Forest protection (overlapping) working circle & Wildlife management (overlapping) working circle have been added along with the earlier working circles namely chil working circle, Bamboo working circle, Coppice working circle, Khair (overlapping) working circle & plantation (overlapping) working circle. Since, the people of the area are

suffering from monkey menace, the control measures such as sterilization including plantation programme consisting of fruits trees for wildlife have been prescribed.

The management of the forests during intervening period i.e. 2012-13 to 2021-22 between the completion of period of earlier working plan & the proposed draft working plan was done as per three year felling programme for bamboo & regular salvage removal for chil, khair & other broad leaved species. The blank patches of forest were planted with fruit bearing species& other economical species as per the site-specific requirement as per the available budgetary provisions and approved Annual Plan of Operations.

The revised working plan has been prepared for a period of ten years, commencing from 2025-26 to 2034-35. The working plan officer and his staff deserve all appreciation for completing the revision of the plan in time bound manner despite their engagement in discharging duties of territorial wing.

LIST OF FLORA OCCURING IN NURPUR FOREST DIVISION

S. No.	Family/ Botanical Name	Habit	Local Name
Acanthaceae			
1	<i>Barleria noctiflora</i> (= <i>Barleria cristata</i>)	Shrub	-
2	<i>Eranthemum pulchellum</i>	Tree	-
3	<i>Justicia adhatoda</i> (= <i>Adhatoda vasica</i>)	Shrub	Basuti
4	<i>Lepidagathis cuspidate</i>	Shrub	-
5	<i>Phlogacanthus thyrsoformis</i>	Shrub	-
6	<i>Strobilanthes auriculata</i>	Shrub	Kapur mingar
Actinidiaceae			
7	<i>Saurauia napaulensis</i>	Tree	Bhakara
Amaranthaceae			
8	<i>Deeringia amaranthoides</i> (= <i>D. celosioides</i>)	Climber	Bhirang
Anacardiceae			
9	<i>Cotinus coggygria</i> (= <i>Rhus continus</i>)	Small Tree	Tung
10	<i>Lannea coromandelica</i>	Tree	Kehmal
11	<i>Mangifera indica</i>	Tree	Am
12	<i>Pistacia chinensis subsp. integerrima</i>	Tree	Kakrain
13	<i>Spondias pinnata</i>	Tree	Ambara
Apocynaceae			
14	<i>Carissa spinarum</i> (= <i>C. opaca</i>)	Shrub	Garna
15	<i>Holarrhena pubescens</i> (= <i>H. antidysenterica</i>)	Small Tree	Keor
16	<i>Ichnocarpus frutescens</i>	Climber	Bakkar Bel
17	<i>Nerium oleander</i> (= <i>N. odorum</i>)	Shrub	Ghanira
18	<i>Tabernaemontana divaricata</i>	Shrub	Tagar
19	<i>Trachelospermum lucidum</i> (= <i>T. fragrans</i>)	Climber	Barora, Dudhi
20	<i>Vallaris solanacea</i>	Climber	Dudh Khal
21	<i>Wrightia arborea</i> (= <i>W. tomentosa</i>)	Tree	Khalwa
Apocynaceae (Asclepiadaceae)			
22	<i>Calotropis procera</i>	Shrub	Akh
23	<i>Cryptolepis buchananii</i>	Climber	Jaman Khumb
24	<i>Dregea volubilis</i>	Climber	Murud bel
25	<i>Periploca calophylla</i>	Climber	Spari
Arecaceae			
26	<i>Phoenix loureiroi</i> (= <i>P. humilis</i>)	Small Tree	Khajur
27	<i>Phoenix syvestris</i>	Small Tree	Khajur
Asparagaceae			
28	<i>Agave americana</i> ²	Shrub	-
29	<i>Agave wightii</i> ²	Shrub	-

30	<i>Asparagus adscendens</i>	Shrub	-
Bignoniaceae			
31	<i>Jacaranda mimosifolia</i> ²	Tree	Jacranda
32	<i>Oroxylum indicum</i>	Tree	Tat Palanga
33	<i>Stereospermum chelonoides</i> (=S. <i>suaveolens</i>)	Tree	Padal
Boraginaceae			
34	<i>Cordia dichotoma</i>	Tree	Lasura
35	<i>Cordia macleodii</i>	Tree	Kluhman
36	<i>Cordia myxa</i>	Tree	Lasura
37	<i>Cordia vestita</i>	Tree	Lasuri
38	<i>Ehretia acuminata</i>	Tree	Puna
39	<i>Ehretia aspera</i> (= <i>E. laevis</i>)	Tree	Chamrod
Cannabaceae			
40	<i>Celtis tetrandra</i>	Tree	Khirk
41	<i>Trema politoria</i>	Shrub	Kasa Kuri, Jeevani
Capparidaceae			
42	<i>Capparis sepiaria</i>	Shrub	Hiun Garna
43	<i>Crateva adansonii</i>	Small Tree	Barna
Celastraceae			
44	<i>Celastrus paniculatus</i>	Climber	Sandhren
45	<i>Elaeodendron glaucum</i> (=Cassine <i>glaucum</i>)	Tree	Morindu, Mirgu
46	<i>Gymnosporia royleana</i>	Shrub	Bhadrun
Combretaceae			
47	<i>Terminalia anogeissiana</i> (=Anogeissus <i>latifolia</i>)	Tree	Dhao
48	<i>Terminalia bellirica</i>	Tree	Bahera
49	<i>Terminalia chebula</i>	Tree	Harar
50	<i>Terminalia elliptica</i> (=T. <i>tomentosa</i>)	Tree	Aisan
Convolvulaceae			
	<i>Poranopsis paniculata</i> (=Porana <i>paniculata</i>)	Climber	Faindal Jhol
Coriariaceae			
	<i>Coriaria nepalensis</i>	Shrub	Nachhar
Ebenaceae			
	<i>Diospyros cordifolia</i>	Tree	Kendu
	<i>Diospyros montana</i>	Tree	Kaldoh
	<i>Diospyros exsculpta</i> (=D. <i>tomentosa</i>)	Tree	Kinu
Euphorbiaceae			
	<i>Euphorbia royleana</i>	Shrub	Thor
	<i>Jatropha curcas</i> ²	Shrub	Japota
	<i>Leptopus cordifolius</i> (=Arachne <i>cordifolia</i>)	Shrub	-
	<i>Mallotus philippensis</i>	Tree	Kamal
Fagaceae			

	<i>Quercus glauca</i>	Tree	Banni
	<i>Quercus leucotrichophora</i> (=Q. incana)	Tree	Ban
Juglandaceae			
	<i>Engelhardia spicata</i>	Tree	Samma
	<i>Juglans regia</i>	Tree	Khor
Lamiaceae			
	<i>Clerodendrum phlomidis</i>	Small Tree	Dhakkari
	<i>Colebrookea oppositifolia</i>	Shrub	Dusen, Dussa
	<i>Duranta erecta</i> ²	Shrub	-
	<i>Gmelina arborea</i>	Tree	Ban
	<i>Holmskioldia sanguinea</i>	Shrub	-
	<i>Isodon rugosus</i> (=Plectranthus rugosus)	Shrub	-
	<i>Lantana camara</i> ^{2&3}	Shrub	-
	<i>Pogostemon benghalensis</i>	Shrub	Kali Basuti
	<i>Premna barbata</i>	Small Tree	Ginani
	<i>Premna mollissima</i> (=P. mucronata)	Small Tree	Gin, Bhankar
	<i>Pseudocaryopteris bicolor</i>	Shrub	Ban Basuti
	<i>Roylea cinerea</i> (=R. calycina)	Shrub	Karhkarhe
	<i>Salvia officianalis</i> ²	Herb	-
	<i>Vitex negundo</i>	Shrub	Bana
Lauraceae			
	<i>Litsea monopetala</i> (=L. polyantha)	Tree	Ghian
	<i>Neolitsea pallens</i>	Tree	Chirindi
Lecythidaceae			
	<i>Careya arborea</i>	Tree	Handbahera
Leguminosae (Caesalpiniaceae)			
	<i>Bauhinia purpurea</i>	Tree	Karal
	<i>Bauhinia racemosa</i>	Small Tree	Karali
	<i>Bauhinia variegata</i>	Tree	Kachnar
	<i>Biancaea decapetala</i> (=Caesalpinia sepiaria)	Climbing Shrub	Relan
	<i>Cassia fistula</i>	Tree	Kaniar
	<i>Phanera vahlii</i> (=Bauhinia vahlii)	Liana	Taur
	<i>Piliostigma malabaricum</i> (Bauhinia malabarica)	Tree	Karal
	<i>Senna obtusifolia</i> (=Cassia obtusifolia) ²	Shrub	-
	<i>Senna occidentalis</i> (=Cassia occidentalis) ²	Shrub	-
	<i>Senna tora</i> (=Cassia tora)	Shrub	-
Leguminosae (Fabaceae)			
	<i>Abrus precatorius</i>	Climber	Rattak
	<i>Codariocalyx motorius</i> (=Desmodium gyrans)	Shrub	
	<i>Dalbergia sissoo</i>	Tree	Tahli
	<i>Delonix regia</i> ²	Tree	Gulmohar

	<i>Erythrina abyssinica</i> (= <i>Erythrina suberosa</i>)	Tree	Grelu, Parjaru
	<i>Flemingia semialata</i>	Shrub	Ban Chola
	<i>Indigofera cassioides</i> (= <i>I. pulchella</i>)	Shrub	Kathi
	<i>Indigofera heterantha</i> (= <i>I. gerardiana</i>)	Shrub	Kathi
	<i>Leucaena leucocephala</i> ^{2&3}	Tree	Lasoonia
	<i>Millettia extensa</i> (= <i>M. auriculata</i>)	Liana	Solangen
	<i>Ougeinia oojeinensis</i> (= <i>O. dalbergioides</i>)	Tree	Sannan
	<i>Pleurolobus gangeticus</i> (= <i>Desmodium latifolium</i>)	Shrub	Jajra
	<i>Pueraria tuberosa</i>	Climber	Salorh
	<i>Tateishia concinna</i> (= <i>Desmodium concinnum</i>)	Shrub	-
Leguminosae (Mimosaceae)			
	<i>Albizia chinensis</i> (= <i>Albizia stipulata</i>)	Tree	Ohi
	<i>Albizia lebbeck</i>	Tree	Shrin
	<i>Albizia odoratissima</i>	Tree	Karmaru
	<i>Albizia procera</i>	Tree	Safed Shrin
	<i>Mimosa rubicaulis</i>	Shrub	Dadrar
	<i>Parkinsonia aculeata</i>	Small Tree	-
	<i>Senegalia caesia</i> (= <i>Acacia caesia</i>)	Tree	Relan, Dhangar
	<i>Senegalia catechu</i> (= <i>Acacia catechu</i>)	Tree	Khair
	<i>Senegalia modesta</i> (= <i>Acacia modesta</i>)	Tree	Phulai
	<i>Vachellia farnesiana</i> (= <i>Acacia farnesiana</i>)	Tree	-
	<i>Vachellia leucophloea</i> (= <i>Acacia leucophloea</i>)	Tree	Reru, Karer
	<i>Vachellia nilotica</i> (= <i>Acacia nilotica</i>)	Tree	Kiker
Linaceae			
	<i>Reinwardtia indica</i> (= <i>R. trigyna</i>)	Shrub	Basant
Loranthaceae			
	<i>Dendrophthoe falcata</i>	Epiphyte	Parand
Lythraceae			
	<i>Lagerstroemia indica</i> ²	Tree	-
	<i>Lagerstroemia parviflora</i>	Tree	Kala dhaun
	<i>Punica granatum</i>	Tree	Daran
	<i>Woodfordia fruticosa</i>	Shrub	Dhawin
Malpighiaceae			
	<i>Aspidopterys wallichii</i>	Climber	Dhur Bel
	<i>Hiptage benghalensis</i>	Liana/Tree	Want
Malvaceae			
	<i>Bombax ceiba</i>	Tree	Simal
	<i>Kydia calycina</i>	Tree	Pula
Malvaceae (Sterculiaceae)			
	<i>Helicteres isora</i>	Shrub	Maror Phali, Chamar Daman

	<i>Pterospermum acerifolium</i> ²	Tree	Kanak Champa
	<i>Sterculia villosa</i>	Tree	Udal
Malvaceae (Tiliaceae)			
	<i>Grewia asiatica</i> (=G. hainesiana)	Tree	Dhaman
	<i>Grewia eriocarpa</i> (=G. elastica)	Small Tree	Phalsa, Pheru
	<i>Grewia optiva</i>	Tree	Dhaman Phali
	<i>Grewia serrulata</i>	Small Tree	Dhamriana
	<i>Grewia tenax</i> (=G. populifolia)	Small Tree	-
Meliaceae			
	<i>Azadirachta indica</i>	Tree	Nim
	<i>Melia azedarach</i> ²	Tree	Bakain, Drek
	<i>Toona ciliata</i> (=Cedrela toona)	Tree	Tun
Menispermaceae			
	<i>Cissampelos pareira</i>	Climber	Katorrhi
	<i>Pachygona laurifolia</i> (=Cocculus laurifolius)	Small Tree	Paror
Moraceae			
	<i>Artocarpus lacucha</i>	Tree	Dheu
	<i>Broussonetia papyrifera</i> ^{2&3}	Tree	Japani Tut
	<i>Ficus auriculata</i> (=F. roxburghii)	Tree	Trembal
	<i>Ficus benghalensis</i>	Tree	Barh
	<i>Ficus hederacea</i> (=F. scandens)	Climber	-
	<i>Ficus hispida</i>	Tree	Dagur, Dadurhi
	<i>Ficus palmata</i>	Tree	Dhoorha, Fagoorha
	<i>Ficus racemosa</i> (=F. glomerata)	Tree	Rumbal
	<i>Ficus religiosa</i>	Tree	Pipal
	<i>Ficus rumphii</i>	Tree	-
	<i>Ficus sarmentosa</i> (=F. foveolata)	Climber	Ruddar
	<i>Ficus semicordata</i> (=F. cunia)	Tree	Kandrol, Khaloa
	<i>Ficus subincisa</i> (=F. clavata)	Shrub	Kharandal
	<i>Ficus virens</i>	Tree	Palakh, Pakhar
	<i>Morus alba</i>	Tree	Tut
	<i>Morus indica</i>	Tree	Sia tut
	<i>Morus laevigata</i>	Tree	Shah tut
	<i>Morus serrata</i>	Tree	Karun
Moringaceae			
	<i>Moringa oleifera</i> (=M. pterygosperma)	Tree	Suhanjna
Myricaceae			
	<i>Myrica esculenta</i> (=M. nagi)	Tree	Kaphal
Myrtaceae			
	<i>Eucalyptus spp.</i> ²	Tree	Safeda
	<i>Syzygium cumini</i> (=Eugenia jambolana)	Tree	Jaman
Oleaceae			
	<i>Jasminum arborescens</i>	Shrub	Dhurmalti

	<i>Jasminum dispersum</i>	Shrub	Sarain
	<i>Jasminum grandiflorum</i>	Shrub	Malti
	<i>Jasminum multiflorum</i> (=J. pubescens)	Shrub	Banmalti
	<i>Ligustrum compactum</i>	Tree	Lalaun
	<i>Nytanthus arbor-tristis</i>	Tree	Harshingar
	<i>Olea europaea</i> var. <i>cuspidata</i>	Tree	Kao
Phyllanthaceae			
	<i>Antidesma acidum</i> (=A. diandrum)	Shrub	Amblu
	<i>Bischofia javanica</i>	Tree	Marak
	<i>Bridelia retusa</i>	Tree	Gadi Kuri
	<i>Bridelia verrucosa</i>	Tree	-
	<i>Flueggea virosa</i> (=F. macrocarpa)	Shrub	Girthan
	<i>Glochidion velutinum</i>	Tree	Saman
	<i>Phyllanthus emblica</i> (=Emblica officinalis)	Tree	Aonla
Pinaceae			
	<i>Pinus roxburghii</i>	Tree	Chil
Poaceae (Bambusaceae)			
	<i>Bambusa bambos</i> (=B. arundinacea)	Bamboo	Kanta Bans, Bontlu
	<i>Bambusa nutans</i>	Bamboo	Banj, Nal
	<i>Dendrocalamus somdevai</i>	Bamboo	Magar
	<i>Dendrocalamus strictus</i>	Bamboo	Bans
Primulaceae (Myrsinaceae)			
	<i>Ardisia solanacea</i>	Shrub	-
	<i>Embelia tsjerium-cottam</i> (=E. robusta)	Shrub	Baobring
	<i>Maesa indica</i>	Shrub	Burkain
	<i>Myrsine africana</i>	Shrub	Chhota mendru
Proteaceae			
	<i>Grevillea robusta</i> ²	Tree	Silver Oak
Putranjivaceae			
	<i>Putranjiva roxburghii</i> ²	Tree	Putajan
Ranunculaceae			
	<i>Clematis gouriana</i>	Climber	Jhol
	<i>Clematis grata</i>	Climber	Chibru Machrun
Rhamnaceae			
	<i>Helinus lanceolatus</i>	Climber	Murian
	<i>Rhamnus triquetra</i>	Small Tree	Galodan
	<i>Sageretia filiformis</i>	Scandent Shrub	-
	<i>Sageretia thea</i> (=Sageretia theezans)	Shrub	Phax
	<i>Ziziphus mauritiana</i>	Small Tree	Ber
	<i>Ziziphus nummularia</i>	Shrub	Ber
	<i>Ziziphus oenopolia</i>	Small Tree	Kokal Ber
Rosaceae			
	<i>Prinsepia utilis</i>	Shrub	Bhekal

	<i>Prunus cerasoides</i> (=P. <i>puddum</i>)	Tree	Paja
	<i>Prunus cornuta</i>	Tree	Jamu
	<i>Pyrus pashia</i>	Tree	Kainth
	<i>Rosa brunonii</i> (=R. <i>moschata</i>)	Scandent Shrub	Gulabrhi
	<i>Rubus ellipticus</i>	Shrub	Akha
	<i>Rubus paniculatus</i>	Shrub	Akha
Rubiaceae			
	<i>Catunaregum spinosa</i> (=Randia <i>dumetorum</i>)	Shrub	Rara
	<i>Himalrandia tetrasperma</i> (=Randia <i>tetrasperma</i>)	Shrub	Jindru
	<i>Hymenodictyon orixense</i> (=H. <i>excelsum</i>)	Shrub	Barthuan
	<i>Mitragyna parvifolia</i>	Tree	Kalam
	<i>Spermadictyon suaveolens</i> (=Hamiltonia <i>suaveolens</i>)	Shrub	Guilhain
	<i>Wendlandia heynei</i> (=W. <i>exserta</i>)	Tree	Pansara
	<i>Wendlandia puberula</i>	Tree	-
Rutaceae			
	<i>Aegle marmelos</i>	Tree	Bil
	<i>Bergera koenigii</i> (=Murraya <i>koenigii</i>)	Shrub	Gandla
	<i>Citrus medica</i>	Shrub	Galgol
	<i>Citrus limon</i>	Shrub	Sangtara
	<i>Murraya paniculata</i> (=M. <i>exotica</i>)	Shrub	Nargan
	<i>Naringi crenulata</i> (=Limonia <i>crenulata</i>)	Shrub	Barhahi, Bilan
	<i>Skimmia anquetilia</i>	Shrub	Kali, Nehra
	<i>Zanthoxylum armatum</i>	Shrub	Tirmar, Timar
Sabiaceae			
	<i>Meliosma simplicifolia</i> subsp. <i>pungens</i> (=M. <i>pungens</i>)	Tree	Larandu
Salicaceae			
	<i>Populus ciliate</i>	Tree	Pialash
	<i>Populus nigra</i>	Tree	-
	<i>Salix pyrina</i>	Tree	-
	<i>Salix tetrasperma</i>	Tree	Badah, Badhia
Salicaceae (Samydaceae)			
	<i>Casearia graveolens</i>	Tree	Chilla
	<i>Casearia tomentosa</i>	Tree	Chilla
Salicaceae (Flacourtiaceae)			
	<i>Flacourtia Indica</i>	Small Tree	Kangu, Kokoa
	<i>Xylosma longifolia</i>	Small Tree	Chirindi
Santalaceae			
	<i>Osyris lanceolata</i> (=O. <i>arborea</i>)	Shrub	Sanson
Sapindaceae			

	<i>Dodonaea viscosa</i>	Shrub	Mendru
	<i>Litchi chinensis</i> ²	Tree	Lichi
	<i>Sapindus mukorossi</i>	Tree	Retha
Sapotaceae			
	<i>Madhuca longifolia</i> (= <i>Bassia latifolia</i>)	Tree	Mawa
Scrophulariaceae (Loganiaceae)			
	<i>Buddleja asiatica</i>	Shrub	Dhurbana
	<i>Buddleja crispa</i>	Shrub	Durpa siaru
Smilacaceae			
	<i>Smilax aspera</i>	Climber	-
Solanaceae			
	<i>Datura stramonium</i> ²	Shrub	Datura
	<i>Solanum erianthum</i> (= <i>S. verbascifolium</i>)	Small Tree	Ulah
	<i>Solanum surattense</i>	Shrub	-
	<i>Withania somnifera</i>	Shrub	Asgandh
Ulmaceae			
	<i>Holoptelea integrifolia</i>	Tree	Rajain
Vitaceae			
	<i>Ampelocissus latifolia</i> (= <i>Vitis latifolia</i>)	Climber	Chamar Bel
	<i>Causonis trifolia</i> (= <i>Vitis trifolia</i>)	Climber	Gidar dakh
	<i>Leea asiatica</i>	Shrub	Basant Jari
	<i>Tetrastigma serrulatum</i>	Liana	-
	<i>Vitis heyneana</i> var. <i>heyneana</i> (= <i>V. lanata</i>)	Liana	-

Notes:

- 1 Family and Botanical Names follow Kew Garden's 'Plant of the World Online (POWO)', as accessed from 01 to 15 April 2025.
- 2 Non-Native/ Exotic
- 2&3 Exotic Weeds

Family	Name*	Habit	Local Name
Acanthaceae	<i>Barleria noctiflora</i> (= <i>Barleria cristata</i>)	Shrub	-
Acanthaceae	<i>Eranthemum pulchellum</i>	Tree	-
Acanthaceae	<i>Justicia adhatoda</i> (= <i>Adhatoda vasica</i>)	Shrub	Basuti
Acanthaceae	<i>Lepidagathis cuspidata</i>	Shrub	-
Acanthaceae	<i>Phlogacanthus thyrsoformis</i>	Shrub	-
Acanthaceae	<i>Strobilanthes auriculata</i>	Shrub	Kapur mingar
Actinidiaceae	<i>Saurauia napaulensis</i>	Tree	Bhakara
Amaranthaceae	<i>Deeringia amaranthoides</i> (= <i>D. celosioides</i>)	Climber	Bhirang
Anacardiceae	<i>Cotinus coggygria</i> (= <i>Rhus continus</i>)	Small Tree	Tung
Anacardiceae	<i>Lannea coromandelica</i>	Tree	Kehmal
Anacardiceae	<i>Mangifera indica</i>	Tree	Am
Anacardiceae	<i>Pistacia chinensis</i> subsp. <i>integerrima</i>	Tree	Kakrain

Anacardiceae	<i>Spondias pinnata</i>	Tree	Ambara
Apocynaceae	<i>Carissa spinarum</i> (=C. <i>opaca</i>)	Shrub	Garna
Apocynaceae	<i>Holarrhena pubescens</i> (=H. <i>antidysenterica</i>)	Small Tree	Keor
Apocynaceae	<i>Ichnocarpus frutescens</i>	Climber	Bakkar Bel
Apocynaceae	<i>Nerium oleander</i> (=N. <i>odorum</i>)	Shrub	Ghanira
Apocynaceae	<i>Tabernaemontana divaricata</i>	Shrub	Tagar
Apocynaceae	<i>Trachelospermum lucidum</i> (=T. <i>fragrans</i>)	Climber	Barora, Dudhi
Apocynaceae	<i>Vallis solanacea</i>	Climber	Dudh Khal
Apocynaceae	<i>Wrightia arborea</i> (=W. <i>tomentosa</i>)	Tree	Khalwa
Apocynaceae (Asclepiadaceae)	<i>Calotropis procera</i>	Shrub	Akh
Apocynaceae (Asclepiadaceae)	<i>Cryptolepis buchananii</i>	Climber	Jaman Khumb
Apocynaceae (Asclepiadaceae)	<i>Dregea volubilis</i>	Climber	Murud bel
Apocynaceae (Asclepiadaceae)	<i>Periploca calophylla</i>	Climber	Spari
Arecaceae	<i>Phoenix loureiroi</i> (=P. <i>humilis</i>)	Small Tree	Khajur
Arecaceae	<i>Phoenix syvestris</i>	Small Tree	Khajur
Asparagaceae	<i>Agave americana</i>	Shrub	-
Asparagaceae	<i>Agave wightii</i>	Shrub	-
Asparagaceae	<i>Asparagus adscendens</i>	Shrub	-
Bignoniaceae	<i>Jacaranda mimosifolia</i>	Tree	Jacranda
Bignoniaceae	<i>Oroxylum indicum</i>	Tree	Tat Palanga
Bignoniaceae	<i>Stereospermum chelonoides</i> (=S. <i>suaveolens</i>)	Tree	Padal
Boraginaceae	<i>Cordia dichotoma</i>	Tree	Lasura
Boraginaceae	<i>Cordia macleodii</i>	Tree	Kluhman
Boraginaceae	<i>Cordia myxa</i>	Tree	Lasura
Boraginaceae	<i>Cordia vestita</i>	Tree	Lasuri
Boraginaceae	<i>Ehretia acuminata</i>	Tree	Puna
Boraginaceae	<i>Ehretia aspera</i> (= E. <i>laevis</i>)	Tree	Chamrod
Cannabaceae	<i>Celtis tetrandra</i>	Tree	Khirk
Cannabaceae	<i>Trema politoria</i>	Shrub	Kasa Kuri
Capparidaceae	<i>Capparis sepiaria</i>	Shrub	Hiun Garna
Capparidaceae	<i>Crateva adansonii</i>	Small Tree	Barna
Celastraceae	<i>Celastrus paniculatus</i>	Climber	Sandhren
Celastraceae	<i>Elaeodendron glaucum</i> (=Cassine <i>glaucum</i>)	Tree	Morindu, Mirgu
Celastraceae	<i>Gymnosporia royleana</i>	Shrub	Bhadrun
Combretaceae	<i>Terminalia anogeissiana</i> (=Anogeissus <i>latifolia</i>)	Tree	Dhao

Combretaceae	<i>Terminalia bellirica</i>	Tree	Bahera
Combretaceae	<i>Terminalia chebula</i>	Tree	Harar
Combretaceae	<i>Terminalia elliptica</i> (=T. tomentosa)	Tree	Aisan
Convolvulaceae	<i>Poranopsis paniculata</i> (=Porana paniculata)	Climber	Faindal Jhol
Coriariaceae	<i>Coriaria nepalensis</i>	Shrub	Nachhar
Ebenaceae	<i>Diospyros cordifolia</i>	Tree	Kundu
Ebenaceae	<i>Diospyros montana</i>	Tree	Kala dhao
Ebenaceae	<i>Diospyros exsculpta</i> (=D. tomentosa)	Tree	Kinu
Euphorbiaceae	<i>Euphorbia royleana</i>	Shrub	Thor
Euphorbiaceae	<i>Jatropha curcas</i>	Shrub	Japota
Euphorbiaceae	<i>Leptopus cordifolius</i> (=Arachne cordifolia)	Shrub	-
Euphorbiaceae	<i>Mallotus philippensis</i>	Tree	Kamal
Fagaceae	<i>Quercus glauca</i>	Tree	Banni
Fagaceae	<i>Quercus leucotrichophora</i> (=Q. incana)	Tree	Ban
Juglandaceae	<i>Engelhardia spicata</i>	Tree	Samma
Juglandaceae	<i>Juglans regia</i>	Tree	Khor
Lamiaceae	<i>Clerodendrum phlomidis</i>	Small Tree	Dhakkari
Lamiaceae	<i>Colebrookea oppositifolia</i>	Shrub	Dusen, Dussa
Lamiaceae	<i>Duranta erecta</i>	Shrub	-
Lamiaceae	<i>Gmelina arborea</i>	Tree	Ban
Lamiaceae	<i>Holmskioldia sanguinea</i>	Shrub	-
Lamiaceae	<i>Isodon rugosus</i> (=Plectranthus rugosus)	Shrub	-
Lamiaceae	<i>Lantana camara</i>	Shrub	-
Lamiaceae	<i>Pogostemon benghalensis</i>	Shrub	Kali Basuti
Lamiaceae	<i>Premna barbata</i>	Small Tree	Ginani
Lamiaceae	<i>Premna mollissima</i> (=P. mucronata)	Small Tree	Gin, Bhankar
Lamiaceae	<i>Pseudocaryopteris bicolor</i>	Shrub	Ban Basuti
Lamiaceae	<i>Roylea cinerea</i> (=R. calycina)	Shrub	Karhkhharhe
Lamiaceae	<i>Salvia officianalis</i>	Herb	-
Lamiaceae	<i>Vitex negundo</i>	Shrub	Bana
Lauraceae	<i>Litsea monopetala</i> (=L. polyantha)	Tree	Ghian
Lauraceae	<i>Neolitsea pallens</i>	Tree	Chirindi
Lecythidaceae	<i>Careya arborea</i>	Tree	Handbahera
Leguminosae (Caesalpiniaceae)	<i>Bauhinia purpurea</i>	Tree	Karal
Leguminosae (Caesalpiniaceae)	<i>Bauhinia racemose</i>	Small Tree	Karali
Leguminosae (Caesalpiniaceae)	<i>Bauhinia variegata</i>	Tree	Kachnar
Leguminosae (Caesalpiniaceae)	<i>Biancaea decapetala</i> (=Caesalpinia sepiaria)	Climbing Shrub	Relan

Leguminosae (Caesalpiniaceae)	<i>Cassia fistula</i>	Tree	Kaniar
Leguminosae (Caesalpiniaceae)	<i>Phanera vahlii</i> (= <i>Bauhinia vahlii</i>)	Liana	Taur
Leguminosae (Caesalpiniaceae)	<i>Piliostigma malabaricum</i> (<i>Bauhinia malabarica</i>)	Tree	Karal
Leguminosae (Caesalpiniaceae)	<i>Senna obtusifolia</i> (= <i>Cassia obtusifolia</i>)	Shrub	-
Leguminosae (Caesalpiniaceae)	<i>Senna occidentalis</i> (= <i>Cassia occidentalis</i>)	Shrub	-
Leguminosae (Caesalpiniaceae)	<i>Senna tora</i> (= <i>Cassia tora</i>)	Shrub	-
Leguminosae (Fabaceae)	<i>Abrus precatorius</i>	Climber	Rattak
Leguminosae (Fabaceae)	<i>Codariocalyx motorius</i> (= <i>Desmodium gyrans</i>)	Shrub	
Leguminosae (Fabaceae)	<i>Dalbergia sissoo</i>	Tree	Tahli
Leguminosae (Fabaceae)	<i>Delonix regia</i>	Tree	Gulmohar
Leguminosae (Fabaceae)	<i>Erythrina abyssinica</i> (= <i>Erythrina suberosa</i>)	Tree	Grelu, Parjaru
Leguminosae (Fabaceae)	<i>Flemingia semialata</i>	Shrub	Ban Chola
Leguminosae (Fabaceae)	<i>Indigofera cassioides</i> (= <i>I. pulchella</i>)	Shrub	Kathi
Leguminosae (Fabaceae)	<i>Indigofera heterantha</i> (= <i>I. gerardiana</i>)	Shrub	Kathi
Leguminosae (Fabaceae)	<i>Leucaena leucocephala</i>	Tree	Lasoonia
Leguminosae (Fabaceae)	<i>Millettia extensa</i> (= <i>M. auriculata</i>)	Liana	Solangen
Leguminosae (Fabaceae)	<i>Ougeinia oojeinensis</i> (= <i>O. dalbergioides</i>)	Tree	Sannan
Leguminosae (Fabaceae)	<i>Pleurolobus gangeticus</i> (= <i>Desmodium latifolium</i>)	Shrub	Jajra
Leguminosae (Fabaceae)	<i>Pueraria tuberosa</i>	Climber	Salorh
Leguminosae (Fabaceae)	<i>Tateishia concinna</i> (= <i>Desmodium concinnum</i>)	Shrub	
Leguminosae (Mimosaceae)	<i>Albizia chinensis</i> (= <i>Albizia stipulata</i>)	Tree	Ohi
Leguminosae (Mimosaceae)	<i>Albizia lebbeck</i>	Tree	Shrin
Leguminosae (Mimosaceae)	<i>Albizia odoratissima</i>	Tree	Karmaru
Leguminosae (Mimosaceae)	<i>Albizia procera</i>	Tree	Safed Shrin
Leguminosae (Mimosaceae)	<i>Mimosa rubicaulis</i>	Shrub	Dadrar
Leguminosae (Mimosaceae)	<i>Parkinsonia aculeata</i>	Small Tree	-
Leguminosae (Mimosaceae)	<i>Senegalia caesia</i> (= <i>Acacia caesia</i>)	Tree	Relan, Dhangar

Leguminosae (Mimosaceae)	<i>Senegalia catechu</i> (=Acacia catechu)	Tree	Khair
Leguminosae (Mimosaceae)	<i>Senegalia modesta</i> (=Acacia modesta)	Tree	Phulai
Leguminosae (Mimosaceae)	<i>Vachellia farnesiana</i> (=Acacia farnesiana)	Tree	-
Leguminosae (Mimosaceae)	<i>Vachellia leucophloea</i> (=Acacia leucophloea)	Tree	Reru, Karer
Leguminosae (Mimosaceae)	<i>Vachellia nilotica</i> (=Acacia nilotica/ A. arabica)	Tree	Kiker
Linaceae	<i>Reinwardtia indica</i> (=R. trigyna)	Shrub	Basant
Loranthaceae	<i>Dendrophthoe falcata</i>	Epiphyte	Parand
Lythraceae	<i>Lagerstroemia indica</i>	Tree	-
Lythraceae	<i>Lagerstroemia parviflora</i>	Tree	Kala dhaun
Lythraceae	<i>Punica granatum</i>	Tree	Daran
Lythraceae	<i>Woodfordia fruticosa</i>	Shrub	Dhawin
Malpighiaceae	<i>Aspidopterys wallichii</i>	Climber	Dhur Bel
Malpighiaceae	<i>Hiptage benghalensis</i>	Liana/Tree	Want
Malvaceae	<i>Bombax ceiba</i>	Tree	Simal
Malvaceae	<i>Helicteres isora</i>	Shrub	Chamar Daman
Malvaceae	<i>Kydia calycina</i>	Tree	Pula
Malvaceae (Sterculiaceae)	<i>Helicteres isora</i>	Small Tree	Maror Phali
Malvaceae (Sterculiaceae)	<i>Pterospermum acerifolium</i>	Tree	Kanak Champa
Malvaceae (Tiliaceae)	<i>Grewia asiatica</i> (=G. hainesiana)	Tree	Dhaman
Malvaceae (Tiliaceae)	<i>Grewia eriocarpa</i> (=G. elastica)	Small Tree	Phalsa, Pheru
Malvaceae (Tiliaceae)	<i>Grewia optiva</i>	Tree	Dhaman Phali
Malvaceae (Tiliaceae)	<i>Grewia serrulata</i>	Small Tree	Dhamriana
Malvaceae (Tiliaceae)	<i>Grewia tenax</i> (=G. populifolia)	Small Tree	-
Meliaceae	<i>Azadirachta indica</i>	Tree	Nim
Meliaceae	<i>Melia azedarach</i>	Tree	Bakain, Drek
Meliaceae	<i>Toona ciliata</i> (=Cedrela toona)	Tree	Tun
Menispermaceae	<i>Cissampelos pareira</i>	Climber	Katorrhi
Menispermaceae	<i>Pachygone laurifolia</i> (=Cocculus laurifolius)	Small Tree	Paror
Moraceae	<i>Artocarpus lacucha</i>	Tree	Dheu
Moraceae	<i>Broussonetia papyrifera</i> **	Tree	Japani Tut
Moraceae	<i>Ficus auriculata</i> (=F. roxburghii)	Tree	Trembal
Moraceae	<i>Ficus benghalensis</i>	Tree	Barh
Moraceae	<i>Ficus hederacea</i> (=F. scandens)	Climber	-
Moraceae	<i>Ficus hispida</i>	Tree	Dagur, Dadurhi
Moraceae	<i>Ficus palmata</i>	Tree	Dhoorha, Fagoorha
Moraceae	<i>Ficus racemosa</i> (=F. glomerata)	Tree	Rumbal
Moraceae	<i>Ficus religiosa</i>	Tree	Pipal

Moraceae	<i>Ficus rumphii</i>	Tree	-
Moraceae	<i>Ficus sarmentosa</i> (=F. <i>foveolata</i>)	Climber	Ruddar
Moraceae	<i>Ficus semicordata</i> (=F. <i>cunia</i>)	Tree	Kandrol, Khaloa
Moraceae	<i>Ficus subincisa</i> (=F. <i>clavata</i>)	Shrub	Kharandal
Moraceae	<i>Ficus virens</i>	Tree	Palakh, Pakhar
Moraceae	<i>Morus alba</i>	Tree	Tut
Moraceae	<i>Morus indica</i>	Tree	Sia tut
Moraceae	<i>Morus laevigata</i>	Tree	Shah tut
Moraceae	<i>Morus serrata</i>	Tree	Karun
Moringaceae	<i>Moringa oleifera</i> (=M. <i>pterygosperma</i>)	Tree	Suhanjna
Myricaceae	<i>Myrica esculenta</i> (=M. <i>nagi</i>)	Tree	Kaphal
Myrtaceae	<i>Eucalyptus crebra</i>	Tree	Safeda
Myrtaceae	<i>Syzygium cumini</i> (=Eugenia <i>jambolana</i>)	Tree	Jaman
Oleaceae	<i>Jasminum arborescens</i>	Shrub	Dhurmalti
Oleaceae	<i>Jasminum dispersum</i>	Shrub	Sarain
Oleaceae	<i>Jasminum grandiflorum</i>	Shrub	Malti
Oleaceae	<i>Jasminum multiflorum</i> (=J. <i>pubescens</i>)	Shrub	Banmalti
Oleaceae	<i>Ligustrum compactum</i>	Tree	Lalaun
Oleaceae	<i>Nyctanthus arbor tristris</i>	Tree	Harshingar
Oleaceae	<i>Olea europaea</i> var. <i>cuspidata</i>	Tree	Kao
Phyllanthaceae	<i>Antidesma acidum</i> (=A. <i>diandrum</i>)	Shrub	Amblu
Phyllanthaceae	<i>Bischofia javanica</i>	Tree	Marak
Phyllanthaceae	<i>Bridelia retusa</i>	Tree	Gadi Kuri
Phyllanthaceae	<i>Bridelia verrucose</i>	Tree	-
Phyllanthaceae	<i>Flueggea virosa</i> (=F. <i>macrocarpa</i>)	Shrub	Girthan
Phyllanthaceae	<i>Glochidion velutinum</i>	Tree	Saman
Phyllanthaceae	<i>Phyllanthus emblica</i> (=Embllica <i>officinalis</i>)	Tree	Aonla
Pinaceae	<i>Pinus roxburghii</i>	Tree	Chil
Poaceae (Bambusaceae)	<i>Bambusa bambos</i> (=B. <i>arundinacea</i>)	Bamboo	Kanta Bans, Bontlu
Poaceae (Bambusaceae)	<i>Bambusa nutans</i>	Bamboo	Banj, Nal
Poaceae (Bambusaceae)	<i>Dendrocalamus somdevai</i>	Bamboo	Magar
Poaceae (Bambusaceae)	<i>Dendrocalamus strictus</i>	Bamboo	Bans
Primulaceae (Myrsinaceae)	<i>Ardisia solanacea</i>	Shrub	-
Primulaceae (Myrsinaceae)	<i>Embelia tsjerium-cottam</i> (=E. <i>robusta</i>)	Shrub	Baobring
Primulaceae (Myrsinaceae)	<i>Maesa indica</i>	Shrub	Burkain
Primulaceae (Myrsinaceae)	<i>Myrsine africana</i>	Shrub	Chhota mendru
Proteaceaea	<i>Grevillea robusta</i>	Tree	Silver Oak

Putranjivaceae	<i>Putranjiva roxburghii</i>	Tree	Putajan
Ranunculaceae	<i>Clematis gouriana</i>	Climber	Jhol
Ranunculaceae	<i>Clematis grata</i>	Climber	Chibru Machrun
Rhamnaceae	<i>Helinus lanceolatus</i>	Climber	Murian
Rhamnaceae	<i>Rhamnus triquetra</i>	Small Tree	Galodan
Rhamnaceae	<i>Sageretia filiformis</i>	Scandent Shrub	-
Rhamnaceae	<i>Sageretia thea</i> (=Sageretia theezans)	Shrub	Phax
Rhamnaceae	<i>Ziziphus mauritiana</i>	Small Tree	Ber
Rhamnaceae	<i>Ziziphus nummularia</i>	Shrub	Ber
Rhamnaceae	<i>Ziziphus oenopolia</i>	Small Tree	Kokal Ber
Rosaceae	<i>Prinsepia utilis</i>	Shrub	Bhekal
Rosaceae	<i>Prunus cerasoides</i> (=P. puddum)	Tree	Paja
Rosaceae	<i>Prunus cornuta</i>	Tree	Jamu
Rosaceae	<i>Pyrus pashia</i>	Tree	Kainth
Rosaceae	<i>Rosa brunonii</i> (=R. moschata)	Scandent shrub	Gulabrhi
Rosaceae	<i>Rubus ellipticus</i>	Shrub	Akha
Rosaceae	<i>Rubus paniculatus</i>	Shrub	Akha
Rubiaceae	<i>Catunaregum spinosa</i> (=Randia dumetorum)	Shrub	Rara
Rubiaceae	<i>Himalrandia tetrasperma</i> (=Randia tetrasperma)	Shrub	Jindru
Rubiaceae	<i>Hymenodictyon orixense</i> (=H. excelsum)	Shrub	Barthuan
Rubiaceae	<i>Mitragyna parvifolia</i> (=Stephegyne parvifolia)	Tree	Kalam
Rubiaceae	<i>Spermadictyon suaveolens</i> (=Hamiltonia suaveolens)	Shrub	Guilhain
Rubiaceae	<i>Wendlandia heynei</i> (=W. exserta)	Tree	Pansara
Rubiaceae	<i>Wendlandia puberula</i>	Tree	-
Rutaceae	<i>Aegle marmelos</i>	Tree	Bil
Rutaceae	<i>Bergera koenigii</i> (=Murraya koenigii)	Shrub	Gandla
Rutaceae	<i>Citrus medica</i>	Shrub	Galgol
Rutaceae	<i>Citrus limon</i>	Shrub	Sangtara
Rutaceae	<i>Murraya paniculata</i> (=M. exotica)	Shrub	Nargan
Rutaceae	<i>Naringi crenulata</i> (=Limonia crenulata)	Shrub	Barhahi, Bilan
Rutaceae	<i>Skimmia anquetilia</i>	Shrub	Kali, Nehra
Rutaceae	<i>Zanthoxylum armatum</i>	Shrub	Tirmar, Timar
Sabiaceae	<i>Meliosma simplicifolia</i> subsp. pungens (=M. pungens)	Tree	Larandu
Salicaceae	<i>Populus ciliate</i>	Tree	Pialash
Salicaceae	<i>Populus nigra</i>	Tree	-
Salicaceae	<i>Salix pyrina</i>	Tree	-

Salicaceae	<i>Salix tetrasperma</i>	Tree	Badah, Badhia
Salicaceae (=Samydaceae)	<i>Casearia graveolens</i>	Tree	Chilla
Salicaceae (=Samydaceae)	<i>Casearia tementosa</i>	Tree	Chilla
Salicaceae (Flacourtiaceae)	<i>Flacourtia Indica</i>	Small Tree	Kangu, Kakoa
Salicaceae (Flacourtiaceae)	<i>Xylosma longifolia</i>	Small Tree	Chirindi
Santalaceae	<i>Osyris lanceolata (=O. arborea)</i>	Shrub	Sanson
Sapindaceae	<i>Dodonaea viscosa</i>	Shrub	Mendru
Sapindaceae	<i>Litchi chinensis</i>	Tree	Lichi
Sapindaceae	<i>Sapindus mukorossi</i>	Tree	Retha
Sapotaceae	<i>Madhuca longifolia (=Bassia latifolia)</i>	Tree	Mawa
Scrophulariaceae (Loganiaceae)	<i>Buddleja asiatica</i>	Shrub	Dhurbana
Scrophulariaceae (Loganiaceae)	<i>Buddleja crispa</i>	Shrub	Durpa siaru
Smilacaceae	<i>Smilax aspera</i>	Climber	-
Solanaceae	<i>Datura stramonium</i>	Shrub	Datura
Solanaceae	<i>Solanum erianthum (=Solanum verbascifolium)</i>	Small Tree	Ulah
Solanaceae	<i>Solanum surattense</i>	Shrub	-
Solanaceae	<i>Withania somnifera</i>	Shrub	Asgandh
Ulmaceae	<i>Holoptelea integrifolia</i>	Tree	Rajain
Vitaceae	<i>Ampelocissus latifolia (=Vitis latifolia)</i>	Climber	Chamar Bel
Vitaceae	<i>Causonis trifolia (=Vitis trifolia)</i>	Climber	Gidar dakh
Vitaceae	<i>Leea asiatica</i>	Shrub	Basant Jari
Vitaceae	<i>Tetrastigma serrulatum</i>	Liana	
Vitaceae	<i>Vitis heyneana var. heyneana (=Vitis lanata)</i>	Liana	-

- **Note: - The List of trees, herbs, shrubs and grasses has been prepared in due consultation with Sh Dr G. S. Goraya Pr. C.C. F. (Retd.) and Sh Vineet Jistu Scientist HFRI.**

LIST OF COMMON ANIMALS AND BIRDS OCCURING IN NURPUR FOREST DIVISION

Local Name	English Name	Scientific Name
Bagla	Grey heron	<i>Ardea cinerea</i>
Bagla	Little egret	<i>Egretta garzetta</i>
Bandar	Macaque or Rhesus monkey	<i>Macaca mulatta</i>
Batair	Common quail	<i>Coturnix coturnix</i>
Bejoo	Ratel, Honey-badger	<i>Mellivora capensis</i>
Bhojanga, Hojanga	King Crow, Black Drongo	<i>Dicrurus macrocercus</i>
Billi	Cat	<i>Felis catus</i>
Bulbul	Red-vented bulbul	<i>Pycnonotus cafer</i>
Chamgadar	The Bat	<i>Pteropus medina</i>
Chhota fakhat	Indian spotted dove	<i>Streptopelia chinensis</i>
Chhuchhunder	Gray-musk shrew	<i>Suncus murinus</i>
Chua	Rat	<i>Rattus rattus</i>
Chua	Brown mouse	<i>Mus platythrix</i>
Chua khana sanp, Dhaman	Common rat-snake	<i>Ptyas mucocous</i>
Chuhi	House mouse	<i>Mus musculus</i>
Ghuggi, Fakhta	Indian ring dove	<i>Streptopelia decaocto</i>
Giddar	The jackal	<i>Canis aureus</i>
Gilhari	Squirrel	<i>Funambulus pennanti</i>
Goh	Large bengal monitor lizard	<i>Varanus bengalensis</i>
Hudhud	Hoopoe	<i>Upupa epops</i>
Jangli murga	Red jungle fowl	<i>Gallus gallus</i>
Jangli-billi	Jungle-cat	<i>Felis chaus</i>
Kachua	Common land tortoise	<i>Testudo flagans</i>
Kaikil	Common King fisher	<i>Alcedo atthis</i>
Kakkar	Barking deer, Muntjac	<i>Muntacus muntjac</i>
Kala titar	Black partridge	<i>Francolinus francolinus</i>
Khargosh	Common hare	<i>Lepus nigricollis(L. ruficaudatus)</i>
Kirla, Girgit	Indian Chameleon	<i>Chameleon calcaratus</i>
Kirli	Common lizard	<i>Hemidactylus gleadowii</i>
Koel	Koel	<i>Eudynamys scolopacea</i>
Lakkar-bagha	Hyaena	<i>Hyaena hyaena</i>
Langur	Common langur	<i>Presbytis entellus</i>
Lomri	Fox	<i>Vulpes bengalensis</i>
Maina	Common myna	<i>Acridotheres tristis</i>
Mor	Common pea fowl	<i>Pavo cristatus</i>
Murgabi	Grey duck, Spot-billed duck	<i>Anas poecilorhyncha</i>
Nag	King Cobra	<i>Ophiophagus hannah</i>
Neol	Common mongoose	<i>Herpestes edwardsi</i>
Neol	Strip-necked mongoose	<i>Herpestes vitticollis</i>
Nilgai	Blue-bull	<i>Boselaphus tragocamelus</i>
Nilkanth	Blue jay, Roller	<i>Coracias benghalensis</i>
Pahari bulbul	Red whiskered bulbul	<i>Pyconotus jocosus</i>

Pahari kowa	Himalayan jungle crow	<i>Corvus macrorhynchos</i>
Pahari titar	Hill partridge	<i>Arborophila torqueola</i>
Phaniar	Common cobra	<i>Naja naja</i>
Safed bagla	Cattle egret	<i>Bubulcus ibis</i>
Sambhar	The Sambhar	<i>Cervus unicolor</i>
Sanp	Common Indian worm snake	<i>Typhlina braminus</i>
Sanp	Russells Viper	<i>Vipera russelii</i>
Selva kabutar	Blue rock pigeon	<i>Columba livia</i>
She	Porcupine	<i>Hystrix indica</i>
Suar	Indian wild boar	<i>Sus scrofa</i>
Tatihri	Red wattled lapwing	<i>Vanellus indicus</i>
Tendua, Bagh, Sher	Leopard	<i>Panthera pardus</i>
Titar	Grey partridge	<i>Francolinus pondicerianus</i>
Tota	Large Indian parakeet	<i>Psitacula eupatria</i>
Tota	Rose ringed parakeet	<i>Psitacula krameria</i>
Ullu	Spotted owlet	<i>Athene brama</i>

GLOSSARY OF LOCAL TERMS.		
Sr No.	LOCAL TERM	ENGLISH EQUIVALENT
1.	Abadi	A village habitation.
2.	Abi	Irrigated.
3.	Adna Malik	Inferior owner.
4.	Ala Malik	Superior owner.
5.	Ala malkiyat	Superior ownership.
6.	Atiala/Tiala	A raised platform around a tree.
7.	Banjar Jadid	New fallow. Not cultivated for more than four successive year.
8.	Banjar Kadim	Old fallow. Not cultivated for the last eight successive year.
9.	Ban Kharetar	Hay land in the forest.
10.	Ban Muafi	Forest area owned by villagers.
11.	Ban Sarkar (Gair Mehdooda)	Un-Demarcated Protected Forests where land belongs to the individuals or a group of individuals and natural tree growth or planted by Forest Department belongs to the Government.
12.	Ban Sarkar Malkiyat (Mehdooda)	Demarcated Protected Forest where land belongs to individuals or a group of individuals and is assessed to land revenue.
13.	Barani	Un-irrigated land, dependent on rain.
14.	Bartan	Rights admitted in Forest Settlement.
15.	Bartandars	Right holders.
16.	Bauli or Bauri	A natural spring of drinking water.
17.	Bahand Banjar	Occasionally cultivated.
18.	Burjee	A boundary pillars.
19.	Behandar	Cultivated land
20.	Chhachhre	Broom for beating fire
21.	Chak	Part of land.
22.	Chak Ban	An area maintained as a forest jointly by few tika.
23.	Chak dakhli	An area taken out from the tika and entered into other to facilitate revenue control.
24.	Chak kharji	An area taken out from the tika.
25.	Chak Shamlat deh	A piece of Ban Sarkar area surrounded by Demarcated Protected and Reserve Forest.
26.	Chalotu	A chil pole.
27.	Chand	Boundary pillar of tika.
28.	Changer	A rainfed inferior area.
29.	Charand	Grazing ground.
30.	Chheka	Counter fire during summers
31.	Chhachhare	Locally made fire-broom
32.	Chillaru	Dry leaves of chil.
33.	Cho	A seasonal nallah not more than 50 feet in depth.
34.	Choharam	Share of the forest Rakha from the sale proceeds of forest produce.
35.	Chowkidar	A village watchman.
36.	Dandi	A foot path.
37.	Darya	A river.
38.	Devta/Bajhia	A local deity.

39.	Drat	A sickle for cutting bushes and trees.
40.	Drati	A sicle for cutting grasses.
41.	Gaddies	A community of migratory graziers keeping sheep and goats.
42.	Gair mumkin	Barren land under buildings, roads, paths and streams.
43.	Gair marusi	Tenants
44.	Ghanera	Ruins of village habitation.
45.	Gharal	A shed for cattle and stiring grass.
46.	Gharat	A water mill for grinding purpose.
47.	Gohar	A path.
48.	Goharn	A Cattle shed.
49.	Goth	A grazing run.
50.	Gujjars	A community of migratory graziers keeping buffaloes.
51.	Hadbast number	A serial number given to a village, at the time of revenue settlement.
52.	Haldun	Flat fertile ground with deep soil.
53.	Har	Land laid waste due to flood
54.	Haq	Right.
55.	Haq Chuhram	Zamidari share means one fourth share in sale proceeds of trees and grass etc. in Ban Sarkar areas.
56.	Hath	A linear unit, approximately equal to (18 inches) 45cm.
57.	Jagnu	Chil splinters used for lightning fire.
58.	Jagir	An Estate awarded to an individual by the British for an act of bravery etc.
59.	Jagirdar	Owner of the Jagir.
60.	Jamabandi	Three years record of land maintained by revenue Depptt.
61.	Jhikla	Lower
62.	Jungle Mehdooda	Demarcated Protected Forest.
63.	Jungle Mehfooja	Protected forest.
64.	Jungle gair mehdooda and mehfooja	Undemarcated Protected Forest.
65.	Karam	A linear unit equal to 57.5 inches = 146.05 cm.
66.	Katha	Tannin obtained from Khair trees.
67.	Khad / Khalla	A stream perennial or seasonal.
68.	Kharetar	Hay field owned by individuals.
69.	Kharif	Autumn harvest.
70.	Khasra	A field number given on the village revenue records.
71.	Khola	A small valley.
72.	Kotwal	Manager of an area or Station House Officer.
73.	Lahr	Fields near the habitation.
74.	Lamberdar	A village headman who collects the revenue.
75.	Langhana	A Y-shaped wooden obstruction for cattle but a passage for men in brush wood fence.
76.	Makbooja	Possession.
77.	Mali	Gardener.
78.	Manu	Current years shoot of Bamboo.
79.	Marla	A revenue measuring unit 9 sq. Karam (1/20th of a Kanal)
80.	Mauza	A unit constituted by a member of tika for purposes of revenue administration.

81.	Nadi	A stream.
82.	Nallah	A small water channel or a torrent not more than 50 ft.in Width
83.	Naun	A spring used for bathing washing purposes.
84.	Nautor	Breaking of land for purposes of cultivation off habitation for the first time.
85.	Palam	Irrigated Paddy area.
86.	Panch	A member of Panchayat.
87.	Panchayat	A body of Panches forming a village management committee.
88.	Patrah	Tree fodder.
89.	Patwar	A group of villages forming a Patwar Circle.
90.	Patwari	A revenue official incharge of a Circle.
91.	Quila	A fort.
92.	Rabi	Spring crop.
93.	Raja or Rajah	A ruler.
94.	Rakha	A person appointed for the protection of forests who collects grains from right holders and gets Choram from sale of forest produce for his services.
95.	Rang	Boulder/rock
96.	Sarhada	Trijunction pillar of three tikas.
97.	Sarpanch	A person head of the Gram Panchayat.
98.	Sawana	Gujjars encamping and grazing grounds.
99.	Shajra	A village field map.
100.	Sawanadars	Right holders of Sawana.
101.	Shamlat	A village common land.
102.	Taluqa	A management unit fixed by Revenue Depptt.
103.	Talab/Toba	Water pond.
104.	Thatch	Grazing grounds in the forests in higher reaches.
105.	Tehhdari	Owner of the all layers of soil.
106.	Tehsil	A sub division of a District made for the purpose of Administration
107.	Terhai	Closed area.
108.	Terni	Grazing fee of sheep and goats.
109.	Tika	The smallest unit of area forming a part of mauza for purpose of revenue administration (a village).
110.	Unclassed	Ban Sarkar area not declared as Protected Forests under IFA
111.	Uperla	Upper
112.	Zamindar	A land lords.
113.	Zamindari share	Out of revenue derived from sale of trees of grass etc. from Ban Sarkar area.

CHAPTER-I

THE TRACT DEALT WITH

1.1 Name & Situation: -

This working Plan covers the Forests of Nurpur Forest division and is revision of the working plan of Shri J.C. Katoch HPFS. This plan covers all the Reserve, Demarcated & Un-Demarcated Protected Forests and Un-Classed Forests of Sh J.C. Katoch HPFS working plan together with Co-operative Forest Societies covered by Nanak Chand IFS working plan of Nurpur Forest Division (1976-77 to 1991-92).

All these Forests occur in Nurpur, Indora, Jawali and Fatehpur Sub Division of Civil District of Kangra and are situated on the right bank of River Beas/Pong Dam reservoir. The area lies between longitudes 75°35'45" to 76°9'0". East, latitudes 31°56'30" N to 32°23'45" north. Chakki Khad separates the tract from Pathankot District of Punjab on the north-west; River Beas separates the tract from District Hoshiarpur of Punjab on the South-west; Gaj khad, Dehar Khad and Pong Dam separates the tract from Dharamshala and Dehra Forest Division on South east and; Hathidhar on North east separates the tract from Dalhousie Forest Division of Chamba District.

Total geographical area of the Division is 1257.23 Sq. Km. The Forest do not form a continuous and compact belt but are scattered throughout the Division and cover about 40% of the total Geographical area.

- 1.1.1. The Division headquarter is at Nurpur which is situated at an elevation of 590 meter and is situated around 60 Kms from Dharamshala and around 25 Kms from Pathankot Railway Station. It is situated on Pathankot Mandi National Highway (NH 154).

The tract is covered by following survey sheets: -

1:15000 scale:

247 SE 1, 247 SW 4, 247 SE 3,
246 SW/11, 246 SE/4, 246 SE/2, 263 SWI
247 NE2, 264 SW/1, 264 NW/1, 264 NW/3
264 NW/2, 264 NW/4, 264 SW3, 263 SW/3

1:50000 scale (maps are as under)

52D/4, 43P/16
43P/15, 44M/13
52D/3

1.2 Configuration of the Ground

The tract is mostly hilly, with altitude varying from 257 meters from Chakki bridge near Pathankot to 1590 Meters on Hathidhar. The tract is mainly hilly, starting from Hathal and Chakki bridge to Hathidhar, culminating at 1590 meter. The tract is relatively plain on North Western side and is rugged on southwestern side. The upper reaches of the Hathidhar i.e. North East side are steep and there is a sharp drop of 500 to 600 meters. The ridges on the southeastern side runs at a gentle gradient.

Number of intermediate and parallel spurs exist and so the tract gives the appearance of a number of a low and high hill of rugged and broken ground. A series of ridges passes through Nurpur itself and runs parallel to first, but is generally irregular though the rock is of the same nature.

The last ridges running through Sidhpurghar and Harsar Nana, in an apparently of later age and is generally composed of gravels of soft gravelly sandstone. Lastly, at the western end of the tract near Chakki, Khanni and Damtal, the Shivaliks beds are overlaid by the gravels probably of riverine origin.

1.3 Geology, Rock and Soil

The rock formation met within the area can be straight graphically classified as middle and lower Shivaliks while latter predominate over most of the area. They are composed of sandstones, clay and conglomerates having the characteristics of fluvial deposit of torrential streams and floods in shallow water basins. The fossils included in these areas show that the earlier beds were deposited in a somewhat brackish environment as compared with the later ones. The sandstone show poor stratification and are felspathic micaceous and current-bedded and some of them have clearly been derived from the breakdown of the Central Himalayan granites. The Shivalik belt of hills, several miles wide, is made up of a series of parallel ridges, most of them with a steep scarp facing south and a gentle dip slope on the north side.

The Shivaliks have been involved in the later phase of Himalayan orogeny for we find them often folded, faulted, overthrust, and lying at steep angles against the other formations. The Nahan (Lower Shivaliks) group is composed of alternating beds of sandstone and clay. The sandstone is coarse and micaceous. The Nahan clays are mostly bright red in colour.

Broadly speaking rock beds comprise of extremely thick belt of conglomerates, which can be seen in the Hathidhar on the northern boundary. Near the western boundary along the Chakki in Khanni and Damtal, the Shivalik beds are overlaid by gravels of riverine origin. The northern and eastern parts of the Division are characterized by massive soft sandstone of Nahan series with overlying layer of clay of varying depth. The composition of vegetation is determined by the depth of clay soil and the softness of the rocks permitting penetration of roots. The sandstone formation in most parts becomes soft during rains and permits penetration of roots. The soil is generally loose and loam to sandy loam in texture in the upper reaches of the Division and supports Chil Forests.

Towards the western and southern parts, soil is alluvial and sandy or loamy in texture, formed by the weathering of sandstones and conglomerates which support a mixed crop of Chil and scrub. Along the river Chakki, Beas, and other khads riverine gravels predominate, which support scrub forests and predominate by khair forests.

A brief description of a representative soil profile from Nurpur collected from the Agriculture University Palampur is given below: -

Table No. 1.1 MECHANICAL ANALYSIS OF SOIL

Horizon	Depth	% Sand coarse	Fine	% Clay	% Silt	pH	Organic matter %
AI	0.10 cm	8.50	36.15	17.80	36.37	7.00	0.8
A3	10.30 cm	5.90	38.36	18.60	34.40	7.20	0.74
BI	30.80 cm	7.95	34.80	20.20	36.60	7.00	0.28
B2 (ii)	80.110 cm	3.99	32.50	24.50	38.60	7.00	0.24
B2 (iii)	110.150 cm	3.88	33.25	24.50	38.20	6.90	0.21
B2 (c)	150 cm	3.35	32.75	24.60	38.60	6.90	0.19

These soils are generally deficient in organic matter. The soil profiles are not mature and well developed.

Regional Horticultural Research and Training Station, Jachh (Nurpur), Kangra, H.P.

(Dr. Y S Parmar University of Horticulture and Forestry, Nauni (Solan), HP) Soil Testing Laboratory, RHR&TS, Jachh has done soil testing for entire division.

The results are tabulated below:

Table No. 1.2 Soil test report of forest soils of Nurpur Range

SN.	Name	pH	EC (dS/m)	Organic Carbon (%)	Nitrogen (kg/ha)	Phosphorus (kg/ha)	Potassium (kg/ha)
1	Nurpur (Khair)	5.10	0.60	1.35	288.24	19.65	173.98
2	Nurpur (Sagwan)	4.35	0.17	0.60	250.88	13.11	115.61
3	Nurpur (Conifer)	4.02	0.10	0.93	266.56	14.56	108.88
4	Sadwan (Conifer)	4.41	0.19	0.45	188.16	14.93	95.41
5	Sadwan (Khair)	7.18	0.34	0.87	188.16	11.29	140.31
6	Sadwan (B/L)	4.59	0.08	0.60	156.80	11.29	76.33
7	Jaunta (B/L)	5.15	0.07	0.81	344.96	14.56	173.98
8	Jaunta (Khair)	5.75	0.19	1.62	376.32	24.36	286.23
9	Jaunta (Conifer)	5.21	0.10	1.20	250.88	9.28	309.81
10	Minjgran (B/L)	7.50	0.21	0.51	219.52	6.74	145.92
11	Minjgran (Conifer- 1)	7.22	0.26	0.45	156.80	9.82	76.33
12	Minjgran (Conifer- 2)	7.67	0.26	0.39	188.16	11.82	78.57

13	Khanni (Khair-1)	5.85	0.08	0.63	156.80	9.27	114.49
14	Khanni (Khair-2)	5.57	0.06	0.51	188.16	13.27	121.23
15	Khanni (Conifer- 1)	4.10	0.04	0.84	235.20	9.28	245.82
16	Khanni (Conifer- 2)	4.14	0.05	0.87	250.88	6.74	215.52
17	Khanni (B/L)	4.19	0.04	0.64	219.52	9.46	99.90

Table No. 1.3 Soil test report of forest soils of Jawali Range

SN.	Name	pH	EC (dS/m)	Organic Carbon (%)	Nitrogen (kg/ha)	Phosphorus (kg/ha)	Potassium (kg/ha)
1.	Rehan (Khair)	4.06	0.14	1.34	329.28	13.27	212.15
2.	Gharoli (Conifer)	5.20	0.33	0.87	125.44	8.355	134.70
3.	Golwan (B/L)	5.45	0.19	2.85	439.04	9.28	291.85
4.	Gurial (B/L)	6.15	0.09	1.02	250.88	5.65	105.51
5.	Jawali Paloura (B/L)	5.18	0.12	1.14	250.88	27.80	250.31
6.	Harsar (Khair)	4.79	0.17	1.31	250.88	12.18	204.29
7.	Khabbal (Conifer)	7.25	0.49	0.69	141.12	15.63	65.10
8.	Dinni (Conifer)	6.21	0.29	1.11	219.52	9.28	204.29
9.	Junat (Bamboo)	7.37	0.42	1.38	297.92	6.74	217.76
10.	Hauri (Khair)	5.13	0.34	2.49	360.64	5.65	237.97
11.	Fatehpur (B/L)	5.50	0.17	0.93	266.56	6.65	252.56

Table No. 1.4 Soil test report of forest soils of Kotla Range

SN.	Name	pH	EC (dS/m)	Organic Carbon (%)	Nitrogen (kg/ha)	Phosphorus (kg/ha)	Potassium (kg/ha)
1.	Nadholi (Teak)	5.87	0.23	0.45	235.20	5.83	92.65
2.	Kuther (Khair)	4.80	0.29	1.27	250.88	5.65	119.80
3.	Anuhi (B/L)	4.38	0.18	1.32	188.16	10.19	171.74
4.	Bhali (B/L)	7.20	0.49	1.08	313.60	6.19	249.19
5.	Bhali (Bamboo)	8.68	0.55	0.30	62.72	5.53	365.93
6.	Bhali (Khair)	7.92	0.41	1.26	94.08	5.65	138.06
7.	Dole (Conifer)	6.26	0.28	1.02	188.16	5.46	270.52
8.	Ballah (Khair)	7.67	0.34	0.75	125.44	5.65	94.29
9.	Trilokpur (Conifer)	5.83	0.08	0.57	94.08	5.65	65.10
10.	Soldha (B/L)	7.75	0.36	0.51	62.72	6.19	87.55
11.	Chachian (B/L)	7.18	0.38	0.90	235.20	9.28	151.53
12.	Balera (Chil)	6.07	0.08	0.39	109.76	6.74	47.14
13.	Mastgarh (Khair)	4.51	0.08	1.32	94.08	8.35	420.93
14.	Batuhi (Conifer)	5.85	0.15	1.59	125.44	5.65	314.30
15.	Batuhi (B/L)	4.89	0.10	0.78	188.16	5.65	77.45

Table No. 1.5 Soil test report of forest soils of Rey Range

SN.	Name	pH	EC (dS/m)	Organic Carbon(%)	Nitrogen (kg/ha)	Phosphorus (kg/ha)	Potassium (kg/ha)
1.	Badukhar (Khair)	7.54	0.35	0.33	109.76	27.04	321.03
2.	Badukhar (Conifer)	7.30	0.23	0.48	46.92	16.17	53.88
3.	Badukhar (B/L)	7.46	0.44	1.53	219.52	16.91	130.21
4.	Bhogarwan (B/L)	7.77	0.54	0.54	125.44	13.63	149.29
5.	Bhogarwan (Conifer)	7.98	0.54	0.18	62.72	85.16	178.47
6.	Bhogarwan (Khair)	5.21	0.41	0.75	230.84	30.61	259.28
7.	Dhameta Sathana (Conifer)	5.48	0.24	1.17	250.88	14.72	98.78
8.	Khatiar (Khair)	7.12	0.45	0.54	235.20	10.36	53.88
9.	Anoh (B/L)	5.36	0.23	0.66	250.88	6.19	76.33
10.	Rey (Khair)	7.37	0.58	1.47	329.28	5.65	251.44
11.	Diana Rey (B/L)	6.15	0.25	0.57	172.48	52.24	136.94
12.	Nangal (Conifer)	7.60	0.50	0.36	125.44	12.75	87.55

CLIMATE

The climate of the area is sub-tropical characterized by rain fall from July to September, droughts both in the pre and post Monsoon period and frost of moderate intensity from December and January. Figures for average rainfall and temperature data of Nurpur Forest Division are given below for the period from 2012-13 to 2021-22: -

Table No.1.6 Rainfall and Temperature:

Monthly rainfall Nurpur Forest Division w.e.f January 2012 to Dec,2023												
Year	Jan	Feb	Mar	Apr	May	June	July	August	Sept	Oct	Nov	Dec
2012	201.8	45.4	34.4	62.7	10.5	41.6	899.8	1116.8	392.7	14.6	5.4	25.2
2013	42.1	126	61.8	26.7	30.7	349.7	666.3	680.7	180.6	28.2	22	60.6
2014	57.3	144	126.1	71.3	59.1	132.3	633.2	254.4	154.2	21.2	0.6	36.6
2015	68.4	135	182.5	69.2	49.0	294.1	830.5	834.3	148.1	46.6	5.7	38.7
2016	5.5	38.2	105.7	13.4	101.7	137.9	591.9	665.2	182.6	1.4	0.0	1.7
2017	116.1	28.5	43.3	58.7	73.8	232.1	230.2	736.1	108.6	0.0	0.0	102.0
2018	12.9	50.8	29.6	73.5	81.6	274.2	602	1074.4	411.1	7.5	25.5	8.3
2019	105.3	217	38.4	66.5	60.8	38.1	332.8	619.1	380.2	19.6	29.9	108.1
2020	124	5.9	228.6	62.7	98	136.1	427.4	868.6	26.5	0.0	29.6	36.3
2021	43.4	11.7	10.1	109.4	73.7	215.0	569.6	540.5	193.4	118.0	1.6	9.6
2022	198.4	58.2	7.8	3.2	53.5	170.0	635.8	1060.8	182.6	58.6	9.0	6.8
2023	145.3	3.4	104.5	95.2	189.8	316.8	538.8	662.6	217.6	17.1	21.1	7.9

Monthly avg Max. temp. (in mm) of Nurpur Forest Division w.e.f January 2012 to Dec, 2023												
Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
2012	16.3	18.8	26	30	35.4	38.1	32.2	29	30.6	28.7	24.5	20.5
2013	18.7	20.2	26.4	30	36	33	30.6	29.9	31.3	28.5	24.5	20.7
2014	18.7	19.2	23.2	28.3	32.3	35.4	31.1	31.6	29.8	28.3	25.4	20.9
2015	18.1	21.4	24.2	28.5	34.9	33.4	30.5	30.4	30.7	28.7	24.9	20.3
2016	19.4	23.1	26.4	32.5	35.1	34.7	30.6	30.2	31	29.8	25.7	22.6
2017	18.4	23	25.7	32.8	34.7	33.9	31.1	30.3	30.3	30.4	24.4	21.4
2018	20.7	23.1	28	31.6	34.2	34.1	31.3	30	29.5	28.8	24.4	20.2
2019	17.2	19.1	24.2	31.3	33.9	37.1	31	30.5	30.3	28	22.9	18.2
2020	17	21.6	23	29.3	32.7	33.2	32	30.7	32	30.8	23.8	20.6
2021	19.1	23.8	28.5	30.4	32.5	33.8	31.5	30.7	29.8	28.5	24.4	19.5
2022	16.3	20.3	29.1	35.1	35.5	35.4	30	30.6	29.8	28	24.2	21.4
2023	18.4	23.8	25	29	31	32.6	30.5	31.1	31.3	28.8	25.3	22.1
Monthly avg Min. temp. (in mm) of Nurpur Forest Division w.e.f January 2012 to Dec,2023												
Year	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
2012	4.2	6.9	10.1	14.7	18.2	22.1	22.1	21.2	19.8	12.9	8.2	5.6
2013	3.6	7.4	10.9	14.2	19	22	22.2	21.9	19	15.9	8.3	5
2014	4.9	6.2	9.7	12.7	17.3	20.9	23	21.7	19.7	14	9.9	4.8
2015	4.9	8.3	10.2	15.2	18.2	19.7	21.8	21.3	17.5	13.8	9.2	4.7
2016	4.9	7.4	11.3	15.8	19	21.7	22.4	21.2	19.8	14.1	8.9	6.3
2017	5.7	8.2	10.1	15.9	18.7	20.5	21.9	21.5	19.4	14.8	9.1	6.6
2018	4.5	7.6	11.3	15.6	18.5	22.1	22.9	22.2	19.4	12.8	9.6	4.7
2019	4.9	7	9.8	15.6	17.7	21.5	22	22	20.4	14.2	11.1	5
2020	5.2	7.4	9.7	14.5	17.7	20.7	20.5	22.6	20.4	13.8	8.5	5.3
2021	4.5	8.5	12.5	14	18.1	21.6	23.4	22.1	21.1	15.5	8.8	5.7
2022	5.9	5.9	12.9	17	20.3	21.6	22.3	22.6	20.4	15	9.8	6.1
2023	6.3	9	11.7	13.8	16.9	20.8	22.4	22.7	20.5	14.1	10.1	6.2

Water Source:

Dehar and Chakki are the only snow-fed streams which receive large quantity of water from the melting snow of the Chamba Ranges during hot weather. The flow of water, however, varies considerably, ranging from torrents during monsoon to insignificant streams during summer. Owing to very heavy incidence of grazing, the runoff is very rapid resulting in floods during July and August. Many irrigation channels have been taken out of Dehar and its tributaries for purpose of irrigation.

A large number of lift irrigation and water supply schemes have been installed by Jal Shakti Vibhag (JSV), all over the area which has considerably eased the scarcity of drinking and irrigation water in the area.

Two major canal systems namely:

1. Shah Nehar from Dehar khad: command area in Jawali and Fatehpur sub-division.
2. Phina Singh Nehar (Chakki River): Command area in Nurpur Sub-Division.

In addition, there are many spring sheds (Bowri) which are being used by locals for drinking water supply for human and cattle populations.

In Nurpur Forest Division, 20 such spring sheds are being recharged with forestry intervention through Himachal Pradesh Forest Eco-system and Climate Proofing project sponsored by KFW Bank of Germany.

Similar, interventions were carried out by building 16 water harvesting structure through Jal Bhandaran scheme, sponsored by CAMPA funding.

1.6 State of boundaries

The boundaries of the reserved and delimited protected Forests were suitably demarcated with large pillars of loose stone masonry at salient and reentrant angles and with smaller intermediate pillars of similar construction, which are now being replaced with RCC cemented pillars. The internal boundaries of compartments and sub-compartments have been demarcated with small loose masonry pillars, included cultivation, however, is not so demarcated at all places. Boundary lines are usually cleared to a width of 3 m and 9 m in the case of scrub and Chil forests, respectively. Internal boundaries are not cleared except where these boundaries act as fire lines.

The boundary pillars are found on the ground but generally not in a good condition. The numbers of most of the boundary pillars are not easily decipherable. Checking of boundaries is shown to be done in the books according to the prescribed programme but detailed checking of bearing, distance, repainting of numbers, etc., is not attended properly. The total length of external and internal boundaries for the reserved and delimited protected forests in the Division is 146.662 KM and 247.806 km, respectively. The number of large and small boundary pillar is 2,547 and 2152, respectively.

1.7 Distribution of Area

The distribution of area by forest legal classification and range wise is as under is as under:-

<u>S.No.</u>	<u>Type of Forest</u>	<u>Range</u>	<u>Area in ha.</u>
1.	Reserve Forests (RF's)	Nurpur	1826.03
		Kotla	1016.00
		Jawali	242.77
		Rey	588.70
		Indora	210.43
		Total	<u>3883.93 ha</u>
2.	Demarcated Protected Forests (DPF's)	Nurpur	1593.47
		Kotla	562.80
		Jawali	1799.37
		Rey	103.99
		Indora	1198.08
		Total	<u>5257.71 Ha</u>
3.	Un-delimited Protected Forests (UPF's)	Nurpur	5836.91

Kotla	3115.50
Jawali	3624.67
Rey	5670.88
Indora	7759.27
Total	<u>26007.23 Ha</u>

4. **Unclassed Forests**
(UF's)

Nurpur	3029.19
Kotla	3830.45
Jawali	1082.48
Rey	2064.79
Indora	261.02
Total	<u>10267.93 Ha</u>

5. **Co-operative Forest Society**

Nurpur	1892.76
Kotla	---
Jawali	683.78
Rey	1485.73
Indora	3698.74
Total	<u>7761.01 Ha</u>

G. Total **53,177.81 Ha**

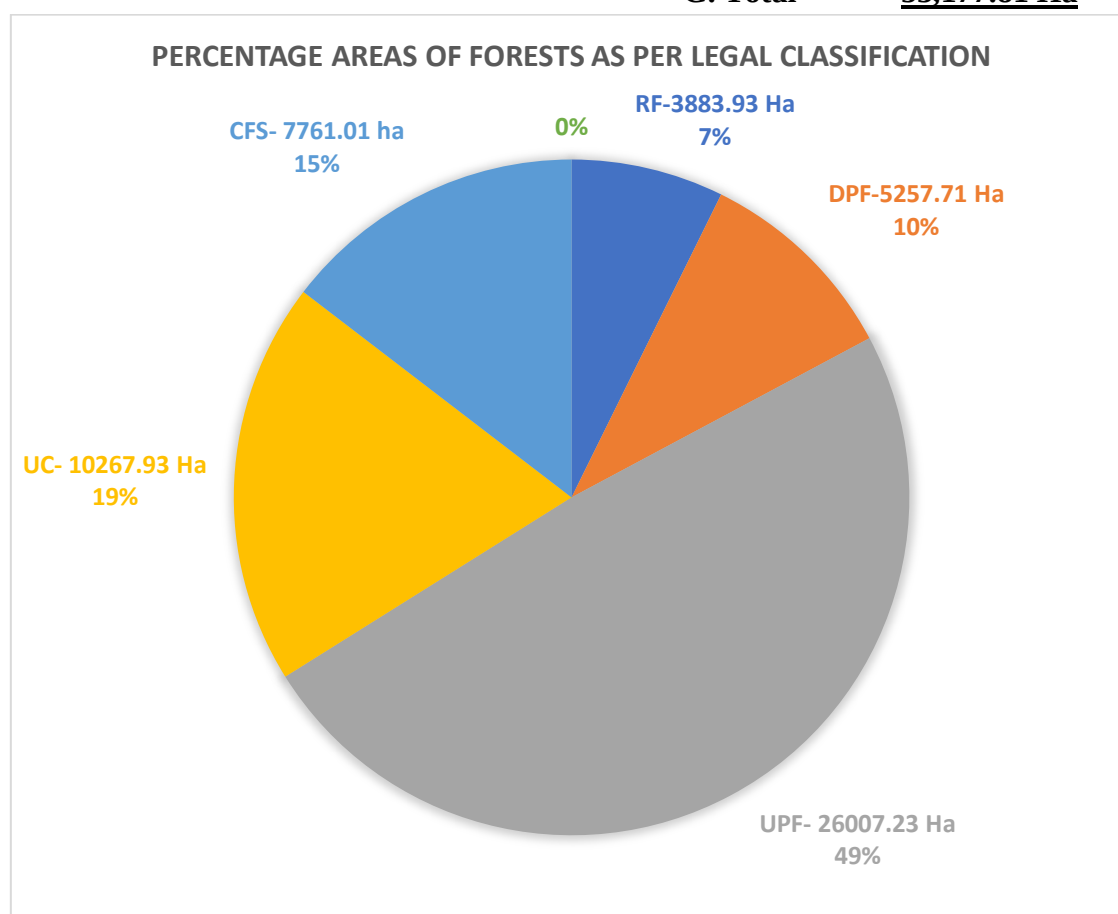


Chart 1.1

Total Area= 53,177.81 Ha

Ban Sarkar registers have been prepared in duplicate for use in Divisional as well as in range offices.

The number and area of included cultivation chaks existing in the Reserve, demarcated, un-demarcated protected and unclassified Forests is given in Appendix II.

The external as well as internal boundaries of both un-demarcated protected forest and unclassified Forests is uncertain.

1.8 LEGAL POSITION:

In order to have a fair idea of the present legal status of the forests a detailed historical background of various measures taken in Kangra district as a whole is considered appropriate and is therefore, discussed as under :-

1.8.1 LAND TENURES AND LAND REVENUE SETTLEMENTS

Before commencement of the Mughal Rule, the Raja was the manorial Lord of his territory which was a single estate divided into a number of circuits for administrative purpose. The circuits were more groupings of holdings under a collector of rents. All waste lands were the property of the Raja. Every right was supposed to come from the Raja and holding of land was derived from his grant. This system of Land tenures continued unchanged, under the Mughal and Sikh rulers till 1846 when the tract ceded to the British Government

LAND REVENUE BARNES SETTLEMENT (1849 TO 1852):-

After the cessation of the territory in 1846, a summary settlement was carried out by John Lawrence while regular settlement was conducted by Barnes during the year 1849-52. Barnes converted each circuit which were collection of hamlets with patches of cultivation and (*undefined rights of user in the surrounding wastes, in to mauza and*) demarcated their boundaries. Land holders of each mauza were converted in to a co-proprietary body and land revenue was assessed as lump-sum for the entire mauza. The payment of which was made the joint responsibility of all the land holders of the mauza. In order to balance the responsibility so imposed these village co-proprietary community were conferred with the right to collect and divide amongst themselves certain items of miscellaneous revenue. The most important result of the settlement from Forest point of view was that the ownership of the soil of the Forest and the waste was transferred to the village co-proprietary body with certain reservations of the rights of Gaddi shepherds and Gujjar herdsmen while Govt retaining only the ownership of the trees of spontaneous growth or planted by it and the right to collect grazing dues from gaddis.

1.8.2 LYALL'S REVISED LAND REVENUE SETTLEMENT (1865-1869):

Lyall (Sir James) sub divided the Mauzas (circuits) into Tikas, consisting of one or more hamlets with surrounding waste over which rights were claimed, defined and fixed the boundaries of the tikas (Tikabandi) and thus, Tika became the unit of management. This was the most important feature of Lyall's operations. A large proportion of waste was included within the Tika boundaries (on the basis of mutual agreement) the ownership of which was vested in the Khewatdars of that Tika and was recorded as "Shamlat Tika".

The waste that could not be partitioned remained the joint property of the whole mauza and was recorded as “Shamlat Deh”. Under the latter category fall :-

- (i) all or almost all the larger blocks of waste which were generally formed into separate tika known as “Chakban” followed by the name of the Mauza (chakbans are tikas containing nothing but or very little else than forests, are the property of the whole mauza) and
- (ii) certain small blocks of specially valuable forests which are shown in the maps of the tikas in which they fall. The proprietary right in Shamlat Deh “is in proportion to the revenue, paid by each tika where as in Shamlat Tikas it is, as a rule, proportional to the revenue paid by each Khewatdar. However, there is an intermediate case, though not quite common, where the waste is the joint property of a few and not of all the tikas of the mauza.

Lyall made certain proposals for forest conservancy which were never sanctioned and thus from an ambiguous definition of the lands under government forests and the conservancy clauses of the administration papers of his settlement had little effect upon forests.

1.8.3 SCHEME OF ROE AND DUFF (1872-1875) RESERVED AND UNCLASSIFIED FORESTS:

On representation made by the Conservator of Forests in 1869 the Government appointed Roe (Settlement Officer) along with Duff (Deputy Conservator of Forests) for demarcating absolute government forest areas. The principle to be followed was to acquire absolute proprietary rights in selected areas in exchange for a modification of its rights in the remaining wastes.

The scheme resulted in the acquisition of complete rights over 3430.52 ha. (8477 acres) in 21 villages of Nurpur Tehsil and 3095.00 ha. (7648 acres) in 29 villages of Dehra Tehsil by way of granting special money and land concessions, by abandoning the right of closures in the remaining wastes and by conferring to the village communities some special rights in such wastes. The land so acquired was notified as Reserved forests vide notification No. III-F and II/F dated 6th March, 1879 the remaining wastes over which the right of closures was abandoned were designated as Unclassified forests. Rules for preservation and protection of trees in unclassified forests were later on notified vide Notification No. 11 dated 20th January, 1897. Subsequently amended vide No. 994 dated 11th January, 1919.

Fortunately, further negotiations on the above lines failed, the hazards of demarcation on these principles realized and further demarcation on these lines was dropped. Considering the special money and land concessions and the abrogation of the important right of closures the result of the measures described above can only be termed as disastrous to the forest conservancy.

1.8.4 ANDERSON’S FORESTS SETTLEMENT (1883-1897):

The regular forest settlement was carried out by Anderson in Kangra proper from 1883 to 1897 which was sanctioned in 1897. The principles on which the demarcation was carried out are laid down in para 5 of the report which are as under:

- i) No change was to be made in the forest management of the forest and land after inside or outside the demarcation.

- ii) Forest land which should be permanently maintained as such was to be separated by demarcation from forest land in which clearance for cultivation might at some time be permitted.
- iii) There was to be no “give and take” negotiations with the Zamindars nor was the demarcation to proceed with the idea that the forests excluded from it would be made over to the Zamindars and released from all control.
- iv) Anderson did not deal with the Reserved and the unclassed forests. The remaining forests were declared Protected and in these forests he demarcated a large number of more important areas including the majority of the old trihais (closed in 1860) which was termed to be “Demarcated Protected Forests”, while the areas on side his demarcation came to be known as “Un-demarcated Protected Forests”. The results of the Anderson’s settlement may be summarized as un-demarcated, Demarcated Protected Forests which are to be maintained permanently as forest (Notification No. 57 dated 26th January, 1897 amended by Notification No. 991 dated 11th January, 1919.
- (v) The formation of un demarcated protected forests by application of chapter IV of the Indian Forest Act, (Notification No. 58 dated 26th January, 1897 amended by Notification No. 992 dated 11th January 1919) to all forest and waste land in which the trees had been declared in the revenue settlement record to belong to the Government with following exception:-
 - (a) The demarcated Forests.
 - (b) The reserved and unclassed forests.
 - (c) Areas in which the Deputy Commissioner may from time to time sanction appropriation of land for cultivation or for any other purpose.
 - (d) Forest and waste land included in the Jagirs of Rajas of Guler and DadaSiba (Dehra Tehsil).
- (vi) The declaration in Notification No. 59 dated 26th January 1897 as amended Notification No. 993 dated the 11th January, 1919, of 62 species of trees to be reserved under section 30 (a) of the Indian Forest Act in the Protected forests. The 62 species are as under:-

<u>Sr. No</u>	<u>Local Name</u>	<u>Scientific Name</u>
1.	Chil	<i>Pinus roxburghii</i>
2.	Harar	<i>Terminalia chebula</i>
3.	Dhao, or Chal	<i>Anogeissus latifolia</i>
4.	Kakkrain (kakkarsingi)	<i>Pistacia integerrima</i>
5.	box (Boxwood)	<i>Buxus sempervirens</i>
6.	Walnut	<i>Juglans regia</i>
7.	Chestnut	<i>Aesculus indica</i>
8.	Elm	<i>Ulmus wallichiana</i>
9.	Khair	<i>Acacia catechu</i>
10	Shisham	<i>Dalbergia sissoo</i>
11	Oak	<i>Quercus spp.</i>
12.	Kinu	<i>Diospyros tomentosa</i>
13	Tun	<i>Cedrela toona</i>
14	Bamboo	<i>Dendrocalamus strictus</i>
15	Sal	<i>Shorea robusta</i>
16	Kalm	<i>Stereospermum parvifolia</i>
17	Kendu	<i>Diospyros cordifolia</i>

18	Rajain	<i>Holoptelea integrifolia</i>
19	Behra	<i>Terminalia bellirica</i>
20	Mahwa (Mahua)	<i>Madhuca latifolia</i>
21	Keor	<i>Holarrhena antidysenterica</i>
22	Berna	<i>Crataeva religiosa</i>
23	Sanan	<i>Ougenia dalbergioides</i>
24	Kaamal	<i>Mallotus philippinensis</i>
25	Sarin	<i>Albizia lebbek</i>
26	Jaman	<i>Syzygium cumini</i>
27	Simul	<i>Bombax ceiba</i>
28	Bill	<i>Aegle marmelos</i>
29	Kemba	<i>Lannea grandis</i>
30	Kilawa	<i>Wrightia tomentosa</i>
31	Arjun	<i>Terminalia arjuna</i>
32	Ber	<i>Zizyphus jujuba</i>
33	Asan	<i>Terminalia elliptica</i>
34	Amla	<i>Phyllanthus emblica</i>
35	Lasora	<i>Cordia myxa</i>
36	Patajan	<i>Putranjiva roxburghii</i>
37	Dhaman	<i>Grewia</i> spps.
38	Pariara	<i>Erythrina suberosa</i>
39	Ohi	<i>Albizia stipulata</i>
40	Phula	<i>Butea monosperma</i>
41	Kao	<i>Olea cuspidata</i>
42	Kikar	<i>Acacia arabica</i>
43	Karmaru	<i>Albizia odoratissima</i>
44	Kuthman	<i>Syzygium jambolanum</i>
45	Kachnar	<i>Bauhinia variegata</i>
46	Maple	<i>Acer</i> spps
47	Spruce	<i>Picea smithiana</i>
48	Silver fir	<i>Abies webbiana</i>
49	Mulberry	<i>Morus</i> spps.
50	Rhododendron	<i>Rhododendron</i> spps.
51	Khirak	<i>Celtis australis</i>
52	Duri	<i>Cedrela serrata</i>
53	Jamu	<i>Prunus cerasoides</i>
54	Haleo	<i>Cornus macrophylla</i>
55	Guj	<i>Viburnum nervosum</i>
56	Bado	<i>Salix</i> spps
57	Puna	<i>Ehretia laevis</i>
58	Badrin	<i>Wikstroemia canescens</i>
59	Burj	<i>Betula</i> spps
60	Kurumb	<i>Machilus</i> spps
61	Dodan	<i>Sapindus detergens</i>
62	Deodar	<i>Cedrus deodara</i>

- (vi) Completion of detailed Forests record of rights and notification of rules for the exercise and regulation of these rights.
- (vii) Notification of rules applicable to the Un-classed Forests under section 76 of the Indian Forest Act 1927 (Notification No. 61 dated 26th January 1897 amended by No. 994 dated 11th January, 1919.)

1.8.5 MIDDLETON'S REVISED LAND REVENUE SETTLEMENT (1913-1919)

The identification and record of the areas on which the trees were the property of the state was the most important forest matter dealt with in the course of this settlement. In spite of attention to detail which characterized the earlier land revenue settlements. The records were not quite clear as to the field number on which the trees belonged to the government. Andersons Forest Settlement, though resulted in a clear record of rights in the demarcated protected forests, did not remove the difficulty of ascertaining the areas outside the demarcation in which the trees were the property of the government. This verification was carried out by Middleton with the assistance of Mitchell who prepared "Tree files by tracing each field number to Lyall's record and declaring the proprietary right of government otherwise in terms of new field numbers." In doing so the title of government to trees in small scattered areas not exceeding 4 acres (4 acre rule) was generally abandoned. The Government Forests (Ban Sarkar) area were, thus, clearly defined and the matters were brought on a far more satisfactory footing than ever before, and one of the main, difficulties of Revenue and Forest administration was removed.

In the body of the 'record-of-rights; wherever a field number in which the Government owns the trees occurs, a note to that effect was recorded in the remarks column, at the end of the record forming part of the "Jamabandi". In addition, a Forest Register for each tehsil showing the field number and the area of each class of forest in every Tika was drawn up.

1.8.6 MITCHELL & WALTER'S ROTATIONAL CLOSURE SCHEME (1919):

The forests included in the earlier demarcations and closed to grazing continued to improve but those outside the demarcation deteriorated steadily and were in danger of extinction. Realizing the true state of affairs, the Government, in order to save the forests from irretrievable damage, issued orders in 1913 for the preparation of a scheme of rotational closure of the forests. The Inspector General of Forests, who toured the District in 1915, also suggested to the Government that the whole area which was proposed ever to be closed under the Indian Forest Act should be delimited by a special Revenue Officer along with a Forest Officer. Accordingly, Mitchell and Walter's were deputed for the purpose and their operations resulted in a scheme known as Mitchell and Walter's Rotational Closure Scheme.

A question may be raised as to why a fresh delimitation of areas to be subjected to rotational closure was felt necessary when already there existed a good number of demarcated protected forests. It was not possible to consider the then existing

demarcated forests as the basis for the new system of “Closure Series” on account of the following three main reasons:

Firstly the Government’s right of closure extended equally to both demarcated and un-demarcated protected forests and contiguous with the demarcated forest there were pieces of un-demarcated forests in which there was a little objection as to the closure of most of the demarcated areas.

Secondly, the demarcated forests were, in many cases, large and included wastes taken from many tikas and often more than one mauza. The tikabandi of the waste was carried out on the basis of the grazing ground mainly used by each tika concerned and though it was rare to find a case in which tika grazed exclusively on its own waste and had no mutual arrangement with its neighbors, still it is obvious that under conditions which render a tikabandi possible the closure series could not be very much larger than the waste of each tika.

Thirdly, the demarcated forests included a considerable extent of forests which could never be closed without great hardship to the right holders. The best instance is that of large ‘Chakbans’ which are tikas containing nothing but or very little else than forest, and are the property of the whole mauza and not merely of the khewatdars of the nearest cultivated land. Obviously, these were the tracts which conformed to the principles of the demarcation in Anderson’s settlement and they were, as a rule, accepted as demarcated protected forests as they stood. But when the boundaries had been fixed at Lyall’s settlement, the majority of cases, the tikas bordering the chakbans were given no waste at all, so that their cattle entered direct from the houses into the demarcated forests which contained all the paths from one part of the grazing land to another and all the watering places.

In view of the above, the closures Series had to be constructed without reference to the old demarcation. Some un demarcated forests had to be included and some demarcated forests had to be excluded from the new delimitation. Thus, for the selection of area to be subjected to the scheme of Rotational closure an amalgamation of the demarcated and un demarcated protected forests took place. The areas so delimited which may be composed entirely of demarcated protected or entirely of un-demarcated protected forest of both, were termed Delimited Protected Forests (D.P.F.).

There exists some misunderstanding between the term ‘Delimitation’ and “Delimited forest”. The term “delimitation” was used only to avoid any confusion with the previous act of demarcation. The latter connotes a legal difference between the two classes of forest, (demarcated and un-demarcated) while the former is merely an executive act having no legal significance whatsoever. The demarcated protected forest remained under the charge of forest department while some legally demarcated forests excluded from the delimitation were transferred to the control of Deputy Commissioner along with other remaining forests.

1.8.7 SUMMARY OF THE RESULTS OF THE SETTLEMENT AND THE SCHEME: -

The net result of various measures described above was to create the following categories of Forests: -

- (i) **BAN-MUAFI FORESTS:** -Which were the absolute, common property of the Village proprietary bodies.
- (ii) **RESERVED FORESTS:** -Which are the absolute property of the government, practically free of rights.
- (iii) **UNCLASSED FORESTS:** -Where trees belong to the government but no closures can be made without the consent of the people.
- (iv) **DEMARCATED PROTECTED FORESTS:-**(Jungle Mehduda) In which appropriation of land can never be granted.
- (v) **UNDEMARCATED PROTECTED FORESTS:** (Jungle Ger Mehduda) In which breaking up of land could be sanctioned by the Deputy Commissioner.
- (vi) **DELIMITED PROTECTED FORESTS:-** (Jungle Mehfuja) In which area to be subjected to the rotational closures scheme and are to be permanently maintained as forests.

1.8.8 THE COOPERATIVE FOREST SOCIETIES: -

The condition of the delimited protected Forests being, under proper management by the Forest Department improved, and was quite satisfactory, but the unclassed and the un-delimited protected Forests suffered badly due to indiscriminate felling, lopping, grazing, browsing etc resulting in serious loss of soil cover which accelerated erosion specially in the lower foot hills. In order to arrest further deterioration of these Forests, the Government decided in 1938, to associate the villagers in the Forests Management by entrusting them the management of all government forests within each village estate, generally a Mauza, provided, they agreed to manage the remaining un managed forests also under regular working plans through the agency of the co-operative societies. The scheme of the co-operative Forest Societies was sanctioned by the Government vide their letter No 568-Ft, dated 27th Feb 1940, where in the detailed administrative aspect of this new institution were outlined. The detailed organizational set up, the bye-laws etc are given in Appendix. The scheme was sanctioned initially for a period of five years and the first societies was registered during Nov.1941. The scheme was reviewed and extended from time to time., till 31st march 1971. Nothing has been done to extend the scheme and further renewal of the registration of these Societies since then.

1.8.9 THE HP VILLAGE COMMON LANDS (VESTING AND UTILIZATION) ACT, 1974:-

With the enactment of “The H.P Village and Utilization Act, 1974” the ownership of the soil which was earlier with the village proprietors has vested in the government. As a result of this, the Ban Muafi Forests which were the property of the villagers have now become the government property. Similarly, the soil of the un-classed and the Protected Forests which belonged to the people (Government having proprietary rights only on the trees of spontaneous growth or planted by it) has also vested in the

government and these Forests have also become the absolute property of the government, although burdened with rights.

1.8.10. The Van (Sanrakshan Evam Samvardhan) Adhiniyam, 1980

With the enactment of “The Van (Sanrakshan Evam Samvardhan) Adhiniyam, 1980” no forests land can now be diverted for any non-forestry purpose without the permission of the Government of India. As a consequences of this, the position regarding breaking up of land for cultivation in the un-classed and the Un-demarcated protected forests with the permission of the Deputy Commissioner has been completely altered. Thus, the distinction amongst the demarcated protected, Un-demarcated Protected and the Un-classed forests, as far as the breaking up of land for cultivation is concerned has disappeared.

1.9.1. RIGHTS AND CONCESSIONS: -

Rights in reserved Forests: Owing to the manner in which reserves were created, no rights what ever except loosely defined rights of way and water.

1.9.2. RIGHTS IN PROTECTED FORESTS: -

The difference in the matter for the rights between the demarcated and un-demarcated protected forests are few. In the former, the rights have been definitely recorded and detailed in the Anderson’s detailed “Tikawar” record of rights and breaking up of land for cultivation is entirely prohibited, while in the latter the rights are only recorded in general terms and breaking up of land for cultivation can be permitted by the deputy commissioner/Sub-Divisional Magistrate. In delimited protected forests the rights are recorded in special record of rights prepared by Mitchell and Walter for each forest and are appended in the Forest Journals. It is important to emphasize that although there are some un-demarcated protected Forests in the delimited protected Forest yet it is presumed that appropriation of land will never be allowed in these delimited protected forests. All rights of user (except those of Gaddi and Gujjar pastoralists and customary right holders) are appendant to cultivated land assessed to land revenue are acquired and alienated with such land, and are exercised only for bonafide agricultural and domestic requirement (as distinct from pastoral and industrial requirement). All rights are granted subject to the condition that the right holder shall be responsible for paying grain cess to Rakhas and subject to the limitation that the rights will not be exercised to an extent which will endanger the existence of the forest. Government retains the power to limit or suspend right for sufficient reasons.

1.9.3. SUMMARY OF PRINCIPAL RIGHTS: -

The principal rights recognized at the forests settlement are: -

Breaking up of land for cultivation; timber for building purposes; timber and wood for burning the dead; and for marriage and funeral ceremonies; wood for agricultural implements; grazing; grass cutting; lopping.

The soil, the proceeds from the sale of grass from areas closed by government and the fruits of the trees belong to the village proprietors, Government owns the trees of spontaneous growth or planted by it and is entitled to protect, improve and reproduce the forest growth and to sell trees to traders and non-right holders to the full.

The exercise of the rights is regulated by rules framed under Section 32 for the Indian Forest Act, and gazette notification No. 416 dated the 14th August, 1897 as amended by No 55 dated the 6th Feb, 1904 and No. 995 dated the 11th January, 1901 for Kangra.

1.9.4. BREAKING UP OF LAND FOR CULTIVATION

This has been explained in above paragraph 1.9.2.

1.9.5. TIMBER FOR BUILDING PURPOSE

The right has been clearly defined in the forest settlement and timber for buildings can only be obtained on application to the Forest officer and on payment on fixed Government fees which is Rs 250.00 per cubic meter for *Shisham, Safeda, Tuni, Chil*, and other Broad Leaved (BL)

The trees principal used for building timber in low hills are as follow:-

Pinus roxburghii, Dalbergia sissoo, Acacia catechu, Acacia nilotica, Albizia stipulata, Albizia lebbbeck, Syzygium cumini, Anogeissus latifolia and Terminalia bellirica.

Now, the timber is being granted to the right holders who have their recorded rights in the concerned forest settlement reports for grant of timber for construction, repair and addition or alteration of residential house, cow sheds for bonafide domestic use. As per the new rules, no T.D will be made for ten years to the right holder who has sold trees yielding timber for construction of houses from his private land holding. In case the right holder has land holding which qualifies him for grant of timber at more than one place, he can be granted timber at both places but the rates of the trees will be doubled at the second place. The T.D is also not being granted in case where the land owner has purchased the land after obtaining permission from the government under section 118 of the Tenancy and Land Reforms Act, 1972.

Timber is only being granted to the head of the family as per the Panchayat records for the construction, repair and addition or alteration of house and cow shed to be used only for bonafide domestic purposes. The timber is not granted if trees for the purpose are not available silviculturally in the concerned forest. However, trees can be given from other forests at 50 percent of market rate of trees, provided right holders of those forests have no objection. The provision has been made that right holders will continue to exercise rights other than for timber construction, repair and addition alteration as contained in forest settlement reports. It has also been ensured that the T.D rights will be subject to the active cooperation and participation of right holders in forest conservancy.

If a right holder fails to perform his duties for apprehending offenders, extinguishing fire or commits any forest offence, his T.D will be suspended for sixteen years. The T.D shall also be suspended for sixteen years in case the right holder will be found to have misused the the timber under these rules.

Earlier, there was provision to grant trees in converted form from the depots but now trees are being allotted in unconverted form. For construction of new house, up to 7 cubic meters standing volume is being granted instead of earlier provision of 3 cubic meters in converted form and for repair, addition or alteration up to 3 cubic meters

standing volume is being granted which earlier was 1 cubic meter. Trees are being given from salvage (fallen, dry standing) trees but if salvage trees are not available, then only silviculturally green trees will be given to the right holders.

The periodicity for grant of T.D has also been enhanced and for construction of new house it will be given once in fifteen years instead of thirty years and for repair work it will be given once in five years which earlier use to be given once in fifteen years. The sufferers of natural calamities, fire incidents will not be given timber distribution more than 7 cubic meters which is the maximum limit.

The timber granted has to be utilised by the right holder within a period of one year, however if he fails to do so, concerned Divisional Forest Officer can grant extension for their use based on the genuineness of the case.

Under the new rules, Rs. 500 per cubic meter standing volume is being charged for Deodar and Rs. 250 per cubic meter standing volume for other species. The right holders suffering from natural calamities will be given trees free of cost and the rates once fixed will be valid for five years.

The following statement shows the number of trees of the principal species given to right holders for building purposes between 2012-13 to 2021-22.

Sr No	Year	No of TD	Trees Granted	Vol (in cubic meters)
1	2012-13	Nil	Nil	Nil
2	2013-14	Nil	Nil	Nil
3	2014-15	3	3	2.931
4	2015-16	2	2	4.517
5	2016-16	2	2	3.067
6	2017-18	33	33	33.833
7	2018-19	44	44	45.019
8	2019-20	63	63	66.386
9	2020-21	137	137	149.069
10	2021-22	177	177	256.642
11	2022-23	149	149	144.377
12	2023-24	124	124	131.596

Timber and wood for burning, the dead and for funeral, Marriage Ceremonies and Agricultural implements etc.

For the regulation of the rest of these miscellaneous rights, trees have been divided into two classes, of which the first-class comprises the sixty two species “reserved” in notification number 59 dated the 26th January, 1897 and second class contains all other trees. The Lamberdar are authorized to give permits for the cutting of second class trees so long as they are not required for building purposes of any kind whatsoever and where second class trees are not available, the rules allow permission to be given for the utilization, on Lamberdars permits, of crooked or unsound stem of Ist class, with the exception of 19 named species, provide that the trees to be cut are first marked by a duly authorized Forest Official for the actual burning of dead, however, a sufficiency

of any wood, except of 19 species named below, may be notice being given to the local forest official within ten days. Thorny bushes can be cut by the villagers without a permit from the Lamberdar vide Punjab Government letter No 756-C(S), dated the 2nd July, 1938.

The rules regarding the grazing of sheep and goats are confused but are to be interpreted to mean, according to a decision of the Financial Commissioner, that the right holder may graze any number of such animals as are required for his domestic and agricultural (not including pastoral) purposes, or a number of animals equal to 30% more than the number at O'Briens assessment of revenue in 1892, which ever may be greater, in practice, however these restrictions have remained a dead letter on account of the impossibility of satisfactorily differentiating between domestic and industrial, agricultural and pastoral pursuits and of applying O'Briens enumeration figures which do not distinguish between the gaddies nomadic flocks and local sheep and Goats. With the exceptions mentioned above, resident non-right holders can graze there on domestic cattle free, if the right holders do not object.

Gaddi Grazing

The "Gaddi" who generally belong to Chamba, but in some cases, have settled in Kangra to become entitled to all the rights of user, are true shepherds. The rich pastures on the Southern slopes of Dhauladhar provide autumn and summer grazing for four to five months, but for 3 or 4 months, in the winter the flocks resort to their recorded "runs" in the low hills which provide only insufficient and poor grazing. In rainy season the "gaddi" take shelter behind the main range by moving to Bara Bhangal, Chamba and Lahaul where grazing of very fine quality is available in the alpine pastures. The movement of flocks are governed by the following rules:-

(i) Two classes of "Gaddi" have to be recognized and they pay at rates are given below as fixed in 1967: -

Class

(a) Migratory (i) Sheep Rs.19.00 per hundred

(ii) Goats Rs.37.00 per hundred

(b) Residents (i) Sheep Rs. 7.81 per hundred

(ii) Goats Rs.25.00 per hundred

(ii) For purposes of enumeration, lambs and kids born in the spring are counted.

(iii) Daily stays must be 8 KM apart.

(iv) No halt may ordinarily be made for more than one night at any halting place, but when delayed by rain or by necessity of giving salt to the flocks, a halt for two nights is equal to the full grazing fee is leviable but the Deputy commissioner has discretion in special cases to reduce it in case of Goats, to not less than Rs 4.68 per hundred. Further, the halting fee of Rs 4.68 per hundred should be charged for halting for *more than two days but less than six days* unless the halt is for manuring the fields of the right holders when no fee is leviable. Further, Rs 6.25 per hundred Goats and Rs 4.68 per hundred Sheep is leviable if the stay exclusive of days allowed for manuring exceeds *9 days but does not exceed 15 days*. No flocks are permitted to halt at a place for *more than 15 days*. The period for halting for manuring should not exceed 3 nights at one place and halting is leviable for excess even if the halt for manuring purpose.

- (v) In spring, a halt of 3 weeks in the higher ranges, in excess to the period actually necessary for the journey across the passes, is permitted.
- (vi) No halting fee can be charged for halting in tikas where “Gaddis” own land and are, thus ordinary right holders, provided they confine their grazing to the Forests in which they have rights as owners of land.
- (vii) Gaddis and the Jamindars must make their own arrangement in regard to manuring fields but the Zamindars may not interfere with the “Gaddis” even though they refuse to manure.

1.9.10 Gujjar Grazing

Gujjar are of two classes: - “*Ban Gujjar*” and “*Swanadars*”. The former were originally nomads or residents, but the latter are invariably permanent residents of the district and generally co-proprietors of the village and have “*Swans*” or “*Dhars*” recorded in their names which can be transferred only through inheritance.

The *sawanadar gujjar* may graze their cattle in the *sawanas* recorded in their name to the exclusion of all other right holders during 3 or 4 months of monsoon. The *Ban gujjars* on the other hand have got no recorded right anywhere in the district but the right holders in Nurpur Tehsil may permit them to graze the horned cattle on payment of certain fees.

The range wise details of number of grazing permits given in year 2023-24:-

Sr. No.	Range	Year	No. of Grazing Permits given
1.	Nurpur	2023-24	40
2.	Indora	2023-24	58
3.	Jawali	2023-24	34
4.	Rey	2023-24	08
5.	Kotla	2023-24	01

1.9.11 LOPPING

The lopping of thirteen species is prohibited entirely, but all other trees may be lopped for fodder, bedding, and manuring by the *ordinary right holders*; and by *Gujjars* within their *swanas*; and by *ban gujjars* where they are permitted to graze in nurpur area; and by *gaddis* within their grazing runs (for kids only) provided that no trees less than 45 cm girth is lopped at all and that the branches cut do not exceed a finger in thickness and that the trees not lopped to more than one-half of their height.

The enforcement of these rules has always been a very difficult matter, especially near any settlement of *Gaddis* or *Gujjar*. In the past, some of the area were closed to lopping as a punitive measure, but unfortunately such punitive closures have not proved sufficiently effective.

1.9.12 RIGHTS IN UN CLASSED FORESTS

No separate or detailed record of rights exists for the unclassified forests, the government being the owner of trees of spontaneous growth or planted by it, retains the rights of management but no closure can be affected without the consent of people who are proprietors of the soil and the remaining Forests produce. There is no statutory prohibition against cultivation so long as no damage is done to the Forests growth. The following special rights were conferred and arrangement made with the villagers in old Nurgpur Tehsil in which the reserves were constituted: -

- (i) In six villages Bhol Thakran, Kherian, Kothiwanda, Punder, Bhadwar and Minjgran of Nurgpur Tehsil demarcated in 1872 fixation of zamindari rate of all trees at Rs.0.25 per tree distribution of one-fourth of all income from sheep and goat grazing in proportion to the area opened in each village and one-third of all proceeds of the sale of the timber in proportion of 44% (seven annas) to the village proprietors, 28% (four annas and a half to the lumberdars) and 9% (three annas in a rupee), to rakhas while the balance of 9% (One and half annas) being the patwari share has been resumed by government.
- (ii) In 15 village Bhali, Sirit, Gurial, Larth, Soldha, Dole, Talara, Khanni, Damtal, Bhadroya, Banoli, Bhugnara, Bari, Bassa Harrialian and 929 villages in Dehra Tehsil demarcated in 1875, distribution of one third of all sale proceeds of timber and one third of all income sheep and goat grazing in the proportion of 25% (Four anna) to village proprietors 37.5% (six annas) to Lamberdar and 25% (Four annas in a rupee) to Rakhas, the remaining 12.5% (Two annas) being resumed by government as Patwaris no longer receive a share.

Rules for the preservation, reproduction and disposal of trees (Notification No. 61 dated the 26th Jan. 1897), as amended by notification No. Unclassed Forests are identical with rules for protected Forests except that they contain no provision for appropriation of land, grazing and closures.

1.9.13 ZAMINDARI SHARE

From early times (1859) a proportion of revenue obtained from the sale of the trees is paid to the village communities to be divided between the proprietors and certain specified village servants. To quote paragraph 61 of Anderson's settlement report, "this was not a malkana paid in recognition of their property in soil but was a voluntary grant made to secure their interest and cooperation in Forest Conservancy. If the village do not render assistance in enforcing Forest Rules. This grant can be and should be taken away as punishment "Action can be taken on these lines for one year with the approval of Deputy commissioner and with the commissioner's sanction for a longer period. Such punitive action, however, has been rare and the payment has only been withheld in case of incendiarism.

In Protected Forests all over the Division, the sale proceeds of trees at Zamindari rates, one quarter of the net revenue (calculated by deducting all working charge except the cost of establishment from the gross revenue) on departmental works are paid to village proprietors, lamberdars and rakhas. Un-delimited protected forests, the total share is divided amongst the constitute tikas in proportion but in demarcated protected forests and in un-demarcated protected Forests, not included in delimitation the whole share goes to the tika from which the trees are sold. The interna distribution every tika is 50%

(Eight Annas) to the Lamberdars and 19% (three annas) in a rupee to the Rakhas while the old Patwaries share of 12% (Two Annas) has now been resumed by government. The grant is annually announced in a meagerly attended meeting held at tehsil headquarters and the share of the proprietors and Lamberdars is paid to the Deputy commissioner in part payment of land revenue demand, the rakhas receiving their share direct from the Forest Department H.P Government vide their letter No.II-21/74 (Rev-B) dated the 1st Dec.1976 have stopped the payment of zamindari share to the Khewatdars beyond 1973-74 pending final decision.

1.9.14 SPECIAL RIGHTS

The settlement records special concessions to the Jagirdars of Rey, the Mahant of Damtal, Raja of Nurpur and Chaudhari of Indora. These concessions do not materially affect the forest management and are mainly concerned with timber rights. These are as under: -

- i) Raja of Nurpur was allowed as an act of grace to take wood for his domestic use, free of payment from 138.71 ha. of waste land in Mauza Chhatroli and tika Phulel of Mauza Bhadwar.
- ii) The Jagirdar of village Rey was allowed a right to receive trees for his bonafide use free of cost from mauza Rey. He also gets the share of the income from sale of trees which in other places is given to the village proprietors.
- iii) Mahant of Damtal enjoys rights in 30.22 ha. of demarcated protected forests in Mauza Sirit and in 1.92 ha. in Damtal. All the trees standing in this area are the absolute property of the Mahant.
- iv) For the sake of management, 64.75 ha. of the waste land of Mauza Indora was put under the control of Chaudhari of Indora for granting trees to the local Zamindars. He himself is not the owner of trees in this area.

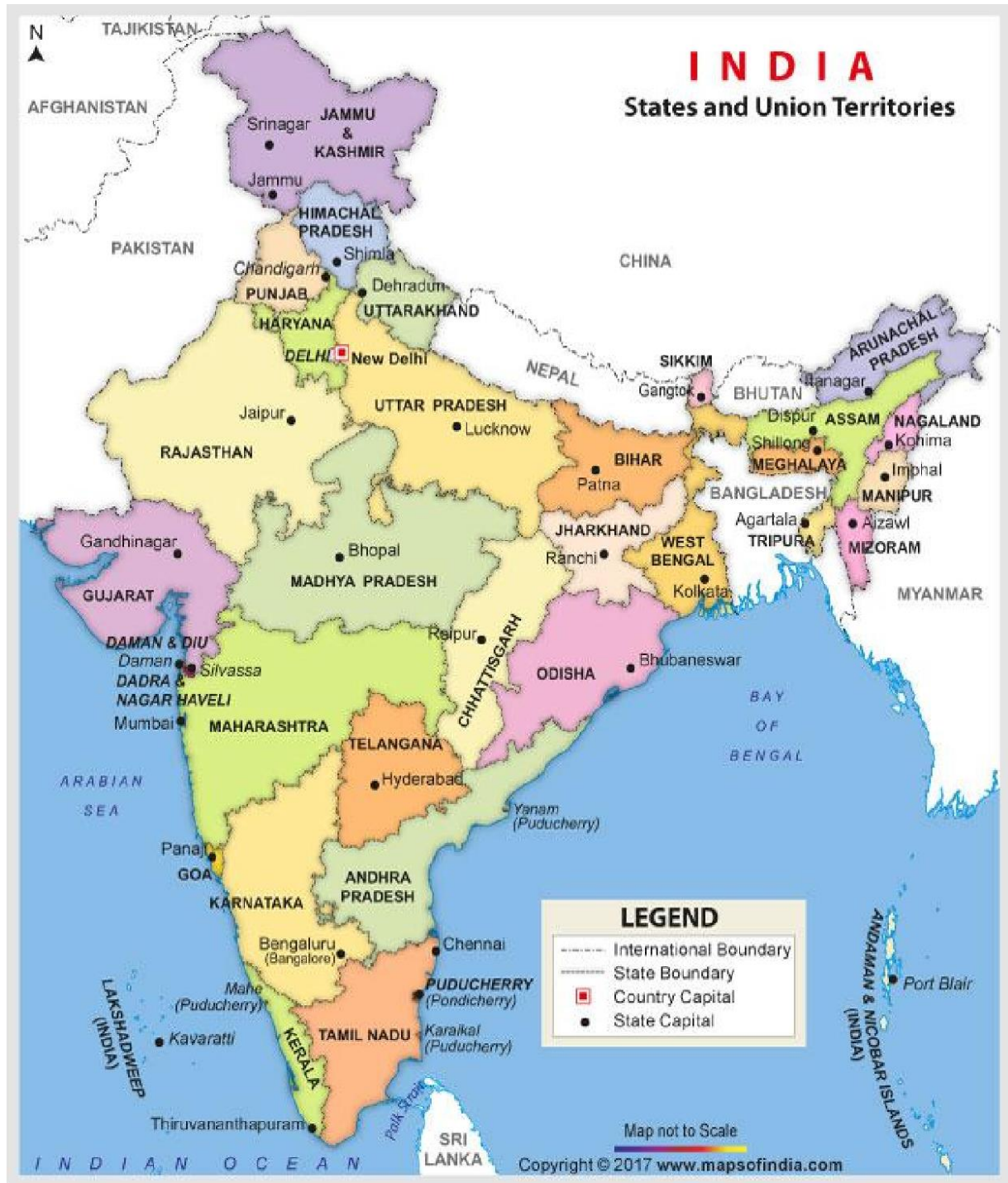
1.9.15 Cattle Tax

On account of the impossibility of enforcing the restrictions against sheep and goat grazing, as pointed out in paragraph above and with a view to cause a reduction in their number and in the number of Gujjar buffaloes, a Cattle Tax was imposed under the Land Revenue Act in 1916 on all goats and sheep owned by the proprietors and tenants of agricultural land on the buffaloes, pigs of sawandars, gujjars and of non-right holding "*Ban Gujjar*" grazing their buffaloes in Nurpur Tehsil. Those ban gujjars who have become right holders by purchase of permanent occupation on rent of agricultural land are exempted from cattle tax. The tax at its inception amounted to Rs. 6.25 per hundred goats and Rs. 4.68 per hundred sheep but was to be doubled at each triennial enumeration if there was no reduction in the numbers kept; on the other hand, it was to be specially reduced in any village where a reduction and was livable on the she-buffaloes of two years and over but was not assessable if the buffaloes only traveled through the Mauza. The rate on goats was doubled in Nurpur Tehsil in 1920 and in Dehra Tehsil in 1921. In 1926 a cattle tax committee was appointed to examine the results and on its reports no change was made in the scale. Another report was due with Government in December, 1930. Since then various meetings of Revenue and forest officers have taken place to consider the increase in taxation with a view to reduce the live-stock of the district, but it was decided to postpone the final decision till the next

revision of Land Revenue Settlement. It may be noted that the whole income from the tax is paid to the zila parishad and the Forest Department is only concerned with the collection of the tax from the Gujjars and its remission as fluctuating land revenue to the treasury.

The question was recently discussed by the grazing Advisory and Forest Utilization Committee set up by the H.P. Government. The number of goats and buffaloes was to be frozen as that the 1970 grazing season.

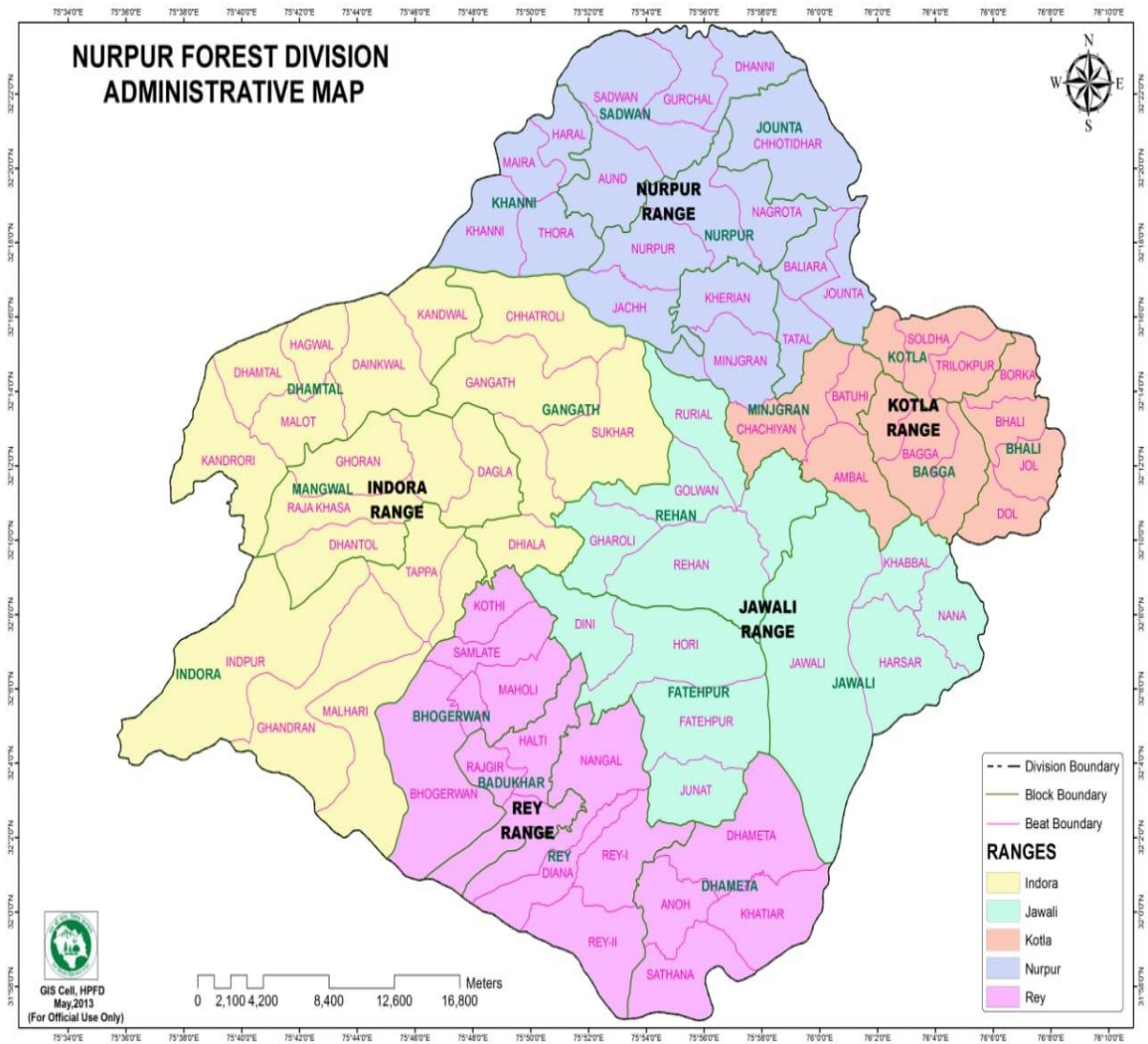
MAP OF INDIA



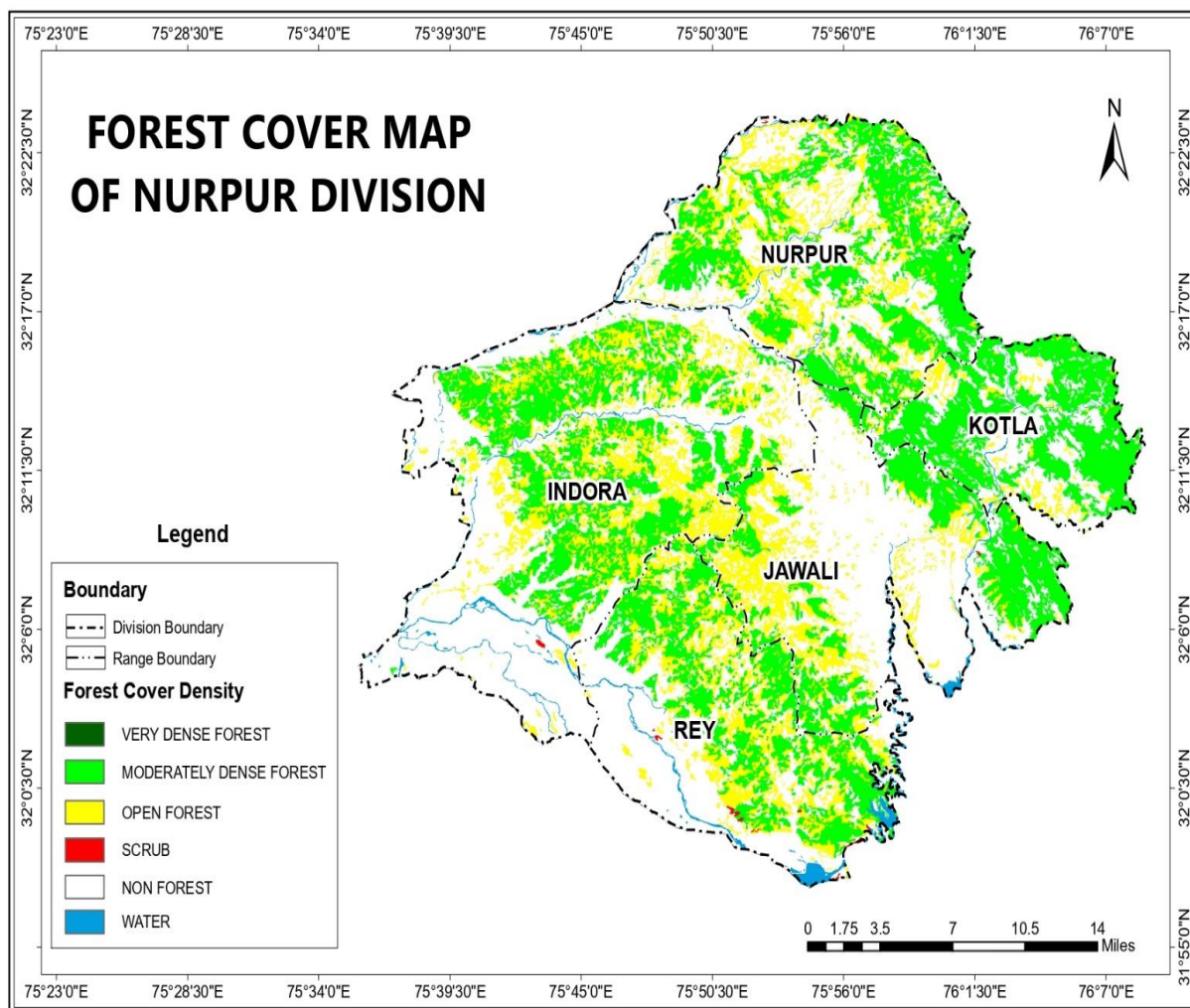
MAP OF HIMACHAL PRADESH



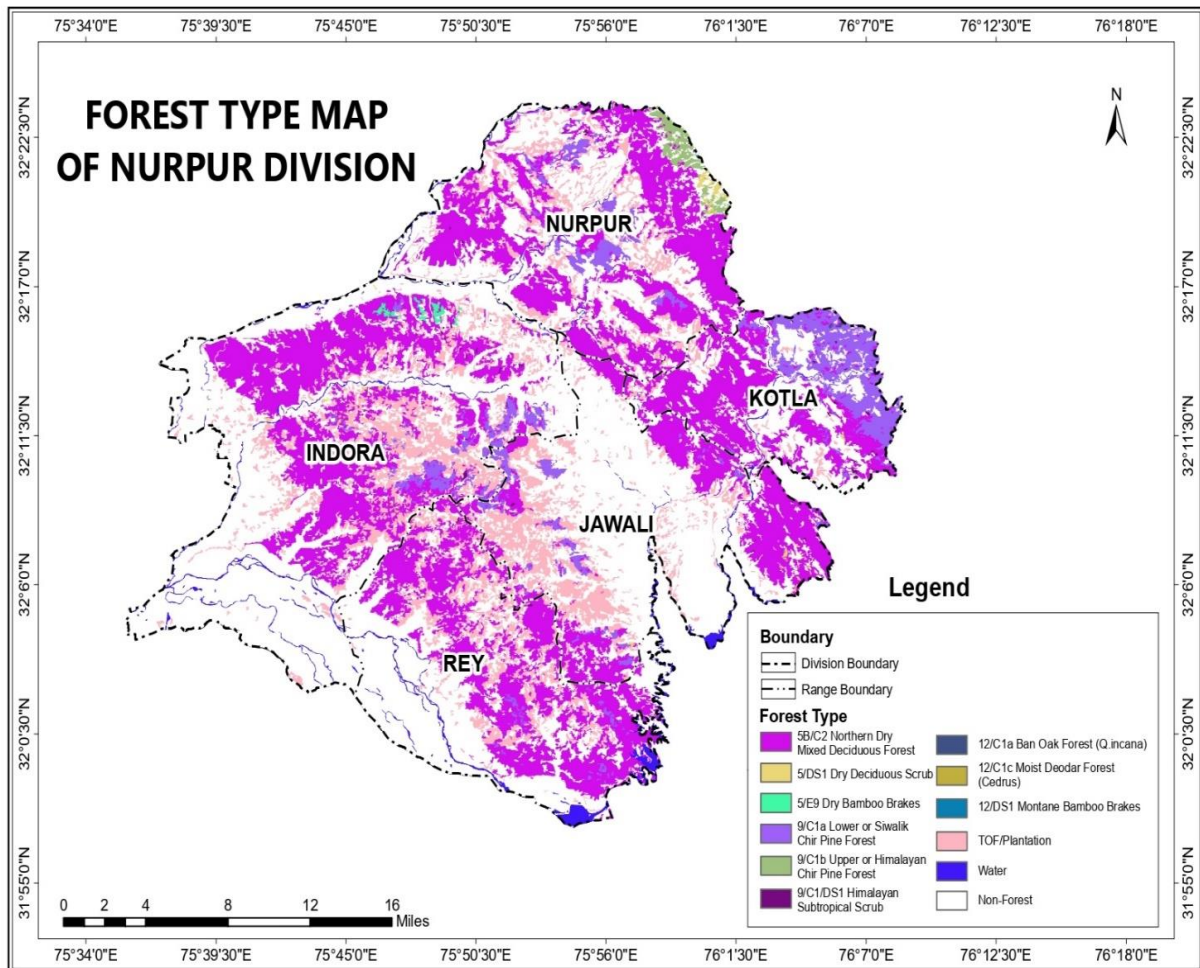
ADMINISTRATIVE MAP OF NURPUR FOREST DIVISION



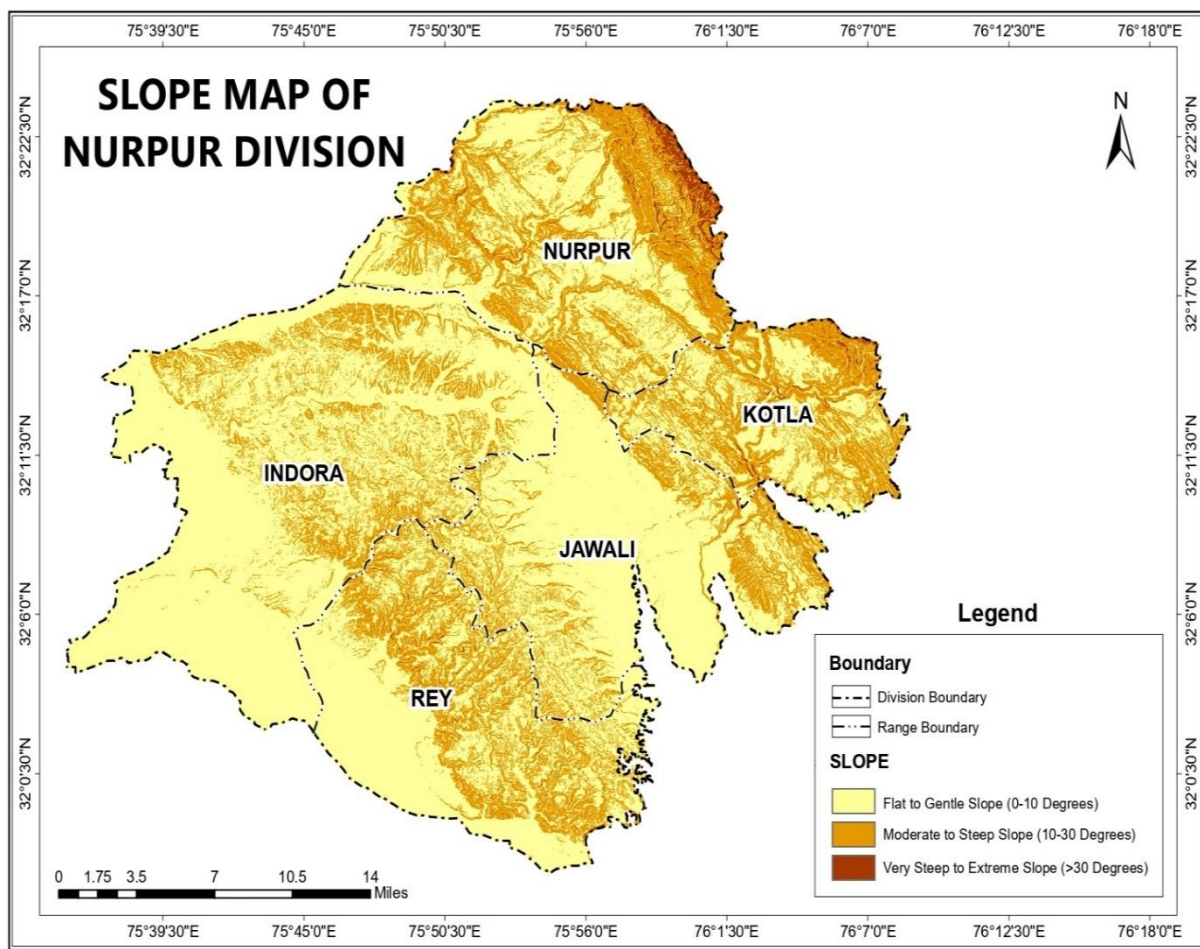
FOREST COVER MAP OF NURPUR FOREST DIVISION



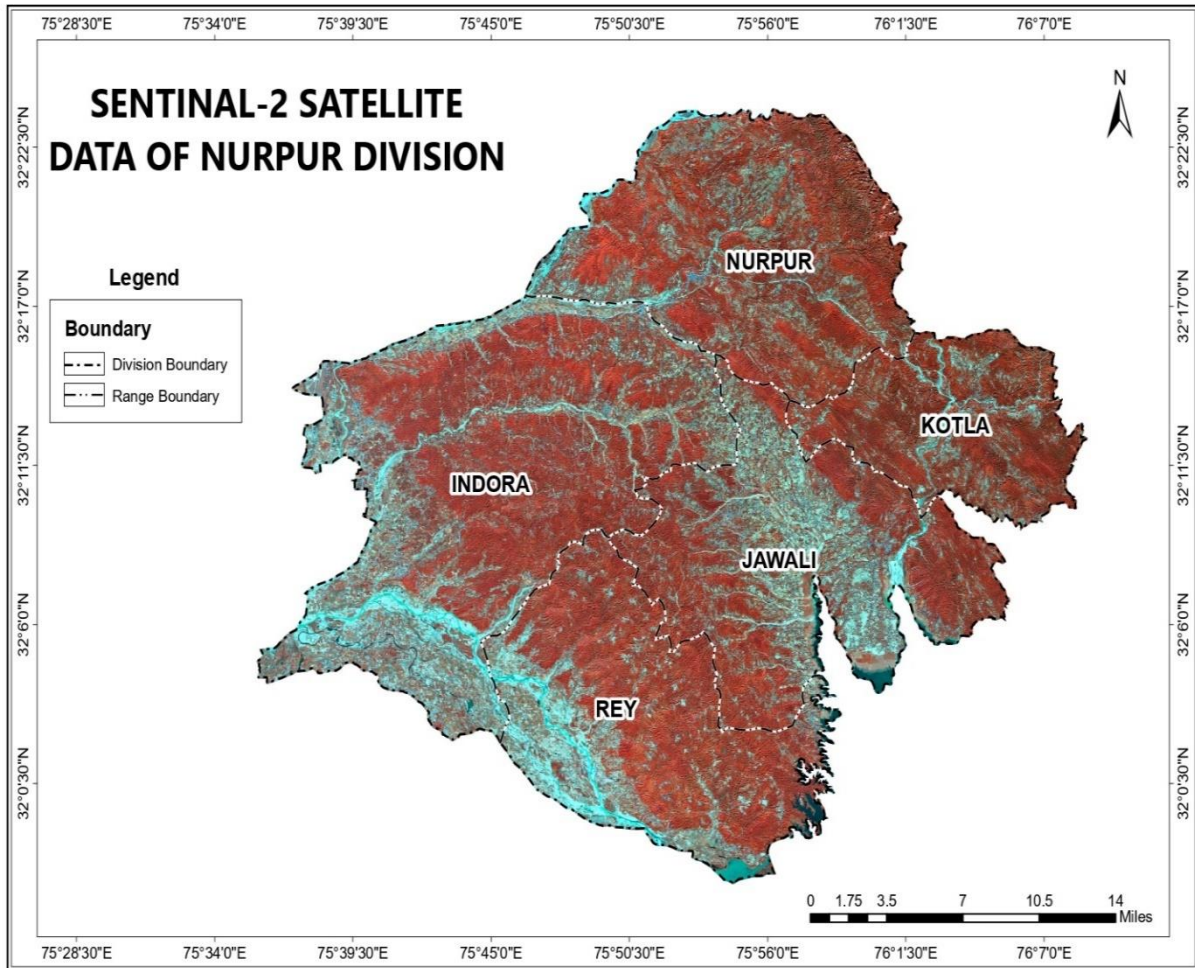
FOREST TYPE MAP OF NURPUR FOREST DIVISION



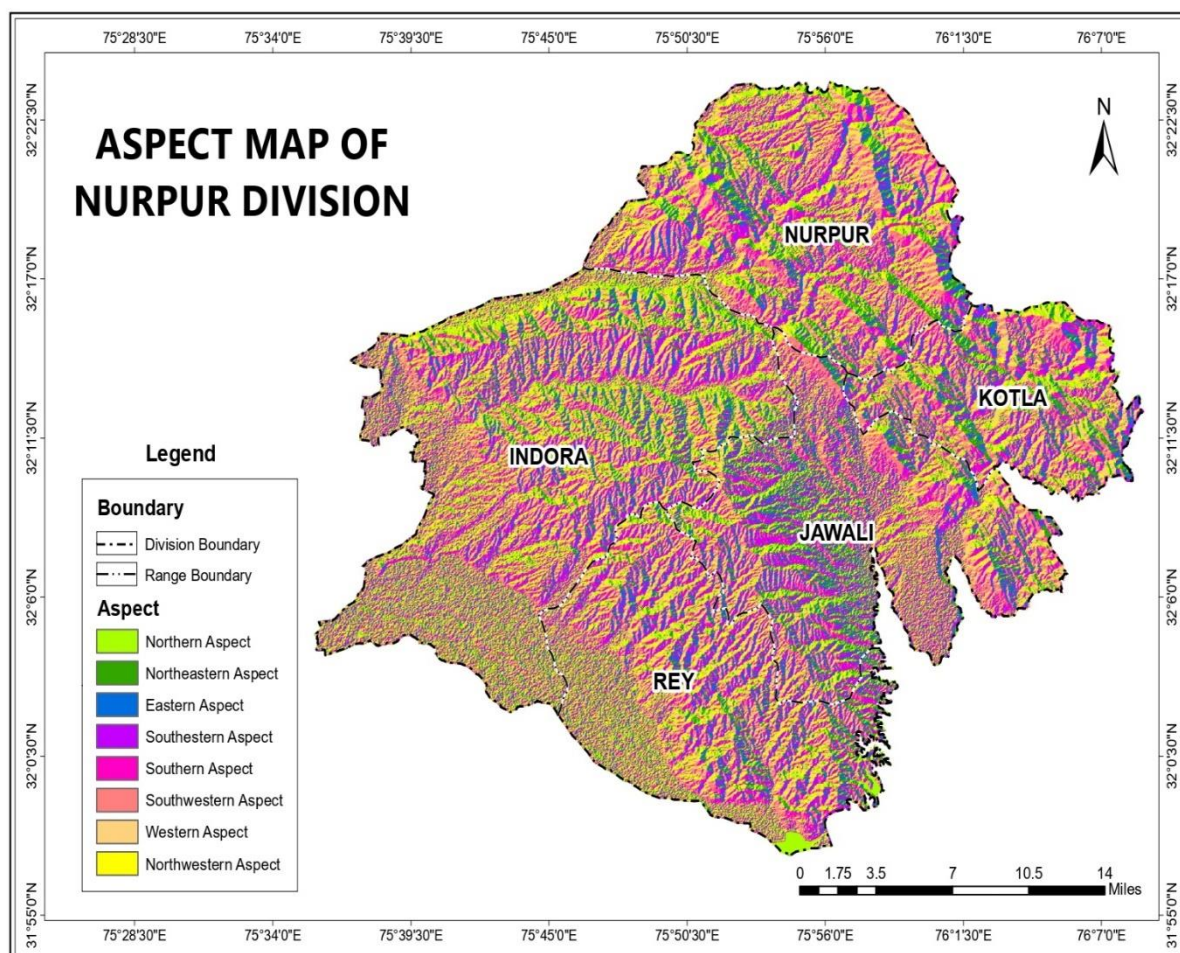
SLOPE MAP OF NURPUR FOREST DIVISION



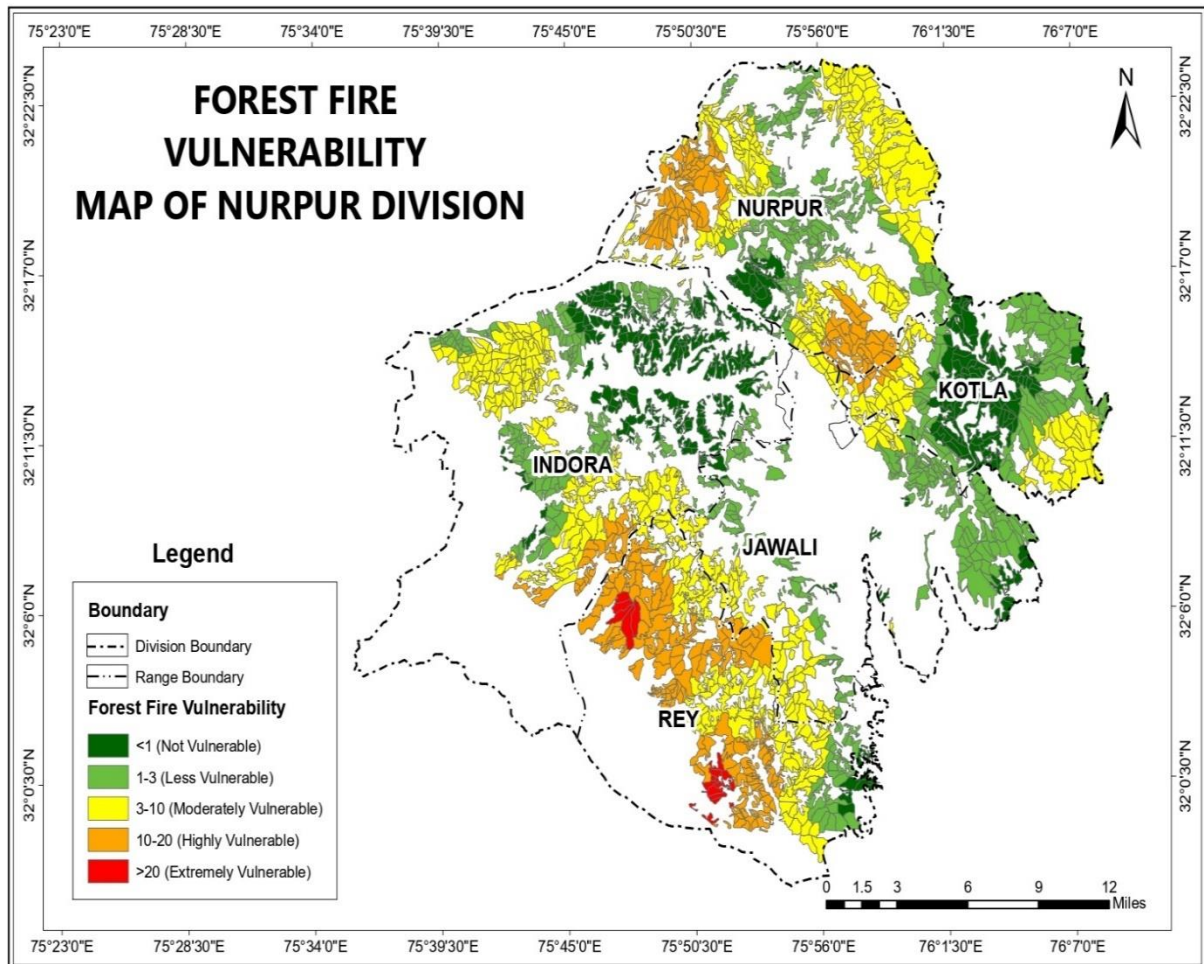
SENTINAL-2 SATELLITE MAP OF NURPUR FOREST DIVISION



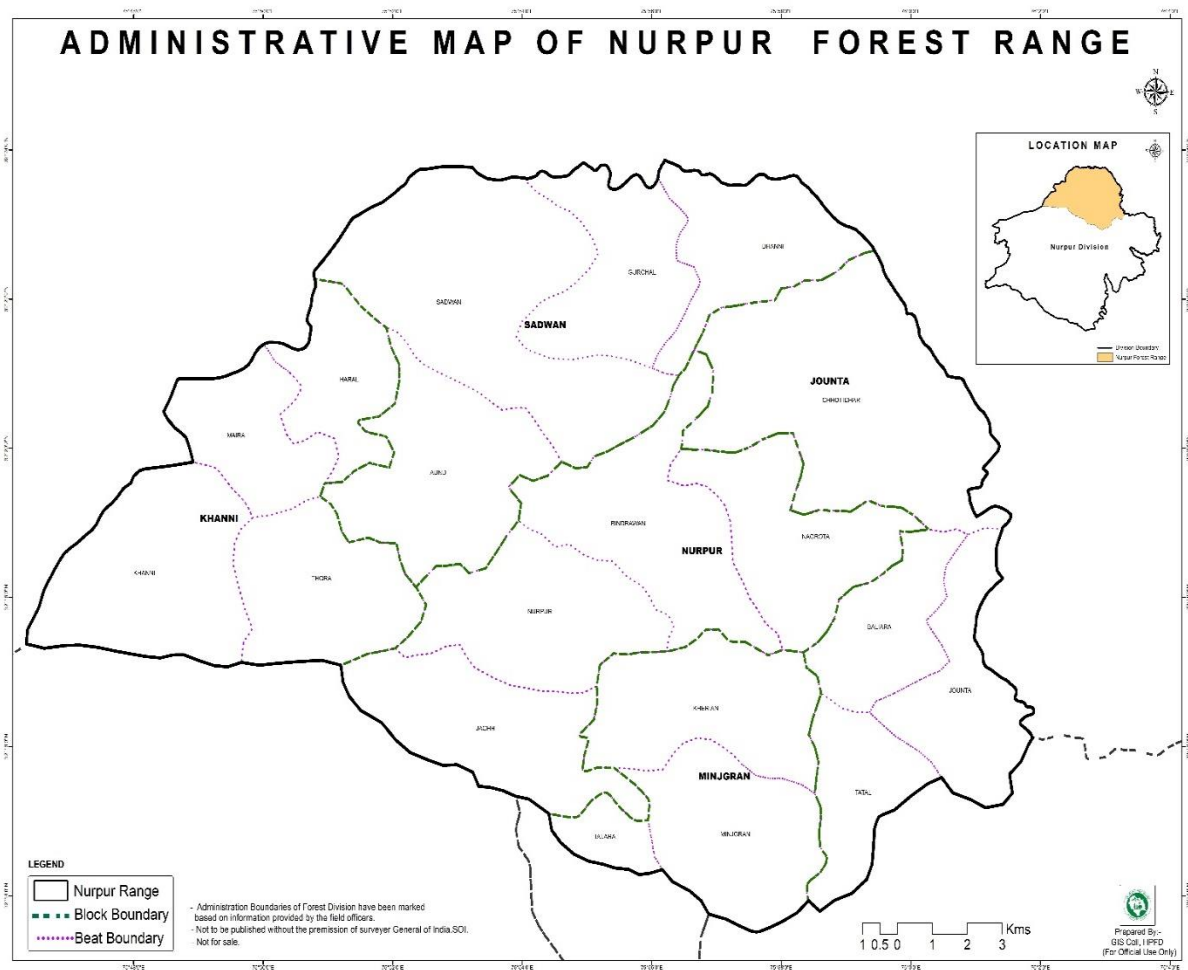
ASPECT MAP OF NURPUR FOREST DIVISION



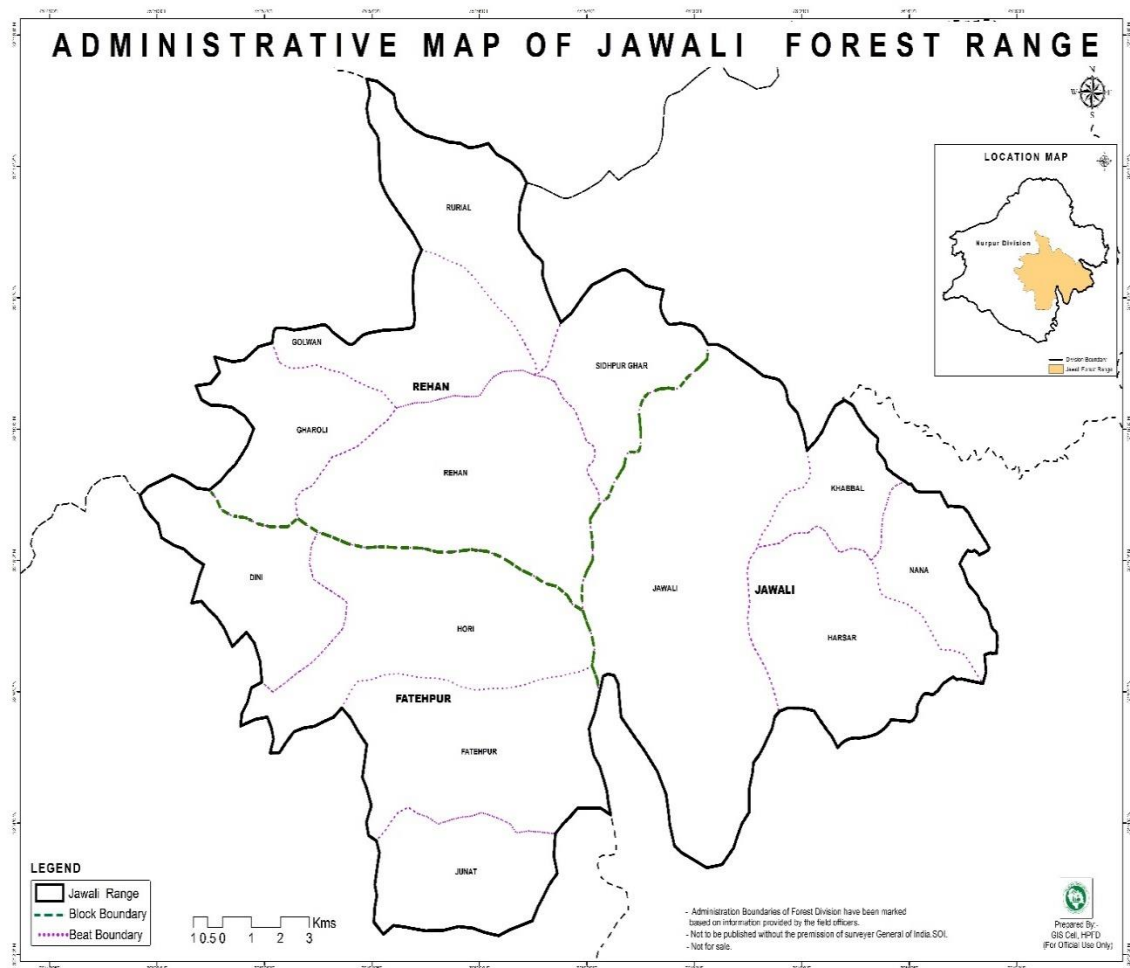
FOREST FIRE VULNERABILITY MAP OF NURPUR FOREST DIVISION



FOREST MAP OF NURPUR FOREST RANGE



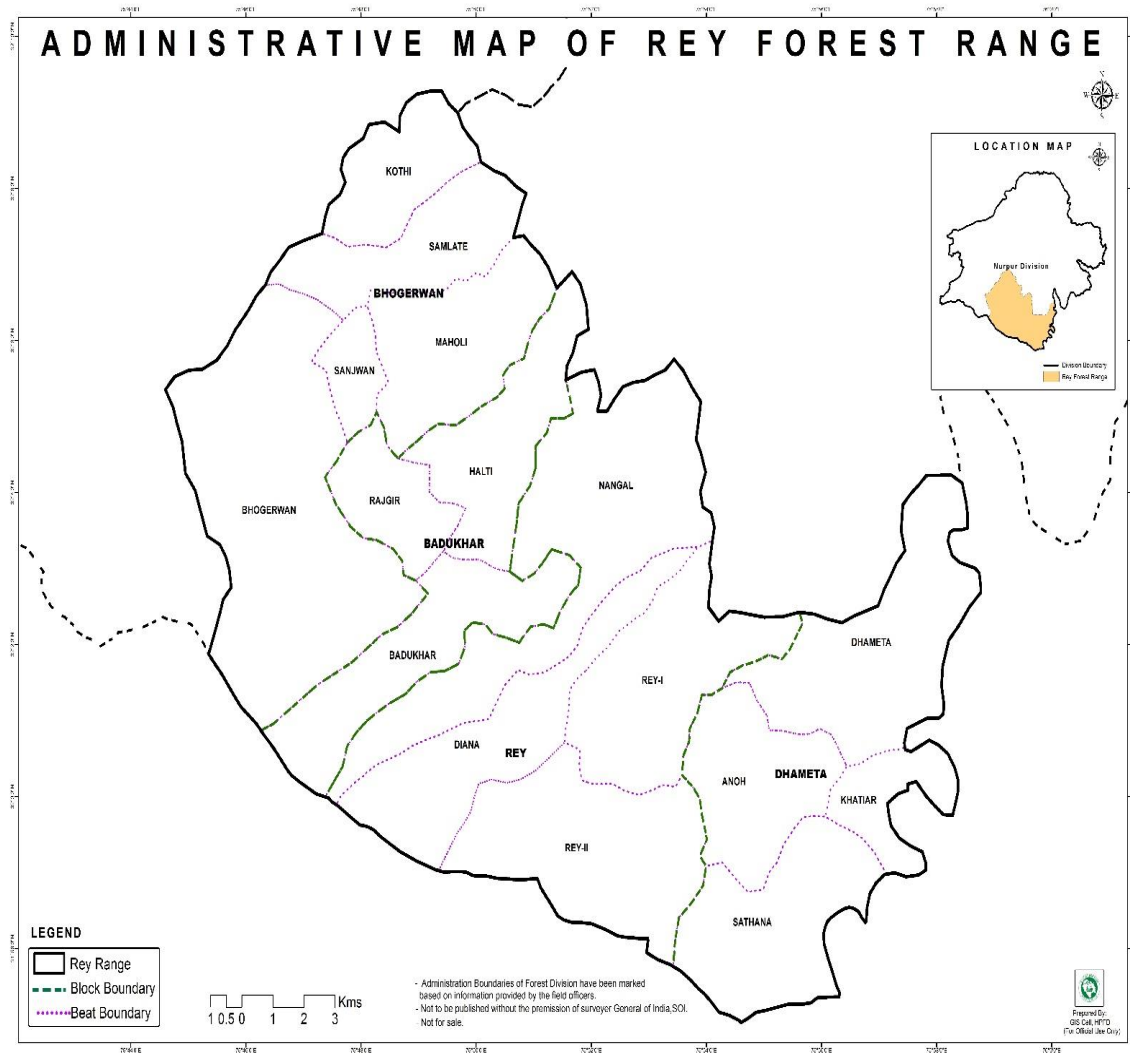
FOREST MAP OF JAWALI FOREST RANGE



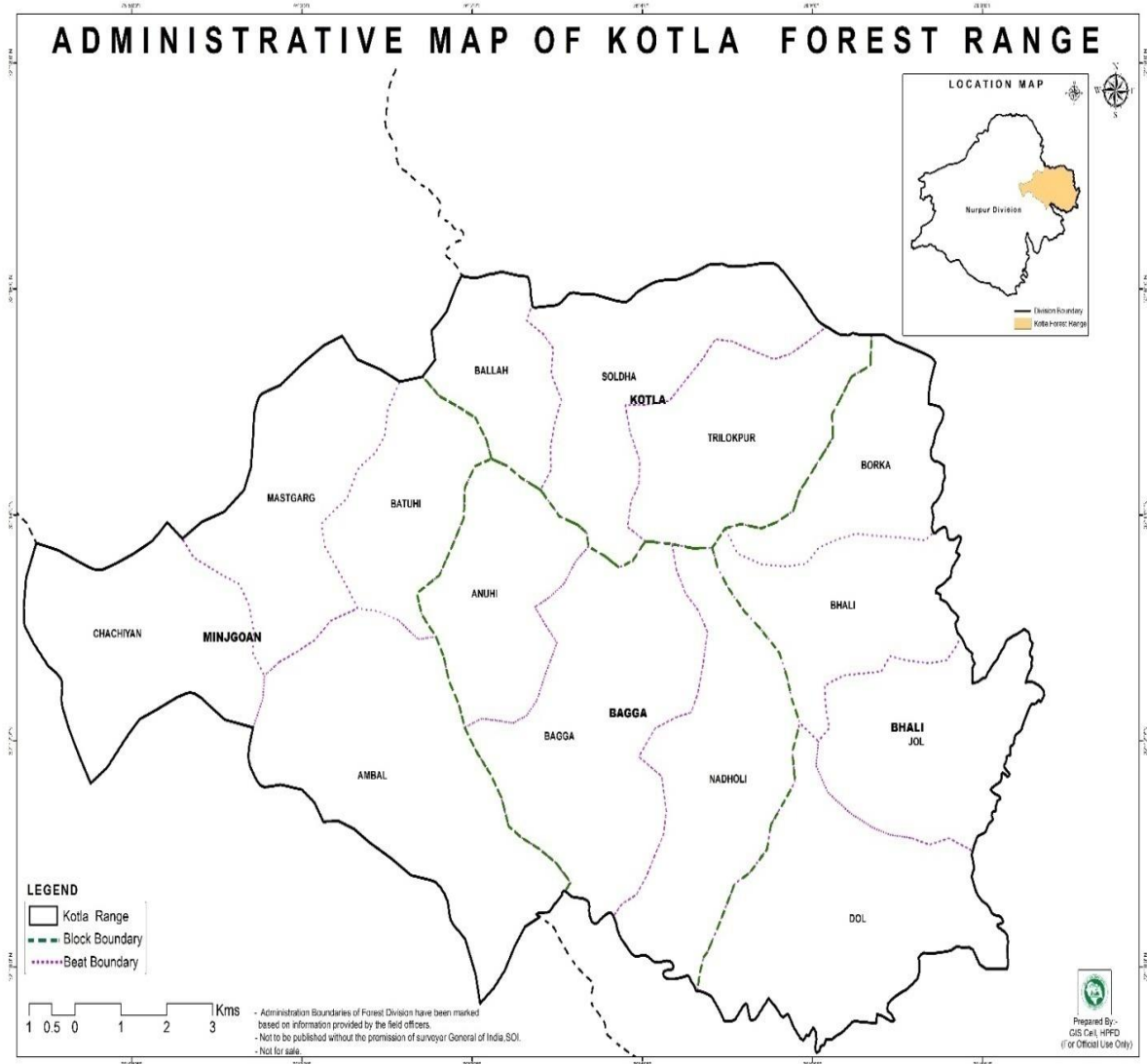
ADMINISTRATIVE MAP OF INDORA FOREST RANGE



FOREST MAP OF REY FOREST RANGE



FOREST MAP OF KOTLA FOREST RANGE



Chapter- II

Maintenance/increase in the extent of forest and tree cover

2.1 Area of forests under different legal classes

This working Plan covers all the Reserved, Demarcated Protected Forests, Un-demarcated Protected Forests, Un-classed Forests and Cooperative Society Forests, of the Nurpur Forest Division. Nurpur Forest Division comprises five territorial ranges namely Nurpur, Jawali, Indora, Rey and Kotla designated by their respective headquarters. Range wise area statement is as below:

Table No. 2.1

Range	RF		DPF		UPF		UC		CFS	Total No.		Area (ha)
	No	Ha	No	Ha	No	Ha	No	Ha	No	Ha		
Nurpur	8	1826.03	19	1593.47	17	5836.91	9	3029.19	6	1892.76	59	14178.36
Kotla	6	1016	7	562.8	9	3115.5	5	3830.45	-	-	27	8524.75
Jawali	2	242.77	9	1799.37	12	3624.67	5	1082.48	3	683.78	31	7433.07
Rey	2	588.7	2	103.99	14	5670.88	6	2064.79	5	1485.73	29	9914.09
Indora	1	210.43	12	1198.08	37	7759.27	2	261.02	10	3698.74	62	13127.54
Total (ha.)	19	3883.93	49	5257.71	89	26007.23	27	10267.93	24	7761.01	208	53177.81

Table No. 2.2

Forest Classification	Area	Number and Date of Notification
Reserve Forest	3883.93	The notification is in Forest settlement report of Kangra by James Anderson 1897 (Appendix I)
DPF	5257.71	
UPF	26007.23	
Unclassed	10267.93	
CFS	7761.01	
Total	53177.81	

The administrative area has been further divided into 5 Ranges, 20 Blocks and 82 Beats:-

Sr.No	Division	Range Name	Block Name	Beat Name
1	Nurpur	Nurpur	Nurpur	Nurpur
2				Bindraban
3				Jachh
4				Nagrota
5			Jounta	Jounta
6				Bariara
7				Tattal
8				Chottidhar
9			Sadwan	Sadwan
10				Danni
11				Gurchal
12				Aund
13			Khanni	Khanni
14				Thora Bhaloon
15				Haral
16				Maira
17			Minjgran	Minjgran
18				Talara
19				Kherian
		Total	5	19
20		Indora	Damtal	Damtal
21				Hagwal
22				Dainkwan
23				Kandwal
24				Kandrori
25				Malot
26			Gangath	Sukhar
27				Gangath
28				Dhiala
29				Chhatroli
30				Bhalakh
31			Mangwal	Ghoran

32				Mangwal
33				Raja Khasa
34				Dantol
35				Dagla
36			Indora	Tappa
37				Malahri
38				Indpur
39				Ghandran
		Total	4	20
40		Kotla	Kotla	Tirlokpur
41				Soldha
42				Ballah
43			Mastgarh	Mastgarh
44				Ambal
45				Batuhi
46				Chachian
47			Bhalli	Jole
48				Bhalli
49				Dole
50				Boharka
51			Bagga	Bagga
52				Nadholi
53				Anuhi
		Total	4	14
54		Rey	Dhameta	Dhameta
55				Sathana
56				Anoh
57				Khatiar
58			Rey	Rey II
59				Rey I
60				Nangal
61				Diana
62			Badukhar	Badukhar
63				Hatli
64				Rajgir
65			Bhogrwan	Bhogarwan
66				Kothi

67				Sanjwan
68				Samlet
69				Moholi
		Total	4	16
70		Jawali	Fatehpur	Fatehpur
71				Houri
72				Dini
73				Junat
74			Jawali	Jawali
75				Nana
76				Khabbal
77				Harsar
78			Rehan	Rehan
79				Sidhpurghar
80				Golwan
81				Gharoli
82				Gurial
		Total	3	13
		G. Total	20	82

2.2 Forest area under different working circle/ management plan

The statement showing the areas of working circles and their range wise distribution is given in the table below:

Table No. 2.3

Name of Range	Chil Shelter Wood WC	Bambo o	Coppice WC	Plantation WC	Protection WC	Total
Nurpur	3348.37	97.12	1017.96	8306.29	1408.62	14178.36
Kotla	2927.78	-	488.40	4606.43	502.14	8524.75
Jawali	2395.13	-	878.05	3875.44	390.62	7433.07
Rey	1893.63	-	441.43	4125.46	3453.57	9913.49
Indora	249.26	237.53	2175.76	7528.93	2936.06	13127.54
Total	10814.17	334.65	5001.60	28442.55	8691.01	53177.81

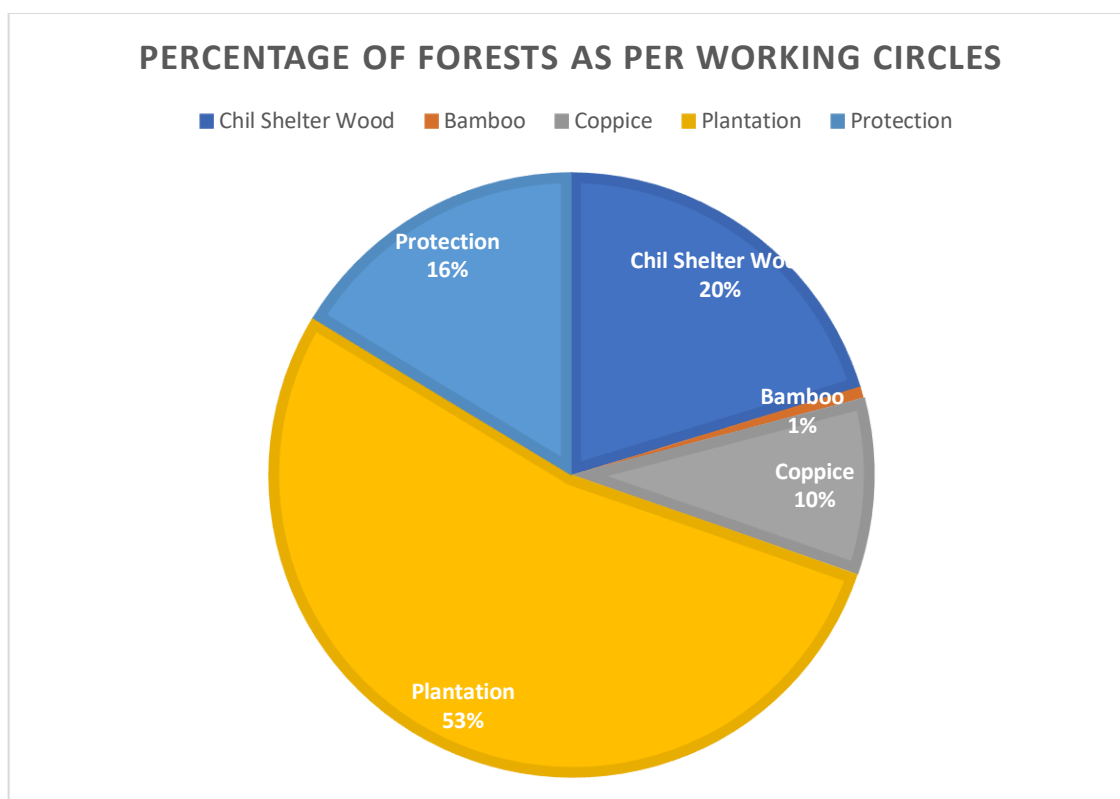


Chart 2.1

2.3 Percentage of forest with secured boundaries

The forests having classification as Reserved, Demarcated Protected Forests in Nurpur Forest division are delineated and boundaries are well defined through boundary pillars. Its record is maintained at range level in boundary pillar register. The boundary pillars at some of locations are damaged and broken due to increased biotic pressure, natural. It is being proposed to repair 1/3rd of total boundaries pillars every year and replacing it with cement concrete pillars for which budget will be demanded in Annual Plan Operation (APO). The GPS Coordinates of all the boundary pillars to be entered in the boundary pillar register. The detail of boundary pillars are as under:-

Table No. 2.5

Year	Range	Repair of Pillars	Re -construction
2011-12	Indora	224	16
	Jawali	166	0
2012-13	Jawali	6	0
2013-14	Indora	10	21

	Nurpur	80	0
2014-15	Indora	20	0
	Kotla	10	0
2014-15	Nurpur	18	0
	Kotla	58	46
2018-19	Indora	0	30
	Kotla	50	16
2019-20	Nurpur	118	136
2020-21	Nurpur	129	153
	Indora	0	30
2021-22	Nurpur	0	105
	Total	889	553

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

There is a land use change since the last working plan due to the reason that some of the forest land has been diverted for non- Forestry purpose and some encroachments on the forest land has been detected and recorded by divisional forest officer, however over the years there is a perceptible change in the forest density classes due to tremendous increase in biotic and a biotic pressure. A total of 378.46.99 hectares of forest land has been diverted for non-Forestry purpose. and encroachment to the extent of 211.05.14 hac. has been recorded by divisional forest officer out of which area to the extent of 206.61.23 hectare has been evicted on spot.

Information of Land Use Change under FCA & FRA w.e.f. 1980 to 2022-23 (up to 31-07-2023)

Table No. 2.6

Year	Name of Proposal	Date of final approval	Area in Ha.
1982	C/O Jassur to Bohd road	22.12.1982	00.05.38
1986	C/O Bohd – Chakki-Dhar road	24.06.1986	25.91.00
1986	400 Kv Transmission Line Chamera Hydo Electric Power Project	06.11.1986	13.20.00
1990	C/O 800 KV Transmission line Kihsanpur to Moga	12.09.1990	23.75.50
1990	C/O 132 KV Transmission line(Jassur to Dehra)	03.07.1990	07.30.00

1990	C/O 132 KV Transmission line (Jassur to Kandrori)	13.06.1990	14.70.00
1997	C/O Har KhabbalLakhnehr- Chelian- Dhiala Road	07.01.1997	00.75.00
1999	Widening of NH -20	26.10.1999	05.32.59
1999	C/O Water Storage Tank at Bhugnara	14.05.1999	00.16.11
1999	C/o 220 KV Transmission line Thein to Jassur	28.05.1999	07.01.66
1999	C/O Shah- Nehar Project	11.11.1999	30.07.85
2000	C/O Bhogarwan- Patti- Samlet Road	24.06.2000	03.70.44
2000	C/O Bharmar –Sidhpurghar-Bhallad road	01.02.2000	05.55.63
2001	Widening of NH -20	08.10.2001	04.44.39
2001	C/o Chinwan to Bhugnara road	13.02.2001	01.19.88
2001	C/o 33K. Sub Station Sunet at Fatehpur	27.06.2001	00.39.00
2001	C/o Chandbeh-Madoli-Bagrili-Dhial road	17.09.2001	02.04.69
2001	Widening of NH-20 Km 50 to 56	23.11.2001	03.42.81
2002	C/O Makore-Jammu- Chakki Road	06.11.2002	00.16.00
2002	C/O Water Storage Tank for Civil Hospital	18.06.2002	00.08.16
2002	Doubling of Railway Line Jalandhar Cantt to Jammu Tabhi	12.12.2002	01.83.40
2002	C/O Mohtli –Sirit-Chocher- Baleer road	28.02.2002	00.80.38
2002	C/O Banderu- Gheli- Dhewa- Gatnalu Road	31.12.2002	03.67.62
2003	C/O Bhadwar- Kherian Road	13.08.2003	00.90.00
2003	C/O Nana – Bnderu-Padhar-Bassa-Jole	12.03.2003	10.14.34
2003	C/O Pollian-Jakhbar road	09.05.2003	01.00.00
2004	C/O Siddhartha medium irrigation project	20.02.2004	04.77.89
2005	C/o Bhatili Dhar- Bara Chicher- Bhali road	20.06.2005	03.59.70
2006	C/O Four Lining NH-IA-Jallandhar pathankot road	10.11.2006	21.59.00
2006	C/O Judicial Complex at Indora	23.02.2006	00.18.81
2006	C/O ITI Building at Nurpur	31.05.2006	00.98.00
2006	2006 C/O 5 MW-Trindi Dhar	29.05.2007	00.61.00
2007	C/O Residential Complex Building for Civil Judge, Indora	12.01.2007	00.11.50
2007	C/O Jachh to Gahin Lagore road	28.03.2007	01.91.64
2007	C/o Link Road to Village Hathidhar	02.02.2007	04.59.64
2007	C/o Three rising mains (under ground)	12.12.2007	00.80.97
2008	C/O Shahid Joginder Singh Link road from HindoraGhart-Hatlietc	24.03.2008	00.89.01
2010	C/O High Level Chakki Bridge	15.02.2010	00.06.38
2010	C/O Bagani to Barni Via Tanan Baldoon	26.05.2010	02.90.64
2010	Remodeling of LWSS Mohal Nawa Shehr	06.03.2010	00.18.60

2010	Widening / Improvement of Ranital Kotla road	21.10.2010	05.10.17
2010	Establishment of Industrial Area of Raja Ka Bagh	20.08.2010	15.00.71
2011	Laying Of OFC.From Barani to Vodafone Tower Nurpur	01.01.2011	00.03.01
2011	C/O Nidholi to Purkhehr road	03.02.2011	01.27.46
2012	C/O ShahneharProject(Revised Proposal)	09.12.2012	12.24.86
2012	C/O Phina Singh Medium irrigation Project	02.07.2012	07.19.18
2012	C/O 400 KV Transmission line from Chemera III (Rajera) to Jalander	26.06.2012	57.20.60
2012	C/o Baleer to Dainkwan via Samoon Randoh road	17.08.2012	03.36.42
2013	33Kv Transmission line from Kandrori to Damtal	03.06.2013	00.14.88
2015	C/o link road from Hatli, Khadoun, Behi ,Kuthar, Mohar etc.	17.11.2015	00.19.37
2016	C/o link road From Dard Nala to Damoh via Jamun	07.05.2016	02.39.04
2016	C/o Link road to Tarriah to Sughala	04.08.2016	00.96.37
2017	Up gradation of existing 33/11 Kv Sub Station Fatehpur	11.07.2017	00.24.84
2018	C/o Banoli to Chachin Road	05.07.2018	01.34.02
2018	C/O link road to TarriahChamarannurpur	28.07.2018	01.35.40
2020	C/o link road Sihuni to Channi	07.10.2022	02.15.90
2021	C/o Arya college Nurpur	26.02.2021	01.80.00
2021	C/o Road Dinni Kumbi to Dhanara	26.10.2021	02.46.84
2021	C/o link road from Khuhi to BatwalanAbadhi	24.08.2021	00.32.40
2022	C/o Augmentation of various water supply scheme jawali	19.07.2022	00.94.58
2022	C/o War Memorial at Nurpur	30.11.2022	00.88.03
2022	C/o Rehabilitation and upgratation , configuration Chakki Mandi Road	11.02.2022	50.98.30
		TOTAL	378.46.99 Ha

2.5 Threats to the forest Injuries to which the crop is liable:-

The main agencies causing injuries to the forest crop during its various stages of growth can be classified into following sub heads: -

- Due to natural causes.
- Incidental to man.
- Wild animals and insects.
- Climbers and Weeds.

Natural Causes

a) Drought

This is most dreaded of all the unfavorable factors. The pre-monsoon and post-monsoon drought period play an important role in the success of natural as well as artificial regeneration. The variation in annual rainfall influences the growth and development of forest species. Manus in bamboo clumps do not appear well if the monsoons are delayed. The pre-monsoon drought leads to forest fires. In years of severe drought groups of trees on thin soil, spurs and ridges and scattered individual trees have dried up. The mortality is not confined to old and resin tapped trees but pole and untapped trees have also died, this is believed to be due to steady desiccation which is proceeding in this tract. The heavy incidence of grazing and grass cutting aggravate bad effects of drought.

b) Frost

The frost is common in the tract and cause severe damage to the young seedlings of khair. The severe frost of 1929 and 1945 entirely stripped off the bamboo shoots of foliage.

c) Erosion

The destruction of forests from excessive grazing, browsing and repeated forest fires and intense logging has caused and continues to cause, erosion and denudation to an extent which seriously threatens the welfare of an overwhelmingly agricultural tract. The denudation of soil of once thickly forested area is being rapidly carried away and the hill sides are reduced to barren, stony wastes unless to both man and cattle. Old perennial streams are dry except during the monsoons when they becomes raging torrents. At the worst effected places *Carissa spinarum* has been replaced by its mixture with *Dodonea viscosa* or by a pure crop of the latter. On gravel sand stone and gravel loam formation erosion takes two different forms as soon as the vegetation is removed to permit the rainfall to impinge directly on the ground.

- i) On the gravel sand stone (which includes pebbly sand stone) heavy falls of soil occur at the heads of the nalas and rain water cuts deeper and deeper channels in the friable sand stone. The various stages of 'ravine and block' formations are met with in Indora and Rey Range.
- ii) On gravel loam areas landslips are frequent. The upper slopes of the water course are precipitous while lower down falling debris goes on accumulating and being washed away. The channel bed is broader than in (i) and is characterized by a rapid fall in its gradient and by being covered with quartzites stone and boulders.

On both these formations, erosion is for advances, the ridges are generally knife edged while their slopes are deeply cut by small nalas with precipitous sides, the entire slope being an alternating series of a depression and knife edged ridge.

d) Wind

Wind storms cause considerable damage to the standing trees particularly badly tapped chil trees which are a napped, and to roadside trees which are uprooted. The damage to chil trees has becomes a regular feature. The road side trees were badly damaged during the wind storm of 2017.

e) Fire

Fires cause maximum damage to the forest wealth. The forest fires are generally caused by men to get maximum fodder and grass for their cattle. In major part of the tract, with its low

and rugged hills and the low crowns of the chil together with the dense undergrowth on which are suspended the dry and fallen needles, the damage is invariably great, the fire often developing into a crown fire and resulting in the death of large number of trees. The erosion in the fire burnt areas is so accelerated that wherever the soil has been washed or the rock exposed, the immediate cause has been found to be fire. Incendiarism encourages the recession and eradication of chil and stimulates the propagation of scrub. The fires have also caused serious damage of scrub where *lantana camara* is spreading. Fire kills young poles and wipes out seedlings and saplings. These destroy the microflora fauna and thus impede soil forming processes.

The chief predisposing causes of forest fires are drought, accumulation of pine needles, thick brush wood growth abundance of dry grass and felling debris. In majority of the cases, the fires are results of neglect of farmers burning their ghasnis and the passengers who throw the lighted cigarette ends. Sometimes the fires are vindictive in origin; at other times fires are lighted to drive out pigs from the forests with dense undergrowth. The fires have now become as annual feature.

Fires effect fertilization and seed production to a considerable extent. An early summer fire interferes with fertilization of cones and thus reduces seed production while a late summer fire burns seed of the year and either kills or reduces the germination power of seed in the cones of succeeding years. Too close resin channels are another aggravating cause for the death of trees by burning of cambium all-round the tree.

AREAS AFFECTED BY FOREST FIRES IN LAST 10 YEARS:

With the onset of summers, fires are quite common in the region. They are accidental as well as deliberate. As the fires occur, burning of areas lead to a clean flush of grass. The local inhabitants are of the impression that burning of area leads to a flush of grass, therefore they put the forest areas on fires. However, in most of the cases, results are extremely dangerous. There is a tremendous loss to both flora and fauna. The following table shows the areas burnt from 2012-13 onwards:

Table No. 2.7

Fire incidences in last working plan period						
S.No	Name of Divison	Year	No of Fire	Area in Hac	Loss of Plantation	Gross Total
1	Nurpur	2012	94	597.8	2336500	2336500
2		2013	6	58.7	153800	153800
3		2014	11	56.65	0	0
4		2015	14	43.55	0	0
5		2016	42	208.18	78000	78000
6		2017	21	89.8	195000	195000
7		2018	161	2508.4	2317400	2317400
8		2019	27	161.58	214400	214400
9		2020	1	3	0	0
10		2021	68	308	1247000	1247000

11		2022	8	78	430000	430000
12		2023	1	25	87400	87400
	Total		454	4138.66	7059500	7059500

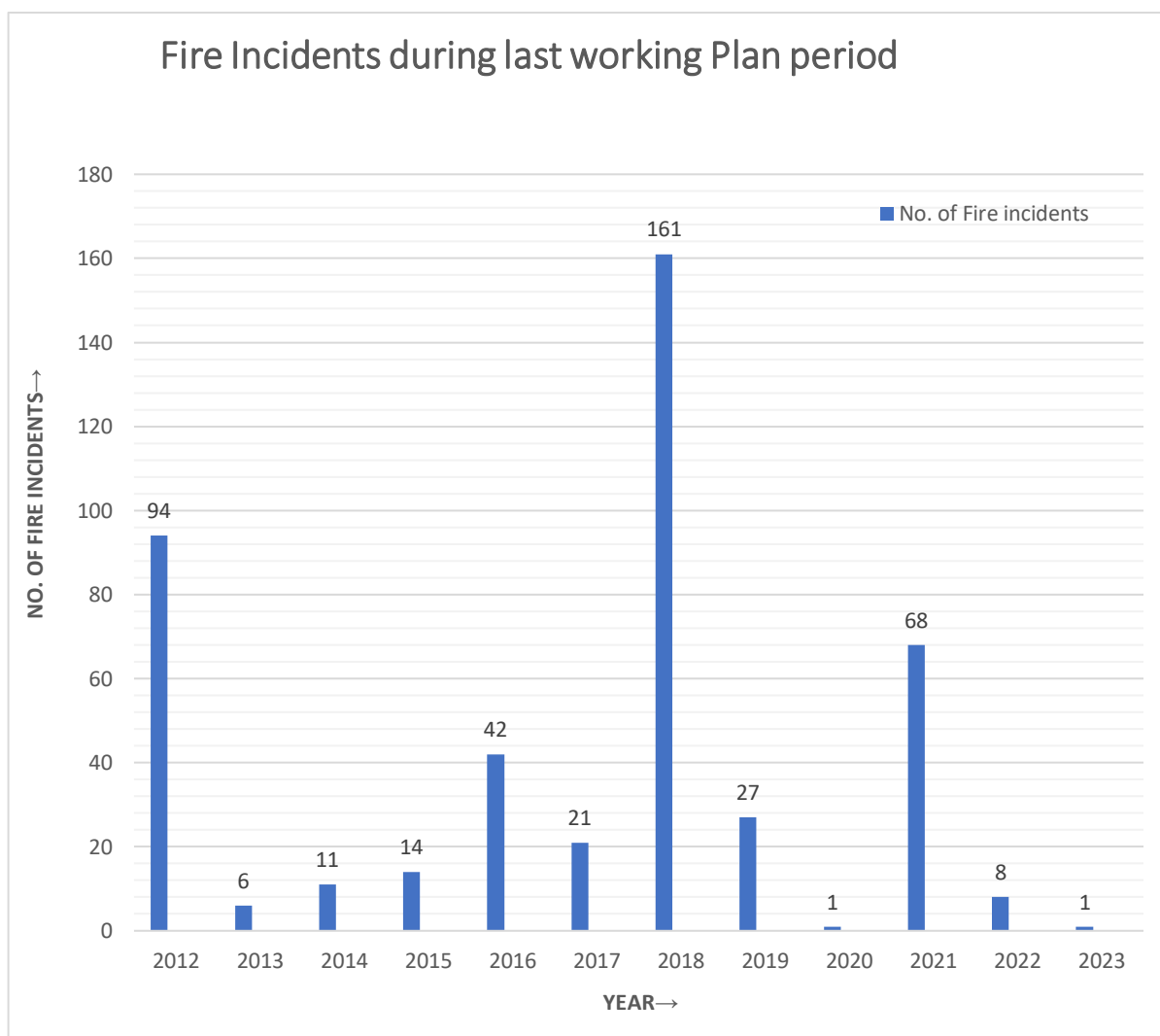


Chart 2.2

f) Non-Working of forest

In the past non-working of forest has caused immense damage to the crop due to congestion and stagnation of new growth. Regular thinning and silviculture operations like seeding and final felling as per working plan is of utmost importance to keep forest healthy and growing.

g) Infestation by invasive weed species in forests

The forests has been invaded by invasive weed species like *Lantana*, *Parthenium*, *Ageratum* etc. which has caused negative impact on native biodiversity causing economical loss and harming human health. Lantana has done maximum invasion for which extensive survey for determining the extent of invasion like up to 25% invasion, 25 to 50%, 50 to 75% and more than 75% categories has been defined and survey reports has been posted in CH files.

h) Incidence of pests and diseases

i) Insects and Fungi

Forests are usually attacked during the rainy season by leaf defoliator which enrolls itself through a number of leaves and devours them. Termite attack is also very common which is more predominant in plains than in hilly tracks.

Witches broom disease which causes damage to Khair. *Fungus ganoderma* causes damage to shesham, khair and other leguminous trees, it survives on the stem of infected trees spreading the infection to other healthy trees in its vicinity. Fresh infection of Ganoderma can be prevented by digging a trench around the infected trees to cut off contact with healthy ones.

ii) Climbers and weeds

Pueraria tuberosa (Selohar) completely wraps bamboo and other species and hinders their growth some of the younger plants and clumps get badly suppressed. The spread of lantana camara as unpalatable weed has threatened the growth of palatable grasses and regeneration of species of economic importance. Lantana is also a threat to the biodiversity of the forest.

2.6 Distribution of different forest types:

(i) Type 5B/c.2 Northern Dry Mixed deciduous Forests :-

This type is characterized by the presence of *Anogeissus latifolia*. In most localities the tree canopy has been seriously broken by human activities, so that scattered trees and small groups are now typical. In the climax state, however, the canopy would be thin but fairly complete, most trees having low spreading crowns. Transitions to the still drier types are characterized by a broken top canopy. Many tract area at present occupied almost exclusively by shrubs and small trees such as *Nyctanthes arbortristis* and it is now difficult to determine just how for their condition is due to maltreatment.

Floristics :-

Top Story

Acaia catechu, *Anogeissus latifolia*, *Lannea coromandelica*, *Aegle marmelos*, *Ehretia laevis*, *Kydia calycina*, *Ougeinia delbergioides*, *Mitragyna parvifolia*, *Flacourtia indica*.

Middle Story:

Mallotus philippinensis, *Nyctanthes arbortristis*, *Dendrocalamus strictus* occurring occasionally.

Shrubs :-

Carissa opaca, *Dodonea viscosa*, *Woodfordia fruticosa*, *Adhatoda vasica*.

Grasses :-

Chrysopogon montanus (Dholoo), *Heteropogon contortus* (Lamboo), *Themeda anathera* (Lunji), *Eulaliopiris binata* (Bhabbar), *Aristida* spps.

Climbers :-

Pueraria tubersoa, *Bauhinia vahlii*, *Acacia caesia*.

The total area under this type is estimated to be 39349.61 ha. or 74 % of the total forest area.

(II) TYPE 5B/D SI-Dry Deciduous Scrub :

A low broken soil cover of shrubby growth, 3 to 6m high including some tree species reduced to similar conditions, usually many stemmed from the base is the common vegetation met with. Some bamboo is often present. Many of the shrubs are distasteful to cattle while others are thorny thin grasses occur throughout.

There may be localities in which the soil and climate are such as to permit the development of a dry deciduous low forest in which tree growth in the narrower sense is scarce, but all examples examined seem unquestionably to owe their stunted condition to maltreatment, usually directly or indirectly connected with felling, lopping, grazing and frequent fires.

Floristic:-

Nyctanthes arbortristis, *Dodonea viscosa*, *Woodfordia fruticosa*, *Carissa opaca*, *Flacourtia indica*, *Lannea coromandelica*, *Aegle marmelos*, *Cassia fistula*, *Acacia catechu*.

The area under this type is estimated to be 3430.02 ha. or 6.5 % of the total forest area.

(III) E9-Dry Bamboo brakes:-

Only one species, *Dendrocalamus strictus*, occurs and forms relatively low (rarely over 7m) but often dense brakes. When grazed, the bamboo grown in dense patches with grass and deciduous often thorny shrub in between. A scattered overwood of the harder species of the dry deciduous forest may indicate the dominance of the bamboo to be only secondary. Sometimes there is practically no over wood.

Floristics:-*Dendrocalamus strictus* with a sprinkling of the tree and scrub species of the local form of dry deciduous forests, like *Anogeissus latifolia* and *Lannea coromandelica*, *Acacia catechu*, *Aegle marmelos*, *Holoptelea integrifolia* and *Flacourtia indica*.

Shrubs *Adhatoda vasica*, *Carissa opaca*, *Nyctanthes arbortristis*.

Grasses *Chrysopogon montanus* (Dholoo), *Heteropogon contortus* (Lamboo), *Themeda anathera* (Lunji) etc.

Biotic factors certainly influence the occurrence of these bamboo brakes and the absence of trees may often be due to them, but apparently natural examples occur appearing to be associated with soil conditions.

The total area under this type is estimated to be 334.65 ha. or 0.63 % of the total Forest area.

(IV) TYPE 9/C.I.A- Lower or Shiwalik Chir Pine Forests

The pine stands singly or in groups with a scattered in lower deciduous tree storey more numerous in depressions and cooler aspects. There is usually a fairly continuous low scrub growth of xerophytic shrubs typically on steep dry slopes below 1,000 on the Shiwalik conglomerates and sand stones.

Floristica:-

Top Storey:-*Pinus roxburghii*

Middle Storey:-*Terminalia chebula, Mallotus philippinensis, Pyrus pashia, Syzygium cumini, Albizia chinensis, Embelica officinalis, Acacia catechu.*

Shrubs:-*Carissa opaca, Dodonea viscosa, Rubus ellipticus, flacourtia spp, Myrsine africana, Woodfordia fruticosa, Berberis spp., Indigofera pulchella, Murraya koenigii.*

Grasses:- *Chrysopogon futvus, Cymbopogon spp., Dichanthium annulatum, Heteropogon contortus, Themeda anathera.*

Climbers:-*Bauhinia vahlii, Pueraria tuberosa.*

This type occupies 10063.53 ha. or 18.9 % of the total area under forest.

Table No. 2.8 Classification of area according Champion and Seth:-

Range	5B/C.2	5B/DS1	9/C1A	5B/E9	Total
Nurpur	9260.61	1134.27	3686.36	97.12	14178.36
Jawali	4905.83	594.64	1932.60	-	7433.07
Kotla	5541.09	681.98	2301.68	-	8524.75
Indora	12107.43	533.32	249.26	237.53	13127.54
Rey	7534.65	485.81	1893.63	-	9914.09
	39349.61	3430.02	10063.53	334.65	53177.81

This also include the areas of Cooperative Forest Societies.

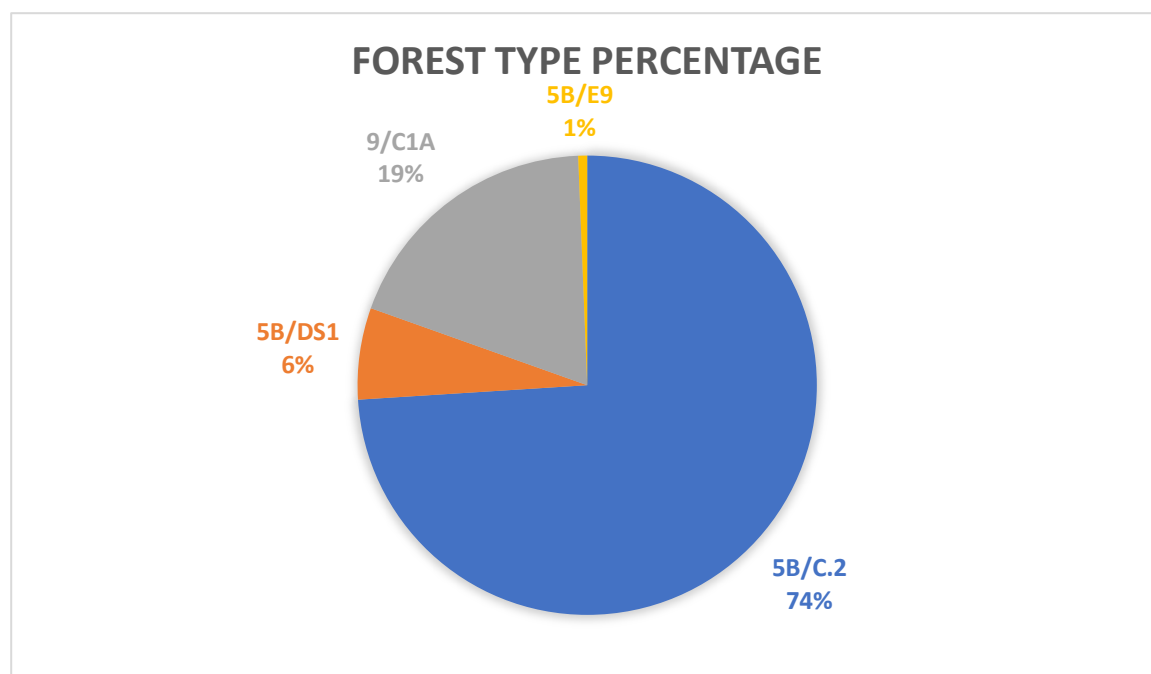


Chart 2.3

2.7 Tree cover outside forest area

The field exercise to assess the species-wise estimation of trees outside forest has been done and the field data so collected has been handed over to FSI for extrapolation whose results are still awaited and will be incorporated when it will be available.

However, study for KDMS area i.e. *Khudro Darakhtan Malkiyat Sarkar* has been done for Nurpur forest division whose details are as following:-

For Khair:-

Table No. 2.9

Total for Nurpur KDMS	Total area of kdms in ha	Sampled area in ha	5-10 cm	10-15 cm	15-20 cm	20-25 cm	25 cm above	Total
	8898.50	16.1	4968	97152	161184	138000	263856	665160

For B/L Species:-**Table No. 2.10**

Name of Range	Total area of KDMS	Total area sampled	Classification of B.L. Trees										
			Below V	V	IV	III	IIA	IIB	IA	IB	IC	ID	Total
Rey	3868.23	5.8	6624	126960	99360	44712	18216	4416	2760	552	0	552	304152
Kotla	228.5	0.3	0	2760	6072	3864	552	552	552	0	0	0	14352
Jawali	585.1	3.2	0	172776	83904	37536	10488	6624	0	552	0	1104	312984
Indora	3190.09	4.8	0	39744	61272	46368	10488	7176	4968	1656	552	0	172224
Nurpur	1026.59	2	6624	38088	40296	17664	6624	2208	552	552	552	1104	114264
	8898.50	16.1	13248	380328	290904	150144	46368	20976	8832	3312	1104	2760	917976

CHAPTER-III MAINTENANCE, CONSERVATION AND ENHANCEMENT OF BIODIVERSITY

3.1 FOREST COMPOSITION AND DISTRIBUTION:-

The forests of this division scattered as they are, over a vast area, contain Chil, scrub and bamboo forests depending on the altitude, rainfall, aspect and geological formation met with. The forests are essentially the low hills or outer Shiwalik type. The common scrub species are *Acacia catechu*, *Anogeissus latifolia*, *Albizia lebbeck*, *Albizia odoratissima*, *Lannea coromandelica*, *Syzygium cumini*, *Kydia calycina*, *Casearia tormentosa*, *Cassia fistula*, but none of these species grows to a size as can yield useful timber. The main produce of these scrub forests are katha and fuel wood. *Acacia catechu* is in great demand for katha manufacturing. Bamboos are an important constituent of scrub forest along Chakki river. Chil is next important species both for production of small sizes timber and resin. Chil is the main source of timber for local use and for export.

The floristics of individual areas are given in the compartment history files. The main vegetation is classified according to revised Survey of the Forest Type of India by Champion and Seth as under:-

According to the classification of Champion and Seth, forest covered by this plan fall under the following types.

Table No. 3.1

S no	Sub group	Type
I	5B /c.2	Northern Dry Mixed Deciduous Forests
II	5B/D SI	Dry Deciduous Scrub
III	5B/E-9	Dry Bamboo brakes
IV	9/c.1.A	Lower or Shiwalik Chir Pine Forests

Classification of area according Champion and Seth:-

Table No. 3.2

Range	5B/C.2	5B/DS1	9/C1A	5B/E9	Total
Nurpur	9260.61	1134.27	3686.36	97.12	14178.36
Jawali	4905.83	594.64	1932.60	-	7433.07
Kotla	5541.09	681.98	2301.68	-	8524.75
Indora	12107.43	533.32	249.26	237.53	13127.54
Rey	7534.65	485.81	1893.63	-	9914.09
	39349.61	3430.02	10063.53	334.65	53177.81

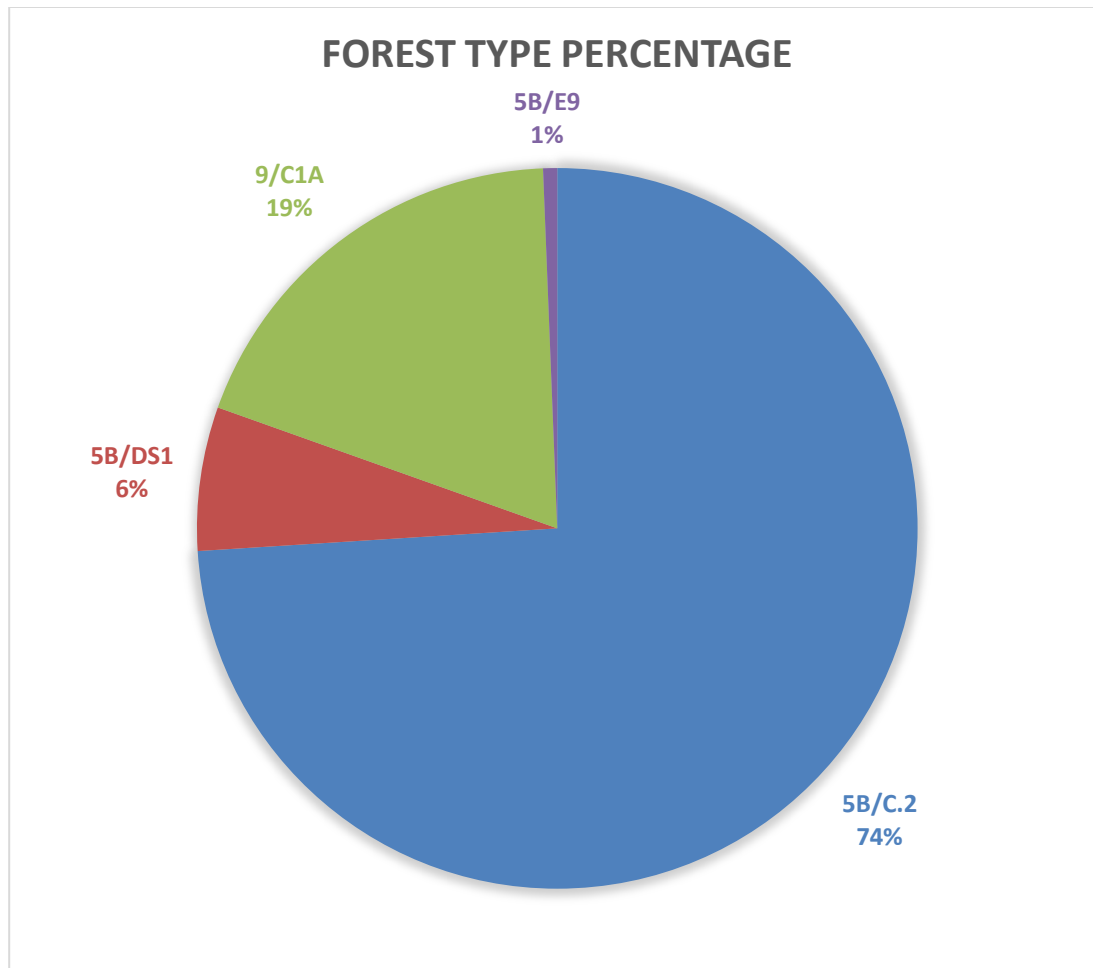


Chart 3.1

3.2 Plant species diversity:

The data collected during enumeration such as the number of individuals of each species and the DBH of each tree was utilized to derive secondary attributes like basal area (BA, m²/ha), density (D, trees per ha) and frequency (F, number of quadrats where trees are present) in relation to total plots observed). Relative values of BA, D and F were then calculated. The important value index (IVI) was calculated by adding up relative dominance (RBAF), relative density (RD) and relative frequency (RF).

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 a high species diversity if many equally or nearby equally abundant species are present. Communities with a large number of species that are evenly distributed are the most diverse. Species diversity indices like **Shannon–Wiener Index** are calculated separately for trees, shrubs and herbs.

The most common species in the forests are given below:

Sr no	Local name	Scientific name
1.	Chil	<i>Pinus roxburghii</i>
2.	Harar	<i>Terminalia chebula</i>
3.	Dhao, or Chal	<i>Anogeissus latifolia</i>
4.	Kakoran	<i>Pistacia integerrima</i>
5.	Khair	<i>Acacia catechu</i>
6	Shisham	<i>Dalbergia sissoo</i>
7.	Kinu	<i>Diospyros tomentosa</i>
8	Tun	<i>Cedrela toona</i>
9	Bamboo	<i>Dendrocalamus strictus</i>
10	Rajain	<i>Holoptelea integrifolia</i>
11	Behra	<i>Terminalia bellirica</i>
12	Sanan	<i>Ougenia dalbergioides</i>
13	Mahil Kamal	<i>Mallotus philippinensis</i>
14	Sarin	<i>Albizia lebbek</i>
15	Jaman	<i>Syzygium cumini</i>
27	Simul	<i>Bombax ceiba</i>
16	Bill	<i>Aegle marmelos</i>
17	Kemba	<i>Lannea grandis</i>
18	Arjun	<i>Terminalia arjuna</i>
19	Ber	<i>Ziziphus jujuba</i>
20	Asan	<i>Terminalia elliptica</i>
21	Amla	<i>Emblica officinalis</i>
22	Lasora	<i>Cordia myxa</i>
23	Dhaman	<i>Grewia asiatica.</i>
24	Ohi	<i>Albizia stipulata</i>
25	Kao	<i>Olea cuspidata</i>
26	Kikar	<i>Acacia arabica</i>
27	Karmaru	<i>Albizia odoratissima</i>
28	Kuthman	<i>Eugenia jambolana</i>
29	Kachnar	<i>Bauhinia variegata</i>
30	Mulberry	<i>Morus spp.</i>
31	Khirak	<i>Celtis australis</i>
32	Jamu	<i>Prunus cerasoides</i>
33	Bado	<i>Salix spp.</i>
34	Dodan/Reetha	<i>Sapindus mukorossi</i>

The frequency, density, basal area and IVI of most important trees and shrubs found in forests are given in Table 3.3

Table 3.3 Ecological parameters of Trees

Working Circle	Species	Relative Density	Relative Frequency	Relative basal Area	IVI=RD+RF+RBA
Bamboo	<i>Acacia catechu</i>	41.86	50.00	28.73	120.59
	<i>Bauhinia variegata</i>	18.60	25.00	1.04	44.64
	<i>Cassia fistula</i>	18.60	25.00	1.04	44.64
	<i>Diospyros cordifolia</i>	37.21	25.00	13.51	75.72
	<i>Ehretia laevis</i>	13.95	50.00	4.24	68.19
	<i>Eugenia jambolana</i>	9.30	25.00	1.04	35.35
	<i>Ficus roxburghii</i>	27.91	25.00	1.81	54.72
	<i>Grewia elaeatica</i>	9.30	25.00	0.59	34.89
	<i>Lannea coromandelica</i>	18.60	25.00	19.59	63.20
	<i>Mallotus philippinensis</i>	43.41	75.00	21.14	139.55
	<i>Melia azadirachta</i>	9.30	25.00	0.59	34.89
	<i>Ziziphus mauritiana</i>	9.30	25.00	6.69	40.99
	Total	100.00	100.00	100.00	300.00
Chil	<i>Acacia catechu</i>	25.76	57.35	9.36	92.47
	<i>Acacia modesta</i>	3.01	0.74	0.03	3.78
	<i>Aegle marmelos</i>	4.22	3.68	0.04	7.94
	<i>Albizia lebbbeck</i>	4.35	6.62	0.38	11.35
	<i>Albizia odoratissima</i>	6.02	2.94	0.03	9.00
	<i>Anogeissus latifolia</i>	10.88	13.24	1.93	26.05
	<i>Bauhinia vahlii</i>	6.02	2.21	0.05	8.28
	<i>Bauhinia variegata</i>	11.55	4.41	0.31	16.27
	<i>Bombax ceiba</i>	3.01	4.41	0.19	7.61
	<i>Butea monosperma</i>	9.04	9.56	0.64	19.23
	<i>Casearia tomentosa</i>	6.72	9.56	0.40	16.68
	<i>cassia fistula</i>	8.13	36.76	0.67	45.57

	<i>Dalbergia sissoo</i>	12.37	13.97	0.86	27.19
	<i>Diospyros cordifolia</i>	4.66	8.09	0.13	12.88
	<i>Diospyrus tomentosa</i>	16.40	6.62	0.85	23.87
	<i>Emblica officinalis</i>	11.25	11.03	0.86	23.13
	<i>Eucalyptus</i>	9.64	3.68	1.45	14.76
	<i>Eugenia jambolana</i>	7.91	11.76	0.61	20.28
	<i>Ficus benghalensis</i>	3.51	4.41	1.33	9.25
	<i>Ficus glomerata</i>	6.02	2.21	0.10	8.33
	<i>Ficus religiosa</i>	3.01	1.47	0.11	4.59
	<i>Ficus roxburghii</i>	6.30	16.18	0.90	23.38
	<i>Flacourtia indica</i>	7.03	4.41	0.13	11.57
	<i>Grewia optiva</i>	14.56	13.24	0.97	28.76
	<i>Holoptelea integrifolia</i>	3.01	0.74	0.02	3.77
	<i>Kydia calycina</i>	16.87	3.68	0.26	20.80
	<i>Lannea coromandelica</i>	7.63	11.03	0.69	19.35
	<i>Lannea grandis</i>	23.85	8.82	1.15	33.82
	<i>Leucaena leucocephala</i>	6.02	5.15	0.10	11.27
	<i>Litsea umbrosa</i>	9.54	4.41	0.20	14.15
	<i>Madhuca indica</i>	3.01	0.74	0.02	3.77
	<i>Mallotus philippinensis</i>	40.44	69.12	9.65	119.21
	<i>Mangifera indica</i>	13.34	5.15	2.13	20.62
	<i>Morus alba</i>	6.53	4.41	0.23	11.17
	<i>Nerium oleander</i>	15.61	8.09	0.45	24.14
	<i>Oroxylum indicum</i>	3.01	0.74	0.00	3.75
	<i>Other/BL</i>	13.91	40.44	3.96	58.31
	<i>Ougeinia dalbergioides</i>	7.03	2.21	0.14	9.37
	<i>Persicaria maculosa</i>	3.01	0.74	0.03	3.77

	<i>Phoenix dactylifera</i>	3.01	1.47	0.11	4.60
	<i>Pinus roxburghii</i>	40.31	61.76	55.91	157.98
	<i>Pistacia integerrima</i>	3.01	1.47	0.00	4.48
	<i>Premna mucronata</i>	6.02	0.74	0.02	6.78
	<i>Psidium guajava</i>	3.01	0.74	0.01	3.75
	<i>Pyrus pashia</i>	8.13	7.35	0.28	15.77
	<i>Randia dumetorum</i>	3.01	2.21	0.03	5.24
	<i>Sageretia theezans</i>	12.05	0.74	0.02	12.81
	<i>Syzygium cumini</i>	6.48	14.71	1.33	22.51
	<i>Terminalia arjuna</i>	4.52	1.47	0.06	6.04
	<i>Terminalia Bellarica</i>	4.02	4.41	0.11	8.54
	<i>Terminalia chebula</i>	6.02	0.74	0.02	6.77
	<i>Tonna ciliata</i>	11.04	2.21	0.31	13.56
	<i>Wendlandia heynei</i>	13.55	1.47	0.06	15.08
	<i>Wendlandia exserta</i>	10.24	3.68	0.14	14.06
	<i>Xylosma longifolium</i>	7.03	2.21	0.10	9.34
	<i>Ziziphus mauritiana</i>	4.02	4.41	0.07	8.50
	Total	100.00	100.00	100.00	300.00
Coppice	<i>Acacia catechu</i>	22.46	66.15	12.47	101.08
	<i>Acacia modesta</i>	5.51	3.08	0.06	8.65
	<i>Aegle marmelos</i>	3.67	1.54	0.01	5.22
	<i>Albizia lebbeck</i>	6.37	23.08	1.84	31.28
	<i>Albizia odoratissima</i>	5.51	3.08	0.20	8.78
	<i>Anogeissus latifolia</i>	28.15	18.46	8.47	55.09
	<i>Azadirachta indica</i>	11.02	1.54	0.06	12.62
	<i>Bauhinia variegata</i>	4.59	6.15	0.17	10.91

	<i>Bombax ceiba</i>	4.20	10.77	1.35	16.32
	<i>Butea monosperma</i>	12.85	3.08	0.76	16.69
	<i>Casearia tomentosa</i>	5.25	10.77	0.68	16.69
	<i>cassia fistula</i>	9.72	26.15	0.97	36.85
	<i>Dalbergia sissoo</i>	4.72	10.77	0.46	15.95
	<i>Diospyros cordifolia</i>	5.97	12.31	0.71	18.99
	<i>Diospyrus tomentosa</i>	18.36	3.08	0.62	22.06
	<i>Emblica officinalis</i>	4.72	10.77	0.44	15.93
	<i>Eucalyptus</i>	65.18	6.15	14.50	85.84
	<i>Eugenia jambolana</i>	7.34	6.15	0.26	13.76
	<i>Ficus glomerata</i>	13.95	7.69	1.10	22.74
	<i>Ficus palmata</i>	3.67	1.54	0.09	5.30
	<i>Ficus religiosa</i>	3.67	4.62	0.85	9.14
	<i>Ficus roxburghii</i>	6.73	18.46	0.55	25.75
	<i>Flacourtia indica</i>	12.24	9.23	0.41	21.89
	<i>Grewia optiva</i>	6.61	7.69	0.36	14.66
	<i>Holarrhena antidysenterica</i>	3.67	1.54	0.05	5.26
	<i>Holoptelea integrifolia</i>	6.61	7.69	1.17	15.48
	<i>Kydia calycina</i>	4.90	4.62	0.26	9.77
	<i>Lannea coromandelica</i>	11.02	23.08	5.52	39.61
	<i>Lannea grandis</i>	15.61	6.15	0.75	22.52
	<i>Leucaena leucocephala</i>	6.30	10.77	0.32	17.39
	<i>Litsea umbrosa</i>	3.67	4.62	0.08	8.37
	<i>Mallotus philippensis</i>	44.00	78.46	16.49	138.95
	<i>Mangifera indica</i>	17.44	6.15	3.00	26.60
	<i>Melia azadirachta</i>	5.51	6.15	0.14	11.81
	<i>Mitragyna parvifolia</i>	9.18	3.08	0.10	12.36

	<i>Morus alba</i>	4.59	6.15	0.22	10.97
	<i>Nerium oleander</i>	24.33	12.31	1.08	37.72
	<i>Oroxylum indicum</i>	3.67	1.54	0.04	5.25
	<i>Other/BL</i>	17.33	49.23	8.58	75.14
	<i>Persicaria maculosa</i>	4.90	4.62	0.23	9.74
	<i>Pinus roxburghii</i>	15.15	24.62	10.88	50.65
	<i>Pistacia integerrima</i>	7.34	1.54	0.13	9.02
	<i>Psidium guajava</i>	3.67	1.54	0.02	5.23
	<i>Pyrus pashia</i>	6.61	7.69	0.28	14.58
	<i>Randia dumetorum</i>	9.18	3.08	0.11	12.37
	<i>Syzygium cumini</i>	9.18	9.23	0.57	18.98
	<i>Terminalia arjuna</i>	3.67	1.54	0.01	5.22
	<i>Terminalia bellirica</i>	4.90	4.62	0.28	9.79
	<i>Terminalia chebula</i>	14.69	1.54	0.17	16.40
	<i>Tonna ciliata</i>	7.34	4.62	0.76	12.72
	<i>Wendlandia heynei</i>	22.03	1.54	0.16	23.73
	<i>Wendlandia exserta</i>	12.59	10.77	0.61	23.97
	<i>Xylosma longifolium</i>	4.59	6.15	0.24	10.98
	<i>Ziziphus mauritiana</i>	9.79	9.23	0.35	19.37
	Total	100.00	100.00	100.00	300.00
Plantation	<i>Acacia catechu</i>	28.81	71.01	17.10	116.93
	<i>Acacia koa</i>	3.78	0.19	0.00	3.98
	<i>Acacia modesta</i>	6.80	1.95	0.07	8.82
	<i>Acacia nilotica</i>	3.78	0.58	0.01	4.37
	<i>Aegle marmelos</i>	11.76	1.75	0.12	13.63
	<i>Albezia family</i>	11.34	0.19	0.06	11.59
	<i>Albizia lebbbeck</i>	7.18	13.42	0.92	21.53
	<i>Albizia odoratissima</i>	9.45	3.89	0.19	13.53

	<i>Anogeissus latifolia</i>	18.82	17.51	3.25	39.58
	<i>Azadirachta indica</i>	16.07	1.95	0.09	18.10
	<i>Bauhinia vahlii</i>	5.04	0.58	0.01	5.63
	<i>Bauhinia variegata</i>	7.40	4.67	0.24	12.31
	<i>Bombax ceiba</i>	4.75	8.37	0.76	13.87
	<i>Bridelia verrucosa</i>	26.46	0.19	0.05	26.70
	<i>Butea monosperma</i>	16.07	3.89	0.54	20.50
	<i>Casearia tomentosa</i>	6.75	5.45	0.38	12.58
	<i>cassia fistula</i>	11.19	38.72	7.14	57.05
	<i>Celtis australis</i>	3.78	0.39	0.01	4.18
	<i>Citrus sedolimontanaka</i>	11.34	0.19	0.02	11.55
	<i>Cordial myxa</i>	4.73	1.56	0.06	6.34
	<i>Dalbergia sissoo</i>	10.09	18.87	2.02	30.99
	<i>Datura stramonium</i>	3.78	0.19	0.00	3.98
	<i>Dendrocalamus strictus</i>	94.51	0.19	0.14	94.84
	<i>Diosphros melanoxyton</i>	3.78	0.19	0.00	3.98
	<i>Diospyros cordifolia</i>	7.10	11.28	0.51	18.90
	<i>Diospyrus tomentosa</i>	17.13	6.23	1.00	24.36
	<i>Ehretia laevis</i>	9.45	0.39	0.06	9.90
	<i>Emblica officinalis</i>	7.56	14.98	0.63	23.17
	<i>Eucalyptus</i>	45.93	3.89	3.93	53.76
	<i>Eugenia jambolana</i>	8.59	6.42	0.63	15.64
	<i>Ficus benghalensis</i>	9.07	3.89	3.00	15.96
	<i>Ficus glomerate</i>	5.59	4.47	0.64	10.71
	<i>Ficus religiosa</i>	4.32	1.36	0.20	5.88
	<i>Ficus roxburghii</i>	7.96	9.14	0.52	17.63

	<i>Flacourtia indica</i>	9.29	4.67	0.19	14.15
	<i>Grewia optiva</i>	8.32	12.65	0.83	21.79
	<i>Grewia elastica</i>	5.04	0.58	0.01	5.63
	<i>Holoptelea integrifolia</i>	9.20	4.47	0.40	14.07
	<i>Jatropha curcas</i>	30.24	0.19	0.01	30.44
	<i>Kydia calycina</i>	12.18	1.75	0.11	14.04
	<i>Lannea coromandelica</i>	15.51	15.57	3.79	34.86
	<i>Lannea grandis</i>	14.05	10.31	1.17	25.53
	<i>Leucaenea leucocephala</i>	16.15	8.56	0.85	25.56
	<i>Litsea umbrosa</i>	9.38	4.86	0.22	14.46
	<i>Mallotus philippensis</i>	37.47	77.43	13.68	128.58
	<i>Mangifera indica</i>	6.30	5.84	1.24	13.38
	<i>Melia azadirachta</i>	5.43	3.11	0.10	8.65
	<i>Mitragyna parvifolia</i>	6.05	4.86	0.22	11.14
	<i>Morus alba</i>	6.66	4.09	0.47	11.21
	<i>Nerium oleander</i>	15.90	12.26	0.86	29.02
	<i>Oroxylum indicum</i>	9.45	0.39	0.02	9.86
	<i>Other/BL</i>	17.14	37.94	7.31	62.38
	<i>Ougeina dalbergiodes</i>	7.56	2.72	0.22	10.50
	<i>Persicaria maculosa</i>	6.38	3.11	0.11	9.60
	<i>Phoenix dactylifera</i>	3.78	0.19	0.02	4.00
	<i>Pinus roxbnrghii</i>	27.57	27.24	20.31	75.12
	<i>Pistacia integerrima</i>	5.29	1.95	0.10	7.34
	<i>Populus ciliata</i>	3.78	0.19	0.01	3.98
	<i>Premna mucronata</i>	3.78	0.39	0.00	4.17
	<i>Prunus persica</i>	3.78	0.19	0.01	3.99
	<i>Pyrus pashia</i>	10.91	8.56	0.51	19.99
	<i>Randia dumetorum</i>	9.18	1.36	0.02	10.56

	<i>Sageretia theezans</i>	5.04	0.58	0.01	5.64
	<i>Stephegyne parvifolia</i>	3.78	0.19	0.03	4.00
	<i>Syzygium cumini</i>	5.40	6.81	0.54	12.75
	<i>Tectona grandis</i>	37.14	3.31	0.32	40.77
	<i>Terminalia arjuna</i>	5.67	2.33	0.25	8.25
	<i>Terminalia bellarica</i>	4.16	1.95	0.27	6.37
	<i>Terminalia chebula</i>	3.78	0.78	0.02	4.57
	<i>Tonna ciliata</i>	9.33	5.84	0.52	15.68
	<i>Wendlandia heynei</i>	8.40	1.75	0.07	10.23
	<i>Wendlandia exserta</i>	12.83	7.39	0.39	20.62
	<i>Wrightia tomentosa</i>	3.78	0.19	0.00	3.98
	<i>Xylosma longifolium</i>	6.45	6.61	0.23	13.30
	<i>Ziziphus mauritiana</i>	5.13	5.45	0.26	10.83
	Total	100.00	100.00	100.00	300.00
Protection	<i>Acacia catechu</i>	25.58	59.46	13.37	98.40
	<i>Acacia Modesta</i>	7.10	4.05	0.10	11.26
	<i>Acacia nilotica</i>	5.68	4.05	0.37	10.10
	<i>Albizia lebbeck</i>	9.95	4.05	0.19	14.20
	<i>Anogeissus latifolia</i>	10.23	6.76	0.72	17.70
	<i>Azadirachta indica</i>	10.66	5.41	0.59	16.66
	<i>Bauhinia variegata</i>	4.26	2.70	0.07	7.03
	<i>Bombax ceiba</i>	6.87	24.32	2.70	33.89
	<i>Butea monosperma</i>	22.95	17.57	4.10	44.62
	<i>Casearia tomentosa</i>	4.26	9.46	0.23	13.95
	<i>Cassia fistula</i>	12.23	31.08	1.90	45.21
	<i>Cordia vestita</i>	4.26	1.35	0.04	5.66
	<i>Dalbergia sissoo</i>	8.05	12.16	1.41	21.63

	<i>Diospyros cordifolia</i>	7.99	10.81	0.70	19.50
	<i>Diospyrus tomentosa</i>	19.42	12.16	2.31	33.89
	<i>Emblica officinalis</i>	8.53	4.05	0.28	12.86
	<i>Eucalyptus</i>	27.71	2.70	3.36	33.77
	<i>Ficus benghalensis</i>	4.26	2.70	1.12	8.08
	<i>Ficus glomerate</i>	8.53	6.76	1.81	17.09
	<i>Ficus religiosa</i>	4.26	2.70	0.18	7.15
	<i>Ficus roxburghii</i>	12.18	9.46	1.08	22.71
	<i>Flacourtia indica</i>	4.26	2.70	0.11	7.08
	<i>Grewia optiva</i>	8.53	20.27	0.91	29.70
	<i>Holoptellea integrifolia</i>	11.84	12.16	2.12	26.13
	<i>Lannea coromandelica</i>	20.37	12.16	4.57	37.10
	<i>Lannea grandis</i>	13.95	14.86	2.34	31.15
	<i>Leucaena leucocephala</i>	34.10	17.57	4.76	56.42
	<i>Mallotus philippensis</i>	25.21	62.16	9.08	96.44
	<i>Mangifera indica</i>	10.66	2.70	0.43	13.78
	<i>Melia azadirachta</i>	10.66	2.70	0.14	13.50
	<i>Mitragyna parvifolia</i>	4.26	4.05	0.20	8.52
	<i>Morus alba</i>	4.26	1.35	0.04	5.66
	<i>Nerium oleander</i>	10.96	18.92	1.00	30.88
	<i>Other/BL</i>	41.31	56.76	23.91	121.98
	<i>Ougeinadalbergiedes</i>	12.79	6.76	1.13	20.67
	<i>Persicaria maculosa</i>	4.26	1.35	0.10	5.71
	<i>Phoenix dactylifera</i>	25.58	2.70	1.19	29.47
	<i>Pinus roxbnrghii</i>	28.93	18.92	9.88	57.73
	<i>Pyrus pashia</i>	9.95	4.05	0.24	14.25

	<i>Syzygium cumini</i>	4.26	1.35	0.01	5.63
	<i>Terminalia arjuna</i>	17.05	1.35	0.34	18.74
	<i>Tonna ciliata</i>	8.53	1.35	0.10	9.98
	<i>Wendlandia heynei</i>	11.37	4.05	0.12	15.54
	<i>Wendlandia exserta</i>	12.79	6.76	0.40	19.95
	<i>Ziziphus mauritiana</i>	5.68	4.05	0.26	9.99
	Total	100.00	100.00	100.00	300.00

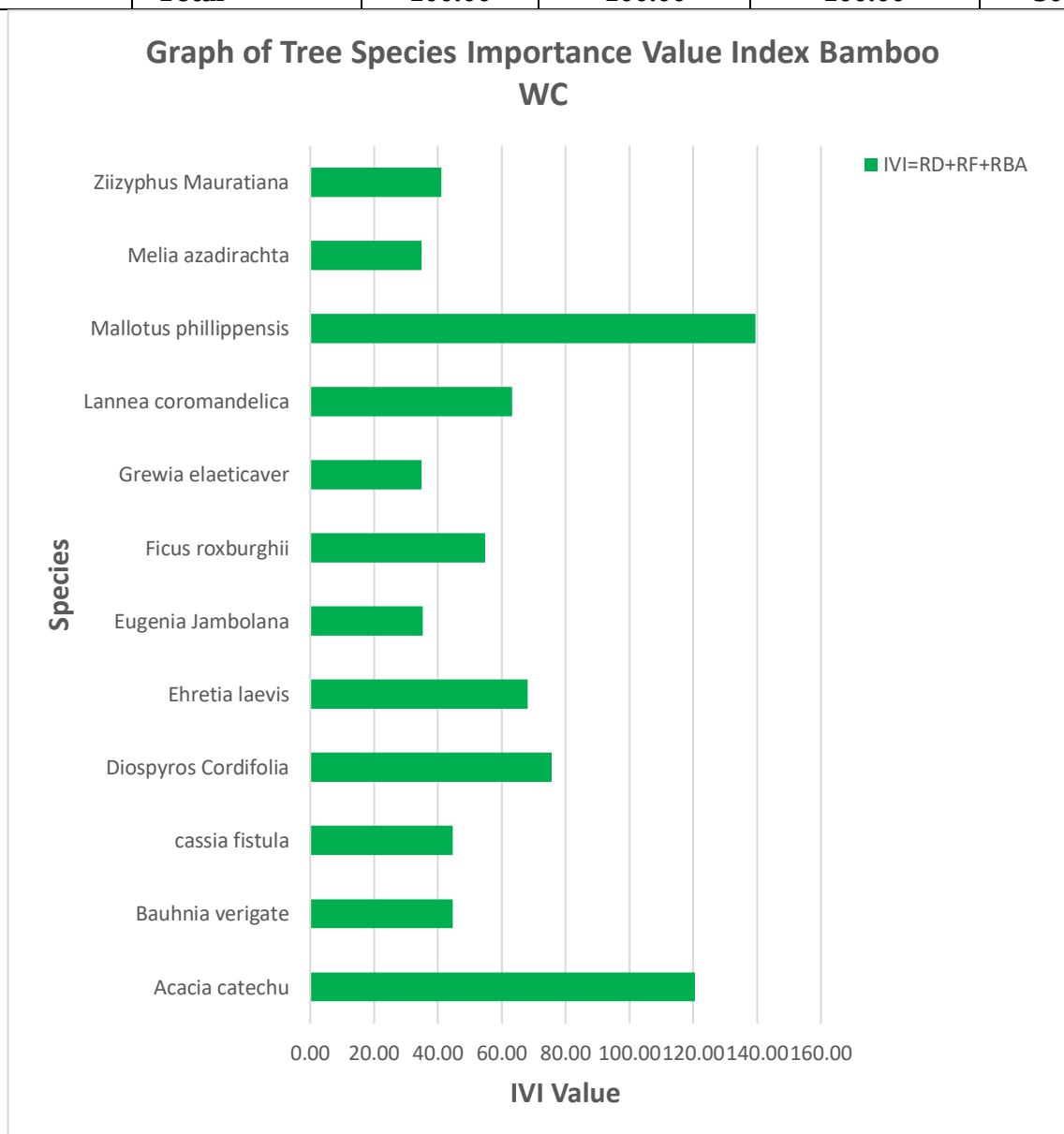


Chart 3.2

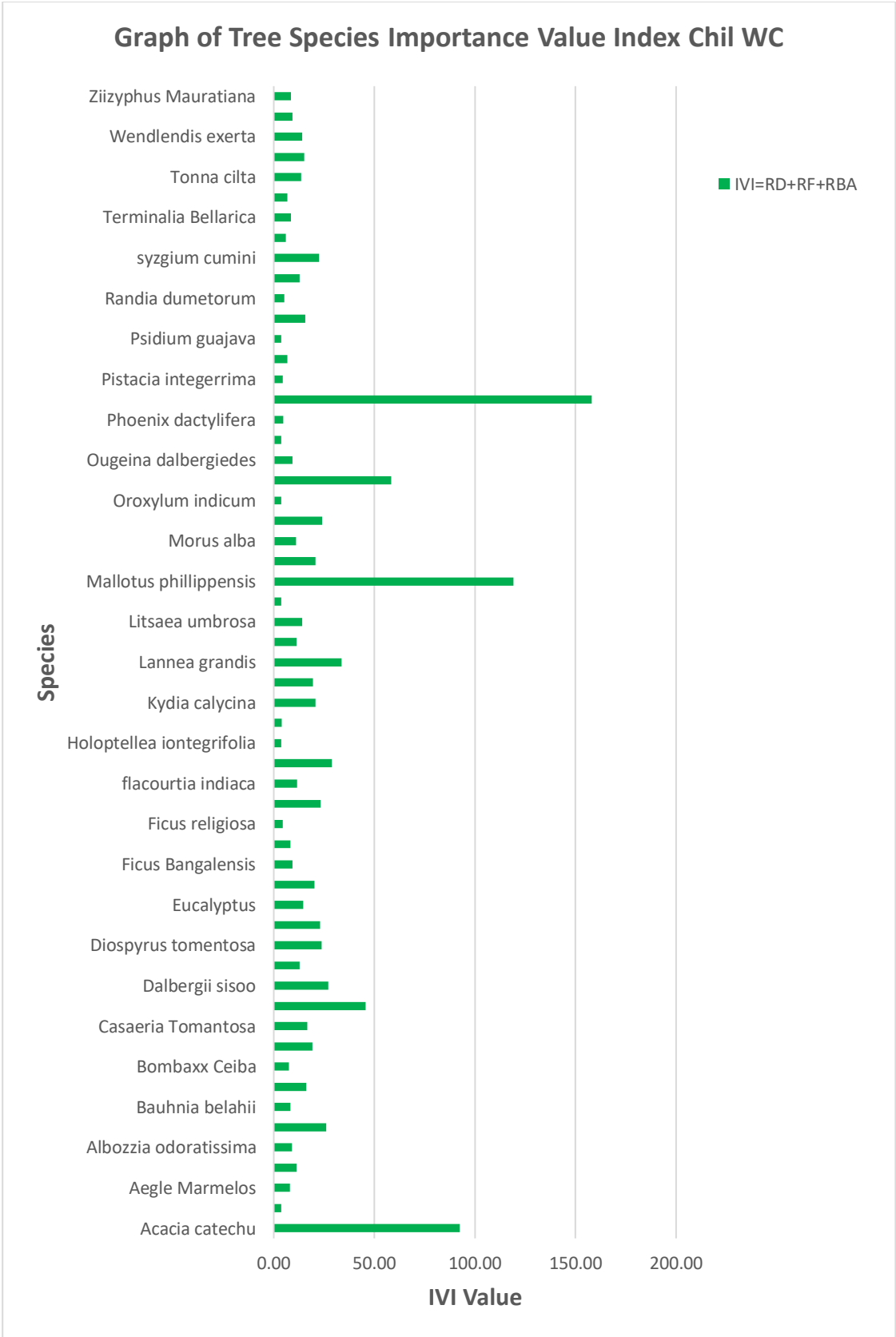


Chart 3.3

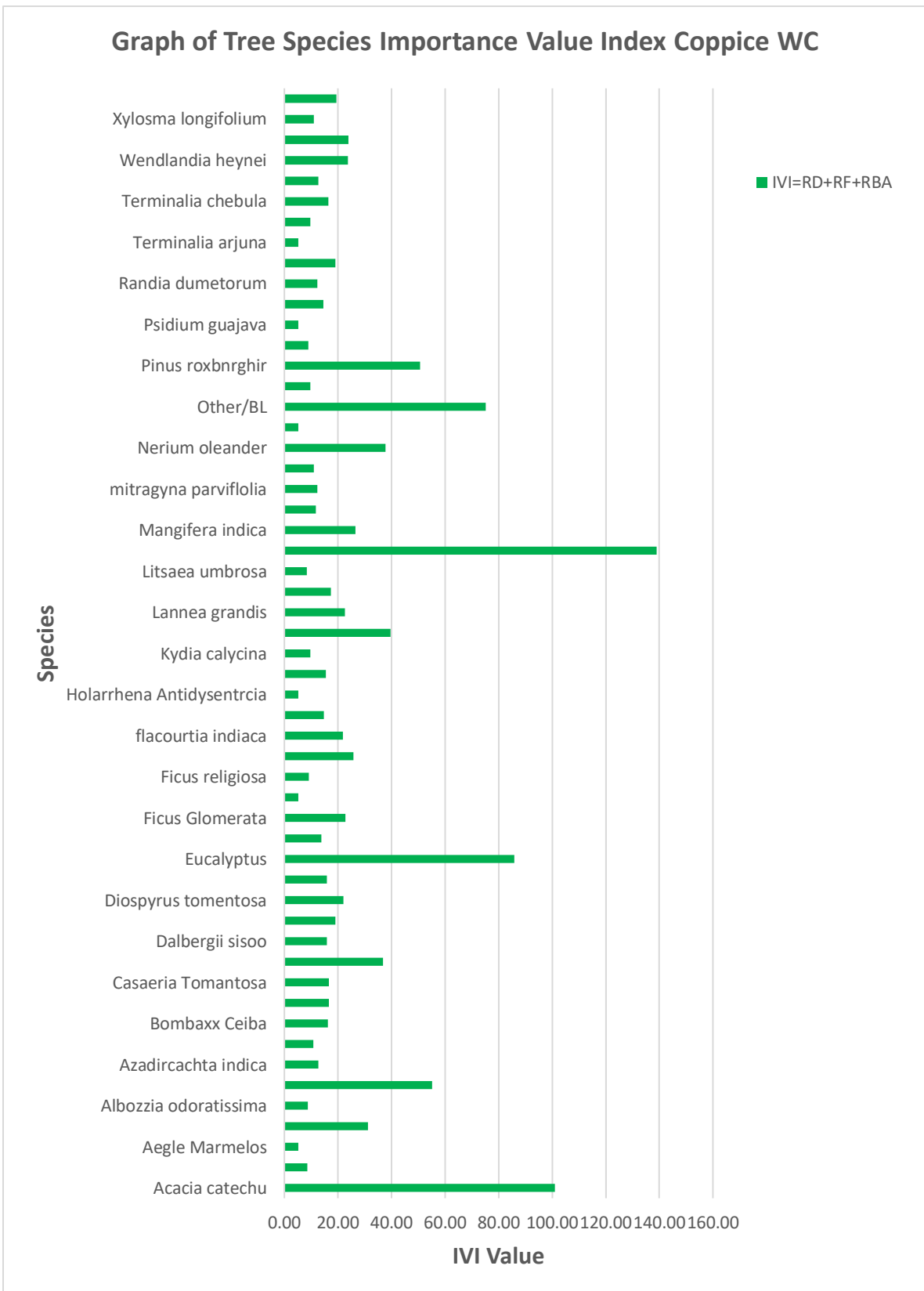


Chart 3.4

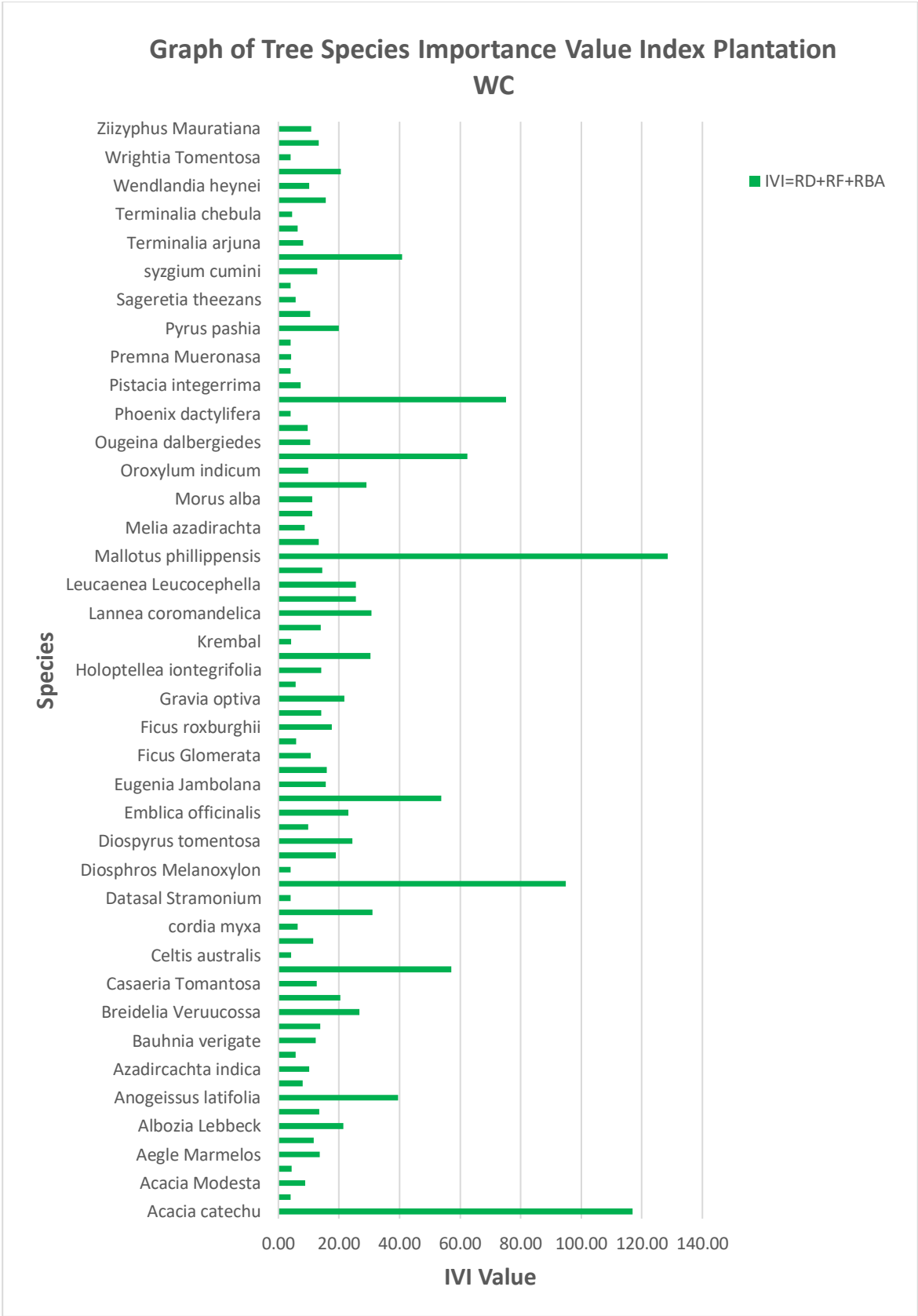


Chart 3.5

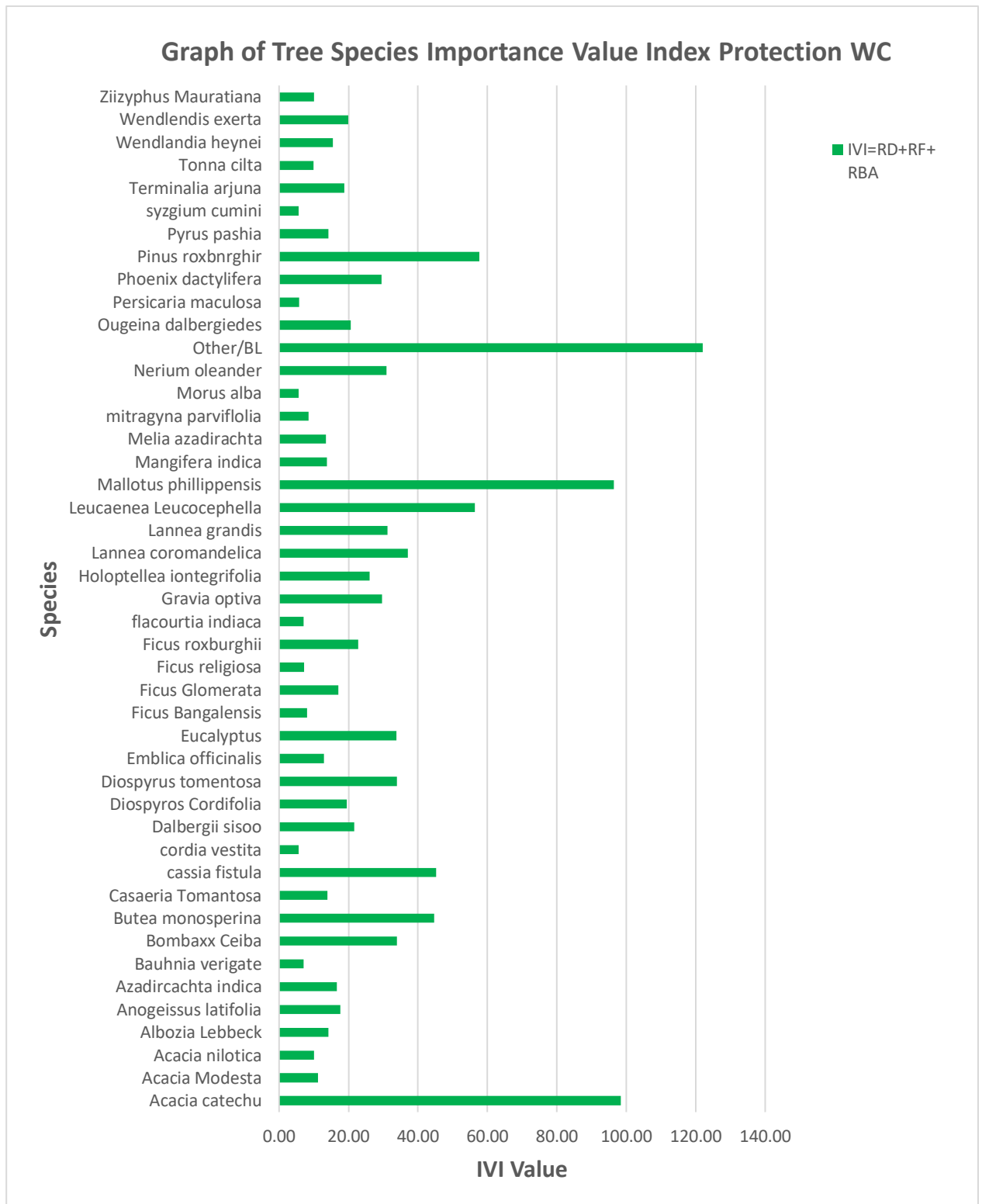


Chart 3.6

Table 3.4 Ecological parameters of Shrub species

Importance Value Index Shrubs				
Species	Relative Density	Relative Frequency	Relative Cover	IVI=RD+RF+RCo
<i>Calotropis gigantea</i>	0.05	0.25	18.98	19.27
<i>Croton bonplandianus</i>	0.09	0.25	37.96	38.30
<i>Justicia adhatoda</i>	4.68	13.05	35.81	53.54
<i>Murraya koenigii</i>	47.41	84.98	55.79	188.17
<i>Carrissa opaca</i>	15.33	43.60	35.17	94.10
<i>Lawsonia inermis</i>	1.31	2.96	44.29	48.55
<i>Ageratum conyzoides</i>	0.65	0.99	66.43	68.07
<i>Lantana camara</i>	30.20	63.79	47.34	141.34
<i>Achyranthes aspera</i>	0.28	0.74	37.96	38.98
	100.00	100.00	100.00	300.00

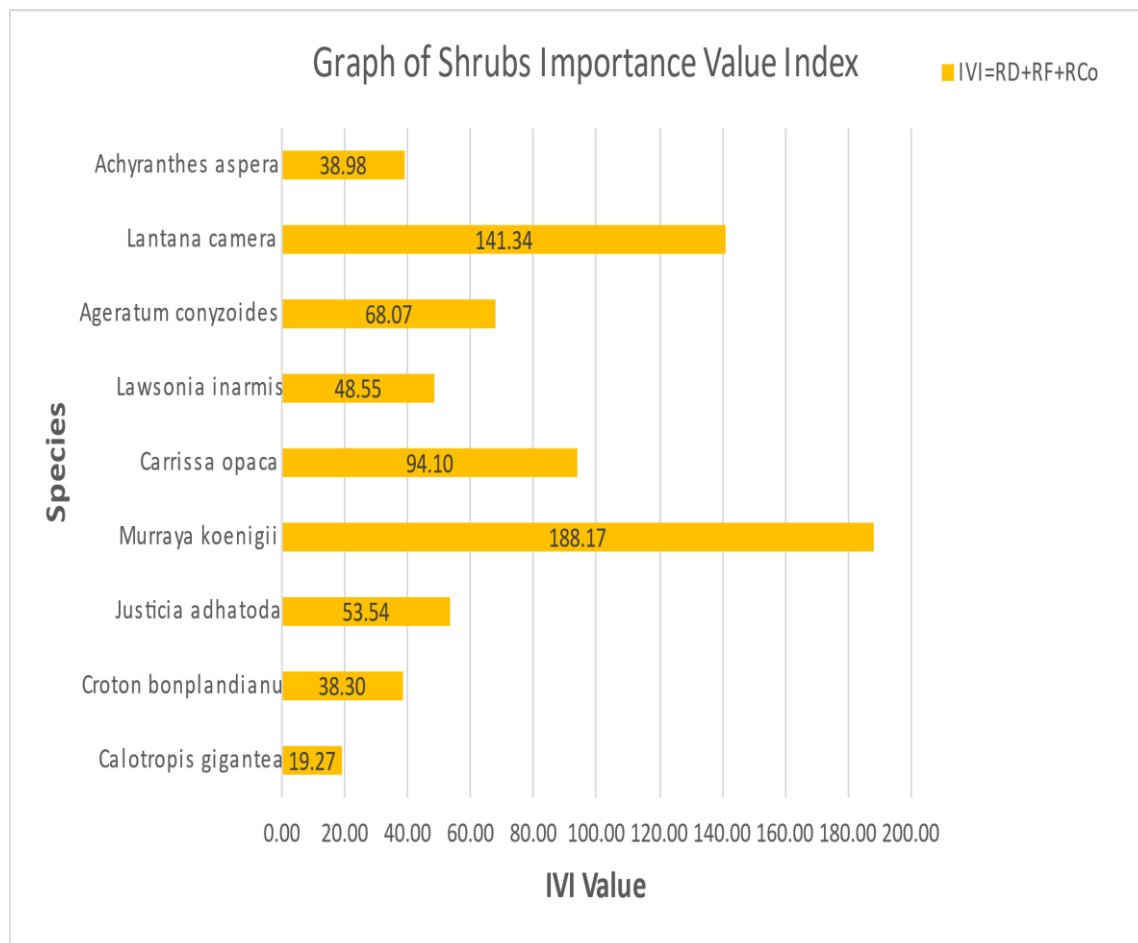


Chart 3.7

Table 3.5 Ecological parameters of Herb species

Importance Value Index Herbs				
Species	Relative Density	Relative Frequency	Relative Cover	IVI=RD+RF+RC o
<i>Achyranthes aspera</i>	12.60	12.04	3.84	28.49
<i>Ageratum conyzoides</i>	24.84	21.43	4.26	50.53
<i>Asplenium</i>	2.02	3.08	2.41	7.52
<i>carissa opaca</i>	0.46	0.14	12.07	12.67
<i>Chrysopogon fulvus</i>	8.28	11.48	2.65	22.41
<i>Corchorus Aestuans</i>	1.01	1.54	2.41	4.97
<i>Curcuma aromatica</i>	0.37	0.56	2.41	3.34
<i>Cynodondactylon</i>	1.20	1.54	2.85	5.59
<i>Cyperus rotundus</i>	1.29	0.28	16.89	18.46
<i>Euphorbia hirta</i>	0.83	1.12	2.71	4.66
<i>Justicia adhatoda</i>	1.38	2.10	2.41	5.89
<i>Kalanchoe pinnata</i>	0.09	0.14	2.41	2.65
<i>Lantana camara</i>	4.97	3.92	4.65	13.54
<i>Lawsonia inarmis</i>	0.28	0.28	3.62	4.18
<i>Mentha sylvestris</i>	7.54	8.26	3.35	19.16
<i>Murraya koenigii</i>	13.34	7.56	6.48	27.38
<i>Oxalis corniculata</i>	2.48	2.94	3.10	8.53
<i>Panicum maximum Jacq</i>	0.64	0.70	3.38	4.72
<i>Parthenium hysterophorus</i>	8.65	11.06	2.87	22.58
<i>Pogonatherum crinitum</i>	1.47	1.26	4.29	7.02
<i>Randia dumetorum</i>	0.28	0.42	2.41	3.11
<i>Sorghum drummondii</i>	2.02	2.38	3.12	7.53
<i>Sorghum halepense</i>	0.55	0.70	2.90	4.15
<i>Tracheophyta</i>	3.40	5.04	2.48	10.93
Grand Total	100	100	100	300

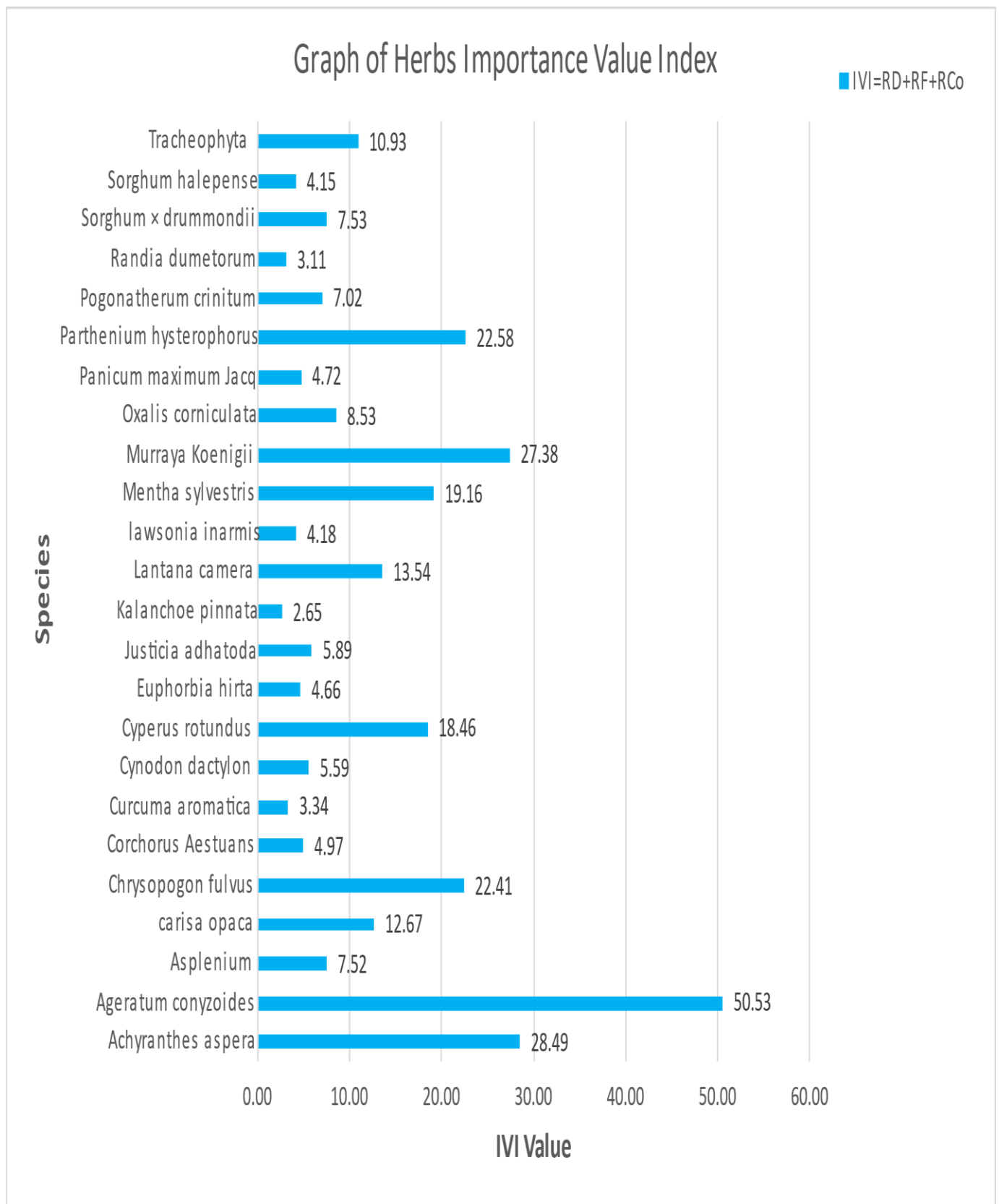


Chart 3.8

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. However, species like *Delphinium denudatum* and *Peristylus constrictus* were found to occur rarely. In a study conducted by Indian Institute of Remote Sensing, the rare plants encountered were: *Cynoglossum wallichii*, *Cynoglossum glochidiatum*, *Dicliptera roxburghiana*, *Galium asperine*, *Kydia calycina*, *Rubus ellipticus* and *Selaginella subdiaphana*.

Medicinal Plants:

Some of the important medicinal plants, encountered are *Adhatoda vesica*, *Aegle marmelos*, *Azadirachta indica*, *Bacopa monnieri*, *Cordia dichotoma*, *Terminalia chebula*, *Terminalia bellirica*, *Moringa oleifera*, *Emblica officinalis*, *Acacia catechu* and *Tinospora cordifolia*.

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*, *Dendrocalamus strictus*, *Moringa oleifera*, *Holoptelea integrifolia*, *Aegle marmelos*, *Emblica officinalis*, *Achryranthes aspera*, *Adhatoda vesica*, *Ageratum conyzoides*, *Azadirachta indica* and *Cannabis sativa*.

3.3 Status of biodiversity Conservation in Forests:

The state has prepared the strategy and action plan for conservation of biodiversity. The strategies include augmentation of forest resources by making efforts to restore original ecosystem, promotion of indigenous tree species, declaring climax communities as closed forest areas, improving canopy density in the existing forests, promotion of natural regeneration, growing of medicinal plants through inter departmental consultations and introduction of dwindling species. The strategic action plan also lays emphasis on involvement of local communities, especially women, in protection of forests making them important components of forest management, also linking forestry with livelihood issues and conducting economic evaluation of biological resources conserved by communities.

3.4 Status of species prone to overexploitation:**INJURIES TO WHICH THE CROP IS LIABLE:**

The forest are subjected to injuries inflicted by several agencies. They include grazing, lopping, illicit, felling, soil erosion, fires, climbers, parasites, draughts, frost, storms, wild animals, insect pests and fungi etc. In the present day set up, the ill effects of grazing, lopping, illicit felling, fires, soil erosion has increased alarmingly. They are posing increasingly high danger to the very existence of the forests. Special watch and preventive

methods are required to counter the occurrence of these injuries. The effects of these injuries are described below.

Grazing: -

This is perhaps the most dangerous cause of depletion of forest wealth. The problem has increased many folds in the last couple of decades. Although there are rules and regulations stipulating freezing the numbers of animals that is to be allowed to graze in a particular area, but practically it is very difficult to control the menace. All the forest dealt in this plan are reserved forest (except a few *Shamlats*) and grazing restrictions area little vogue in them. But in reality, unchecked and uncontrolled grazing is going on. This has adversely affected the regeneration of forests, both natural and artificial. Young regeneration is often grazed, browsed and ultimately destroyed. The grazers include *Gujjars*, *Gaddis* and local inhabitants. The *Gujjars* and *Gaddis* are issued grazing permits in their respective permit forests. But this restriction is hardly followed. There is illicit grazing by the inhabitants of adjoining State of Punjab in the border areas. This needs to be checked too. The staff needs to remain vigilant. They should have a dialogue with the local people. Chronic offenders should be booked under the law. There is need to notify and strengthen the existing cattle ponds.

Lopping: -

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

- I** Top 1/3rd crown of a tree will be left intact.
- II** No branch over 3cm in dia will be cut while lopping.
- III** Heavy cutting instruments, like axe will not be used.
- IV** No trees below 20 cm d.b.h shall be lopped.

However, these restrictions are not been followed in practice. Trees are badly lopped for fodder, sometimes leading shoot are also lopped. This leads to several ill effects. Fungus attacks and stuntedness are one of the few consequences of this. Restrictions (I to IV) listed above are seldom followed. This leads to a stunted, malformed and unhealthy crop. This practice must be checked by the field staff. The species which are badly lopped include Khair, Siris, Kachnar, Bahera, Arjun, Mulberry(Toot) etc.

ILLICIT FELLING: -

Unauthorized felling by local people for private use as well for commercial use, have increased manifold. In the last decade, with the rise in demand of timber and khair wood, illicit felling and smuggling of timber/khair wood is at rise. There have been frequent instances of organized illicit felling and smuggling; the field staff will have to be extremely cautious and vigilant to check this menace. Field staff must be well equipped with infrastructure like patrolling vehicles. Necessary knowledge to take legal action as per IFA in in forest offence cases and to produce offenders to magistrate courts and to put challans in magistrates courts along with Authorized Officers Court be provided.

Soil Erosion: -

The geological formation of the is loose, unstable and prone to soil erosion. With the loss of vegetation cover, soil erosion has assumed dangerous proportions. The denuded hill sides, with sub soil exposed, are an example of destruction and lose of top soil. Areas in Kotla and Nurpur ranges are a testimony to this. Huge slips along nala and river banks are common. Streams like Dehar and Chakki create a havoc in rains due to floods, Heavy landslides and soil erosion worsen the situation. 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 agriculture fields with the loss of top soil, nutrient availability of the plant decreases, which further results in degradation. Suitable Soil conservation and management plans are a must in the region.

Fires: -

With the onset of summers, fires are quite common in the region. They are mostly deliberate, kindled by locals as they have a belief that burning of areas during summers will lead to a clean flush of grass in monsoon. This fact motivates local inhabitants to put their local private as well as forest areas on fires. However, in most of the cases, results are extremely dangerous. There is a tremendous loss to both flora and fauna. The following table shows the areas burnt from 2012-13 onwards:

Table No. 3.6Area affected by Forest fires (Last 10 Years)

Sr.No	Year	Total No of Case	Total Area burnt in Ha.	Percentage of Total area burnt
1	2012-13	94	567.75	1.06
2	2013-14	6	58.71	0.11
3	2014-15	11	56.65	0.11
4	2015-16	14	43.55	0.08
5	2016-17	42	208.15	0.39
6	2017-18	21	89.80	0.17
7	2018-19	161	2508.40	4.70
8	2019-20	27	133.08	0.25
9	2020-21	1	3.00	0.01
10	2021-22	68	268.25	0.50
11	2022-23	79	492.90	0.92
12	2023-24	2	14.50	0.03

CLIMBERS: -

The common climbers found in this tract include Malijhan (*Bauhinia vahlii*), Gauj (*Millettia auriculata*), *Pueraria tuberosa*, Paribel (*vitis latifolia*) and Roel (*Combretum decandrum*). It is sad to note that no climber cutting is done in the forests, as a part of silvicultural operation. With the result, the climbers coil around the trunk or fasten the crowns of trees which lead to strangulation, bending, forking and stuntedness in the crop. Regular climber cutting should be done to keep the forest healthy.

PARASITES: -

Parasites feed on the sap of the host, weaken the tree prevents its growth and development and gradually cause its death.

Drought: -

May and June are extremely hot in the region. These conditions however, do not seriously affect the standing crop, but they certainly cause damage to the regeneration (specially planted sapling/seedlings). If the drought period prolongs, further damage results. The effect is more pronounced on the ridges and spurs.

FROST:

Severe frost is not common in this tract. However mild frost does occur every winter. Young crop can suffer damage by frost.

STORMS: -

Mild storms occur in the tract during March, April and September and October. They cause severing of the crowns and branches of trees. However, sometimes chil and few other spp. are also uprooted by such storms. Storms of severe nature are rare in the area.

WILD ANIMALS: -

The damage caused by the wild animals is not rare. Wild boars, porcupines, hare (serrow) and sambhar do cause damage to the plantation, especially the young crop and regeneration by nibbling and digging.

INSECT PESTS: -

- (I) Occasionally swarm of locusts may reach these localities and attack the foliage of the trees and cause considerable damage.
- (II) Ordinarily a sporadic attack of geometrid leaf defoliator- *Ascotis selenaria* takes place. This affects the growth of individual trees but there is never a large-scale damage.
- (III) Leaf hoppers and scale insects also attack the young shoots of some trees during March and April and retard their growth. During the attacks of the scale insect, the floor gets covered with a shining sticky substance exuded by the insect.
- (IV) Termites are the greatest enemies of the vegetation. These attack the young plants in the plantation during post-monsoon days in September and also during spring when the moisture regime is favorable for their spread. They also attack the dead bark of the trees and at times penetrate to the live bark and thus retard the growth of the trees. The termites damage the coppiced stumps also.

THE FUNGI: -

Trees with developed heartwood are susceptible attacks by the heart rotting fungi, polyporus species. The spores of this fungus enter through the wounds. In the crop of coppice origin, it spreads from the stumps into the poles. The rot is more common in the forest which are overgrazed, lopped or burnt annually. The mature and over mature trees

are invariably affected by this rot. This not only reduced the quality or timber but also useful volume of trees.

Khair is lopped heavily for fodder, throughout the tract. Heavy lopping makes the trees susceptible to attack by a heart rot fungi. Some khair trees are invariably affected by this heart rot.

3.5 Conservation of Genetic Resources:-

There are no preservation plots or permanent sample plots in the forests. However, species diversity of less common species is being enhanced in forest nurseries. The forest staff is being sensitized and encouraged to raise rare or less common species by raising such plants in nurseries. This is going to help in conserving genetic resources as well as biodiversity of local flora. In future modern technologies to conserve genetic resources can be developed to safeguard the species future. There is a good scope of a specialized plant nursery to promote special medicinal and local plant species. Utmost care is being taken to safeguard present reptiles, birds and mammals like Sambhar, Wild boar and Red Jungle Fowls etc. by continuous sensitization of the local community.

3.6 FAUNA AND THEIR HABITAT:-

GENERAL DESCRIPTION :-

A wide range in altitude with varied tropical to Subtropical flora offers diverse type of wild animals and birds capable of thriving under different climatic conditions ranging from tropical to subtropical climate and from densely wooded area to sparse tree growth. The undisturbed forest in the past gave safe harborage to wild creatures and provided guarantee of their survival. With the advancement of civilization, there are hardly few forests left free from intrusion by man. This has a disastrous effect on the wild life. The increase in human population and breaking of forests lands for agriculture has also reduced the domain available to the wild life. The lower areas were rich in goral, wild boar, barking deer, koklash, Khalij, chakor, partridge, and red jungle fowl but their number has reduced to alarming low level with the passage of time. The important wild life species are described below:

ANIMALS

Leopard or Panther (*Panthera pardus*)

It is also known as *Bagh* or *Mirg*. Its population has reduced considerably. It is found up to an elevation of 2500 m and resides in isolated rocky hills. It is of rufous fawn color, has a fulvous or bright fulvous coat marked with dark spots grouped in rosettes. The tail is also more or less ringed. Average male is about 2m long weighing about 57 kg. Panther breeds all the year round and probably one litter of 2 to 4 is given every year. It generally remains in the neighborhoods of villages carrying off sheep, goat, calf and dogs etc, at nights. It seldom attacks human beings without provocation. It has been ruthlessly killed for its ornamental skin and also for the safety of the goats and sheep in the forest.

Porcupine (*Hystrix indica*)

Locally known as *Sehl*, *Sehl* or *Sail*, it is robust heavy and terrestrial. The whole of its back is covered with long and well developed quills which may be nearly 60 to 70 cm long. It feeds on vegetables, principally on roots and damages the young plants in nurseries and plantations especially of amaltas, chil, baheda, bamboo etc. The animal is fond of gnawing

bones and when alarmed it utters a gruntling sound, erects its spines and inflicts injuries. It weighs about 10 to 15 kg and is locally very much valued for its meat.

The Barking Deer (*Muntiacus muntjak*)

It is known as *Kakkar* found between 800 to 2500 m elevation. Its colour is deep chest nut becoming darker on the back and pale and dull below. Its height shoulder is about 50 to 57 cm. The horns rarely exceed 13 cm. Generally it utters a subdued chicking noise but when alarmed and in flight, the sound becomes a bark like cry from which the name barking deer is derived. The animal lives mostly in forests having very thick understorey and comes out to graze in the outskirts of forests in open clearing during night. It is a solitary animal and is rarely found in herds. The animal is diurnal in habit and its food is mainly grass, tender leaves of trees, shrubs and wild fruits. It is unmatched for flexibility and prowess of creeping through the tangled stands. The mating season is during winter months and young are born in spring. During winter it descends down. Being small in height, it cannot run fast on snow and gets stuck up and gunned down easily. It is a sought after animal for its meat. The high incidence of poaching has reduced the population to an alarming low position. The destruction of the habitat of this animal is also the reason for its reduced population.

The Sambhar (*Rusa unicorn*)

This is the largest deer carrying magnificent horns. Its coat is coarse and shaggy and the general colour is brown with yellow or grayish tinge. A full grown average male weighs about 230 to 240 kgs. The horns are about 90 cm. This animal was quite common up to an elevation of 2000m. Due to complete coverage of habitat by domestic animals, increase in the population, better mobility due to roads. More guns and the lust for cheap meat, this animal has been badly hunted in the past.

Common Indian Hare (*Lepus nigricollis*)

Locally known as *Khargosh*, *Serru* it is found everywhere. It is a small size animal having about 40 to 50 cm length and about 2 kg. of weight. It feeds on grasses, seeds and fruits, it is hunted for its meat. It is harmful to nurseries and plants.

The Jackal (*Canis aureus*)

Locally known as *Giddad* (*Giddar*), it is little smaller than the domestic dogs and grey in colour. Very conspicuous due to their howling during dusk or dawn near villages. Their number has increased due to lack of competition by other animals which have been hunted down by the man. They do considerable damage to the crops and also lift the domestic poultry. Killing of these animals also requires permit under big game.

The wild Cat (*Felis silvestris*)

It is known as *Jangli billi*, slightly bigger than the domestic cat and has long legs. It is distributed all over but avoids severe cold during winters. Its habitat is forest fringes, open grass lands and rocky outcrops. It preys on small mammals, birds and even on poultry near villages. Due to diminishing natural diet, its population has decreased.

The leopard cat (*Prionailurus bengalensis*)

It is known as *cheeta billi* about the size of domestic cat with rather longer legs, Its skin marking resembles that of panther. It lives mostly on small birds and rodents.

Indian Grey Mongoose (*Urva edwardsii*)

It is light grey to dusty brown small animal locally called *Nol or Nolu or Nevla*. It eats rats, snakes and small birds. It is found all over the division except snow bound areas.

The Monkey (*Macaca mulatta*)

The common species found are Rhesus macaque locally known as *Baandar* which is in plenty all over due to protection afforded to it on religious grounds. Its population has also increased due to reduction of its natural predators namely panther. It avoids snow and moves down during winter. Monkeys do considerable damage to the agricultural crops, garden fruits and plantations. They live in groups in open areas to the dense forests and feed on tender leaves, wild fruits and tubers, Oak acorns are the favorite food.

The Langoor (*Semnopithecus entellus*)

Locally known as *kaala muh wala baandar*. Like monkey, Langoors are also found from Shiwalik to high Himalayas but move down during winter through on lesser scale. They live on leaves, buds, fruits and flowers of forest trees, shrubs and even herbs. The ban oak acorns, horse chestnut, maple, robinia, walnut and hazelnut seeds are the favoured dietary items. They live in a large group. These animals are shy and less troublesome, compared to monkeys. However, they do damage to the agricultural crop, fruit trees and forest plantations.

OTHERS**The Indian Wild Boar (*Sus scrofa cristatus*):**

Also known as *Jungli Suar*, it is notorious and an omnivorous wild animal living in grassy, bushy and also thickly wooded area. It feeds on field crops, wild roots, tubers and even insects. It is grayish black, the skin being covered with a sparse growth bristles which form a conspicuous mane. Wild boar is a prolific animal giving at least two litters every year, one in the beginning of rains and other after the rains. A well grown male is about 80 to 90 cm at shoulder and may weigh upto 200 kg. It is generally found in herds and causes a lot of damage to agricultural crops forest nurseries

BIRDS**1: TERRESTRIAL BIRDS****PHEASANTS AND FOWL GROUP****The Indian peafowl (*Pavo cristatus*):**

Is also known as the common peafowl, and blue peafowl, is a peafowl species native to the Indian subcontinent. Male peafowl are referred to as peacocks locally known as *mor*, and female peafowl are referred to as peahens and locally known as *bodad/bodar*, although both sexes are often referred to colloquially as a "peacock".

The Red Jungle Fowl (*Gallus gallus*) :

It is known as *Jungli Murga or Kukkar* and is common upto 2000m altitude. It prefers lower scrub forests. It is a favorite bird of shikaris. It is believed to be the ancestor of all domestic fowls, found in pairs or parties. It is a very shy and conning bird, scuttles into cover on

slightest disturbance or suspicion. The male is black below and red above. The tail has long coverts with dark metallic green, black and chestnut. The hens are plain streaked brown with rufous brown under parts. It roosts on thick crowned trees or bamboo clumps; feeds on grains, vegetable shoots, insects etc. Nesting season is generally from March to May.

PATRIDGE AND QUAILS GROUP

THE BLACK PARTRIDGE (*Melanoperdix niger*)

Commonly known as *Kala Tittar*. It is found up to 180m frequenting the grassy and scrub patches near cultivations. It is a small game bird, about half the size of a village hen, generally black and spotted white. The hens are paler and speckled black and white. It feeds on grass seeds, grains, white ants, termites, and other insects. It is a swiftly running bird relying upon its leg to escape, lives singly or in pairs. Nesting season is from April to July.

The Chakor (*Alectoris chukar*)

Chakor is a mountain partridge being one of the best table birds. It is a large, plump, pinkish grey brown with rib like bars on flanks Bills and legs are crimson. Its colour on the upper part and up to breast is plain grey.

The lower parts below the breast are buff and the flans are beautifully banded with grey, buff, and chestnut. It is distinguished at once by the beautiful bearing of flanks. The bird is very prominent due to its call in the evening and at times even during day. It prefers the barren rocky slopes with scattered bushes and grasses. It is a resident bird of Himalaya found between 1500 to 3000 m. Generally, it is seen in parties regular visiting the cultivated fields for food. It feeds on seeds and grain as well as tender roots, green shoots and leaves of grass and food crops and a variety of insects and larvae. The breeding season is from April to August, early at low altitudes and late in the high hills. Seven to twelve eggs are laid at a time.

The Grey Partridge (*Perdix perdix*)

Locally known as *Safed* or *Dhaura teetar*. It is less common than Kala Teetar. Occasionally found in dry scrub forests. It frequents bushy jungles and cultivated lands. Its hunting is common.

Jungle Bush Quail (*Predicula asiatica*)

It is known as *Bater* and is of the size of rain quail. The bird has fulvous brown, mottled black and buff feathers above and white below. In females the lower parts are pale pinkish. It is found in open deciduous and dry scrub forests, it lives in convoys of 5 to 20 which rest together and rise suddenly when almost trodden, feeds on grass seeds, tender shoots and grains. Nesting season is not well defined; it ranges from August to April.

The Common or Grey Quail: (*Coturnix coturnix*)

It is almost the tail less partridge like bird called *Luwa*. It is buffish- brown in colour with pale reddish brown and black streaks. It is found in pairs or parties in grass land and cultivations and hides very well in grass and bushes. It flies straight for a short distance. Their population swells during winter when they migrate from Central and Western Asia to this region. It feeds on grain, grass seeds and insects etc. Nesting season is from March to

May. Rain Quail (*Contrunixcoromandelica*) which migrates locally is also found in the lower regions but rather very rare.

DOVES AND PIGEON GROUP

Blue Rock (*Columba livia*)

Commonly known as *Kabutar* has a slaty grey colour with glistening metallic green purple and magenta sheen on the neck and breast. It lives gregariously on rocky cliffs and precipices. It is found throughout the division in upper reaches. Large flocks regularly visit, cultivated field in search holes. It generally feeds on grass seeds, cereals, pulses etc. Nesting season is not well defined.

Dove (*Streptopelia orientalis*)

Commonly known as *Ghuggi*, it is a commonly dove found in pairs or small parties in open places and cultivated fields. It approaches houses and even verandah if not scared. Its flight is straight and swift. It feeds on grass seeds on grass seeds grains and wild fruits. Its nesting season is also not well defined.

OTHERS

The Wood Cock (*Scolopax rusticola*)

Locally it is known as *Sham Kukra*. This bird is equal to Chakor in size, it is brownish with black and rufous markings.

2. Aquatic Birds

Ducks, teals, goose and cranes are known to visit perennial rivers and streams but rare.

B. NON-GAME BIRDS

These are of two types viz. Raptors, and non-raptors. Raptors are the birds of prey such Hawks, Kestrels eagles, falcons, vultures and owls. Other birds of common occurrence are house and jungle crowns (*Corvus spp.*) The jungle babbler (*Turdoides spp.*), bulbuls (*Chloropsis species and pycnonotus spp.*), King crow (*Dicrurus spp.*), golden oriole (*Oriolus spp.*), the common Myna (*Acridotheres spp.*), the common baya (*Ploceus spp.*), the wood pocker (*Dinopium spp.*), parakeets (*Psittacula spp.*), common king fisher (*Alcedo spp.*), Indian moorhens (*Gallinula spp.*), Herons (*Ardea spp.*), bagula (*Egretta spp.*), etc. These birds too are equally important aesthetically, for forest cleanliness and for forest health, for farming, bird watching and balance of nature, point of view, some of the important raptors and non raptors are described below:-

The Himalayan Griffon Vulture (*Gyps himalayensis*)

It is the largest bird with long naked neck and un-feathered bald head. A large gathering on old carcasses of a domestic animal is the common sight. The other varieties of vultures observed in the tract are the Indian griffon, Long Bellied vultures and Lammergeyer.

The Black Eagle (*Ictinaetus malaienses*)

It is a grey coloured bird in size nearly equal to vulture. It lives mainly on alive smaller birds their young ones, rodents and snakes.

The Golden Eagle (*Aquila chrysaetos*)

Also known as Girja, is a very black looking large powerful eagle with size of vulture seen above the tree level of rather fierce appearance with its flat head, sharply hooked beak and feathered legs armed with sharp claws. A longish tail and often light patches in the wind and tail quills assist recognition. Its colour is deep chocolate brown. Its food is mainly large birds like pheasants, partridges and even crows. It also carries away animals like fawns of barking deer goral, musk deer, foxes and martens. Frogs, lizards and snakes are readily devoured. It avoids heavy forests and camp sites.

The Shahn Falcon (*Falco peregrinus*)

It is a larger than the house crow, slaty blue above with black head, rusty red below. Its favorite habitat is vast steep blanks with rocky out crops. It lives mainly on chakor, partridges and other small birds. Other falcons commonly met are hobby and kestrel.

The Forest Eagle Owl (*Bubo nipalensis*)

It is of a vulture size and is dark brown in colour with two black horns like tuft above its head. Underparts are tawny white barred with blackish brown. This bird is of nocturnal habits and lives mainly on pheasants or large birds and small animals especially the young ones of barking deer etc. The other owls found in the area are scops owl, great horned owl and scalyas wood owl.

Parrot/ Parakeet (*Psittacula eupatria*)

This bird is found in the lower hills and is a menace as it eats away the seed of chil by extracting it from the cones with its very strong beak.

The Jungle Crow (*Corvus macrorhynchos*)

It replaces the common house crow (*corvus splendens*) as a scavenger although the house crow is also found during summers.

Wood Pecker (*Picus squamatus*)

This is a little scaly bellied green wood pecker, distributed throughout. It is easily observed as it works its way up the trunk of a tree. Now stopping to dislodge a piece of bark and then hammering lustily with its chisel like beak at a piece of grub- infested wood. Occasionally it feeds on the ground searching there for ants and termites. The nest hole is excavated in the trunk or branch of a tree and consists of a passage running down from 50 to 75 cm into the next chamber. It is a medium sized greenish bird with pale under parts scale with black which climbs, the trunks of trees in series of jerks, and moves from tree to tree with noisy undulating flight.

A: SNAKES**The common Indian Krait (*Bungarus caeruleus*)**

It has highly polished scales. It inhabits more or less open country at low altitudes, seldom ascending above 1500m.

The Himalayan Pit Viper (*Gloydius himalayanus*)

Also known as saap, it is found between 2000 to 3000 m elevations. Although nocturnal in habit. It comes out at times to bask in the sun.

The Russel's Viper (*Daboia russelii*)
Indian Rock Python (*Python molurus*)

3.7 Threats and challenges to wildlife:

Globally, human-wildlife conflict is a growing obstacle in achieving conservation goals. The wildlife management practices that discourage conflict in the first place are expected to be successful. Yet, it has been found that many managers could not objectively quantify the impact their programs were having on wildlife populations or people's attitudes. The increased human population and huge infrastructural developments and a network of roads and land use, the fragmentation and destruction of a wildlife habitat has taken place all around. On the other hand, due to protection provided to wildlife under the Wildlife (Protection) Act, 1972 the population of herbivores has increased. Due to fragmentation of habitat and invasion of lantana and as a result loss of grass and fodder in the forest areas, the animals tend to raid the cultivated areas during night hours for finding green pastures. This results in man-animal conflict, as the farmers lose their crops and labour. This complete problem of habitat restoration needs to be addressed on a priority basis. (Details are discussed in separate chapter on wildlife added in Part-II)

3.8 Protection and management of fauna:

Legislation setting out protection rules may limit its scope to more valuable or rare species, or extend to apparently fewer interesting species or wildlife or biodiversity as a whole. The legal mechanism for protecting specific species is often to provide for a classification of animals which are to receive varying degrees of protection and therefore for the creation of lists. This approach is quite common and, in some places, remains the principal protection tool. Often, however, it is combined with the statement of broader conservation principles. There is a requirement to ensure conservation of fauna through a favorable environment and sustainable management. Every species has an important role in eco system therefore each species needs to be protected. Although being subject to the law, management activities should be progressively adapted to the needs which may have to be met to ensure sustainability. (Details are discussed in separate chapter on wildlife added in Part-II)

CHAPTER IV

MAINTENANCE AND ENHANCEMENT OF FOREST HEALTH AND VITALITY

4.1 Status of Regeneration:

Due to adverse effects of biotic interference, heavy grazing and non-working of forests due to ban on felling, the natural regeneration in forests of Nurpur Forest Division forests is very low and even absent in many places and has not been relied upon. As a result, artificial plantations of Kachnar, Khair, Shisam, Bamboo, Harar, Bahera, Amla and other Broad-leaved species with introduction of *Tectona grandis* have been tried with various degrees of success. In the forests, the efforts to regenerate naturally by adopting closures, fencing areas, and adopting soil and water conservation measures have helped in securing scanty crop of trees of miscellaneous species, but due to biotic conditions, the growth is not satisfactory. During reconnaissance, natural regeneration of Chil in the old plantations areas has been observed. The seedlings are one year old sheltered under the lantana growth. This regeneration of Chil has been observed to take place after the germination of seed due to scarification by forest fire which was widespread in the area two years back. As the seedlings are frost prone, careful opening after the winters and adoption will help to establish the seedlings. The conditions which favor regeneration of species can be enumerated as follows:

1. Removal of lantana weed which suppresses the young seedlings under its shade helps regeneration.
2. Control of grazing by strictly following closures in the areas.
3. Soil and water conservation measures in the area to control soil erosion and conserve moisture helps regeneration.

To supplement natural regeneration, abstract of plantations raised in the past in these forests is given in Table 4.1 below:

Table 4.1 Plantation done in the past working plan period.

Sr.No.	Year	Name of Division	Area in Hac.	No.of Plants
1	2012-13	Nurpur	314.61	372874
2	2013-14		380.5	380750
3	2014-15		563.54	427180
4	2015-16		763.69	711589
5	2016-17		733.87	536691
6	2017-18		512.15	472591
7	2018-19		712	638167

8	2019-20		615.32	441387
9	2020-21		1386.13	650371
10	2021-22		998.5	646210
11	2022-23		1116.9	476800
G. Total			8097.21	5754610

4.2 Area affected by forest fires:

Due to semi-arid conditions of the climate, dry-deciduous nature of forests, temperature rise and humidity fall, there is a fire hazard build up in the summers starting with April till June. This time coincides with the fire season of the area. The maximum temperature may rise to 43°C and the rainfall is scanty in these months. In the drought areas, due to more accumulation of leaf litter, the fire hazard is multiplied. The details are given in Table 4.2

Table 4.2: Fire incidences in last working plan period					
S.No	Name of Divison	Year	No of Fire	Area in Hac	Loss of Plantation (Rs)
1	Nurpur	2012	94	597.8	2336500
2		2013	6	58.7	153800
3		2014	11	56.65	0
4		2015	14	43.55	0
5		2016	42	208.18	78000
6		2017	21	89.8	195000
7		2018	161	2508.4	2317400
8		2019	27	161.58	214400
9		2020	1	3	0
10		2021	68	308	1247000
11		2022	8	78	430000
12		2023	1	25	87400
	Total		454	4138.66	7059500

To prevent forest fires, the following strategy should be followed:-

- Maintenance of fire lines- The existing Fire Lines should be maintained and adequate provision of maintenance of Fire Lines under CSS and State schemes should be made. The list of these firelines is provided in Table 4.3. These fire lines must be maintained annually removing the lines clear of leaf litter and other obstacles.
- All the staff should register their mobile numbers on Forest Fire Alert System 3.0 of FSI for quick Forest Fire alerts.
- Rapid Response Teams (RRTs) at division as well as Range level should be equipped with fire fighting equipments and a fire patrol vehicle should also be made available for each range.
- Working of bamboo forests is essential on a regular basis without which dry and dead culms become fire hazard.

- v. 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.
- vi. The right holders and the JFM committees should be educated and trained to take necessary fire control measures in their areas.

Fire Lines

The detail of existing fire lines in Nurpur Forest divisions is as under:-

Table No. 4.3

Sr.No.	Year of construction	Range	Name of Forests & Compart	Length in Kms.	Width in (M)
1	1977-78	Nurpur	R.8.N. Chhatril	1.6	22.5
2	1980-81		P.39.N. Thre Kuther	0.88	20
3	1983-84		R.1.N. Tattal	1	15
4	1989-90		R.2.N. Mehdhar	0.6	30
5	1977-78		P.44.N. Kot C-3	0.2	20
6	1978-79	Kotla	R.16.N. Bindra Ban C-2	0.3	20
7	1976-77		P.46.N. Bar	1.6	22.5
8	1979-80		R.13.N. Soldha	3.6	30
9	1982-83		R.14.N. Ballah	1.6	15
10	1988-89		R.4..N. Batuhi	2	10
11	1988-89		R.6..N. Masatgarh	7	30
12	1986-87		R.15.N. Bhali	2	30
13	1989-90		P.4.N. Kaldun	1.5	30
14	1978-79		P.3.N. Baliara	1.5	30
15	1981-82		P.47.N. Anuhi	1.5	30
16	1980-81	Jawali	R.15.N. Bhalli C-1a or C-1b	0.6	20
17	1985-86		P.6.N. Harsar Nana	2	10
18	1988-89		P.1.N. Sidhpurghar	1	30
19	1989-90		P.8.N. Kyari	7.6	30
20	1993-94		R.28.D. Junat	3.125	30
21	1976-77	Rey	P.9.N. Gharoli Chalaun C-3	0.5	20
22	1984-85		R.30.D. Samblian	3	30
23	1987-88		R.29.D. Lohjang	6.25	30
24	1979-80	Kotla	U.P.165 Nangal C-7	0.6	20
25	1997-98		R-15.N. Bhalli (Part)	1	20
26	1998-99		R-15.N. Bhalli (Part)	2	20
27	1999-2000		R.16.N. Soldha	2.5	20
28	2000-01		R.14.N. Ballah	2	20

Table 4.4 New Fire Line Constructed in Previous Working Plan

Sr. No	Year	Name of Range	Forests	Length of Fire Line (in km)	Width of Fire Line (meter)
1	2013-14	Nurpur	P 39 N Ther Kuther C3b	1.240	5
2	2013-14	--do--	P39N Ther Kuther C3c	0.760	5
3	2013-14	--do--	CFS Jachh P4	0.500	5
4	2013-14	--do--	CFS BhugnaraU5	1.00	5
5	2016-17	--do--	P 39 N Ther Kuther C1b, C1d	1.00	4.50
6	2016-17	--do--	P 39 N Ther Kuther C1c, C2a	2.500	5
7	2016-17	--do--	UP 6 a Ladori C4	2.500	5
8	2013-14	Rey	R 30 D Sambaliyan C1a, C1b	1.20	5
9	2-13-14	--do-	R 29 D Loh jang C2b, C2c	1.20	5
10	2013-14	Indora	P-12 N Tung Barisar C2	1	4
11	2013-14	--do--	CFS Paniala U4	1.4	4
12	2013-14	Kotla	R15 N Bhali C1a	2.4	10
13	2016-17	--do--	P 46 N Bar C4	1	4.50

4.3 Area damaged by natural calamities:

Forests are affected by droughts, soil erosion and natural phenomena of frost. The area has experienced drought like condition in the year 2013 and 2020. Aftermath of the drought of 1987, heavy mortality of trees even of big sizes was noticed in the forests resulting in gaps in the forest canopy.

Frost is common during the winter months of December and January. Though, bamboo is not affected, seedling to pole crop of *Holoptelea integrifolia*, *Cassia fistula* and *Bombax ceiba* is affected.

The effects of soil erosion and its control shall be discussed in the next chapter.

4.4 Area protected from grazing

It may be mentioned that there is less pasture land in the villages and the animals are highly dependent on the forest areas for grazing. Over the years the grazing pressure has increased due to increase in the number of cattle.

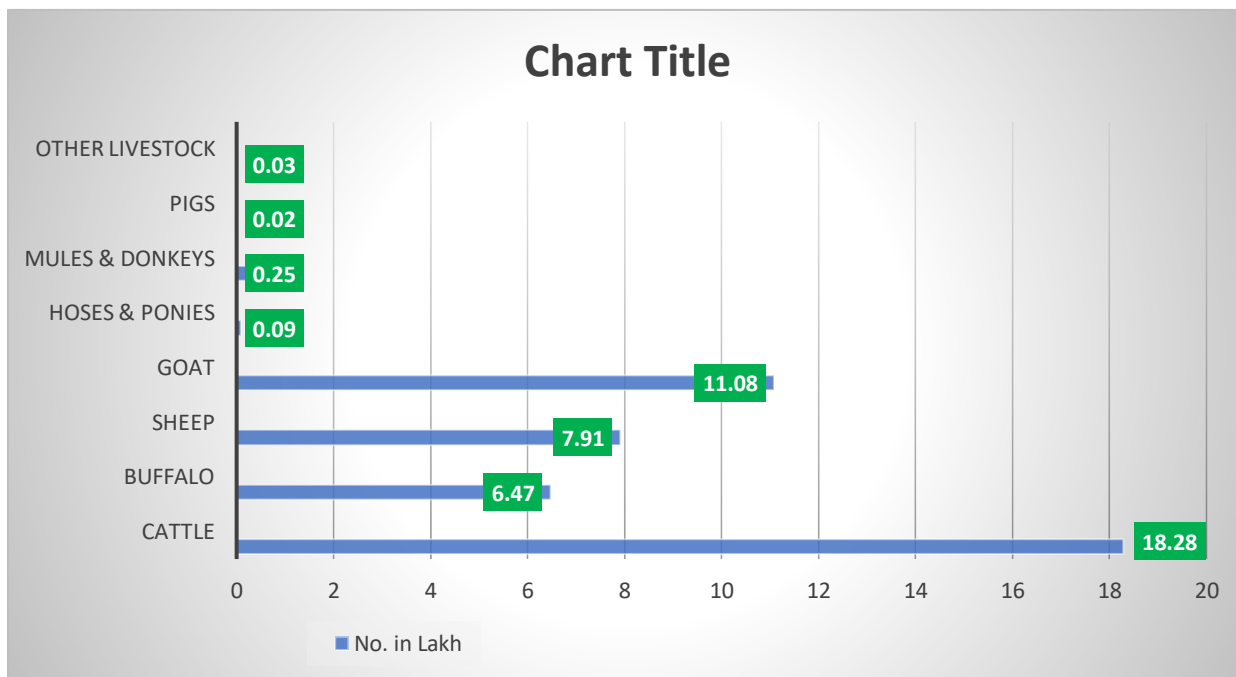


Chart 4.1

Species-wise livestock population in Himachal Pradesh as per the 2019 Census

(Source-Economic Survey 2023-24)

Due to incessant grazing and spread of lantana, the growth of palatable grasses has decreased and non-palatable species increased. The maximum representation is made by grass species like *Cenchrus ciliaris*, *Chrysopogon fulvus*, *Cymbopogon martini*, *Cynodon dactylon*, *Digitaria sanguinalis*, *Eragrostis tenella*, *Eulaliopsis binata*, *Imperata cylindrica*, *Oplismenus burmanii*, *Panicum antidotale*, *Sacharum spontaneum*, *Setaria glauca* and *Sorghum halepense*.

4.5 Lopping practices:

Bamboos, bahera, kachnar, *kaamal*, *siris*, *khair* and various other species are lopped for fodder. The lopping is usually carried out in the winter season when grass on ground dries up. The loppers do not have consideration for the age of the tree when found in government land. Though there are restrictions for lopping the younger trees on the lower half portion of the tree. Usually, few small growing branches at the top are spared to allow regrowth of tree. This heavy lopping leads to drying of trees in the season of severe cold and frost. Before 1903, villages used to lop bamboo for fodder in the rainy season when areas were closed for grazing. This harmful practice was abandoned in the interest of forests, again allowing the opening of forest throughout the year except for three months when culms are

produced and established. This proposal was agreed to by the Deputy Commissioner, Hoshiarpur on behalf of the right holders and sanctioned by the Conservator of Forests in 1903. Under this condition no lopping is permitted but the forests is open to grazing for the village cattle throughout the year. Small areas can be closed for artificial regeneration of the area. This agreement is open to reconsideration in certain eventualities, for example, during the time of gregarious flowering of bamboos.

4.6 Area infested by invasive weed species in forests

Lantana camara, *Parthenium hysterophorus*, *Ageratum conyzoides* and *Cannabis sativa* are the invasive weed species that have overgrown in the area affecting the biodiversity. *Lantana camara* is by far the most obnoxious weeds of the Shiwalik hills of Punjab locally called *phulbuti* or *panchphuli*. The weed is considered to have been introduced from tropical Central America in 1810 AD. Because of its wide adaptability, prolific seed-bearing capacity and its ability to propagate vegetatively as well, fast growth and a strong light demanding habit, it has completely invaded the forests. Being an alien species, it has invaded areas so thickly that it has affected the local species diversity, productivity of land thereby changing the ecology of the area. It has also harmful effects on the health of animals, particularly cows, when browsed accidentally. Studies in Shiwalik hills showed that in the infested areas, it neither favoured palatable nor non-palatable species under its cover. Because of its fast growth, it overtakes the economically important species and negates the efforts of afforestation as well. So far, the efforts to eradicate lantana and utilize it for economical conversion to tradeable products or biomass energy have failed. According to our estimate about 70 per cent of the total forest areas is infested with lantana. But efforts are being made every year to eradicate lantana using CRS (Cut Root Method) method from forests under various schemes but its concrete result is yet debatable. Areas on moderated slopes where moderately dense crop has come up, the Lantana has decreased in those areas, whereas areas with blank spaces are thickly infested with this weed. There are compartments where frequency of Lantana is 100 per cent and IVI is more than 100. (Table 4.5). There is a serious depletion of biodiversity in the seareas.

Table No. 4.5

Data of Intensity of Infestation in (Ha) collected in year 2015-16						Area treated from 2015-16 to 2021-22 balance shown for the year 2022-23				
Name of Range	Upto 25%	26%-50%	51%-75%	76%-100%	Total	Upto 25%	26%-50%	51%-75%	76%-100%	Total
1	2	3	4	5	6	7	8	9	10	11
Kotla	1817.91	1279.02	1290.5	1427.2	5814.63	1632.91	1084.02	736	1282.2	4735.13
Rey	285.29	1808.74	5322.6	2675.57	10092.2	275.29	1719.74	5047.6	2565.57	9608.2
Nurpur	2226.76	2717.01	4485.62	4624.56	14053.95	1968.16	2102.11	3868	3859.34	11797.61

Indora	196.04	1688.04	5308.73	5854.07	13046.88	156.04	1623.04	4990.2 ₃	5679.07	12448.38
Jawali	708.76	1644.37	2719.41	2233.18	7305.72	653.76	1519.37	2324.6 ₆	2063.18	6560.97
G. Total	5234.76	9137.18	19126.86	16814.58	50313.38	4686.16	8048.28	16966.49	15449.36	45150.29

4.7 Incidence of pests and diseases:

Termites though causing negligible damage in standing bamboos, but when feeding on dying and dead culms, they climb up bamboo culms and cause the new culm to originate high up causing congestion in culms. Bamboos are also attacked by culm and shoot borer of the species *Cyrtotrachelus longimanus*. The bamboo leaf roller *Pyrausta bambucivora* is reported to be a pest and particularly active in nallahs during July-October. The smooth naked pinked larvae feed inside the rolled leaves of the host and eventually they pupate in cocoons. Two to three leaves are sometimes rolled together. The species has four generations in a year.

Apart from bamboo pests, Khair and *Dalbergia sissoo* are attacked by *Ganoderma lucidum*, whose fruiting body is found on the base of trees. In some situations, mortality of trees is found in patches. Khair is attacked by witches broom in some localities.

4.8 Forest degradation and its drivers:

There are no two opinions that forests have degraded over the years. The degradation process has started long back with the permission to graze the animals in the forests even in the growing season. Later with the rise of population of both humans and animals, opening of forests for right holders for villages in the fringe of forests, and the increasing incidences of illicit removal, the crop degradation has obviously happened. Coupled with the non-working of forests, non-adherence to cleaning operations, the crop has deteriorated. This can be further evident due to the fact, that yield has decreased in the past working plans. Even the areas covered have slowly taken over by the dry scrub forests and due to absence of natural regeneration, the areas had to be planted with fast growing species. The identifiable drivers of change are:

- Invasion of *Lantana camara*: Due to heavy invasion, the regeneration has ceased to occur.
- Biotic pressure of the fringe villages: Biotic pressure due to grazing and illicit removal has damaged the crop and its regeneration.

4.7 Pollution Control and protection of environment:

The forests are away from the townships and industry, therefore not prone to environmental pollution of the order which can affect their growth and quality.

CHAPTER V

CONSERVATION AND MAINTENANCE OF SOIL AND WATER RESOURCES

5.1 Area treated under soil and water conservation measures:

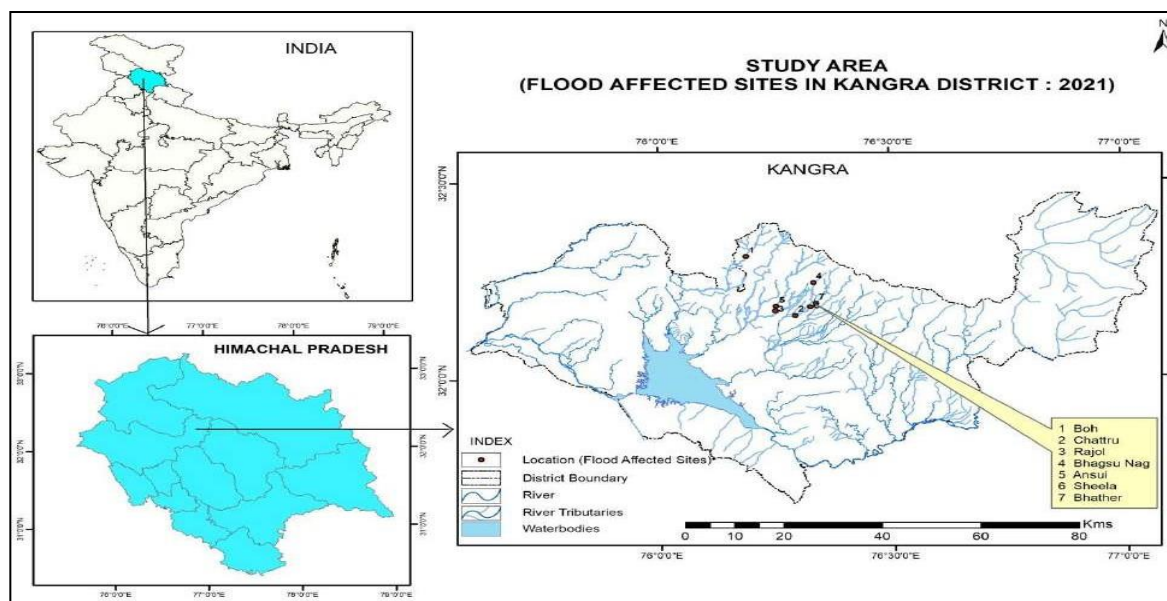
Dehar and Chakki are the only snow fed streams which receive large quantity of water from the melting snow of the Chamba Ranges. The flow in various khads/streams varies considerably ranging from torrents during rains to insignificant streams during summer. Owing to very heavy incidence of grazing the runoff is very rapid resulting in floods during July and August. A good many irrigation channels have been taken out of Dehar and its tributaries for purpose of irrigation.

Based on the agro climatic zonation, the State has been divided into four distinct zones viz. Sub-Mountain-Low Hills Subtropical Zone, Mid Hills Sub-Humid Zone, High Hills-Temperate wet zone and High Hills-Temperate dry zone.

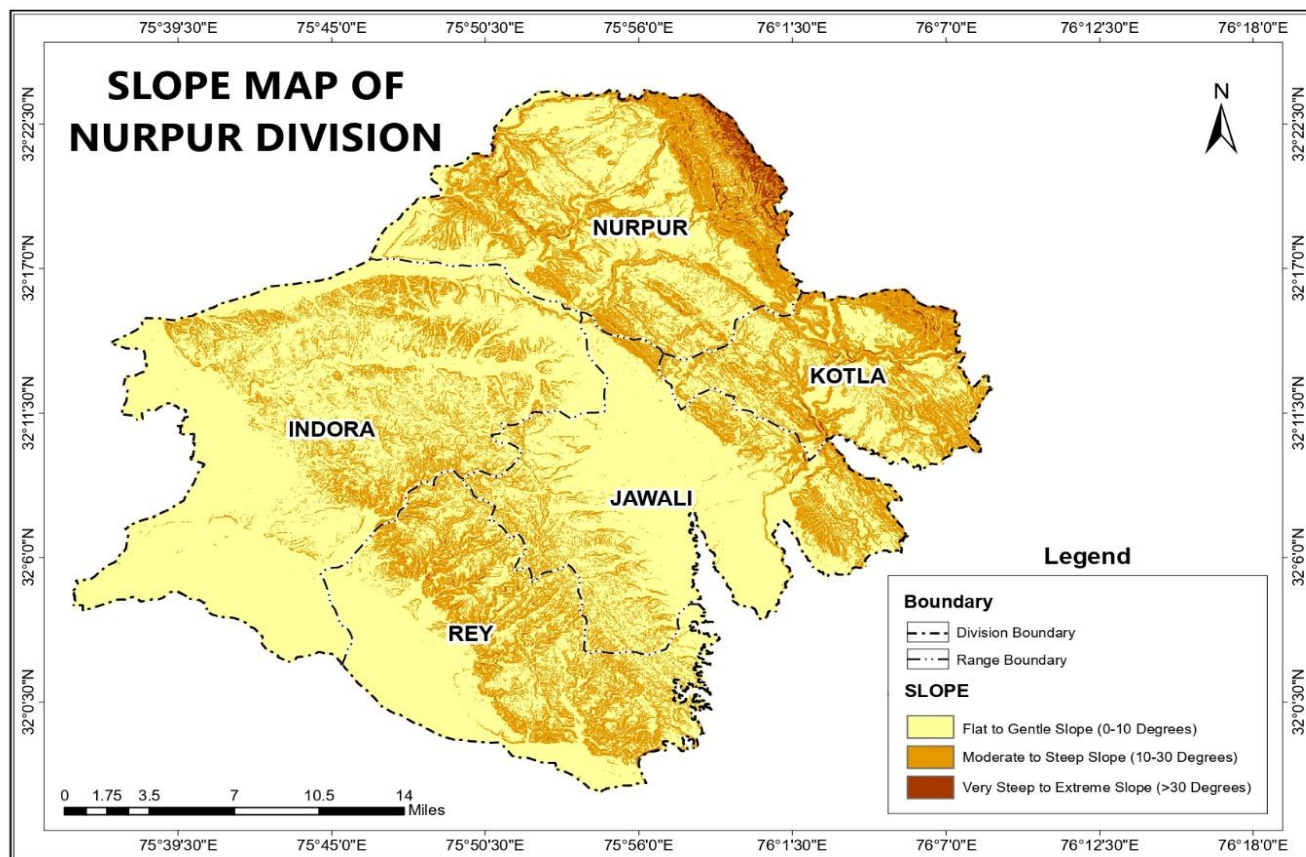
Zone-I: Sub-Mountain-Low Hills, Subtropical

The terrain in this part of the zones is characterized low relief mountains. Rainfall varies between 800 mm to 1600 mm. The areas suffer perpetual summer shortage of water due to high run off. The valleys are generally narrow with flat areas where agriculture grows. The altitude ranges between 350 to 650 m and this zone includes areas falling in Chamba, Kangra, Hamirpur, Sirmour and Bilaspur districts. It occupies about 33% of the total geographical area of the State and 33% of the cultivated area.

The entire Nurpur Forest Division falls under Zone-I which is highly flood prone and vulnerable to soil erosion.



Map 5.1



Map 5.2

The 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 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 like Integrated Watershed Development Project I & II, Hp Mid-Himalayan watershed project and Japan Bank for International Cooperation (JICA) 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 gabion structures in streams, silt retention dams, cement masonry structures and run-off drainage structures. Along with 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 ponds are being constructed. Ponds are also maintained in the forest areas for the benefit of wild animals. The implementation of such a technical package requires proper survey, planning, design of cost-effective structures, judicious integration of vegetative and mechanical measures and people's participation. Many earthen dams, artificial barrages,

multipurpose dams with small and big reservoirs have also been constructed recently for augmenting of irrigation facilities in this area, the detail of which is given below:

Table 5.1

Year of Construction/ Repair	Name of Component	Name of Structure	No. of Structure	Expenditure (Rs)
2012-13	Departmental	Const. of Dry tone Check dams	50	402500
	NPV	Const. of Roof Rain WHS	1	30000
		Water Tank	1	50000
		Bore Well	1	250000
		Const. of Van Sarover/ W/ Pond/ WHS		400000
2013-14	Departmental	Const. of Dry tone Check dams	56	125630
		Const. of Create Wire Check Dams	12	62815
		Const. Water Storage Structure	1	15000
	NPV	Const. of Van Sarover	1	30000
		Const. of Roof Rain WHS	1	10000
2014-15	Departmental			
		Const. of Dry tone Check dams	40	200000
		Const. Water Storage Structure	1	28800
	NPV	Const. of Roof Rain WHS	1	300000
		Const. of Van Sarover	1	40000
		Const. of Dry tone Check dams	104	1700000
2015-16	Departmental	Const. Water Storage Structure	2	11810
		C/o R/ Wall	1	50000
	NPV	Const. of Van Sarover/ W/ Pond/ WHS	5	670000
		C/o R/ Wall	1	350000
		Soil works	1	500000
2016-17	NPV	Dev. & Maint. of Natural water sources/ springs	3	300000
		Const. Water Storage Structure	3	100000
		Const. of WHS	3	1250000

		Const. of Van Sarove	1	500000
		C/o R/Walls	7	1550000
		Creat wire spur	1	50000
		Const. of Dry tone Check dams	11	350000
2017-18	Departmental	Const. of Dry tone Check dams/ R/ Walls	96	1521000
	NPV	Dev. & maint. Of Nature Water Sources/ Springs (Babri)	9	360000
		Const. of WHS	3	500000
		Soil works	17	1600000
2018-19	Departmental	Soil works	72	1343000
	KFW	Dry Stone Check Dam	11	177783
	NPV	Const. of WHS	2	600000
		Dev. & maint. Of Nature Water Sources/ Springs (Babri)	8	67000
		Const. Water Ponds / Farm Ponds	10	1390000
		Const. Dry Stone Check Dams	92	865000
		Const. Create wire spur/ structure and Check dams	9	960000
		C/o R/Walls	3	590000
2019-20	NPV	Const. of WHS	1	120000
		Dev. & maint. Of Nature Water Sources/ Springs (Babri)	5	420000
		Const. Water Ponds / Farm Ponds	14	2455000
		Const. Dry Stone Check Dams/ Create Wire Stucture and R/ Walls etc.	467	5355000
	KFW	Dry Stone Check Dam	87	1097318
2020-21	NPV	Dev. & maint. Of Nature Water Sources/ Springs (Babri)	6	500000
		Const. of WHS	4	1100000
		Dev. Of Van Sarover/ Water Pond etc.	41	6458400
		Const. Dry Stone Check Dams/ Create Wire Stucture and R/ Walls etc.	279	6780100
	KFW	Dry Stone Check Dam	165	1568209

		C/o of Farm Ponds	1	60000
2021-22	NPV			
		Const. Dry Stone Check Dams/ Create Wire Stucture and R/ Walls etc.	243	5711400
		Jal Bhandaran	12	18253752
	KFW	Dry Stone Check Dam	32	258633
2022-23	NPV	Jal Bhandaran	16	34476170
		Const. Dry Stone Check Dams/ Create Wire Stucture and R/ Walls etc.	512	6318050
	Departmental	Const. Dry Stone Check Dams/ Create Wire Stucture and R/ Walls etc.	15	1315000
	KFW	Dry Stone Check Dam	177	1940098
		C/o of Farm Ponds	2	130500
			2721	113617968

5.2 Duration of water flow in the selected seasonal streams:

Nurpur forest division forms the catchment of Beas River Basin and two major tributaries namely Dehar and Chakki passes through the landscape and drains the whole catchment. Following small khads and Nallahs drains the entire landscape in addition to Dehar and Chakki. These Khads and Nallahs either drain into Dehar and Chakki or directly merge with Beas river:-

1. Manjui Khad
2. Bhed Khad
3. Gareli Khad
4. Haral Khad
5. Bhadukhar Khad
6. Jabbar Khad

5.3 Wetlands:

Pong Dam Reservoir is the only one major wetland in the area and is part of the Pong Dam Wild life sanctuary. In addition, traditionally, people and villages have their own system of water conservation through Traditional Talabs, which can be seen all across the landscape.

Jal Bhandaran :-

Table 5.2

Sr No	Name of Block	Name of Beat	Name of work	Budget Allotted
1	Minjgran	Kherian	Const. of WHS in Bhol Thakran Nalla	3000000
2	Sadwan	Sadwan	Const. of WHS in Dibkeshwer Nalla	3000000
3	Nurpur	Nurpur	Const. of WHS in Baldoon Nalla	3000000

4	Sadwan	Danni	Const. of WHS in Danni Nala	3000000
5	Sadwan	Sadwan	Pandrehar Nallah in UP10- Sadwan C-3	3000000
6	Nurpur	Bindraban	Nagni Nallah in U-19-Bhadwar C-1	3000000
7	Minjgran	Kherian	Palota Nalah U-48 Bhol Thakran C-2	3000000
8	Sadwan	Gurchal	Mamuh Nallah	3000000
9	Minjgran	Kherian	U28 Kherian C4	4000000
10	Nurpur	Jacch	CFS Kulahan UI (Dad Kawal Nallah)	4000000
11	Nurpur	Nurpur	CFS GhainLagore C-5&6 (Bagni Nallah)	4000000
12	Jounta	Tattal	U50 Kothiwanada C27	2700000
13	Jounta	Chotidhar	P43N Chhotidhar C2a	2600000
14	Nurpur	Nagrot	U19 Bhadwar C18	2700000
15	Nurpur	Bindraban	U19 Bhadwar C20	2800000
16	Khanni	Thora	UP15 Galore C2	2800000
17	Nurpur	Jachh	CFS Bassa Haridiyala U2	2700000
18	Nurpur	Bindraban	R16 N Bindraban	3000000
19	Jounta	Jounta	U20 Punder C5	2800000
			Total	58100000



Image 5.1 WHS (Jal Bhandaran) U-50 Kothiwanada- Tattal Beat, Jaunta Block, Nurpur Range



Image 5.2WHS (Jal Bhandaran) BaldoonNaala, CFS Gahin Lagore UC 22, Nurpur Beat & Block, Nurpur Range

5.4 Status of aquifers:

Nurpur area has remained largely water deficient and people and wildlife has mostly relied upon springs (Bowri), which are springs of depression types and traditional Talabs. These springs and aquifers recharge the seasonal Khads and Nallahs. In recent years under HP forest Ecosystem and Climate proofing project about 20 such springs has been identified and being rejuvenated with forestry interventions. The name of such springs is as follows:-

Table 5.3

Sr.No.	Name of Spring	Total outlay	Range	Block	Beat	VFMS
1	Bhariya Ki Bowari	253397	Nurpur	Sadwan	Ther	Ther Kuther
2	Kuta Di Bowrie	279165	Nurpur	Sadwan	Gurchal	Ther Kuther
3	Gumala	346863	Nurpur	Nurpur	Danni	Danni
4	Chalwara	220737	Jawali	Jawali	Chalwara	Chalwara
5	Sidhpurghar	825597	Jawali	Rehan	Sidhpurghar	Sidhpurghar
6	Badi Di Bowrie	489734	Kotla	Mastgrah	Chachian	Banoli
7	Mariamah Bowrie	341250	Kotla	Bhali	Dole	Surhandi
8	Bari Da Ballah	195850	Kotla	Bhali	Bohrka	Bohrka
9	Rajol	255318	Kotla	Bagga	Anuhi	Anuhi
10	Sapadde Di Bawrie	177808	Kotla	Bagga	Nadholi	Nadholi
11	Rajan Di Ban	534715	Kotla	Kotla	Ballah	Nichali Ballah
12	Bharnoli Bowrie	30195	Kotla	Bhali	Jole	Jole Bharnoli
13	Darobla Spring	172440	Kotla	Bhali	Jole	Jole Bharnoli
14	Batharu Spring	73737	Kotla	Bhali	Jole	Jole Bharnoli
15	Sandhla	276210	Kotla	Bagga	Nadholi	Anuhi
16	Bassa spring	1034506	Kotla	Bhali	Dole	Surhandi
17	Jhamleta Di Ban	131580	Kotla	Kotla	Soldha	Soldha

18	Sandhe Di Bowrie	114390	Kotla	Bagga	Anuhi	Anuhi
19	Giali Spring	0	Nurpur	Sadwan	Ther	Ther Kuther
20	Siye Di Ban	0	Nurpur	Nurpur	Nurpur	Kuralian



Image 5.3 Springshed- UP-2 Ther- Sadwan Beat & Block, Nurpur Range (Photo-1)



Image 5.4 Springshed- UP-2 Ther- Sadwan Beat & Block, Nurpur Range (Photo-2)

CHAPTER VI

MAINTENANCE AND ENHANCEMENT OF FOREST RESOURCE PRODUCTIVITY

6.1 Growing stock of Wood:

The growing stock indicates tree wealth and includes the distribution of stems in different diameter classes and volume of biomass. 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 for sustainable management of forest.

In Nurpur Forest Division the main crop is Chil and Khair. Chil is being managed under Chil Shelter Wood working system, while Khair forests are being managed under selection working system and coppice working system, whereas the rest of the forests are being managed under selection system.

Forest Resource Assessment methodology as prescribed in the “National Working Plan Code-2014” was used to assess the total growing stock of trees and biomass. In each working circle, number of sample plots were laid out using systematic sampling tools after reconnaissance of the forest area so that representation of all site qualities, type and structure of forests was ensured.

While approaching the sample plot, the observational assessment of site quality, tree species, composition, its health, density and crop age, etc., were recorded in the Plot Approach Form I. Presence of special features such as blanks, scattered trees, plantations raised etc were noted. Information on NTFP-yielding species, intensity of invasive species, faunal sights and their traces, special wildlife habitats and drivers of deforestation were recorded. After reaching the sample plot, a square plot of 0.1 ha was laid out measuring 22.36 m horizontal distance i.e. half of the diagonal in all the four directions. After checking the dimensions of the plot, the latitude, longitude and altitude coordinates were recorded. The main plot was used for recording the trees. The enumeration of trees was done by measuring the diameter/girth of each tree found in the sample plot. Information on regeneration and status of crop, injury to crop, grazing incidence, fire incidence, soil type, gradient of slope etc. was gathered and recorded.

The data of shrubs, climbers and regeneration status from all quadrants of 3m×3m laid out at a distance of 30 meters from the center of the main plot of 0.1 ha was collected and recorded in the plot enumeration form. The data of herbs from all nested quadrants of 1m × 1m laid within each quadrant of 3m × 3m was collected and recorded in the plot enumeration form.

The recorded data was analyzed Working circle wise and the results show that growing stock is represented by about 31 tree species in various proportions. The most predominant species include *Pinus roxburghii*, *Mallotus philippensis*, *Acacia catechu*, *Dalbergia sissoo*, *Terminalia tomentosa*, *Syzygium cumini*, *Holoptelea integrifolia*, *Lannea grandis*, *Butea*

monosperma and Bauhinia variegata.

Table 6.1 Class Wise Number Of Trees Distribution

Spp.	V	IV	III	IIA	IIB	IA	IB	IC	ID	Total
Chil	142805	287226	293085	187986	82429	51216	18807	11390	11659	1086603
Khair	558255	440316	115643	26506	0	0	0	0	0	1140720
Shisham	55387	23244	8136	3143	0	0	0	0	0	89910
BL	3370841	1219553	455771	151453	75610	36759	14259	8738	10818	5343802
Total	4127288	1970339	872635	369088	158039	87975	33066	20128	22477	7661035

Chart 6.1

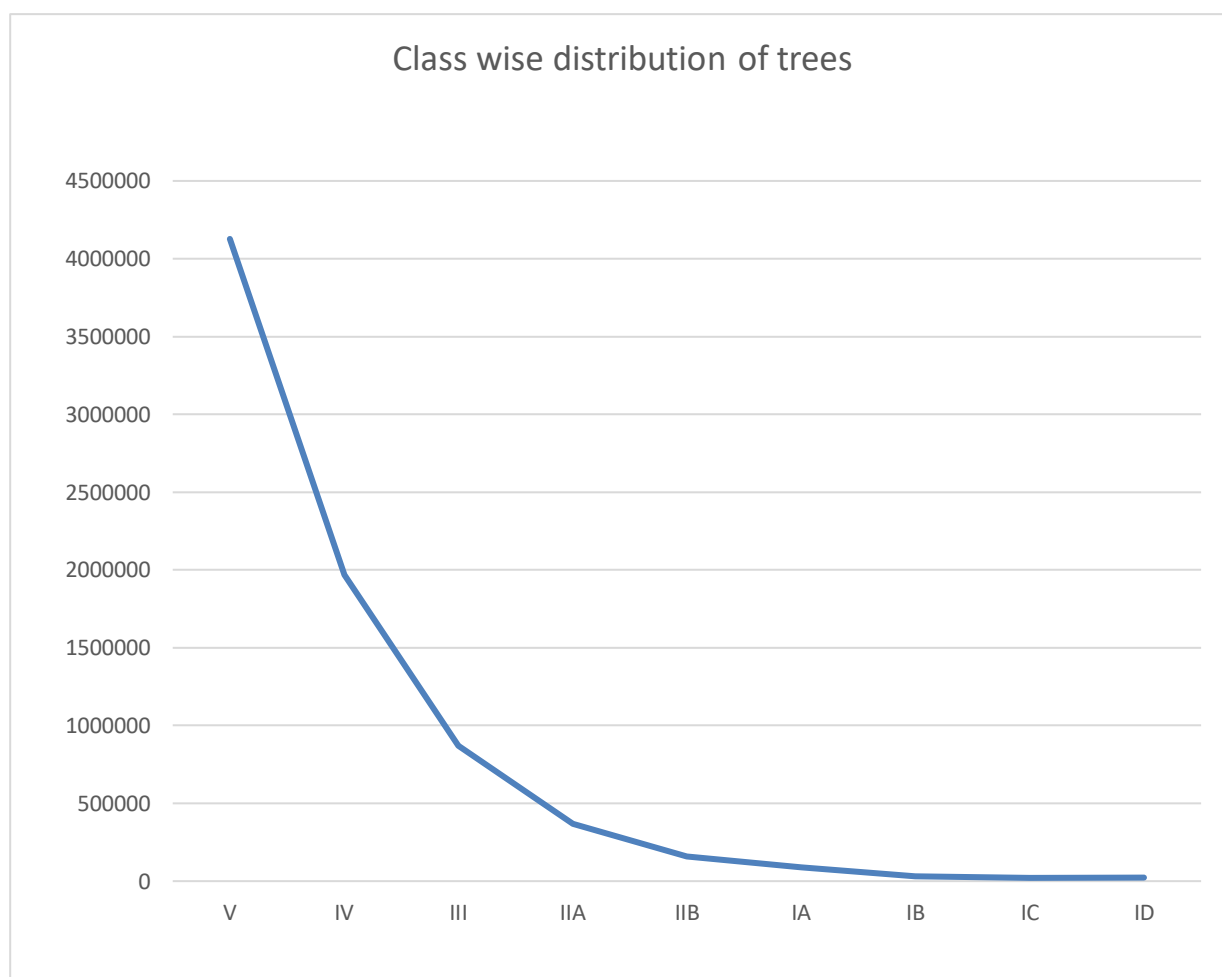


Table 6.2: Total Growing Stock (Volume)

Species	V	IV	III	IIA	IIB	IA	IB	IC	ID	Total
Chil	101125	170737	255232	171142	96025	51830	20105	12321	15253	893770
Khair	202250	341475	510464	342284	192049	103660	40210	24641	30507	1787541
Shisham	3544.8	4090.94	3799.51	3070.71	0	0	0	0	0	14505.9
BL	606751	1024425	1531391	1026851	576148	310981	120631	73923	91520	5362622
Total	913672	1540728	2300885	1543348	864222	466472	180947	110885	137280	8058439

Chart 6.2

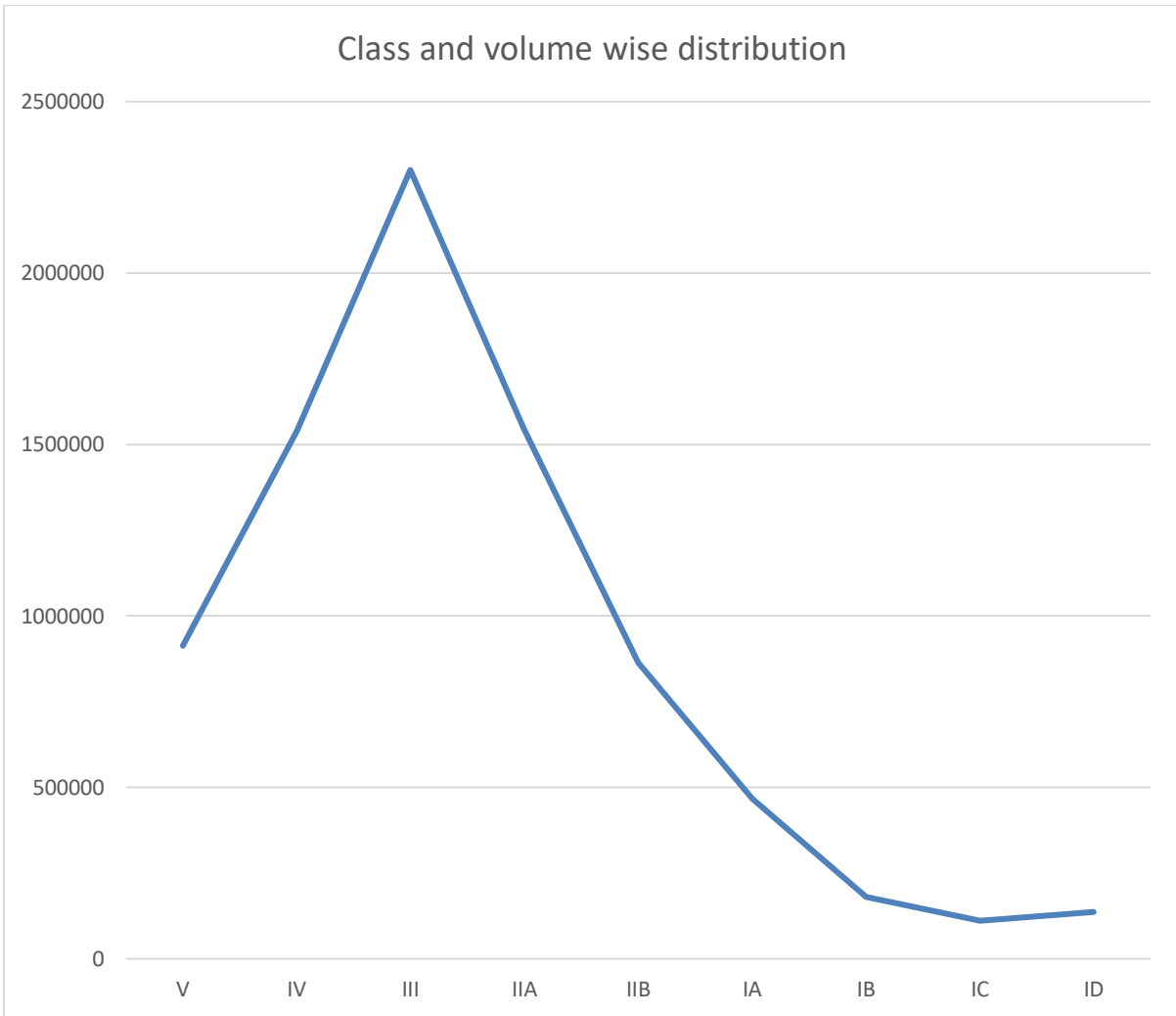
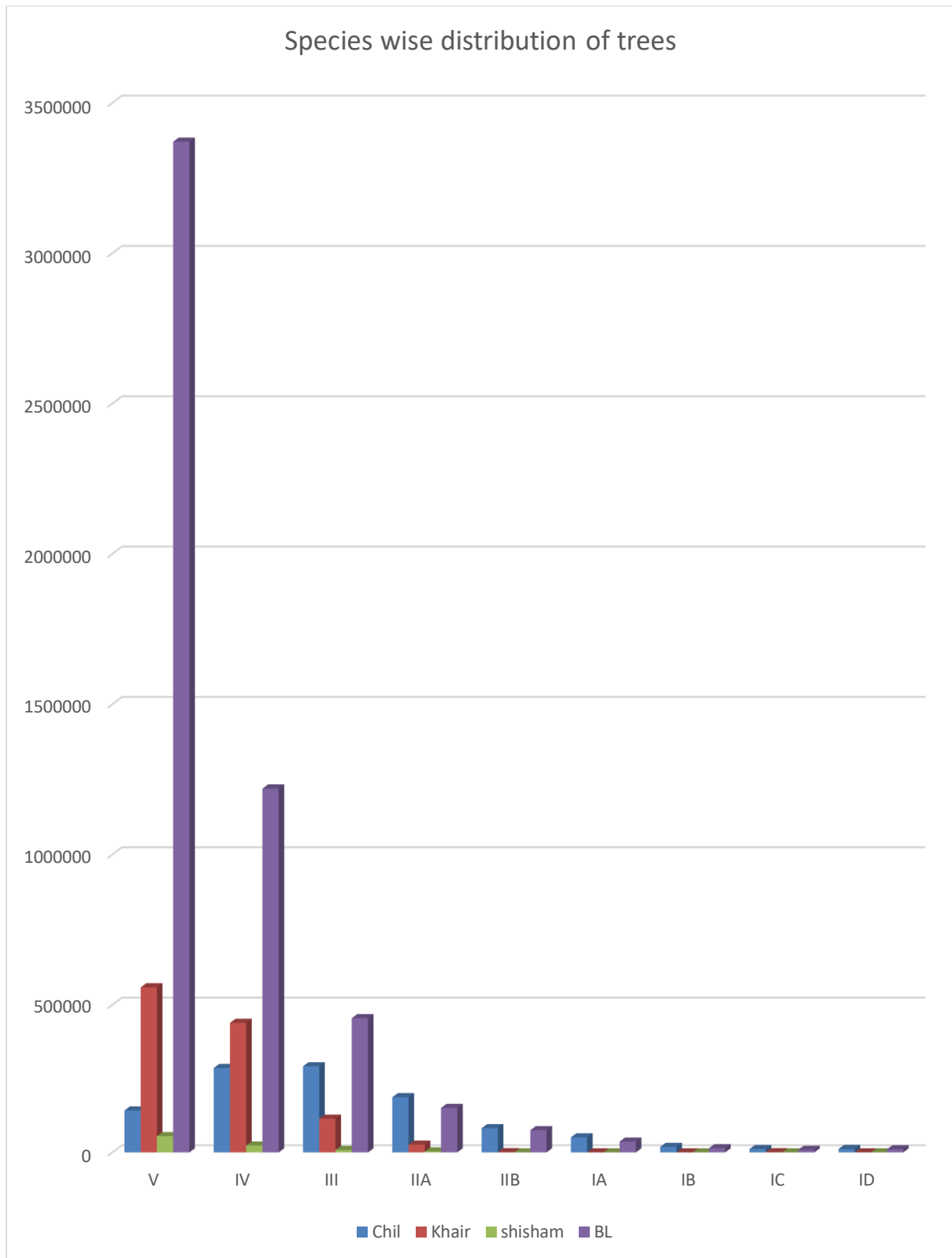


Chart6.3



Importance Value Index (IVI) is a quantitative measure used to assess the relative ecological significance or importance of individual tree species within a forest

community or ecosystem. It provides a way to evaluate the contribution of each species to the overall structure and composition of the forest. Working circle-wise top important species have been tabulated as below:-

1. Chil Working Circle:-

Chart 6.4

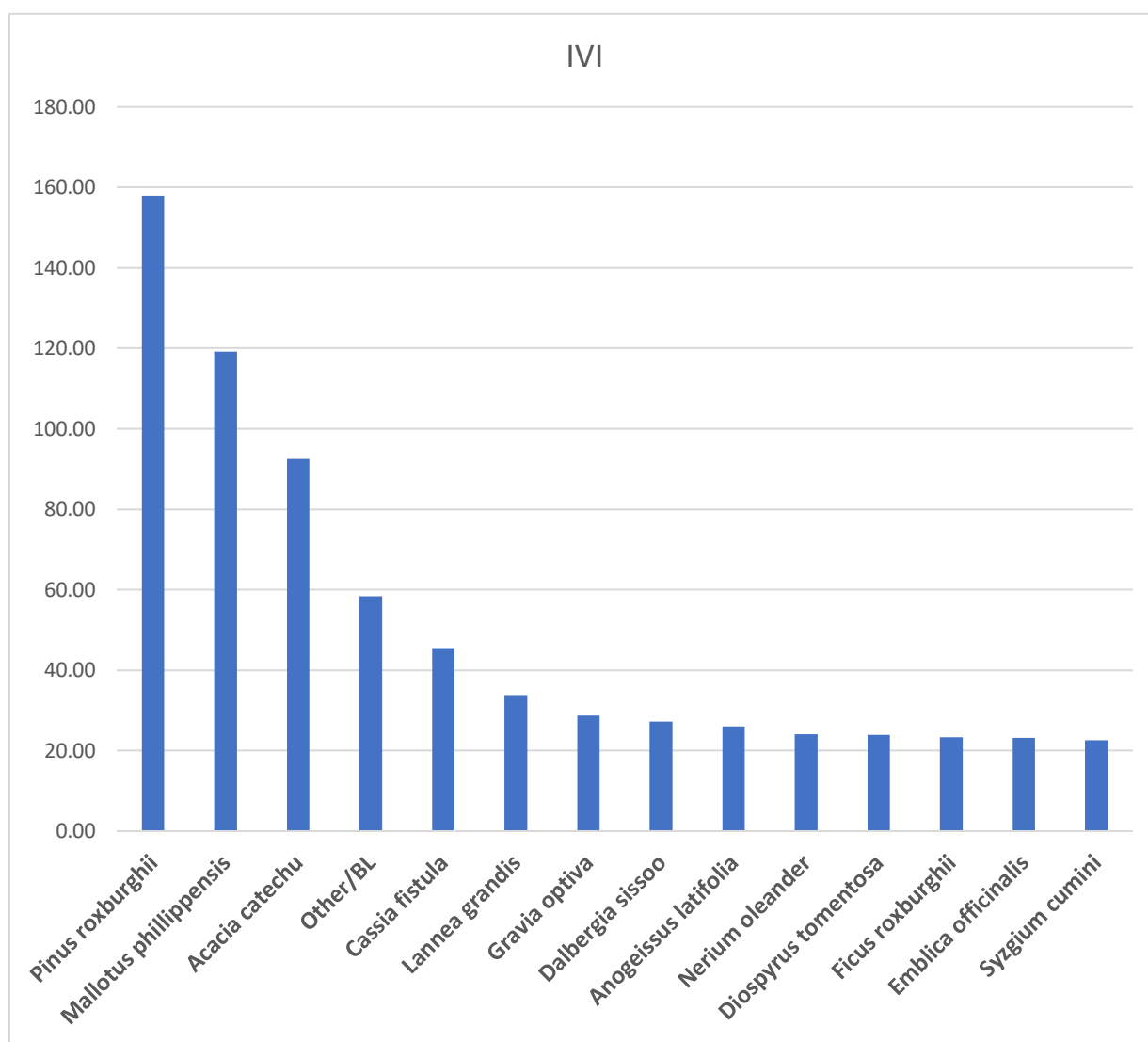


Table 7.1

In Chil working circles dominant species is Chil followed by *Mallotus philippensis* and *Acacia catechu*. Chil forests are present mainly in Kotla, Jawali as well as in Nurpur range. There are mixed Chil forests also in which Chil is present in top canopy while Khair and other broad leaved species are present in middle canopy. In Rey range mostly mixed Chil forests are present. Species wise IVI for top species is shown in table 7.1

2. Coppice Working Circle:-

Chart 6.5

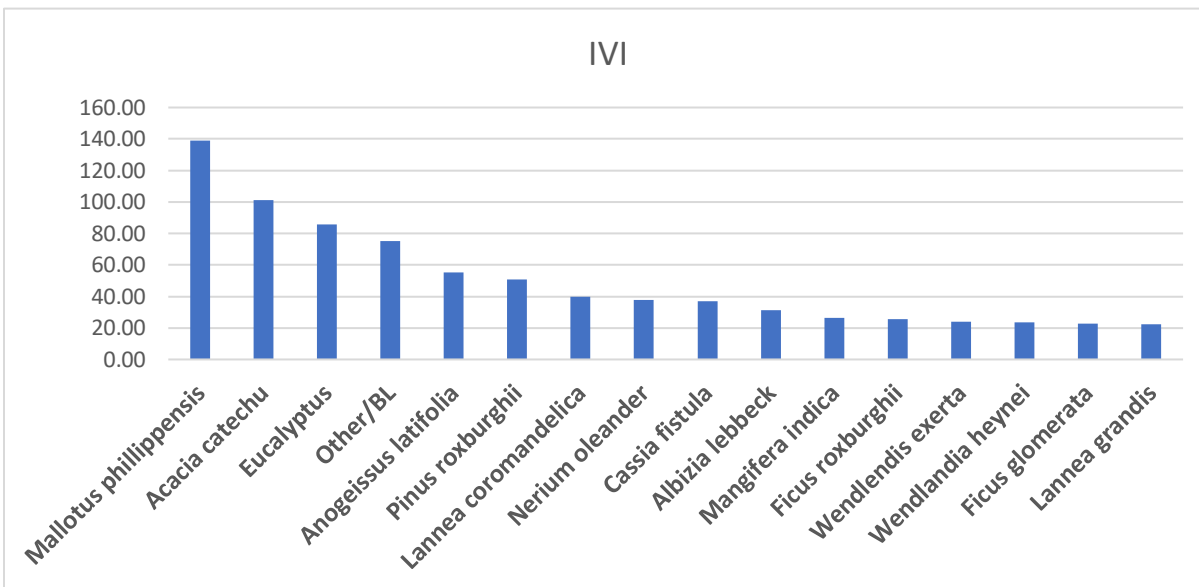
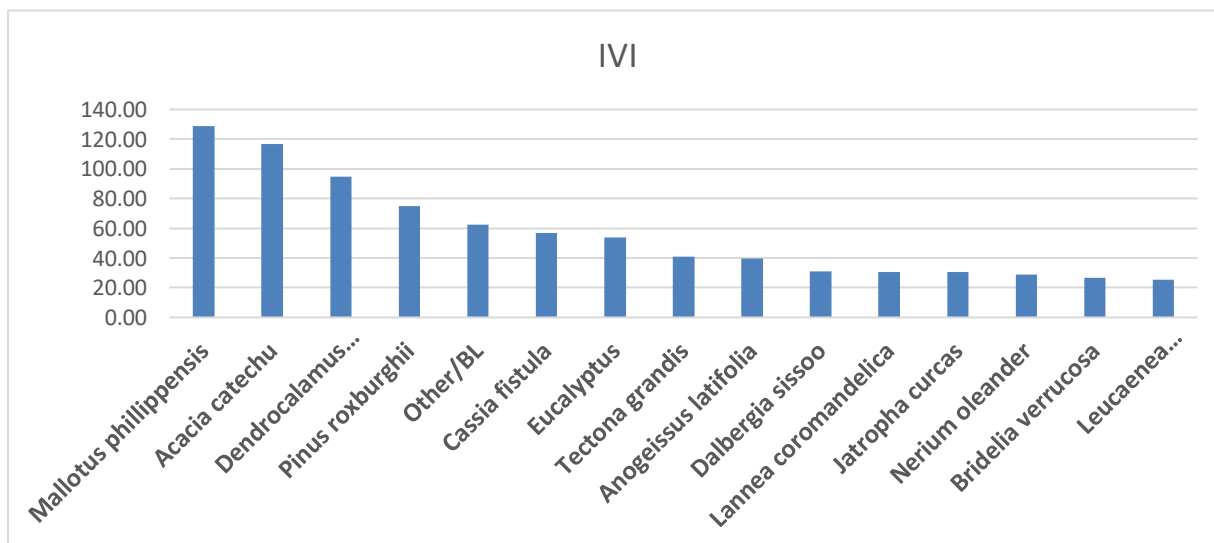


Table 7.2

In coppice working circle main important species is *Acacia catechu*. However, *Mallotus philippensis*, and *Eucalyptus* also has considerable presence. *Acacia catechu* is to be felled under Coppice with standard system. Species wise IVI for top species is shown in table 7.2

3. Plantation Working Circle:-

Chart 6.6



Plantation working circle are forests having lower species density with some blank spaces where there is scope of plantation. These forests mostly have broad leaved species. Species-wise IVI for top species in shown in chart 6.6

4. Protection Working Circle: -

Chart 6.7

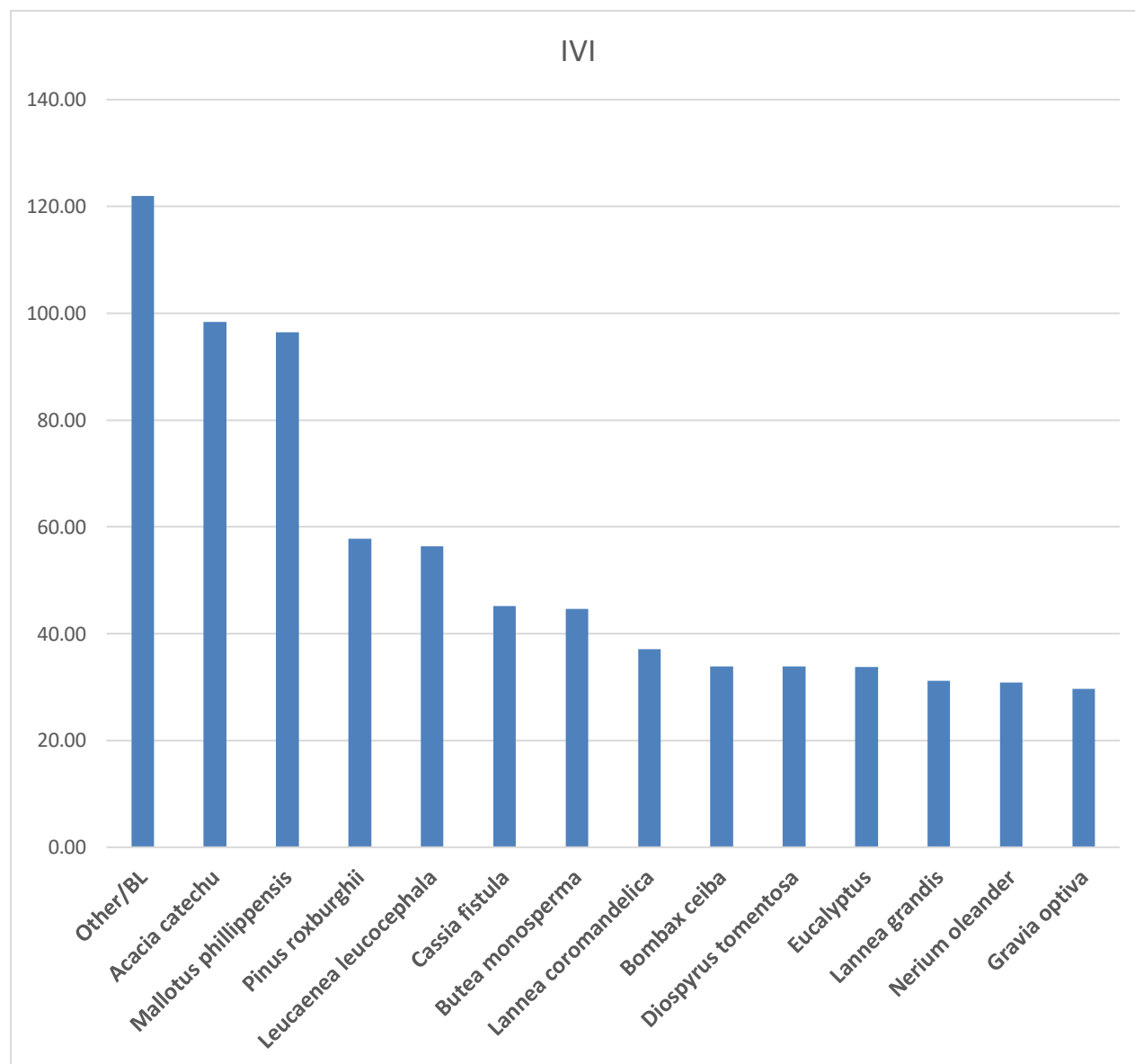


Table 6.4

In Protection working circle, forests are prescribed for protection and there is not much scope of other major silvicultural operations or plantation work. However, this working circle may overlap with overlapping working circles. Species-wise IVI for top species in shown in table 6.4

6.2 Growing Stock of Bamboo:-

The main plot of 0.1 ha was used for recording the bamboo stocking. In case of bamboos, each clump was enumerated by taking its height, number of first, second, and third year culms along with dried, congested culms. Overall condition of the culms also noted.

Bamboo Working Circle: -

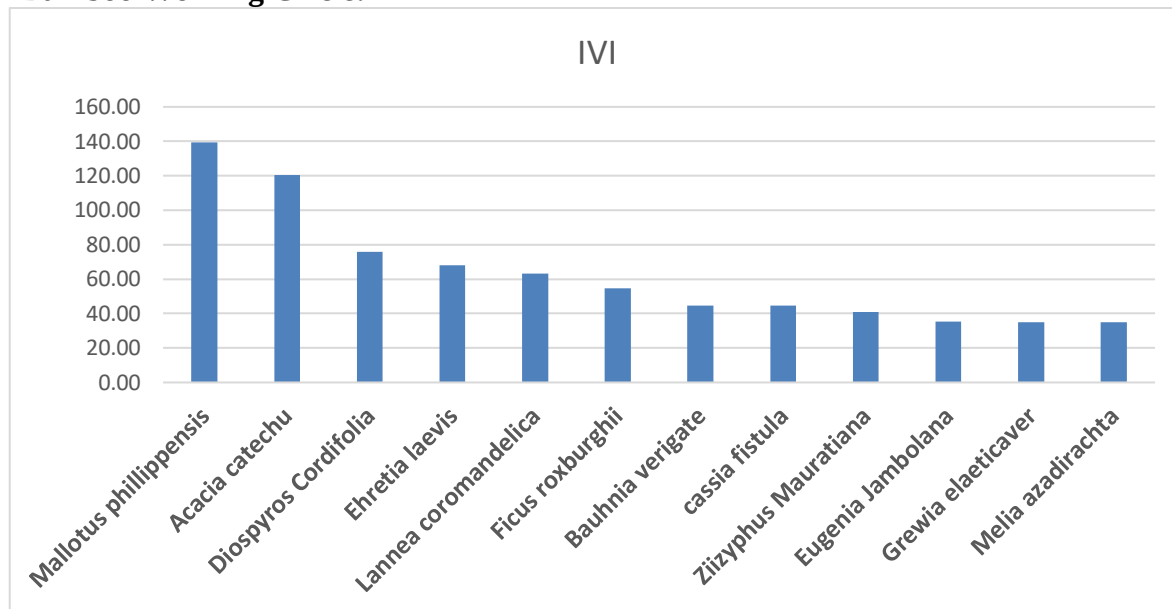


Chart 6.8

Species wise IVI for top species in shown in table 7.5

6.3 Increment in volume of identified timberspecies:

On moderate sites to which these forests subscribe rate of growth of khair in diameter and height is given in Table 6.3.

Table 6.3: Rate of growth of diameter and height for Khair

Age (years)	Height (m)	Diameter (cm)	MAI (m ³)
10	10.6	21.1	0.323
15	13.3	23.5	0.665
20	15.3	25.4	0.907
25	16.8	26.9	1.061
30	18.1	28.3	1.153
35	19.2	29.4	1.999
40	20.1	30.5	1.227
45	20.9	31.4	1.237
50	21.6	32.2	2.238
55	22.3	32.9	1.232
60	22.8	33.5	1.224

As Khair keeps on growing and adding heartwood at the age of 60 years, the rotation of the species should not be kept below this age.

6.4 Efforts towards enhancement of forest productivity through quality plantation activities:

Efforts have been made to remove invasive species like Lantana in infested forest areas followed by plantation of suitable species of trees. Plantations have been done in open, blanks, and less dense forest areas to increase forest cover as well to enhance species enrichment in forests which will lead to enhancement of productivity of forests. The year wise details of plantation and Lantana removal works is given in **Part-II**.

For enhancing forest productivity, quality plantation must be done by carefully choosing the species composition keeping in view the local factors, past history as well as present condition of forest. Silvicultural operations must also be carried out to enhance forest productivity.

6.5 Carbon Stock: -

Biomass studies for carbon stock assessment are carried out separately for each working circle of the Nurpur forest division. The enumeration of stock is done as per the methodology adopted by the Forest Survey of India for conducting the National Forest Inventory. From these observations, the above ground biomass is calculated. For below ground biomass, biomass of litter, rhizomes and the soil is taken separately and added to the “above ground” biomass to arrive at the total biomass. The carbon stock is finally calculated using the biomass-carbon relationship applied by the FSI. Thus total carbon stock of these forests is determined. This will be useful as a baseline to find out the carbon sequestration capacity of these forests and their management keeping in view this object in mind.

Carbon Estimation of Forests:

Soil Carbon:

Soil Carbon refers to the carbon stored within the soil, encompassing both organic matter (from living and dead organisms) and inorganic forms like “carbonate and minerals” playing a crucial role in global carbon cycling and ecosystem health. There is a relationship between soil organic C and the site characteristics such as the deciduous or evergreen vegetation, climate and rainfall conditions. During Resource Assessment Survey, soil samples were collected from each compartment as per the standard procedures. These samples were tested for soil organic carbon(C) content in the soil laboratory of the Forest Research Institute. The results are produced below:

Table 6.4: Soil Carbon estimation in the forests

Working Circle	Total area	Soil Weight (MT)	Soil Carbon %	Total Soil Carbon
	(ha)			(MT)
Chil	10814.17	27197637	1.92	522194
Bamboo	334.65	841644	1.28	10773

Coppice	5001.6	12579024	1.32	166043
Plantation	28442.75	71533516	0.98	701028
Protection	8584.84	21593387	2.15	464257
Total	53177.81	133745208		1864295

The carbon storage in the soil thus comes to **35.06 tonnes/ha**.

Biomass estimation of forests:

After the assessment of growing stock of volume of trees, their biomass was estimated by application of standard equations and methodology developed by the FSI. Working circle-wise estimation of biomass for forests is given in Table 6.5.

Table 6.5: Biomass estimation of Trees

Sr no	Working Circle	Total Growing Stock	Biomass of Tree Bole	Biomass of Roots	Biomass of Branches	Total Biomass
		Volume (Cum)	(Qtl.)	(Qtl.)	(Qtl.)	(Qtl.)
1.	Chil	1197142.57	670040.69	133941.13	13394.11	817375.93
2.	Bamboo	7291.49	4009.59	801.51	80.15	4891.25
3.	Coppice	301205.53	180834.63	36148.84	3614.88	220598.35
4.	Plantation	216609.32	121236.23	24235.12	2423.51	147894.86
5.	Protection	402728.11	241785.87	48332.99	4833.29	294952.15
	TOTAL	2124977.02	1217907.01	243459.59	24345.94	1485712.54

Total Carbon Content:- On the basis of estimates given in the previous paras, the total carbon content in the forest (excluding shrubs and herbs) of the tract has been calculated as follows (Table 6.6):-

Table 6.6 Total Carbon Content (tonnes)

TOTAL AREA	SOIL CARBON (MT)	TREE CARBON (MT)	TOTAL CARBON (MT)
53177.81	1864295	38629	1902926

The estimates show that total carbon contained in the forests is **35.78 tonnes/ha**. It must be mentioned that the carbon content of shrubs and herbs which make a major part of carbon pool in these forests has not been calculated. Of the total carbon, contribution by soil carbon is the maximum and contribution by tree is significantly low. This show that here is a large potential for enhancing the carbon sequestration of these forests.

6.6 Carbon sequestration and mitigation:

Eco-restoration of degraded forestlands and improvement biomass productivity Are achieved through various forestry activities like plantation, lantana eradication, soil moisture conservation works etc. A growing forest, with healthy and vigorous crop is the signature for the maximum sequestration crop. Management efforts must aim to achieve balanced crop having representation of all diameter and height classes which is ideal for maximum carbon sequestration. Forest soil must be kept as healthy and fertile as possible and the forest crops must be kept as vigorous as possible to produce as rapidly as they can the biomass production.

Enhanced Carbon sequestration through recognized silvicultural practices:-

Hon'ble Supreme Court of India vide orders dated 16.02.2018 passed in IA No. 3840 of 2014 in WP (Civil) 202 of 1995 titled as T.N. Godavarman Thirumulkpad Versus Union of India and Others had allowed experimental silviculture felling of Khair trees in the Nurpur Range of the Nurpur Forest Division. Even though silvicultural felling was allowed in 50 forest compartments, the Khair trees were felled only in 38 forest compartments as the rest of the compartments had very less number of mature Khair trees. Fencing, plantation, and soil conservation works were carried out in these remaining compartments. (Details of forests are provided in 7.1)

CHAPTER VII

OPTIMISATION OF FOREST PRODUCE UTILISATION

7.1 Recorded removal of timber:

Due to ban on green felling by Hon'ble Supreme Court, no felling of trees was done as per the prescriptions of previous working plan in Chil Working Circle, Coppice Working Circle, Bamboo Working Circle except the salvage removal of only dry, fallen and uprooted trees. The detail of Year wise trees handed over to Himachal Pradesh State Forest Development Corporation (HPSFDC) is tabulated below:-

Table 7.1

Sr. no	Year	Species	No. of trees	Volume (Cubic Meter)	Royalty Value (Rs.)
1	2013-14	Khair	4721	2097.546	2496080
		Shisham	1013	337.484	1154533
		B/L	308	98.63	45074
		Chil	2887	3452.52	2392596
		Eucalyptus	118	43.09	77131
2	2014-15	Khair	3089	1967.58	3382270
		Shisham	545	198.85	798979
		B/L	271	41.23	18677
		Chil	3299	4081.98	3159453
		Eucalyptus	192	39.87	86956
3	2015-16	Khair	3080	1965.02	2894474
		Shisham	1287	559.814	1758936
		B/L	50	25.840	6977
		Chil	2354	3500.55	2229850
		Eucalyptus	291	66.44	151749
4	2016-17	Khair	3727	2387.13	4251479
		Shisham	395	177.943	555004

		B/L	45	6.58	3020
		Chil	895	1411.71	755265
		Euc.	48	27.73	73651
5	2017-18	Khair	4145	2665.18	6849513
		Shisham	908	477.611	1732773
		B/L	38	39.90	82194
		Chil	1604	2427.21	1135934
		Eucalyptus	100	64.79	27730
6	2018-19	Khair	12750	7726.24	21857533
		Shisham	370	185.316	758684
		B/L	152	70.24	31608
		Chil	1935	2680.61	678062
		Eucalyptus	76	72.04	119947
7	2019-20	Khair	4482	2742.31	5610766
		Shisham	764	279.536	1185792
		B/L	33	26.46	9499
		Chil	2056	2541.06	2055718
		Eucalyptus	75	47.07	81996
8	2020-21	Khair	5604	3570.53	6273421
		Shisham	350	208.867	688843
		B/L	39	43.14	14581
		Chil	2138	2718.32	2025148
		Eucalyptus	14	17.91	23587
9	2021-22	Khair	5465	3512.20	4695811
		Shisham	164	68.021	131553
		B/L	589	152.77	93648
		Chil	723	973.08	299709

		Eucalyptus	58	46.03	36962
10	2022-23	Khair	6393	4043.84	5406614
		Shisham	227	112.624	217815
		B/L	51	48.24	29571
		Chil	893	1530.84	471499
		Eucalyptus	256	212.16	170364

However Experimental silviculture felling of Khair trees in Nurpur Range of Nurpur Forest Division was done as per orders of Hon'ble Supreme Court of India vide orders dated 16.02.2018 passed in IA No.3840 of 2014 in WP (Civil) 202 of 1995 titled as T.N. Godavarman Thirumulkpad Versus Union of India. The felling series pertaining to first year of Working Plan of Nurpur Forest Division, which were supposed to be felled in year 2012-13, were undertaken for experimental felling in 2018-19 and the felling series pertaining to year 2013-14 were undertaken in the year 2019-20 and the number of trees felled and volume area tabulated as under:-

Table No 7.2

Prescribed Year	Name of Forest/Comptt.	Total area of compartment	Species felled	No of trees felled	Volume (Cum)
2018-19	R-1 Tattal C-3c	20.00	Khair green	411	88.374
			Khair dry	37	5.768
	U-20 Punder C-1	20.00	Khair Green	19	5.548
	U-20 Punder C-12	9.54	Khair green	106	20.075
	U-20 Punder C-15	20.00	Khair Green	160	35.093
	P-41 N Paniaru C-1	12.55	Khair green	9	2.428
			Khair dry	2	1.448
	P-41 N Paniaru C-2	14.16	Khair green	5	0.864
			Khair dry	1	0.143
	U-20 Punder C-10	20.00	Khair green	120	24.708
			Khair dry	10	1.952
	U-20 Punder C-11	20.00	Khair green	140	32.254
			Khair dry	13	2.008
	P-41 N Paniaru C-2	14.16	Chil Green	68	101.56
			Chil Dry	18	10.39
	P-41 N Paniaru C-1	12.55	Chil Green	18	19.87
			Chil dry	5	2.66
2019-20	P-41N Paniaru C-4	26.70	Khair Green	20	18.750
			Khair dry	34	18.200

			Chil dry	14	29.20
	P-35 N Kopra C-2	9.31	Khair Green	11	2.02
			Khair Dry	1	0.143
	U-20 Punder C-11	50.58	Khair Green	78	15.522
			Khair dry	6	0.709
	UP-10 Sadwan C-1	20.64	Khair Green	65	13.267
			Khair Dry	70	6.1410
	UP-10 Sadwan C-4	21.85	Khair Green	101	22.264
			Khair Dry	59	6.652
	R-2 N Mehdhar C-1	52.20	Khair Green	498	89.302
			Khair Dry	184	14.928
			Chil	134	159.34
	UP-10 Sadwan C-6	23.47	Khair Green	101	18.664
			Khair Dry	201	17.881
	R-1 Tattal C-3c	59.08	Khair Green	584	123.38
			Khair dry	76	10.97
	UP-14 Thora C-1	17.00	Khair Green	49	10.260
			Khair Dry	24	2.019
	UP-14 Thora C-2	44.51	Khair Green	338	77.928
			Khair dry	32	4.880
	UP-14 Thora C-11	6.07	Khair green	165	43.398
			Khair Dry	17	3.921
	U-20 Punder C-8	41.26	Khair Green	30	5.780
			Khair dry	28	2.888
			Chil green	1	0.19
			Chil Dry	140	65.34
	UP-10 Sadwan C-7	10.92	Khair Green	68	13.851
			Khair Dry	41	3.855
	R-1 Tattal C-1c	40.86	Khair Green	623	156.510
			Khair dry	254	29.60
	U-20 Punder C-15	64.74	Khair green	93	20.55
			Khair Dry	78	8.70
	U-20 Punder C-12	29.54	Khair green	39	9.400
			Khair dry	3	0.280
	UP-10 Sadwan C-8	10.92	Khair green	58	11.621
			Khair dry	16	2.065
	U-20 Punder C-13	10.92	Khair green	72	17.348
			Khair dry	8	0.995
	U-20 Punder C-3	32.78	Khair Green	290	60.289
			Khair dry	76	8.562
	U-20 Punder C-6	20.64	Khair green	82	21.109
			Khair dry	8	1.440
	UP-16 Kopra C-11	42.89	Khair green	392	88.426
			Khair dry	433	46.722
	UP-16 Kopra C-9	32.78	Khair Green	148	32.782

			Khair dry	20	4.225
	R-1 Tattal C-2c	80.74	Khair green	840	186.64
			Khair Dry	355	33.257
	R-1 Tattal C-3b	60.07	Khair green	679	157.07
			Khair dry	222	28.59
	UP-10 Sadwan C-5	26.03	Khair green	110	22.384
			Khair dry	111	11.931
	R-1 Tattal C-1b	39.66	Khair green	819	180.910
			Khair dry	397	36.310
	R-1 Tattal C-3a	27.92	Khair Green	50	10.924
			Khair dry	29	4.222
	R-1 Tattal C-2b	46.53	Khair green	566	113.410
			Khair dry	597	61.460
			Eucalyptus	183	169.85
	R-2 N Mehdhar C-2	96.29	Khair Green	1484	278.010
			Khair dry	1115	92.560
	R-1 Tattal C-1a	87.00	Khair green	444	94.670
			Khair dry	252	24.21
			Eucalyptus	3647	3262.50

The total removal in the last working plan period is as under:

Sr. no.	Species	Salvage Removal Volume (cubic meter)	Removal through silvicultural felling Volume (cubic meter)
1	Chil	25317.88	388.55
2	Khair	32677.576	2655.418
3	Shisham	2606.066	0
4	BL	553.03	0
5	Eucalyptus	637.13	3432.35

7.2 Recorded removal of fuelwood:

No removal of fuelwood has been done except Salvage removal of trees (Refer Table 7.1)

7.3 Recorded removal of Bamboo/Rattans:

There is no recorded extraction/removal of bamboo/rattan from the forest of this division. However, Bamboo is harvested from private areas and is exported to nearby states like Hoshiarpur city of Punjab, where it is used in furniture making, construction and paper mills.

7.4 Recorded removal of locally important NTFPs including MAPs:

There is no recorded removal of Non-Timber Forest Produces (NTFPs) from this division. However, locals do remove some NTFPs for local use. List of few important NTFPs of the Nurpur Forest Division are as follows:-

Table 7.3

Sr No	Common name	Botanical name	Type	Part used	Uses
1.	Babul	<i>Acacia nilotica</i>	Tree	Bark	Used for its demulcent effect.
2.	Basuti	<i>Adhatoda vasica</i>	Shrub	Leaves, flowers	Used to treat cough, asthma
3.	Bel	<i>Aegle marmelos</i>	Tree	Fruit	Used in chronic diarrhea&disentry, 'sharbat' soothing for intestines.
4.	Siris	<i>Albizia lebbeck</i>	Tree	Root, bark, flowers	Used in hemicrania, alexiteric, anthelmintic
5.	Taur	<i>Bauhinia vahlii</i>	Tree	Leaves	Pattal making
6.	Akk	<i>Calotropis procera</i>	Shrub	Root, leaves	Roots to treat dysentery and skin disease. Tincture of leaves used in intermittent fevers.
7.	Amaltas	<i>Cassia fistula</i>	Tree	Fruit	Fruit pulp is used as laxative.
8.	Amla	<i>Emblica officinalis</i>	Tree	Fruits	Source of Vitamin C and good liver tonic.
9.	Pipal	<i>Ficus religiosa</i>	Tree	Bark	Anti bacterial properties
10.	Kangu	<i>Flacourtia indica</i>	Shrub	Fruit/ Bark	Fruits are edible. Bark is astringent, diuretic also used in dog bite.
11.	Harar	<i>Terminalia chebula</i>	Tree	Fuits	Astringent, useful in dysentery. Good in ophthalmia, piles, spleen disease.

12.	Baheda	<i>Terminalia bellerica</i>	Tree	Bark	Mild diuretic, useful in anaemia & leukoderma.
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7.5 Demand and supply of timber and important non-timber forest produce:

Resin:

Resin is a sticky, liquid, organic exude being tapped from *Pinus roxburghii* trees. Resin tapping was done departmentally till 1975 after that is being done by H.P. State Forest Development Corporation Ltd. Prior to 1984, the resin was extracted by conventional French Cup and Lip method which involved deep and rather uncontrolled depth of blazes which when coupled with frequent fires led to heavy mortalities in Chil trees and thus salvage removals.

The improved "German Rill method" was adopted completely since 1988.

Technique:

Tappable diameter for rill method is 35 cm on dbh. Bark surface of length 45 cm and breadth 30 cm is removed above 15 cm from ground level using bark shaver. Bark removed should not be more than 2mm in thickness to facilitate freshening. Central groove is cut by drawing groove cutter from above to downward side except in first year i.e. when 15 cm from ground level groove is drawn from down to upward side. The lip is fixed at 45° with tree using horseshoe nails. A 5 cm long wire nail is driven about 2cm below the mid point of the lip for hanging the collection pot snugly against tree. First rill should be drawn by moving the freshening knife from lowest point of central groove to upward along the blaze boundary in a way that rill makes an angle of 40° with central groove. Process is repeated on other side of central groove at an interval of approximately at weekly intervals. The rills should be parallel to each other with an uncut bark of 5 mm between two successive rills. Width of rill is 6-7mm and depth 2mm (excluding 2mm depth of unshaved bark). Length of rill should neither exceed nor fall short of blaze limit. Blaze attains height of 36-38 cm in one season i.e. 15th March to 15th November with total 32 rills in a season. Stimulant i.e. 20 % solution of Sulphuric and nitric acid mixed in equal proportions (w/w) is sprayed on freshly cut rills using plastic bottle kept at 45° angle to tree with its nozzle kept at 3-5 cm away from tree. Resin is collected in collection can (Balti) from pot using scraper. At season end, the nails should be pulled out and lips be removed. In next year, the position of blaze is marked above top of first blaze and blaze is extended upwards for 4 years. For 5th year the blaze is made at bottom leaving 7.5 cm wide space from outer edge of first year blaze. All pine needles within 1 m radius of trees should be removed. It is better if bushes within 2 m radius are cut. Firefighting equipments should be provided to all resin depots.

Areas for Resin tapping:-

All **PB II** & **PB II** areas of Chil shelterwood working circle only are prescribed for resin tapping using rill method.

The year wise detail of resin blazes handed over to HPSFDC is tabulated as below:-

Table 7.4 Resin tapping (last 10 Years)

Sr. No.	Year	No. of resin blazes handed over to HPSFDC	Quantity extracted in Qtl	Royalty received (Revenue in Rs)
1	2012-13	35,393	---	12,44,545
2	2013-14	24,377	---	14,32,880
3	2014-15	27,050	---	20,36,865
4	2015-16	28,451	---	17,29,920
5	2016-17	33,920	1480.08	22,04,800
6	2017-18	38,388	1601.09	19,19,400
7	2018-19	38,409	1338.55	15,36,360
8	2019-20	38,324	1389.95	14,20,062
9	2020-21	35,729	1570.24	15,00,618
10	2021-22	36,341	1520.20	11,92,992
11	2022-23	40,206	1420.45	15,45,930

7.6 Import and export of wood and wood products:

- **Khair wood/ Khair heart wood/ Khair chips/ Katha**

Khair is one of the most important commercial tree species of this area. Khair is harvested from private areas under 10-year felling program and is regulated by forest department under HP Land Preservation Act 1978 and under Transit rules. Khair heartwood and chips are exported to IBR Boilers and Katha Bhatties of Nurpur forest division, other forest divisions of state as well as to neighboring states. Katha is also exported to neighboring states.

Table 7.5 Details of IBR Boilers in Nurpur Forest Division:-

Sr No.	Division	Range	Name & Address	Mouza	Tikka	Khasra No
1.	Nurpur	Kotla	Moti Lal R/o VPO Kuther, TehJawali, HP	Ambal	Dhiala	1,2,&4
2.	Nurpur	Indora	Arvind Kumar Prop. Shiva Overseas, VPO Bassa Waziran, HP	Bhadroya	Bhadroya	168, 169, 170, 177
3.	Nurpur	Indora	S.K.S. Katha Udyog	Indpur	Indpur	1673

Table No 7.6 Details of Katha Bhatties in Nurpur Forest Division:-

Sr No	Division	Range	Name & Address	Mouza	Tikka	Khasra No
1.	Nurpur	Rey	Hans Raj R/o Hatli, teh. Fatehpur	Nagal	Bhatti Dughwalia n	14
2.	Nurpur	Jawali	Surinder Mohan R/o Pathankot, Punjab	Malahari	Kukrala	177
3.	Nurpur	Jawali	Vijay Singh R/o Naluha, PO Malahari	Fatehpur	Manoh	1116/796
4.	Nurpur	Indora	Balwan Singh R/o Gangath, HP	Gangath	Rapper	675
5.	Nurpur	Indora	Bir Singh R/o Behri, HP	Mandholi	Lakhotarw an	122 & 124
6.	Nurpur	Nurpur	AshuKaushal R/o Dhanwantri, DisttUna HP	Kothi Wanda	Pathiyar	1548/811
7.	Nurpur	Jawali	Hem Raj R/o VPO Sunet	Fatehpur	Pardah	727
8.	Nurpur	Indora	Jasbir Singh R/o Rit HP	RitUperli	RitUperli	688

Table No 7.7 Details of Export from Nurpur Forest Division

Sr.No	Place/ Destination / Location of Khair wood Export
1.	Anokhi Sons Agro (India) Pvt. Ltd 2 KM Stone, Paladhuhi, Bilaspur Road, Distt. Gurgaon, Haryana
2.	Subh Katha Industry, Village Pakana, PO Nilokheri, Karnal, Haryana
3.	M/S AB Katha Factory, BehMawa, Tehsil Mukerian, Distt Hoshiarpur, Punjab
4.	Sai Interprizes, Karluhi, Tehsil Amb Distt. Una, H.P.
5.	Pooja Katha Udhyog, VPO Papehra (Kinnu), Tehsil Amb, District Una, H.P.
6.	Ajay Katha Udhyog, karluhi, Tehsil Amb, District Una, H.P.
7.	Swastik Katha Pvt. Ltd., Godhra Road, Rohtak, Haryana
8.	M/S GS Katha Udyog, Haryal, Tehsil and District Pathankot, Punjab
9.	Shiva Katha Private Limited, 58 Km Stone, Chulian Turning, Rohtak, Haryana
10.	Kashmir Katha Industries, Phase II, Samba J& K
11.	M/S Ichha Ram Saw Mill, Lane No. 4, Bari Brahmna, Distt Samba J&K
12.	The Indian wood product Co/ Ltd. IGC, Phase III, Sidco, Samba, J&K
13.	ML Katha Udhyog, Vill. Alera, P.O Dharampur, Mukeria, punjab

Data of felling of Khair trees from private land of Nurpur Forest Division for period 2019-20 to 2023-24.

Sr No.	Year	No. of Khair trees felled	Volume in cum
1.	2019-20	69853	6576.44
2.	2020-21	50986	4896.94
3.	2021-22	49342	4753.11
4.	2022-23	61989	5275.01
5.	2023-24	37867	3186.89

• **Broad-leaved species**

Broad leaved fuelwood species are harvested from private areas of Nurpur forest division and are exported to local Sawmill, Furniture making shops or to other places within and outside state. There is a huge market in Hoshiarpur, Punjab.

Details of Forest Industries in Nurpur Forest Division:-

Sr. No.	Forest Industry	No.
1.	Furniture shops	116
2.	Imported Timber Sale Depots	74
3.	Saw Mills	174
4.	Charcoal Bhatties	58

7.7 Import and export of NTFPs:

There is no recorded of import and export of NTFPs in Nurpur Forest Division.

7.8 Removal of fodder:

Description of cattle rearing communities in Nurpur Forest Division:-

Gaddi Grazing

The “Gaddi” who generally belong to Chamba, but in some cases, have settled in Kangra to become entitled to all the rights of user, are true shepherds. The rich pastures on the Southern slopes of Dhauladhar provide autumn and summer grazing for four to five months, but for 3 or 4 months, in the winter the flocks resort to their recorded “runs” in the low hills which provide only insufficient and poor grazing. In rainy season the “gaddi” take shelter behind the main range by moving to Bara Bhangal, Chamba and Lahaul where grazing of very fine quality is available in the alpine pastures. The movement of flocks are governed by the following rules:-

- (i) Two classes of “Gaddi” have to be recognized and they pay at rates are given below as fixed in 1967: -

Class

(a) Migratory	(i) Sheep Rs.19.00 per hundred
	(ii) Goats Rs.37.00 per hundred
(b) Residents	(i) Sheep Rs. 7.81 per hundred
	(ii) Goats Rs.25.00 per hundred

- (ii) For purposes of enumeration, lambs and kids born in the spring are counted. Daily stays must be 8 KM apart.
- (iii) No halt may ordinarily be made for more than one night at any halting place, but when delayed by rain or by necessity of giving salt to the flocks, a halt for two nights is equal to the full grazing fee is leviable but the Deputy commissioner has discretion in special cases to reduce it in case of Goats, to not less than Rs 4.68 per hundred. Further, the halting fee of Rs 4.68 per hundred should be charged for halting for *more than two days but less than six days* unless the halt is for manuring the fields of the right holders when no fee is leviable. Further, Rs 6.25 per hundred Goats and Rs 4.68 per hundred Sheep is leviable if the stay exclusive of days allowed for manuring exceeds *9 days but does not exceed 15 days*. No flocks are permitted to halt at a place for *more than 15 days*. The period for halting for manuring should not exceed 3 nights at one place and halting is leviable for excess even if the halt for manuring purpose.
- (iv) In spring, a halt of 3 weeks in the higher ranges, in excess to the period actually necessary for the journey across the passes, is permitted.
- (v) No halting fee can be charged for halting in tikas where “Gaddis” own land and are, thus ordinary right holders, provided they confine their grazing to the Forests in which they have rights as owners of land.
- (vi) Gaddis and the Jamindars must make their own arrangement in regard to manuring fields but the Zamindards may not interfere with the “Gaddis” even though they refuse to manure.

Gujjar Grazing

Gujjar are of two classes: - “*Ban Gujjar*” and “*Swanadars*”. The former were originally nomads or residents, but the latter are invariably permanent residents of the district and generally co-proprietors of the village and have “*Swans*” or “*Dhars*” recorded in their names which can be transferred only through inheritance.

The *sawanadar gujjar* may graze their cattle in the *sawanas* recorded in their name to the exclusion of all other right holders during 3 or 4 months of monsoon. The *Ban gujjars* on the other hand have got no recorded right anywhere in the district but the right holders in Nurpur Tehsil may permit them to graze the horned cattle on payment of certain fees.

Sr. No.	Range	Year	No. of Grazing Permits given
1.	Nurpur	2023-24	40
2.	Indora	2023-24	58
3.	Jawali	2023-24	34
4.	Rey	2023-24	8
5.	Kotla	2023-24	1

7.9 Valuation of the products:

Every year the market rates for green standing trees are fixed by Pr.CCF (HoFF) H.P. in consequence with the authorization accorded vide Government letter No. FFE-B-A (4)-2/2006 dated 28.07.2024, keeping in view of the criteria approved by government for the fixation of market rates vide Letter No. FFE-B-A (4)-22006 dated 16.12.2006.

The Market Rates for green standing trees for year 2023-24 are:-

Table No 7.8

Sr No.	Species	Market Rate for Year 2023-24 (in Rs/m ³)
1.	Deodar	84,683
2.	Kail	73,081
3.	Rai/Fir	53,082
4.	Chil	55,596
5.	Eucalyptus	23,052
6.	Shisham/Tun	52,849
7.	Sain	47,966

8.	Sal	49,867
9.	Khair	1,39,145
10.	Walnut	74,366
11.	Poplar	2,815
12.	Jamun	4,256
13.	Sagwan	32,000
14.	Kikar	30,091

CHAPTER VIII

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

8.1 Number of JFM Committees and areas protected by them:

As envisaged in the National Forest Policy, 1988 the participation of people in the protection, management and development of forests has assumed more and more significance. In order to make the local communities as protectors and managers of forests rather than destroyers, there is an urgent need to establish a continuous dialogue with them. It is felt that foresters and local communities should work together in the formulation of plans for the management of forest resources. It is also envisaged that local communities would participate in the decision-making process on choice of species to be planted, areas to be afforested, protection of forests and benefit-sharing of usufructs. The concept of Joint Forest Management has been developed after a series of experiments and resolutions.

To address the long-standing problems of deforestation and land degradation, the approach of involving local communities in an effective and meaningful manner, is gaining acceptance significantly. Even the present National Forest Policy 1988, emphasizes on participatory management and common property management. It also specifically mentions that to achieve the objectives of the policy, a massive people's movement should be created, especially involving women. Consistent with the National Forest Policy of 1988, the Government of India, on 1st June 1990, issued policy instruction to all state governments supporting greater participation of village communities and NGOs in regeneration, management and protection of the forests. In keeping with the above notification, the Government of Himachal Pradesh has formulated a policy vide No. Forest(C) 3-4/80-V dated 12.5.1993, supporting Joint management arrangements. Ever since village communities are being involved by the Forest Department to further the aim of protection and management of forests and continuation of forest cover. The recognition of the link between socio-economic incentives and forest development has been singularly responsible in eliciting community participation. A new resolution of the Ministry of Environment and Forests dated February 21, 2000 has further strengthened the JFM programme and this circular inter alia contemplates:

- (a) Legal back up to the JFM committees;
- (b) 50% members of the General Body should be women.
- (c) Extension of JFM in good forests areas, with sharper focus on activities concentrating on NTFP/NWFP management.

This resolution is an attempt to evolve a proactive and people friendly framework for meaningful implementation of the programme, though the detailed operational modalities to translate these concerns have not been spelt out.

There are various schemes and projects, initiated by the H.P. Government and some financed through External agencies e.g. externally aided projects that lay emphasis on people's involvement in forestry. The Sanjhi Van Yojana is a H.P. Government and Forest Development Agency, Mandi, Government of India backed initiatives. Recently the Government of Himachal Pradesh has issued a notification No. Fts-II(B)15-10/87 dated 23rd August 2001, called the Himachal Pradesh Participatory Forest Management Regulations, 2001. These rules shall be applicable to such government forests and lands, including common lands, where participatory management is envisaged.

VFDSs under JICA Project:-The following 30 No. of VFDSs has been registered under the jurisdiction of Nurpur Forest Division under JICA assisted Project for Improvement of Himachal Pradesh Forest Ecosystems Management & Livelihoods:-

Table No 8.1

Sr. No	Range	Block	Beat	Panchayat	Name of VFDS	Registration No.
1	Nurpur	Nurpur	Nurpur	Jachh	Jachh	18/CA dtd. 19/07/2022
2	Nurpur	Sadwan	Aund	Kopra	Kopra	19/CA dtd. 27/07/2022
3	Nurpur	Sadwan	Aund	Aund	Aund	17/CA dtd. 19/07/2022
4	Nurpur	Jounta	Chhotidhar	Ladori	Ladori	22/CA dtd. 19/07/2022
5	Nurpur	Jounta	Jounta	Punder	Jounta	23/CA dtd. 05/08/2022
6	Nurpur	Nurpur	Nurpur	Gahin Lagore	Gahin Lagore	27/CA dtd 17/08/2022
7	Nurpur	Minjgran	Minjgran	Minjgran	Minjgran	21/CA dtd 05/08/2022
8	Nurpur	Sadwan	Danni	Danni	Danni	42/CA dtd 12/09/2022
9	Nurpur	Nurpur	Bindra Ban	Nagni	Nagni	40/CA dtd 05/09/2022
10	Nurpur	Jounta	Choti Dhar	Hathi Dhar	Hathi Dhar	36/CA dtd 26/08/2022
11	Nurpur	Khanni	Khanni	Khanni	Khanni	41/CA dtd 07/09/2022
12	Nurpur	Nurpur	Nagrota	Kot Plahri	Kot Plahri	31/CA dtd 17/08/2022
13	Nurpur	Khanni	Khanni	Badhuhi	Badhuhi	38/CA dtd 30/08/2022
14	Nurpur	Khanni	Thora	Bhaloon	Bhaloon	06/C.A dtd. 17/05/2023
15	Indora	Gangath	Giora	Giora	Giora	37/CA S.D.N dtd 30/08/2022

16	Indora	Gangath	Bhalakh	Panjahra	Panjahra	43/CA dtd 12/09/2022
17	Indora	Indora	Ghandran	Ghandran	Ghandran	23/2023/Reader 05/10/2023
18	Indora	Mangwal	Mangwal	Mangwal	Mandholi	25/Reader/2023 dtd. 04/12/2023
19	Indora	Damtal	Malot	Baleer	Baleer	15/2023/ reader dtd. 30/06/2023
20	Indora	Damtal	Dhantol	Mangwal	Indpur	24/Reader/23 dtd 15/11/2023
21	Indora	Dainkwan	Mangwal	Lodhwan	Lodhwan	17/23/ Reader dtd. 18/07/2023
22	Jawali	Rehan	Sidhpur ghar-1	Sidhpur ghar-1	Sidhpur ghar-1	25/2022/Supdt./ SDJ dtd 01-09-2022
23	Jawali	Fatehpur	Fatehpur	Fatehpur	Fatehpur	HPCD-14240 dtd. 28/03/2023
24	Jawali	Rehan	Guriyal	Bhol Khas	Bhol Khas	07/2023/MA/SDJ/ dtd.29/03/2023
25	Jawali	Jawali	Jawali	Lahru	Lahru	05/2023/MA/SDJ/dtd. 23/03/2023
26	Rey	Fatehpur	Dhameta	Bari	Bari	HPCD-11981 dtd.14/09/2022
27	Rey	Bhogrwan	Kothi	Malahari	Khanda	26/2022/SDI dtd 12/09/2022
28	Rey	Dhameta	Sathana	Sathana	Bhanth	HPCD-14547 dtd. 21/04/2023
29	Jawali	Badukhar	Badukhar	Badukhar	Deothi	10/2023/READER/SDI dtd.10/05/2023
30	Jawali	Rey	Rey-1	Lathial	Badal	HPCD-14200 dtd.27/03/2023
					TOTAL	30

VFMSs under KfW Project:- The following 47 No. of VFMSs have been registered under the jurisdiction of Nurpur Forest Division under Himachal Pradesh Forest Eco-system Climate Proofing Project.i.e KfW Project:-

Table No 8.2

Sr. No.	Range	Name of VFMS	Date of Approval
1	Nurpur	Ther Kuther	22.11.2017
2		Milkh	31.12.2017
3		Haral	09.12.2019

4		Danni	04.10.2019
5		Aund	20.07.2019
6		Kuraliyan	24.08.2021
7		Kherian	07.12.2021
8		Minjgran	07.12.2021
9		Madholi Tappa	01.01.2018
10		Gagwal	12.02.2018
11		Indpur	11.12.2018
12		Malot	19.06.2019
13		Dainkwan	04.09.2019
14	Indora	Chaloh	21.09.2020
15		Thatholi	19.10.2020
16		Bhadroya	05.04.2021
17		Raja Khasa	26.07.2021
18		Baranda	13.12.2021
19		Paloura	08.07.2019
20		ChattarJogian	11.12.2018
21		Bhatian	17.05.2019
22	Jawali	Chalwara	29.06.2020
23		Sarola	24.10.2020
24		Sidhpurghar	26.05.2021
25		Gurial	04.01.2022
26		Sathana	01.01.2018
27		Diana	26.04.2019
28		Luthial	26.04.2019
29		Hatli	31.05.2019
30		Khatiar	07.08.2019
31		Nangal	11.10.2019
32		Plakh	30.10.2019
33		Anoh Pollian	14.08.2020
34		Manwala Anoh	25.09.2020
35		Ballah	21.12.2020
36		Soldha	21.12.2020
37		Bohrka	07.01.2021
38		Ambal	12.02.2021
39		Dole	22.03.2021
40		Anuhi	31.07.2021
41		Surhandi	22.09.2021
42	Kotla	Nadholi	15.07.2021
43		Kothi Wanda	27.09.2021
44		Nichali Ballah	29.09.2021
45		Banoli	07.12.2021
46		Sirman	10.01.2022
47		Jole Bharnoli	12.01.2022
		Total	47

8.2 Status of empowerment of JFMCs:-

JICA PROJECT

Project For Improvement of Himachal Pradesh Forest Ecosystem Management and Livelihood

The Japan International Cooperation Agency is a governmental agency that delivers the bulk of Official Development Assistance from the government of Japan. It is chartered with assisting economic and social growth in developing countries, and the promotion of international cooperation.

The Project is being implemented in seven districts i.e. Kinnaur, Shimla, Bilaspur, Mandi, Kullu, Kangra and Lahaul &Spiti. The project period is 10 years from 2018-19 to 2027-28. It will be implemented in 72 Ranges of 22 Divisions falling in jurisdiction of 9 Forest Circles and the activities will be carried out both in PFM as well as departmental mode through 400 VFDS and 60 BMC sub committees.

The basic approaches to be followed under the project to achieve the project objectives include;

- Empowering forest-fringe communities, particularly women, through sustainable livelihoods and ensuring positive involvement of rural people in managing their own environment.
- Strengthening community institutions such as Village Forest Development Society (VFDS) and Biodiversity Management Committees (BMCs)/subcommittees.
- Alleviating poverty of the rural poor through income generating interventions.
- Planning and implementing site specific technical and scientific forestry interventions, including soil and moisture conservation, restocking of degradation areas through appropriate Silvi-cultural operations utilization of the inherent potential of available root stock, under planting with suitable species, block plantations in blank patches.
- Promoting inter- sectoral convergence (ISC).
- Interventions to be planned and implemented by VFDS/JFMCs and Biodiversity Management Committee/subcommittees (Micro planning).
- Capacity Development of Himachal Pradesh Forest Department and VFDS/JFMCs.
- Promoting forest-based and non-forest based enterprises (such as the value addition and marketing of medicinal & aromatic plants, etc.) to generate sustainable employment, develop industries and enhance the value of forests.

- Caring for the socially disadvantaged groups in the society, such as scheduled castes, Scheduled Tribes, forest dwellers, women and other vulnerable people through proper safeguard measures as per the JICA guidelines and applicable Indian laws and regulations.
- Institution capacity strengthening of Forest department and its personnel.

Mode of Operation:-The identified areas shall be divided into Participatory Forest Management (PFM) Mode and Departmental Mode. In case identified potential interventions areas are away from communities but interventions are required for the purpose of the Project and the PFM institutes (VFDS/BMC sub-committee) showing their unwillingness to work in these areas, such interventions are to be conducted in the departmental mode. However, PFM mode shall be selected where applicable from the viewpoint of sustainability. The major activities to be implemented under different modes include as below.

PFM Mode

- Drainage Line Treatment including ex-situ Soil & Water Conservation (SWC) work
- Densification of moderately dense forests by Plantation of multi-purpose trees in degraded forests so as to convert open forests into moderately dense forests and moderately dense forests to dense forests; gap plantations should be preferred to be more effective on larger areas.
- Afforestation/ Improvement of Open/ Scrub Forest
- Rehabilitation of Forest Areas Infested with Invasive Species
- Improvement of Pastures/ Grasslands (including in-situ SWC works)
- Forest Fire Protection
- Forestry Intervention at Outside of Forest Areas

Departmental Mode

- Improvement of Forest Boundary Management at Project Intervention Areas
- Improvement of Nurseries
- Seedling Production
- Non-PFM Drainage Line Treatment (ex-situ SWC work: including treatable
- Surface erosion Control
- Secondary Silvicultural Operations for Improvement of Existing Forests
- Improvement/ Densification of Moderately Dense Forest
- Afforestation/ Improvement of Open/ Scrub Forest
- Improvement of Pastures/ Grasslands (including in-situ SWC work)
- Forest Fire Management

In addition, the Community Development & Livelihood Improvement Plan (CD & LIP) will be executed by PFM institutions including Common Interest Groups (CIG), User Groups, Self-help Groups (SHGs) and Executive Committee of the VFDS.

KfW Project
Himachal Pradesh Forest Eco-system Climate Proofing
Project (HPFECPP)

The overall objective of the envisaged project is “Forest ecosystems in HP are managed in a way, that the risks of climate change and its negative impacts are minimized and/or mitigated, resulting in an increase in biodiversity of the treated Himalayan ecosystems and sustained income in rural areas from sustainable management of natural resources”. The project is expected to lead to reduced forest degradation, increased biodiversity, enhanced income for forest-dependent communities in vulnerable landscapes, increased availability of spring water in treated spring catchment areas and sustainable management of forests in the project area.

Project Objective

Project objective is to minimize and/or mitigate risks of climate change and its negative impacts, increase in biodiversity of the treated Himalayan ecosystems and sustained income in rural areas by sustainable management of natural resources.

Project Goal

- 1 To make the forests resilient to the risks of climate change. (RESILIENT)
2. To enhance the adaptive capacities of local communities to cope up with the negative impacts of climate change. (ADAPTIVE)
3. To sustain the climate resilience of forest ecosystem and adaptive capacities of the local communities. (SUSTAINABLE)

Project Approach

1. Participatory planning and implementation at village level (micro-planning).
2. Beneficiary Contribution.
3. Incentive for continued protection of rehabilitated forest stands via saving book approach.
4. Capacity building of project implementation partners & stakeholders.

5. Convergence of funds at village level with central and state government programmes.

Village Forest Management Society

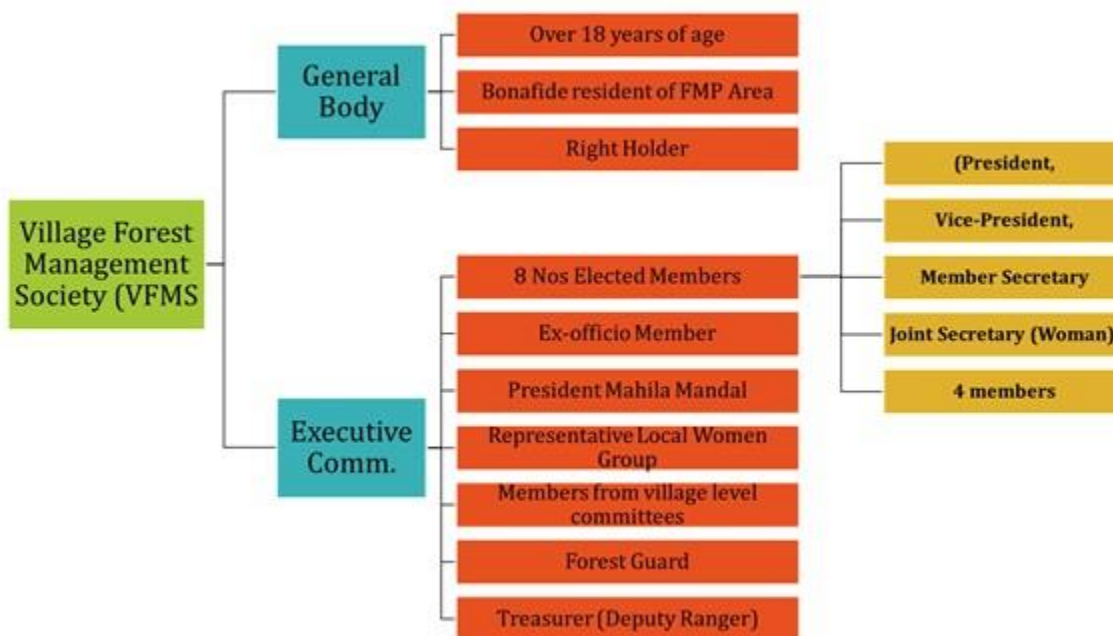


Diagram No 8.1

8.3 Labour Welfare

Labour is engaged locally for various forestry activities like plantation, Nursery management, Lantana eradication, Forest Fire mitigation etc. Standard labour rates as notified by state government from time to time are provided to engaged labour through Treasury system directly to their bank accounts.

8.4 Use of Indigenous Knowledge

Indigenous knowledge w.r.t. traditional medicines, floral and faunal knowledge, local sight specific knowledge is incorporated into forest management practices through Locals as well as van rakhas who are source of past history as well as indigenous knowledge of the local area. They are often associated at ground level in various forestry planning and execution works by local forest staff.

8.5 Extent of cultural/Sacred grooves

Cultural/Sacred grooves are not present in Nurpur Forest Division.

8.6 Ecotourism area/activities

Contents of this para are discussed in separate chapter.

8.7 Social customs

Nurpur located in Kangra district has rich culture and heritage. It is named after Nur Jahan, the wife of Mughal emperor Nur-ud-din Muhammad Salim or known by imperial name Jahangir. The area has history that predates Mughal era.

History:

Nurpur was originally known as Dhamera and its history dates back to 10th century. The region was ruled by Pathania Rajputs, a warrior clan that claims its descent from legendary king Prithviraj Chauhan. During Mughal period the region came under influence of Mughal empire and was renamed from Dhamera to Nurpur. The Nurpur fort, an architectural marvel, was built during this period and remains a significant historic site. Nurpur is known for its beautiful paintings and carvings which reflects a blend of Mughal and Rajput styles.

After the decline of Mughal empire, Nurpur came under British control. After India's independence Nurpur became part of Himachal Pradesh.

Social Customs and Culture:

Language: The primary language spoken in Nurpur is Kangri, a dialect of Pahari. Punjabi and Hindi are also spoken.

Festivals: Nurpur like rest of Himachal, celebrates a variety of festivals with enthusiasm like Diwali, Holi and Dussehra. Local fairs and festivals like Minjar fair and Shivratri also has significance in Nurpur. Local *melas* (fairs), *chhinj* (wrestling) are also popular here.

Religious practices: The region is predominantly Hindu with temples playing a central role in spiritual life of people. The *Brij Raj Swami Temple* in Nurpur is a famous religious site and is said to be the only temple in world where Lord Krishna and Mirabai are worshipped. The temple is said to have been built in 17th century with its idol brought from Rajasthan.

Art and Craft: it is similar to that of Kangra like handicrafts, especially miniature paintings of kangra school of art. Region also has weaving and is known for shawl and blankets production.

Cuisine: Local delicacy "Dham" a traditional meal served during festivals and special occasions, consisting of rice, dal, mandra, khatta and other vegetable dishes.

Architecture: Traditional architecture features stone houses with slate houses design to suit local climate. Historic architecture include Nurpur Fort, Bathu-ki Ladi temple, Masroor temple.

8.8 Status of compliance of Forest Right Act (FRA)

As per section 3(1) of FRA Act, the rights of Scheduled Tribes and other Traditional forest dwellers (OTFDs) are to be settled. There are no scheduled tribe in Nurpur forest division. The livelihood rights and other customary rights of the communities have been settled as

per forest settlement of in the year 1989-2012. Similarly the revenue settlement has also recorded some of the customary rights of the local communities (i.e. OTFDs).

As far as Tenure rights of OTFDs are concerned, no such claims have been received till 31st March, 2024 and as such no tenure rights have been granted to OTFDs or any individuals.

8.9 Other Rights and concessions

Rights of locals in local forests are mentioned in wajib-ul-arj. Locals have right of way; right of timber for cremation purposes; Timber distribution commonly called as TD rights; lopping of fodder trees; extracting grasses etc.

Table No 8.3

Sr. No	Year	Species	No. of Trees	Volume (cubic meter)
1	2012-13	NIL	NIL	NIL
2	2013-14	NIL	NIL	NIL
3	2014-15	Shisham	03	2.931
4	2015-16	Chil	01	3.54
		Shisham	01	0.977
5	2016-17	Chil	01	2.60
		Shisham	01	0.467
6	2017-18	Shisham	61	79.466
		Euc.	10	9.36
		B/L	2	2.40
7	2018-19	NIL	NIL	NIL
8	2019-20	Shisham	58	56.49
		Chil	1	3.54
9	2020-21	Shisham	114	124.13
		Chil	3	10.52
		Euc.	17	19.19
		B/L	3	2.96
10	2021-22	Shisham	162	170.241
		Chil	4	14.16
		Euc.	5	5.64
		B/L	4	3.66

8.10 Dependence of local people on NTFP

Dependence of locals on NTFPs has decreased over the years due to various factors like accessibility of cleaner fuel, availability and affordability of better medical facilities, improved purchasing power. Economic dependency though small is significant for the poor people as NTFPs attributes to additional income to their income sources. Recorded removal of NTFP removal by locals is not present. However locals do collect some NTFPs for traditional medicinal use. There are many NTFPs in Nurpur Forest Division some of them are listed as below:-

Sr. No	Common name	Botanical name	Type	Part used	Uses
1	Babul	<i>Acacia nilotica</i>	Tree	Bark	Used for its demulcent effect.
2	Basuti	<i>Adhatoda vasica</i>	Shrub	Leaves, flowers	Used to treat cough, asthma
3	Bel	<i>Aegle marmelos</i>	Tree	Fruit	Used in chronic diarrhea & dysentery, 'sharbat' soothing for intestines.
4	Siris	<i>Albizia lebbek</i>	Tree	Root, bark, flowers	Used in hemicrania, alexiteric, anthelmintic
5	Taur	<i>Bauhinia vahlii</i>	Tree	Leaves	Pattal making
6	Akk	<i>Calotropis procera</i>	Shrub	Root, leaves	Roots to treat dysentery and skin disease. Tincture of leaves used in intermittent fevers.
7	Amaltas	<i>Cassia fistula</i>	Tree	Fruit	Fruit pulp is used as laxative.
8	Amla	<i>Emblica officinalis</i>	Tree	Fruits	Source of Vitamin C and good liver tonic.
9	Pipal	<i>Ficus religiosa</i>	Tree	Bark	Anti bacterial properties
10	Kangu	<i>Flacourtia indica</i>	Shrub	Fruit/ Bark	Fruits are edible. Bark is astringent, diuretic also used in dog bite.
11	Harar	<i>Terminalia chebula</i>	Tree	Fuits	Astringent, useful in dysentery. Good in ophthalmia, piles, spleen disease.
12	Baheda	<i>Terminalia bellerica</i>	Tree	Bark	Mild diuretic, useful in anaemia & leukoderma.

8.11 Other aspects:-

Grazer Communities

Gaddi Grazing

The “Gaddi” who generally belong to Chamba, but in some cases, have settled in Kangra to become entitled to all the rights of user, are true shepherds. The rich pastures on the Southern slopes of Dhauladhar provide autumn and summer grazing for four to five months, but for 3 or 4 months, in the winter the flocks resort to their recorded “runs” in the low hills which provide only insufficient and poor grazing. In rainy season the “gaddi” take shelter behind the main range by moving to Bara Bhangal, Chamba and Lahaul where grazing of very fine quality is available in the alpine pastures. The movement of flocks are governed by the following rules:-

- (i) Two classes of “Gaddi” have to be recognized and they pay at rates are given below as fixed in 1967: -

Class

(a) Migratory	(i) Sheep Rs.19.00 per hundred
	(ii) Goats Rs.37.00 per hundred
(b) Residents	(i) Sheep Rs. 7.81 per hundred
	(ii) Goats Rs.25.00 per hundred

- (ii) For purposes of enumeration, lambs and kids born in the spring are counted.
- (iii) Daily stays must be 8 KM apart.
- (iv) No halt may ordinarily be made for more than one night at any halting place, but when delayed by rain or by necessity of giving salt to the flocks, a halt for two nights is equal to the full grazing fee is leviable but the Deputy commissioner has discretion in special cases to reduce it in case of Goats, to not less than Rs 4.68 per hundred. Further, the halting fee of Rs 4.68 per hundred should be charged for halting for *more than two days but less than six days* unless the halt is for manuring the fields of the right holders when no fee is leviable. Further, Rs 6.25 per hundred Goats and Rs 4.68 per hundred Sheep is leviable if the stay exclusive of days allowed for manuring exceeds *9 days but does not exceed 15 days*. No flocks are permitted to halt at a place for *more than 15 days*. The period for halting for manuring should not exceed 3 nights at one place and halting is leviable for excess even if the halt for manuring purpose.
- (v) In spring, a halt of 3 weeks in the higher ranges, in excess to the period actually necessary for the journey across the passes, is permitted.
- (vi) No halting fee can be charged for halting in tikas where “Gaddis” own land and are, thus ordinary right holders, provided they confine their grazing to the Forests in which they have rights as owners of land.

- (vii) Gaddis and the Jamindars must make their own arrangement in regard to manuring fields but the Zamindars may not interfere with the “Gaddis” even though they refuse to manure.

Gujjar Grazing

Gujjar are of two classes: - “*Ban Gujjar*” and “*Swanadars*”. The former were originally nomads or residents, but the latter are invariably permanent residents of the district and generally co-proprietors of the village and have “*Swans*” or “*Dhars*” recorded in their names which can be transferred only through inheritance.

The *sawanadar gujjar* may graze their cattle in the *sawanas* recorded in their name to the exclusion of all other right holders during 3 or 4 months of monsoon. The *Ban gujjars* on the other hand have got no recorded right anywhere in the district but the right holders in Nurpur Tehsil may permit them to graze the horned cattle on payment of certain fees.

The range wise details of number of grazing permits given in year 2023-24:-

Sr. No.	Range	Year	No. of Grazing Permits given
1.	Nurpur	2023-24	40
2.	Indora	2023-24	58
3.	Jawali	2023-24	34
4.	Rey	2023-24	8
5.	Kotla	2023-24	1

CHAPTER IX

ADEQUACY OF POLICY, LEGAL AND INSTITUTION FRAMEWORK

9.1 Existing policy and legal framework and their compliance:

The legal system and constitutional arrangements, comprising legislative powers with the Central and State Government as primary source of Laws, and the Supreme Court and High Courts as secondary sources, is the pivotal legal frame works. To achieve the goals of sustainable forest management, Himachal Pradesh Forest Department has many legal and institutional frameworks in place as:-

National Forest Policy, 1988:-The principle aim of Forest Policy must be to ensure environmental stability and maintenance of ecological balance including atmospheric equilibrium which are vital for sustenance of all life forms, human, animal and plant. The derivative of direct economic benefit must be subordinate to this principal aim. The policy reiterates that the national goal should be to have a minimum of one-third of total land area of the country under forests or tree cover. On the hills and mountainous region, it aimed to maintain two third of the area under such cover on order to prevent erosion and land degradation and to ensure the stability of the fragile eco-system.

Himachal Pradesh Forest Sector Policy and Strategy 2005:- To achieve the goal of sustainable management of forests, the State Government has prepared Himachal Pradesh Forest Sector Policy and Strategy 2005 to achieve sustainable forest management

Sustainable management of forest is guided by legal frameworks comprising of various Acts with their amendments, Rules, Notifications, Guidelines, Hon'ble Supreme Court as well as Hon'ble High Court orders etc.

Acts:-

- 1) Indian Forest Act, 1927.
- 2) Indian Forest (Himachal Pradesh Amendment) Act, 1968.
- 3) Indian Forest (Himachal Pradesh Second Amendment) Act, 1991.
- 4) Wildlife (Protection Act, 1972.
- 5) Van (Sanrakshan Evam Samvardhan) Adhiniyam, 1980.
- 6) Environment (Protection) Act 1986.
- 7) National Green Tribunal Act, 2010.
- 8) The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006
- 9) Biological Diversity Act, 2002.
- 10) Himachal Pradesh Land Preservation Act 1978.
- 11) Himachal Pradesh Forest (Sale of Timber) Act, 1968.
- 12) Himachal Pradesh Public Premises and Land (Eviction and Rent Recovery) Act 1971.

- 13) Himachal Pradesh Resin & Resin Products (Regulation of Trade) Act, 1981.
- 14) Himachal Pradesh Forest Produce (Regulation of Trade) Act, 1982.
- 15) Himachal Pradesh Private Forests Act, 1954.
- 16) Himachal Pradesh River Rules 1971.
- 17) Himachal Pradesh Non-Biodegradable Garbage (Control) Act, 1995.

Rules:-

- 1) Himachal Pradesh Forest Produce Transit (Land Routes) Amendment Rules, 2023.
- 2) Rules under H.P. Land Preservation Act, 1978.
- 3) Himachal Pradesh Forest (Sale of Timber) Rules, 1969
- 4) Himachal Pradesh Resin & Resin Products (Regulation of Trade) Rules, 2002.
- 5) Himachal Pradesh Forest Produce (Regulation of Trade) Rules, 1984.
- 6) Biological Diversity Rules, 2004.
- 7) Environment (Protection) Rules, 1986.

To augment the forest resources, the state is implementing a Japan funded Japan International Cooperation Agency (JICA) project and World Bank funded Integrated Development Project (IDP) for afforestation, soil and water conservation works and joint forest management initiatives. The German Development Bank (KfW) has supported the Himachal Pradesh Forest Ecosystem and Climate Proofing Project (HPFECPP) to help reduce the effects of climate change.

Besides this, the state government is also investing through State Plan, centrally sponsored schemes as well as CAMPA.

9.2 Status of approved working plan and compliance:

The working plan by Sh. J.C. Katoch was implemented w.e.f. 2012-13 to 2021-22. The prescriptions and their compliance is given in Table 9.1.

Table 9.1 Status of prescriptions and their compliance

Sr. no.	Prescription	Working Circle	Status
1.	Felling of trees as per approved felling series.	Chil, Coppice, Khair overlapping, Bamboo	No green felling was done except experimental silvicultural felling of Khair on orders of Hon'ble Supreme court in year 2018-19 & 2019-20. Salvage removal was done.

2.	Plantations	Plantation working circle	Plantations have been done departmentally as well as through Externally aided projects in plantation as well as in other working circles mostly as per availability of plantable area.
3.	Soil Moisture conservation works	All working circles	Carried out departmentally as well as through Externally aided projects as per local needs. Not done for watershed as whole.
4.	Construction of Boundary pillars	Misc. regulations	50 Forests were worked under experimental silviculture operations and boundaries were identified and Pillars were erected in 50 forests. In last planning period the boundary pillars were repaired or newly constructed as per available budget. +++
5.	Involvement of locals	Misc. regulations	Locals involved in various activities.

9.3 Number of forest offences:

The forest offences commonly committed in these forests include illicit felling of Khair trees, lopping of culms for fodder, removal green bamboos without grant of permission, grazing of animals in the closed areas etc. Other than petty offences, no major incidences are reported from the area. The range-wise details of forest offence cases are given as under: -

Sr. No.	Year	Range	No. of DRs issued	No. of trees involved	No of DRs compounded	Compensation amount (Rs.)	Court cases
1	2012-13		23	44	23	150674	1 No.FIR No.152/12 dated 23.05.2021

							PS Indora
2	2013-14	Rey	14	36	14	148316	---
3	2014-15		38	92	38	320949	---
4	2015-16		16	33	16	137669	---
5	2016-17		12	29	12	130585	---
6	2017-18		1	1	1	8908	1 No.FIR No.22/2018 dated 26.02.2018 PS Fatehpur
7	2018-19		1	1	1	18408	---
8	2019-20		10	17	10	506643	1 No.FIR No.16/2020 dated 15.01.2020 PS Indora
9	2020-21		5	6	5	40227	---
10	2021-22		9	27	9	81988	---
		Total	129	286	129	1544367	

1	2012-13	Kotla	NIL	NIL	NIL	NIL	----
2	2013-14		NIL	NIL	NIL	NIL	----
3	2014-15		NIL	NIL	NIL	NIL	----
4	2015-16		112	22	112	84649	3
5	2016-17		30	4	30	72115	1
6	2017-18		38	NIL	38	7140	----
7	2018-19		80	2	80	75917	----
8	2019-20		55	4	55	72596	----
9	2020-21		104	11	104	183391	----
10	2021-22		74	23	74	427811	----
		Total	493	40	493	923619	----

1	2012-13	Jawali	199	105	199	772640	Nil
2	2013-14		269	114	269	720595	Nil
3	2014-15		194	72	194	358713	Nil
4	2015-16		122	100	122	269496	Nil
5	2016-17		33	22	33	134182	Nil
6	2017-18		Nil	Nil	Nil	Nil	Nil
7	2018-19		107	78	107	449454	Nil
8	2019-20		102	65	102	708740	Nil
9	2020-21		230	127	230	510519	Nil
10	2021-22		91	63	91	683870	Nil

		Total	530	333	530	2352583		
1	Nurpur	2012-13	204	14	204	5396	02	04 Nos
2		2013-14	345	22	345	194373	01	
3		2014-15	272	75	272	415922	01	
4		2015-16	225	56	225	471367	01	
5		2016-17	34	16	34	69965	01	
6		2017-18	71	0	71	23590	Nil	
7		2018-19	49	1	49	15118	01	
8		2019-20	32	2	32	57928	01	
9		2020-21	173	22	173	341234	01	

10		2021-22	158	22	158	322217	01	
		Total	1563	230	1563	1917110		

1	Indora	2012-13	11	15	11	66443		
2		2013-14	30	48	30	198849		
3		2014-15	33	79	33	189844		
4		2015-16	51	158	51	53300		
5		2016-17	5	10	05	0		
6		2017-18	0	0	0	0		
7		2018-19	5	11	5	202301		
8		2019-20	12	12	12	198961		
9		2020-21	4	6	4	90505		

10		2021-22	42	78	42	929126		
		Total	193	417	193	1929329		

9.4 Status of research and development:

Various research findings are incorporated into execution works from time to time and field staff is also trained accordingly.

9.5 Human reserve capacity building efforts:

The Forest Training Institute & Rangers college Sundernagar and Forest Training Institute Chil imparts training to field staff at various levels. Frontline field staff is trained at FTI Chil at regular intervals. Trainings are imparted time to time to officers/officials of all levels of department in collaboration with expert institutes of state/centre/others on diverse subjects such as Wildlife conflict management, Drone survey, GIS & uses, Forest Fire protection, Nursery techniques, Forest Surveys, e-office, NTPS etc.

9.6 Forest Resource Accounting:

State Revenue:-Timber (Mostly Salvage & through Experimental Silvicultural felling)

Resin extraction, Grazing permits, Eco-tourism activities yield revenue to state.

Benefits to Locals:- Fuel and fodder needs of locals. Local traditional medicinal uses. Seasonal edible forest products.

Environmental benefits:- Biodiversity and its roles, benefits to ecosystem, carbon sequestration, soil erosion control, water recycling, improvement in air quality, wildlife habitat.

9.7 Budgetary allocations to the forestry sector:

The budgetary allocations to the forestry sector have traditionally been at the low level varying from 0.09 to 0.65 in the 12th Five Year Plan. Himachal being a predominantly a forest dominated state having approximately 66% of land classified as forests, the allocation is low as compared to agriculture, irrigation and rural development departments. Nevertheless, the budget allocation has been sufficient to meet the plan and non-plan expenditure. But the budget allocation is neither projected on the basis of working plan prescription by the

Department, nor allocated accordingly, therefore most of the prescriptions given in the working plan remain unfulfilled. Plan and non-plan expenditure details are given in Table No. 9.3.

Table 9.3 Plan and non-plan expenditure in Nurpur Forest Division

Sr No.	Year	Non Plan (in Rs.)		Plan (in Rs)	
		Allotment	Expenditure	Allotment	Expenditure
1.	2012-13	8,65,26,366	8,65,26,372	1,47,70,834	14770834
2.	2013-14	42,15,525	42,15,525	1,93,29,125	19239125
3.	2014-15	8,95,64,293	8,95,64,293	1,92,30,024	19229928
4.	2015-16	8,30,94,785	8,30,94,750	18902175	18902175
5.	2016-17	9,59,37,200	9,59,37,134	24134960	24134960
6.	2017-18	10,99,72,386	10,99,72,325	33970530	33970506
7.	2018-19	11,02,70,850	11,02,64,149	64569530	64569416
8.	2019-20	10,44,06,677	10,95,86,416	127284682	108578993
9.	2020-21	16,02,51,554	14,54,02,767	178689781	156233600
10.	2021-22	24,94,83,467	21,18,58,797	162868861	153908148

9.8 Existence of monitoring, assessment and 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, at Hamirpur who has support of the Conservator of Forests and Divisional Forest Officer and their officials to perform the field work. The external monitoring of works has been given to the Forest Research Institute, Dehradun who carries out the work as per the guidelines of the Government of India.

For evaluation of prescriptions of the Working Plan, Control forms devised by the Department are given in Annexure. They pertain to evaluation of fellings, subsidiary fellings, progress of regeneration, statement showing the deviations and works of maintenance, reproduction, improvement and protection. It is the responsibility of the Conservator of Forests to review the control forms annually during the Annual Office inspection of his subordinate offices. The Conservator and his superior officers are supposed to inspect the coupes and see themselves the adequacy of the operations in the different working circles.

9.9 Public awareness and education:

Publicity and extension education is an important part of the Forest Department. At present, one division at Shimla is providing extension services to the people. Forest education and

awareness is provided through forest exhibitions and by distributing posters, pamphlets, manuals of various schemes, Forest fire awareness and other publicity informations free of cost to public during various public gatherings at local fairs, and Van Mahotasava and wildlife week celebrations etc throughout the state.

9.10 Adequate manpower in Forest Division:

The details of sanctioned permanent and temporary posts are given in the Table 9.4. In general, adequate manpower is available to manage the forests.

Table 9.4: Sanctioned and working strength as on March 2025.

Sr.No.	Name of post	Sanctioned cadre	Working No.	Vacant Post
1	DFO	1	1	-
2	ACF	1	1	-
3	Supperintendent	1	1	-
4	Forest Ranger	6	4	-2
5	Senior Assistant	3	3	-
6	Deputy Ranger	27	16	-11
7	Forester	-	-	-
8	Surveyor	-	-	-
9	Forest Guard	96	72	-24
10	Steno Typist	-	-	-
11	Driver	1	1	-
12	Tractor Operator	-	-	-
13	Clerk/Junior Assistant	6	5	-1
14	Peon	13	13+2 daily wages =15	+2
15	Multipurpose worker	4	5	+1
16	Beldar	-	-	-
17	Chowkidar	13	7	-6
18	Mali	9	9	-
19	Mali Cum Plantation Work	3	3	-
20	Mali-Cum Nursery work	5	4	-1
21	Kanungo	2	2	-
22	Forest Worker	100	39	Dying cadre
23	Dak Ranner	-	-	-
24	Sweeper	-	-	-
	Total	289	200	

Labour is locally available for carrying out all types of operations in the forest and nurseries. However, there is some shortage of labour during sowing and harvesting season of *Rabi* and *Kharif* crops.

Table 9.5 Wages rates per day in Himachal Pradesh

S.No	Category of labour	w.e.f. 1-04-22	w.e.f. 1.04.2021	w.e.f. 1.04.2019	w.e.f. 1.04.2018
1.	Unskilled labor	350.00	300.00	275.00	250.00
2.	Semi-skilled labor	371.77	318.52	292.00	267.00
3.	Skilled labor	406.36	348.21	319.17	294.17
4.	Highly skilled labor	483.17	414.03	379.50	354.50

Latest Wage rates as per Government of Himachal Pradesh Finance (Pay Revision) Department Notification No. FIN-(PR)B(7)-33/2010 dated 04.03.2024 effective from 01.04.2024 for selected designation is as following:-

Sr No.	Designation	Wage rate effective from 01.04.2024
1.	Casual Labourer	400.00
2.	Mate	--do--
3.	Cook	--do--
4.	Mali	--do--
5.	Chowkidar	--do--
6.	Helper	--do--
7.	Sweeper	--do--
8.	Boatman	--do--
9.	Peon	--do--
10.	Zoo animal attendant	--do--
11.	Fire watcher	--do--
12.	Logger Dresser (Pachani)	--do--
13.	Climber (Looper)	--do--
14.	Feller (Garani)	--do--

15.	Calliperman	--do--
16.	Fireman	415.00
17.	Sawyer (Charani)	419.00
18.	Security Guard	437.00
19.	Carpenter 2nd Class (Forest Department)	469.00
20.	Mason 2nd Class (Forest Department)	--do--
21.	Painter Ist Class (Forest Department)	--do--
22.	Distemperer (Forest Department)	--do--
23.	Mason Ist Class (Forest Department)	551.00
24.	Carpenter (Ist Class) (Forest Department)	--do--

CHAPTER-X

FIVE YEAR PLANS

GENERAL

In the past the forests of the division have been managed for getting sustainable yield through various working plans. The silvicultural fellings were mainly aimed at marking the forest uniform and the regeneration achieved through natural means. Till the early seventies, the emphasis was on planting commercially important species such as Chil, Shisham etc. The increasing demand of forest produces in the state especially that of timber and fuelwood resulted in focus on target scale plantations of commercially important species. Although the plantations programme started from Ist Five Year Plan, but it gained momentum from IIIrd plan onwards. The plan wide management of forests and expenditure is as under:-

I FIVE YEAR PLAN (1951-56)

During Ist Five Year Plan, the forests of this division were managed under Ramesh's Revised Working Plan (1951-52 to 1975-76). The forests of the tract were exploited commercially to meet the timber and fuelwood requirements. Chil Shelterwood, Coppice and Selection Working Circles were constituted and worked. The Protection and Plantation were created to improve the condition of growing stock and meet local demand of fuel and fodder. The Chil Shelterwood was managed under "Punjab Shelterwood System" with mainly artificial regeneration. However, in Coppice Working Circle the silvicultural system adopted was "Coppice with standard" whereas in Plantation Working Circle "Clear Felling System" followed by plantation of Chil was preferred. The combined figures of Revenue and Expenditure during Ist Five Year Plan of Nurpur Forest Division are tabulated as under:-

Table:1.5.1 Revenue and Expenditure during Ist Five Year Plan

Year	Revenue	Expenditure	Surplus/Deficit
1951-52	Nil	Nil	Nil
1952-53	Nil	Nil	Nil
1953-54	Nil	Nil	Nil
1954-55	Nil	Nil	Nil
1955-56	Nil	Nil	Nil

II FIVE YEAR PLAN (1956-61)

During this period, the forests of this Division were managed under Romesh's revised Working Plan (1951-52 to 1975-76) as above. The combined figures of Revenue and Expenditure during IInd Five Year Plan of Nurpur Forest Division are tabulated below:-

Table:1.5.2 Revenue and Expenditure during IInd Five Year Plan

Year	Revenue	Expenditure	Surplus/Deficit
1956-57	Nil	Nil	Nil
1957-58	Nil	Nil	Nil
1958-59	Nil	Nil	Nil
1959-60	Nil	Nil	Nil
1960-61	Nil	Nil	Nil

III FIVE YEAR PLAN (1961-66)

During this period, the forests of this Division were managed under Romesh's revised Working Plan (1951-52 to 1975-76). The year wise Revenue and Expenditure of Nurpur Forest Division is tabulated below:-

Table:1.5.3 Revenue and Expenditure of Nurpur Forest Division during IIIrd Five Year Plan

Year	Revenue	Expenditure	Surplus/Deficit
1961-62	Nil	Nil	Nil
1962-63	Nil	Nil	Nil
1963-64	Nil	Nil	Nil
1964-65	Nil	Nil	Nil
1965-66	Nil	Nil	Nil

IV FIVE YEAR PLAN (1969-74)

During this period, the forests of this Division were managed under Romesh's revised Working Plan (1951-52 to 1975-76). The year wise Revenue and Expenditure of Nurpur Forest Division is tabulated below:-

Table:1.5.4 Revenue and Expenditure of Nurpur Forest Division during IVth Five Year Plan

Year	Revenue	Expenditure	Surplus/Deficit
1969-70	608974	2315985	(+)3773739
1970-71	4256229	2816876	(+)1439353
1971-72	2376022	2355553	(+) 20469
1972-73	2202276	3169053	(-) 966777
1973-74	4947252	3398408	(+)1548844

V FIVE YEAR PLAN (1974-79)

During this period, the forests of this Division were managed under Romesh's revised Working Plan (1951-52 to 1975-76). The year wise Revenue and Expenditure of Nurpur Forest Division is tabulated as:-

Table:1.5.5 Revenue and Expenditure of Nurpur Forest Division during Vth Five Year Plan

Year	Revenue	Expenditure	Surplus/Deficit
1974-75	7422555	4179952	(+) 3243603
1975-76	Nil	Nil	Nil
1976-77	Nil	Nil	Nil
1977-78	Nil	Nil	Nil
1978-79	Nil	Nil	Nil

Source:- Nurpur Working Plan by Nanak Chand.

VI FIVE YEAR PLAN (1980-85)

During this period the forests of this division were managed under Nanak Chand's Working Plan (1976 to 1991). In Nanak Chand's Working Plan forests of this division were managed under Chil, Bamboo, Coppice Protection and Plantation Working Circles. The Chil Shelterwood Working Circle was managed under "Punjab Shelterwood System" with mainly artificial regeneration and in Plantation Working Circle "Modified clear Felling system" was followed and plantation of Chil was preferred. However, due to ban on green felling only salvage removals has been done and no silvicultural felling carried out during this period. During this working plan with the launching of social forestry programme, the focus shifted towards raising of fuel, fodder, small timber and grasses to meet the growing domestic needs of rural communities. The year wise Revenue and expenditure during VI Five Year Plan of Nurpur Forest Division is tabulated as under in table 1.5.6.

Table:1.5.6 Revenue and Expenditure of Nurpur Forest Division during VIth Five Year Plan

Year	Revenue	Expenditure	Surplus/Deficit
1980-81	N.A.	N.A.	N.A.
1981-82	3552725	4662160	(+) 3890565
1982-83	11540275	6131746	(+) 5408529
1983-84	10374010	6277621	(+) 4096385
1984-85	3283391	7683457	(-) 4408066

Source:- Nurpur Forest Division Working Plan by R.C.Kang

VII FIVE YEAR PLAN (1985-90)

During this period the forests of this tract were managed under Nanak Chand's Working Plan (1976 to 1991) as above. The social forestry works were in full swing, main emphasis being on raising fuel, fodder, small timber and grasses to meet the increasing domestic needs of rural communities. The year-wise Revenue and Expenditure during VII five-year plan of Nurpur Forest Division is as under in table 1.5.7.

Table:1.5.7 Revenue and Expenditure of Nurpur Forest Division during VIIth Five Year Plan.

Year	Revenue	Expenditure	Surplus/Deficit
1985-86	1770850	15538191	(-) 13767341
1986-87	13628916	12211442	(+) 1417474
1987-88	1326617	21415659	(-) 20089042
1988-89	598573	38274073	(-) 37675500
1989-90	571852	22142478	(-) 21840626

Source:- Nurpur Forest Division Working Plan by R.C.Kang.

VIII FIVE YEAR PLAN (1992-97)

During this period the forests of this tract were managed under R.C. Kang's Working Plan (1991-92 to 2005-06). The JFM approach also started in the division and the forestry activities were implemented under departmental schemes. Due to ban on green felling, the main objective was afforesting denuded/degraded forests. The constitution of forest development committees and their participation in planning and implementation was sought. The year wise plantation raised in Nurpur Forest Division are tabulated below in table 1.5.8.

Table:1.5.8 Plantation raised in Nurpur Forest Division during VIII Five Year Plan.

Year	Area in ha
1992-93	660.30
1993-94	1592.30
1994-95	1495.50
1995-96	1371.00
1996-97	1373.50

(Source:- Nurpur Forest Division

IX FIVE YEAR PLAN (1997-2002)

The activities of DFID & JFM continued in this period and due to ban on green felling, the objective was mainly on afforesting denuded/degraded forests/ The works of afforestation, soil conservation, entry point activity started by the VFDCs and microloan process learnt and executed. Sanjhi Van Yojna started on the principles of JFM. Here again the focus remained on restocking/regeneration of degraded forests. Year wise plantation of Nurpur Forest Division during IXth Five Year Plan is tabulated below in Table-1.5.9.

Table 1.5.9 Plantation raised from 1997-2001 in Nurpur Forest Division during IXth Five Year Plan.

Year	Area in ha
1997-98	1353.00
1998-99	823.00
1999-2000	937.00
2000-01	1504.40
2001-02	1202.04

(Source:- Nurpur Forest Division)

Xth FIVE YEAR PLAN (2002-2007)

Both the JFM programmes & Sanjhi Van Yojna created mass awareness about forestry but the focus was again on raising plantations besides soil works and entry point activities. Due to ban on green felling only salvage removals has been carried out with focus on planting open and denuded forests. The year wise plantation raised in Nurpur Forest Division are tabulated below in Table-1.5.10.

Table: 1.5.10 Plantation raised from 2002-2006 in Nurpur Forest Division during Xth Five Year Plan.

Year	Area in ha
2000-03	758.00
2003-04	230.78
2004-05	830.60
2005-06	1154.25
2006-07	733.38

(Source:- Nurpur Forest Division)

XIth FIVE YEAR PLAN (2007-2012)

FDA, JFM programmes & Sanjhi Van Yojna created mass awareness about forestry but the focus again in on raising plantations and increasing forest cover besides soil works. Compensatory Afforestation is being implemented with emphasis on soil water conservation. The year wise plantation of Nurpur Forest Division is as under in Table-1.5.11.

Table: 1.5.11 Plantation raised from 2007-2010 in Nurpur Forest Division during XIth Five Year Plan.

Year	Area in ha
2007-08	799.20
2008-09	1096.69
2009-10	528.00
2010-11	745.00

(Source:- Nurpur Forest Division)

LAST WORKING PLAN PERIOD:-

1. Plan and non-plan expenditure in Nurpur Forest Division for Last Working Plan period (2012-13 to 2021-22)

Sr No.	Year	Non Plan (in Rs.)		Plan (in Rs.)	
		Allotment	Expenditure	Allotment	Expenditure
1.	2012-13	8,65,26,366	8,65,26,372	1,47,70,834	14770834
2.	2013-14	42,15,525	42,15,525	1,93,29,125	19239125
3.	2014-15	8,95,64,293	8,95,64,293	1,92,30,024	19229928
4.	2015-16	8,30,94,785	8,30,94,750	18902175	18902175
5.	2016-17	9,59,37,200	9,59,37,134	24134960	24134960
6.	2017-18	10,99,72,386	10,99,72,325	33970530	33970506
7.	2018-19	11,02,70,850	11,02,64,149	64569530	64569416
8.	2019-20	10,44,06,677	10,95,86,416	127284682	108578993
9.	2020-21	16,02,51,554	14,54,02,767	178689781	156233600
10.	2021-22	24,94,83,467	21,18,58,797	162868861	153908148

2. Plantation data for last working Plan period:-

Plantation data for last working plan period			
Sr. No.	Year	Name of Scheme	Area in Hac.
1	2012-13	102-04 (Soon) Afforestation	33
		102-04 (Soon) Enrichment	25
		102-04 (Soon) Re-Afforestation	30
		102-32 (Soos) TFC	9.61
		102-01 (Soon) Soil	45
		Compensatory Plantation	66
		Back Ward Area Sub Plan	25
		NMPB- Plantation	41
		NBM Plantation (Nation Bamboo Mission)	40
		G.Total	314.61

2	2013-14	102-01 (Pasture & Grazing)	5
		102-04 (Soon) Afforestation	55.5
		102-04 (Soon) Enrichment	30
		102-04 (Soon) Re-Afforestation	15
		102-32 (Soos) TFC	70
		102-01 (Soon) Soil	25
		NBM Plantation (Nation Bamboo Mission)	25
		NPV	30
		Compensatory Plantation	123
		IWDP	10
		G.Total	388.50
3	2014-15	102-01 (Soon) Soil	30
		102-01 (Pasture & Grazing)	10
		102-04 (Soon) Afforestation	75
		102-04 (Soon) Enrichment	20
		102-04 (Soon) Re-Afforestation	25
		102-32 (Soos) TFC Afforestation	80
		NBM Plantation (Nation Bamboo Mission)	15
		NPV	173
		G.Total	428.00
4	2015-16	102-01 (Soon) Soil	65
		102-01 (Pasture & Grazing)	7
		102-04 (Soon) Afforestation	130
		102-04 (Soon) Enrichment	35
		102-04 (Soon) Re-Afforestation	50
		102-18 (BASP)	3
		Forfited Security in PVT. Forest Contractor	51
		NPV (Havitat Plantation enrichment)	15
		NPV	260
		NMPB- Plantation	47.4
		NMPB- Plantation (harb&Shurbs)	16
		NBM Plantation (Nation Bamboo Mission)	54
		NBM Plantation (Demonstation)	5
		Hill Top Durga Mata Mandir Damtal	20.3
		Plantation through School Children	4.99
		G.Total	763.69
5	2016-17	102-01 (Soon) Soil	25
		102-01 (Pasture & Grazing)	10
		102-04 (Soon) Afforestation	65
		102-04 (Soon) Enrichment	55

		102-04 (Soon) Re-Afforestation	70
		Forfited Security in PVT. Forest Contractor	2
		101-08 (Under KfW Project)	157
		101-08 Bamboo Palntation (KfW)	5
		NPV Plantation	305
		Compensatory Plantation	5.87
		NPV (Havitat Plantation enrichment)	14
		Hill Top Durga Mata Mandir Damtal	20
		Plantation through School Children	1
		G.Total	734.87
6	2017-18	102-01 (Soon) Soil	45
		102-04 (Soon) Afforestation	74
		102-04 (Soon) Enrichment	220
		102-04 (Soon) Re-Afforestation	30
		789-12 (Soon) Afforestation	83
		789-12 (Soon) Enrichment	30
		forfited (Van Mahotsav)	0.5
		AgroForestaory	10
		Hill Top Durga Mata Mandir Damtal	11
		Compensatory Plantation	7.31
		Plantation through School Children	1.34
		G.Total	512.15
7	2018-19	102-01 (Soon) Soil	50
		102-04 (Soon) Afforestation	86
		102-04 (Soon) Enrichment	128
		102-04 (Soon) Re-Afforestation	10
		789-12 (Soon) Afforestation	52
		789-12 (Soon) Enrichment	55
		789-12 (Soon) Re-Afforestation	10
		Hill Top Durga Mata Mandir Damtal	10
		NPV Plantation	257
		Havitat Plantation enrichment	7
		KfW	45.04
		Plantation through School Children	1.21
		G.Total	711.25
8	2019-20	102-01 (Soon) Soil	35
		102-04 (Soon) Afforestation	75
		102-04 (Soon) Enrichment	63.2
		102-04 (Soon) Re-Afforestation	52
		102-39 (soon) Experemental Silviculture Felling	69.77
		789-12 (Soon) Afforestation	40
		789-12 (Soon) Enrichment	49.6

		789-12 (Soon) SilvicuturProgramm	72.59
		Vidhyarthi Van Mittar Yogna	7
		Forfited Plantation	0.75
		Compensatory Plantation	9.5
		Hill Top Durga Mata Mandir Damtal	12
		101-08 (KfW)	123.91
		G.Total	610.32
9	2020-21	102-01 (Soon) Soil	32
		102-04 (Soon) Afforestation	113
		102-04 (Soon) Enrichment	87
		102-04 (Soon) Re-Afforestation	15
		102-39 (soon) Experemental Silviculture (400 Plants/ha.)	78.11
		102-39 (soon) Experemental Silviculture (200 Plants/ha.)	543.53
		789-12 (Soon) SCSP Afforestation	35
		789-12 (Soon) Enrichment	25
		789-12 (Soon) SilvicuturProgramm (500/Plants)	5
		789-12 (Soon) SilvicuturProgramm (400/Plants)	46.97
		789-12 (Soon) SilvicuturProgramm (200/Plants)	119.37
		AgroForestaory (NBM)	6
		Havitat Plantation enrichment	10
		LPA (1978 Afforestation)	30
		LPA (1978 Enrichment)	26
		NGT	10
		Hill Top Durga Mata Mandir Damtal	10
		101-08 (KfW)	200.15
		G.Total	1392.13
10	2021-22	102-01 (Soon) Soil	20
		102-43 Afforestation	125
		102-04 Enrichment	87
		102-43 Re- Afforestation	35
		102-39 (soon) Experemental Silviculture	179.93
		789-27 Afforesation	25
		789-27 Enrichment	15
		789-02 Afforesation	25
		789-22 (400 plants/ha.)	30
		789-22 (200 plants/ha.)	100
		LPA (1978 Plantation)	20
		Hill Top Durga Mata Mandir Damtal	15
		101-08 (KfW)	96.5

		Compensatory Plantation	4.32
		NPV Plantation	54
		Red Cross	1
		AgroForestry (Pvt. Land)	2
		G.Total	834.75
11	2022-23	102-01 (Soon) Soil	130
		102-43 Afforestation	100
		102-43 Enrichment	80
		102-39 (soon) Silviculture (200 Plants/ha.)	87
		789-27 Afforestation	9
		789-27 Enrichment	150
		789-02 Afforestation	45
		Back Ward Area Sub Plan	20
		NPV (Campa)	80
		Compensatory Plantation	10.648
		Vidhyarthi Van Mittar Yogna	2
		101-18 (KfW)	403.25
		G.Total	1116.898
12	2023-24	789-02 (Van Mohatsav)	2
		101-08 (KfW)	136.25
		G.Total	138.25

3. Fire data for last working plan period:-

Fire incidences in last working plan period						
S.No	Division	Year	No of Fire	Area in Hac	Loss of Plantation	Gross Total
1	Nurpur	2012	94	597.8	2336500	2336500
2		2013	6	58.7	153800	153800
3		2014	11	56.65	0	0
4		2015	14	43.55	0	0
5		2016	42	208.18	78000	78000
6		2017	21	89.8	195000	195000
7		2018	161	2508.4	2317400	2317400
8		2019	27	161.58	214400	214400
9		2020	1	3	0	0
10		2021	68	308	1247000	1247000
11		2022	8	78	430000	430000
12		2023	1	25	87400	87400
	Total		454	4138.66	7059500	7059500

CHAPTER XI

PAST SYSTEM OF MANAGEMENT

11.1 GENERAL HISTORY OF THE FORESTS :-

Before the commencement of Mughal rule, the Raja was the manorial lord of his territory, which was a single state divided for administrative purpose into circuits, mere groupings of holding under a collector of reuts (land revenue system). All wastelands were the Raja's waste and every interest in land was direct from the Raja as a separate tenancy. This system of land tenures continued unchanged under Moghul and Sikh rules till 1846, when the tract was ceded to the British Government

With the advent of British rule (1846), the forests were placed under the control of the Deputy Commissioner and management based on the rules embodied in the Barnes Regular Land Revenue Settlement (1849-52) and inserted in the village administration papers. These rules were modified by Bailey in 1853, which were further replaced by rules promulgated by Government of India in 1855 for the conservancy of forests in the hill tracts of Punjab.

In 1870, as a preliminary to the constitution of reserved forests, Nurpur and Dehra Forests were placed under control of the Forest Department. Indian Forest Act, was introduced in the year 1878. Regular forest settlement commenced in 1883 and after the legislation of the forest settlement operations in 1897, the first working plan was compiled by Hart in 1903-04.

A brief account of the past history of the forests of this division, prior to introduction of scientific forest management, is given as under:-

General History of the Forests.

With the advent of British rule (1846) the forests were placed under the control of the Deputy Commissioner and the management was based on the rules embodied in the Barnes Regular Land Revenue Settlement (1849-52) and inserted in the village administration papers. These rules were modified by Bailey in 1853, which were further replaced by rules promulgated by Government of India in 1855 for the conservancy of forests in the hill tracts of the Punjab.

In 1870, as a preliminary to the constitution of reserved forests, Nurpur and Dehra Tehsil forests were placed under the control of Forest Department. The year 1878 saw the introduction of the first Indian Forest Act and the reserves were re-notified in 1879 while the regular forest settlement commenced in 1883. After the legislation of the Forest Settlement operation in 1897, the first Working Plan was compiled by Hart in 1903-04 and the area was managed under its prescriptions from 1903-04 to 1920-

In 1909, the Government of India draw attention to the unsatisfactory nature of many of the forests settlements for protected forests, to the ever-increasing demands by right holders and to the excessive sheep and goat grazing and asked for adoption of suitable measures to save the forests from permanent injury. An exhaustive and protracted enquiry ensued and resulted in the imposition of a cattle tax, in the enhancement of 'gaddi' grazing, and in the

creation in 1920 of two forest authorities in the district, areas which were likely to respond to proper silvicultural treatment were retained by the Forest Department and subjected to a scheme of rotational closures. Subjected to a scheme of rotational closure prepared by Mitchell and Walters, a revised working plan for such areas and for the reserved forests being prepared by Walters and enforced from 1920-21 to 1929-30. The remaining forests were placed once more under the control of the Deputy Commissioner (who employed a separate staff to protect and control these forests) with a view to managing them solely for the benefit of the villagers with their consent and assistance. In 1924, however, the Punjab Legislative Council refused to provide funds for the Deputy Commissioner's special establishment and Forest Department resumed charge of all those forests. The position has since remained unchanged. Walters Working Plan remained in force from 1920-21 to 1929-30 when it was revised by Mohan in 1931. Mohan's Plan remained in force from 1931-32 to 1950-51 and Romesh's Plan from 1951-52 to 1975-76 and Nanak Chand's Plan from 1976-77 to 1990-91. and R.C. Kang Plan from 1991-92 to 2005-06.

11.2 Past System of Management and Their Results

The period 1846 to 1950-51 can be suitably divided into three periods from the management point of view:-

- (i) Management under the Deputy Commissioner from 1846 to 1870 in Nurpur and Dehra Tehsil. This may be termed as the period of Organization.
- (ii) Management under the Forest Department from 1870 to 1903-04 in Nurpur and Dehra Tehsil. This may be called as the period of transition.
- (iii) Management under proper Working Plans from 1903-04 to 1950-51 or as the period of scientific management, sub divided into.
 - (a) Hart's Working Plan from 1903-04 to 1920.
 - (b) Walter's Revised Working Plan from 1920-21 to 1929-30.
 - (c) Mohan's Revised Working Plan from 1931-32 to 1950.
 - (d) Romesh's Revised Working Plan from 1951-52 to 1975-76.
 - (e) Nanak Chand's Revised Working Plan 1976-77 to 1990-91.
 - (f) Sh R.C. Kang Revised Working Plan 1991-92 to 2005-06.

The management during each period is described in the following paragraphs :-

The period of Organization (1846 to 1870): The long strength of years from 1846 to 1870 during which the forests were managed by the Deputy Commissioner, is characterized by the promulgation of simple forest conservancy rules defining the legal statement of the forest estates and the constitution of the various kinds of forests under the India Forest Act. Barnes conservancy rules asserted the exclusive right of Government to sell timber, forbade the cutting of green wood for fuel and made an order of the village headman necessary before timber could be felled for buildings, but the laxity of the system failed to save the forests from misuse. These rules were modified by Bailey who drew up a code of rules in 1853, which introduced a strict system of forest conservancy and which provided, inter alia, for the division, of all forest land into three parts, for the closure of each part (one third) the

name still in use for a closed area whether actually one- third or more) for three or more years in rotation, for strict control in the open two thirds and for the prohibition of grass burning in winter and extension of cultivation without permission and for the appointment for forest assistant's 'Ban wazirs' in each 'Pargana' in 1855 the general rules for forest conservancy in the Punjab Hill Tracts were introduced under which Commissioners of Divisions were required to submit detailed rules of forest conservancy applicable to the circumstances of their Divisions. Colonel Lake, the then commissioner, proposed certain amendments and alternations in Bailey's rules which were sanctioned by the Lieutenant Governor in 1859. The most notable alterations were that the 'Zamindar' were ordered to apply to the Tehsildar of the 'Pargana' for all timber they might require for building or agricultural purposes and to pay a light fee for agricultural purposes and to pay a light fee for it, instead of getting it free on application to the village headmen. on the other hand a share of 25% of the value of timber sold annually by Government was awarded to the village officials and village community, with the object of entrusting them generally in the success of forest conservancy. These two measures laid the foundations of what are now called the grant of trees at 'Zamindari' rate and the system of the distribution of 'Zamindari share'. The amended rules were put in full force and in 1859 and 1860 the 'tishais' (one third of the forest in each mauza) were marked off and closed to exercise of rights in Dehra Tehsil. This work was never done in Nurpur. Only the tihai itself was demarcated and no arrangement was made to carry out the original intention of closing in rotation with the result that in vast majority of case, the original tihai remained uncharged till 1917. The effect of the 57 years closure (1860-1917) was undoubtedly beneficial to the areas closed. Sufficient natural chil regeneration was obtained which now forms a pole crop of some of the reserves of Dehra Tehsil and in the old tishais included in delimited protected forests. The rest of the forests, which were comparatively inadequately protected, as they were managed by the rules and were subjected to an increased incidence of rights for a long time, very naturally deteriorated until it became apparent that many of them were in danger of extinction.

With regard to export fellings, traders were required to apply to Deputy Commissioner for chil trees which were then sold by them at a fixed rate of Rs. 8 per tree. As the rate was high they only paid to take good trees of large dimensions in accessible localities, while other trees were left untouched.

The bamboos of Nurpur were worked only in accessible parts, but without any regular felling cycle. This combined with slack demand resulted in bringing the crop into poor condition with individual clumps choked with dead and malformed culms.

The period of Transition (1870-1903)

Such was the general conditions of the forests when the management of the forests passed into the hands of the Forest Department in Nurpur and Dehra Tehsils in 1870. The old system of management continued uncharged throughout the greater part of the period of transition. An irregular system of selection fellings was adopted for chil forests. Little

silviculture was applied in these fellings and no scheme of cutting existed, the forests were worked spasmodically until a few sound exploitable trees were left in an area. In 1894 however, a system of improvement fellings bearing on all age classed in accordance with the silvicultural requirements of the crop was introduced in the chil forests.

The bamboo forests continued to be worked in accordance with the demand of the purchasers in accessible parts, but during the last eight years of the period, efforts were made to improve the condition of the clumps by clearing away dead and malformed culms and also to introduce a system of annual cuttings in cleaned areas and of biennial cuttings in forests to which the cleaning operations had not been extended. The experience gained showed the clumps cleaning stimulated the annual production of shoots with the result that the yield of an area in which the clumps had been cleared was greater than that of a similar area in which the clumps were in a congested condition.

11.2 PAST SYSTEM OF MANAGEMENT AND THEIR RESULTS:

After introduction of scientific working (1903-04), the forests have been managed under different working plans as below:-

- i) Hart's Working Plan from (1903-04 to 1920).
- ii) Walter's Revised Working Plan from (1920-21 to 1929-30).
- iii) Mohan's Revised Working Plan from (1931-32 to 1950).
- iv) Romesh's Revised Working Plan from (1951-52 to 1975-76).
- v) Nanak Chand's Revised Working Plan (1.04.1976 to 1990-91).
- vi) R.C. Kang Revised Working Plan (1991-92 to 2005-06)

A brief account of management under these working plans is also included along with a critical appraisal of expiring working Plan

i) Hart's Working Plan from (1903-04 to 1920)

The principal object of the plan was to bring the entire workable area under regular treatment, aimed at sustained annual yield primarily to meet the local legitimate requirements of right holders, any surplus yield being available for sale at market rate. The forests were allotted to working circles. However, only 3 of these, concerning the area to be dealt in the plan viz. Pine, Bamboo and scrub, are discussed below. Remaining four working circles were Oak, Coppice, Oak high forests, Deodar and Fir.

PINE WORKING CIRCLE: - Improvement fellings and thinnings were prescribed in preference to selection system but were not carried out because of the difficulty of getting the forests closed. On account of poor, quality of crop and remoteness of forests, thinning were also not carried out regularly and by the middle of the period of plan, the fellings, were in arrears in all ranges. Repeated fires also played havoc and unregulated markings for right holders deteriorated the forests considerably.

BAMBOO WORKING CIRCLE: Annual cuttings (selection fellings) were prescribed in the areas which could be closed in the three months of rainy season and biennial cutting in the areas not so protected. Clump cleaning was not prescribed as it was held that the system was impossible of application with a poor market. It resulted in congestion of clumps.

SCRUB WORKING CIRCLE: Production was the main object aimed at in this working circle. No definite felling prescription were made. Coppice with standard system with a rotation of 20 years was, however suggested, should any demand arise. A small demand arose near 1907 and a number of forests were then wholly or partly worked.

From the above, it will be seen that the prescriptions of this working plan were not carried out satisfactorily. The period of Hart's working plan did not actually expire till 1922-23 and was revised in 1920-21 by Walter Owing, primarily to preparation of a rotational closure scheme by Mitchell and Walter in 1919.

ii) Walter's working plan: The scheme of rotational closure constituted the framework of this working plan which came into force from 1st July, 1920. A total of six working circles were constituted out of which only four, viz. Kangra Pine, Bamboo, Coppice and unworkable working circles concerning the tract to be dealt with have been discussed below. Remaining two working circles are Oak, and Deodar & Fir.

KANGRA PINE WORKING CIRCLE: Replacement of then existing irregular crop by even aged crop distributed over four age classes and realization of maximum sustained yield were the main objectives of management. The system of management prescribed was uniform, with artificial regeneration in **PB-I** and subsidiary fellings aimed at the removal of over mature trees standing over pole crop in other periodic blocks.

During the plan period only 51% of total **PB-I** areas were subjected to regeneration fellings and closure and only 24% of it had been regenerated. Most of the regeneration was obtained by natural means.

BAMBOO WORKING CIRCLE: Improving the density of bamboos to bring the forests in full bearing was the subject of management.

Biennial cuttings (preceded where necessary, by careful cleanings) were prescribed for the management of bamboos. The scrub in these areas also set to be worked under coppice with standard fellings. Though Bamboo was more or less regularly worked, Scrub in most of the forests could not be touched due to lack of demand.

COPPICE WORKING CIRCLE: In this working circle the end in view was the production of revenue in the reserved forests. However, in case of delimited protected forests, the management was designed to provide for grazing, fodder leave and timber for right-holders' requirement.

The system applied was coppice with standards and sowing was prescribed to be carried out irrespective of fellings having been made or not. A large number of forests were not worked, there being no demand for the produce the prescription remained in arrears.

UNWORKABLE WORKING CIRCLE: It included unworkable scrub areas subjected to rotational closure scheme (DPFs) and undelimited protected forests (UPFs) as well for which no scheme of working could be proposed.

Almost all the DPFs were notified to be closed and results obtained were encouraging. UPFs, however, remained open to exercise of rights and showed no signs of improvement.

ii) **MOHAN'S WORKING PLAN (1931-32 TO 1950-51) :** A total number of six working circles were created out of which only five have been discussed below since the sixth (Oak shelterwood) does not concern the tract to be dealt with in the working plan.

CHIL SHELTERWOOD WORKING CIRCLE: Better stocked Chil forests with economically valuable crop were allotted to this working circle. Areas, where silvicultural availability of the produce was sufficient for market sale after satisfying the requirement of local right holders were included in **Felling Series-1**, and remaining in **Felling Series-II**.

System of management prescribed was uniform system and natural regeneration was to be supplemented, where necessary, by sowings. The rotation and regeneration periods were fixed at 120 and 30 years, respectively, to fit in the prescriptions of Mitchell and Walter's closure scheme. Closure of all the **PB-I** area at once without waiting for the seeding fellings was prescribed by Mohan, on the strength of his opinion that chil in this tract did not require a very heavy opening of the canopy to induce natural regeneration. No fellings were prescribed in **PB-II** in order to preserve the future yield. Thinning's and improvement fellings of a very conservative nature were prescribed in **PB-III** and **PB-IV**.

The general condition of **PB-I** areas remained unsatisfactory, Fires being the main culprit. In **PB-II** and **PB-IV** as well, thinning could not be carried out owing to the lack of demand and tika-wise system of thinning prescribed. A heavy demand for Chil poles in **World War II** made it possible to carry out all these arrear fellings, and results had been distinctly satisfactory.

BAMBOO WORKING CIRCLE: Biennial fellings, under a selection system preceded by cleanings, where necessary, was the prescribed system of management. The scrub in these forests was to be treated under selection felling and thinnings.

The bamboo forests were regularly worked during the currency of the plan resulting in marked improvement in the quality of bamboos.

COPPICE WORKING CIRCLE : Mostly such forests having Khair were allotted to this working circle.

The system of management prescribed was coppice with standards, with 50-75 standards per ha. were prescribed to be retained. In reserved forests, the rotation was adopted as 20 years, whereas, in DPFs it was fixed at 30 years to fit within the parameters of rotational closure scheme.

There was a steady demand for firewood during this period and fellings were carried out as prescribed, except for a few distant areas were carried out as prescribed except for a few distant areas, where extraction was uneconomical. The fellings resulted in vigorous

production of coppice shoots but regeneration by seed had been generally deficient. On the whole, the prescription worked satisfactorily for the working circle.

SELECTION WORKING CIRCLE: It contained those forests in which prescriptions nature of the terrain and the peculiar legal position permitted working on very conservative lines and comprised mainly of DPFs and unclassed forests.

The silvicultural system prescribed was the selection system, combined with thinnings. The felling cycle was fixed at 10 years.

In the areas that remained closed to grazing good deal to fresh regeneration was noticeable. In other areas, it was conspicuously absent. The main crop, however, continued to be in healthy condition despite lack of proper fellings.

PROTECTION WORKING CIRCLE The principal object of management was efficient protection against denudation and erosion.

No fellings were prescribed in this circle except for the requirements of right holders to be made under very conservative selection fellings and thinnings, extensive chil sowings were prescribed.

The results of forming this circle had been satisfactory. The process of erosion had been steadily controlled and general condition of forests improved markedly. Chil sowing could, however, be done only on a limited scale owing to infrequency of good seed year's. In favorable localities, natural chil regeneration had established well. In other less favorable areas, there was a distinct increase in the proportion of scrub.

ROMESH'S WORKING PLAN (1951-52 TO 1975-76):Of the seven working circles constituted by Romesh Chandra , critical analysis of only six working circles is given below since one of these (Oak Shelterwood Working Circle) does not concern this division.

CHIL SHELTERWOOD WORKING CIRCLE: Almost all the chil forests of the division with the exception of those on precipitous terrain and poor stocking, were allotted to this circle. The forests were generally under stocked, irregular and a good many in the lower zone under constant invasion by scrub species.

The forests were to be managed under shelterwood system. Natural regeneration, supplemented with sowing in some forests at lower altitude was to be relied upon to restock the felled areas, A rotation of 120 years divided into four **PB**'s of 30 years each was adopted to comply with the requirements of the rotational closure scheme.

No felling in **PB-II** with a view to safeguard the future yield were prescribed. The forests allotted to **PB-III** were to be thinned. The mother trees standing over young regeneration in **PB-IV** were to be removed gradually and the young crop, properly cleaned and thinned. No sequence of seeding fellings in **PB-I** areas was prescribed, this being left to the discretion of the Divisional Forest Officer. Likewise no definite sequence of felling in **PB-IV** areas was laid down.

No fellings in **PBI** continued to be invaded by a host of scrub species including Khair. The broadcast and patch sowing of chil as prescribed in the working plan have, despite repeated efforts, been a total failure. The regeneration of **PB-I** areas of the division is a knotty problem, even though from 1967-68 onwards chil planting with nursery grown tubed

inexpensive working plan prescriptions of chil sowings. As per the regeneration assessment carried out at the end of the working plan, 264.82 ha. Out of a total of 576.26 ha. felled under seeding fellings during the currency of working plan had failed and 162.45 ha. was only poorly regenerated, 67.88 ha. was fairly regenerated and the balance (70.26ha) moderately regenerated. Khair was found coming in these areas though it is not main species of this working circle.

The removals from **PB-I** areas was in deficit at the end of working plan, especially during the second half of the regeneration period as due to failure or slow progress of regeneration, there was no occasion of carrying out secondary or final fellings, The deficit was, however, largely made up by the unforeseen large scale salvage removals. The general condition of **PB-I** areas was thus unsatisfactory at the end of working plan period.

No felling in **PB-II** area were prescribed, but these forests were open to local timber distribution and it coupled with salvage removals was more than enough to deplete the mature stock and jeopardize future yield. Same has been the case with **PB-II** areas.

It was unfortunate that the burden of local timber distribution was allowed to fall largely on **PB-II** and **PB-III** areas and mother trees standing in **PB-IV** were put to commercial sale. The removal during the plan period from **PB-IV** areas were on excess side (4500 m³) approx. Cleaning and early thinnings in **PB-IV** areas were generally neglected. It has all resulted in degeneration of **PB-IV** areas.

BAMBOO WORKING CIRCLE : Bamboo bearing areas were allotted to this working circle.

These were to be worked on two-years felling cycle under selection and thinning's preceded by cleaning wherever necessary. The scrub areas in reserved and delimited protected forests allotted to this working circle were also to be worked under coppice with standards system. Artificial regeneration works of bamboos to replace the dead clumps as also to increase the proportion of this species were also suggested. Weeding and cleaning in the newly planted patches and young bamboo clumps was also suggested. Strict closure against grazing was enjoined.

The forests were worked as per these prescription upto 1955-56. Subsequently, these were leased out for a period of 15 years to Shree Gopal Paper Mills, Jamuna Nagar who overexploited them upto 1971-72. No sowing and planting closure against grazing and artificial regeneration operations was undertaken during this period. The year-round heavy grazing left no chances for any young growth to establish itself. It all resulted in a considerable deterioration of the bamboo forests w.r.t decrease in size and number of bamboo clumps and clumps/ culm. The two-year felling cycle was too short and proved disastrous.

THE COPPICE WORKING CIRCLE/PLANTATION WORKING CIRCLE:

The best scrub forest of the division was allotted to this working circle. The silviculture system prescribed was coppice with standards. About 50 standards per ha. Suitably staggered and of the most valuable species. In the crop were to be retained. The rotation for

coppice and standards was fixed at 30 and 90 years respectively. Sowing and planting of more valuable tree species were to be carried out within the first 3 years of felling a coppice coupe to increase the potential value of these forests. Weeding and cleaning operations and thinning of the young coppice shoots were also prescribed.

RESULTS OF COPPICE WORKING : The original plan prescription were followed only upto 1964-65. In some case, it was not possible to sell the coupes either because of their small size or remote situation. No concerted efforts to ameliorate the lot of these forests by sowing and plantings of the more valuable species were made. Even formal closures for a good many of these forests were not notified as required. In view of this the resultant coppice crops turned out to be the usual emancipated scrub with no improvement in its composition as intended.

THE PLANTATION WORKING CIRCLE : It was created from 1965-66 onwards out of the forests allotted to the coppice and protection working circles. The areas selected for allotment to this circle were such as were considered suitable for raising concentrated plantations of quick species. After clear felling the existing scrub vegetation without any fear of erosion and plan the felled areas with nursery grown stock of fast-growing economic tree species like Eucalyptus and Poplar.

The first four years of working viz. 1965-66 to 1968-69 can rightly be styled as the Eucalyptus era. All these plantations upto the end of the working plan (1975) was a failure having become only whipping saplings 10 to 15m. height and 3 to 5cm. in dbh.

The severity of clear felling was reduced from 1969-70 onwards under revised plantation directives of CCF, H.P. with retention of 8-10 standard per hac. Of the more valuable species. It was also decided to plant only indigenous tree species like khair and chil. Besides, other species like Shisham were also raised. The results have been fairly encouraging specially in khair and chil. However, the main factors affecting these plantations adversely are:-

i) suppression by bushes and scrub (ii) drought and isolation (iii) in-effective closures and (iv) heavy biotic pressure.

THE SELECTION WORKING CIRCLE : Forests with an irregular nature of the crop, steep and broken ground and peculiar legal position with regard to closures were allotted this circle. The crop comprised of a heterogeneous mixture of Chil and scrub growth.

The forests were to be managed under selection system and thinning's and the management objectives was to remove all silvicultural available mature trees and to thin out the rest of the crop on conservative lines. All the forests were to remain open to grazing and grass cutting unless voluntary closures were possible.

The forests have registered no improvement either in locality factors or composition and density of the crop. This is understandable for the forests were open to grazing without let or hindrance.

No artificial regeneration operations were undertaken or prescribed. In the absence of closures such measures were otherwise doomed to failure.

THE PROTECTION WORKING CIRCLE: All such reserved delimited protected and unclassed forests as were to be protected and unclassed forests were to be protected against

denudations and erosion were allotted to this circle. Blanks were common and the ground precipitous. No silvicultural system was prescribed as no fellings except to meet the local timber demands and of khair trees, under the khair overlapping working circle, were prescribed, Marking of trees for local demand was to be under very conservative selection fellings and thinning's.

Artificial sowing of chil, Simbal and khair and planting of bamboos, simbal and shisham etc. were also advocated in reserves and for the closed portions of the delimited protected forests. No such operations were prescribed for unclassified forests. Soil conservation measures such as gully plugging and check damming of the land slips that frequented these forests were also advocated.

No concerted efforts at artificial sowing and planting of these forests were made. Concentrated efforts at planting the blanks in forests of this circle with nursery grown plants of khair and chil were, however, commenced only in 1972-73. The results were encouraging. So soil conservation measures were undertaken as prescribed in working plan.

THE KHAIR OVER LAPPING WORKING CIRCLE: This circle includes all forests areas of the division, except those allotted to the coppice plantations working circle. The special object of management was to harvest mature and over mature stock of the khair trees.

The forests were to be managed under modified selection system without thinnings. Two out of every three khair trees of 25 cm dbh and over were to be marked for fellings. Khair sowings were to be carried out in suitable places in all the reserved and delimited protected forests closed to grazing. On the whole, the prescriptions of this circle have worked well. However, the prescription with regard to artificial sowing of khair in suitable areas was indefinite and not exact and also not followed properly. It did not significantly affect the condition of forest.

NANAK CHAND'S WORKING PLAN (1.4.1976 TO 31.3.1991) : The working plan laid down the following general objects of management (para 46.2)

- i) To preserve the hill sides against denudation and erosion so as to ensure and equitable flow of water in the streams and rivers that originate from these hills.
- ii) To provide for the bonafide domestic and agricultural requirements of the local population for timber, firewood, grass and grazing subject to the capacity of the subservient forest estate.
- iii) To produce the maximum possible permanent yield and progressively in rising yield of resin subject to the maintenance of the chil crops in a health and thrift condition.
- iv) To exploit mature khair all over the division which is very much in demand for katha manufacturing.
- v) To continue the conversion of the generally irregular chil forest to more or less uniform crops, and to bring them gradually to condition as near normal as possible by

obtaining a normal gradation of age classes with normal increment and normal density of stocking.

vi) To replace the less valuable species by raising plantations of the most valuable economic tree species over as large an area as possible by artificial means of sowing and planting.

vii) Consistent with the above, to obtain the maximum possible sustained yields of timber and firewood of all types from these forests.

viii) To increase the area under Kharetars (Grass preserves) as to provide adequate for age for the cattle of tract.

In conformity with the objects of management outlined above, the following working circles were constituted.

- i) The Chil shelterwood working circle.
- ii) The Bamboo Working Circle.
- iii) The Plantation Working Circle.
- iv) The Khair (Over Lapping) Working Circle.

THE CHIL SHELTERWOOD WORKING CIRCLE: This working circle comprised all those forests where chil was found either pure or in fair proportion. Refractory chil forests (231.06 ha.) which were allotted to this working circle in Ramesh Chandra's working plan and tended to become more of khair bearing areas rather than chil forests were excluded. The chil forests previously allotted to selection (46.54 ha.) were also included in this working circle.

An area of 10814.17 Was allotted to this circle. Forest class wise distribution of the area is as under

Class of Forests	Area allotted to chil shelterwood working circle (ha.)
Reserved	1518.58 ha.
Delimited Protected	1805.89 ha.
Un-delimited Protected	2849.94 ha.
Unclassed	4061.97 ha.
CFs	577.79 ha.
Total	<u>10814.17 ha.</u>

The forest was generally understocked, irregular majority of them belong to unstable chil type as distinguished by Mohan. Such forests are under constant invasion of scrub species including khair and other broad-leaved species. Stratified partial enumerations over about 25% of the area were carried out of all chil trees of and above 20 cm dbh in 10cm diameter classes. Besides, the entire areas were stock mapped on 4"=1 mile scale.

The forests were to be managed under Punjab shelterwood system. Two felling series viz. legal and voluntary closure felling series were formed. All the reserved and delimited protected forests were allotted to former and the rest to the later felling series. To comply with the requirements of the rotational closure scheme, a rotation of 120 years divided into four periods of 30 years each, as followed by Walter (1921), Mohan (1931) and Ramesh Chandra (1951) was adopted. Exploitable diameter was fixed at 55cm dbh and chil trees of 30 cm ddb recommended for resin tapping.

Area of the legal closure felling series were definitely allotted to all four **PB**'s while areas of voluntary closure felling series were allotted as **PB-I** and **PB** unallotted. It was so as other **PB**'s in voluntary felling series could not be distinguished.

The regeneration in most of **PB-I** area gone over in seeding felling in Ramesh Chandra's plan (388.44 ha) came very late and so was young at the time of commencement of this working plan. Bush cutting and planting of chil raised in Polythene bags in all such areas during rainy season was prescribed. Secondary fellings in these areas were to follow the place of regeneration. However, no definite felling, sequence was provided for this purpose and it was left to DFO's ascertainment of the position of regeneration. Thinning were also prescribed to be carried out in compact advance growth patches (392.89 ha.).

In the newly allotted areas to **PB-I**, light seeding felling were advanced considering the openness of crop. At least 25 trees of II size evenly distributed in the area were to be retained as seed bearers 7 advance growth having apole crop of density of 0.7 and covering at least 0.2 ha advocated to be retained as a part of the future crop. The mode of regeneration was indicated primarily by artificial means of sowing and planting by chil raised in polythene bags. No natural regeneration of chil was to be relied upon though advantage may be taken of all healthy young growth. The chil being of unstable type in this division, and there being danger of invasion by scrub species, repeated weeding and bush cutting to keep young plants free from suppression was prescribed to help regeneration.

No felling in **PB-II** with a view to safeguard the future yield were prescribed. Only dry trees, if any were to be removed. The forests allotted to **PB-III** were to be lightly thinned, since most of them were already very open. The mother trees standing over young regeneration in **PB-IV** were to be removed gradually and approximately 50% of such in the over ward were estimated to be available during the plan periods. The demand of the right holders were to be solely met with from the areas of **PB** unallotted, No yield from this **PB** was prescribed.

The annual yield from various **PB**'s was prescribed as under:-

PERIODIC BLOCK	ANNUAL YIELD (M3)	COMMENTS
PB-1		
a) Legal Series	1800	Seeding and secondary felling
b) Voluntary Series	2000	
c) CFs	200	-do-

CRITICAL APPRAISAL OF WORKING BY PERIODIC BLOCKS ROTATION AND REGENERATION PERIOD:

The purpose of rotation of 120 years and regeneration period of 30 years is in keeping with the dictates of rotational closure scheme and no change there in is contemplated because as per para of Nanak Chand's plan the chil takes 102 years to reach dbh of 50cm and 130 years to reach dbh of 55 cm for raising production as well as timber a dia. of 50-55cm is optimum so the rotation of 120 years is quite justified.

Only 2 **PB-I** area of legal felling series could be felled during the currency of plan (1976-77) under revision. These are P-39, Nothern Kuthar Old (15.88 ha) and P-43-N Chottidhar C6a (9.70 ha) Both these areas are fully regenerated after following prescriptions of working plan. The prescription of seeding felling in remaining **PB-I** area was not carried out at all. It will, therefore, not be fair to assess the results of working under plan period under the existing system of management and to comment upon the suitability of shelterwood system for chil forest of this division of its basis.

The regeneration of **PB-I** areas of the division is a knotty problem even though from 1967-68 onwards, Chil planting with nursery grown tubed seedlings have almost entirely replaced the unhelpful though inexpensive method of sowings. Notable examples of this nature are provided by R-1, N. Tattal C-2 b and R-16 N Bindraban C-2. At the same time, natural and artificial regeneration techniques have been found quite satisfactory in R-13 N Khanni and has also come up beautifully in R-6 N Mastgrah C-2c (Through not **PB-I**) due to large openings in the canopy. Natural regeneration is also being noticed in the periphery of Tattal and Chhatril forests in all category of forests and in CFs Ghain Lagore.

The experience with Chil plantations raised during last 10-15 years, where natural regeneration also has been noticed to come up in fair proportions also suggest that chil areas of kotla and Nurpur ranges are receptive to both natural and artificial techniques of regeneration. Regeneration of chil in patches is also noticed at places with suitable openings and favourable soil conditions. The regeneration is, however, patchy and scattered in Jawali block of Jawali Range, and scanty or absent in Rehan, and Rey Blocks of Rey Range and whole of Indora Range.

Account given above suggests that majority of chil forests of this division are suitable to be managed under shelterwood system. The failure of regeneration in some forests can be on account of different reason say type of soil (Tattal and Bindraban), geological (Chhotidhar), zonal altitudinal (Gharoli Challon) and incendiary fires Bhalli and Minjgran.

Therefore, for regeneration purpose, the chil **PBI** areas need to be divided into two categories viz one where dependence will be mainly on natural regeneration and the second category where only artificial regeneration will be relied upon with intensive subsidiary silvicultural operations.

YIELD CALCULATIONS: Though, there have been practically no green markings (with the exception of 25.08 ha. in 1976-77). Huge removals is in the form of salvage markings have taken place from all **PB's**. The yield position for various **PB's** as it stood on 31.3.2006 is tabulated below.

Felling Series	Sr. No.	Total prescribed Yield (m³)	Total removals upto 31.3.2006	Deviation as on 31.3.2006
Legal	1	1052.36	33187.21	(+) 33134.85
Voluntary	II	1155.64	49263.49	(+) 49807.85
CFs	III	156.83	1798.85	(-) 1655.68

It is clear from above that there have been excessively high removals from all **PB's** except **PB-I** of voluntary felling series. Such heavy removals have resulted in premature opening of crop and resulting invasion of scrub species these forests. The depletion of growing stock is anticipated to be alarming on account of these removals. A comparison of growing-stock of Chil in R-15-N Bhali as enumerated by Ramesh Chandra in 1950-51 and as enumerated no. in 1990-91 reveals that depletion in this particular forest is about 25%. As against a total growing stock of 22888 M3 in 1950-51, the present-day figure is 17250. The regeneration status has been given separately in appendix.

THE BAMBOO WORKING CIRCLE: Such of the reserved, delimited protected, protected and unclassed forests or parts thereof where bamboo is found either pure or in mixture has been allotted to this circle. The criterion was a mixture of 120 clumps per ha which was taken as corresponding to a density of O.D. (Para 77 refers). The area allotted to this circle was 453.58 ha. located in R-10-N Talara, R-12-N. Damtal, R-11-N. Khanni, P.19 N Duliana and UP Damtal. Besides, Bamboo clumps were advocated to be worked in areas allotted to plantation working circle also where there were adequate number of clumps.

The bamboos were to be worked on a three year felling cycle with cleanings to be taken up along with main fellings (Para-84 and 85.1) refers. Two felling series, primarily to segregate the reserves and DPR's from the UPF's and UF's were no closure could be enforced without the willing cooperation of the villagers, were recognized. The silvicultural system adopted was selection fellings in individual clumps together with cleaning. The yield was prescribed by area. The number of bamboos likely to be available was estimated to be 3000 per ha. A definite sequence of felling was laid down in para 87. Definite felling rules were laid down in para 85. Fellings were prescribed to be completed by February and were to be restricted to bigger and denser clumps. The maximum number of sheets to be cut in clumps were not to exceed the total number of "manus" and one- and two-year-old shoots. Clumps which have flowered were to be clear felled.

As natural regeneration was wanting, artificial regeneration using transplanting of nursery grown stock was prescribed. A definite planting Programme was laid down (para 9) weeding and cleaning in the newly planted patches and young bamboo clumps was also suggested. Closure of 15 years in planted areas was enjoined (para 88).

RESULTS OF WORKING:- The bamboos have generally been deteriorating and shrinking in the past. As against an area of 986.6 ha. under this working circle in Ramesh Chandra's working plan, only 453.58 ha. was found fit to be included in this working circle by Nanak Chand. The prescriptions of the working plan for these forests were totally ignored and no fellings were done at all in any of the forest except R-12N Damtal. In the later also, regular felling in triennial felling cycle were not done and in was marked only twice during the entire plan period of 15 years i.e. 1977-78 and 1990-91. Resultingly there have been a considerable deterioration of bamboos in Reserves Khanni and Talara Forests. The number of clumps and their size has reduced and these are highly conjured per clump has also diminishes and proportion of dead culms increased. These no longer appear to be bamboo forests. However, the scientific working in reserve Damtal in 1990-91, has tremendously improved the quantity of clumps as also the qualitative aspect of it because of planting of bamboos having been done in allowing year. This forest which was also destined to meet the fate of Khanni and Talara forests now gives the look of a fairly good bamboo forest. No planting of bamboos as envisaged in the working plan was ever

undertaken with the exception of reserves Damtal in 1991-92. As such in the revised working plan emphasis will be laid for planting of such degraded area with bamboos.

THE PLANTATION WORKING CIRCLE: This working circle was constituted by merging areas from the protection working circle, coppice working circle, selection working circle, scrub areas of plantation and bamboo working circle of the Romesh Chandra's working plan together with newly included Ups UFs. All the areas which can be planted with khair, Chil and bamboo were included in this working circle, the criterion for allocation being depth of soil or more precisely the depth to which penetration of roots in the available soil and parent rock is possible. The main object of management was to replace useless scrub, growth with commercially valuable trees like chil, khair, and bamboos. Two felling series, primarily to segregate the reserve and delimited protected forests from the unclassed forests, where no closure could be enforced without the willing cooperation of the villagers, were constituted and designated as legal and voluntary closure felling series, respectively. Out of the total area of 44983.41 ha. brought under management in Nanak Chand working plan, 34677.46 ha. i.e. 77% was allocated to it thus making it the most important working circle.

The forests allotted to this working circle can be further categorized into 2 groups based on prescribed system of management viz.

- i) Group I, comprising 14611.77 ha. which was to be felled and planted during the currency of working plan.
- ii) Group II, comprising 20065.69 ha. which was not to be planted during the working plan period and where only khair trees were to be worked as per the prescriptions of khair overlapping working circle.

The details about system of management in the areas under group-II and its critical appraisal have been discussed while commenting upon khair overlapping working circle. Here only group-I areas are being discussed.

The silvicultural system prescribed for these areas was clear felling with reserves. The word reserve was further elaborated to mean trees as well as areas of given species and density that could be retained as part of the future crop. As applied to area, of the more valuable species like chil, khair, Shisham, tun and bamboo etc. and be of not less than one hectare in extent. As applied to single trees on standards, these would not be less than 30 cm dbh and were to be suitably staggered. The yield was prescribed to be worked by area and it was estimated that 25 m³ stacked fuelwood or 175 quintals of green fuelwood would be available per ha. of felled area.

The clash of interest due to plantation activities or closures in this circle with the grazing requirement was well anticipated. Prompt restocking of the felled areas and taking up small closures with spectacular results was therefore emphasized. Main species recommended for inclusion in plantation activities were chil, khair and bamboos. No rotation or exploitable sizes were considered necessary. A definite sequence of felling planting for the entire working plan period was laid out. Approximately 330 ha of legal and 640 ha of voluntary closure felling series areas were prescribed to be felled annually. Felling operations were to be completed by 31st March, every year and area burnt thoroughly so as to make it fit for planting by July. It was to be planted subsequently with nursery raised plants. The plantations were to be kept free of bush suppression by cutting back of coppice shoots, bush

cutting together with the weeding of the plant's plantations were to be carried out only after the closure had been notified.

The fellings were carried out regularly as per felling sequence, However, not all the areas due during a particular year were felled on account for various reasons like concern for soil erosion, non-availability of saleable material, remoteness of the area, fuelwood requirement etc. which resulted in deficit felling The year wise account of felling in these areas is tabulated below:-

RESULTS OF WORKING: - Actual marking done was more of the type of coppice with standard rather than prescribed system of clear felling with. 50-60 standards of more valuable species per ha. have been retained. Most of the areas felled annually have been planted as per prescriptions of working plan with khair, chil and Bamboos. In addition to above mentioned species. Some other broad-leaved species were also planted though in similar proportions. This proportion was later increased, keeping in view the local demand of fuel and fodder and awareness created by the concept of Social Forestry. These species included Shisham, Leucenia, Siris, Kachnar, Kikar, Dhaman and Popalar etc.

The results of the working circle are of mixed type. There has been a definite improvement in the commercial value of the forests on account of successful chil and khair plantations in large number of areas, which was in fact the sole specific object of management. However, failures are also found, the main reasons for it being i) Suppression by heavy bush growth. ii) Infestation by Lantana in a large number of areas specially in Nurpur and Indora Range iii) drought iv) non-co-operation by local people and heavy biotic pressure due to permits issued to graziers. Human factors like poor nursery protection. Wrong choice of species, soil workings poor protection etc, also cannot be ruled out for such failures. Fires also have important role to play in wiping out some very successful chil plantations.

Eucalyptus planted on shallow soil is struggling where as it is doing very well on deep soil as in R-I Pattern and the felling being very heavy in comparison with prescriptions, irreparable loss has been caused to reserved forests so far as biodiversity is concerned. Main casualty had been o fodder species primarily *Annogeissos latifolia* (Dhau), which as diminished greatly. It is owing to very heavy lopping pressure on such species, local people resorting to lopping of first year coppice shoots itself. Fodder broad leaved species which give vigorous coppice shoots are lopped in the first year itself. Non-carrying out of tending operations has further added to the dimensions of the problem. Unfortunately, such operations including non-singling of coppice shoots also resulted in the failure of the areas. However, over all conditions of Shisham and leucine planted alongwith chil and khair is satisfactory.

THE KHAIR OVER- LAPPING WORKING CIRCLE: This circle over lapped with all other working circles, except the areas to be brought under plantation during the currency of the expiring working plan. The special objects of management were to harvest mature and over mature stocks of khair and to increase the proportion of khair in suitable localities by natural and artificial means. The growing stock was enumerated over 10% area by taking random samples down to 10 cm dbh in 5 cm diameter classes.

The silvicultural system prescribed was selection system and the exploitation size of khair was fixed at 25 cm dbh. All khair trees 15 cm dbh and above were also to be felled depending upon their silvicultural availability. Silvicultural availability was defined as those trees of dbh 15 cm to 25 cm dbh when situated within five meters of another similar

tree without creating permanent blanks; Felling cycle of 15 years was adopted. The annual yield was prescribed at 5000 trees. Definite sequence of felling was provided for entire 30371 hact. Of area under this working circle. Two felling series were formed i.e. legal (3599.99 ha) comprising reserve, and delimited protected forests and voluntary (26772.05 ha) comprising undelimited protected and unclassed forests.

RESULT OF WORKING : On the whole, the prescriptions of this circle have worked well. The Khair exploited during different years has coppiced well except in case of rotten or over mature trees.

Large scale afforestation works have been carried out in the past years in Nurpur Forest Division. These activities have not remained confined to plantation working circle but embrace all other working circles. In fact, most of these have been taken up in those areas of plantation working circle which was not to be planted during the currency of working plan. About 20000 ha. of area has been taken up for afforestation during the currency of the expired working plan. It is a massive afforestation Programme implemented in any single division of Himachal Pradesh. The present status of these plantations' has been given in appendix.

Cooperative Society Forests: The cooperative Society Forests were managed by individual working plan Scheme for each Society Forest in the past, The details of which is as under:

FORESTS OF THE CO-OPERATIVE FORESTS SOCIETIES

1.	2.	3.	4.
1.	Basa Harialan	Sunder Singh (1.4.41 to 31.5.51)	E.S. Dass (1.4.51 to 31.3.81)
2.	Bhagnara	Jogdhian (1.4.45 to 31.3.60)	Agea Ran (1.4.60 to 31.3.75)
3.	Ghain Lagore	Arjun Singh (1.4.45 to 31.3.60)	Agea Ram (1.4.60 to 31.3.74)
4.	Jachh	Jogdhian (1.4.45 to 31.3.60)	Agea Ran (1.4.60 to 31.3.75)
5.	Kulahan	Jogdhian (1.4.45 to 31.3.60)	Agea Ran (1.4.60 to 31.3.75)
6.	Lahru	Gurdas Mohan (1.4.43 to 31.3.58)	Agea Ran (1.4.58 to 31.3.75)
7.	Palohra	Gurdas Mohan (1.4.43 to 31.3.58)	Agea Ran (1.4.58 to 31.3.75)
8.	Suliali	Arjun Singh (1.4.43 to 31.3.58)	-
9.	Badala	JagdishChander (1.4.46 to 31.3.59)	-
10.	Badukhar	Gurdas Mohan (1.4.46 to 31.3.59)	-
11.	Bhaleta	Hari Singh (1.4.46 to 31.3.61)	Agea Ram (1.4.61 to 31.3.76)
12.	Bhatoli	JagdishChander (1.4.46 to 31.3.61)	Agea Ram (1.4.61 to 31.3.76)

13.	Chanour	Gurdas Mohan (1.4.49 to 31.3.59)	- -
14.	Deothi	Mazbul Ahmed (1.4.46 to 31.3.61)	- -
15.	Dhantol	Hari Singh (1.4.45 to 31.3.64)	Agea Ram (1.4.60 to 31.3.76)
16.	Golwan	Mohinder Singh (1.4.51 to 31.3.71)	- -
17.	Chandaran	Gurdas MohanVeda Parkash (1.4.42 to 31.3.57)	(1.4.57 to 31.3.72)
18.	Indora	Jogdhian (1.4.45 to 31.3.60)	Agea Ran (1.4.60 to 31.3.75)
19.	Indpur	Arjun Singh (1.4.42 to 31.3.52)	- -
20.	Lodhiwan	Jogdhan (1.4.42 to 31.3.52)	E.S.Dass (1.4.52 to 31.3.82)
21.	Paniala	Gurdas MohanRam (1.4.42 to 31.3.57)	VedaParkash (1.4.57 to 31.3.72)
22.	Rey	Jogdhian (1.4.44 to 31.3.59)	Agea Ran (1.4.59 to 31.3.74)
23.	Sanaur	Jogdhian (1.4.44 to 31.3.60)	Agea Ran (1.4.60 to 31.3.75)
24.	Sirit	Hari Singh (1.4.43 to 31.3.53)	E.D. Dass (1.4.53 to 31.3.68)
25.	Raja Khasa	Hari Singh (1.4.49 to 31.3.69)	- -
26.	Riali	Gurdass Mohan (1.4.49 to 31.3.69)	-

The essentials of the prescription of working plans were the closure against grazing. With few exceptions, the commonly recognized working circles were as under: -

- (i) The Chil Working Circle
- (ii) The Fuel and Fodder Working Circle.
- (iii) The Plantation Working Circle.
- (iv) The Protection Working Circle.

RAWAL'S INTEGRATED WORKING PLAN (1968-69 TO 1982-83): The working of forests under each working circle in respect of above 26 co-operative forest societies in this division are discussed below:-

CHIL WORKING CIRCLE: The total area of 511.47 ha. having almost pure chil forests was allotted to this circle. The system and principles of management generally were the same as in Nanak Chand's Working Plan discussed in para 59-60 except the yield was regulated by area and not by volume. A total area of 367 ha. (**PB I**=195.83 Ha, **PB II**=132.33 Ha, **PB IV** =38.84 ha) was prescribed for fellings, under the marking rules of the respective periodic blocks. The **PB I** areas were prescribed to be regenerated artificially with chil either by sowing or by planting. A sowing/planting Programme for **PB I** areas being already open enough was laid down. The prescriptions have generally been carried out and there is no significant deviation. These chil forests are in good shape and well

stocked. Most of the blanks have been planted up. There is definite improvement in growing stock.

THE FUEL AND FODDER, WORKING CIRCLE: An area of 1655.19 ha. of denuded or semi denuded scrub forest adjoining the habitation and mostly used as grazing grounds meeting the day-to-day requirement of fuel, fodder, wood for agriculture implements etc. was allotted to this circle, Preservation and protection of these forests consistent with meeting the above requirements was the object of management. No definite prescriptions were laid out. Rotational voluntary closure and national lopping practices were suggested to be enforced for which detailed lopping rules were laid down. The lopping rules and rotational could not be strictly enforced. The forests under this working circle have, therefore, deteriorated considerably.

THE COPPICE WITH STANDARD WORKING CIRCLE: Comparatively better type of miscellaneous broad leaved and scrub forests measuring 1118.70 ha. in extent were allotted to this working circle. The main object of management was protection and prescription consistent with meeting the demand of fuel and fodder. Detailed marking rules were prescribed. An area of 1117.73 ha. was prescribed for felling. In addition to coppice growth, sowing, planting of chil. Khair, Shisham eucalyptus and siris were recommended. The coupes whether felled or not, were to remain closed for grazing for a period of 15 years. But for few scattered plantations of khair, no sowing/planting of other species has been done. The results of working in this circle are therefore far from satisfactory.

THE BAMBOO WORKING CIRCLE:-This is of no practical significance as a negligible 17.40 ha. was included in this circle.

THE PLANTATION WORKING CIRCLE:-An area of 829.01 ha. with deep fertile soil having only useless shrubs or blank was allotted to this working circle with the object of restocking it with valuable and economic tree species. This was to be achieved by clear felling the shrubs and other useless bushes and planting mainly chil, khair, mango, Shisham, and Albizia and bamboos were also suggested to be raised on suitable sites. An area of 531 ha was prescribed for planting which has been planted. The old plantations were maintained and protected as suggested. The results of working in this circle can be termed as satisfactory.

THE PROTECTION WORKING CIRCLE:-The forests situated on difficult and precipitous ground are steadily deteriorating due to continuous grazing, were allotted to this working circle. The area under this circle in this division was 3687.05 ha. The main object of management was to protect these forests from denudation and erosion. No felling except to meet the demand of right holders, were to be done, planting of chil and khair was proposed over an area of about 948.40 ha. Against this an area of 950 ha. has been planted mainly with Khair & other B/L Species. Some soil conservation measures i.e. construction of small check dams and gully plugging were also suggested to be done as and when renewed. All areas under this working circle were prescribed to remain closed to grazing for 15 years, which has hardly been enforced except the areas under plantation.

CONTROL AND RECORDS:- The maintenance of the co-operative forests societies, history files is very poor. No entries in respect of removals, cultural operations, maintenance of boundary pillar etc. are available in history files. Even the usual prescribed forms are

lacking. The maintenance of boundary pillars had been very adversely commented upon and it had been observed that in good many case the boundary pillars had fallen out of repairs and in some others, they are altogether missing. With a view to improve the situation the W.P.O. had prescribed inspection and repairs of the boundaries and laid down a definite Programme. Nothing seems to have been done in this respect.

Encroachments in society Forests especially where allotments have been made are very common and there seems to be lack of sincere will to check and improve the situation.

The chil forests have generally been protected from fires, which is evident from the presence of good pole crop almost in each society forests. The conditions of these forests are, on the whole, quite satisfactory.

J.C. KATOCH'S WORKING PLAN (2012-13 TO 2021-22)

Consistent with the mandate of National Forest Policy, 1988 and silvicultural considerations; the general objects of management of Forests under the plan were as under:-

1. To ensure continued provision of specific product of services from Forests to the public without doing any harm to the eco balance.
2. To maintain environmental stability by conserving national heritage of biologically diverse floral and formal resources.
3. To check soil erosion and denudation in the catchment area of rivulets draining into the reservoirs.
4. To enhance the Forest cover and productivity of the Forest through the application of scientific and technical inputs.
5. To endeavor for attaining normalcy of the forests by supplementing natural process with artificial techniques.
6. To intensively need based Forestry Programme with special emphasis on augmenting fuelwood, fodder production.
7. To generate motivational campaign in the public for conserving and increasing the Forest Wealth through Joint Forest Management.
8. To take effective Measures for safeguarding against encroachments in Forest land
9. To evolve management techniques such a way as to take special case of the needs of Wild Life Conservation.
10. Consistent with above to provide for optimum sustained flow of services from the forest in perpetuity.

Keeping in view the treatment essential for different species as per their silvicultural characteristics the overall physiographic condition and objects of management the Nurpur Forest Division was allotted to six working circles namely Chil working circle, bamboo working circle, Coppice working circle, Plantation Working circle, Protection working circle and Khair (Overlapping) working circle; out of which four important one is discussed as follows:

CHIL WORKING CIRCLE: All the forest, where chil is found either pure or in fair proportion and having potential to grow it, and where ground conditions are suitable to the application of concentrated regeneration fellings, are grouped in Shelterwood Working Circle. This working circle is more or less same as chil shelterwood Working Circle of Nanak Chand's Plan, except that a few better stocked chil forests of Kotla Forest Range which have been allotted to Plantation Working Circle in the expired Plan, have been included. Besides the co-operative society forests allotted to Chil Working Circle of Rewal's Working Plan, were added to this circle. The total area of the Working Circle is 10814.17 ha.

BLOCK AND COMPARTMENTS

The boundaries of forest blocks and compartments remain the same as in the previous plan.

FELLING SERIES

Keeping in view the legal status of forests with regard to closures and their control for management, three felling series have been constituted as under:

- I) **Legal felling series:-** All the reserved and demarcated protected forests have been allotted to legal felling series.
- II) **Voluntary felling series:-** All the undemarcated and unclassified forests have been allotted to voluntary felling series.
- III) **Cooperative Forest Society Felling Series:-** This includes the forests under the control of the defunct co-operative forests societies.

STATEMENT SHOWING THE DISTRIBUTION OF AREA TO CHIL SHELTER WOOD					
LEGAL FELLING SERIES					
Name of Range					
	PB-I	PB-II	PB-III	PB-IV	Total
Nurpur	524.83	476.27	159.03	377.50	1537.63
Kotla	363.77	343.96	56.64	180.05	944.42
Jawali	121.78	93.47	152.93	193.42	561.60
Rey	-	37.23	51.78	60.29	149.30
Indora	55.84	33.18	42.50	0	131.52
Total:-	1066.22	984.11	462.88	811.26	3324.47
VOLUNTARY FELLING SERIES					
Name of Range	PB-I		PB - UNALLOTTED	Total	
Nurpur	540.17		1016.85	1557.02	
Kotla	711.35		1272.01	1983.36	
Jawali	427.30		1287.28	1714.58	
Rey	339.48		1281.05	1620.53	
Indora	22.26		14.16	36.42	
Total:-	2198.61		4713.30	6911.91	
CFs FELLING SERIES					

Range	PB-I	PB-II	PB-III	PB-IV	Total
Nurpur	72.09	59.01	83.78	38.84	253.72
Kotla	-	-	-	-	-
Jawali	118.95	-	-	-	118.95
Rey	50.17	14.57	59.06	-	123.8
Indora	40.05	24.28	16.99	-	81.32
Total:-	281.26	97.86	159.83	38.84	577.79

GROWING STOCK:

The following table indicated comparative position of the existing growing stock, the normal growing (as per yield figures corresponding to the crop age) and growing stock at the beginning of the plan under revision.

PERIODIC	EXISTING GROWING STOCK		Normal	GROWING STOCK AT THE BEGINNING OF PLAN
BLOCK	No. of stumps per Ha.	Vol.in cum/ Ha.	G.S.Ha. in cum	
(I) LEGAL FELLING SERIES				
I	48	38.02	234	56.22
II	53	45.03	195	63.63
III	23	23.49	169	90.40
IV	30	23.47	86	84.40
Average	39	32.5	171.75 cum.	73.66 cum.

PERIODIC	EXISTING GROWING STOCK		Normal	GROWING STOCK AT
BLOCK	No. of stumps per Ha.	Vol.in cum/ Ha.	G.S.Ha. in cum	THE BEGINNING OF PLAN
(II) VOLUNTARY FELLING SERIES				
I	61	25.17	234	41.98
Un-alloted	42	25.21	118	47.40
Average	52	25.19 cum.	176 cum.	44.69 cum
(III) CO-OPERATIVE SOCIETY FELLING SERIES				
I	14	19.73	234	60.49
II	55	47.00	198	82.93
III	24	23.61	169	53.37
IV	32	39.69	86	24.02
Average	31	32.51 cum.	171.75cum.	55.20 cum

The growing stock of forests **PB** wise is as under:-

- i) **PB-I** 97459.27 cum.
- ii) **PB-II** 4 8945.79 cum.
- iii) **PB-III** 14648.23 cum.
- iv) **PB-IV** 20581.19 cum.
- v) **PB-unallotted** 118816.54 cum.

FELLING SERIES

Sr.No.	Year of	Name of	Felling	Name of Forest	Comptt.	Area in
	Felling	Range	Series			ha.
1	2013.14	Nurpur	Legal	R 1 N Total	C- 2b	46.53
				P.39 N Ther Kuther	C- 1d	15.38
				P.39 N Ther Kuther	C- 4b	7.69
				P.39 N Ther Kuther	C- 4c	4.45
					Total:-	74.05
			Voluntary	UP.6. Ladori	C-5	48.55
					Total:-	48.55
			CFS Felling	CFS Gahin Lagore	R-3	12.95
			Series		Total:-	12.95
		Kotla	Legal	R 15 N Bhali	C-1d	36.42
					Total:-	36.42
			Voluntary	UP.54 Bar	C-1	38.45
				U.55 Bhali	C-8	78.90
					Total:-	117.35
		Jawali	Legal	-	-	-
			Voluntary	U.13 Junat	C-1	45.32
					Total:-	45.32
			CFS Felling	-	-	-
			Series			
			Legal	-	-	-
		Rey	Voluntary	-	-	-
			CFS Felling	CFS Rey	U-19	23.88
			Series			
					Total:-	23.88
			Indora	-	-	-
				G. Total of Legal Felling		110.47
				G. Total of Vol. felling		211.22
				G. Total CFS Felling Series	36.83	
Sr.No.	Year of	Name of	Felling	Name of Forest	Comptt.	Area in

	Felling	Range	Series			ha.
2	2014-15	Nurpur	Legal	P. 42 N Ladori	C-2b	13.76
				P. 40 N Manuha-Ki- Dhar	C-1c	14.16
					Total:-	27.92
			Voluntary	-	-	-
			CFS Felling	CFS Gahin Lagore	U-9	22.66
			Series		Total:-	22.66
		Kotla	Legal	P. 3 N. Balira	C-2c	25.88
					Total:-	25.88
			Voluntary	U.50 Kothi Banda	C-8	35.61
				U.50 Kothi Banda	C-10	56.24
					Total:-	91.85
			CFS Felling	-	-	-
			Series			
		Jawali	Legal	P 6 N Harsar Nana	C- 2b	48.56
					Total:-	48.56
			Voluntary	U-13 Junat	C-22	18.21
					Total:-	18.21
			CFS Felling	-	-	-
			Series			
		Rey	Legal	-	-	-
			Voluntary	-	-	-
			CFS Felling	CFS Rey	U-6	5.66
			Series		U-10	5.66
					Total:-	11.32
		Indora	Legal	-	-	-
			Voluntary	-	-	-
			CFS Felling	-	-	-
			Series			
				G. Total of Legal Felling		102.36
				G. Total of Voluntary Felling	110.06	
				G. Total CFS Felling Series	33.98	
				G. Total of 2014-15		246.40
Sr.No.	Year of	Name of	Felling	Name of Forest	Comptt.	Area in

	felling	Range	Series			ha.
3	2015-16	Nurpur	Legal	P. 43 N. Chhotidhar	C-6a	9.70
					Total:-	9.70
			Voluntary	-	-	-
			CFS Felling	-	-	-
			Series			
		Kotla	Legal	P .46 N. Bar	C-3	13.76
				P. 47 N. Anuhi	C-2	26.70
					Total:-	40.46
			Voluntary	U.50 Kothi Banda	C-24	43.39
					C-13	37.23
					Total:-	80.62
			CFS Felling	-	-	-
			Series			
		Jawali	Legal	P 6 N Harsar Nana	C-1b	23.96
					Total:-	23.96
			Voluntary	UP.146 Fatehpur	C-18	32.72
					Total:-	32.72
			CFS Felling	-	-	-
			Series	-	-	-
		Rey	Legal	-	-	-
			Voluntary	U-25 Anoh	C-4	40.46
					Total:-	40.46
			CFS Felling	CFS Rey	U-29	4.45
			Series		U-11	2.83
					Total:-	7.28
		Indora	Legal	-	-	-
			Voluntary	-	-	-
			CFS Felling	CFS Lodhwan	P-28	20.23
			Series		Total:-	20.23
				G. Total of Legal Felling		74.12
				G. Total of Voluntary Felling	153.80	
				G. Total CFS Felling Series	27.51	
				G. Total of 2015-16		255.43
Sr.No.	Year of felling	Name of Range	Felling Series	Name of Forest	Comptt.	Area in ha.

4	2016-17	Nurpur	Legal	P 34 N Aund	C-3	16.59
					Total:-	16.59
			Voluntary	-	-	-
			CFS Felling	-	-	-
			Series			
		Kotla	Legal	P 47 N Anuhi	C-3	14.57
					Total:-	14.57
			Voluntary	U-55 Bhali	C-16	12.94
					Total:-	12.94
			CFS Felling	-	-	-
			Series			
		Jawali	Legal	-	-	-
			Voluntary	U-13 Junat	C-25	61.50
					Total:-	61.50
			CFS Felling	CFS Lahroo	U-5	6.88
			Series		Total:-	6.88
		Rey	Legal	-	-	-
			Voluntary	-	-	-
			CFS Felling	CFS Rey	U-43	7.69
			Series		Total:-	7.69
		Indora	Legal	-	-	-
			Voluntary	-	-	-
			CFS Felling	CFS Lodhwan	P-15	19.82
			Series		Total:-	19.82
				G. Total of Legal Felling		31.16
				G. Total of Voluntary Felling	74.44	
				G. Total CFS Felling Series	34.39	
				G. Total of 2016-17	139.99	
Sr.No.	Year of felling	Name of Range	Felling Series	Name of Forest	Comptt.	Area in ha.
5	2017-18	Nurpur	Legal	R 2 N Meh Dhar	C 1b	52.20
				P 43 N Chhotidhar	C 3	11.33
					Total:-	63.53
			Voluntary	-	-	-
			CFS Felling	-	-	-
			Series			
		Kotla	Legal	R 15 N Bhali	C 2a	42.48
					Total:-	42.48
			Voluntary	UP.52 Soldha	C-17	32.78

				UP.52 Soldha	C-6	38.48
					Total:-	71.26
			CFS Felling Series	-	-	-
		Jawali	Legal	P. 7 N. Fatehpur	C-3b	18.20
					Total:-	18.20
			Voluntary	UP.104 Nana	C-3	22.26
				-	Total:-	22.26
			CFS Felling Series	CFS Lahroo	U-26	5.26
					Total:-	5.26
		Rey	Legal	-	-	-
			Voluntary	-	-	-
			CFS Felling Series	-	-	-
		Indora	Legal	-	-	-
			Voluntary	-	-	-
			CFS Felling Series	-	-	-
				G. Total of Legal Felling		124.21
				G. Total of Voluntary Felling	93.52	
				G. Total CFS Felling Series	5.26	
				G. Total of 2017-18	222.99	
Sr.No.	Year of felling	Name of Range	Felling Series	Name of Forest	Comptt.	Area in ha.
6	2018-19	Nurpur	Legal	P-39- N Ther Kuthar	C-2c	14.57
					Total:-	14.57
		Kotla	Legal	P-4-N Kaldun	C-1a	24.69
					Total:-	24.69
				P-47-N Anuhi	C-4	25.50
					Total:-	25.50
			Voluntary	U-54 Bhali	C-22	5.66
					Total:-	5.66
		Rey	CFS	CFS Kulahri	U-5	4.05
					Total:-	4.05
				G. Total of Legal Felling		64.76
				G. Total of Voluntary Felling	5.66	

				G. Total CFS Felling Series	4.05	
				G. Total of 2018- 19	74.47	
7	2019-20	Nurpur	Legal	P-40-N Manua- Di-Dhar	C-1b	10.52
					Total:-	10.52
		Kotla	Voluntary	U-52 Soldha	C-1a	61.50
					Total:-	61.50
				G. Total of Legal Felling		10.52
				G. Total of Voluntary Felling	61.50	
				G. Total CFS Felling Series	0.00	
				G. Total of 2019- 20	72.02	
8	2020-21	Nurpur	Legal	P-36 -N BassaFarkunda	C-2a	3.24
					Total:-	3.24
				G. Total of Legal Felling		3.24
				G. Total of Voluntary Felling	0.00	
				G. Total CFS Felling Series	0.00	
				G. Total of 2020- 21	3.24	
9	2021-22	Nupur	Legal	P-42-N Ladori	C-4	25.90
					Total:-	25.90
				G. Total of Legal Felling		25.90
				G. Total of Voluntary Felling	0.00	
Sr.No.	Year of felling	Name of Range	Felling Series	Name of Forest	Comptt.	Area in ha.
10	2022-23	Kotla	Legal	U-55 Bhali	C-21	32.37
					Total:-	32.37
				G. Total of Legal Felling		32.37

				G. Total of Voluntary Felling	0.00	
				G. Total CFS Felling Series	0.00	
				G. Total of 2022-23	32.37	
				Gran Total Type A :-		1430.40

Sr.No.	Year of Felling	Name of Range	Felling Series	Name of Forest	Comptt.	Area in ha.
1	2013.14	Nurpur	Legal	R 1 N Tatal	C- 2b	46.53
				P.39 N Ther Kuther	C- 1d	15.38
				P.39 N Ther Kuther	C- 4b	7.69
				P.39 N Ther Kuther	C- 4c	4.45
					Total:-	74.05
			Voluntary	UP.6. Ladori	C-5	48.55
					Total:-	48.55
			CFS Felling Series	CFS Gahin Lagore	R-3	12.95
					Total:-	12.95
		Kotla	Legal	R 15 N Bhali	C-1d	36.42
					Total:-	36.42
			Voluntary	UP.54 Bar	C-1	38.45
				U.55 Bhali	C-8	78.90
					Total:-	117.35
		Jawali	Legal	-	-	-
			Voluntary	U.13 Junat	C-1	45.32
					Total:-	45.32
			CFS Felling Series	-	-	-
			Legal	-	-	-
		Rey	Voluntary	-	-	-
			CFS Felling Series	CFS Rey	U-19	23.88
					Total:-	23.88
			Indora	-	-	-
				G. Total of Legal Felling		110.47

				G. Total of Vol. felling		211.22
				G. Total CFS Felling Series	36.83	
				G. Total of 2013-14	358.52	
Sr.No.	Year of Felling	Name of Range	Felling Series	Name of Forest	Comptt.	Area in ha.
2	2014-15	Nurpur	Legal	P. 42 N Ladori	C-2b	13.76
				P. 40 N Manuha-Ki- Dhar	C-1c	14.16
					Total:-	27.92
			Voluntary	-	-	-
			CFS Felling Series	CFS Gahin Lagore	U-9	22.66
					Total:-	22.66
		Kotla	Legal	P. 3 N. Balira	C-2c	25.88
					Total:-	25.88
			Voluntary	U.50 Kothi Banda	C-8	35.61
				U.50 Kothi Banda	C-10	56.24
					Total:-	91.85
			CFS Felling Series	-	-	-
		Jawali	Legal	P 6 N Harsar Nana	C- 2b	48.56
					Total:-	48.56
			Voluntary	U-13 Junat	C-22	18.21
					Total:-	18.21
			CFS Felling Series	-	-	-
		Rey	Legal	-	-	-
			Voluntary	-	-	-
			CFS Felling Series	CFS Rey	U-6	5.66
					U-10	5.66
					Total:-	11.32
		Indora	Legal	-	-	-
			Voluntary	-	-	-
			CFS Felling Series	-	-	-
				G. Total of Legal Felling		102.36
				G. Total of Voluntary Felling	110.06	

				G. Total CFS Felling Series	33.98	
				G. Total of 2014-15		246.40
Sr.No.	Year of felling	Name of Range	Felling Series	Name of Forest	Comptt.	Area in ha.
3	2015-16	Nurpur	Legal	P. 43 N. Chhotidhar	C-6a	9.70
					Total:-	9.70
			Voluntary	-	-	-
			CFS Felling Series	-	-	-
		Kotla	Legal	P .46 N. Bar	C-3	13.76
				P. 47 N. Anuhi	C-2	26.70
					Total:-	40.46
			Voluntary	U.50 Kothi Banda	C-24	43.39
					C-13	37.23
					Total:-	80.62
			CFS Felling Series	-	-	-
		Jawali	Legal	P 6 N Harsar Nana	C-1b	23.96
					Total:-	23.96
			Voluntary	UP.146 Fatehpur	C-18	32.72
					Total:-	32.72
			CFS Felling Series	-	-	-
				-	-	-
		Rey	Legal	-	-	-
			Voluntary	U-25 Anoh	C-4	40.46
					Total:-	40.46
			CFS Felling Series	CFS Rey	U-29	4.45
					U-11	2.83
					Total:-	7.28
		Indora	Legal	-	-	-
			Voluntary	-	-	-
			CFS Felling Series	CFS Lodhwan	P-28	20.23
					Total:-	20.23
				G. Total of Legal Felling		74.12
				G. Total of Voluntary Felling	153.80	
				G. Total CFS Felling Series	27.51	

				G. Total of 2015-16		255.43
Sr.No.	Year of felling	Name of Range	Felling Series	Name of Forest	Comptt.	Area in ha.
4	2016-17	Nurpur	Legal	P 34 N Aund	C-3	16.59
					Total:-	16.59
			Voluntary	-	-	-
			CFS Felling Series	-	-	-
		Kotla	Legal	P 47 N Anuhi	C-3	14.57
					Total:-	14.57
			Voluntary	U-55 Bhali	C-16	12.94
					Total:-	12.94
			CFS Felling Series	-	-	-
		Jawali	Legal	-	-	-
			Voluntary	U-13 Junat	C-25	61.50
					Total:-	61.50
			CFS Felling Series	CFS Lahroo	U-5	6.88
					Total:-	6.88
		Rey	Legal	-	-	-
			Voluntary	-	-	-
			CFS Felling Series	CFS Rey	U-43	7.69
					Total:-	7.69
		Indora	Legal	-	-	-
			Voluntary	-	-	-
			CFS Felling Series	CFS Lodhwan	P-15	19.82
					Total:-	19.82
				G. Total of Legal Felling		31.16
				G. Total of Voluntary Felling	74.44	
				G. Total CFS Felling Series	34.39	
				G. Total of 2016-17	139.99	
Sr.No.	Year of felling	Name of Range	Felling Series	Name of Forest	Comptt.	Area in ha.
5	2017-18	Nurpur	Legal	R 2 N Meh Dhar	C 1b	52.20
				P 43 N Chhotidhar	C 3	11.33
					Total:-	63.53
			Voluntary	-	-	-
			CFS Felling	-	-	-

			Series			
		Kotla	Legal	R 15 N Bhali	C 2a	42.48
					Total:-	42.48
			Voluntary	UP.52 Soldha	C-17	32.78
				UP.52 Soldha	C-6	38.48
					Total:-	71.26
			CFS Felling	-	-	-
			Series			
		Jawali	Legal	P. 7 N. Fatehpur	C-3b	18.20
					Total:-	18.20
			Voluntary	UP.104 Nana	C-3	22.26
				-	Total:-	22.26
			CFS Felling	CFS Lahroo	U-26	5.26
			Series		Total:-	5.26
		Rey	Legal	-	-	-
			Voluntary	-	-	-
			CFS Felling	-	-	-
			Series			
		Indora	Legal	-	-	-
			Voluntary	-	-	-
			CFS Felling	-	-	-
			Series			
				G. Total of Legal Felling		124.21
				G. Total of Voluntary Felling	93.52	
				G. Total CFS Felling Series	5.26	
				G. Total of 2017-18	222.99	
Sr.No.	Year of felling	Name of Range	Felling Series	Name of Forest	Comptt.	Area in ha.
6	2018-19	Nurpur	Legal	P-39- N Ther Kuther	C-2c	14.57
					Total:-	14.57
		Kotla	Legal	P-4-N Kaldun	C-1a	24.69
					Total:-	24.69
				P-47-N Anuhi	C-4	25.50
					Total:-	25.50
			Voluntary	U-54 Bhali	C-22	5.66
					Total:-	5.66
		Rey	CFS	CFS Kulahri	U-5	4.05
					Total:-	4.05
				G. Total of Legal Felling		64.76

				G. Total of Voluntary Felling	5.66	
				G. Total CFS Felling Series	4.05	
				G. Total of 2018-19	74.47	
7	2019-20	Nurpur	Legal	P-40-N Manua-Di-Dhar	C-1b	10.52
					Total:-	10.52
		Kotla	Voluntary	U-52 Soldha	C-1a	61.50
					Total:-	61.50
				G. Total of Legal Felling		10.52
				G. Total of Voluntary Felling	61.50	
				G. Total CFS Felling Series	0.00	
				G. Total of 2019-20	72.02	
8	2020-21	Nurpur	Legal	P-36 -N BassaFarkunda	C-2a	3.24
					Total:-	3.24
				G. Total of Legal Felling		3.24
				G. Total of Voluntary Felling	0.00	
				G. Total CFS Felling Series	0.00	
				G. Total of 2020-21	3.24	
9	2021-22	Nupur	Legal	P-42-N Ladori	C-4	25.90
					Total:-	25.90
				G. Total of Legal Felling		25.90
				G. Total of Voluntary Felling	0.00	
				G. Total CFS Felling Series	0.00	
				G. Total of 2021-22	25.90	
Sr.No.	Year of	Name of	Felling	Name of Forest	Comptt.	Area in

	felling	Range	Series			ha.
10	2022-23	Kotla	Legal	U-55 Bhali	C-21	32.37
					Total:-	32.37
				G. Total of Legal Felling		32.37
				G. Total of Voluntary Felling	0.00	
				G. Total CFS Felling Series	0.00	
				G. Total of 2022-23	32.37	
				Gran Total Type A:-		1430.40

TABLE OF PLANTING		
2013-14		
1	UP.146 Fatehpur	20.00 ha.
2	UP.15 Dhameta U-7	8.00 ha.
3	UP.13 Anuhi C-5	11.00 ha.
4	P.39.N Ther Kuther C-3c(P)	5.00 ha.
5	UP.93 Chuttar C-1	77.69 ha.
6	CFS Lahru U-14	4.85 ha.
7	UP.84 Dole C-20	32.37 ha.
8	UP.6a Ladori C-3	49.00 ha.
9	R.1.N. Tattal C-1b	39.66 ha.
10	P.9.N. Gharoli C-3	11.74 ha.
2014-15		
1	R.1.N. Tattal C-2c	40.52 ha.
2	UP.129 Dini C-5	10.00 ha.
3	UP.6 Danni C-7	23.06 ha.
4	UP-68 Ladori C-13	52.60 ha.
5	R.1.N. Tattal C-2c	40.00 ha.
6	UP-68 Ladori C-3	20.00 ha.
7	U.50 Kothi Banda C-21 & C-3	36.61 ha.
8	UP.84 Dole C-21	40.46 ha.
	Total:-	262.25 ha.
2015-16		
1	P.39.N. Ther Kuther C-3c	10.00 ha.
2	UP9 Aund C-4	42.08 ha.
3	UP-146 Fatehpur C-6	43.30 ha.
4	P-12.N.Tung Bari Sar C2	39.25 ha.
5	R.1.N. Tattal C-3b	60.70 ha.
6	P.44 Kot Hatli	12.95 ha.
7	U.52 Soldha C-10	27.52 ha.
8	UP.104 Nana C-20	20.00 ha.
	Total:-	265.80 ha.

2016-17		
1	UP.6a Ladori C-3	20.01 ha.
2	UP.51 AnuhiC-9	18.21 ha
3	U.40 Katrah C-6	27.46 ha.
4	R.4.N.Batuhi C-1	32.60 ha.
5	CFS Lahru U-13	19.42 ha.
6	UP.18 KotPalahri C-10	9.30 ha
7	UP.9. Aund C-11	21.85 ha.
8	P.40.N.Manuha-Ki-Dhar C-2d	15.78 ha.
9	UP.104.Nana C-2c	15.78 ha.
10	U.40 Katrah C-6	30.00 ha.
11	UP.115Bheri C-6	22.26 ha.
12	UP.129 Dini C-5	19.36 ha.
	Total:-	251.83 ha.
2017-18		
1	U.50 Kothi Banda C-4	32.37 ha.
2	UP.129 Dini C-5	20.00 ha.
3	UP.104 Nana C-20	15.00 ha.
4	UP.53 Sihuni C-5	6.19 ha.
5	UP.145 Hatli C-12	34.80 ha.
6	P.13.N Salakhar C-2	16.59 ha.
7	UP.10 Sadwan C-4	21.85 ha.
8	U.49 Minjgran C-3	26.20 ha.
9	U.15 Dhameta C-7	23.79 ha.
10	UP.146 Fatehpur C-13	29.77 ha.
11	CFS Gahin Lagore U-31	19.81 ha.
	Total:-	246.49 ha.
2018-19		
1	R.4.N.Batuhi C-1	20.00 ha.
2	R.28.D Nunet C-3	20.22 ha.
3	P.39.N Ther Kuther C-3c	10.09 ha.
4	UP.12 Milk C-1	17.40 ha.
5	U.13.N.Junet C-3	32.60 ha.
6	R.15.N. Bhali C-2b	24.52 ha.
	Total:-	124.83 ha.
2019-20		
1	CFS Suliali U-1	7.29 ha.
2	UP.12. Milk C-4	27.92 ha.
3	UP.79 Ambal C-17b	26.53 ha.
4	UP.130 Bhagroli C-1a	26.30 ha.
5	U-15 Dhameta C-7	20.00 ha.
6	R.13.N. Soldha C-2	24.65 ha.
	Total:-	134.69 ha.
2020-21		
1	U.26 Barla C-7	30.00 ha.
2	UP.12 Milk C-5	12.14 ha.
3	UP.16 Kopra C-1	23.07 ha.
4	U-13 Junet C-8	20.00 ha.

5	CFS Suliali U-15	5.26 ha.
6	R.8.N. Chharil C-1a	16.19 ha.
7	R.15.N. Bhali C-2a	20.00 ha.
	Total:-	126.40 ha.
2021-22		
1	UP.18 KotPalahri C-7	21.85 ha.
2	UP.79 Ambal C-17b	20.00 ha.
3	UP.26 Barla C-7	22.60 ha.
4	.20.Punder C-2	31.69 ha.
5	CFS Lahru P-18	14.57 ha.
6	CFS Lahru P-17	9.31 ha.
	Total:-	119.72 ha.
2022-23		
1	U.20 Punder C-2	20.00 ha.
2	CFS Lahru U-24	11.73 ha.
3	CFS Palaura P-9	36.93 ha.
4	C.13 N Soldha C-2	30.00 ha,
5	R.16.N.Bindra Ban C-2	12.95 ha.
6	P.40.N. Manuha Ki DharC-2c	14.97 ha.
	Total:-	125.58 ha.
	Grand Total Type B:-	1917.16 ha.

TABLE OF PLANTING		
2013-14		
1	UP.146 Fatehpur	20.00 ha.
2	UP.15 Dhameta U-7	8.00 ha.
3	UP.13 Anuhi C-5	11.00 ha.
4	P.39.N Ther Kuther C-3c(P)	5.00 ha.
5	UP.93 Chuttar C-1	77.69 ha.
6	CFS Lahru U-14	4.85 ha.
7	UP.84 Dole C-20	32.37 ha.
8	UP.6a Ladori C-3	49.00 ha.
9	R.1.N. Tattal C-1b	39.66 ha.
10	P.9.N. Gharoli C-3	11.74 ha.
		258.31 ha.
2014-15		
1	R.1.N. Tattal C-2c	40.52 ha.
2	UP.129 Dini C-5	10.00 ha.
3	UP.6 Danni C-7	23.06 ha.
4	UP-68 Ladori C-13	52.60 ha.
5	R.1.N. Tattal C-2c	40.00 ha.
6	UP-68 Ladori C-3	20.00 ha.
7	U.50 Kothi Banda C-21 & C-3	36.61 ha.
8	UP.84 Dole C-21	40.46 ha.
	Total:-	262.25 ha.
2015-16		
1	P.39.N. Ther Kuther C-3c	10.00 ha.

2	UP9 Aund C-4	42.08 ha.
3	UP-146 Fatehpur C-6	43.30 ha.
4	P-12.N.Tung Bari Sar C2	39.25 ha.
5	R.1.N. Tattal C-3b	60.70 ha.
6	P.44 Kot Hatli	12.95 ha.
7	U.52 Soldha C-10	27.52 ha.
8	UP.104 Nana C-20	20.00 ha.
	Total:-	265.80 ha.
2016-17		
1	UP.6a Ladori C-3	20.01 ha.
2	UP.51 AnuhiC-9	18.21 ha.
3	U.40 Katrah C-6	27.46 ha.
4	R.4.N.Batuhi C-1	32.60 ha.
5	CFS Lahru U-13	19.42 ha.
6	UP.18 KotPalahri C-10	9.30 ha.
7	UP.9. Aund C-11	21.85 ha.
8	P.40.N.Manuha-Ki-Dhar C-2d	15.78 ha.
9	UP.104.Nana C-2c	15.78 ha.
10	U.40 Katrah C-6	30.00 ha.
11	UP.115Bheri C-6	22.26 ha.
12	UP.129 Dini C-5	19.36 ha.
	Total:-	251.83 ha.
2017-18		
1	U.50 Kothi Banda C-4	32.37 ha.
2	UP.129 Dini C-5	20.00 ha.
3	UP.104 Nana C-20	15.00 ha.
4	UP.53 Sihuni C-5	6.19 ha.
5	UP.145 Hatli C-12	34.80 ha.
6	P.13.N Salakhar C-2	16.59 ha.
7	UP.10 Sadwan C-4	21.85 ha.
8	U.49 Minjgran C-3	26.20 ha.
9	U.15 Dhameta C-7	23.79 ha.
10	UP.146 Fatehpur C-13	29.77 ha.
11	CFS Gahin Lagore U-31	19.81 ha.
	Total:-	246.49 ha.
2018-19		
1	R.4.N.Batuhi C-1	20.00 ha.
2	R.28.D Nunet C-3	20.22 ha.
3	P.39.N Ther Kuther C-3c	10.09 ha.
4	UP.12 Milk C-1	17.40 ha.
5	U.13.N.Junet C-3	32.60 ha.
6	R.15.N. Bhali C-2b	24.52 ha.
	Total:-	124.83 ha.
2019-20		
1	CFS Suliali U-1	7.29 ha.
2	UP.12. Milk C-4	27.92 ha.
3	UP.79 Ambal C-17b	26.53 ha.
4	UP.130 Bhagroli C-1a	26.30 ha.

5	U-15 Dhameta C-7	20.00 ha.
6	R.13.N. Soldha C-2	24.65 ha.
	Total:-	134.69 ha.
2020-21		
1	U.26 Barla C-7	30.00 ha.
2	UP.12 Milkha C-5	12.14 ha.
3	UP.16 Kopra C-1	23.07 ha.
4	U-13 Junet C-8	20.00 ha.
5	CFS Suliali U-15	5.26 ha.
6	R.8.N. Chharil C-1a	16.19 ha.
7	R.15.N. Bhali C-2a	20.00 ha.
	Total:-	126.40 ha.
2021-22		
1	UP.18 KotPalahri C-7	21.85 ha.
2	UP.79 Ambal C-17b	20.00 ha.
3	UP.26 Barla C-7	22.60 ha.
4	.20.Punder C-2	31.69 ha.
5	CFS Lahru P-18	14.57 ha.
6	CFS Lahru P-17	9.31 ha.
	Total:-	119.72 ha.
2022-23		
1	U.20 Punder C-2	20.00 ha.
2	CFS Lahru U-24	11.73 ha.
3	CFS Palaura P-9	36.93 ha.
4	C.13 N Soldha C-2	30.00 ha.
5	R.16.N.Bindra Ban C-2	12.95 ha.
6	P.40.N. Manuha Ki DharC-2c	14.97 ha.
	Total:-	125.58 ha.
	Grand Total Type B:-	1917.16 ha.

**RESULTS OF CHIL WORKING CIRCLE:
YIELD CALCULATIONS:**

Sr. No	Felling Series	Total prescribed yield (m3)	Total removals till date	Deviation
	Legal	10800	6797.43	(-) 4002.57
	Voluntary	12000	6250.82	(-) 5749.18
	CFs	1200	270.49	(-) 929.51

It is clear from the above that there have been relatively less removals from all the **PB**'s of Legal, voluntary and legal felling series resulting into over mature forests of low significance. Absence of periodical thinning and other subsidiary silvicultural operations led these forests to be invaded by weeds like *Lantana camara*. Heavy forest fires also played a major role in deteriorating the overall quality of the chil forest especially to the forests allotted to **PB I** areas.

BAMBOO WORKING CIRCLE: The forests are in retrogression state and facing extinction. This has been the result of lack of observance of felling rules, heavy incidence

of grazing and hacking of fodder and fuel wood. The rainy season closures as prescribed for these areas were not honoured. Natural regeneration is almost absent owing to uncontrolled grazing. The bamboos are therefore not reproducing both form Rhizomes and seed except in some of the better stocked compartments of R.12.N. Damtal and CFS Sirit. All the areas allotted to this working circle except R.10.N Talara from which the bamboo has completely vanished, in R.C. Kang Plan, were retained in this working circle. In addition, areas of CFS Sirit allotted to Bamboo Working Circle. In R.D. Rawal's Plan had been allotted to this working circle. The details areas allotted by legal status range wise to this working circle are given below:

	Kind of Forest	Ranges (Area in ha.)		
		Nurpur	Indora	Total
Legal closure felling series	Reserved	97.12	148.10	245.22
Voluntary felling Series	Undemarcated	-	72.03	72.03
	Protected Forest			
		-		0
CFS Felling Series	Reserved		17.40	17.40
	Total:-	97.12	237.53	334.65

On the basis of ground conditions of the crop the area has been divided into two types:-

‘A’ Type: The areas bearing few scattered congested clumps, the bamboos therein being malformed and the ground is either occupies by scrub growth or is blank. The area under this type was 177.24 ha.

‘B’ Type: The areas bearing bamboos worth exploitation with miscellaneous broad-leaved species interspersing all over. The area under this type was 157.41 ha.

The details of areas under ‘A’ and ‘B’ types are as under:

Type	Type of Forest	Range/ Name of Forest (area in ha.)			
A'	Reserved	Nurpur		Indora	
		R.11.N Khanni		R.12.N. Damtal	
		C-1a	39.66	C-17	8.09
		C-2b	24.28		
		C-2f	33.18		
	Unclassed forest	-		UP.56.Damtal	
				C-2	29.14
				C-3	42.89
		Total:-	97.12		80.12 ha.
		G.Total:-			177.24 ha.
B'	Reserve	Nurpur		Indora	
			-	R.12.N. Damtal	

				C-3	7.28
				C-5	13.35
				C-9	8.90
				C-10	10.93
				C-11	12.95
				C-12	22.66
Type	Type of Forest	Range/ Name of Forest (area in ha.)			
B'	Reserved	Nurpur		Indora	
			-	R.12.N. Damtal	
				C-13	10.12
				C-14	15.78
				C-15	8.09
				C-16	7.28
				C-19	10.93
				C-20	11.74
		Total:-			140.01 ha.
	CFS Sirit			R-1	10.52
				R-2	6.88
		Total:-			17.40 ha.
		G.Total:-			157.41 ha.

Silvicultural System:

Selection system with thinning was supposed to be adopted. Cleanings where-ever required were supposed to be simultaneously carried out. The unit of treatment was an individual clump.

Rotation:

In bamboos rotation has reference to the individual culms and not the clump. The culm attains full height and thickness during the very first year of its growth and deterioration sets in about the fifth year. The life of the culm on an average is six years. The age at which bamboo is fit for felling varies from 3 to 5 years.

Felling Cycle:

Felling cycle of three years so as to allow ample time for the new 'manus' to develop and establish.

Method of Executing Felling:

Type 'B' Areas (Bamboo)

To ensure sustained productivity of the Rhizomes, removals should be restricted to net increment which is equal to the total number of new shoots (manus) produced in a year, minus the loss through decay, malformation and all other destructive agencies. Congested

clumps would be cleaned so that the production of ‘manus’ is not hampered. The following Rules must be observed in carrying out the fellings;

1. Felling will commence not earlier than 15th of November and shall be completed by 15th of March.
2. Cleanings and hygienic fellings comprising of removal of dead dry and malformed culms shall be simultaneously carried out.
3. Culms will be Cut using sharp tools to avoid splitting; above a node within 15 cms from the ground; but where support is needed for adjoining ‘manus’ the cut may higher.
4. No ‘manus’ (shoots of previous resins) or ‘chal’ (on the periphery of clump) shall be cut except when malformed and for the support of these are equal number of well grown live culms of 2 to 3 years evenly distributed over the clump will be retained.
5. No flowering culm or clump will be cut till the seed has been shed.
6. Digging of rhizomes not to be allowed.
7. cut portion of bamboo will not be left in the clump.
8. Broad-leaved trees suppressing bamboo clumps will invariably be removed.

In view of past experience of bamboo working through contractor’s agency as well as H.P. State Forest Development Corporation Ltd. in the recent past; the above rules have been followed more in breach than in observance. Moreover, the yield is insignificant. In view of these and cutting of bamboo being a highly silvicultural operation, the working is suggested to be done departmentally.

Type ‘A’ Areas

1. The congested un-workable clumps shall be clear felled.
2. In the remaining bamboo clumps; cutting rules for ‘B’ type areas shall be followed.
3. The growth of board leaved species will not be sacrificed for the growth of bamboo.

Sequence of Felling:-

The following sequence of felling and subsidiary silvicultural treatment of type ‘B’ areas keeping in view the three years felling cycle; shall be followed as under:

	B' Type Area		
	Year of felling	Name of forest and compartment No.	Area in ha.
	2013-14	R.12.N. Damtal C-3,5,9	29.53
	2016-17		
	2019-20		
(i)	B' Type Area		
	Year of felling	Name of forest and compartment No.	Area in ha.
	2014-15	R.12.N. Damtal C-10,11,12	46.54
	2017-18		

	2020-21		
	2015-16	CFS Sirit R-1 = 10.52	17.40
	2018-19	R-2 = 6.88	
	2021-22	Total:- 17.40	
	2016-17	R.12.N. Damtal C-13,14,15	33.99
	2019-20		
	2022-23		
	2017-18	R.12.N. Damtal C-16,19,20	29.95
	2020-21		
These areas are in plantation working circle but the bamboo clumps			
	will be worked	G.Total:-	157.41 ha.

(ii) 'A' Type Areas:-

No definite sequence of felling and subsequent planting of felled areas with bamboo has been laid down. However, the entire 177.24 ha. of area under type 'A' should be felled and afforested with bamboo in ten years period w.e.f. 2012-13 to 2022-23. 15 to 20 ha. of coupes depending upon the availability of closures should be annually laid out at the discretion of Divisional Forest Officer, felled and subsequently planted with bamboo

RESULTS OF WORKING

The bamboos have generally been deteriorating and shrinking in the past. The prescriptions of the working plan for these forests were totally ignored and no fellings were done at all in any of the forest. Resultantly there have been a considerable deterioration of bamboos in Reserves Khanni and Talara Forests. The number of clumps and their size has reduced and these are highly congested per clump has also diminishes and proportion of dead culms increased. These no longer appear to be bamboo forests. No planting of bamboos as envisaged in the working plan was ever undertaken As such in the revised working plan emphasis will be laid for planting of such degraded area with bamboos.

THE PLANTATION WORKING CIRCLE

General Constitution:

This working comprises of following areas:

- (i) All the Areas of plantation working circle of the expired working plan.
- (ii) Areas of plantation/Coppice working circle of co-operative society forests which have failed and are suitable for afforestation.

The areas which are suitable for planting with khair, chil bamboo and other broad leaved species have been included in this working circle. The areas which can be planted after removal of bushes or which are open for planting with good soil depth have been included in this working circle. This has been estimated from the density and height of tree vegetation. Detailed suitability maps on 16" = 1 mile scale have been prepared indicating the species which have to be raised on different parts of the compartment.

Special Objects of Management:

The main object is to carry out plantation with valuable species in suitable areas for afforestation.

AREA AVAILABLE FOR PLANTING				
Range	Felling Series			Total Area
	Legal	Voluntary	Co-operative Society	
Nurpur	1184.67	6125.55	996.07	8306.29
Kotla	555.49	4050.94	0	4606.43
Jawali	1155.63	2365.79	354.02	3875.44
Rey	276.76	3066.50	782.20	4125.46
Indora	713.71	5298.62	1516.60	7528.93
Total:-	3886.26	20907.40	3648.89	28442.55

Based on field observations following recommendation are made in the working circle:

- Grazing pressure from the local people and migratory gaddies and gujjars is very high, therefore small and rotational closures with effective results are suggested.
- Three complete bush cutting in January –February , May-June and October- November are suggested in lantana infested areas while undertaking for plantations. These repeated cuttings are to be carried out till the planted species grow beyond bush growth.
- Two-year-old tall plants of Shisham and Khair are suggested for lantana infested area. Bamboo is also suitable species for lantana areas with deep and moist soil/
- The existing norms of plantations for lantana infested areas are required to be revised depending upon intensity of lantana.
- The valuable naturally growing species in bush growth should not be cut back along with bush cutting but should be tended.
- Separate norms are required to be worked out for plantation along roads and railway line.

Choice of Species:

The main species will be Chil, Khair and Bamboos in addition other broad leaved species such as Buel, Tooni, Darek and Siris etc. should also be planted depending upon the site conditions and requirement of the local people. Bamboo is suitable for depression with better water regime and soil depth- ornamental species are recommended for road side plantation. Monoculture practice should be avoided and planting of indigenous species like Bamboo, Kachnar, Khair, Shisham. Dhau. Tun. Harar, Arjun, Amla, Bhera etc. will be encouraged.

Sequence of Planting :

Sequence of planting may be decided by territorial D.F.O depending upon the targets and availability of budget year wise during the period of working plan. Detail of areas to be treated under this working circle is as under:

Detail of Plantation Working Circle							
Sr. No.	Kind of Forest	Nurpur	Kotla	Jawali	Rey	Indora	Total
1	Reserve	851.69	391.23	127.05	249.65	62.33	1681.95
2	D.P.F.	332.98	164.26	922.41	27.11	651.38	2098.14
3	U.P.F.	4296.93	2449.43	2042.60	2531.59	5235.9	16556.45
4	U.F.	1828.62	1601.51	429.36	534.91	62.72	4457.12
	Total:-	7310.22	4606.43	3521.42	3343.26	6012.33	24793.66
	SOCIETY						
1	R.F.	169.96	-	-	-	-	169.96
2	P.F.	121.42	-	89.01	-	263.43	473.86
3	Un-Classed	704.69	-	265.01	782.20	1253.17	3005.07
	Total:-	996.07	-	354.02	782.20	1516.60	3648.89

RESULT OF WORKING

Sr. No	Plantation prescribed	Plantation actual done up to 31/12/2018	Deviation
1	17065.5 ha	13542.23 ha	(-) 3523.27 ha

The results of the working circle are of mixed type. There has been a definite improvement in the commercial value of the forests on account of successful chil and khair plantations in large number of areas, which was in fact the sole specific object of management. However, failures are also found, the main reasons for it being i) Suppression by heavy bush growth. ii) Infestation by Lantana in a large number of areas specially in Nurpur and Indora Range iii) drought iv) Non-co-operation by local people and heavy biotic pressure due to permits issued to graziers. Human factors like poor nursery protection. Wrong choice of species, soil workings poor protection etc, also cannot be ruled out for such failures. Fires also have important role to play in wiping out some very successful chil plantations.

KHAIR (OVER LAPPING) WORKING CIRCLE

As per approved working plan of Nurpur Forest Division Khair is being worked under Khair overlapping working circle. This working circle will overlap all the other working circles except Coppice Working Circle.

The special objective of management is to harvest the mature and over mature stock of Khair and to regenerate the area subsequently. The areas in this working circle are those allotted to Chil Working Circle, Bamboo Working Circle, Plantation Working Circle and Protection Working Circle. As per approved working plan of Nurpur Forest Division, a total of 4817621 ha. of area falls under Khair (overlapping) Working Circle.

Silviculture System:

Khair will be harvested under Selection System

Exploitable diameter :

The exploitable diameter is fixed at 25 cm at breast height.

Rotation:

Rotation age of Khair is 30 years.

11.3 MANAGEMENT PLAN OF KHAIR (OVERLAPPING) WORKING CIRCLE.

The Khair is an overlapping crop in two major Working Circles i.e. Chil Shelter wood Working Circle and Plantation Working Circle.

Scientific Management

It shall be ensured that at least 25 percent of mature Khair trees or 50 trees per ha (whichever is less) of 25cm diameter and above are retained as mother trees. These trees should be marked and numbered as trees not to be felled, preferably in a color different from that of marking for trees to be felled. The number, size and girth of such trees should be clearly spelt out.

As per the guidelines of CEC, it was initially proposed to have 20 ha regeneration plots for experimental silvicultural felling of Khair, in a way to ensure that no contiguous opening of more than 20 ha. is made within or across the compartments. However, now the Apex Court has approved the recommendation of the monitoring committee to designate the compartments as the unit of management. Hence, the whole compartment areas will have to be worked and treated.

Basis of Proposal

The Hon'ble Supreme Court has allowed experimental silviculture felling of Khair species in Nurpur Forest Range of Nurpur Forest Division, in areas allotted to Khair overlapping working circle which were prescribed for felling in the working plan of Nurpur Forest Division, approved during 2012-13. As per the approved felling programme contained in the said working plan the following forests have been prescribed for felling on experimental basis:

Forest	Compartment	Area (ha.)	Plantation WC	CSW WC
U-20 Punder	C1	20.23	20.23	-
	C2	51.39	-	51.39
	C3	32.78	32.78	-
	C4	21.04	21.04	-
	C5	17.40	17.40	-
	C6	20.64	20.64	-
	C7	36.42	36.42	-
	C8	41.26	-	41.26
	C9	46.93	-	46.93
	C10	23.88	23.88	-
	C11	50.58	50.58	-
	C12	29.54	29.54	-

	C13	10.92	-	10.92
	C14	38.85	-	38.85
	C15	64.74	64.74	-
	C16	62.31	62.31	-
Total		568.91	379.56	189.35
R1N Tattal	C1b	39.66	-	39.66
	C1c	40.86	-	40.86
	C2c	80.52	-	80.52
	C3c	59.08	-	59.08
	C3b	60.70	-	60.70
Total				280.82
P41N Paniaru	C1	12.55	-	12.55
	C2	14.16	-	14.16
	C4	26.70	-	26.70
Total		53.41		53.41
G.Total		903.14	379.56	523.58

REGENERATION PLAN

The experimental silvicultural fellings are to be carried out as soon as area is marked by the competent authority and handed over to HP State Forest Development Corporation Ltd. The following activities are to be carried out for regeneration.

- The latitude and longitude of the regeneration plot be recorded for preparation of digital map.
- The boundary of the regeneration plot be marked by making a belt at breast height on the trees at the boundary of the plot.
- Lantana Eradication before marking of the trees for felling
- 100% Enumeration of major species in the regeneration.
- Marking of trees for silvicultural felling.
- Handing over the marked trees to HP State Forest Development Corporation Ltd. By 15th of September.
- Back possession of the lots / forests from HPSFDC.
- Fencing of area with RCC posts and barbed wire to encourage Natural Regeneration.
- For Khair species, the Selection System for Natural regeneration is to be followed as per prescription of the Working Plan.
- Soil Conservation Works to improve soil moisture regime in the area to create enabling conditions for natural regeneration to come up.
- Planting of area with site-specific broad-leaved species to attain multilayered canopy forests. Planting is to be done with Tall plants as per Tall Plant norms/standards given in Departmental Orders/Instructions.
- The maintenance of area for 5 year period is prescribed.

Marking of Trees for Silvicultural felling.

- The bark will be shaved uphill side by making a patch of 6''x4'' above the soil level.
- The patch will be painted with black Japan, Marking number on this patch will be engraved by iron chisel.
- The marking hammer will also be affixed on the patch.
- At breast height the marking hammer will also be affixed uphill side on the tree to be felled.

HON'BLE SUPREME COURT COMMITTEE APPROVAL

The Committee constituted by Hon'ble Supreme Court of India under the Chairmanship of Sh. V.P. Mohan's has visited Nurpur Forest Division. The total 24 regeneration plots were put up before the Hon'ble Committee for inspection. The Committee has approved 12 experimental silvicultural regeneration plots to be felled for the year 2018-19 and 12 experimental plots to be felled in the year 2019-20. The detail of this experimental silvicultural regeneration plots is given as per Table 11.1 and 11.2 below: -

TABLE 11.1

KHAIR- NURPUR RANGE, NURPUR FOREST DIVISION (12 APPROVED FOR SELECTION FELLING UNDER KHAIR OVERLAPPING WORKING CIRCLE IN 2018-19)								
Sr.No.	CODE	FOREST NAME	COM. AREA (Ha)	REGEN. PLOT AREA (Ha)	LEFT OUT AREA (TO BE TREATED IN 2019-20)	LAT./ LONG.	INSPECTI ON DATE	APPROVA L STATUS
1	2	3	4	5	6	7	8	9
1	N/1-2018-19	C 3 C-TATTAL	59.08	20.00	39.08		23.3.18	PB II- CHIL SHELTER WOOD WORKING CIRCLE
2	N/2-2018-19	C-1 PUNDER	20.23	20.23	0		23.3.18	PLANTATI ON WORKING CIRCLE
3	N/3-2018-19	C-2 PUNDER	51.39	20.00	31.39		23.3.18	PB I- CHIL SHELTER WOOD WORKING CIRCLE
4	N/4-2018-19	C1 PANIARU	12.55	12.55	0		24.4.18	PB III- CHIL SHELTER WOOD WORKING CIRCLE
5	N/5-2018-19	C2 PANIARU	14.16	14.16	0		24.4.18	PB IV- CHIL SHELTER WOOD WORKING CIRCLE
6	N/6-2018-19	C-10 PUNDER	23.88	20.00	3.88		24.4.18	PLANTATI ON WORKING CIRCLE
7	N/7-2018-19	C-11 PUNDER	50.58	20.00	30.58		24.4.18	PLANTATI ON WORKING CIRCLE

8	N/8-2018-19	C-12 PUNDER	29.54	9.54	20.00		24.4.18	PLANTATI ON WORKING CIRCLE
9	N/9-2018-19	C-14 PUNDER	38.85	20.00	18.85		25.4.18	PB(UNAL LOTEd)- CHIL SHELTER WOOD WORKING CIRCLE
10	N/10-2018-19	C-15 PUNDER	64.74	20.00	44.74		25.4.18	PLANTATI ON WORKING CIRCLE
11	N/11-2018-19	C-16 PUNDER	62.31	20.00	42.31		25.4.18	PLANTATI ON WORKING CIRCLE
12	N/12-2018-19	C-9 PUNDER	46.93	20.00	26.93		19.5.18	PB(UNAL LOTEd)- CHIL SHELTER WOOD WORKING CIRCLE
TOTAL	N/1 TO N/12	474.24	216.48	257.76				
AVERA GE AREA	39.52	18.04						

TABLE 11.2

Sr. No.	CODE	FOREST NAME	COM. AREA (Ha)	REGEN. PLOT AREA (Ha)	LEFT OUT AREA	LAT/ LON G.	INSPECTIO N DATE	APPROVAL STATUS
1	2	3	4	5	6	7	8	9
KHAIR- NURPUR RANGE , NURPUR FOREST DIVISION (12 APPROVED FOR 2019-20 AFTER TOTAL LANTANA ERADICATION)								
1	N/13- 2019-20	C 1b TATTAL	39.66	20.00	19.66		25.4.18	PB I- CHIL SHELTER WOOD WORKING CIRCLE
2	N/14- 2019-20	C1C TATTAL	40.86	20.00	20.86		25.4.18	PB II- CHIL SHELTER WOOD WORKING CIRCLE

3	N/15- 2019-20	C2C TATTAL	80.52	20.00	60.52		INSPECTIO N POSSIBLE IN OCTOBER 2018	PB I- CHIL SHELTER WOOD WORKING CIRCLE
4	N/16- 2019-20	C3B TATTAL	60.70	20.00	40.70			PB I- CHIL SHELTER WOOD WORKING CIRCLE
5	N/17- 2019-20	C-3 PUNDER	32.78	20.00	12.78			PLANTATION WORKING CIRCLE
6	N/18- 2019-20	C- 6 PUNDER	20.64	20.00	0.64		INSPECTIO N POSSIBLE IN OCTOBER 2018	PLANTATION WORKING CIRCLE
7	N/19- 2019-20	C-7 PUNDER	36.42	20.00	16.42			PLANTATION WORKING CIRCLE
8	N/20- 2019-20	C-8 PUNDER	41.26	20.00	21.26			PB(UNALLOTTED)- CHIL SHELTER WOOD WORKING CIRCLE
9	N/21- 2019-20	C-13 PUNDER	10.92	10.92	0			PB(UNALLOTTED)- CHIL SHELTER WOOD WORKING CIRCLE
10	N/22- 2019-20	C-4 PUNDER	21.04	20.00	1.04		25.4.18	PLANTATION WORKING CIRCLE
11	N/23- 2019-20	C-5 PUNDER	17.40	17.40	0		25.4.18	PLANTATION WORKING CIRCLE
12	N/24- 2019-20	C-4 PANIARU	26.70	6.70	20.00		24.4.18	PB II- CHIL SHELTER WOOD WORKING CIRCLE
TO TAL	N/13 TO N/24	428.90	215.02	213.88				
AVE RA GE AR EA	35.74	17.91						

Note:- In compartment C9 of U-20 N-Punder forest no Khair trees for silvicultural felling are available and area is very steep and refractory. The 100% enumeration in this plot is not required and the area is to be fenced with wooden poles (carriage of RCC poles is not

possible) to encourage natural regeneration and wherever possible and soil conservation works be carried out to improve the moisture regime.

LANTANA ERADICATION:

The regeneration plots are infested with Lantana from 25%. 50%, 75% to 100% and need removal of same by CRS method approved and followed by the HP Forest department.

A) Lantana infestation in Khair overlapping over Chil Shelter wood Working Circle:

Forest	Comp.	Area (ha)	Infestation
R1N Tattal	C1b	39.66	100%
	C1c	40.86	100%
	C2c	80.52	100%
	C3b	60.70	100%
	C3c	59.08	100%
P41 N- Paniaru	C1	12.52	25%
	C2	14.16	25%
	C4	26.70	50%
U-20- Punder	C2	51.39	50%
	C8	41.26	50%

B) Lantana infestation in Khair overlapping in Plantation W.C

Sr. No.	Forest	Compartment	Area (Ha)	Infestation Percentage
1	Punder	C1	20.23	50%
		C3	20	50%
		C4	20	100%
		C5	17.40	100%
		C6	20	75%
		C7	20	50%
		C9	46.93	25%

		C10	20	25%
		C11	20	25%
		C12	9.54	50%
		C13	10.92	75%
		C14	38.85	25%
		C15	20	50%
		C16	20	50%

1. The lantana removal is to be done in all the 24 regeneration plots wherever lantana infestation is there in the year 2018-19.
2. The marking for felling is to be carried in all 12 regeneration plots given in the TABLE NO 1. These plots have comparatively lesser degree of lantana infestation as compared to regeneration plots in TABLE NO. 2
3. The lots be handed over to the HPSDFC Ltd. in September 2018 for felling this year only. (For the plots given in TABLE NO. 1)
4. The regeneration plots given in the TABLE NO 2 are very heavily infested with lantana, therefore no marking can be carried out before September in the year 2018. So the lantana be removed in these heavily infested plots of TABLE NO. 2 in the year 2018 and these plots are to be marked and handed over to HPSDFC LTD. in the year 2019-20 for the felling operations.
5. The Experimental plots gone over for Lantana removal and marking in the year 2018-19 will be taken up for natural regeneration and artificial regeneration in the year 2019-20 and the experimental plots treated under lantana eradication in the year 2019-20 will be gone over for natural regeneration and artificial regeneration in the year 2020-21 and so on. This clearly means that Lantana Eradication works will be done one year in advance and the regeneration works will follow in the next year.

1.4.4 (g) REGENERATION OF THE FELLED PLOTS

The following regeneration operation are proposed:

CLOSURE OF AREA FOR REGENERATION

The following regeneration plots are proposed for closure for natural regeneration and artificial regeneration as per the following time schedule.

Year	Name of Forests	Area(ha)
2018-19	List of forests as per Table 1	474.24
2019-20	List of forests as per Table 2	428.90
	Total	903.14

Nurpur Forest Division, the felling series has been prescribed in Khair Overlapping Working Circle at Page 168 in para 2.7.9 of the approved Working Plan of Nurpur Forest Division. This felling series has to be followed in a phased manner up to 10 years period of this Management Plan. This means all the forests prescribed for felling are to be gone over for silvicultural fellings as and when the approval of felling of Khair is allowed for whole of the Nurpur Forest Division in future. Essentially this Management Plan shall be incorporated as a part of the Working Plan in future.

REGENERATION PLOT WISE TREATMENT AND RECOMMENDATION OF THE HON'BLE SUPREME COURT COMMITTEE :

The specific details of regeneration treatment and recommendations of Hon'ble Supreme Court Committee are given plot wise as below:

SERIAL NUMBERS OF REGENERATION PLOTS							
	SITE FEATURES	N 1	N 2	N 3	N 4	N 5	N 6
1	INSPECTION DATE	23.3.18	23.3.18	23.3.18	24.4.18	24.4.18	24.4.18
2	NAME OF FOREST	TATTAL	PUNDER	PUNDER	PANIARU	PANIARU	PUNDER
3	COMPARTMENT No.	C-3c	C-1	C-2	C1	C-2	C10
4	COMPARTMENT AREA	59.08	20.23	51.39	12.55	14.16	23.88
5	AREA OF REGENERATION PLOT APPROVED	20	20.33	20	12.55	14.16	20
6	PRESCRIBED YEAR AND TYPE OF FELLING AS PER WP	2012-13	2012-13	2012-13	2012-13	2012-13	2012-13
7	SILVICULTURE SYSTEM AS PER WP	CHILSW PB-11	PLANTATION WC	CHILSW PB-1	CHILSW PB-111	CHILSW PB 1V	SELECTION SYSTEM PLANTATION WC
8	WORKING CIRCLE AS PER WP	KHAIR OVER LAPPING	KHAIR OVER LAPPING	KHAIR OVER LAPPING	KHAIR OVER LAPPING	KHAIR OVER LAPPING	KHAIR OVER LAPPING
9	APPROVAL STATUS AFTER INSPECTION	APPROVED	APPROVED	APPROVED	APPROVED	APPROVED	APPROVED
10	GPS DATA	NOT DONE	NOT DONE	NOT DONE	NOT DONE	NOT DONE	NOT DONE

NEXT STEPS APPROVED BY COMMITTEE AFTER SITE VISIT FOR IMMEDIATE COMPLIANCE							
1	FELLINGS APPROVAL /TYPE/	SELECTION	SELECTION	SELECTION	SELECTION	SELECTION	SELECTION
2.	CLOSING THE AREA WITH 5 STRAND BARBED WIRE AND RCC POLE FENCE.	YES	YES	YES	YES	YES	YES
3	LOPPING KHAIR TOTALLY PROHIBITED	YES	YES	YES	YES	YES	YES
4	PLANT ALL BLANKS WITH BL SPECIES NAMELY KHAIR, SHISHAM, ARJUN, KACHNAR, BAMBOO-	YES	YES	YES	YES	YES	YES
5	ERADICATE LANTANA COMPLETELY	YES	YES	YES	YES	YES	YES
6	100 % ENUMERATION TO BE DONE AND COMPARED WITH VOLUME FIGURES TAKEN FROM CHF	YES	YES	YES	YES	YES	YES
7	MARKINGS TO BE INITIATED AFTER SHOWING VOLUMES OF 100 % ENUMERATIONS WITH CHF VOLUMES TO COMMITTEE	YES	YES	YES	YES	YES	YES
8	EFFECTIVE FIRE PROTECTION MEASURES	YES	YES	YES	YES	YES	YES
9	EFFECTIVE INTERVENTIONS FOR IN-SITU WATER CONSERVATION AND SOIL CONSERVATION MEASURES	YES	YES	YES	YES	YES	YES
10	REMOVAL OF SLASH AFTER FELLINGS	YES	YES	YES			
11	TOTAL BAN ON BURNING OF	YES	YES	YES	YES	YES	YES

	DEBRIS TO ENCOURAGE NR AND REDUCE SOIL EROSION						
12	ERADICATE CLIMBERS FROM KHAIR TREES	YES	YES	YES	YES	YES	YES
13	PUT UP PLOT NO BOARD WITH GPS INFORMATION AND CONSTRUCT INSPECTION PATH FOR MONITORING INSPECTIONS	YES	YES	YES	YES	YES	YES
14	ANY OTHER TREATMENT						

SERIAL NUMBERS OF REGENERATION PLOTS							
S. NO	SITE FEATURES	N7	N8	N9	N10	N11	N12
1	INSPECTION DATE	24.4.18	24.4.18	25.4.18	25.4.18	25.4.18	24.4.2018
2	NAME OF FOREST	PUNDER	PUNDER	PUNDER	PUNDER	PUNDER	PUNDER
3	COMPARTMENT NO	C-11	C-12	C-14	C-15	C-16	C-9
4	COMPARTMENT AREA	50.58	29.54	38.85	64.74	62.31	46.93
5	AREA OF REGENERATION PLOT APPROVED	20	9.54	20	20	20	20
6	PRESCRIBED YEAR AND TYPE OF FELLING AS PER WP	2012-13	2012-13	2012-13	2012-13	2012-13	2012-13
7	SILVICULTURE SYSTEM AS PER WP	SELECTION SYSTEM PLANTATION WC	SELECTION SYSTEM PLANTATION WC	CHILS W PB -UNALLOTTED WC	SELECTION SYSTEM PLANTATION WC	PLANTATION WC	CHILS SW PB -UNALLOTTED WC
8	WORKING CIRCLE AS PER WP	KHAIR OVER LAPPING	KHAIR OVER LAPPING	KHAIR OVER LAPPING	KHAIR OVER LAPPING	KHAIR OVER LAPPING	KHAIR OVER LAPPING
9	APPROVAL STATUS AFTER INSPECTION	APPROVED	APPROVED	APPROVED	APPROVED	APPROVED	APPROVED
10	GPS DATA	NOT DONE	NOT DONE	NOT DONE	NOT DONE	NOT DONE	NOT DONE

SERIAL NUMBERS OF REGENERATION PLOTS							
S. NO	SITE FEATURES	N7	N8	N9	N10	N11	N12
NEXT STEPS APPROVED BY COMMITTEE AFTER SITE VISIT FOR IMMEDIATE COMPLIANCE							
1	FELLINGS APPROVAL/TYPE/NO S RETENTION	SELECTIO N	SELECTIO N	SELECTIO N	SELECTIO N	NOT DON E	NOT DON E
2	CLOSING THE AREA WITH 5 STRAND BARBED WIRE AND RCC POLE FENCE.	YES	YES	YES	YES	YES	YES
3	LOPPING KHAIR TOTALLY PROHIBITED	YES	YES	YES	YES	YES	YES
4	PLANT ALL BLANKS WITH BL SPECIES NAMELY KHAIR, SHISHAM, ARJUN, KACHNAR, BAMBOO	YES	YES	YES	YES	YES	YES
5	ERADICATE LANTANA COMPLETEY	YES	YES BY 30.11.2018	YES	YES	YES	YES
6	100%ENUMERATION TO BE DONE AND COMPARED WITH VOLUME FIGURES TAKEN FROM CHF	YES	YES	YES	YES	YES	YES
7	MARKING TO	YES	YES	YES	YES	YES	YES

SERIAL NUMERS OF REGERATION PLOTS							
S. NO	SITE FEATURES	N7	N8	N9	N10	N11	N12
BE INITIATED AFTER SHOWING VOLUMES OF 100% ENUMERATIONS WITH CHF VOLUMES TO COMMITTEE							
8	FIRE LINES TO BE MADE TO SAVE NATURAL REGENERATION FROM FIRE	YES	YES	YES	YES	YES	YES
9	EFFECTIVE INTERVENTIONS FOR IN-SITU WATER CONSERVATION	YES	YES	YES	YES	YES	YES
10	REMOVAL OF LEAF LITTER FROM SURFACE AFTER FELLINGS	YES	YES	YES	YES	YES	YES
11	TOTAL BAN ON BURING OF DEVRIS TO ENCOURAGE NR AND REDUCE SOIL EROSION	YES	YES	YES	YES	YES	YES
12	ERATICATE CLIMBERS FROM KHAIR TREES	YES	YES	YES	YES	YES	YES
13	PUT UP PLOT NO BOARD WITH GPS	YES	YES	YES	YES	YES	YES

SERIAL NUMBERS OF REGENERATION PLOTS							
S. NO	SITE FEATURES	N7	N8	N9	N10	N11	N12
INFORMATION AND CONSTRUCTION INSPECTION PATH FOR MONITORING INSPECTIONS							
14	ANY OTHER TREATMENT			REGENETATION PLOT TO BE MARKED OPPOSITE TO THE BOUNDRY WITH C 14 AND C 15		18	

SERIAL NUMBERS OF REGENERATION PLOTS							
S. NO	SITE FEATURES	N7	N8	N9	N10	N11	N12
1				RKED OPPOSITE TO THE BOUNDRY WITH C 14 AND C 15			

SERIAL NUMBERS OF REGENERATION PLOTS							
S. NO	SITE FEATURES	N13	N14	N15	N16	N17	N18
1	INSPECTION DATE	INSPECTED ON 25.04.2018	INSPECTED ON 25.04.2018	NA	NA	NA	NA
2	COMPARTMENT NO	C1b	C1c	C2c	C3b	C3	C6
3	COMPARTMENT AREA	39.66	40.86	80.52	60.70	32.78	20.64
4	AREA OF REGENERATION PLOT APPROVED	20	20.00	20.00	20.00	20.00	20.00
	ANY OTHER TREATMENT	ALL ABOVE LISTED FOREST AREAS ARE HEAVILY INFESTED LANTANA AREAS, WHERE ENTRY AT THIS STAGE IS NOT POSSIBLE. THE COMMITTEE HAS DIRECTED THAT ON WAR FOOTING ERADICATION OF LANTANA WOULD BE TAKEN UP THIS YEAR AND COMMITTEE WOULD INSPECT THESE AREAS IN THE MONTH OF OCTOBER THIS YEAR ITSELF.					

REGENERATION PLOTS NUMBERS							
S. NO	SITE FEATURES	N19	N20	N21	N22	N23	N24
1	INSPECTION DATE	TWO SAMPLE REGENERATION PLOTS VERY HEAVILY INFESTED WITH LANTANA WERE INSPECTED ON 25.04.2018. THE COMMITTEE HAS DIRECTED THE FIELD STAFF THAT ON WAR FOOTING TOTAL ERADICATION WORK SHOULD BE UNDERTAKEN.					
2	NAME OF FOREST	PUNDER	PUNDER	PUNDER	PUNDER	PUNDEER	PANIARU
3	COMPARTMENT NO	C-7	C-8	C-13	C-4	C-5	C 4
4	COMPARTMENT AREA	36.42	41.26	10.92	21.04	17.40	26.70
5	AREA OF REGENERATION PLOT APPROVED	20.00	20.00	10.92	20.00	17.40	6.70
	TOTAL AREA	56.42	61.26	21.84	41.04	34.8	33.40
	ANY OTHER TREATMENT	ALL ABOVE LISTED FOREST AREAS ARE HEAVILY INFESTED LANTANA AREAS, WHERE ENTRY AT THIS STAGE IS NOT POSSIBLE. THE COMMITTEE HAS DIRECTED THAT ON WAR FOOTING ERADICATION OF LANTANA WOULD BE TAKEN UP THIS YEAR AND COMMITTEE WOULD INSPECT THESE AREAS IN THE MONTH OF OCTOBER THIS YEAR ITSELF.					

Experimental Silviculture lots Handed over to HPSFDC 2018-19 (Volume Extracted)	
Khair	222.581 Cum
Chil	134.48 Cum

Experimental Silviculture lots Handed over to HPSFDC 2019-20 (Volume Extracted)	
Khair	2199.399 Cum
Chil	254.26 Cum
Eucalyptus	3388.47 Cum

The WPO will consider the deviation obtained as a result of above extraction from the list of forests in Experimental Silvicultural Felling program while prescribing volume for working plan in the next plan period.

Chapter XII

STATISTICS OF GROWTH AND YIELD

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 J.C. Katoch HPFS (2012-13 to 2021-22). Since the climate and depict conditions are almost the same for different vegetative zones in the divisions, it was decided to adopt the data for statistics of growth and yield of different species from working plan of Sh. J.C. Katoch HPFS (2012-13 to 2021-22) for preparing the current working plan. The same is reproduced here in detail incorporating a few changes in enumerations, stock mapping etc.

12.1 GENERAL:

The main species found in the region are Chil, Khair, Shisham, Eucalyptus etc. Apart from these species several miscellaneous species also exist in the area the statistics of growth, volume and yield of these species are discussed below:-

i) Chil (*Pinus roxburghii*)

The result of the analysis carried out for the preparation of working plan under revision of Nurpur Forest division in the recent past are reproduced below and recommended to be made use of:

Table 1: Diameter growth data for Chil

DBH OB in Cms	10	15	20	25	30	35	40	45	50	55	60
No. Of Years to DBH	18	25	32	39	48	57	67	82	102	130	176

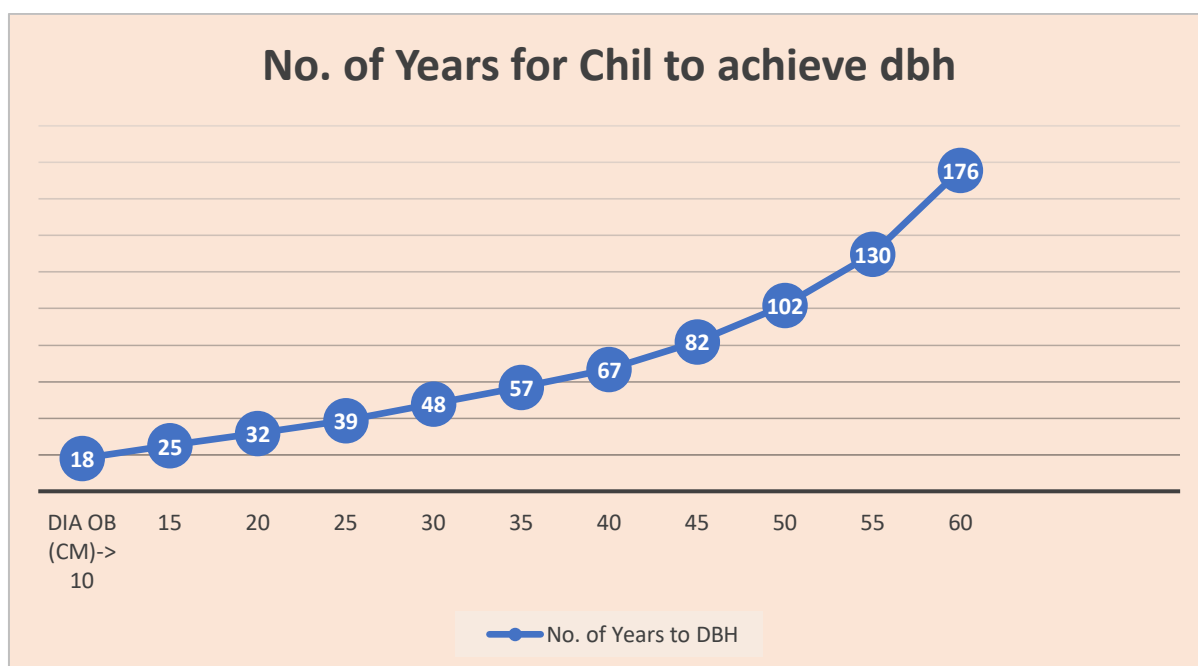


Chart 12.1

The volume table for chil has been adopted from previous working plan and is tabulated below:

Table 2: Local Volume table for Chil

Diameter class	DBH in cm	Total Standing Volume (m ³)
V	10-20	0.06
IV	21-30	0.19
III	31-40	0.65
IIA	41-50	1.44
IIB	51-60	2.60
IA	61-70	3.54
IB	71 -80	3.54
IC	81-90	3.54
ID & above	91 & above	3.54

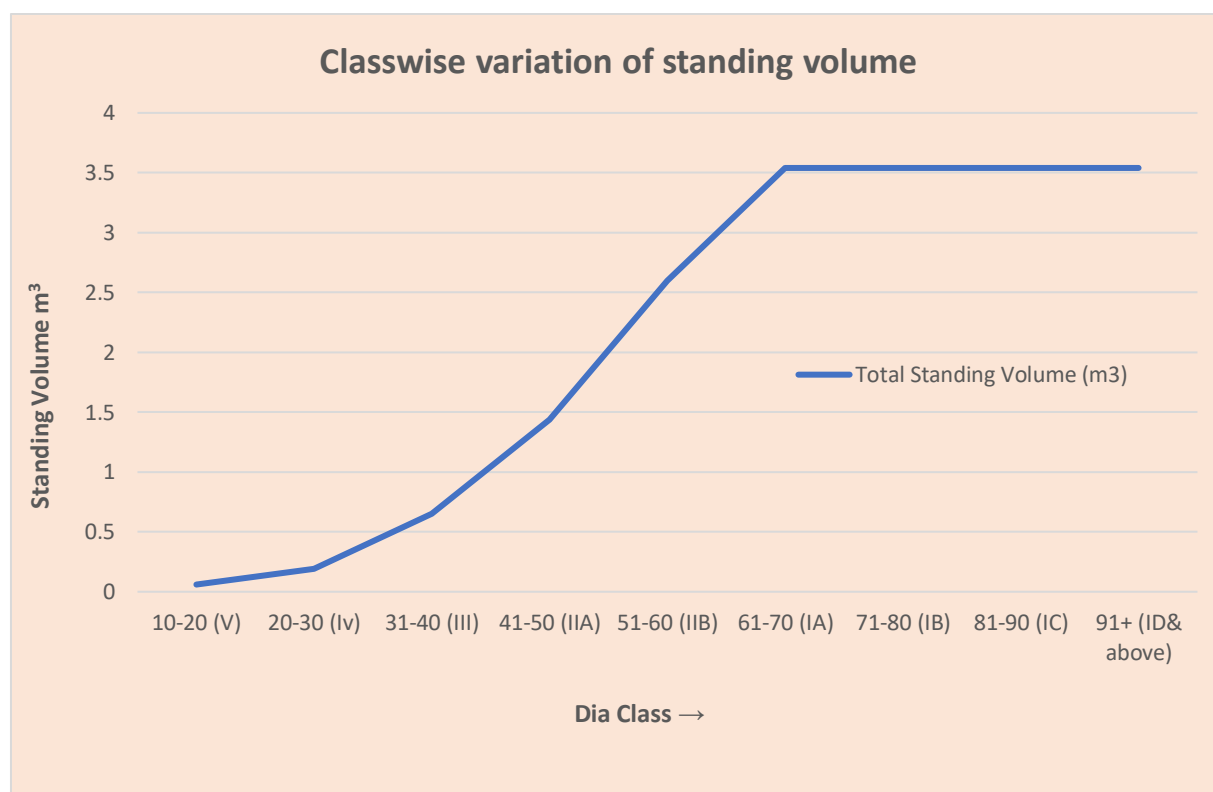


Chart 12.2

Volume increment percent for Chil:

The Volume increment percent for Chil for each diameter class has been adopted from other forest divisions of Kangra district

Diameter class in Cms	10-20	20-30	30-40	40-50	50-60	60-70
Volume increment percentage	6.51	3.87	3.22	1.80	1.23	0.56

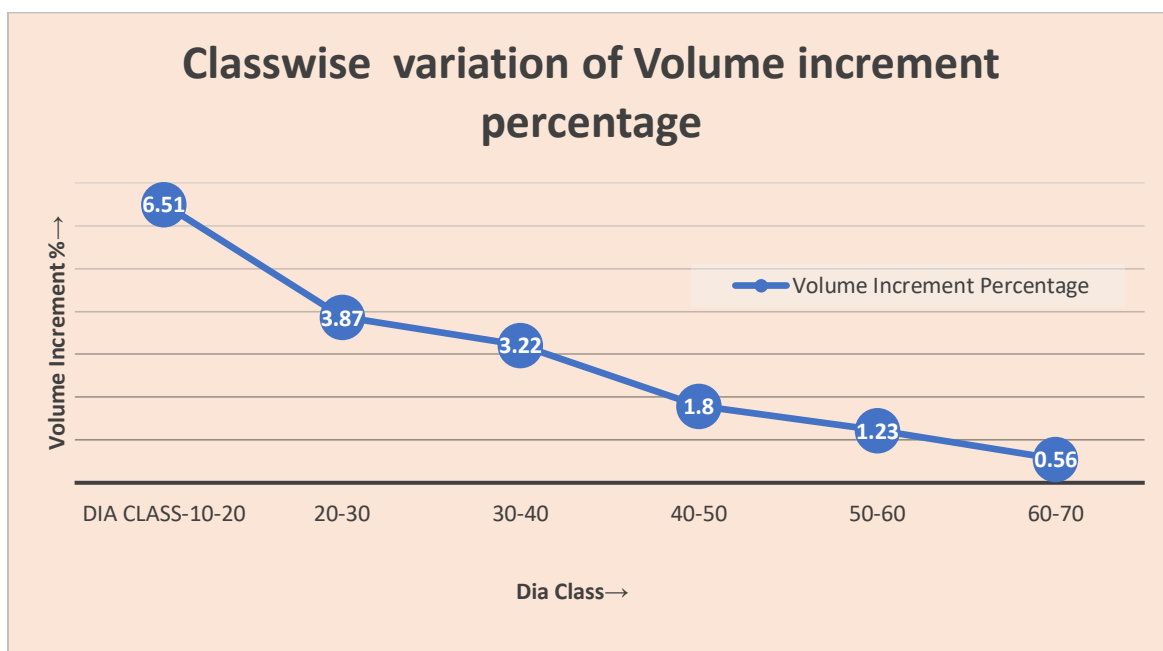


Chart 12.3

ii) Khair (*Acacia catechu*)

Due to higher value of khair tree and low exploitable diameter (20 cm) the volume factor is based on 5 cm dia class as was adopted in previous working plan by Sh Nanak Chnad, Sh R C Kang and thereafter, and reproduced as under

Yield Table:

Dia (cms)	Height (m)	Standing Volume M3	Heartwood M3	Weight of wood Kg	Katha Kg
10-15	8.30	0.025700	0.011220	11.2	-
15-20	10.10	0.068600	0.03100	31.6	2.5
20-25	11.80	0.118100	0.05760	50.6	5.0
25-30	12.90	0.216970	0.10960	78.7	8.0
30-35	13.40	0.252870	0.17570	128.3	14.0
35-40	13.40	0.252870	0.17570	128.3	14.0
40-45	13.40	0.333100	0.24060	197.4	23.0
45-50	13.40	0.546800	0.38980	280.1	29.0

Relation of age and diameter for Khair:

A. Seed origin:

Dia (cms)	Height (m)	Standing Volume M3	Heartwood M3	Weight of wood Kg	Katha Kg
10-15	8.30	0.025700	0.011220	11.2	-
15-20	10.10	0.068600	0.03100	31.6	2.5
20-25	11.80	0.118100	0.05760	50.6	5.0
25-30	12.90	0.216970	0.10960	78.7	8.0
30-35	13.40	0.252870	0.17570	128.3	14.0
35-40	13.40	0.252870	0.17570	128.3	14.0
40-45	13.40	0.333100	0.24060	197.4	23.0
45-50	13.40	0.546800	0.38980	280.1	29.0

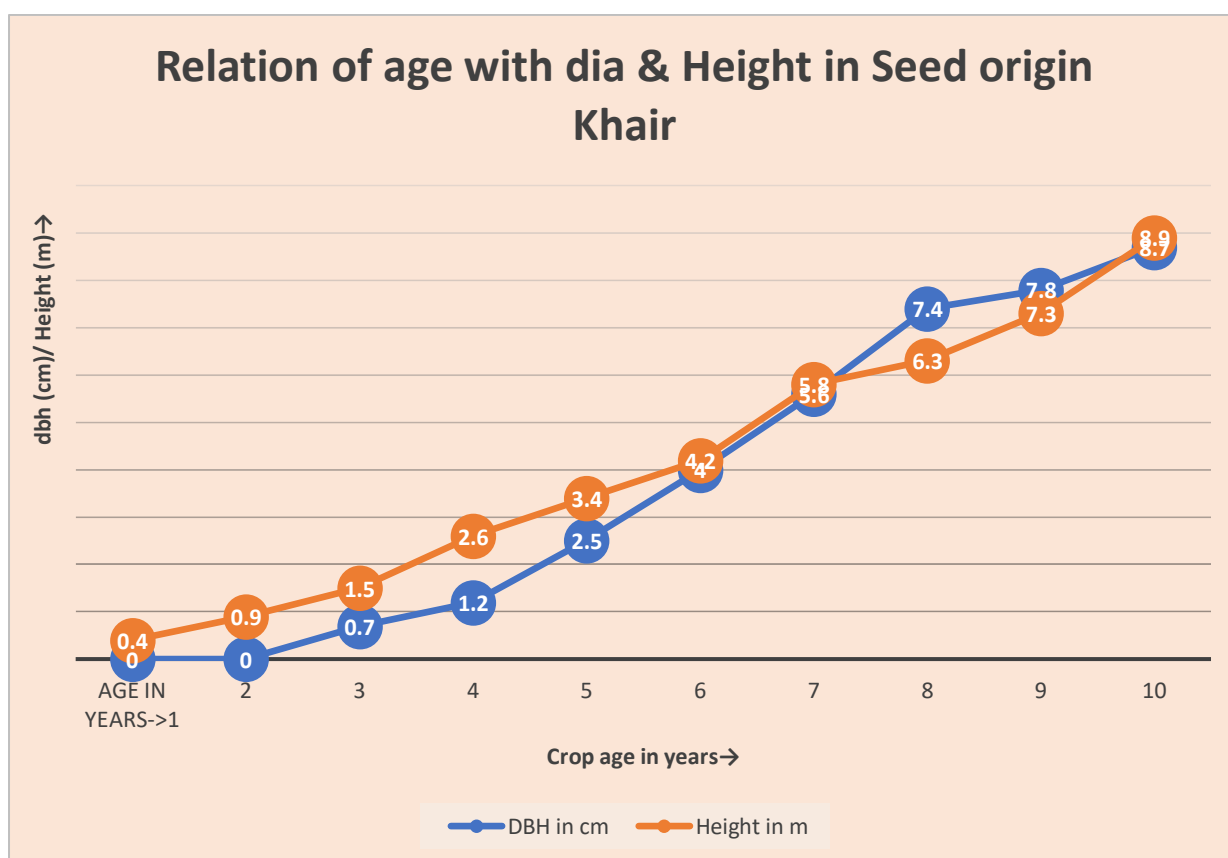


Chart 12.4

B. Coppice origin

	1	2	3	4	5	6	7	8	9	10	13	15	20	24
DBH in cm	2.5	4.2	4.8	5.7	6.4	7.2	8.3	9.2	10.4	11.5	13.0	14.4	17.0	18.8
Height in (m)	2.30	3.50	4.50	6.10	6.50	6.90	7.50	8.10	8.80	9.50	10.40	11.00	11.40	13.10

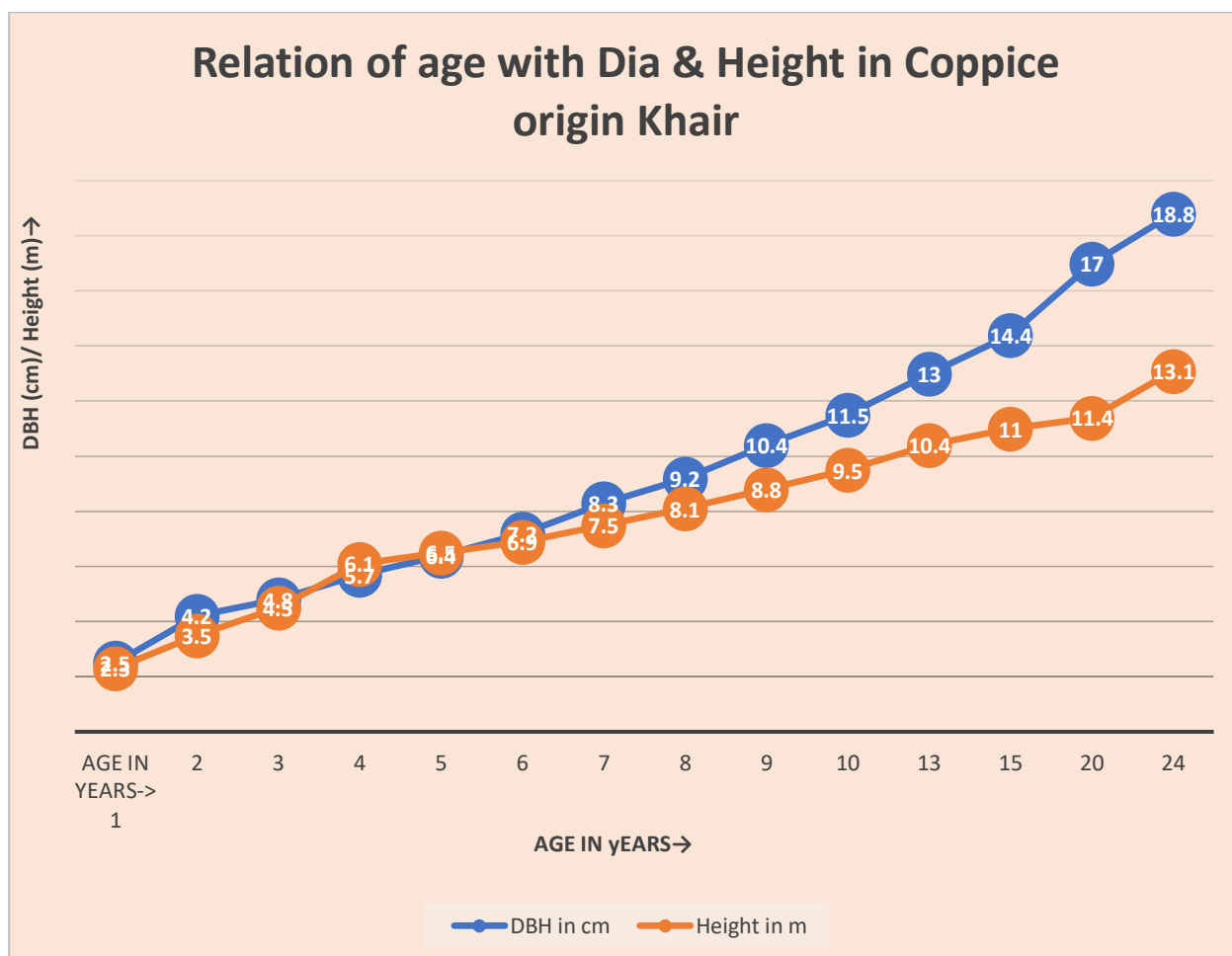


Chart 12.5

Growth Statistics for Khair:-

Crop Age in years	5	10	15	20	25	30	35	40	45	50	55	60
Average DBH in cm	3.5	7.6	11.1	13.9	16.5	18.8	20.8	22.6	24.1	25.4	26.6	27.7
Average Height in (m)	3.3	6.0	8.5	10.9	13.1	14.9	16.7	18.3	19.5	20.7	21.6	22.5

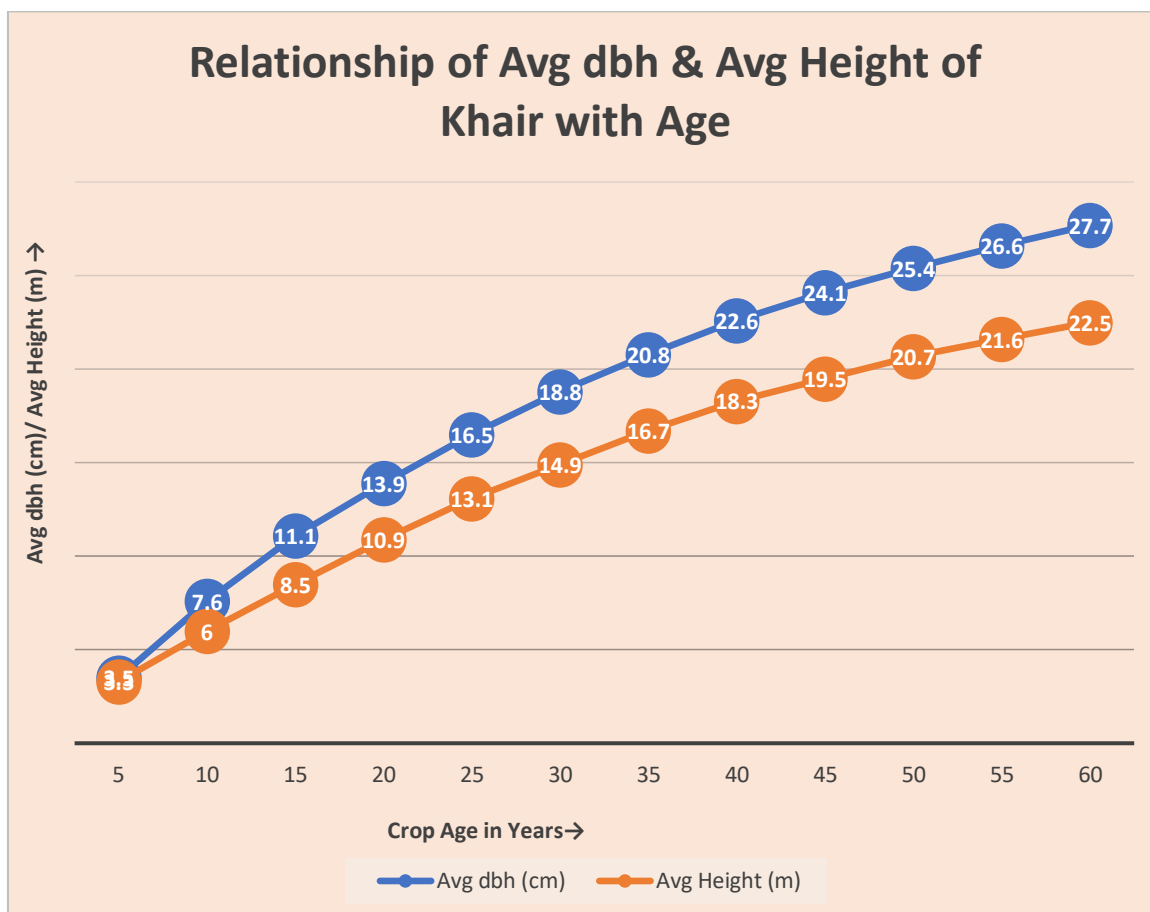


Chart 12.6

Time taken by Khair to enter next diameter class:-

Diameter Class (cm)	Total age on entering the class (Years)	Years taken to enter next dia. class
10-15	14	8
15-20	22	11
20-25	33	14
25	47	--

It is estimated that annual rate of mortality in passing from one diameter class to next higher diameter class is 1.87%.

iii) Miscellaneous BL species

The volume for miscellaneous species is not available in previous working plans as such the volume as applicable in adjoining Dharamshala forest division is proposed and will be applicable upon approval of this plan.

Dia class	DBH (Over bark)	Standing volume (m3)
V	10-20	0.03
IV	21-30	0.14
III	31-40	0.56

IIA	41-50	1.13
IIB	51-60	1.27
IA	61-70	1.41
IB	71 -80	1.41
IC	81-90	1.41
ID & above	91 & above	1.41

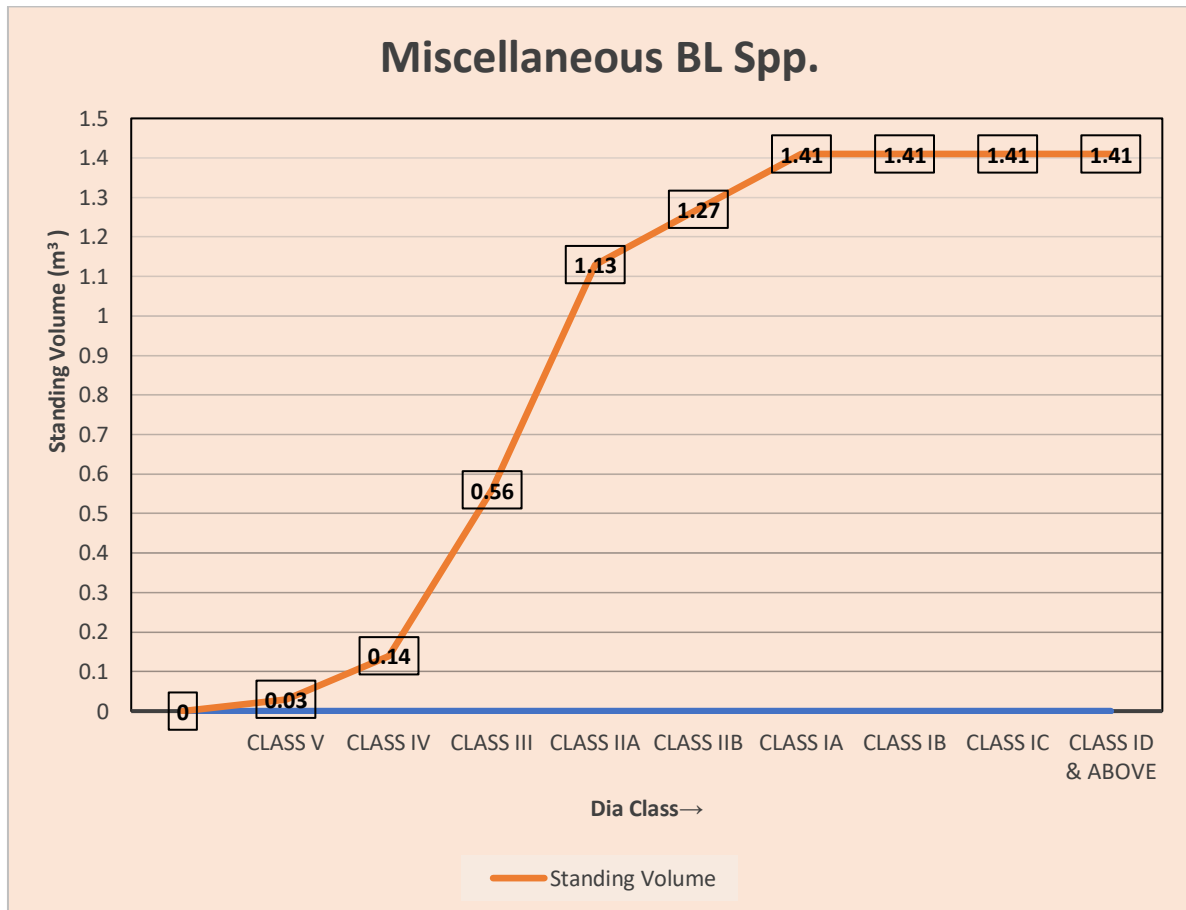


Chart 12.7

iv) Shisham

The volume factors as were applicable in Paonta working plan will be made applicable after approval of current working plan from Government of India and is tabulated as under

Diameter class	DBH in cm	Shisham Volume (m3)
V	10-20	0.064
IV	21-30	0.176
III	31-40	0.467
IIA	41-50	0.977
IIB	51-60	1.523
IA	61-70	2.265
IB & above	71 -80	2.265

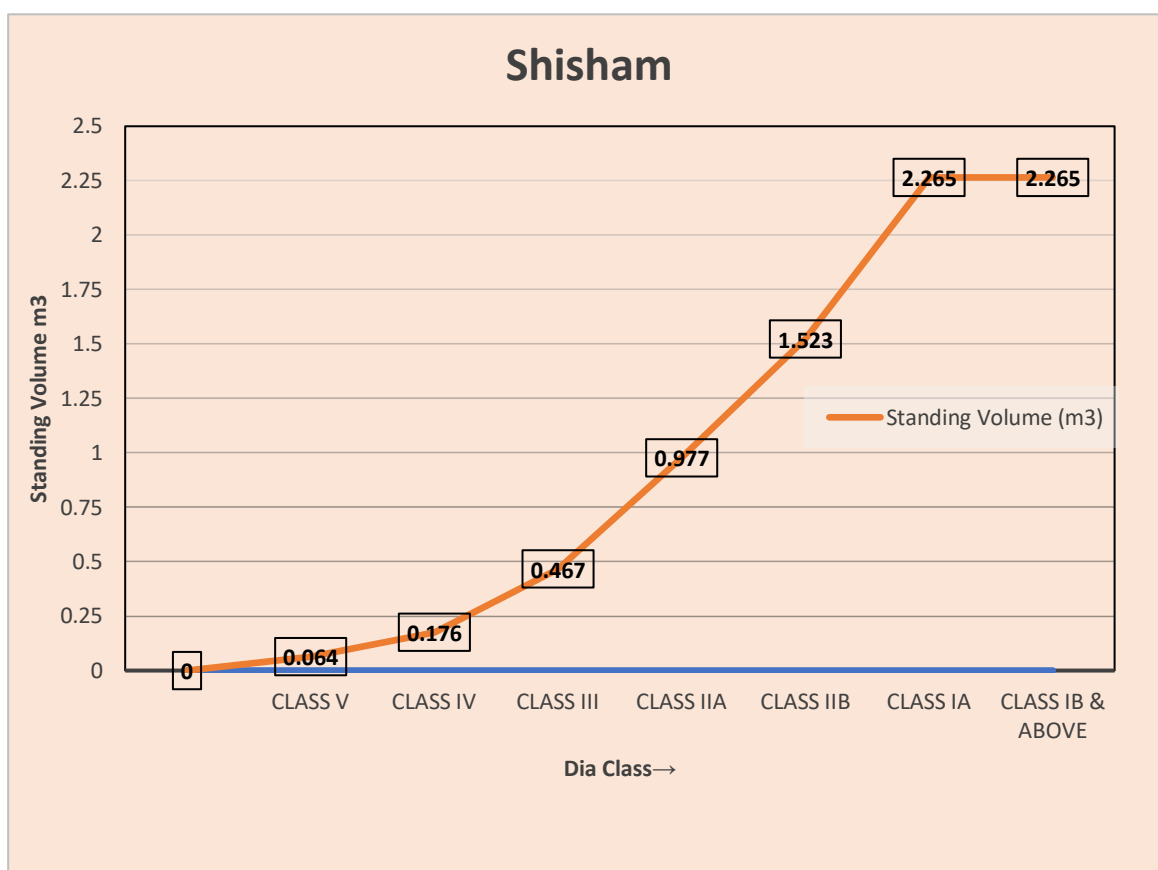


Chart 12.8

v) Fuelwood

The 3rd most important forest produce of the area is fuel wood. The number of trees of different species and diameter classes available per ha. of area under scrub species as determined in the expired working plan on the basis of 10 plot on one ha. each laid over the division is estimated as under.

STOCKING PER HA.

Name of Species	V	IV	III	IIA	IIB
<i>Anogeissus latifolia</i> (dhao)	6	4	-	-	-
<i>Lannea coromandelica</i> (Kehmbal)	1	9	4	2	
<i>Eugenia jambolana</i>	2	3	1	-	-
<i>Eugenia jambolana</i> (Kathaman)			-		
(Karmaru) <i>Albizia Odoratissima</i>	2	1	-		
<i>Flacourtia Indica</i> (Kangu)	12	6	2		

<i>Mallotus philippinensis</i> (Kamal)	13	12	2	-	
Total	36	35	9	2	-

The stacked volume of fuelwood per ha. is estimated as 25m³ with a weight of 175 quintals (wet).

v) Bamboo

The existing arrangements for classifying bamboos by girth and height will continue. Girth is measured towards the thicker end on the second internodes at a distance of 5 cm above the node.

The existing commercial classification is given below

- i) “Kalan” means to bamboos over 12.7 cms in girth.
- ii) “Khurd” means to bamboos with girth between 9.5 cm and 12.7 cms.
- iii) “Sota” means bamboos having girth below 9.5 cms.

20 quadrates of 10 m x 10m were laid out in R 11 Khanni and UF Damtal and silvicultural felling's of bamboos were done in the previous plan and the same result has been adopted as such. The number of bamboos quadratwise of different categories are given below:-

Quadrat	No of clump weighed	Kalan	Khurd	Sota	Patti	Green Weight
1	3	7	15	10	6	124.5
2	4	7	21	2	10	140
3	4	17	9	-	4	121.5
4	4	3	5	15	-	54
5	2	-	1	4	-	11
6	4	18	3	-	-	120
7	4	6	-	-	1	30
8	3	2	21	-	-	62
9	3	7	-	-	-	75
10	5	7	5	-	12	82
11	2	-	64	15	1	186.4
12	3	-	55	8	8	228
13	2	-	16	5	14	269.2
14	3	-	54	4	-	178.8
15	1	1	10	14	-	62.5
16	3	-	23	8	-	110.9
17	3	-	19	4	1	81
18	3	-	15	3	3	65.7
19	3	12	15	5	-	112.1
20	2	11	13	14	1	123.3
Total	61	98	364	111	61	2038.4

This corresponds to about 10 metric tones of green bamboos per hac. The weight of air dried about 100 bamboos of different classes is given below :-

Descriptions	Weight	Unit
Kalan	3.40	QTL

Khurd	2.60	QTL
Patti	2.10	QTL
Sota	1.00	QTL

vi) Charcoal :

Charcoal is made from Chil, Dhaun (*Anogeissus latifolia*) and other BL species. It is estimated that 1.05 quintals of charcoal are extracted from one m³ of standing volume. In past working plan period no green feeling has been done in Broad leaved species and no charcoal made out of Chil.

However, the conversion factor of obtaining Charcoal from different species is tabulated below:

1 cum of stacked volume of species	Weight of fuel wood in KGs	Charcoal obtained (kg)
Chil	300	150
Other BL	400	240
Table 8.14: Conversion factors for stacked-solid volumes for broad leaved species 1		
(i)	Solid volume/Stacked volume	1/2
(ii)	Air-dry weight/cubic meter Solid volume.	7.20 qtls
(iii)	Air-dry weight/cubic meter Stacked volume.	3.60 qtls.

12.2 QUALITY CLASS ASSESSMENT:

The all India Quality classes as given as given in F.R.I. yield table of chil have been adopted. Quality class for each sub-compartment or compartment has been determined on ocular basis and is recorded in the compartment history files

12.3 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 as per Working plan code 2014 as under:-

Sampling Technique adopted

A two-stage sampling was followed as under:

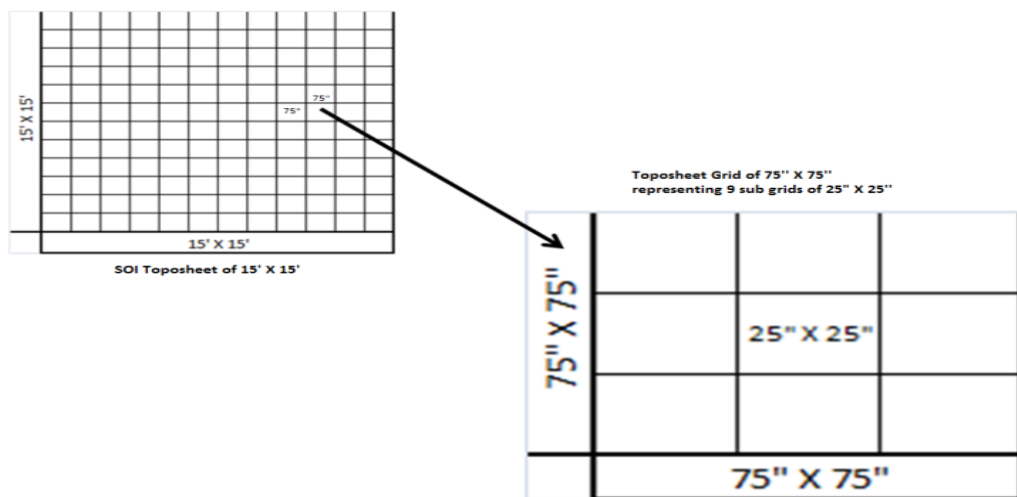
- All the compartments of a Division after inspection were allocated to one or the other working circle and then the compartments falling in a working circle was arranged in some order.
- Random systematic sampling model was drawn and 30% sample were drawn with software.
- Going this way, compartments numbered was selected.
- At least, eight compartments were selected from each major Working Circle.

- Having selected these compartments, field crew who was responsible for enumeration reached at the location of compartment with sketch of the compartment drawn from the CH file indicating direction of the sides and approximate length of sides.
- Located the South-West corner (S-W corner) of the sketch on the ground.
- From this point, with the help of compass, went 100 meters in East direction. From this point went 50 meters in North direction. This is the location of first sample point (second stage sampling unit).
- From the S-W corner, now went 100 meters in North direction and from there went 50 meters in East direction. This is the location of second sample point in that compartment.
- Now located the North – East (N-E corner) corner of the sketch on the ground.
- From this point, with the help of compass, went 100 meters in west direction. From this point went 50 meters in south direction. This is the location of third sample point.
- From the N-E corner, now went 100 meters in South direction and from there went 50 meters in West direction. This is the location of fourth sample point in that compartment.
- This way four points were selected in every selected compartment.
- These points were plot centers of the plot where enumeration is to be carried out.
- After reaching the plot centers fixed a stout peg of 10 cm diameter and 1.5 m height, and fixed it firmly on the ground. With GPS took the Longitude, Latitude and Altitude of the plot centre. Selected a large tree near the plot centre and took bearing and distance of plot centre from this tree. The bearing and distance of the plot centre from the tree was written with red paint on this tree stem after making a square blaze at the breast height. The GPS coordinates and the measurements from the nearby tree helped in the location of the plot centre at the time of checking by the checking party.
- After reaching the plot center, from true North, fixed the NE at 45° , SE at 135° , SW at 225° , NW at 315° corners of the plot by measuring 22.36 m. horizontal distance, i.e. half of the diagonal, by steel tape in all four directions.
- Checked the dimensions of the plot i.e. all sides should measure 31.62 metres horizontal distance. Care was taken to adjust the dimensions of the plot according to slopes.
- The data regarding herbs and shrubs (including regeneration) was collected from four square plots of 1m x 1m and 3m x 3m respectively. These plots were laid out 30 meters from the centre of 0.1 ha plot in all four directions along diagonals in non-hilly area and along trails in hilly areas. In case of hilly areas the plot were taken randomly 2-10 meters away either side of the trail as shown in the diagram. Now to lay out 1m x 1m square plots for herbs whose centres are marked at 30 meters from the centre of 0.1 ha plot, marked four points at the distance of 0.71 meter along diagonal in both sides and at right angles. Joined all the four points. Similarly, for shrubs and regeneration square plots of 3m x 3m were laid out at the same centre by marking and joining four points at 2.12 meters distance along diagonal and at right angles.

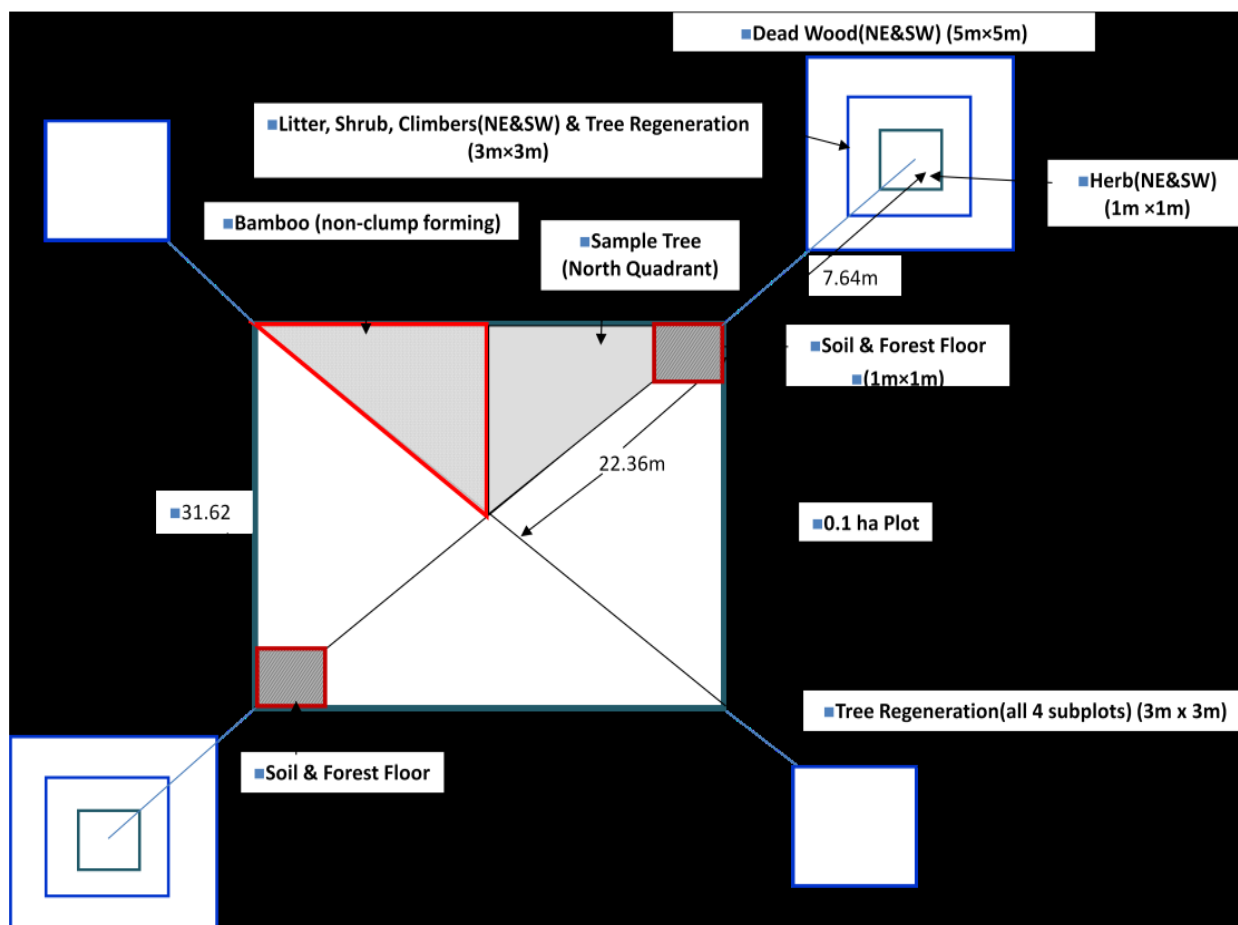
From the centre of 0.1 ha plot along the diagonal 50m in each direction, square plot of 3m x 3m for shrubs and regeneration, 1m x 1m plot for herbs were laid out

Square plot: 1m x 1m

Square plot : 3m x 3m



Plot configuration of main plot and attached sub-plots



STOCK MAPS:

The stock maps of all types of forest included in this plan is on GIS Platform and almost all survey sheets are available in this division & same is also attached in CH files

12.4 Forest Resource Assessment

Assessment of natural resources is an essential and integral component of working plan exercise. On the basis of this assessment, past performance is evaluated and future management finalized. In Forest crops one has to identify multi-dimensional populations with various parameters and attributes. Forest data collected covers:

- Growing stock Inventory-** It includes, Individual tree species stand or forest type; form and composition of tree crop-according to age, quality, extent, etc. and its distinction; Statistics of growth and yield through stump and stem analysis as well as from other available records; Biomass carbon stocks; Status of plantations etc.
- Vegetation survey-** It includes enumeration of species composition such as dominant and co-dominant tree species, bamboos, rattans, shrubs, herbs, climbers, lichens, algae, fungi, epiphytes and parasites for their density, frequency, dominance and abundance

values. This survey is necessary for study of status of regeneration, geographic distinction and environmental relationships of plant communities, assessment of medicinal and aromatic plants; and other NWFP species (excluding bamboo and rattans).

(C) Survey of Forest soils and assessing soil organic carbon stock.

(D) Socio-economic survey to assess the dependence on forests for livelihood needs.

12.4.1 Laying out grids on the topo sheet and sample unit.

For Forest resource assessment of working plan, the sample plots are systematically laid out in the forest area which is indicated on the Survey of India toposheet on the scale of at least 1:50,000. The grids are laid out by dividing the toposheets of 1:50,000 scale (size 15' X 15' i.e. 15-minute latitude and 15-minute longitude) falling within the division/district boundary into 144 grids of 1 ¼' x 1 ¼'. To carryout Forest Resource Assessment for Working Plan, each of these 1 ¼' x 1 ¼' grids are further sub-divided into 9 sub-grids for forming the basis sampling frame of 25" x 25" (sub-grid of twenty five seconds latitude and twenty five seconds longitude) representing approximately 60 ha on the ground). All the sub-grids of 25" x 25" are to be surveyed. The intersection of diagonals of sub grid is marked as centre of sub-grid on the map. The latitude and longitude of the intersection of diagonals of sub grid will be identified as the centre of the sub-grid. These latitude and longitude will be used for reaching the centre of the sub-grid by using GPS. The grids of 1 ¼' x 1 ¼' and sub-grids of 25" x 25" are conveniently serial numbered by WPO. A sample unit with a radius of 80 m covering an area of 2 hectare is taken at the centre of the sub-grid without actually laying out the plot.

The land use may be classified into closed forest, dense forest, open forest, scrub, bamboo brakes, shifting cultivation, young plantations of forest species, tree in line (Avenue plantation), forest roads, grass lands, barren lands, agricultural land without trees in surround, agricultural land with trees in surround, non forestry plantations, habitation, water bodies etc. as per the description given in Manual for National Forest Inventory of India (FSI, 2010).

12.4.1.1. Descriptive work while reaching the sample unit and sample plots.

After deciding the grid and sub-grid numbers to be surveyed, the team leader i.e. forester in charge should find a nearest convenient route so that they reach the sample unit i.e. centre of the subgrid from minimum traverse by vehicle or foot. After reaching at a nearby location of the plot, the next job would be to search a reference point, which can be identified on the map as well as can be located on the ground. The sub-grid centre is reached after covering desired distance and bearing from the reference point. The reference point selected on a map should not be a temporary structure. The possible reference points may be Village tri-junction points, Bridges and culverts, Temples, Mosques and Churches; Crossing of rail, road, rivers, streams; Ponds and Wells; Mile stones orkilometer stone or prominent trees etc. The location of reference points and

its correct description recorded in the form is very important to re-visit the sample unit in future.

12.4.1.2. Stock Mapping

While approaching the sample unit, stock assessment and mapping (earmarking the stocked area on the map) should be done occularly traversing the forests (compartment/village/any other management unit); so as to cover the entire area making observational assessment of site quality, tree species composition, its health (including injury to the tree-crop), density and crop age, etc.; All locations where any of the parameters change should be described in PLOT APPROACH FORM (Annexure-I) and depicted/delineated on the map. Presence of special features within the compartment/village/other management unit, namely grassy patches, scattered trees, plantations raised, etc., should also be described in PLOT APPROACH FORM, Code-2014 and depicted on the stock map. Regeneration status of main species should also be observed.

12.4.2. LAYOUT OF SAMPLE PLOTS IN THE FIELD

12.4.2.1. After reaching the sampling unit i.e. the centre of the sub-grid, a square plot of 0.1 ha (Central plot) will be laid out by measuring 22.36 m horizontal distance i.e. half of the diagonal in all the four directions at 45° in North-East, at 135° in South-East, at 225° in South-West, and at 315° in North-West corners of the plot from the true north. Check the dimensions of the plot, i.e. all sides should measure 31.62 m horizontal distance. Care should be taken for laying out the proper dimensions of the plot. Each sampling unit may contain 5 sample plots of 0.1 ha (31.62m X 31.62m) each for tree inventory. Four side plots (namely North Plot, East Plot, South Plot and West Plot) of 0.1 ha (31.62m) will be laid at a distance of 50m from the centre of the central plot to their centre in all the four directions i.e. North, East, South and West. Nested quadrates of size 3m x 3m and 1m will be laid out a distance of 30 meters from the centre of the central plot in all four directions along diagonals in non-hilly area and along trails in hilly areas for the enumeration of shrubs (including regeneration status) and herbs respectively. The provision of side plots in each sampling unit for enumeration of trees may be systematically reduced by the state government subject to local conditions and objectives of the management.

12.4.2.2. Three nested quadrates of size 5m x 5m, 3m x 3m and 1m x 1m may be laid at the centre of the central plot for the estimation of carbon stock . In 5m x 5m, all the dead wood above 5cm diameter would be collected, weighted and recorded. In 3m x 3m, all the woody litter, that is all branches below 5cm diameter, would be collected, weighted and recorded. All shrubs (including all the trees below 10cm dbh) and climbers in 3m x 3m plots would be up-rooted, weighted and recorded. For trees, allocation of carbon in root, stem, branch, twigs and leaves may be obtained separately. In 1m x 1m, all the herbs including leaf litter would be collected, weighted and recorded. Dry biomass would be converted into carbon stock. For collecting data on humus and soil carbon, forest floor

of 1m x 1m plot would be swept and materials thus collected, would be weighed and a portion of the same would be kept for the carbon analysis. After that, a pit of 30cm x 30cm x 30cm would be dug at the centre of the 1m x 1m plot and a composite sample of soil weighing 200gm would be kept for organic carbon analysis.

12.4.3 General plot variables to be recorded

General information related to land use, physiographical features like altitude, aspect, slope, soil and water resources; crop composition, regeneration status, injury to the crop, fire incidence, grazing incidence, presence of weeds, presences of grasses, occurrence of bamboo, plantation status, distance from water course, drivers of degradation, etc. should be recorded for every sampling unit of 2 (two) hectare area in the PLOT DESCRIPTION FORM (Annexure-II). This information along with the general observations made in PLOT APPROACH FORM (Annexure-I) will be used for writing the compartment description. General definition and description of terms not specifically mentioned here may be taken from the manual for national forest inventory of India (FSI, 2010).

12.4.4. Plot Enumeration

For the Sample Plot, which cannot be laid out due to steep slopes or other conditions, may be left out of enumeration and its inaccessibility conditions need to be mentioned in Plot Enumeration Form. All trees having diameter 10cm and above will be enumerated, species and diameter class wise, from all the identified sample plots of 0.1 ha and recorded in the PLOT ENUMERATION FORM. Trees, the stems of which touch the north and west border lines of the plot (called border line trees) will be enumerated. However, trees, and stems of which touch the east and south border lines of the plot will be treated as “out trees” and will not be enumerated. In and out bamboo would be similarly decided and treated. Trees below 10cm diameter at breast height over bark will not to be enumerated. Enumeration of trees/bamboo will start from the NE corner of the plot and will proceed in clockwise direction. The same procedure should be followed for all the sample plots. For bamboo, average diameter of the clump will be measured and number of green culms of different age class (up to 1 year, 1-2 years and above 2 years) and dry & damaged culms in the given clump will be recorded. Also the height of the trees, at least from the central plot should be measured and recorded for ascertaining the site quality. The data of the shrubs, climbers and regeneration status from all 4 quadrates of 3m x 3m laid at the centre of the plots is to be collected and recorded in the PLOT ENUMERATION FORM. The data of herbs from all nested quadrates of 1m x 1m laid within each quadrates of 3m x 3m at the centre is to be collected and recorded in the PLOT ENUMERATION FORM.

12.5. GROWING STOCK ESTIMATION

From the enumeration/field data, species wise distribution of trees in each diameter class will be generated for compartment/village/any other management unit. Ratio method of estimation will be used for estimating the growing stock of important trees species using local volume table developed by FRI/FSI or under previous plan. Adding the growing

stock of all compartment, the growing stock of the particular forest will be estimated, which will be again integrated up to range level and further at divisional level. Stratification developed by FSI based on forest type, density, land use using GIS can be used for increasing the precision of the estimates. Any gap in research results with respect to estimation of growing stock must be brought out clearly.

12.5.1 Statistics of Forest Carbon Stock

Stock maps has been prepared using modern technologies using open series maps (OSMs) on appropriatescale fitting to the compartment size and A-3 paper both in digital and analogue form. The maps have been placed in C.H. files

ESTIMATES OF CAPITAL VALUE OF FORESTS

A rough estimate of capital value of forests base on the value of land and growing stock is as under:-

S.No	Particulars	Quantity	Rate per ha/Cum	Total Value
1	Land	53177.81 ha	--	-
2	Growing Stock:			
	a) Chil Timber	300451.02 cum	7000/- per cum	2,10,31,57,140.00
	b) Coppice	5001.60 ha	2,00,000/- P.ha	1,00,03,20,000.00
	c) Plantation	9750.35 ha	2,00,000/- P.ha	195,00,70,000.00
	d) Bamboos	237877 Nos	15/- each	35,68,050.00

PART-II

FUTURE MANAGEMENT

CHAPTER-I

BASIS OF PROPOSAL

General

Historically, forest management systems have tended to focus on one objective of overwhelming importance, such as the maintenance of a certain flow of timber, protection of a fragile watershed or provision of an attractive forest environment for outdoor recreation. In reality, this was mostly an analytical and operational simplification. Natural resource users and managers have always observed with awe the miracle of forests: they produce a multitude of goods and services, frequently at the same time and from the same piece of forest land and they often regenerate with minimal human intervention. Forest management attention has also generally shifted from management for a single objective (often wood production) to an ecosystem approach that tries to incorporate the production of multiple outputs into forest management decisions.

This renewable resource has played a pivotal and significance role in the fabric of National economy in general and socio-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 has 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 Siwalik zone has a very fragile and friable geological formation which in the absence of any vegetal mantle erodes easily. This aspect assumes more significance in view of the Pong Dam in the area. Thus, soil conservation measures supplemented by afforestation form an important tool to restore the green cover and prevent any soil erosion. While the Van (Sanrakshan Evam Samvardhan) Adhiniyam, 1980 has largely halted the process of alienation of land from the control of Forest Department, but this has not put halt to the condition of vegetation cover of forests.

1.1 Objects of Management:

The recognition of the hopes and aspirations of the many stakeholders interested in the future of forests is a positive step forward. However, this raises the question of: how can this multiplicity of objectives be addressed once it is acknowledged that it is simply not physically possible to manage forests in a way that simultaneously achieves every aspiration? Increasingly complex modelling and valuation methodologies have been developed to quantify the range of diverse products and environmental services that forests can provide, but trade-offs or compromises still have to be made as policy advice moves from theory to practice. The community of forestry professionals and forest stakeholders continues to search for an acceptable

method to reconcile different perceptions of the relative importance or value of each forest management objective.

In the allocation of market goods, prices are the main indicator upon which production, consumption, savings and investment decisions are taken. Thus, because so many of the outputs of forest ecosystems do not pass through markets and are public in nature, many argue that market solutions result in far too little investment in the conservation and management of forests. However, to decide on a different course of investment and conservation, the trade-offs implied must be analyzed within the framework of a commonly accepted value system. Values determine the "weight" or importance of each one of the objectives in sustainable forest management, but values vary enormously between different people and are seldom expressed in terms that would provide clear operational guidance. To summarize, if there is little agreement about objectives and their relative importance, it is not possible to conclude whether a forest is sustainably managed or not.

Consistent with the mandate of National Forest Policy, 1988 the general objects of management of Forests under the plan area is under: -

1. To Reverse Forest Loss: Reverse the loss of forest cover worldwide through sustainable forest management, including protection, restoration, afforestation and reforestation, and increase efforts to prevent forest degradation.
2. To Enhance Forest-Based Benefits: Enhance forest-based economic, social and environmental benefits, including by improving the livelihoods of forest-dependent people.
3. To Increase Sustainability Managed Forests: Increase significantly the area of protected forests worldwide and other areas of sustainably managed forests, as well as the proportion of forest products from sustainably managed forests.
4. To Mobilize Financial Resources: Reverse the decline in official development assistance for sustainable forest management and mobilize significantly-increased new and additional financial resources from all sources for the implementation of sustainable forest management principles.
5. To ensure continued provision of specific product of services from Forests to the public without doing any harm to the eco balance.
6. To check soil erosion and denudation in the catchment area of rivulets draining into the reservoirs.
7. To enhance the Forest cover and productivity of the Forest through the application of scientific and technical inputs.
8. To Endeavor for attaining normalcy of the forests by supplementing natural process with artificial techniques.
9. To generate motivational campaign in the public for conserving and increasing the Forest Wealth through Joint Forest Management.
10. To take effective Measures for safeguarding against encroachments in Forest land
11. To evolve management techniques such a way as to take special case of the needs of Wild Life Conservation.
12. Consistent with above to provide for optimum sustained flow of eco system services from the forest in perpetuity.

1.2 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:

1. CHIL WORKING CIRCLE
2. BAMBOO WORKING CIRCLE
3. COPPICE WORKING CIRCLE
4. PLANTATION WORKING CIRCLE
5. FOREST PROTECTION WORKING CIRCLE
6. KHAIR (OVERLAPPING) WORKING CIRCLE
7. WILD LIFE MANAGEMENT (OVERLAPPING) WORKING CIRCLE
8. JOINT FOREST MANAGEMENT (OVERLAPPING) WORKING CIRCLE
9. NTFP (OVERLAPPING) WORKING CIRCLE
10. EUCALYPTUS (OVERLAPPING) WORKING CIRCLE
11. GRAZING (OVERLAPPING) WORKING CIRCLE
12. BIO-DIVERSITY CONSERVATION (OVERLAPPING) WORKING CIRCLE

1.3 Felling Series:

There will be Three Felling Series.

1. Legal Felling Series (RF & DPF)
2. Voluntary Felling Series (UPF & UF)
3. Co-Operative Forest Felling Series

1.4 PERIOD OF WORKING PLAN:

This plan is prepared for 10 years Period from **2025-26 to 2034-35**

Interim Period Management:

Management of Forest during the Interim Period (2022-23 to 2024-25): -

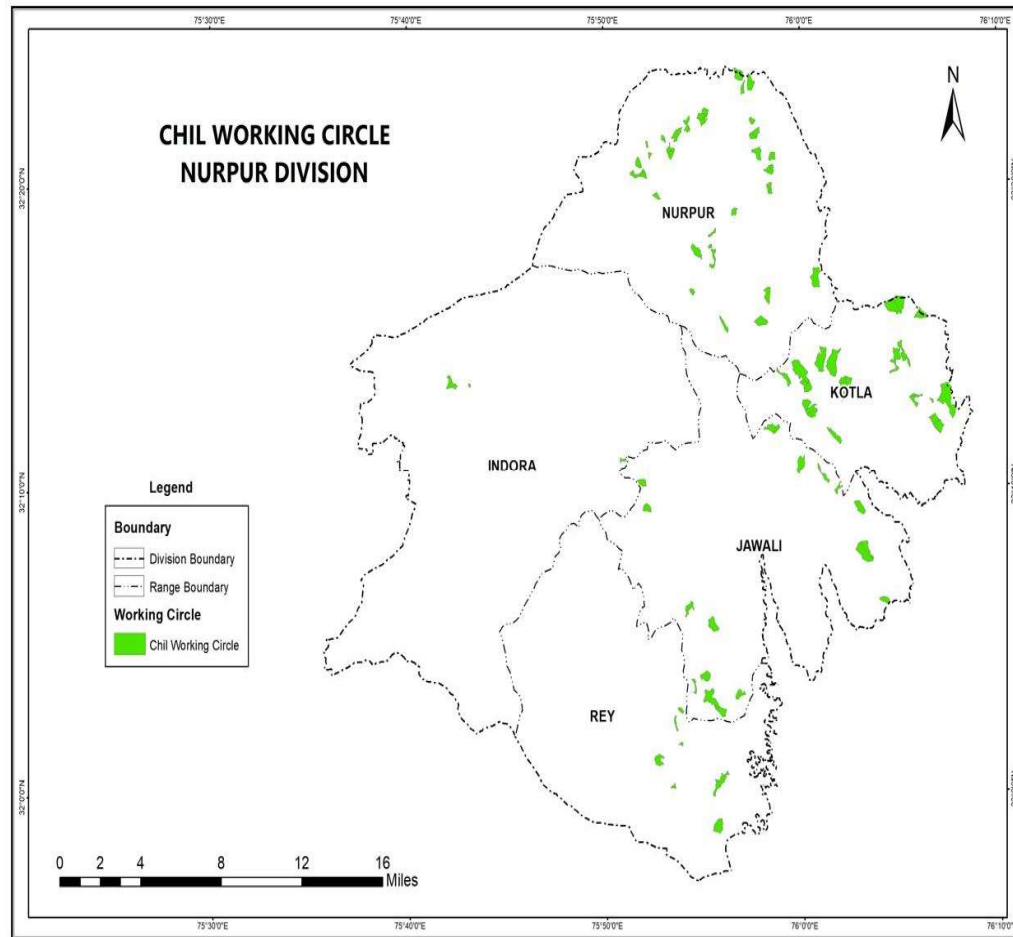
The management of the Nurpur Forest Division during the interim period, from the conclusion of the previous working plan to the commencement of this revised working plan was conducted under the guidance of the prescription outlined in the existing working plan i.e. JC Katoch Working Plan. The delay in the preparation and approval of the revised working plan was primarily due to unforeseen disruptions, including the global COVID-19 pandemic, administrative constraints, and technical challenges. These challenges, however, were met with adaptive management strategies, ensuring minimal disruption to forest management during the interim period. The draft working plan (2025-26 to 2034-35) builds upon the foundations laid during the interim period. It integrated lessons learned, addresses management gaps identified, and aligns with the latest scientific and policy frameworks. It is ensured that the Nurpur Forest Division continues its trajectory toward sustainable

and climate-resilient forest management.

In the meeting of Standing Consultative Committee Chaired by Principal Chief Conservator of Forest (HOFF) Himchal Pradesh held on 10.3.2025 has condoned the interim period from 2022-23 to 2024-25 and granted the in-principle approval for the Draft working Plan of Nurpur Forests Division. In the meeting DIGF, Regional Office Chandigarh opined that forest soil test done by the WPO Nurpur be used to plan out the planation activities during the plan period.

CHAPTER-II

THE CHIL SHELTERWOOD WORKING CIRCLE



MAP NO. 2.1. - GIS MAP (1: 50,000) FOR CHIL SHELTERWOOD WORKING CIRCLE

2.1 GENERAL CONSTITUTION OF THE CIRCLE AND CHARACTER OF VEGETATION:

All the forest, where chill is found either pure or in fair proportion and having potential to grow it, and where ground conditions are suitable to the application of concentrated regeneration felling, are grouped in Shelterwood Working Circle. This working circle is same as chil shelterwood Working Circle of Sh. J.C. Katoch. The total area of the Working Circle is 10814.17 Hac.

The following table summarizes as the distribution of area over different ranges are as under:

Table No. 2.1. Showing Distribution of Area over Different Ranges

Class of Forest	Ranges (Area in hac.)					
	Nurpur	Kotla	Jawali	Rey	Indora	Total
Reserved	717.41	611.82	59.88	129.47	0	1518.58
Demarcated Protected	820.22	332.60	501.72	19.83	131.52	1805.89
Un-demarcated Protected	822.97	394.96	1161.82	433.77	36.42	2849.94
Unclassed	734.05	1588.40	552.76	1186.76	0	4061.97
Co-operative Society Fts.	253.72	0	118.95	123.80	81.32	577.79
Total: -	3348.37	2927.7	2395.13	1893.63	249.26	10814.17

The forests are on the whole under-stocked, irregular, poorly grown and heavily grazed. At lower elevations particularly in Rey, Jawali, Indora and Part of the Nurpur Forest Ranges, fair proportion of Khair mixed with other broad-leaved species is found interspersed forming understory to chil. The quality growth varies conforming to FRI IV in the lower elevations and III to higher elevations in Kotla and part of Nurpur Forest Ranges. The age gradations are very irregular.

2.2 SPECIAL OBJECTS OF MANAGEMENT

The special objects of management are as under: -

1. To continue conversion of generally irregular crops into more or less uniform crop.
2. To fully stock the PB-I areas mainly by natural regeneration, failing which artificial regeneration will be resorted to.
3. To tend the existing stand properly so as to progress generally in the direction of normal forest by obtaining normal growing stock, normal age class distribution and normal regeneration.
4. To fully protect the forest from fires by control burning and through other control measures.
5. To obtain the maximum possible progressive yield of timber and resin per unit area by adopting scientific method of exploitation and resin tapping after meeting the bonafide requirement of the right holders.

2.3 BLOCK AND COMPARTMENTS

The boundaries of forest blocks and compartments remain the same as in the previous plan.

2.4 FELLING SERIES

Keeping in view the legal status of forests with regard to closures and their control for management, three felling series have been constituted as under:

- I) **Legal felling series:** - All the reserved and demarcated protected forests have been allotted to legal felling series.

- II) **Voluntary felling series:** - All the un-demarcated and unclassed forests have been allotted to voluntary felling series.
- III) **Co-operative Forest Society Felling Series:** - This includes the forests under the control of the defunct co-operative forest's societies.

2.5 AREA STATEMENT

The following statement gives the area in Hac. of each felling series allotted to different periodic blocks. The forest wise detail of allotment has been given in appendix-I

Table No. 2.2.

Felling Series-I					
Range	PBI	PBII	PBIII	PBIV	Grand Total
Indora	89.02		42.5		131.52
Jawali	215.25		152.93	193.42	561.6
Kotla	707.73		56.64	180.05	944.42
Nurpur	979.66	21.44	159.03	377.5	1537.63
Rey	37.23		51.78	60.29	149.3
Grand Total	2028.88	21.44	462.88	811.26	3324.47

Felling Series-II				
Range	PBI	PBII	PB(UNALLOTTED)	Grand Total
Indora	36.42			36.42
Jawali	1596.84	117.74		1714.58
Kotla	787.43		1195.93	1983.36
Nurpur	806.81		750.21	1557.02
Rey	566.48		1054.05	1620.53
Grand Total	3793.98	117.74	3000.19	6911.91

Felling Series-III						
Range	PBI	PBII	PBIII	PBIV	PB(U)	Grand Total
Indora	40.05	24.28	16.99			81.32
Jawali	118.95					118.95
Nurpur	131.1		83.78	38.84		253.72
Rey	59.08		12.94		51.78	123.8
Grand Total	349.18	24.28	113.71	38.84	51.78	577.79

2.6 ANALYSIS AND VALUATION OF THE CROP

The forests have been stock mapped on digital KML format using GIS platform. Necessary details/ Hard copy has been placed in the respective compartment history files. Chil being the prominent species occupies 87% of the working

circle area, the rest being under Khair, other miscellaneous broad-leaved species, culturable and un culturable blanks. The detailed break-up is below: -

Table No. 2.3
I-LEGAL FELLING SERIES

RANGE	CHIL	KHAIR	MISC. B/L	CULTURABLE BLANK	UNCULTURABLE BLANK	NET AREA
Nurpur	1353	26.35	141.2	1.61	15.33	1537.63
Kotla	812.2	11.7	92.69	26.22	1.61	944.42
Jawali	426.8	38.64	93.73	1.21	1.21	561.6
Rey	129.5	11.5	8.3	-	-	149.3
Indora	111.3	1.01	19.21	-	-	131.52
Total: -	2833	89.2	355.2	29.04	18.15	3324.47

II VOLUNTARY FELLING SERIES

RANGE	CHIL	KHAIR	MISC. B/L	CULTURABLE BLANK	UNCULTURABLE BLANK	NET AREA
Nurpur	1323	12.31	77.79	53.55	89.9	1557.02
Kotla	1745	-	205.6	-	32.37	1983.36
Jawali	1509	4.15	131.3	-	70.3	1714.58
Rey	1426	4.85	118.8	-	70.82	1620.53
Indora	36.42	-	-	-	-	36.42
Total: -	6040	21.31	533.5	53.55	263.39	6911.91

III CFS FELLING SERIES

RANGE	CHIL	KHAIR	MISC. B/L	CULTURABLE BLANK	UNCULTURABLE BLANK	NET AREA
Nurpur	190.3	7.27	29.84	23.42	2.9	253.72
Kotla	-	-	-	-	-	-
Jawali	83.26	9.25	19.94	6.5	-	118.95
Rey	92.5	-	21	7.3	3	123.8
Indora	59.12	3	8	11.2	-	81.32
Total: -	425.2	19.52	78.78	48.42	5.9	577.79

- ii) Quality and age class: The average quality of chil is III/IV to III. It has been ocularly estimated for each compartment/ sub compartment and recorded in compartment History files. The crops are un-even aged. Middle age class trees Predominate.
- iii) Density: canopy density of each compartment/ sub compartment has been ocularly estimated and recorded in the Compartment History files. The overall density varies from 0.3 to 0.7; and average for the entire working circle is taken at 0.5.
- iv) 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. A total of 54 Sample Plots (FSI), of 0.1 hac. were laid in this working circle covering all PBs. The detail of PB wise sample plots are as under

**Table No. 2.4. Detail of PB wise sample plots
Felling series I**

Sr. No.	PB	No. of plots	Total area counted Hac
1	PB-I	30	3.00
2	PB-II	07	0.70
3	PB-III	05	0.50
4	PB-IV	12	1.20
	Total	54	5.40

GROWING STOCK

Felling series I

PBI

Table no. 2.5. PB wise detail of growing stock in each felling series

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	17071	25607	41366	33486	15101	3283	3283	1313	2626	143136
Khair	34799	27577	9192	2626	0	0	0	0	0	74194
Shisham	22981	9849	656	656	0	0	0	0	0	34142
BL	303350	93237	24294	12475	2626	656	0	656	656	437950
Grand Total	378201	156270	75508	49243	17727	3939	3283	1969	3282	689422

Tree Volume										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	1024.26	4865.33	26887.90	48219.84	39262.60	1162.82	1162.82	4648.02	9296.04	157447.63
Khair	2387.21	3943.51	2684.06	1286.74	0.00	0.00	0.00	0.00	0.00	10301.53
Shisham	1470.78	1733.42	306.35	640.91	0.00	0.00	0.00	0.00	0.00	4151.47

BL	9100.50	13053.18	13604.64	14096.75	3335.02	924.96	0.00	924.96	924.96	55964.97
Grand Total	13982.76	23595.45	43482.96	64244.24	42597.62	12546.78	11621.82	5572.98	10221.00	227865.60

PB II

Tree Count										
Spp.	Class									G. Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	1725	1610	2300	805	230	0	0	0	0	6670
Khair	1725	2070	230	0	0	0	0	0	0	4025
Shisham	0	0	0	0	0	0	0	0	0	0
BL	3680	2070	1035	345	0	0	0	0	0	7130
Grand Total	7130	5750	3565	1150	230	0	0	0	0	17825

Tree Volume										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	103.50	305.90	1495.00	1159.20	598.00	0.00	0.00	0.00	0.00	3661.60
Khair	118.34	296.01	67.16	0.00	0.00	0.00	0.00	0.00	0.00	481.51
Shisham	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BL	110.40	289.80	579.60	389.85	0.00	0.00	0.00	0.00	0.00	1369.65
Grand Total	332.24	891.71	2141.76	1549.05	598.00	0.00	0.00	0.00	0.00	5512.76

PB III

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0	0	2777	1851	925	925	0	0	0	6478
Khair	925	1851	2777	0	0	0	0	0	0	5553
Shisham	0	0	0	0	0	0	0	0	0	0
BL	74986	28698	2777	925	0	0	0	0	0	107386
Grand Total	75911	30549	8331	2776	925	925	0	0	0	119417

Tree Volume										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0.00	0.00	1805.05	2665.44	2405.00	3274.50	0.00	0.00	0.00	10149.99
Khair	63.46	264.69	810.88	0.00	0.00	0.00	0.00	0.00	0.00	1139.03
Shisham	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BL	2249.58	4017.72	1555.12	1045.25	0.00	0.00	0.00	0.00	0.00	8867.67
Grand Total	2313.04	4282.41	4171.05	3710.69	2405.00	3274.50	0.00	0.00	0.00	20156.69

PB IV

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	2028	8788	12168	16901	10140	6084	1352	2028	0	59489
Khair	18253	14197	4056	2028	0	0	0	0	0	38534
Shisham	0	0	0	0	0	0	0	0	0	0
BL	116280	35830	9464	2028	0	0	0	0	0	163602
Grand Total	136561	58815	25688	20957	10140	6084	1352	2028	0	261625

Tree Volume										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	121.68	1669.72	7909.2	24337.44	26364	21537.36	4786.08	7179.12	0.00	93904.6
Khair	1252.16	2030.17	1184.35	993.72	0.00	0.00	0.00	0.00	0.00	5460.40
Shisham	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BL	3488.40	5016.20	5299.84	2291.64	0.00	0.00	0.00	0.00	0.00	16096.08
Grand Total	4862.24	8716.09	14393.39	27622.80	26364.00	21537.36	4786.08	7179.12	0.00	115461.08

Felling series II

Sr. No.	PB	No. of plots	Total area counted Hac
1	PB-I	49	4.90
2	PB-II	01	0.10
3	PB-III	00	0.00
4	PB-IV	2	0.20
5	PB-U	29	2.90
	Total	81	8.10

PB I

Tree Count										
Spp.	Class									G. Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	27874	76653	80525	48779	20905	8517	2322	1548	6194	273317
Khair	143242	72008	12388	3871	774	0	0	774	0	233057
Shisham	6968	3097	0	0	0	0	0	0	0	10065
B/L	452180	131627	36391	13937	6194	1548	3871	2322	2322	650392
G. Total	630264	283385	129304	66587	27873	10065	6193	4644	8516	1166831

Tree Volume										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	1672.44	14564.07	52341.25	70241.76	54353.00	30150.18	8219.88	5479.92	21926.76	258949.26
Khair	9826.40	10297.14	3617.30	1896.79	379.26	0.00	0.00	379.26	0.00	26396.15
Shisham	445.95	545.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	991.02
B/L	13565.40	18427.78	20378.96	15748.81	7866.38	2182.68	5458.11	3274.02	3274.02	90176.16
G. Total	25510.19	43834.07	76337.51	87887.36	62598.64	32332.86	13677.99	9133.20	25200.78	376512.60

PB II

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0	0	0	0	0	0	0	0	0	0
Khair	0	0	0	0	0	0	0	0	0	0
Shisham	0	0	0	0	0	0	0	0	0	0
B/L	22370	3532	0	0	0	0	0	0	0	25902
G. Total	22370	3532	0	0	0	0	0	0	0	25902

Tree Volume										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Khair	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Shisham	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B/L	671.10	494.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1165.58
G. Total	671.10	494.48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1165.58

PB III & PBIV

NIL

PB UNALLOTTED

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	57934	115869	103454	64141	21725	15518	7241	3103	0	388985
Khair	40347	25863	6207	0	0	0	0	0	72418	144835
Shisham	5172	1034	0	0	0	0	0	0	6207	12413
BL	287604	65176	17587	8276	2069	0	0	2069	382782	765563
Grand Total	391057	207942	127248	72417	23794	15518	7241	5172	461407	1311796

Tree Volume										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	3476.04	22015.11	67245.10	92363.04	56485.00	54933.72	25633.14	10984.62	0.00	333135.7
Khair	2767.80	3698.41	1812.44	0.00	0.00	0.00	0.00	0.00	35484.82	43763.48
Shisham	331.01	181.98	0.00	0.00	0.00	0.00	0.00	0.00	14058.86	14571.85
BL	8628.12	9124.64	9848.72	9351.88	2627.63	0.00	0.00	2917.29	53972.62	582220.9
Grand Total	15202.97	35020.14	78906.26	101714.92	59112.63	54933.72	25633.14	13901.91	589266.30	973691.9

FELLING SERIES III

Sr. No.	PB	No. of plots	Total area counted Hac
1	PB-I	3	0.3
2	PB-II	3	0.3
3	PB-III	3	0.3
4	PB-IV	4	0.4
5	PB(UA)	3	0.3
	Total	19	1.90

PB I

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0	0	0	0	1163	10475	1163	1163	0	13964
Khair	11639	5819	3491	2327	0	0	0	0	0	23276
Shisham	2327	0	0	0	0	0	0	0	0	2327
BL	13967	10475	4655	1163	1163	0	0	0	0	31423
G. Total	27933	16294	8146	3490	2326	10475	1163	1163	0	70990

Tree Volume										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0.00	0.00	0.00	0.00	3023.80	37081.50	4117.02	4117.02	0.00	48339.34
Khair	798.44	832.12	1019.37	1140.23	0.00	0.00	0.00	0.00	0.00	3790.15
Shisham	148.93	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	148.93
B/L	419.01	1466.5	2606.8	1314.19	1477.01	0.00	0.00	0.00	0.00	7283.51
G. Total	1366.37	2298.62	3626.17	2454.42	4500.81	37081.50	4117.02	4117.02	0.00	59561.93

PB II

Per Hac. Tree Count (GRID-05)										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	55	40	80	30	5	0	0	0	0	210
Khair	65	80	5	5	0	0	0	0	0	155
Shisham	0	0	0	0	0	0	0	0	0	0
B/L	170	70	35	10	5	0	0	0	0	290
G. Total	290	190	120	45	10	0	0	0	0	655

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	1335	971	1942	728	121	0	0	0	0	5097
Khair	1578	1942	121	121	0	0	0	0	0	3762
Shisham	0	0	0	0	0	0	0	0	0	0
B/L	4127	1699	849	242	121	0	0	0	0	7038
G. Total	7040	4612	2912	1091	242	0	0	0	0	15897

PB III

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0	0	454	227	227	227	0	0	0	1135
Khair	227	682	454	0	0	0	0	0	0	1363
Shisham	0	0	0	0	0	0	0	0	0	0
B/L	10233	3411	454	227	0	0	0	0	0	14325
G. Total	10460	4093	1362	454	227	227	0	0	0	16823

Tree Volume										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0.00	0.00	295.1	326.8	590.2	803.5	0.0	0.0	0.0	2015.7
			0	8	0	8	0	0	0	6
Khair	15.57	97.53	132.5	0.00	0.00	0.00	0.0	0.0	0.0	245.67
			7				0	0	0	
Shisham	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.00
							0	0	0	
B/L	306.9	477.5	254.2	256.5	0.00	0.00	0.0	0.0	0.0	1295.2
	9	4	4	1			0	0	0	8
G.Total	322.5	575.0	681.9	583.3	590.2	803.5	0.0	0.0	0.0	3556.7
	6	7	1	9	0	8	0	0	0	1

PB IV

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	388	1942	2718	3884	2330	194	388	194	0	12038
Khair	4855	2913	582	388	0	0	0	0	0	8738
Shisham	0	0	0	0	0	0	0	0	0	0
B/L	19225	8156	2330	194	0	0	0	0	0	29905
G.Total	24468	13011	5630	4466	2330	194	388	194	0	50681
Tree Volume										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	23.28	368.98	1766.7	5592.9	6058	686.7	1373.5	686.7	0.0	16556.9
			0	6		6	2	6	0	6
Khair	333.0	416.56	169.94	190.12	0.00	0.00	0.00	0.00	0.0	1109.68
	5								0	
Shisham	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.0	0.00
									0	
B/L	576.7	1141.8	1304.8	219.22	0.00	0.00	0.00	0.00	0.0	3242.61
	5	4	0						0	

G.	933.0	1927.3	3241.4	6002.3	6058.0	686.7	1373.5	686.7	0.0	20909.2
Total	8	8	4	0	0	6	2	6	0	5

PB UNALLOTTED

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	11132	21747	19935	11650	3883	3106	1035	258	0	72746
Khair	9061	4660	776	0	0	0	0	0	0	14497
Shisham	0	0	0	0	0	0	0	0	0	0
B/L	49191	11391	3106	1035	258	0	0	258	0	65239
G. Total	69384	37798	23817	12685	4141	3106	1035	516	0	152482

Tree Volume										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	667.92	4131.93	12957.75	16776.00	10095.80	10995.24	3663.90	913.32	0.00	60201.86
Khair	621.58	666.38	226.59	0.00	0.00	0.00	0.00	0.00	0.00	1514.56
Shisham	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
B/L	1475.73	1594.74	1739.36	1169.55	327.66	0.00	0.00	363.78	0.00	6670.82
G. Total	2765.23	6393.05	14923.70	17945.55	10423.46	10995.24	3663.90	1277.10	0.00	68387.24

- v) Regeneration: To assess the status of regeneration, survey of proposed PB I areas was conducted and position of the areas is as under: -

Table No. 2.6.

Sr. No.	Particulars	Area in Hac.
1	Total of PB I	6112.96
2	Fully regenerated (76%)	1362.70
3	Moderately regenerated (50 to 75%)	1580.02
4	Poorly regenerated (50%)	1596.61
5	Advanced Growth	363.48
6	Area not regenerated (Blank)	----

	Culturable	410.68
8	Unculturable	101.05
9	Other Species (Misc/BL/Khair)	908.81
	Total: -	6112.96

From the above table it is evidently clear that progress of regeneration has been rather very poor.

2.7 GROWING STOCK:

The following table indicated comparative position of the existing growing stock, the normal growing (as per yield figures corresponding to the crop age) and growing stock at the beginning of the plan under revision.

Table No. 2.7. Showing comparative position of the existing growing stock and growing stock at the beginning of the plan under revision.

PB	Stems/ha c	Volum e	GS	GS at beginning
(1) LEGAL FELLING SERIES				
I	73	79.93	234	56.22
II	83	45.47	195	45.03
III	14	13.99	169	23.49
IV	30	23	86	23.47
Average	39	63.78	171.75 cum.	32.50 cum.

(2) VOLANTARY FELLING SERIES

I	61	25.17	234	41.98
Un-allotted	42	25.21	118	47.4
Average	52	25.1	176	44.698

(3) CFS FELLING SERIES

I	14	19.73	234	60.49
II	55	47	198	82.93
III	24	23.61	169	53.37
IV	32	39.69	86	24.02

From the above figures it is evidently clear that the position of growing stock in all the felling series is much below the normal:

The growing stock of forests PB wise is as under: -

1	PB-I	421236.21 cum.
2	PB-II	6551.41 cum.
3	PB-III	12165.75 cum.
4	PB-IV	110461.56 cum.
5	PB-un-allotted	393337.63 cum.
	Total	890194.22cum.

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	108141	220259	244909	166983	71564	39757	13517	8746	10337	884213
Khair	263197	167778	40553	11132	795	0	0	795	0	484250
Shisham	40553	15903	795	795	0	0	0	0	0	58046
BL	1317579	390423	104961	42143	12722	4770	3975	4770	3180	1884523
Grand Total	1729470	794363	391218	221053	85081	44527	17492	14311	13517	3311032

Tree Volume										
Spp.	Class									G. Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	6488.46	41849.2	159190.85	240455.52	186066.40	140739.78	47850.18	30960.84	36592.98	890194.2
Khair	18055.31	23992.2	11841.48	5454.68	389.55	0.00	0.00	389.55	0.00	60122.82
Shisham	2595.39	2798.93	371.27	776.72	0.00	0.00	0.00	0.00	0.00	6542.30
B/L	39527.37	54659.2	58778.16	47621.59	16156.9	6725.70	5604.7	6725.7	4483.8	240283.2
G. Total	66666.54	123299.61	230181.75	294308.51	202612.89	147465.48	53454.93	38076.09	41076.78	1197142.57

2.8 SILVICULTURAL SYSTEM:

The chil forests will be managed under the Indian Irregular shelter wood System “The Punjab Shelter wood System”. This system permits retention of compact groups of immature stock so as to avoid un-necessary sacrifice for the sake of rigid uniformity. Like-wise the precipitous and rocky bits of forests will be worked on selection principles.

The felled areas will be regenerated without delay by artificial planting through well-established plantation techniques supplemented by such amount of natural regeneration as may already be present on ground or as would come in naturally without having to wait for a good seed year to follow the seeding felling. Compact group of young crops up to 40 cms d.b.h. but not less than 0.20 ha. in extent provided healthy and vigorous growth; shall be retained as part of the future crop.

2.9 CHOICE OF SPECIES:

Chil will be the main species, however Khair and other important broad-leaved species such as Shisham, Siris, Toon, Hera, Dhau, Kalam and Ambala etc. wherever coming up naturally shall be retained to maintain eco-diversity. But no attempt to grow Khair and other Broad-leaved species artificially shall be made in the forests allotted to Chil Working Circle where only Chil shall be grown.

2.10 ROTATION AND EXPLOITATION DIAMETER:

These forests have been worked on a rotation of 120 years and regeneration period of 30 years in the past consistent with the norms of scheme of rotation closures. Chil crop is expected to attain a diameter of 55 cms d.b.h. at a rotation of 120 years which is good enough for resin as well as timber production. Therefore, rotation is kept at 120 years.

2.11 REGENERATION PERIOD:

Keeping in view the requirement of rotational closure scheme as well as the longer time expected to be taken by Chil regeneration to establish in this type of chil forests which are under retrogression owing to repeated fires and other biotic interference. The regeneration period is fixed at 30 years.

2.12 DIVISION INTO PERIODS AND ALLOTMENT TO PERIODIC BLOCKS:

With a rotation of 120 years and a regeneration period of thirty years, to achieve the set objectives there will be four periodic blocks thirty years each in legal and co-operative Society felling series.

In view of the forests comprising voluntary felling series; being irregular and understocked, only those forests which can be immediately taken up for concentrated artificial regeneration consistent with rotation closure scheme have been allotted to periodic block-I The remaining area will remain as PB-n-allotted.

TABLE OF FELLING IN PB-I

The sequence of felling in PB-I to be followed during the Working Plan period is given at infra. While carrying out marking in PB-I, the main criteria have to be the marking principles. It due to any reasons the regeneration operation as prescribed cannot be carried out in the felled area, future fellings have to be stopped.

2.13 METHOD OF EXECUTING SEEDING FELLING IN PB-I (GENERAL PRINCIPLES OF MARKING)

- i) All tress except to be retained as mentioned below are to be marked.
- ii) Well grown healthy, tall, clean bolded and disease-free trees of IA to IC classes 15-20 numbered per ha. corresponding to a distance of 25-44 m apart on northern and eastern slopes and favorable grounds and 20-25 number per hac. Corresponding to distance of 16.25 m a part on the south and south western aspect with hot shallow soils will be retained seed bearers. Trees of II A Class would be preferred over crooked and malformed trees of IIB and above.
- iii) Compact groups of healthy poles with the density of not less than 0.7 up to 30 cm in diameter and not less than 0.2 ha. in extent shall be retained as part of future crop and thinned wherever necessary, such patches of advance growth shall be shown on a map to be prepared by marking officer and submitted along with marking list to the Divisional Office. A copy of the map shall also be placed in Compartment History Files along with a note on markings.
- iv) All mature trees standing over such advance growth shall be marked.
- v) On very steep and broken grounds marking will confirm to selection principles.
- vi) Marking on the periphery of forests especially near the village shall be lighter to avoid opening of the area and minimize the chances of encroachment.

- vii) Important broad-leaved species viz. Khair Siris, Shisham, Toon, Bhera, Dhau Kalam, Amla etc. are not to be marked, generally may be lopped where-ever suppressing chill trees.

2.14 METHOD OF EXECUTING FELLING IN PB-II (GENERAL PRINCIPLES OF MARKING)

No commercial felling is prescribed in this periodic block, C/D grade thinning will, however, be carried out in pole crop. To safe guard the failure yield trees of approach classes i.e. IIA and above class will be meticulously conserved and will only be marked when dead, dying, diseased trees (Whose 1/3 of the crown is already dead) or malformed crooked branchy trees suppressing healthy pole crop also be marked.

2.15 METHOD OF EXECUTING SEEDING FELLING IN PB-III (GENERAL PRINCIPLES OF MARKING)

The forests allotted to this PB on the whole are much below normal and as such generally not thinning would be necessary. However, wherever necessary thinning cum improvement felling will be done on the following general principles: -

- i) All removal should aim at improving the composition, health, vigor and hygiene of the crop.
- ii) No trees shall be marked to under fresh regeneration.
- iii) Trees of IA class and above which are out of place in this PB will be removed if they are silviculturally available and lasting gap is created in the canopy by their removal.
- iv) All dead, diseased, damaged, malformed and stunted trees will be marked.

2.16 METHOD OF EXECUTING FINAL FELLING IN PB-IV (GENERAL PRINCIPLES OF MARKING)

- i) Mother trees (Seed bearers) standing over established regeneration will be marked except 2-3 trees per ha. as fire insurance and also national emergency reserve.
- ii) Isolated III classes trees if any will also be marked.
- iii) In group of poles and patches of advance growth thinning may be done where-ever necessary.

2.17 CALCULATION OF YIELD:

Yield from PB I areas is calculated as under:

LEGAL FELLING SERIES:

Total volume of enumerated	157447.63 M3
III and below	32777.49 M3
III and above	151558.04 M3

% age of III and below:

$$\frac{32777.49 \times 100}{157447.63} = 20.81 \text{ or say } 20\%$$

% age of III and above:

$$\frac{151558.04 \times 100}{157447.63} = 96.25 \text{ or say } 90\%$$

Constant = 0.2(C1) and 0.9(C2)

Ist METHOD:

$$\text{Formula } Y = \frac{C1V1}{10} + \frac{C2V2}{10} = \frac{32777.49 \times 0.2}{10} + \frac{151558.04 \times 0.9}{10} = \frac{142957.72}{10}$$

14295.77 Or say 14000 M³ per year

IInd METHOD:

i)	Total volume enumerated	157447.63 M3
ii)	Volume of trees to be retained as seed Bearers (50 trees of III and IIA per ha.	102922.05 M3
iii)	Volume of advance growth retained (100% of V+IV trees)	5889.59 M3
iv)	Likely to be marked for Right Holders	2000 M3
v)	Volume available for commercial felling in 10 years	46635.99 M3

Or Say 46000 cum

Annual Yield 4600 M³ (Being conservative yield is fixed at 4000 m³)

IInd method being conservative will be followed and hence annual yield prescribed **4000 m³**

VOLUNTRY FELLING SERIES

Total volume of enumerated	258949.26 M3
III and below	68577.76 M3
III and above	242712.75 M3

% age of III and below:

$$\frac{68577.76 \times 100}{258949.26} = 26.48 \text{ or say } 20\%$$

% of III and above:

$$\frac{242712.75 \times 100}{258949.26} = 93.72 \text{ or say } 90\%$$

Constant = 0.2 and 0.9

Ist METHOD:

$$\text{Formula } Y = \frac{C1V1}{10} + \frac{C2V2}{10} = \frac{0.2 \times 68577.76}{10} + \frac{0.9 \times 242712.75}{10} = \frac{232157.02}{10}$$

23215.70 Or Say 20000 cum.

IInd METHOD

i)	Total volume enumerated	258949.26 m ³
ii)	Volume of trees to be retained as seed Bearers (50 trees of III and IIA per ha.	198235.45 m ³
iii)	Volume of advance growth retained (100% of V+IV trees)	16236.51 m ³
iv)	Likely to be marked for Right Holders	2000 m ³
v)	Volume available for commercial felling in 10 years	42477.3 m ³

Or Say = 42000 cum

Annual Yield 4200 M³

IInd method being conservative will be followed and hence annual yield prescribed **4000 m³**

CO-OPERATIVE FOREST SOCIETY FELLING SERIES:

Total volume of enumerated	48339.34 M3
III and below	0.00 M3
III and above	48339.34M3

% of III and below:

$$\frac{0 \times 100}{5549.27} = 0 \text{ or say } 0\%$$

% of III and above = 100%

Constant = 0.0 and 1.0

IstMETHOD:

$$\text{Formula } Y = \frac{C1V1 + C2V2}{10} = \frac{0.0 \times 0 + 1.0 \times 48339.34}{10}$$

= 4833.93 or say 4800 M³

IInd METHOD

i)	Total volume enumerated	48339.34 M3
ii)	Volume of trees to be retained as seed bearers (6 trees of IIB per ha.)	5447.20 M3
iii)	Volume of advance growth retained (20% of V+IV) class trees	0 M3
iv)	Likely to be marked for Right Holders	2000 M3
v)	Volume available for commercial felling in 10 years	40892.14 cum

Annual Yield 4000 M3

IInd method being conservative will be followed and annual yield prescribed **4000 m³**

2.18 YIELD PRESCRIBED

Commercial felling has been prescribed in PB-I areas only. The hygienic removal forms the regeneration areas and the salvage removals elsewhere have to be accounted for. For this purpose, the yield prescribed is to be restricted to the annual increment of the growing stock of IV class to IIB which constitutes 57.85% of the growing stock excluding V class. The increment put on by Ist class trees is practically nil. The increment present has been worked out by applying Presler's formula at 6.84, 3.98, 1.64 and 0.41 for IV, III, IIA and IIB class trees respectively. At these rates the total annual increment for the entire working circle works out to 6821.28 m³.

In view of the aforesaid and as a safeguard against repeated fires and consequent heavy salvage removals; the yield for the entire working circle is fixed at 4200 m³ annum.

Annual Yield prescription

Table No. 2.8. Showing PB wise Annual yield

PB	Annual yield m3	Remarks
I	4200	Reduced keeping in view annual increment
II	500	Salvage & right holder removals
III	500	Do
IV	1000	Final fellings
Un-allotted	500	Salvage & right holder removals
Total	6700	

2.19 CONTROL OF YIELD:

Yield control shall be by volume. The removal over a period of 5 years or the entire plan period will not vary by more than 10% of the yield for the period in question. All removals irrespective of sizes of the trees will count towards yield. Deviation of yield must be got approved from the competent authority.

2.20 SUBSIDIARY SILVICULTURE OPERATIONS IN PB I AREAS:

- i) **SITE CLEARANCE:** The area will be cleared off the bush growth and felling refuse if any, *Lantana camara*, wherever found, will be uprooted. The material will be burnt. These operations would be completed positively in the month of March.
- ii) **SOWING AND PLANTATION:** The earth work for sowing and planting would be done during March and April before 15th April. Temporary nursery will be raised near to the area where the water is available so as to have not less than 15 cm high seedling by 30th June. The pits would be refilled during May and June. Sufficient quantity of seed would be broadcast in the area with the first shower of monsoon. The planting of tube plants would be completed latest by July end so that the plants get more than a month's period of rains to establish well to withstand the drought of autumn and next summer. The failure will be beaten up till the area have been fully stocked. The broadcast sowing be stopped with the progress of regenerations.
- iii) **WEEDING AND BUSH CUTTING:** These operations are the most important because of the areas being infested with grass and bushes. There would be two weeding, one in March and second in August in first year and one seeding per year in the subsequent three years. The bushes be cut twice in March and September every year till the plant have out grown the bush growth and thereafter once a year in spring till the plantation have been controlled burnt twice and grown to a minimum height of 3 meters. This is necessary to reduce fire hazard. The cut material would be burnt.
- iv) **CLEANING:** Cleaning would be carried-out in denser patches of young regeneration comprising mainly of saplings. All material would be burnt as a fire protection measure.
- v) **MECHANICAL THINNING:** When the crop is in the young pole stage 3m to 5m it will be subjected to stick thinning.
- vi) **CONTROL BURNING:** The chil crop will be control burnt when the height is between 2.5 m to 3m. Sufficient labour would be engaged to protect seedlings and saplings less than this height and to restrict the fire to the regeneration areas. The boundaries of regenerations areas will also be kept clear to the inflammable material during the fire season.

- vii) **CLOSURE:** All the regeneration area shall remain closed to grazing till the young crop attains a minimum height of 3 meters. Thereafter the areas can be thrown open to grazing at the discretion of D.F.O.

2.21 MISCELLANEOUS REGULATION:

- i) **RIGHT HOLDERS' REQUIREMENT:** The marking of trees for local timber distribution would be confined to winter season as per standing orders of Pr.C.C.F. HP and C.F. Dharamshala circle.
- ii) **REGENERATION ASSESSMENT SURVEY:** Regeneration survey on 1:3750 scale map as per guidelines given in code for working plan procedure in H.P. shall be prepared every year before 31st of March and results of such survey made use for preparing A.P.O. and felling programme for next years. Special periodical review of success of regeneration operations will be taken at every five years and necessary measures to be taken wherever required.
- iii) **FIRE PROTECTION:** It has been discussed in para (vi) of Chapter IX. The villagers exercising rights of user in the various forests are required to render all possible help in detection and extinguishing of forest fire. In case of negligence on their part their rights would be suspended at least for a period of five years. Special emphasis will be given to prevent forest fires in the regeneration areas.
- iv) **RESIN TAPPING:** Of late the forests of Nurpur Forest Division are being tapped by rill method. In the light of consultations with Indian Council of Forestry Research and Education Dehradun, Pr. CCF. HP has laid down the following conditions for resin tapping w.r.f 1995 season onwards:
- Minimum tapping diameter has been fixed at 35 cms.
 - No wrong fixation of rill to be done on trees having been tapped earlier by cup and lip method, such trees shall be deleted.
 - Readymade acid paste to be used.
 - No resin tapping shall be done on chil trees below 35 cms. D.b.h. in plantations areas and PB-IV areas of chil working circle.
 - Blank areas are to be regenerated with clear prescriptions to the effect that healthy stock of chil plants will be planted on an average 600-700 plants per hac. with provision to clear the bushes around pits to relieve the plants from suppression. The clearance of bushes will be carried out twice a year in the area on meter radius around pits.

Natural growth of important broad-leaved species such as Khair, Siris, Toon, shisham, Bhera, Kalam and Amla are to be encouraged and retained.

2.22 Chil Seed Stand:

P35N Kopra Consist of two compartments i.e. C1(10.52 hac) and C2(9.31 hac). C2 consist of more evenly spaced mature mother trees of chil. The trees are 22m apart. Therefore, this particular forest is kept as seed bank for chil.

2.23 Sequence of Felling in PB-I

Table No. 2.9. Showing Sequence of Felling

FELLING SERIES						
Sr. No.	Year of Felling	Name of Range	Felling Series	Name of Forest	Comptt.	Area in Hac.
1	2024-25	Nurpur	Legal	R 1 N Tatal	C- 2b	46.53
				P.39 N TherKuther	C- 1d	15.38
				P.39 N TherKuther	C- 4b	7.69
				P.39 N TherKuther	C- 4c	4.45
					Total: -	74.05
			Voluntary	UP.6. Ladori	C-5	48.55
					Total: -	48.55
			CFS Felling Series	CFS Gahin Lagore	R-3	12.95
					Total: -	12.95
		Kotla	Legal	R 15 N Bhali	C-1d	36.42
					Total: -	36.42
			Voluntary	UP.54 Bar	C-1	38.45
				U.55 Bhali	C-8	78.9
					Total: -	117.35
		Jawali	Legal	-	-	-
			Voluntary	U.13 Junat	C-1	45.32
					Total: -	45.32
			CFS Felling Series	-	-	-
			Legal	-	-	-
		Rey	Voluntary	-	-	-
			CFS Felling Series	CFS Rey	U-19	23.88
					Total: -	23.88
		Indora		-	-	-
			Legal Felling	G. Total of Legal Felling		110.47
			Voluntary	G. Total of Vol. felling		211.22
			CFS Felling	G. Total CFS Felling Series		36.83
				G. Total of 2024-25		358.52
2	2025-26	Nurpur	Legal	P. 42 N Ladori	C-2b	13.76
				P. 40 N Manuha-Ki- Dhar	C-1c	14.16
					Total: -	27.92

			Voluntary	-	-	-
			CFS Felling	CFS Gahin Lagore	U-9	22.66
			Series		Total: -	22.66
		Kotla	Legal	P. 3 N. Balira	C-2c	25.88
					Total: -	25.88
			Voluntary	U.50 Kothi Banda	C-8	35.61
				U.50 Kothi Banda	C-10	56.24
					Total: -	91.85
			CFS Felling	-	-	-
			Series			
		Jawali	Legal	P 6 N Harsar Nana	C- 2b	48.56
					Total: -	48.56
			Voluntary	U-13 Junat	C-22	18.21
					Total: -	18.21
			CFS Felling	-	-	-
			Series			
		Rey	Legal	-	-	-
			Voluntary	-	-	-
			CFS Felling	CFS Rey	U-6	5.66
			Series		U-10	5.66
					Total: -	11.32
		Indora	Legal	-	-	-
			Voluntary	-	-	-
			CFS Felling	-	-	-
			Series			
				G. Total of Legal Felling		102.36
				G. Total of Voluntary Felling		110.06
				G. Total CFS Felling Series		33.98
				G. Total of 2025-26		246.4
3	2026-27	Nurpur	Legal	P. 43 N. Chotidhar	C-6a	9.7
					Total: -	9.7
			Voluntary	-	-	-
			CFS Felling	-	-	-
			Series			
		Kotla	Legal	P .46 N. Bar	C-3	13.76
				P. 47 N. Anuhi	C-2	26.7
					Total: -	40.46

			Voluntary	U.50 Kothi Banda	C-24	43.39
					C-13	37.23
					Total: -	80.62
			CFS Felling	-	-	-
			Series			
		Jawali	Legal	P 6 N Harsar Nana	C-1b	23.96
					Total: -	23.96
			Voluntary	UP.146 Fatehpur	C-18	32.72
					Total: -	32.72
			CFS Felling	-	-	-
			Series	-	-	-
		Rey	Legal	-	-	-
			Voluntary	U-25 Anoh	C-4	40.46
					Total: -	40.46
			CFS Felling	CFS Rey	U-29	4.45
			Series		U-11	2.83
					Total: -	7.28
		Indora	Legal	-	-	-
			Voluntary	-	-	-
			CFS Felling	CFS Lodhwan	P-28	20.23
			Series		Total: -	20.23
				G. Total of Legal Felling		74.12
				G. Total of Voluntary Felling		153.8
				G. Total CFS Felling Series		27.51
				G. Total of 2026-27		255.43
4	2027-28	Nurpur	Legal	P 34 N Aund	C-3	16.59
					Total: -	16.59
			Voluntary	-	-	-
			CFS Felling	-	-	-
			Series			
		Kotla	Legal	P 47 N Anuhi	C-3	14.57
					Total: -	14.57
			Voluntary	U-55 Bhali	C-16	12.94
					Total: -	12.94
			CFS Felling	-	-	-
			Series			

		Jawali	Legal	-	-	-
			Voluntary	U-13 Junat	C-25	61.5
					Total: -	61.5
			CFS Felling	CFS Lahroo	U-5	6.88
			Series		Total: -	6.88
		Rey	Legal	-	-	-
			Voluntary	-	-	-
			CFS Felling	CFS Rey	U-43	7.69
			Series		Total: -	7.69
		Indora	Legal	-	-	-
			Voluntary	-	-	-
			CFS Felling	CFS Lodhwan	P-15	19.82
			Series		Total: -	19.82
				G. Total of Legal Felling		31.16
				G. Total of Voluntary Felling		74.44
				G. Total CFS Felling Series		34.39
				G. Total of 2027-28		139.99
5	2028-29	Nurpur	Legal	R 2 N Meh Dhar	C 1b	52.2
				P 43 N Chotidhar	C 3	11.33
					Total: -	63.53
			Voluntary	-	-	-
			CFS Felling	-	-	-
			Series			
		Kotla	Legal	R 15 N Bhali	C 2a	42.48
					Total: -	42.48
			Voluntary	UP.52 Soldha	C-17	32.78
				UP.52 Soldha	C-6	38.48
					Total: -	71.26
			CFS Felling	-	-	-
			Series			
		Jawali	Legal	P. 7 N. Fatehpur	C-3b	18.2
					Total: -	18.2
			Voluntary	UP.104 Nana	C-3	22.26
				-	Total: -	22.26
			CFS Felling	CFS Lahroo	U-26	5.26
			Series		Total: -	5.26

		Rey	Legal	-	-	-
			Voluntary	-	-	-
			CFS Felling Series	-	-	-
		Indora	Legal	-	-	-
			Voluntary	-	-	-
			CFS Felling Series	-	-	-
				G. Total of Legal Felling		124.21
				G. Total of Voluntary Felling		93.52
				G. Total CFS Felling Series		5.26
				G. Total of 2028-29		222.99
Sr. No.	Year of Felling	Name of Range	Felling Series	Name of Forest	Comptt.	Area in ha.
6	2029-30	Nurpur	Legal	P-39- N TherKuther	C-2c	14.57
					Total: -	14.57
		Kotla	Legal	P-4-N Kaldun	C-1a	24.69
					Total: -	24.69
				P-47-N Anuhi	C-4	25.5
					Total: -	25.5
			Voluntary	U-54 Bhali	C-22	5.66
					Total: -	5.66
		Rey	CFS	CFS Kulahri	U-5	4.05
					Total: -	4.05
				G. Total of Legal Felling		64.76
				G. Total of Voluntary Felling		5.66
				G. Total CFS Felling Series		4.05
				G. Total of 2029-30		74.47
7	2030-31	Nurpur	Legal	P-40-N Manua-Di-Dhar	C-1b	10.52
					Total: -	10.52
		Kotla	Voluntary	U-52 Soldha	C-1a	61.5
					Total: -	61.5
				G. Total of Legal Felling		10.52

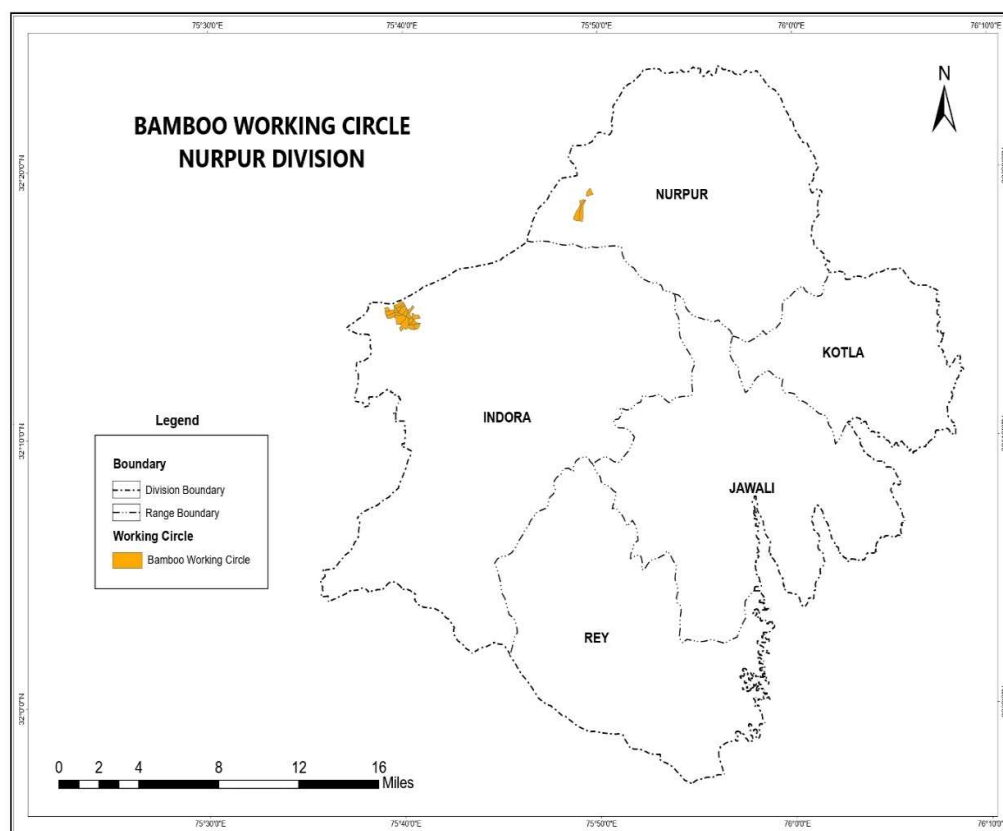
				G. Total of Voluntary Felling		61.5
				G. Total CFS Felling Series		0
				G. Total of 2030-31		72.02
8	2031-32	Nurpur	Legal	P-36 -N BassaFarkunda	C-2a	3.24
					Total: -	3.24
				G. Total of Legal Felling		3.24
				G. Total of Voluntary Felling		0
				G. Total CFS Felling Series		0
				G. Total of 2031-32		3.24
9	2032-33	Nupur	Legal	P-42-N Ladori	C-4	25.9
					Total: -	25.9
				G. Total of Legal Felling		25.9
				G. Total of Voluntary Felling		0
				G. Total CFS Felling Series		0
				G. Total of 2032-33		25.9
Sr. no.	Year of Felling	Name of Range	Felling Series	Name of Forest	Comptt.	Area in ha.
10	2033-34	Kotla	Legal	U-55 Bhali	C-21	32.37
					Total: -	32.37
				G. Total of Legal Felling		32.37
				G. Total of Voluntary Felling		0
				G. Total CFS Felling Series		0
				G. Total of 2033-34		32.37
				G. Total Type A: -		1430.4

2.24 Sequence of Felling in PB-IV

Chil Working Circle					
Year	Range	Type	Name of Forest	Compartment	Area
2024-25	Jawali		P. 1. N. SidhpurGhar	C-1c	21.45
	Kotla		P. 3. N. Balira	C-1b	23.88
	Nurpur		CFS Ghahin Lagore	U- 8	19.42
	Jawali		P. 6. N. Harsar Nana	C-1a	31.16
2025-26	Jawali		P. 8. N. Kyari	C-1a	36.4
	Nurpur	RF	R .3. N. Bhol Thakran	C-1	17.81
	Jawali	RF	R. 28.D. Junat	C-2	39.66
2026-27	Kotla	DPF	P. 2. N. Devi-Da-Ban	C-2a	29.93
	Jawali		P. 1. N. SidhpurGhar	C-1d	38.45
	Kotla		P. 3. N. Balira	C-2b	19.02
2027-28	Nurpur		P.N. 39 TherKuther	C- 1c i	11.33
	Nurpur		P.N. 39 TherKuther	C-2b	16.19
	Kotla		P. 46. N. Bar	C-2	16.58
2028-29	Nurpur		P.40.N. Manuha-Ki-Dhar	C-2b	15.38
	Kotla		R. 6. N. Mastgarh	C-1b	23.47
	Nurpur		CFS Gahin Lagore	U- 19 b	9.71
2029-30	Nurpur		CFS Gahin Lagore	U- 7	3.64
	Jawali		P. 10. N. Karahu	C-1	17.4
	Nurpur		CFS Suliali	U- 12	6.07
	Nurpur	DPF	P. 34. N. Aund	C-1	14.97
	Nurpur		P. 34. N. Aund	C-2	17.8
	Nurpur		P. 36. N. Bassa Farkunda	C- 4	14.97
2030-31	Rey	RF	R 30 D Samblian	C-1a	40.46
	Nurpur		P. 43. N. Chhotidhar	C-2	9.71
	Nurpur		P. 43. N. Chhotidhar	C-5	8.9
	Nurpur		P. 44. N. Kot Hatli	C-2	11.33
2031-32	Nurpur		P.35.N. Kopra	C-2	9.31
	Kotla	RF	R. 13. N. Soldha	C- 1	50.98
	Nurpur		P.42.N. Ladori	C-2a	18.6
	Kotla		P. 45. N. Tilok Nath	C-3	4.05
2032-33	Nurpur		P.N. 39 TherKuther	C- 1c ii	24.67
	Kotla		P. 46. N. Bar	C-1	12.14
	Nurpur		P.N. 39 TherKuther	C-3b	25.09
	Nurpur		P.N. 39 TherKuther	C-4a	8.09
2033-34	Jawali		P. 9. N. Gharoli Chalaun	C-2	8.9
	Nurpur		R. 8.N. Chhatril	C-3	139.19
	Rey	DPF	P. 2. D. Ghar Bambota	C-1	19.83
	Nurpur		P. 41. N. Paniaru	C-2	14.16

CHAPTER-III

BAMBOO WORKING CIRCLE



Map No. 3.1 (1: 50,000) GIS MAP FOR BAMBOO WORKING CIRCLE

3.1 General Distribution and Character of Vegetation: The general

description of this working circle has been discussed in chapter -II of Part -I. The forests are in retrogression state and facing extinction. This has been the result of no fellings done in last 2 working plan periods, heavy incidence of grazing and hacking for fodder and fuel wood. The rainy season closures as prescribed for this area were not honored properly, though scattered planation of Bamboo species has yielded results all across the division but not significant pacthes have been created which would increases the area under this working circle. Natural regeneration is almost absent owing to uncontrolled grazing. The bamboos are



therefore not reproducing both form Rhizomes and seed except in some of the better stocked compartments of R-12N Damtal and CFS Sirt. All the areas allotted to this working circle except R10.N Talara from which the bamboo has completely vanished, in R.C. Kang Plan, have been retained in this working circle. In addition, areas of CFS Sirt allotted to Bamboo Working Circle in R.D. Rawal's Plan have been allotted to this working circle. The detail of areas allotted by legal status range wise to this working circle is given below:

Table No. 3.1 Showing Range Wise Area Allotted to this working circle

Felling series	Kind of Forest	Ranges (Area in ha.)		
		Nurpur	Indora	Total
Legal closure felling series	Reserved	97.12	148.10	245.22
Voluntary felling Series	Un-demarcated	-	72.03	72.03
	Protected Forest	-	-	0
CFS Felling Series	Reserved		17.40	17.40
Total: -		97.12	237.53	334.65

3.2 Special Objects of Management:

The object of management shall be the rejuvenation of old bamboo forests.

3.3 Block and Compartments:

Table No. 3.2.

Bamboo Working Circle				
Range	Type	Name of Forest	Compartment	Area
Indora	CFS	CFS Sirt	R- 1	10.52
			R- 2	6.88
	RF	R. 12. N Damtal	C-10	12.95
			C-11	22.66
			C-12	10.12
			C-13	15.78
			C-14	8.09
			C-15	7.28
			C-16	8.09
			C-18	10.93
			C-19	11.74
			C-3	7.28
	UF	U-56 Damtal	C-5	13.35
			C-8	8.9
			C-9	10.93
			C 2	29.14
			C 3	42.89

Nurpur	RF	R.11.N Khanni	C-1a	39.66
			C-2b	24.28
			C-2f	33.18
Grand Total				334.65

3.4 Analysis and Valuation of the Crop:

Enumeration: 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. A total of 4 Sample Plots of 0.1 hac. were laid in this working circle covering all PBs. The detail of PB wise sample plots is as under:

Sr. No.	No. of plots	Total area counted Hac
1	4	0.4

Results:

Table No. 3.3. Showing result of Enumeration

Bamboo Working Circle											
Detail	Current years Clums			1 to 2 Years			Green Damaged/ Twisted Clums			Green Damage/ Twisted	G. Total
	A	B	c	a	b	c	A	B	c		
Per Hac. 63 Clump	250	303	303	550	600	650	606	610	630	653	5155
Total Working Circle Hac.	83662	101398	101398	184057	200790	217522	202797	204136	210829	218526	1725115

*(a denotes diameter class of culm between 2<5cm; b denotes diameter class of culm between 5<8cm; c denotes diameter class of culm above 8cm)

The forests have been stock mapped on 1:15000 (4"=1 mile) scale, The bamboo bearing area works-out to 169.16 ha. only i.e. 50% of the total area of the Working Circle. The bamboo bearing area has badly shrunk in the past.

Estimation of bamboo along with other species has been carried out in the forests allotted to this working circle. The stocking of bamboo works out to 63 clumps per ha. Complete details of enumeration have been appended in the compartment history files,

The quality of bamboo is generally poor except in R-12. N. Damtal and CFS Sirit. The reproduction being poor; the older bamboos predominate. By and large the density of the clumps is poor, except in R-12. N. Damtal and CFS and Sirit and the clumps are congested.

on the basis of ground conditions of the crop the area has been divided into two types: -

‘A’ Type: The areas bearing few scattered congested clumps, the bamboos therein being malformed and the ground is either occupies by scrub growth or is blank. The area under this type is 177.24 ha.

‘B’ Type: The areas bearing bamboos worth exploitation with miscellaneous broad-leaved species interspersing all over. The area under this type is 157.41 ha.

Table No. 3.4. The details of areas under ‘A’ and ‘B’ types

Bamboo Working Circle					
Type	Type of Forest	Range/ Name of Forest / Area in Hac.			
A’	Reserved	Nurpur		Indora	
		R.11.N Khanni		R.12.N Damtal	
		C1a	39.66	C17	8.09
		C2b	24.28		
		C2f	33.18		
	Unclassed Forests			UP 56 Damtal	
				C2	29.14
				C3	42.89
		Total	97.12		80.12
		G. Total	177.24		
B’	Reserve	Nurpur		Indora	
				R.12.N Damtal	
				C3	7.28
				C5	13.35
				C9	8.90
				C10	10.93
				C11	12.95
				C12	22.66
	Type of Forest	Range/ Name of Forest / Area in Hac.			
		Nurpur		Indora	
				R.12.N Damtal	
				C13	10.12
				C14	15.78
				C15	8.09
				C16	7.28
				C19	10.93
				C20	11.74
		Total		140.01 ha.	
	CFS Sirit			R1	10.52
				R2	6.88
		Total		17.40 ha.	
		G. Total		157.41 ha.	

3.5 Silvicultural System: Selection system with thinning shall be adopted. Cleanings where-ever required shall be simultaneously carried out. The unit of treatment shall be an individual clump.

3.6 Rotation:

In bamboos rotation has reference to the individual culms and not the clump. The culm attains full height and thickness during the very first year of its growth and deterioration sets in about the fifth year. The life of the culm on an average is six years. The age at which bamboo is fit for felling varies from 3 to 5 years.

3.7 Felling Cycle:

Felling cycle will be three years so as to allow ample time for the new ‘manus’ to develop and establish.

3.8 Calculation of Yield:

The yield is prescribed by area.

3.9 Method of Executing Felling:

Type ‘B’ Areas (Bamboo)

To ensure sustained productivity of the Rhizomes, removals should be restricted to net increment which is equal to the total number of new shoots (manus) produced in a year, minus the loss through decay, malformation and all other destructive agencies. Congested clumps would be cleaned so that the production of ‘manus’ is not hampered. The following Rules must be observed in carrying out the fellings;

1. Felling will commence not earlier than 15th of November and shall be completed by 15th of March.
2. Cleanings and hygienic fellings comprising of removal of dead dry and malformed culms shall be simultaneously carried out.
3. Culms will be Cut using sharp tools to avoid splitting; above a node within 15 cms from the ground; but where support is needed for adjoining ‘manus’ the cut may higher.
4. No ‘manus’ (shoots of previous resins) or ‘chal’ (on the periphery of clump) shall be cut except when malformed and for the support of these are equal number of well grown live culms of 2 to 3 years evenly distributed over the clump will be retained.
5. No flowering culm or clump will be cut till the seed has been shed.
6. Digging of rhizomes not to be allowed.
7. Cut portion of bamboo will not be left in the clump.
8. Broad-leaved trees suppressing bamboo clumps will invariably be removed.

In view of past experience of bamboo working through contractor’s agency as well as H.P. State Forest Corporation Ltd. in the recent past; the above rules have been followed more in breach than in observance. *Moreover, the yield is*

insignificant. In view of these and cutting of bamboo being a highly silvicultural operation, the working is suggested to be done departmentally.

Type 'A' Areas

1. The congested un-workable clumps shall be clear felled.
2. In the remaining bamboo clumps; cutting rules for 'B' type areas shall be followed.
3. The growth of board leaved species will not be sacrificed for the growth of bamboo.

3.10. Sequence of Felling: -

The following sequence of felling and subsidiary silvicultural treatment of type 'B' areas keeping in view the three years felling cycle; shall be followed as under:

- (i) 'B' Type Area etc.
- (ii) 'A' Type Areas: -
No definite sequence of felling and subsequent planting of felled areas with bamboo has been laid down. However, the entire 177.24 ha. of area under type 'A' shall be felled and afforested with bamboo in ten years period w.e.f. 2024-25 to 2025-26. 15 to 20 ha. of coupes depending upon the availability of closures shall be annually laid out at the discretion of Divisional Forest Officer, felled and subsequently planted with bamboo

3.11. Subsidiary Silvicultural Operations:

Type 'A' (Area 177.24 ha)

- (i) Clearance of Site: The area will be cleared of scrub growth in totality and in the process climbers and bushes like *Caesalpinia sepiaria* and *Lantana camara* Uprooted. The cut material will be burnt.
- (ii) Planting: The earth work for bamboo planting should be done during March-April & completed before 15th of April. The pits of size 30 cum. Cube shall be spaced 4mx 4 m apart. The bamboo nursery be located near to planning site where enough water is available and healthy plants not less than nine months old and 30 cms in height grown in polythene tubes should be planted out with first shower of monsoons. The entire planting operation to be completed by July end.
- (iii) Weeding and Bush Cutting: In view of the areas being refractory and infested with rank weeds and bushes, these operations are of utmost importance. Two weeding: The first in March and the second in August, in the first year and one weeding a year in subsequent years will be carried out. The bushes be cut twice, in March and September every year till the plants have outgrown the bush growth, in Lantana infested areas bush cutting shall be required at least for five years.
- (iv) Maintenance: Beating up of failures to be continued till the area is fully stocked.

Type 'B' Areas:

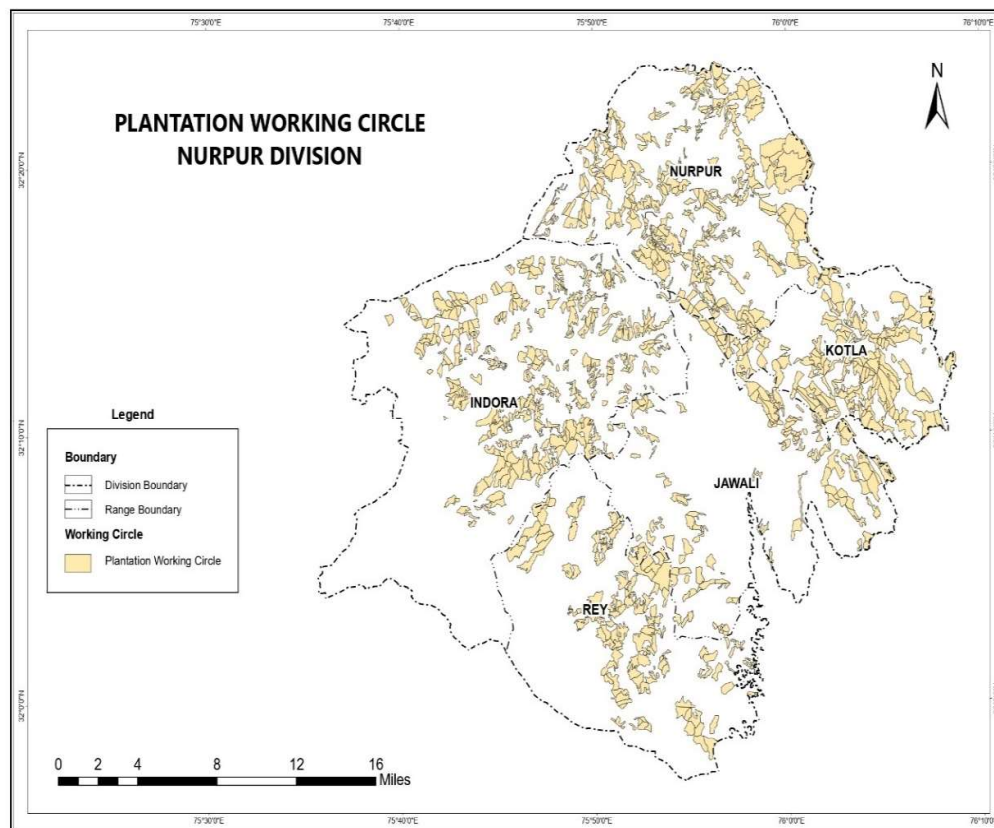
The type 'B' areas will be gone over for cleanings and main felling in accordance with the rules laid for executing these. In addition. The sizeable blanks where over occurring therein, will be planted and maintained like type 'A' areas.

3.12. Closures:

Ten years closure shall be strictly enforced in areas to be taken up for bamboo planting. Besides, three months closure against grazing during July to September will be strictly observed in all the forests allotted to this Working Circle for the protection of seedlings and production of 'manus'.

Chapter IV

THE PLANTATION (OVERLAPPING) WORKING CIRCLE



MAP NO. 4.1 GIS MAP (1: 50,000) FOR PLANTATION WORKING CIRCLE

4.1 General Constitution:

This working circle comprises of following areas:

- (i) All the areas of plantation working circle of the expired working plan.
- (ii) Areas of plantation/Coppice working circle of co-operative society forests which have failed and are suitable for afforestation.

The area which are suitable for planting with khair, Chil bamboo and other broad-leaved species have been included in this working circle. The areas which can be planted after removal of bushes or which are open for planting with good soil depth have been included in this working circle. This has been estimated from the density and height of tree vegetation. Detailed suitability maps on GIS platform on 4"=1 mile scale density wise have been prepared to assess the open spaces available for various plantation models indicating the species which have to be raised on different parts of the compartment.

4.2. Special Objects of Management:

The main object is to carry out plantation with valuable species in suitable areas for afforestation for sustained flow of eco-system services.

4.3. Blocks and Compartments:

Table No. 4.1.

Plantation Working Circle				
Range	Type	Name of Forest	Compartment	Area
Indora	CFS	CFS Bhaleta	U- 1	8.09
			U- 2	4.45
			U- 3	14.16
			U- 4	32.78
			U- 5	23.07
		CFS Dhantol	U- 1	25.9
			U- 2	8.09
			U- 4	14.97
			U- 6	17.4
			U- 7	30.75
		CFS Ghandran	U- 11	29.95
			U- 14	17.81
			U- 15	5.66
			U- 3	14.57
			U- 4	37.23
			U- 7	2.83
			U- 8	10.12
			U- 9	19.42
		CFS Indora	U- 1	15.38
			U- 2	4.45
			U- 3	1.21
			U- 4	41.68
		CFS Lodhwan	P 11	37.23
			U- 1	46.93
			U- 12	10.52
			U- 14	12.14
			U- 16	20.23
			U- 17	16.18
			U- 18	14.57
			U- 2	15.78
			U- 23	13.76
			U- 24	10.93
			U- 26	29.14
			U- 27	27.52
			U- 3	27.92
			U- 30	11.73
			U- 31	13.76
			U- 33	26.71
			U- 34	27.11
			U- 35	2.43

			U- 36	2.43
			U- 38 a	4.05
			U- 4	19.83
			U- 44	12.14
			U- 45	11.73
			U- 46	6.07
			U- 47	4.45
			U- 48	7.28
			U- 5	21.04
			U- 55	49.36
			U- 56	17.4
			U- 57	20.23
			U- 71	37.63
			U- 72	23.07
			U- 73	21.85
		CFS Paniala	U- 1	65.96
			U- 10	27.92
			U- 11	3.24
			U- 2	54.62
			U- 3	103.99
			U- 4	102.77
			U- 5	10.52
			U- 6	58.27
			U- 8 b	56.25
		CFS Raja Khasa	U- 7	5.26
		CFS Sanor	U- 2	24.68
	DPF	P .21. N. Hagwal	C- 3b	11.32
		P .23. N. Agra Da Nal	C- 1	16.19
			C- 2	23.46
		P. 11. N. Ghantal Sanun	C- 1	12.94
			C- 2	15.78
			C- 3	15.38
		P. 12. N. Tung Bari sar	C- 3	17.4
		P. 13. N. Salakher	C- 4	18.61
		P. 15. N. Sundroo	C- 1b	8.09
			C- 1c	8.09
			C- 1d	13.35
			C- 2a	38.03
			C- 2b	34.8
			C- 2C	14.97

			C- 2d	12.95
		P. 16. N. Bagnal	C- 2	27.52
		P. 18. N. Malot Karari	C- 2C-	38.8
		P. 19. N. Daliana	C- 1	37.23
			C- 2	38.46
			C- 3	12.92
		P. 20. N. Thapkaur Gagwal	C- 1	26.31
			C- 2a	16.19
			C- 2b	17.8
			C- 3a	19.83
		P. 24. N. Suggar Nal	C- 1a	24.28
			C- 1b	16.19
			C- 2a	27.5
			C- 2b	42.48
			C- 3a	14.16
			C- 3b	30.35
	RF	R. 12. N. Damtal	C- 1	20.64
			C- 18	6.48
			C- 2	14.16
			C- 4	9.31
			C- 6	7.69
			C- 7	4.05
	UC	U-56 Damtal	C- 1	27.92
		U-68 Bhadroya	C- 6	34.8
	UP	UP-114 Madholi	C- 10	23.06
			C- 11	12.14
			C- 12	9.3
			C- 13	4.05
			C- 15	38.04
			C- 16	59.48
			C- 19	33.18
			C- 20	62.32
			C- 21	70.81
			C- 22	72.83
			C- 23	48.55
			C- 24	80.92
			C- 25	34.39
			C- 27	20.23
			C- 28	48.95
			C- 3	31.57

			C- 30	41.67
			C- 31	4.05
			C- 32 a	69.19
			C- 32 b	61.11
			C- 33	32.57
			C- 34	19.02
			C- 35	39.25
			C- 36	12.14
			C- 37	35.2
			C- 38	22.25
			C- 4	19.02
			C- 5	18.62
			C- 6	35.2
			C- 7	35.2
			C- 8	42.89
			C- 9	14.57
		UP-115 Bheri	C- 1	11.74
			C- 10	24.28
			C- 11	66.36
			C- 12	29.14
			C- 13	17.81
			C- 14	14.16
			C- 15	12.95
			C- 16	12.95
			C- 17	13.35
			C- 18	45.92
			C- 19	63.13
			C- 2	8.09
			C- 20	53.6
			C- 21	29.95
			C- 22	34.8
			C- 23	17
			C- 24	7.69
			C- 25	52.2
			C- 26	43.7
			C- 27	50.58
			C- 28	11.33
			C- 29	30.35
			C- 3	25.5
			C- 30	32.37
			C- 31	40.46
			C- 32	44.51
			C- 4	10.12
			C- 5	22.26
			C- 9	8.09
		UP-141 Surdwan	C- 3	83.35

		UP-150 Kathgarh	C- 1	6.48
			C- 2	6.07
			C- 3	5.27
		UP-151 Ban Indorian	Whole	8.5
		UP-21 Baranda Kandwal	C- 1	24.28
			C- 10	34.4
			C- 13	32.37
			C- 16	43.29
			C- 17	28.33
			C- 2	32.37
			C- 4	24.28
			C- 6	24.28
			C- 7	25.09
			C- 9	32.37
		UP-22 Chhatroli	C- 1	11.33
			C- 12	27.92
			C- 2	23.88
			C- 5	21.04
			C- 6	33.59
			C- 8	30.76
		UP-29 Bhadroot	C- 1	12.95
			C- 2	44.51
		UP-30 Thapkaur	C- 1	28.33
			C- 3	37.23
		UP-31 Gagwal	C- 1	32.37
		UP-32 Hagwal	C- 1	27.52
		UP-34 Lakhanpur	C- 1	22.66
			C- 4	31.97
			C- 5	23.06
			C- 6	16.19
			C- 7	22.26
			C- 8	17.81
		UP-35 Attara	C- 1	33.99
			C- 4	17.81
		UP-36 Gangath	C- 1	31.57
			C- 2	33.99
			C- 3	5.67
			C- 4	34.39
			C- 5	12.94
			C- 6	42.46

			C- 7	49.37
			C- 8	29.14
		UP-37 Charor	C- 2	22.25
			C- 3	35.6
		UP-38 Sadrahar	C- 1	15.78
			C- 3	34.4
			C- 5	18.21
			C-2	21.45
		UP-41 Agahar	C- 2	26.52
		UP-42 Panjarahara	C- 1	26.3
			C- 2	28.33
			C- 3	52.6
			C- 4	5.26
			C- 5	19.41
		UP-58 Dainkwan	C- 1	33.99
			C- 4	43.7
			C- 6	36.83
		UP-59 Chaloh	C- 1	16.19
			C- 2	50.58
		UP-62 Rit	C- 1	17.4
			C- 2	8.09
			C- 3	30.46
			C- 4	58.55
			C- 5	35.21
		UP-63 Dagla	C- 1	16.19
			C- 2	10.93
			C- 3	20.23
			C- 4	6.45
			C- 5	21.04
			C- 7	24.28
		UP-65 Anoh	C- 2	39.66
			C- 4	60.69
			C- 6	52.2
			C- 7	9.7
		UP-66 Palakh	C- 1	23.06
			C- 2	6.48
			C- 3	42.08
		UP-67 Bassa Godialan	C- 2	30.75
		UP-69 Majra	C- 1	25.49
			C- 10	18.21
			C- 11	19.83
			C- 12	17
			C- 13	7.29
			C- 14	17

			C- 15	29.54
			C- 16	24.28
			C- 2	13.35
			C- 3	38.44
			C- 4	39.25
			C- 5	25.9
			C- 6	27.11
			C- 7	12.95
			C- 8	25.09
		UP-87 Surajpur	C- 1	35.21
			C- 2	25.9
		UP-88 Malot	C- 1	18.21
			C- 2	10.52
			C- 3	6.48
			C- 4	7.28
			C- 5	31.57
			C- 7	10.52
		UP-89 Balkhor Kulara	C- 3	25.5
			C- 4	26.3
			C- 5	14.97
		UP-90 Ghoran	C- 1	30.35
			C- 6	68.79
			C- 7	52.6
			C- 8	34.8
		UP-91 Bharlad	C- 2	33.99
		UP-92 Dharwal	C- 1	16.19
			C- 2	55.84
			C- 3	44.51
			C- 4	45.32
			C- 6	62.31
			C- 7	38.85
		UP-95 Batrahan	C- 1	15.78
			C- 2	29.13
Jawali	CFS	CFS Golwan	U- 11	2.02
			U- 12	2.83
			U- 13	6.47
			U- 14	4.05
			U- 4	2.02
			U- 7	19.83
			U- 8	10.12
			U- 9	1.62
		CFS Lahru	U- 15	4.85
			U- 16	8.09
			U- 21	5.66

			U- 28	6.47
			U- 4	10.12
			U- 9	18.21
			U-3	6.47
		CFS Palauhra	P- 10	24.68
			P- 11	6.47
			P- 12	16.59
			P- 1a	12.95
			P- 1b	18.21
			P- 1c	20.23
			U- 13	8.09
			U- 14	12.54
			U- 15	13.76
			U- 16	3.64
			U- 17	8.5
			U- 18	7.69
			U- 19	1.21
			U- 2	8.5
			U- 20	2.02
			U- 21	13.35
			U- 22	6.88
			U- 23	1.62
			U- 3	4.85
			U- 4	11.33
			U- 5	11.73
			U- 6	10.93
			U- 7	8.09
			U- 8	11.33
	DPF	D.P. Bah Kanger	Whole	106.17
		DP Chack Ban Harsar	Whole	327.21
		P .8. N. Kyari	C- 1b	24.28
		P. 1. N. Sidhpur Ghar	C- 2b	54.22
			C- 2c	49.35
			C- 3a	42.08
			C- 3b i	16.19
			C- 3b ii	24.28
			C- 3c	40.46
		P. 5. N. Khabbal	C- 1a	54.21
			C- 1b	59.08
		P. 6. N. Harsar Nana	C- 2e	35.21
			C- 2f	21.06
			C- 2g	22.66
			C- 3a i	32.36

			C- 3a ii	31.56
			C- 3b	67.56
		P. 7. N. Fatehpur	C- 2a	20.64
	RF	R. 10. N. Talara	C- 10	41.25
			C- 6	27.52
			C- 8	27.52
			C- 9	30.76
	UC	U-13 Junat	C- 19	42.49
			C- 21	26.3
			C- 24	12.95
			C- 5	12.14
			C- 7	21.45
		U-46 Gurial	C- 1	37.64
			C- 2	18.62
			C- 3	31.97
			C- 4	35.61
			C- 5	8.09
		U-70 Bari Khas	Whole	26.71
		U-75 Larth	C- 1	31.16
			C- 2	5.26
		U-77 Bhol	C- 1	33.59
			C- 2	4.86
			C- 3	33.99
			C- 6	20.23
			C- 7	26.3
	UP	UP-103 Jawali	C- 1	24.69
			C- 2	39.66
			C- 3	34.4
			C- 4	8.5
			C- 5	25.9
			C- 6	32.37
			C- 7	18.21
			C- 8	23.88
			C- 9	14.16
		UP-104 Nana	C- 1	13.35
			C- 10	34.4
			C- 11	109.25
			C- 12	29.14
			C- 15	32.37
			C- 17	23.06
			C- 19	29.95
			C- 2	16.19
			C- 22	45.32
			C- 24	21.04

			C- 25	42.48
			C- 4	38.45
			C- 5	29.54
			C- 6	71.62
			C- 7	60.69
			C- 8	54.22
		UP-130 Bagroli	C- 2	18.21
			C- 3	19.02
			C- 4	26.3
			C- 5	48.34
			C- 7	40.06
			C- 8	24.28
			C- 9	45.74
		UP-132 Sunet	C- 3	19.42
			C- 4	9.71
			C- 5	35.21
			C- 6	39.66
			C- 7	37.23
		UP-146 Fatehpur	C- 1	6.48
			C- 16	35.21
			C- 17	40.46
			C- 19	48.96
			C- 2	34.8
			C- 20	14.57
			C- 22	43.7
			C- 23	39.25
			C- 26	60.69
			C- 7	38.45
			C- 8	29.54
			C- 9	32.37
		UP-147 Chalwara	Whole	38.8
		UP-149 Harsar	C- 1	18.21
			C- 2	32.37
			C- 3	23.88
			C- 4	10.52
		UP-93 Chhattar	C- 2	54.22
			C- 3	45.32
			C- 4	12.14
			C- 6	19.02
		UP-94 a Hatpang	Whole	21.45
Kotla	DPF	P. 3. N. Balira	C- 2a	16.19
		P. 4. N. Kaldun	C- 1c	17

			C- 2a	31.16
			C- 2b	42.45
			C- 2c	57.46
	RF	R. 14. N. Bhallah	C- 1	20.23
			C- 2	40.46
			C- 3	18.21
			C- 4	38.45
			C- 5	32.76
		R. 15. N. Bhali	C- 3b	36.42
			C- 4a	86.97
			C- 4b	66.34
		R. 4. N. Batuhi	C- 2	45.32
		R. 5. N. Sawarka	C- 1	6.07
	UC	U-47 Banoli (P) (ii)	C- 1	34.4
			C- 2	32.37
			C- 3	32.37
			C- 4	62.72
			C- 7	48.55
		U-50 Kothi Banda	C- 11	36.42
			C- 14	33.99
		U-52 Soldha	C- 1	54.62
			C- 11	10.93
			C- 12	12.14
			C- 13	26.3
			C- 2	68.38
			C- 3	22.26
			C- 4	32.37
			C- 5	4.05
			C- 8	28.33
			C- 9	101.96
		U-55 Bhali	C- 1	85.37
			C- 14	8.9
			C- 17	72.83
			C- 19	8.09
			C- 23	17.79
			C- 24	19.02
			C- 25	16.18
			C- 26	12.14
			C- 27	26.71
			C- 3	44.5
			C- 30	65.14
			C- 31	50.17
			C- 9	16.59

		U-84 Dol	C- 1	78.91
			C- 10	91.04
			C- 11	38.85
			C- 14	28.33
			C- 15	54.62
			C- 16	30.35
			C- 18	22.26
			C- 19	56.24
			C- 22	30.35
			C- 24	40.46
			C- 8	44.51
	UP	UP-51 Anuhi	C- 1	33.18
			C- 10	17.81
			C- 13	45.72
			C- 14	10.12
			C- 2	23.47
			C- 3	44.51
			C- 4	23.47
			C- 5	32.37
			C- 6	30.35
			C- 7	22.26
			C- 8	32.37
		UP-53 Seuni	C- 1	7.69
			C- 2	7.69
			C- 3	3.24
			C- 4	17.81
			C- 7	29.95
		UP-54 Bar	C- 11	48.15
			C- 12	61.91
			C- 13	12.14
			C- 14	10.13
			C- 2	10.52
			C- 3	10.52
			C- 4	11.74
			C- 5	6.48
		UP-78 Sidhpur Ghar	C- 1	49.36
			C- 2	70.81
			C- 5	14.97
		UP-79 Ambal	C- 10	72.83
			C- 11	44.51
			C- 12	46.53
			C- 14	23.07
			C- 15	46.53
			C- 16	49.37
			C- 19	64.75
			C- 2	21.05

			C- 20	50.58
			C- 22	35.62
			C- 3	42.48
			C- 4	28.33
			C- 5	40.46
			C- 6	21.05
			C- 9	36.42
		UP-80 Kuther	C- 1	12.95
			C- 10	8.5
			C- 11	21.85
			C- 12	5.67
			C- 13	26.71
			C- 14	18.21
			C- 15	17
			C- 16	9.71
			C- 17	19.42
			C- 2	27.92
			C- 3	34.8
			C- 4	30.76
			C- 5	18.21
			C- 6	15.38
			C- 8	14.57
			C- 9	9.71
		UP-81 Jangal	C- 1	3.24
			C- 10	11.33
			C- 11	11.34
			C- 12	10.53
			C- 13	24.28
			C- 14	16.19
			C- 2	8.09
			C- 3	10.12
			C- 4	16.19
			C- 5	18.21
			C- 6	6.07
			C- 7	14.57
			C- 8	25.08
			C- 9	25.9
		UP-82 Sirmani	C- 2	83.35
			C- 3	54.62
			C- 4	89.42
			C- 5	38.45
		UP-83 Nadholi	C- 1	42.48
			C- 10	27.11
			C- 11	14.16
			C- 12	25.5
			C- 14	22.26
			C- 15	31.57

			C- 16	24.28
			C- 2	33.18
			C- 3	30.35
			C- 4	10.52
			C- 5	20.23
			C- 6	30.35
			C- 7	34.4
			C- 8	14.16
			C- 9	18.21
Nurpur	CFS	CFS Bassa Harlian	R- 1	54.22
			U- 2	63.13
		CFS Bhugnara	R- 1	34.4
			R- 2	18.21
			U- 1	65.95
			U- 2	6.88
			U- 3	24.28
			U- 4	15.78
			U- 5	48.96
		CFS Gahin Lagore	U- 11	9.71
			U- 12	10.52
			U- 13	6.88
			U- 17	40.06
			U- 19 c	8.5
			U- 20	29.54
			U- 23	38.44
			U- 25	29.14
			U- 26	4.04
			U- 27	145.69
			U- 28	4.85
			U- 29 a	25.48
			U- 29 b	29.54
			U- 29 c	17.86
			U- 30	6.27
			U- 32	19.42
			U- 33	19.42
			U- 35	17.8
			U- 36	9.31
			U- 37	4.04
			U- 4 b	17.4
			U- 4 c	14.56
		CFS Jachh	P- 2	9.71
			P- 3	34.4
			P- 4	44.11
			P- 5	28.34
			P- 6	9.71

			P-1	4.86
			U- 10	2
			U- 7	9.71
			U- 8	6.88
			U- 9	6.07
	DPF	P .41. N. Paniaru	C- 3	11.33
		P. 26. N. Nurpur	C- 1	16.19
			C- 2	6.87
		P. 28. N. Thora	C- 1b	26.3
			C- 2	20.23
		P. 29. N. Maheti	C- 1b	8.9
			C- 1c	12.95
			C- 2c	9.71
		P. 30. N. Galore	C- 1b	14.57
			C- 2	21.45
			C- 3b	19.82
		P. 31. N. Maira Dumal	C- 2	11.33
			C- 3	3.64
		P. 33. N. Haral	C- 2c	17.78
		P. 36. N. Bassa Far Kunda	C- 1	15.38
			C- 3	26.3
		P. 37. N. Khajan	C- 1	15.38
			C- 2	16.19
			C- 3	11.72
		P. 38. N. Janera	C- 2a	14.17
			C- 2b	19.42
			C- 2c	13.35
	RF	R. 1. N. Tatal	C- 1a	87
			C- 2a	38.44
			C- 3a	27.92
		R. 10. N. Talara	C- 2	44.49
		R. 11.N. Khanni	C- 1c	22.24
			C- 2a	22.65
			C- 2c	17.81
			C- 2d	9.71
			C- 2e	28.33
			C- 2g	26.71
			C- 3	24.69

		R. 16.N. Bindra Ban	C- 3a	49.36
			C- 3b	19.02
		R. 3. N. Bhol Thakran	C- 2	19.42
		R. 7. N. Jhakhar	C- 2	72.43
		R. 8. N. Chhatril	C- 1b	123.8
			C- 2	93.46
			C- 4a	74.85
			C- 4b	49.36
	UC	U-13 Khanni	C- 12	22.66
			C- 14	19.42
			C- 16	60.69
			C- 17	29.14
			C- 4	17.81
			C- 5	12.93
			C- 6	25.09
			C- 7	12.14
			C- 8	14.97
		U-19 Bhadwar	C- 10	35.61
			C- 11	14.97
			C- 12	27.52
			C- 13	17
			C- 15	12.95
			C- 17	20.23
			C- 18	14.56
			C- 2	32.37
			C- 20	16.19
			C- 21	12.55
			C- 3	6.07
			C- 5	11.33
			C- 6	22.26
			C- 7	32.37
			C- 9	31.57
		U-20 Punder	C- 1	20.23
			C- 10	23.88
			C- 11	50.58
			C- 12	29.54
			C- 15	64.74
			C- 16	62.31
			C- 3	32.78
			C- 4	17.4
			C- 5	21.04
			C- 6	20.64
			C- 7	36.42
		U-28 Kherian	C- 11	21.85

			C- 4	27.11
			C- 5	39.25
			C- 6	32.37
			C- 7	34.4
			C- 8	40.06
			C- 9	32.37
		U-45 Talara	C- 1	16.19
			C- 4	29.54
			C- 5	38.45
			C- 6	38.45
		U-47 Banoli – i	C- 10	22.66
			C- 11	36.42
			C- 12	36.42
			C- 13	20.23
			C- 14	32.37
			C- 5	28.33
			C- 6	16.59
			C- 7	40.06
			C- 8	40.46
			C- 9	36.42
		U-48 Bhol Thakran	C- 1	15.78
			C- 2	42.08
			C- 3	15.38
		U-49 Minjgran	C- 5	26.71
			C- 6	25.5
		U-50 Kothi Banda	C- 17	46.53
			C- 18	41.27
			C- 19	53.41
	UP	UP- 15 Galore	C- 1	29.95
			C- 3	27.52
		UP- 2 Ther	C- 1	15.38
			C- 2	10.52
			C- 3	25.9
			C- 4	17.81
			C- 5	10.12
		UP-10 Sadwan	C- 1	20.64
			C- 2	6.27
			C- 3	14.16
			C- 6	23.47
			C- 7	10.92
			C- 8	10.92
		UP-12 Milk	C- 10	249.2
			C- 11	219.3
			C- 12	153.7
			C- 2	9
				37.23

			C- 3	28.33
			C- 6	27.92
			C- 7	232.64
			C- 8	76.86
			C- 9	324.48
		UP-14 Thora Bhaloon	C- 11	6.07
			C- 2	44.51
			C- 3	22.26
			C- 7	17.81
			C- 8	53.81
		UP-16 Kopra	C- 10	42.08
			C- 11	42.89
			C- 14	67.57
			C- 15	72.43
			C- 16	41.27
			C- 3	21.85
			C- 4	28.33
			C- 5	26.71
			C- 7	28.33
			C- 9	32.78
		UP-18 Kot Palahri	C- 1	17.81
			C- 11	27.52
			C- 2	40.46
			C- 3	30.75
			C- 4	18.61
			C- 5	24.28
			C- 6	10.52
			C- 8	42.88
			C- 9	6.47
		UP-26 Baral	C- 1	27.11
			C- 2	24.28
			C- 3	12.14
		UP-3 Kukher Khawara	C- 1	66.76
			C- 2	45.92
			C- 3	28.32
			C- 4	11.13
			C- 5	25.9
			C- 6	38.64
			C- 7	8.09
		UP-4 Mamun Gurchal	C- 1	10.52
			C- 2	9.31
		UP-5 Niar Sanoh	C- 1	7.28

			C- 2	11.33
			C- 3	11.33
			C- 4	5.67
			C- 5	17.4
			C- 6	8.09
			C- 7	9.51
			C- 8	8.9
			C- 9	23.88
		UP-6 Danni	C- 10	49.36
			C- 11	10.11
			C- 12	27.52
			C- 13	50.58
			C- 14	72.43
			C- 15	27.92
			C- 16	18.21
			C- 3	129.06
			C- 4	154.96
			C- 5	197.45
			C- 8	44.5
			C- 9	33.99
		UP-6a Ladhori	C- 10	11.33
			C- 11	29.13
			C- 7	29.13
			C- 8	21.04
			C- 9	30.75
		UP-7 Maira Dumal	C- 1	14.16
			C- 2	35.21
			C- 3	32.37
			C- 4	19.83
			C- 5	10.12
			C- 7	31.57
			C- 8	35.61
		UP-8 Haral	C- 2	22.26
			C- 3	36.83
			C- 4	30.35
			C- 5	18.21
			C- 6	41.27
			C- 7	22.66
			C- 8	30.76
		UP-9 Aund	C- 1	14.57
			C- 12	32.37
			C- 13	27.52
			C- 14	4.86
			C- 5	29.14

			C- 6	28.33
			C- 7	20.23
			C- 8	38.04
			C- 9	30.35
Rey	CFS	CFS Badala	U- 3	8.9
			U- 4	8.5
		CFS Badukhar	U- 1	30.35
			U- 2	47.34
			U- 3	48.96
		CFS Bhatoli	U- 1	2.43
			U- 3	2.02
			U- 4	3.64
			U-2	3.24
		CFS Deothi	U- 1	12.14
			U- 2	19.83
			U- 3	17.81
			U- 4	25.9
			U- 5	18.61
			U- 6	19.42
			U- 7	55.03
		CFS Rey	U-20	19.02
			U-21	21.45
			U-22	21.04
			U-23	2.83
			U-24	3.24
			U-25	0.81
			U-26	2.02
			U-27	8.5
			U-28	2.43
			U-55	6.07
			U-56	7.69
			U-60	12.95
			U-61	13.35
			U-63	23.88
			U-64	37.23
			U-65	1.62
			U-66	5.66
			U-67	17.81
			U-68	1.02
			U-70	8.9
			U-71	8.09
			U-72	33.59
			U-73	25.49
			U-77	42.08
			U-78	50.18
			U-79	69.2
			U-81	5.86

			U-82	6.07
	DPF	P. 1. D. Ghar Junat	C- 1	14.16
			C- 2	12.95
	RF	R .30. D. Samblian	C- 1b	33.18
			C- 2b	54.61
		R. 29. D. Lahjang	C- 1a	48.55
			C- 2a	31.57
			C- 3a	29.14
			C- 3C-	52.6
	UC	U-13 Junat	C- 9	30.35
		U-15 Dhameta	C- 2	34.4
			C- 4	18.21
			C- 5	19.42
			C- 6	29.54
		U-25 Anoh	C- 11	41.26
			C- 12	60.69
			C- 7	19.02
			C- 8	40.86
			C- 9	48.55
		U-26 Barla	C- 1	17
			C- 2	22.26
			C- 6	44.51
			C- 8	10.12
		U-Sathana	C- 1	55.43
			C- 2	43.29
	UP	UP-128 Samlet	C- 14	56.65
			C- 15	63.88
			C- 21	61.1
			C- 24	54.62
			C- 25	9.71
			C- 26	30.34
			C- 4	21.45
		UP-142 Palakh	C- 1	80.92
			C- 2	72.83
			C- 3	72.83
			C- 4	84.97
			C- 5	80.92
			C- 6	71.22
			C- 7	48.55
		UP-144 Maholi	C- 2	67.98
			C- 3	67.17
			C- 4	48.55
			C- 5	46.54
			C- 6 b	74.28
			C- 9 a	50.48

			C- 9 b	83.85
		UP-145 Hatli	C- 18	78.1
			C- 4	14.16
		UP-146 Fatehpur	C- 10	60.69
			C- 12	59.89
			C- 14	25.09
			C- 15	29.14
			C- 27	58.27
		UP-165 Nangal	C- 1	45.32
			C- 10	32.78
			C- 12	28.33
			C- 13	25.09
			C- 14	50.17
			C- 18	48.55
			C- 19	30.35
			C- 21	24.28
			C- 22	24.28
			C- 23	28.33
			C- 24	31.57
			C- 25	36.42
			C- 3	48.55
			C- 4	34.4
			C- 8	48.15
		UP-185 Diana	C- 1	24.28
			C- 10	36.02
			C- 11	64.34
			C- 3	34.4
			C- 4	40.06
			C- 5	55.03
			C- 6	66.76
			C- 7	36.42
			C- 8	30.35
		UP-189 Dhaulpur	Whole	33.18
Grand Total				28442.75

4.4. Analysis and Valuation of the Crop:

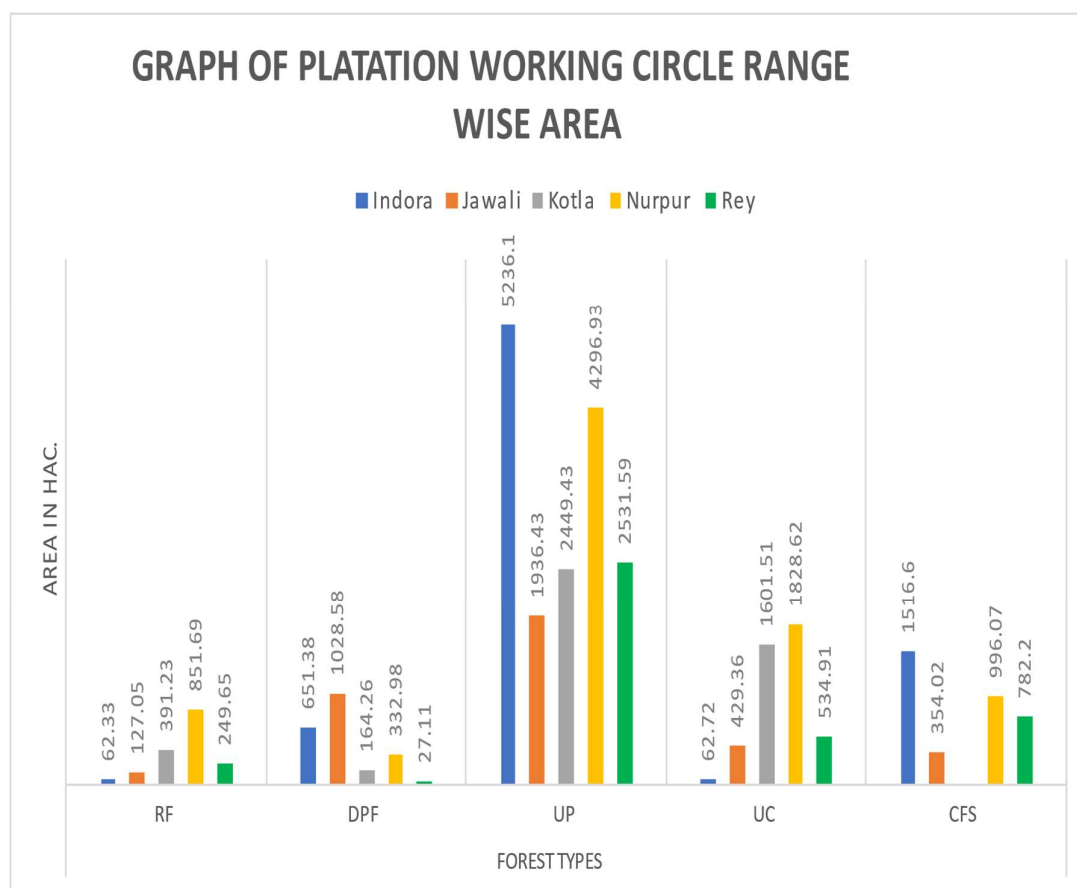
Detailed digital stock maps on GIS platform have been prepared.

The total area under plantation working circle is 28442.55 ha,

The detail of area is as under:

Table No. 4.2. Showing Range Wise Distribution of Area

Range wise distribution of Area				
Range	Feling Series			Total Area
	Legal	Voluntary	Co-operative Society	
Nurpur	1184.67	6125.55	996.07	8306.29
Kotla	555.49	4050.94	0	4606.43
Jawali	1155.63	2365.79	354.02	3875.44
Rey	276.76	3066.5	782.2	4125.46
Indora	713.71	5298.62	1516.6	7528.93
Total: -	3886.26	20907.4	3648.89	28442.55



Graph/Chart No 4.1. Showing Range wise area in Plantation Working Circle

4.5 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. A total of 30 Sample Plots of 0.1 ha

were laid in this working circle covering all PBs. The detail of PB wise sample plots is as under

Sr. No.	No. of plots	Total area counted Hac
1	30	3.00

GROWING STOCK

Table No. 4.3. Showing Growing Stock

Tree Count										
Spp.	Class									G. Total
	V	IV	III	IIA	IIB	IA	IB	IC		
Chil	6640	8853	8853	3873	1106	3320	221 3	110 6	553	36517
Khair	59209	64743	1992 0	1660	0	0	0	0	0	14553 2
Shisam	2766	1106	1106	0	0	0	0	0	0	4978
BL	47755 0	17320 1	6252 9	2600 7	1992 0	1106 7	332 0	166 0	221 3	77746 7
G.Total	546165	247903	92408	31540	21026	14387	5533	2766	2766	964494

Tree Volume										
Spp.	Class									Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	398.4	1682.07	5754.45	5577.12	2875.6	11752.8	7834.02	3915. 24	1957. 62	41747.3 2
Khair	4061.74	9258.25	5816.64	813.4	0	0	0	0	0	19950.0 3
Shisam	177.02	194.66	516.5	0	0	0	0	0	0	888.18
BL	14326.5	24248.1 4	35016.2 4	29387.9 1	25298.4	15604.47	4681.2	2340. 6	3120. 33	154023. 79
Total	18963.66	35383.1 2	47103.8 3	35778.4 3	28174	27357.27	12515.2 2	6255. 84	5077. 95	216609. 32

4.6 Treatment of Afforestation:

The areas are to be cleared of bushes before taking up for closure and planting. Indora, Rey, Nurpur and part of Jawali Ranges are heavily infested with lantana bushes. Its repeated removal is required for success of plantation. Three cuttings are required in a year so that useful planted species are not suppressed by the bush growth. Three cuttings are suggested in a year during May-June, September-October and January-February. The normal financial norms provided for plantations are not enough to meet the requirement for repeated cuttings. Repeated lantana removal is essential for success of plantations in such areas and therefore separate financial norms may be provided for afforestation of lantana infested area. Territorial D.F.O. may calculate and suggest norms for various lantana densities viz. high, medium and low lantana intensities. Naturally growing economical species such as Grewia, Toon and Jamun etc. should not be cut back but instead tending of such species be done.

With the exception of the reserved forests, demarcated forests can be closed for only 10 years and other type of forests for a like period but only voluntarily. Closures of un-demarcated protected forests for only 10 years and other type of forest are to be easily forth coming only if the results are speedy, spectacular and impressive.

The main clash of the plantation activities of closures in this working circle will be with the grazing requirements of the local people. Damage by frost and other biotic agencies is to be considered. Therefore, small and affective closures are suggested. The areas closed should be promptly planted and thrown open to grazing at the earliest.

Detailed suitability maps on 4"=1-mile scale delineating the areas to be brought under different species and those considered unfit for planting have been prepared. These maps have to be used as single guide and may be amended before carrying out actual planting if some change is considered necessary.

The main factor to be taken in consideration for declaring as area as fit for planting has been depth of soil/ parent rock for penetration of roots. This has been primarily judged from cutting density and height of existing crop found in the areas.

Based on field observations following recommendation are made in the working circle:

- i) Grazing pressure from the local people and migratory gaddies and gujjars is very high, therefore small and rotational closures with effective results are suggested.
- ii) Three complete bushes cutting in January–February, May-June and October-November are suggested in lantana infested areas while undertaking for plantations. These repeated cuttings are to be carried out till the planted species grow beyond bush growth.

- iii) Two-year-old tall plants of Shisham and Khair are suggested for lantana infested area. Bamboo is also suitable species for lantana areas with deep and moist soil.
- iv) The existing norms of plantations for lantana infested areas are required to be revised depending upon intensity of lantana.
- v) The valuable naturally growing species in bush growth should not be cut back along with bush cutting but should be tended.
- vi) Separate norms are required to be worked out for plantation along roads and railway line.

4.7 Choice of Species:

The main species will be Chil, Khair and Bamboos in addition other broad-leaved species such as Grewia, Toon, Arjun, Jamun, Amla and Siris etc. should also be planted depending upon the site conditions and requirement of the local people. Bamboo is suitable for depression with better water regime and soil depth- ornamental species are recommended for road side plantation. Monoculture practice should be avoided and planting of indigenous species like Bamboo, Kachnar, Khair, Shisham. Dhau. Tun. Harar, Arjun, Amla, Bhera etc. will be encouraged.

Sequence of Planting:

Sequence of planting may be decided by territorial D.F.O depending upon the targets and availability of budget year wise during the period of working plan. Detail of areas to be treated under this working circle is as under:

Plantation Working Circle					
Year	Range	Type	Name of Forest	Compartment	Area in Hact.
2025-26	Indora	CFS	CFS Bhaleta	U- 3	10.00
			CFS Dhantol	U- 1	10.00
			CFS Ghandran	U- 11	10.00
			CFS Lodhwan	P 11	10.00
			CFS Paniala	U- 1	10.00
			CFS Sanor	U- 2	10.00
	Jawali	CFS	CFS Golwan	U- 7	10.00
			CFS Lahru	U- 4	10.00
			CFS Palauhra	P- 10	10.00
		DPF	P .8. N. Kyari	C- 1b	10.00
			P. 1. N. Sidhpur Ghar	C- 2b	10.00
			P. 5. N. Khabbal	C- 1a	10.00
	Kotla	DPF	P. 3. N. Balira	C- 2a	10.00
			P. 4. N. Kaldun	C- 1c	10.00
		UC	U-47 Banoli (P) (ii)	C- 1	10.00
			U-50 Kothi Banda	C- 11	10.00
			U-52 Soldha	C- 1	10.00
			U-55 Bhali	C- 1	10.00
	Nurpur	CFS	CFS Bassa Harlian	R- 1	10.00

			CFS Jachh	P- 4	10.00
		DPF	P. 28. N. Thora	C- 1b	10.00
		UC	U-13 Khanni	C- 12	10.00
		UP	UP-12 Milk	C- 10	10.00
			UP-16 Kopra	C- 10	10.00
	Rey	CFS	CFS Badukhar	U- 1	10.00
			CFS Dhantol	U- 1	10.00
			CFS Deothi	U- 1	10.00
			CFS Rey	U-20	10.00
		DPF	P. 1. D. Ghar Junat	C- 1	10.00
		UC	U-13 Junat	C- 9	10.00
				Total	300.00
2026-27					
	Indora	DPF	P. 11. N. Ghantal Sanun	C- 1	10.00
			P. 12. N. Tung Bari sar	C- 3	10.00
			P. 13. N. Salakher	C- 4	10.00
			P. 15. N. Sundroo	C- 1d	10.00
			P. 16. N. Bagnal	C- 2	10.00
			P. 19. N. Daliana	C- 1	10.00
	Jawali	UP	UP-132 Sunet	C- 3	10.00
			UP-146 Fatehpur	C- 16	10.00
			UP-149 Harsar	C- 1	10.00
			UP-93 Chhattar	C- 2	10.00
			UP-130 Bagroli	C- 2	10.00
			UP-104 Nana	C- 1	10.00
	Kotla	UP	UP-51 Anuhi	C- 1	10.00
			UP-53 Seuni	C- 1	10.00
			UP-54 Bar	C- 11	10.00
			UP-78 Sidhpur Ghar	C- 1	10.00
			UP-79 Ambal	C- 10	10.00
			UP-80 Kuther	C- 1	10.00
	Nurpur	UC	U-28 Kherian	C- 11	10.00
			U-47 Banoli - i	C- 10	10.00
		UP	UP-18 Kot Palahri	C- 1	17.81
			UP-18 Kot Palahri	C- 1	10.00
			UP-3 KukherKhawara	C- 1	10.00
			UP-6 Danni	C- 10	10.00
	Rey	UP	UP-128 Samlet	C- 14	10.00
		CFS	CFS Dhantol	U- 1	10.00
		UP	UP-144 Maholi	C- 2	10.00
			UP-145 Hatli	C- 18	10.00
			UP-146 Fatehpur	C- 10	10.00
			UP-165 Nangal	C- 1	10.00
				Total	300.00
2027-28					
	Indora	RF	R. 12. N. Damtal	C- 1	10.00
		UC	U-56 Damtal	C- 1	10.00
			U-68 Bhadroya	C- 6	10.00
		UP	UP-114 Madholi	C- 10	10.00

			UP-115 Bheri	C- 1	10.00
			UP-141 Surdwan	C- 3	10.00
	Jawali	UC	U-13 Junat	C- 19	10.00
			U-46 Gurial	C- 1	10.00
			U-75 Larth	C- 1	10.00
			U-77 Bhol	C- 1	10.00
		UP	UP-103 Jawali	C- 1	10.00
			UP-104 Nana	C- 11	10.00
	Kotla	UP	UP-81 Jangal	C- 10	10.00
			UP-82 Sirmani	C- 2	10.00
			P. 4. N. Kaldun	C- 2a	10.00
		RF	R. 14. N. Bhallah	C- 2	10.00
			R. 15. N. Bhali	C- 4a	10.00
		UC	U-47 Banoli (P) (ii)	C- 1	10.00
	Nurpur	UC	U-13 Khanni	C- 16	10.00
			U-19 Bhadwar	C- 10	10.00
			U-45 Talara	C- 1	10.00
			U-48 Bhol Thakran	C- 1	10.00
			UP- 15 Galore	C- 1	10.00
			U-50 Kothi Banda	C- 17	10.00
	Rey	UP	UP-185 Diana	C- 1	10.00
			UP-165 Nangal	C- 1	10.00
			UP-146 Fatehpur	C- 12	10.00
			UP-132 Sunet	C- 6	10.00
			UP-130 Bagroli	C- 2	10.00
			UP-104 Nana	C- 15	10.00
			Total		300.00
2028-29	Indora	UP	UP-95 Batrahan	C- 1	10.00
			UP-91 Bharlad	C- 2	10.00
			UP-92 Dharwal	C- 1	10.00
			UP-89 BalkhorKulara	C- 3	10.00
			UP-87 Surajpur	C- 1	10.00
			UP-88 Malot	C- 1	10.00
	Jawali	UC	U-13 Junat	C- 7	10.00
			U-46 Gurial	C- 4	10.00
			U-77 Bhol	C- 7	10.00
			UP-104 Nana	C- 8	10.00
		UP	UP-103 Jawali	C- 2	10.00
			UP-104 Nana	C- 24	10.00
	Kotla	UP	UP-83 Nadholi	C- 1	10.00
		UC	U-55 Bhali	C- 27	10.00
			U-52 Soldha	C- 9	10.00
			U-50 Kothi Banda	C- 11	10.00
			U-47 Banoli (P) (ii)	C- 4	10.00
		DPF	P. 4. N. Kaldun	C- 2c	10.00
	Nurpur	CFS	CFS Bhugnara	R- 1	10.00
			CFS Gahin Lagore	U- 27	10.00
		RF	R. 10. N. Talara	C- 2	10.00
		UC	U-28 Kherian	C- 6	10.00

			U-47 Banoli - i	C- 7	10.00
		UP	UP-6 Danni	C- 7	10.00
	Rey	CFS	CFS Badukhar	U- 2	10.00
			CFS Deothi	U- 2	10.00
			CFS Rey	U-21	10.00
		DPF	P. 1. D. Ghar Junat	C- 2	10.00
		RF	R .30. D. Samblian	C- 2b	10.00
		RF	R .30. D. Samblian	C- 1b	10.00
				Total	300.00
2029-30	Indora	CFS	CFS Dhantol	U- 7	10.00
			CFS Ghandran	U- 14	10.00
			CFS Paniala	U- 1	10.00
			UP-114 Madholi	C- 11	10.00
			UP-21 Baranda Kandwal	C- 1	10.00
			UP-115 Bheri	C- 1	10.00
	Jawali	CFS	UP-104 Nana	C- 1	10.00
			CFS Palauhra	P- 12	10.00
		UC	UP-104 Nana	C- 5	10.00
			U-46 Gurial	C- 2	10.00
			U-75 Larth	C- 1	10.00
		UP	UP-103 Jawali	C- 1	10.00
	Kotla	UC	U-47 Banoli (P) (ii)	C- 1	10.00
			U-50 Kothi Banda	C- 11	10.00
			U-52 Soldha	C- 1	10.00
			U-77 Bhol	C- 1	10.00
			UP-53 Seuni	C- 7	10.00
			UP-54 Bar	C- 11	10.00
	Nurpur	CFS	CFS Bassa Harlian	R- 1	10.00
			CFS Bhugnara	R- 1	10.00
			CFS Gahin Lagore	U- 17	10.00
		UC	U-13 Khanni	C- 12	10.00
			U-19 Bhadwar	C- 10	10.00
			U-45 Talara	C- 4	10.00
	Rey	CFS	CFS Badukhar	U- 1	10.00
			CFS Deothi	C-9	10.00
		DPF	P. 16. N. Bagnal	C- 2	10.00
			P. 18. N. MalotKarari	C- 2C	10.00
			P. 19. N. Daliana	C- 1	10.00
		UP	UP-114 Madholi	C- 10	10.00
				Total	300.00
2030-31	Indora	CFS	CFS Bhaleta	U- 3	10.00
			CFS Dhantol	U- 7	10.00
			CFS Ghandran	U- 11	10.00
			CFS Lodhwan	P 11	10.00
			CFS Paniala	U- 1	10.00
			CFS Sanor	U- 2	10.00
	Jawali	CFS	CFS Golwan	U- 7	10.00
			CFS Lahru	U- 4	10.00

			CFS Palauhra	P- 10	10.00
		DPF	P .8. N. Kyari	C- 1b	10.00
			P. 1. N. Sidhpur Ghar	C- 2b	10.00
			P. 5. N. Khabbal	C- 1a	10.00
	Kotla	DPF	P. 3. N. Balira	C- 2a	10.00
			P. 4. N. Kaldun	C- 1c	10.00
		UC	U-47 Banoli (P) (ii)	C- 1	10.00
			U-50 Kothi Banda	C- 11	10.00
			U-52 Soldha	C- 1	10.00
			U-55 Bhali	C- 1	10.00
	Nurpur	CFS	CFS Bassa Harlian	R- 1	10.00
			CFS Jachh	P- 4	10.00
		DPF	P. 28. N. Thora	C- 1b	10.00
		UC	U-13 Khanni	C- 12	10.00
		UP	UP-12 Milk	C- 10	10.00
			UP-16 Kopra	C- 10	10.00
	Rey	CFS	CFS Badukhar	U- 1	10.00
			CFS Dhantol	U- 7	10.00
			CFS Deothi	U- 1	10.00
			CFS Rey	U-20	10.00
		DPF	P. 1. D. Ghar Junat	C- 1	10.00
		UC	U-13 Junat	C- 9	10.00
				Total	300.00
2031-32	Indora	DPF	P. 11. N. Ghantal Sanun	C- 1	10.00
			P. 12. N. Tung Bari sar	C- 3	10.00
			P. 13. N. Salakher	C- 4	10.00
			P. 15. N. Sundroo	C- 1d	10.00
			P. 16. N. Bagnal	C- 2	10.00
			P. 19. N. Daliana	C- 1	10.00
	Jawali	UP	UP-132 Sunet	C- 3	10.00
			UP-146 Fatehpur	C- 16	10.00
			UP-149 Harsar	C- 1	10.00
			UP-93 Chhattar	C- 2	10.00
			UP-130 Bagroli	C- 2	10.00
			UP-104 Nana	C- 1	10.00
	Kotla	UP	UP-51 Anuhi	C- 1	10.00
			UP-53 Seuni	C- 1	10.00
			UP-54 Bar	C- 11	10.00
			UP-78 Sidhpur Ghar	C- 1	10.00
			UP-79 Ambal	C- 10	10.00
			UP-80 Kuther	C- 1	10.00
	Nurpur	UC	U-28 Kherian	C- 11	10.00
			U-47 Banoli - i	C- 10	10.00
		UP	UP-18 Kot Palahri	C- 1	17.81
			UP-18 Kot Palahri	C- 1	10.00
			UP-3 KukherKhawara	C- 1	10.00
			UP-6 Danni	C- 10	10.00
	Rey	UP	UP-128 Samlet	C- 14	10.00

		CFS	CFS Dhantol	U- 1	10.00
		UP	UP-144 Maholi	C- 2	10.00
			UP-145 Hatli	C- 18	10.00
			UP-146 Fatehpur	C- 10	10.00
			UP-165 Nangal	C- 1	10.00
				Total	300.00
2032-33	Indora	RF	R. 12. N. Damtal	C- 1	10.00
		UC	U-56 Damtal	C- 1	10.00
			U-68 Bhadroya	C- 6	10.00
		UP	UP-114 Madholi	C- 10	10.00
			UP-115 Bheri	C- 1	10.00
			UP-141 Surdwan	C- 3	10.00
	Jawali	UC	U-13 Junat	C- 19	10.00
			U-46 Gurial	C- 1	10.00
			U-75 Larth	C- 1	10.00
			U-77 Bhol	C- 1	10.00
		UP	UP-103 Jawali	C- 1	10.00
			UP-104 Nana	C- 11	10.00
	Kotla	UP	UP-81 Jangal	C- 10	10.00
			UP-82 Sirmani	C- 2	10.00
		DPF	P. 4. N. Kaldun	C- 2a	10.00
		RF	R. 14. N. Bhallah	C- 2	10.00
			R. 15. N. Bhali	C- 4a	10.00
		UC	U-47 Banoli (P) (ii)	C- 1	10.00
	Nurpur	UC	U-13 Khanni	C- 16	10.00
			U-19 Bhadwar	C- 10	10.00
			U-45 Talara	C- 1	10.00
			U-48 Bhol Thakran	C- 1	10.00
		UP	UP- 15 Galore	C- 1	10.00
			U-50 Kothi Banda	C- 17	10.00
	Rey	UP	UP-185 Diana	C- 1	10.00
			UP-165 Nangal	C- 1	10.00
			UP-146 Fatehpur	C- 12	10.00
			UP-132 Sunet	C- 6	10.00
			UP-130 Bagroli	C- 2	10.00
			UP-104 Nana	C- 15	10.00
				Total	300.00
2033-34	Indora	UP	UP-95 Batrahan	C- 1	10.00
			UP-91 Bharlad	C- 2	10.00
			UP-92 Dharwal	C- 1	10.00
			UP-89 BalkhorKulara	C- 3	10.00
			UP-87 Surajpur	C- 1	10.00
			UP-88 Malot	C- 1	10.00
	Jawali	UC	U-13 Junat	C- 7	10.00
			U-46 Gurial	C- 4	10.00
			U-77 Bhol	C- 7	10.00
			UP-104 Nana	C- 8	10.00
		UP	UP-103 Jawali	C- 2	10.00
			UP-104 Nana	C- 24	10.00

	Kotla		UP-83 Nadholi	C- 1	10.00
			U-55 Bhali	C- 27	10.00
			U-52 Soldha	C- 9	10.00
			U-50 Kothi Banda	C- 11	10.00
		UC	U-47 Banoli (P) (ii)	C- 4	10.00
			P. 4. N. Kaldun	C- 2c	10.00
	Nurpur		CFS Bhugnara	R- 1	10.00
			CFS Gahin Lagore	U- 27	10.00
			R. 10. N. Talara	C- 2	10.00
			U-28 Kherian	C- 6	10.00
			U-47 Banoli - i	C- 7	10.00
			UP-6 Danni	C- 7	10.00
	Rey	CFS	CFS Badukhar	U- 2	10.00
			CFS Deothi	U- 2	10.00
			CFS Rey	U-21	10.00
		DPF	P. 1. D. Ghar Junat	C- 2	10.00
		RF	R .30. D. Samblian	C- 2b	10.00
		RF	R .30. D. Samblian	C- 1b	10.00
				Total	300.00
2034-35	Indora	CFS	CFS Dhantol	U- 7	10.00
			CFS Ghandran	U- 14	10.00
			CFS Paniala	U- 1	10.00
		UP	UP-114 Madholi	C- 11	10.00
			UP-21 Baranda Kandwal	C- 1	10.00
			UP-115 Bheri	C- 1	10.00
	Jawali	CFS	UP-104 Nana	C- 1	10.00
			CFS Palauhra	P- 12	10.00
		UC	UP-104 Nana	C- 5	10.00
			U-46 Gurial	C- 2	10.00
			U-75 Larth	C- 1	10.00
		UP	UP-103 Jawali	C- 1	10.00
	Kotla	UC	U-47 Banoli (P) (ii)	C- 1	10.00
			U-50 Kothi Banda	C- 11	10.00
			U-52 Soldha	C- 1	10.00
			U-77 Bhol	C- 1	10.00
			UP-53 Seuni	C- 7	10.00
			UP-54 Bar	C- 11	10.00
	Nurpur	CFS	CFS Bassa Harlian	R- 1	10.00
			CFS Bhugnara	R- 1	10.00
			CFS Gahin Lagore	U- 17	10.00
		UC	U-13 Khanni	C- 12	10.00
			U-19 Bhadwar	C- 10	10.00
			U-45 Talara	C- 4	10.00
	Rey	CFS	CFS Badukhar	U- 1	10.00
			CFS Deothi	C-9	10.00
		DPF	P. 16. N. Bagnal	C- 2	10.00
			P. 18. N. MalotKarari	C- 2C	10.00
			P. 19. N. Daliana	C- 1	10.00
		UP	UP-114 Madholi	C- 10	10.00

				Total	300.00
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4.8 Subsidiary Silvicultural Regulations:

- (i) Clearing of the areas: All the bush growth will be cleared by 31st march every year. Only undesirable bush growth shall be sacrificed for the sake of plantation. The areas are to be cleared of all the bush refuse by giving burn immediately. This operation has not to be delayed beyond 31st March. For timely executing of this operation the targets should be allotted well in time then only systematic closure of the areas under the relevant scheme is practically possible.
- (ii) Earth Work: Planting will be done at a distance of 3mx3m along the contour in pits 30cmx30cmx30cm. However, the spacing may vary depending upon the scheme and the nature of the area. No pit will be dug within 3 meters of any plant retained. In case of trees of and above 20 cm diameter the next plant should be at least five meters away from the outer projection of the crown of the tree. The earth work must be completed during April-May. In fact, this is possible when the targets are allotted at least one-year in advance.
- (iii) Permanent Nurseries: In last Plan period the thrust has been laid to produce quality Nursery seedlings by establishing permanent Nurseries and strengthening those nurseries (making them Modern nurseries). In that endeavor following Permanent Nurseries have been established in Division with funding from CAMPA, EAP (Externally Aided Projects) like HP FEC and CP (funded by KFW) and HP FEM and LIP (JICA). Manohra Nursery has been modernized under HP FEMLIP (JICA) project and is one of the best nurseries in the state. Following are the nurseries in Nurpur Forest Division.
 1. Jach Nursery, Nurpur Range
 2. Manorha Nursery, Nurpur Range
 3. Ther-Kuther Nursery, Nurpur Range
 4. Kotla Nursery, Kotla Range
 5. Khirwain Nursery, Kotla Range
 6. Kund Nursery, Indora Range
 7. Bhadroya Nursery, Indora Range
 8. Rey Nursery, Rey Range
 9. Dhiala Nursery, Rey Range
 10. Har Nursery, Jawali Range
 11. Mano-Sial Nursery, Jawali Range
 12. Kadhana Nursery, Jawali Range



- (iv) Grass Cutting: Grass cutting form areas under plantations may be permitted at the earliest so that beneficial effects of closures are available to the local people. The young plantations are to be free from sickle damage. The grass should be suitably distributed amongst the right holders.
- (v) Closures: Plantations have to be carried out only after the closure has been notified. In fact, no area will be marked unless papers have been prepared. All the reserved forest can be closed without any difficulty and 1/3 of demarcated protected forests can be closed for a period of 10 years. In case of un-demarcated and unclassed forest, the total closures prescribed for each mauza are not more than 25 percent of the total area of that mauza. Maintenance of old plantations has to be given due consideration. The plantation raised in the past which are beyond damage are to be thrown open.

4.9. Beating up of failures:

Beating up of failures will be done for two years after the planting. Suitable anti erosion measures like construction of check dams and gully plugging considered necessary may be carried out.

4.10. Planting Along Roads and Railway Lines:

The existing road length of this Division is 2265 K.M. Total length of NH 154 passing through division is 43 kms. There are two railway lines in this division viz. Jalandhar-Pathankot (12 KM) and Kangra Valley from Pathankot to Joginder Nagar (43 KM). The existing growth in the strips along these railway lines consists of degraded scrub growth of *Zizyphus*, *Jujuba*, *Phoenix homiles*, *Carissa opaca*, *Acacia arabica*, *Adhatota vasica*, *Murraya koenigii* and *Acacia catechu*.

The degraded scrub growth should be removed from the strips which are 15 meters wide and following species planted in three rows at a spacing of 3mx3m.

- i) *Dalbergia sisoo*.
- ii) *Acacia catechu*.
- iii) *Ficus religiosa*,
- iv) *Azadirachta indica*
- v) Eucalyptus Species

The sides on the roads are mostly devoid of scrub growth with standing trees of Mango, Shisham etc. in a scattered manner. Due to recent widening of NH 154 from Ghatnal to Chakki, all the big trees of Eucalyptus, shisham and Mango have already been removed therefore it is suggested that two rows on each side be planted on double road viz. Ghatnal (Bhali Beat) to Chakki and single row on the other single road, Strand B/ wire fencing in strips is suggested when two rows are to be planted whereas tree guards are suggested around plants on single road. Ornamental species are suggested along roadside plantation. Since on roadside/ B//wire fencing will be comparatively costly on road side plantation a separate norm be worked out by territorial D.F.O. for such planting.

The Planting sequence and Programme is left to the territorial Divisional Forest Officer depending upon the availability of budget in different years during the periods of working plan.

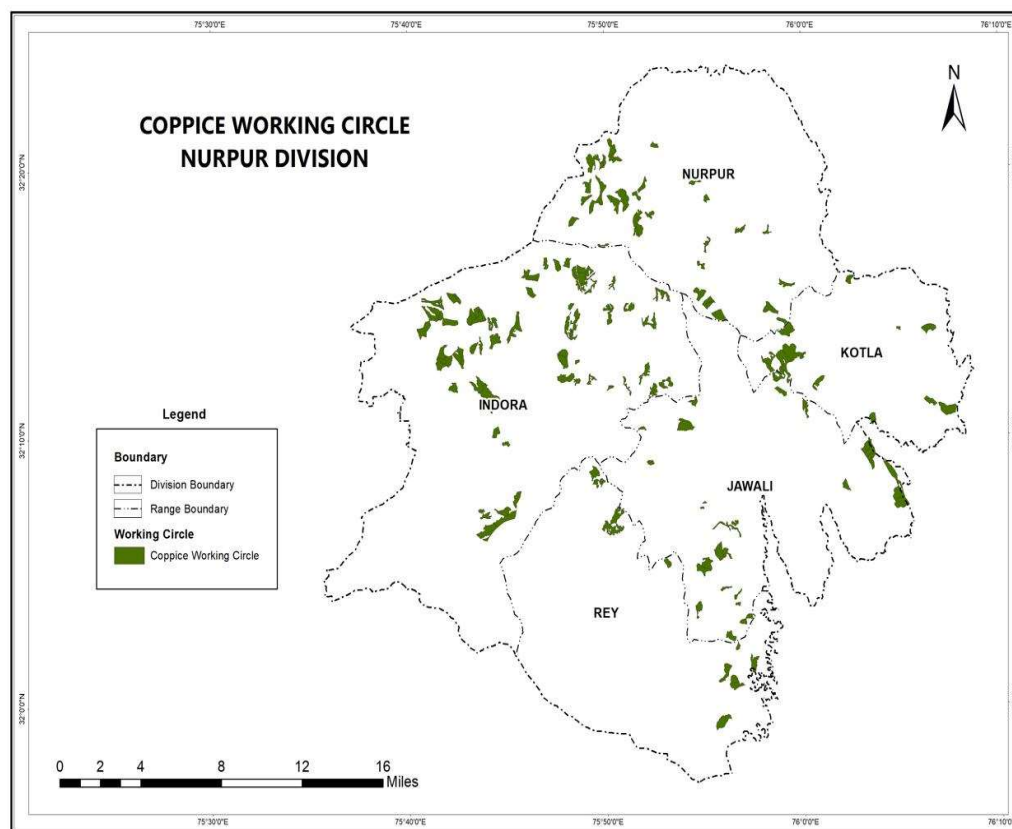
Annual yield and removals

No felling is prescribed in this working circle except salvage removals and removals by right holders.

However, keeping in view the annual increment the removal from this working circle is restricted to 8000 m³ per annum

Chapter-V

THE COPPICE WORKING CIRCLE



MAP NO. 5.1. GIS MAP (1: 50,000) FOR COPPICE WORKING CIRCLE

5.1 General Condition:

This working circle has been carved out of the plantation working circle of Nanak Chand's working plan. It includes following areas: -

- i) All such which were recommended for felling but not actually felled shall be allotted to this working circle. But only those areas are included which are actually suitable for felling under coppice felling i.e. where the Khair crop is uniform and are away from habitation so that area can be felled and regenerated fully.
- ii) The areas which were not recommended for felling under the prescription of plantation working circle and only Khair was to be harvested under Khair overlapping working circle were also included in this working circle. But only those areas have been included which can be felled and regenerated.
- iii) Suitable areas of the felled and planted successfully in plantation working circle of Nanak Chand's working plan.
- iv) Suitable areas from Co-operative society forests have also been included.
- v) The Experimental Silviculturally felled areas during 2018-19 and 2019-20 are to be felled in the last 2 years of the plan under revision.

5.2. Special Objects of Management:

The main object in this working circle is to cater to local fuelwood quantitative requirement simultaneous with the harvesting of valuable crop. Khair and Dhau are good coppicer and thus the main focus is to harvest mature Khair trees, while keeping standards and nurturing vigorous coppice shoots. Therefore, the special objective of managemnets are:

- i) To improve and increase the forest resources by replacing uneconomic scrub forest with economic tree species.
- ii) To harvest uniform cropped forests of Khair which can be and harvested regenerated without much problem viz uniform areas away from habitation with little biotic interference.
- iii) To produce small size timber for fuelwood and charcoal to meet the increasing demand for the same and also to grow trees of valuable species.

5.3. Blocks and Compartments:

Table No. 5.1.

Coppice Working Circle				
Range	Type	Name of Forest	Compartment	Area
Indora	CFS	CFS Dhantol	P- 5	39.16
			U- 3	12.95
		CFS Ghandran	U- 1	56.65
			U- 10	3.24
			U- 13	64.34
			U- 2	46.53
			U- 6	4.85
		CFS Lodhwan	U- 22	42.89
			U- 25	24.28
		CFS Paniala	U- 9	27.92
	DPF	CFS Sirat	U- 3	55.44
		P. 14. N. Agra Da Nal	C- 1	10.52
		P. 15. N. Sundroo	C- 1a	8.5
		P. 16. N. Bagnal	C- 1	13.35
			C- 3	16.59

		P. 18. N. Malot Karari	C- 2a	37.6 4
			C- 2b	34
			C- 3a	35.6 1
			C- 3b	35.6 1
			C- 3c	18.6 1
			C- 3d	39.2 6
		P. 21. N. Hagwal	C- 1	21.8 5
			C- 2	27.5 2
		P. 23. N. Agra-Da-Nal	C- 3	33.1 8
		P. 24. N. Suggar Nal	C- 1c	21.0 4
			C- 3C-	38.0 4
		P.20.N. Thapkaur Gagwal	C- 3b	23.8 6
	UC	U 68 Bhadroya	C- 1	33.5 9
			C- 2	16.1 9
			C- 3	15.3 8
			C- 4	32.7 8
			C- 5	28.3 3
	UP	UP. 21. Baranda Kandwal	C- 3	28.3 3
			C- 5	34.8
			C- 8	46.5 3
		UP. 22. Chhatroli	C- 10	43.7
			C- 11	44.5 1
			C- 3	29.1 4
			C- 4	21.8 5
			C- 7	24.2 8
			C- 9	29.9 5
		UP. 30. Thapkour	C- 2	35.6 1

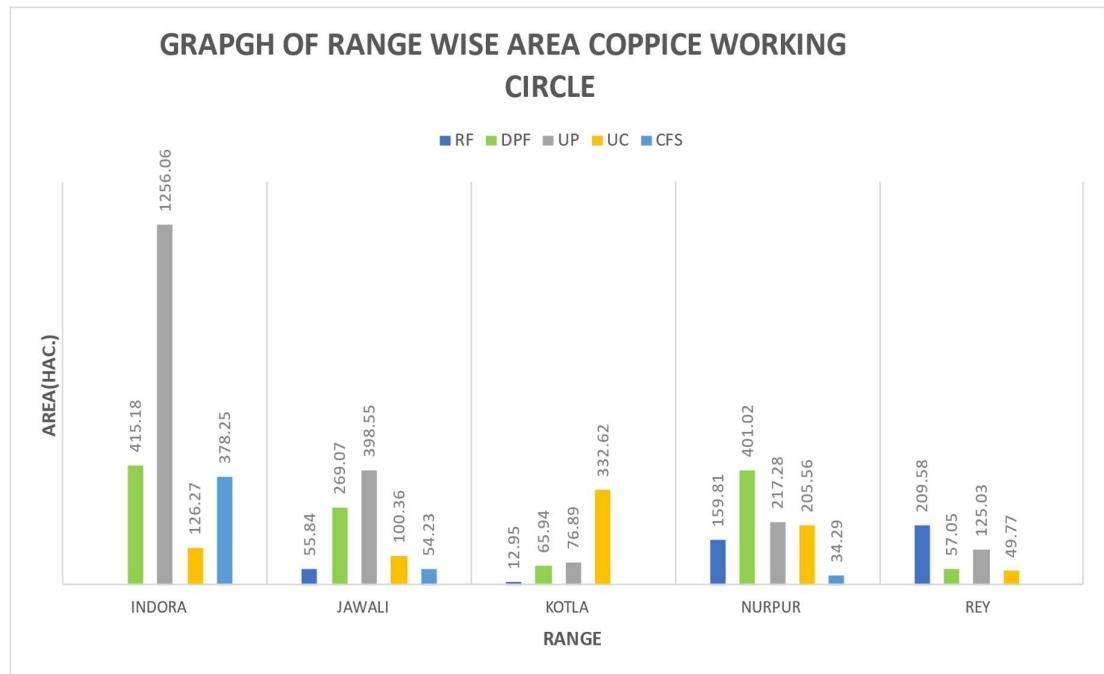
		UP. 31. Gagwal	C- 2	28.3 2
		UP. 32. Hagwal	C- 2	17.8 1
		UP. 34. Lakhon Pur	C- 3	17
		UP. 35. Attarah	C- 2	30.3 5
			C- 3	29.1 4
			C- 5	17.8 1
		UP. 37. Charor	C- 1	47.3 4
		UP. 38. Sadrahr	C- 4	30.3 5
		UP. 41. Agahar	C- 1	48.9 5
			C- 3	41.2 8
		UP. 58. DainKwan	C- 2	28.3 3
			C- 3	40.4 6
			C- 5	9.71
		UP. 61. Gadwal	Whole	38.4 5
		UP. 64. Banuri	C- 1	26.7 1
			C- 2	9.71
			C- 3	37.6 4
			C- 4	29.9 5
			C- 5	30.3 5
		UP. 65. Anoh	C- 3	13.7 5
			C- 5	26.3
		UP. 67. Bassa Godialan	C- 1	42.4 8
		UP. 69. Majra	C- 9	24.2 8
		UP. 72 . Bari	Whole	37.2 5
		UP. 89. Balkhor Kulara	C- 2	36.4 2
		UP. 90. Ghoran	C- 2	48.5 5
			C- 3	60.6 9
			C- 4	8.09

			C- 5	15.3 8
		UP. 92. Dharwal	C- 5	44.5 1
Jawali	CFS	CFS Golwan	U- 1	2.43
			U- 2	15.3 8
			U- 3	2.43
			U- 5	16.5 9
			U- 6	17.4
	DPF	P. 1. N. Sidhpur Ghar	C- 2a	28.3 3
		P. 10. N. Karahu	C- 2	4.05
		P. 5. N. Khabbal	C- 1c	44.9
			C- 2a	21.4 5
			C- 2b	23.0 6
			C- 2c	32.7 8
		P. 6. N. Harsar Nana	C- 3c	33.9 8
		P. 7. N. Fatehpur	C- 1	33.1 8
			C- 2b	8.09
			C- 3a	21.0 4
		P. 8. N. Kyari	C- 2c	18.2 1
	RF	R. 10. N. Talara	C- 7	28.3 2
		R. 28. D. Junat	C- 1	27.5 2
	UC	U. 13. Junat	C- 23	48.5 6
			C- 4	38.4 5
			C- 6	13.3 5
	UP	UP. 104. Nana	C- 13	46.5 3
			C- 14	88.2
			C- 9	16.1 9
		UP. 129. Dini	C- 1	51.3 8
			C- 13	10.1 1
		UP. 132. Sunet	C- 1	13.7 6

			C- 2	16.5 9
			C- 8	11.7 4
		UP. 146. Fatehpur	C- 21	50.9 8
		UP. 78. Sidhpur Ghar	C- 3	30.3 5
			C- 4	30.3 5
		UP. 96. Sakri	Whole	32.3 7
Kotla	DPF	P 2 N Devi Da Ban	C- 2b	17.8 1
		P 45 N Tilok Nath	C- 2	9.31
		P.1.N Sidhpurghar	C- 1a	38.8 2
	RF	R. 5. N. Sawarka	C- 2	12.9 5
	UC	U. 47. Banoli - ii	C- 5	42.4 8
			C- 6	50.5 8
		U. 50. Kothi Wanda	C- 15	66.7 6
			C- 16	31.5 7
		U. 52. Soldha	C- 14	13.7 6
			C- 15	12.5 5
		U. 55. Bhali	C- 29	30.7 5
		U. 84. Dol	C- 23	31.5 7
			C- 9	52.6
	UP	UP. 79. Ambal	C- 17 a	10.1 2
			C- 21	50.5 8
		UP. 83. Nadholi	C- 13	16.1 9
Nurpur	CFS	CFS Ghahin Lagore	U- 15 a	6.47
			U- 15 b	11.3 3
			U- 18	16.4 9
	DPF	P. 30. N Galore	C- 1a	35.2
			C- 3a	16.5 9

		P. 31. N. Maira Dumal	C- 1	19.8 3
		P. 33. N. Haral	C- 1a	22.2 6
			C- 1b	25.0 9
			C- 1c	19.0 2
			C- 2b	17
		P.27. N. Baral Bhaloon	C- 1	24.2 8
			C- 2	27.5
			C- 3	29.9 5
		P.28.N. Thora	C- 1a	29.1 4
			C- 3a	12.1 4
			C- 3b	38.4 5
		P.29. N. Maheti	C- 1a	16.5 9
			C- 2a	14.5 7
			C- 2b	9.71
		P.36.N. Bassa Farkunda	C- 2b	18.6 1
		P.38.N. Janera	C- 1	25.0 9
	RF	R.10. N. Tallara	C- 1	24.2 8
			C- 3	38.8 5
			C- 4	33.9 8
			C- 5	29.5 4
		R.11.N. Khanni	C- 1b	33.1 6
	UC	U. 13. Khanni	C- 10	33.1 8
			C- 11	14.9 7
			C- 15	29.1 4
		U. 19. Bhadwar	C- 1	14.1 6
			C- 19	14.1 6
			C- 8	14.9 7

		U. 45. Talara	C- 3	12.9 5
		U. 50. Kothi Wanda	C- 1	21.4 5
			C- 20	36.4 2
			C- 21	14.1 6
	UP	UP. 14. Thora Bhaloon	C- 4	19.4 2
			C- 6	17.4
		UP. 15. Galore	C- 2	49.3 6
		UP. 16. Kopra	C- 12	16.1 9
			C- 13	51.3 8
			C- 8	27.1 1
		UP. 7.Maira Dumal	C- 6	36.4 2
Rey	DPF	P. 1. D. Ghar Junat	C- 3	12.1 4
		P. 2. D. Ghar Bambota	C- 2	23.4 7
			C- 3	21.4 4
	RF	R. 29. D. Lahjong	C- 2b	47.7 4
			C- 2c	65.5 4
			C- 3b	46.1 2
		R.30.D. Samblian	C- 2a	50.1 8
	UC	U. 26. Barla	C- 4	19.4 2
			C- 5	30.3 5
	UP	UP .146. Fatehpur	C- 11	31.1 6
		UP. 144. Madholi	C- 1	93.8 7
Grand Total				5001 .6



Graph/Chart No. 5.1. Showing Range wise Area of Coppice Working Circle

5.4. Analysis and valuation of crop:

Stock Maps: - Detailed stock maps on 4"=1-mile scale has been prepared and is given in concerned compartment history files.

Quality and age classes: - The crop is more or less even aged with major proportion of young poles.

Density: - The density of each compartment and sub compartment was determined on the basis of ocular estimates and is given in concerned compartment history files.

Enumeration and Results: -

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. A total of 65 Sample Plots of 0.1 hac. were laid in this working circle covering forests. The detail of sample plots is as under: -

S. No	No. of plots	Total area counted Hac
1	65	6.5 ha (more than 10% sampling intensity)

Results: -

Table No. 5.2. Showing results of Enumeration

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	9233	12311	12311	5386	1538	4616	3077	1538	769	50779
Khair	82334	90028	27701	2308	0	0	0	0	0	202371
Shisham	3847	1538	1538	0	0	0	0	0	0	6923
BL	664058	240846	86950	36165	27701	15389	4616	2308	3077	1081110
G. Total	759472	344723	128500	43859	29239	20005	7693	3846	3846	1341183

Tree Volume										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	553.98	2339.09	8002.15	7755.84	3998.80	16340.64	10892.58	5444.52	2722.26	58049.86
Khair	5648.1	12874.00	8088.69	1130.92	0.00	0.00	0.00	0.00	0.00	27741.73
Shisham	246.21	270.69	718.25	0.00	0.00	0.00	0.00	0.00	0.00	1235.14
BL	19921.7	33718.44	48692.00	40866.45	35180.27	21698.49	6508.56	3254.28	4338.57	214178.8
Grand Total	26370	49202.22	65501.09	49753.21	39179.07	38039.13	17401.14	8698.80	7060.83	301205.50

5.5 Area and allotment:

The area of this working circle is 5001.6 ha. constituted by reserve, demarcated, un-demarcated and unclassified forests including the area of co-operative society forests.

Area by Legal classification

Table No. 5.3. Showing Area Under Coppice Working Circle

Kind of Forest	Name of Range	Total Area in ha.	Chil	Khair	Mixed B.L.	Cultivated Scrub	Un-cultivated Scrub	Bamboo	Total Area
Reserve Forest	Nurpur	159.81	-	28.81	118.46	-	-	12.54	159.81
	Kotla	12.95	6.88	-	6.07	-	-	-	12.95
	Jawali	55.84	15.38	-	38.44	-	-	2.02	55.84
	Rey	209.58	101.95	10.51	97.12	-	-	-	209.58
	Indora	-	-	-	-	-	-	-	-

	Total:-	438.18	124.21	39.32	260.09	0	0	14.56	438.18
Demarcated	Nurpur	401.02	0.4	250.94	125.84	-	23.84	-	401.02
Forest	Kotla	65.94	8.9	8.91	8.91	-	0.4	-	65.94
	Jawali	269.07	19.03	196.64	36.39	-	21.85	-	269.07
	Rey	57.05	-	24.68	32.37	-	-	-	57.05
	Indora	415.18	21.85	142.74	142.79	-	107.4	0.4	415.18
	Total:-	1208.26	50.18	623.91	346.3	0	153.49	0.4	1208.26
Un-demarcated	Nurpur	217.28	-	49.76	159.84	-	7.68	-	217.28
Forest	Kotla	76.89	50.58	-	26.31	-	-	-	76.89
	Jawali	398.55	51.38	73.07	224.98	-	49.12	-	398.55
	Rey	125.03	4	-	121.03	-	-	-	125.03
	Indora	1256.06	22.05	100.75	327.76	-	805.5	-	1256.06
	Total:-	2073.81	128.01	223.58	859.92	0	862.3	0	2073.81
Un-Classed	Nurpur	205.56	2.03	14.98	183.27	-	5.28	-	205.56
Forest	Kotla	332.62	75.67	-	256.95	-	-	-	332.62
	Jawali	100.36	62.72	13.35	24.29	-	-	-	100.36
	Rey	49.77	10.12	20.23	19.42	-	-	-	49.77
	Indora	126.27	-	20	-	106.27	-	-	126.27
	Total:-	814.58	150.54	68.56	484	106.27	5.28	0	814.58
Co-operative	Nurpur	34.29	-	34.29	-	-	-	-	34.29
Society	Kotla	-	-	-	-	-	-	-	-
	Jawali	54.23	-	54.23	-	-	-	-	54.23
	Rey	-	-	-	-	-	-	-	-
	Indora	378.25	-	378.25	-	-	-	-	378.25
		-	-	-	-	-	-	-	-
	Total:-	466.77	0	466.77	0	0	0	0	466.77
	G. Total	5001.6	452.94	1422.64	1949.8	106.27	1021.07	14.96	5001.6

5.6.Silvicultural System:

The forests will be managed under coppice with standard system. The retention of standards is necessary to afford shelter to the young- coppice and helps in regeneration.

5.7. Method of executing felling:

The following marking rules will be observed while carrying out felling coppice areas.

- i) About 70-80 vigorously growing trees with large spreading crowns capable of producing enough good seed and shade of valuable species such as Khair, Shisham, Harar, Bhera, Amla, Jamun and Dhau etc. would be retained per ha. as standards uniformly spread over the forests. The standard in case of Khair shall not be less than 15 cm. d.b.h. and 30 cm d.b.h. in case of other species. For bamboos healthy single clumps will be taken as standards.
- ii) All Khair below 20 cm d.b.h. shall be retained.
- iii) All Khair trees above 20 cm d.b.h. except to be retained as standards will be marked for simultaneous exploitation.
- iv) To maintain eco-diversity of the forest, crop the following shall not to be felled unless dead, dying and hollow.
Jamun, Dhau, Siris, Bhera, Tunu, Kalam, Pipal, Bar, Tut, Mango, Sanan, Shisham, Harar, and Ambla.
- v) All dead, dying and malformed trees will be felled.
- vi) No green tree, the removal of which under any pretext is liable to cause a blank or enhance a blank will be felled blank will be felled.
- vii) Trees along the nallahs and overlooking slopes shall be retained for soil conservation purposes.
- viii) The stool height should be 10cm to 15 cm and the stool top with slope from center to the periphery. High stool often dries up to a result of excessive transpiration losses and low ones by the beat of the soil and thus fail to coppice.
- ix) All Khair trees between 20 cm and 25 cm d.b.h. will be marked for felling subject to silvicultural availability.
- x) The clear felling of natural grown species shall be avoided.

5.8. Rotation, exploitable Diameter and regeneration period:

A rotation of 30 years for coppice and 90 years for standards have been adopted. Billets 15 cm and over in diameter are fit for conversion into charcoal into charcoal and small sizes downs to 5 cm diameter can be used as fuel wood. The demand for both fuelwood and charcoal is increasing. In order to grow material of an average diameter of 1.5 cm, the exploitable diameter is fixed at 25 cm. In selected areas various hardwood species may be grown to bigger sizes for the production of timer, The regeneration period will be 10 years.

5.9. Felling Cycle:

Felling cycle will be 30 years.

5.10. Calculation of yield:

The yield will be regulated by area. Approximately 70 ha areas will be available annually for felling. On the basis of studies made over selected areas and result

of fellings made in the past, it is estimated that 25 m³ stacked fuelwood or 175 quintals of green fuelwood will be available per ha. of the felled area.

5.11. Sequences of felling:

The following table given the felling Programme for the areas to be worked during the period of plan.

Table No. 5.4. Sequence of Felling

Year	Felling Series	Range	Forest	Comptt. Sub comp.	Area in ha.
2025-26	Voluntary	Indora	UP.169 Majra	C-14	17
		Rey	UP.114 Mohali	C-1	23.47
		Nurpur	U.49 Bhadwar	C-8	14.97
	Legal	Indora	P-18-N Malot Kareri	C-2a	18.82
				Total: -	74.26
2026-27	Voluntary	Indora	UP.22 Chhatroli	C-1	22.25
		Rey	UP.144 Mohali	C-1	23.47
		Indora	UP.69 Majra	C-16	24.28
				Total: -	70
2027-28	Voluntary	Nurpur	UP.15 Galore	C-2	24.68
	Legal	Jawali	P.6. Harsar Nana	C-3	33.98
	Voluntary	Indora	UP.69 Majra	C-14	17
				Total: -	75.66
2028-29	Legal	Jawali	P.5.N. Khabbal	C-2b	23.06
	Voluntary	Jawali	U.13 Junat	C-6	13.35
	Voluntary	Kotla	UP.83 Nadholi	C-13	6.19
		Indora	UP.21 Baranda Kandwal	C-5	17.2
			UP.90 Galolre	C-4	8.09
				Total: -	67.89
2029-30	Legal	Jawali	P.5.N. Khabbal	C-2b	23.06
	Voluntary	Jawali	U.13 Junat	C-6	13.35
	Voluntary	Kotla	UP.83 Nadholi	C-13	6.19
	Legal	Nurpur	P.31.N Maira Dumal	C-1	19.83
	Voluntary	Kotla	UP.79 Ambal	C-17	10.12
				Total: -	72.55

2030-31	Legal	Indora	P.18.N. Malot Kareri	C-2a	18.82
	Voluntary	Rey	UP.144 Mohali	C-1	23.47
	Voluntary	Kotla	UP.69 Majra	C-12	17
	Legal	Indora	P.14.N Agra-Da-Nal	C-1	10.52
				Total: -	69.81
2031-32	Voluntary	Indora	UP.21 Baranda Kandwal	C-8	23.26
	Legal	Rey	R.29.D Lohjang	C-3b	23.06
	Legal	Nurpur	P.33.N. Haral	C-1a	22.26
				Total: -	68.58
2032-33	Voluntary	Indora	UP.21 Baranda Kandwal	C-8	23.27
	Voluntary		UP.90 Ghoran	C-2	24.28
	Legal		UP.22 Chhatroli	C-11	22.26
				Total: -	69.81
2033-34	Voluntary	Indora	UP.21 Baranda Kandwal	C-5	17.2
	Voluntary		UP.69 Majra	C-10	18.21
	Voluntary	Nurpur	UP.7 Maira Duamal	C-6	18.36
		Jawali	UP.146 Fatehpur	C-11	20.16
				Total: -	73.93
2034-35	Legal	Rey	R.29.D Lohjang	C-3b	23.06
	Voluntary	Nurpur	UP.7. Maira Dumal	C-6	18.36
	Voluntary	Rey	UP.144 Mohali	C-1	23.46
		Jawali	UP.146 Fatehpur	C-11	10.35
				Total: -	75.23
				G. Total:-	717.72

Note: - Most of the areas purposed for felling under this working circle are dominated by lantana bushes. Their felling should only be done when special norms are provided for subsidiary silviculture operations and plantations and discussed in plantation working circle.

5.12. Plantation Programme:

Plantation shall be carried out during monsoon of the year following the fellings. Following operation will be carried out for undertaking plants.

(I) Subsidiary Silvicultural operations:

- (a) Immediately after the felling refuse will be collected in heaps and burnt in February and March. The principles underlying the collection and disposal of slash which has to be completed during witness are summarized as follows:
- (b) Start collection from the top of the compartment and work downhill.
- (c) Stack larger slash by hand in open places in moderated heaps of about 20 quintals each.
- (d) Rake chips and humus downhill on to the heap of slash.
- (e) Burn the heaps in downhill. The smoke does not interfere with the networking below and there are less risks of fire.
- (f) Burn the heaps in rotation to reduce the heat, women and boys can be employed on raking up the smaller chips.
- (g) One forest Guard can hardly control more than six laborers and the same men should be employed year after year.
- (h) It is recognized that once regeneration by seed or coppice has been obtained the slash from the secondary fellings cannot be burnt. Therefore, steps should be taken to get rid of this in the first instance.
- (i) Steps should be taken to make it a condition of sales of trees locally or to right holders of grants to free grantees that these peoples collect their refuse into heaps or removed it from the forest.

(II) Sowing and planting:

The earth work for planting of Chil, Khair and other economic species should be done during March to April before 15th April. Plants should be raised in permanent nurseries of not less than 15 cm height by 30th June. The pits should be refilled during May and planting done in July so that the plants get more than a month period to establish well to withstand the drought of autumn and next summer. The beating up to failures of Chil, Khair and other economic species should be continued till area is fully stocked which should be possible within a period of 3 years.

(III) Weeding and Bush cutting:

There should be two weeding, one in march and other in August in Ist year and one weeding a year in the subsequent three years. The bushes be cut twice in March and September every year till the plants have outgrown the bush growth to free the young plants from suppression. Special emphasis be laid on bush cutting.

(IV) Cleanings:

Cleanings will be carried out in the 2nd year after coppicing. Coppice shoots appearing from stumps of middle-aged trees to economic value will be cleaned and 2 or 3 healthy shoots per stumps retained.

(V) Climber Cutting:

Climber cutting along with bush cutting every year will be carried out so as to keep the coppice shoots free from suppression. This will be done till the plants are more than 2 meter high. In addition, climber will be done in all areas in accordance with five years cycle.

(VI) Grass cutting:

Grass cutting from the areas under plantations may be permitted under the strict supervision of the forest staff where the plants have grown beyond the likelihood of damage in the process.

(VII) Notification of closures:

The closure procedure will be started by one year in advance of felling planting Programme. The planting operation will be carried out only after the closure has been notified. All the reserved forests can be closed without any difficulty but in delimited protected, un-demarcated protected and unclassed forests only 1/3rd area can be closed in view of the grazing problem in the tract. Effective B/wire fencing supplemented with ipomoea cutting will be erected around the plantation area.

(VIII) Lopping:

All areas allotted to this working circle shall be protected against indiscriminate lopping.

(IX) Regeneration paths:

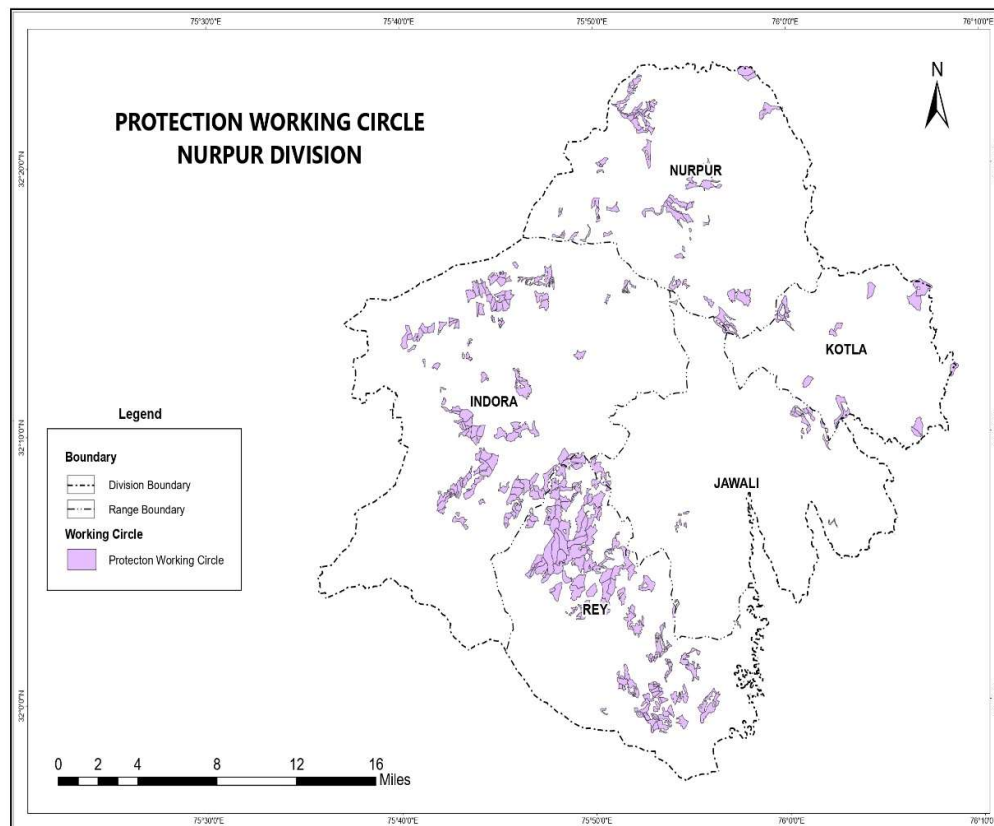
¾ the meter-wide regeneration paths traversing over the entire area to facilitate inspection will be constructed and maintained in the areas worked and planted.

5.13. Choice of species:

The species to be planted will be Khair, Shisham, Bamboo and other broad-leaved species depending upon the site.

CHAPTER-VI

THE PROTECTION-CUM-REHABILITATION WORKING CIRCLE



MAP NO. 6.1 GIS MAP (1: 50,000) FOR PROTECTION WORKING CIRCLE

6.1. General Constitution and Characters of Vegetation:

Working circles included in general all those forests not allotted to other working circle due to steep/precipitous slop, fragile soil and particular legal status where concentrated fellings of the closures are not feasible and especially in case of “*TAHE JAMIN Malkan Khudro Darkhtan Malkiat Sarkar* areas” (KDMS). Because of the varied type of the areas included in this working circle, almost every type of vegetation except bamboo met with in this tract is found in the areas allotted to this working circle. The description of individual Forest has been placed in the compartment history files. The growing stocks is thinner in comparison to the areas allotted to the other working circle and inferior in quality.

The entries of "*Khudro Drakhtan Malkiyat Sarkar* (KDMS)" appear in the revenue record in following categories of land:

1. Where the ownership is in the name of HP Govt. and in possession column, the entry is Jungle Mehdooda/Mehfuza or Gair Mehdooda/ Mehfuza Van Vibhag.

2. Where the ownership is in the name of HP Govt. and in possession column, the entry is in the name of private individuals as tenant or Nazayaj Kabaj.
3. Where the ownership is in the name of private individual and in possession column, the entry is Jungle Mehdooda/ Mehfuza or Gair Mehdooda/ Mehfuza Van Vibhag.
4. Where the ownership is in the name of private individual and in possession column also, the entry is in the name of private individual but the status of land as per entry of Jikar Van Sarkar given at the end of Jamabandi is Jungle Mehdooda/ Mehfuza or Gair Mehdooda/ Mehfuza.
5. Where the ownership is in the name of private individual and in possession column, the entry is in the name of other Govt. Deptt. viz Health, Education etc.
6. Where the ownership is in the name of HP Govt. and in possession column, the entry is in the name of other Govt. Deptt. viz Health, Education etc.
7. Where the ownership is in the name of private individual, in possession column also, the entry is again in the name of private individual and nothing appears under status of land as per entry of Jikar Van Sarkar given at the end of Jamabandi.

As per entry of Naksha Van Sarkar status of forests, such land is recorded as Jungle Mehdooda/ Mehfuza or Gair Mehdooda/ Mehfuza against the categories appearing at Sr. No. 1 to 6 above. Such an entry attracts the provisions of Van (Sanrakshan Evam Samvardhan) Adhiniyam, 1980 and felling of trees on such land cannot be permitted in view of Hon'ble Supreme Court orders dated 12.12.1996 passed in WP (C) No. 202 of 1995. Even the category 4, where the ownership and possession is with the private individuals, also attracts FCA 1980 due to the status of land Jungle Mehdooda/ Mehfuza or Gair Mehdooda/ Mehfuza Van Vibhag as per entry of Jikar Van Sarkar given at the end of Jamabandi.

This area covered under this working circle is the area under category 1 to 4 as mentioned above

6.2. Special Objects of Management:

The special objects of management are to protect the areas from further denudation and erosion thereby to preserve forest ecosystem and maintain hygienic condition of the forest.

6.3 Blocks and Compartments: -

Table No. 6.1.

Protection Working Circle				
Range	Type	Name of Forest	Compartment	Area
Indora	CFS	CFS Ghandran	Sept Kh No	0.4
			U- 12	58.67
		CFS Indpur	U- 5	6.07
			P- 1	21.45
			P- 2	22.66
			P- 3	38.85
			P- 4	35.61
			Sept Kh No	6.07
			U- 10	23.87
			U- 11	8.9
			U- 12	46.94
			U- 13	35.61
			U- 14	4.45
			U- 15 a	16.19
			U- 15 b	18.21
			U- 15 c	23.47
			U- 16 a	30.75
			U- 16 b	27.92
		CFS Lodhwan	U- 5	19.43
			U- 6	57.86
			U- 7	56.25
			U- 8	33.59
			U- 9	38.04
			U- 13	13.35
			U- 19	12.54
			U- 20	17.4
			U- 21	51.79
			U- 29	6.07
			U- 32	2.83
			U- 37	2.83
			U- 38 b	2.43
			U- 39	8.9
			U- 40	5.26
			U- 41	2.43
			U- 42	5.66
			U- 43	0.81
			U- 49	1.62
			U- 50	4.05
			U- 51	16.18
			U- 52	18.21
			U- 53	19.02

			U- 54	17.4
			U- 58	14.97
			U- 59	17.4
			U- 6	15.78
			U- 60	25.49
			U- 61	11.73
			U- 62	36.02
			U- 63	22.66
			U- 64	18.21
			U- 65	30.76
			U- 66	20.23
			U- 67	21.45
			U- 68	27.11
			U- 69	28.34
			U- 7	6.07
			U- 70	40.06
			U- 74	18.21
			U- 75	19.42
			U- 76	1.21
			U- 8	9.71
		CFS Paniala	Sept Kh No	5.26
			U- 7	59.89
			U- 8 a	11.73
		CFS Raja Khasa	U- 1	15.78
			U- 2 a	12.54
			U- 2 b	13.35
			U- 3	66.36
			U- 4	41.68
			U- 5 a	19.83
			U- 5 b	16.19
			U- 6	16.19
			U- 8	11.33
		CFS Sanour	U- 1	43.7
			U- 3	15.38
			U- 4	21.45
			U- 5	18.2
		CFS Sirt	Sept Kh No	8.09
			U- 1	59.08
			U- 2	5.66
			U- 4	12.95
			U- 5	5.66
	UP	UP 38 Sadrahr	C- 6	10.12
			C- 7	24.28
		UP-114 Madholi	C- 1	35.61
			C- 14	54.62
			C- 17	53.41

			C- 18	23.87
			C- 2	57.47
			C- 26	40.46
			C- 29	37.63
		UP-127 Malahari	C- 10	39.66
			C- 11	38.85
			C- 12	34.4
			C- 13	39.25
			C- 14	61.91
			C- 15	68.79
			C- 16	67.17
			C- 17	39.66
		UP-141 Surdwan	C- 1	64.74
			C- 2	40.46
			C- 4	38.04
			C- 5	87.4
		UP-21 Baranda Kandwal	C- 11	18.21
			C- 12	22.26
			C- 14	40.06
			C- 15	45.66
			C- 18	40.86
			C- 19	12.14
		UP-34 Lakhon Pur	C- 2	6.48
		UP-63 Dagla	C- 6	10.93
		UP-65 Anoh	C- 1	29.95
		UP-88 Malot	C- 6	9.71
			C- 8	4.86
		UP-89 Balkhor Kulara	C- 1	4.86
			C- 6	12.14
		UP-91 Bharlahar	C- 1	14.97
Jawali	CFS	CFS Golwan	Sept Kh No	0.81
			U- 7	11.73
		CFS Lahroo	P 1	4.85
			P 2	20.23
			U- 10	18.61
			U- 11	3.24
			U- 12	17.4
			U- 19	8.5
			U- 20	11.33
			U- 22	3.24
			U- 23	1.21
			U- 25	5.26
			U- 27	9.31
			U- 29	8.09
			U- 6	11.33
			U- 7	1.21

			U- 8	20.23
	DPF	DP Beh Kangar	W	106.17
	UP	UP-129 Dini	C- 2	86.99
		UP-130 Bagroli	C- 6	30.76
		UP-149 Harsar	C- 5	10.12
Kotla	UC	U-50 Kothiwanda	C- 23	27.52
			C- 25	18.21
		U-55 Bhali	C- 32	53.41
			C- 33	77.28
		U-84 Dol	C- 12	60.69
			C- 13	56.65
			C- 2	14.16
	UP	UP 51 Anuhi	C- 12	11.33
			C- 15	17.4
		UP 79 Ambal	C- 13	52.6
			C- 7	48.55
			C- 8	48.15
		UP-54- Bar	C-7	16.19
Nurpur	CFS	CFS Ghahin Lagore	Sep Kh No	2.83
			U- 1	17.8
			U- 10	12.14
			U- 14	2.43
			U- 16	1.62
			U- 19 a	9.71
			U- 2	13.76
			U- 21	4.85
			U- 22	96.3
			U- 24	4.45
			U- 3	16.99
			U- 34	2.43
			U- 4 a	10.52
			U- 5	56.25
		CFS Kulahan	U- 5	55.14
			U- 6	6.88
			U- 7	5.66
		CFS Suliali	Sep Kh No	6.07
			U- 10	3.64
			U- 11	6.47
			U- 13	8.09
			U- 14	9.31
			U- 16	14.57
			U- 17	31.16
			U- 18	7.69
			U- 19	16.19
			U- 2 a	8.5
			U- 2 b	4.05

			U- 20	10.52
			U- 21	11.73
			U- 22	14.57
			U- 23	23.07
			U- 24	1.21
			U- 25	3.64
			U- 3	15.78
			U- 4 a	9.31
			U- 4 b	11.33
			U- 4 c	8.9
			U- 5	3.64
			U- 6	22.66
			U- 7	4.05
			U- 8	26.3
			U- 9	6.47
	DPF	P.32.N. Bharnue	C- 1	6.88
			C- 2	5.66
			C- 3	6.48
		P.33.N. Haral	C- 2a	20.23
	UC	U-13 Khanni	C- 1	17
			C- 13	8.9
			C- 2	23.47
			C- 3	14.16
		U-45 Talara	C- 2	9.71
		U-47 Banoli (i)	C- 1	14.97
			C- 2	34.4
			C- 3	37.99
			C- 4	36.42
		U-49 Minjgran	C- 2 a	10.52
			C- 7	26.71
			C- 8	26.71
	UP	UP-14 Thora Bhaloon	C- 1	17
			C- 10	30.76
			C- 5	10.12
			C- 9	14.16
		UP-16 Kopra	C- 6	40.46
		UP-17 Hatli	C- 1	38.84
			C- 2	6.47
			C- 3	28.33
			C- 4	10.12
			C- 5	12.54
		UP-6 Danni	C- 1	123.81
			C- 2	72.43
		UP-6a Ladhori	C- 1	67.17
		UP-9 Aund	C- 2	27.52
Rey	CFS	CFS Badala	U- 1	6.07

			U- 10	3.24
			U- 2	7.28
			U- 5	8.5
			U- 6	8.09
			U- 7	19.42
			U- 8	8.09
			U- 9	12.14
		CFS Bhatoli	U- 5	1.62
		CFS Rey	Sept Kh No	5.26
			U-12	21.45
			U-13	23.07
			U-14	2.83
			U-15	4.86
			U-16	5.26
			U-17	3.24
			U-18	4.45
			U-30	4.86
			U-31	7.28
			U-32	7.28
			U-33	6.47
			U-34	2.02
			U-35	3.64
			U-36	35.61
			U-37	30.35
			U-38	29.95
			U-39	3.24
			U-4	19.02
			U-40	4.04
			U-41	2.02
			U-42	7.69
			U-45	18.61
			U-46	22.26
			U-47	17.4
			U-48	34.9
			U-49	25.09
			U-5	4.05
			U-50	9.09
			U-51	4.45
			U-52	1.62
			U-53	7.28
			U-54	2.83
			U-57	8.09
			U-58	6.07
			U-59	13.35
			U-62	4.85
			U-69	6.07

			U-74	23.07
			U-75	19.02
			U-76	5.66
			U-83	5.26
			U-84	0.4
			U-85	1.21
			U-86	3.24
			U-87	10.93
			U-88	10.12
			U-9	6.47
	UC	U 13 Junat	C- 12	64.74
			C- 13	26.3
		U 15 Dhameta	C- 1	11.33
		U 25 Anoh	C- 10	19.02
			C- 14	27.11
			C- 15	45.32
			C- 5	48.95
			C- 6	50.58
	UP	UP-127 Malahri	C- 1	32.37
			C- 2	31.56
			C- 3	31.97
			C- 4	22.66
			C- 5	46.94
			C- 6	18.62
			C- 7	33.18
			C- 8	32.37
			C- 9	21.04
		UP-128 Samlet	C- 1	18.21
			C- 10	28.33
			C- 11	56.84
			C- 12	36.02
			C- 13	37.23
			C- 16	48.55
			C- 17	44.51
			C- 18	28.73
			C- 19	34.4
			C- 2	13.76
			C- 20	39.66
			C- 22	50.17
			C- 23	16.19
			C- 27	43.04
			C- 28	38.45
			C- 3	14.16
			C- 5	12.95
			C- 6	26.71
			C- 7	17
			C- 8	55.43

			C- 9	18.62
			C-29	24.28
		UP-143 Sanjwan	C- 1	47.75
			C- 2	66.76
			C- 3	72.83
			C- 4	54.22
			C- 5	67.98
		UP-144 Maholi	C- 10	40.46
			C- 11 a	57.46
			C- 11 b	27.52
			C- 6 a	55.59
			C- 7	39.65
			C- 8	77.28
		UP-145 Hatli	C- 1	6.88
			C- 10	63.93
			C- 11	33.99
			C- 14	23.47
			C- 15	15.78
			C- 16	39.25
			C- 17	41.26
			C- 5	20.23
			C- 6	56.24
			C- 7	33.59
			C- 8	30.35
			C- 9	49.77
		UP-156 Bhogarwan	C- 1	16.19
			C- 2	30.35
			C- 3	29.95
		UP-157 Pind Padhian	C- 1	45.32
			C- 2	50.58
		UP-160 Malal	C- 1	18.21
			C- 2	7.69
		UP-161 Rajgir	C- 1	18.21
			C- 2	40.86
			C- 3	36.82
			C- 4	50.58
		UP-165 Nangal	C- 15	33.99
			C- 16	32.37
			C- 17	29.14
			C- 2	42.08
			C- 7	53.81
		UP-185 Diana	C- 9	48.15
Grand Total				8691.01

6.4. Area and allotment:

The total area of the working circle is 8691.01 ha. The breakup of area by Ranges and different categories of Forests is given in the following statement.

Table No. 6.2. Range wise Area Under Protection Working Circle

Sr. No.	Range	Class of Forest with Area in ha.					Total
		RF	DPF	UPF	UF	CFS	
1	Nurpur	-	39.25	499.70	260.96	608.68	1408.82
2	Kotla	-	-	194.22	307.92	-	502.14
3	Jawali	-	106.17	127.87	-	156.58	390.62
4	Rey	-	-	2580.49	293.36	579.73	3454.57
5	Indora	-	-	1230.89	-	1705.17	2936.06
	Total:	-	145.42	4633.20	862.23	3050.16	8691.01

6.5. Analysis and Valuation of Crop:

The forests have been stock mapped a 1:15000 (4" to 1-mile) scale which have been placed in the compartment history files. The area under different species and classes of forest is given below:

Enumeration and Results: -

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. A total of 74 Sample Plots of 0.1 hac. were laid in this working circle covering all PBs. The detail of PB wise sample plots are as under

S. No	No. of plots	Total area counted Hac
1	74	7.40

Results:

Table No. 6.3. Result of Enumerations

Tree Count										
Spp.	Class									G. Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	18791	45803	27012	11744	8221	3523	0	0	0	115094
Khair	152679	112748	25838	10570	0	0	0	0	0	301835
Shisam	8221	4697	4697	2348	0	0	0	0	0	19963
BL	889066	413410	199658	44629	15267	4697	2348	0	2348	1571423
Grand Total	1068757	576658	257205	69291	23488	8220	2348	0	2348	2008315

Tree Volume										
Spp.	Class									G. Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	1127.46	8702.57	17557.80	16911.36	21374.60	12471.42	0.00	0.00	0.00	78145.21
Khair	10473.78	16122.96	7544.70	5179.30	0.00	0.00	0.00	0.00	0.00	39320.74
Shisam	526.14	826.67	2193.50	2294.00	0.00	0.00	0.00	0.00	0.00	5840.31
BL	26671.98	57877.40	111808.48	50430.77	19389.09	6622.77	3310.68	0.00	3310.68	279421.85
Grand Total	38799.36	83529.61	139104.48	74815.43	40763.69	19094.19	3310.68	0.00	3310.68	402728.11

6.6. Density:

The canopy density has been assessed and recorded in the compartment history files. The average density of all the forests is taken as 0.3.

6.7. Silvicultural System:

No definite silvicultural system is prescribed. These forests are to be preserved, protected and replenished. In order to check the steady deterioration of the Forests no felling will be done except for meeting right holders' requirement and salvage removals. The cultural blanks and poorly stocked areas will be taken up for planting with suitable species. Mature and over mature Khair will be felled under selection system.

6.8. Closures:

Closures for afforestation purposes be carried out with the consent of right holder and owners of land in case of Khudra Drakhtan Malkiat Sarkar Areas (KDMS).

6.9. Calculation of Yield:

No felling except of the dead, dry fallen trees for the demand of right holders are allowed. As such no yield is being calculated and prescribed. However, record of all such remarks will be maintained in the prescribed control Forms.

6.10. Method of Executing Felling:

Marking of trees to right holders and marking in case of Khair is to be done on the principle of selection system. Attempt should be made preferable to mark dry and fallen trees. The tendency to remove best selected stems is such markings is to be avoided.

6.11. Soil Conservation Measures:

The soil conservation measure mainly Gully plugging, check damming and putting up of Engineering structures will be taken up as warranted and permitted by the availability of funds.

6.12. The sequence of planting

The sequence of planting in blanks is not laid out & left to the desertion of Divisional Forest Officer who may frame it as per availability of funds and consent of people for closure. However, the following is the list of forests which requires immediate attention.

Table No. 6.4. Sequence of Planting

Range	Name of Forest	Compartment
Nurpur	P-33N Haral	C-2a
	UP-6a Ladori	C-1
	UP-6 Danni	C-1
		C-2
	UP-9 Aund	C-2
	UP-16 Kopra	C-6
	UP-17 Hatli	C-1
		C-3
	U-13 Khanni	C-2
		C-13
	U-45N Talera	C-2
	U-47N Banoli	C-3
	(Part-I)	
	U-49 Minjgran	C-3
	U-50 Kothi Banda	C-23
	CFS Gahin Lagore	U-22
	CFS Suliali	U-17
		U-23
		U-8
Kotla	UP-51 Anuhi	C15
	U-55 Bhali	C-33
		C-32
	UP-79 Ambal	C-13
	U-84 Dole	C-12
		C-13
	U-50 Kothiwanda	C-25
Jawali	UP-129 Dini	C-2
	CFS Lahru	P-2
	U-77 Bhol	C-5

Rey	UP-127 Malahri	C-2
	UP128- Samlet	C-8
		C-8
		C-11
		C-22
		C-27
	UP-143 Sanwan	C-2
		C-5
		C-8
	UP-144 Maholi	C-8
		C-11a
Indora	UP-21 Baranda Kandwal	C-14
	UP-38 Sadrahar	C-18
	UP-65 Anoh	C-7
	UP-114 Madholi	C-1
		C-2
		C-17
	UP-127 Malahri	C-15
		C-16
		C-17
	CFS Paniala	U-17
	CFS Raja Khasa	U-3
		U-4
	CFS Lodhwan	U-21
		U-62
		U-70
	CFS Sirit	U-1
	CFS Indpur	U-6
		U-7
		U-9
		U-13

6.13. FOREST FIRE MANAGEMENT PLAN, NURPUR FOREST DIVISION

1. Introduction

Forest fires pose a significant threat to the rich biodiversity, forest wealth, and livelihoods dependent on the forests in the Nurpur Forest Division. This Forest Fire Management Plan outlines the division's strategy for the prevention, preparedness, response, and mitigation of forest fires, adhering to the guidelines set by the Himachal Pradesh Forest Department.

2. Objectives

- Minimize the incidence and impact of forest fires.
- Improve community participation in forest fire management.
- Build capacity for quick and effective response.
- Conserve forest resources and protect wildlife.

3. Forest Fire Vulnerability Assessment

High-Risk Areas Identified:

- Total number of beats- 82
- Very Sensitive- 34
- Sensitive- 15

A detailed list of beats, along with the Fire Sensitivity Map of the Nurpur Forest Division, is attached.

Vulnerable Period 1st April to 30th June/ till onset of monsoon season
(peak summer and pre-monsoon season).

Contributing Factors: Accumulation of dry biomass, Chir pine needle litter, Human negligence.

4. Prevention Measures

Fire Lines Creation and Maintenance-

- New Creation- Nil
- Maintenance of Existing Fires Lines- 80.088 km
- Controlled Burning- 40.00 ha.
- Cleaning of Pine Needles- 1575 ha.
- Cleaning of Fire Line- 75 km

5. Awareness Programs/ Campaigns

- School Rallies and Quiz/ painting competitions at different blocks in collaboration with Hans foundation are conducted.**
 - Community Engagement through street plays (Nukkad Nattak) and Puppet Shows in collaboration with Hans Foundation are also conducted every year.**
- 6) Forest Fire volunteer training**
- Mock Drill for Fire Response Preparedness** Joint training exercises with Disaster Management Authority and Fire Services including NDRE, Jassur is conducted every year during April.

- ii) Engagement of local communities (in collaboration with Hans Foundation) and Village Forest Management Societies/ Village Forest development Societies) formed under the HPFECF (KfW) Project and JICA State Forestry projects.
- iii) Conducted Fire Awareness meetings at Nurpur and Nurpur Forest Ranges in collaboration NDRF, Jassur is conducted every year during April.

7. Preparedness Measures

- Forest Fire Control Room at Divisional and Range Levels.
- Formation of Quick response teams at Range Level with vehicular Mobility.
- Formation of Forest Fire Task Force at Block levels.
- Identification of Volunteers from Forest Fire prone areas at Village level in collaboration with Hans Foundation (List of volunteers attached)
- Regular Coordination with PRI members.

8. Firefighting Equipment Stock.

i. Modern equipments:

Sr. No.	Name of Forest Division	Particulars of serviceable Forest Fire Tools Available in Forest Division	Number
1	Nurpur	Racker Iron	3
2		Fire Fighting Racker	49
3		Fire Registrate Cloth	15
4		Fire Racker	91
5		Steel Fire Racker	40
6		Pick Axes	60
7		Fire Budy	1
8		Fire Tong	1
9		Fire Gauge	5
10		Fire Extinguisher EOS	2
11		Fire Bucket	4
12		Wooden Stand for fire Bucket	1

13		2 Stroke Backpack Leaf Blower	5
14		Backpack Bags 25 L	50
15		Fire Beaters	100
16		Falcon Garden Rakes	100
17		Fire Man Axe	50
18		Leo Carbide tipped blade Chain Saw	5
19		Fire Extinguisher EOS	20
20		Nail Rake	10
21		Fire Blowers	5

- ii. Vehicle Mounted Mobile Water Tankers arranged for Nurpur Range and Rey Forest Ranges.
- iii. Deployment of Fire Watchers and APADA Mittra.

6.14 Fire Incidence Management: - All the Forest field staff and recently engaged Van Mitras are registered on Fire Alert Management System. This is helping in early detection of forest fires and RRTs (Rapid Response Teams) constituted at Block Level are mobilised quickly to douse fire. The RRTs are fully equipped with above mentioned equipments and are able to quickly respond to any forest fire within their jurisdiction. Every fire incidence is responded and action taken is reported on forest fire portal of Himachal Pradesh Forest Department. The loss on account of fire is also reported on the portal. Each fire burnt area is revisited as per 3-tier forest fire monitoring system for post monsoon loss assessment.

6.15 Management Plan for Prevention of Illicit Felling

I. Introduction

Objective:

To prevent illicit felling of trees with specific preventive measures strategies and to take swift action after detection of offence cases based on standard protocols at Beat, Block, and Range levels.

Scope:

Applicable to all Ranges, Blocks, and Beats under Nurpur Forest Division.

II. Understanding the Modus Operandi

1. Identification of Sensitive Areas

Each Beat Officer, BOs & ROs shall prepare a list of sensitive areas based on several criteria for their respective jurisdiction which will be used to prepare a division level plan on following criteria: -

Area Name	Species Density	Road Proximity	Habitation Proximity	Exit Route Description	Remarks
Compartment name	High/med/low (Approx no.)	Close to NH/SH/VR	Adjacent to Village xyz at ABC meters	Probable route- local and outside Division and state	High/Med/Low Risk Any other factor

2. Patrolling Plan for Sensitive Areas

Patrolling Frequency and Details- A patrolling roaster of sensitive areas shall be prepared by all ranges and the same be regularly submitted to division, alongwith monthly naaka register. Naaka and patrolling details be prepared on a register clearly recording time and duration of naaka/patrolling; place /route; Name and designation of officials; Description of checking like details of vehicles checked; outcome found anything or not; Remarks if any.

3. Management of staff on duty during leave- leave must be sanctioned prior to leaving of station from competent authority.

III. Threat Assessment

A threat introspection of respective areas would be conducted: -

- 1. Time of Illicit Felling:** Sensitive time of illicit felling would be documented based on past cases as well as latest field position. All evidences with respect to interval of felling between two incidents, time of felling, season of felling, trend of last 10 years and area of felling must be critically analyzed and a pattern be drawn to chalk out a strategy to nab the culprits. Also find out illegal transit timings in your areas and its routes (especially for border staff).
- 2. Nature of Offenders:** A list of probable suspects which may include both local as well outsiders as well as hybrid local-outsider organized gangs would be prepared to narrow down scope of investigation. Locals intelligence regarding these possible suspects be gathered time to time to get timely information of possible offences.
- 3) Patterns and Trends:** Incidents may spike around full moon days as it will provide moonlight to act during the night, khair season, or holidays, staff leave etc.

IV. Strategic Response Plan

- 1. Standard Operating Procedure (SOP)** After detection of offence, the staff while doing local investigation must try to find out exact date and time of incident; possible suspects – local/outside; entry and exit route; checking of CCTV; recording of statements of locals/witnesses; information from local inputs; coordination with staff at Exit points/border areas.

A sample detection response sheet is provided below:

Incident	Time	Location	Exit Route	Tools Found	Local Info	Action Taken	Follow-up Needed
Illicit felling near 12A	02:00 AM	Beat 2	Forest trail to Kandwal	Chainsaw	Informed by villager	Exit sealed, patrolled	Track offender

2. Static and Dynamic Surveillance Measures

Includes establishment of check-posts, CCTV installation, joint patrolling, and plugging of routes at sensitive points especially border exit routes.

3. Chainsaw Registration

All chainsaws to be registered with ownership and location details. (ROs to take up the matter with local pradhans)

4. Proposal for Infrastructure

New check-posts at sensitive locations and surveillance infrastructure (Control Room at Divisional Level) would be created during the current Working Plan Period.

5. Exit Route Mapping

A route map of all possible Exit routes inside and outside forest division alongwith infrastructure on those routes which could help in detection of Offenders in case of illicit felling would be created.

V. Reporting & Monitoring

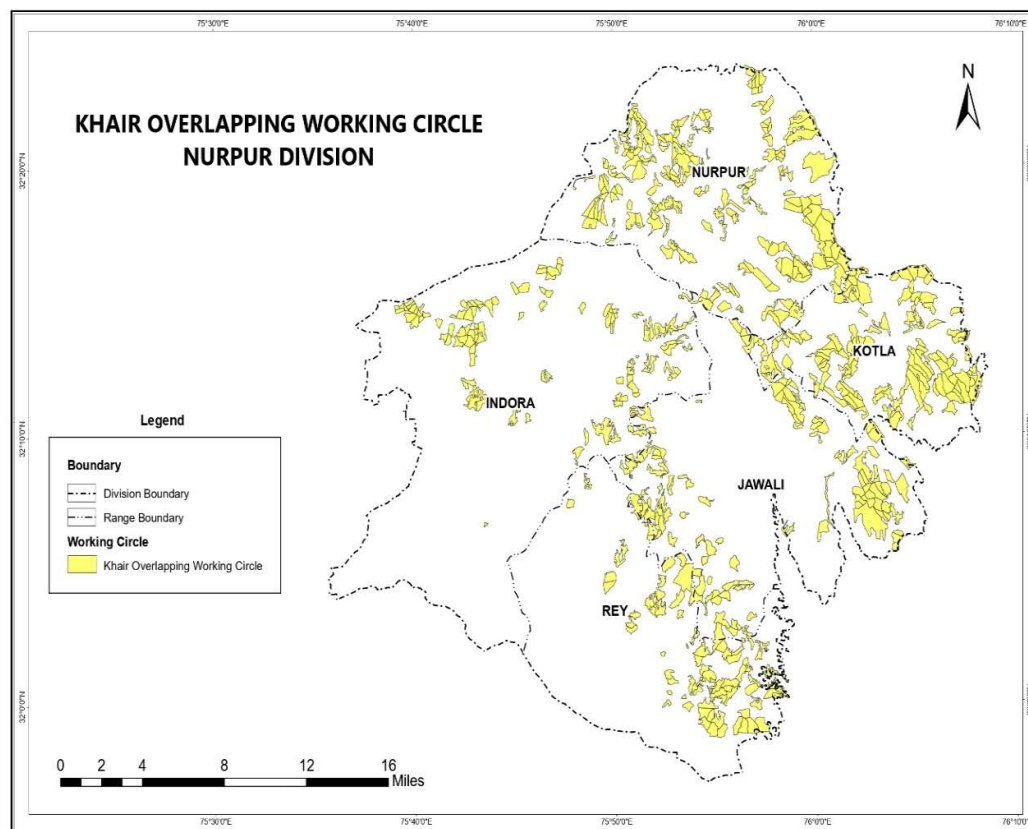
Weekly review at Range level and monthly review at Division HQ. Use GIS, Drones and maintain updated offence registers.

VI. Coordination & Community Involvement

Endeavors shall be made to develop local intelligence, conduct awareness drives, and encourage whistleblowers with reward mechanisms.

CHAPTER -VII

THE KHAIR (OVERLAPPING) WORKING CIRCLE



MAP NO. 7.1. GIS MAP (1: 50,000) FOR KHAIR(OVERLAPPING) WORKING CIRCLE

7.1. General Constitution:

This working circle will overlap all other working circles except coppice working circle. The Khair of the tract enjoy good reput for the purpose of making Katha. The trees grow to a height of 10m and d.b.h. 25 cm without developing any rot or hollowness. The straight and well grown trees from a fair proposition. The heartwood formation starts with attaining 12.5 cm d.b.h. The Khair trees of coppice working circle will be worked along with other broad-leaved scrub species of the respective annual couples.

7.2 Special Objects of management:

The special object of management is to harvest the mature and over mature stock of khair in excess of the local requirement and thereby realize maximum revenue for the state.

7.3. Area and allotment:

The area in this working circle are those allotted to Chil Working Circle, Bamboo Working Circle, Plantation working circle and protection working circle (whole area under the plan minus area of coppice working circle). The total area is 48176.21 ha. The Range wise break up is as under: -

Table No. 7.1. Range wise Area Under Khair (Overlapping) Working Circle

Sr. No.	Range	Class of Forest with Area in ha.					Total
		RF	DPF	UPF	UF	CFS	
1	Nurpur	1666.22	1192.45	5619.63	2823.63	1858.47	13160.40
2	Kotla	1003.05	496.86	3038.61	3497.83	-	8036.35
3	Jawali	186.93	1530.30	3226.12	982.12	629.55	6555.02
4	Rey	379.12	46.94	5545.85	2015.02	1485.73	9472.66
5	Indora	210.43	782.9	6503.21	134.75	3320.49	10951.78
	Total: -	3445.75	4049.45	23933.42	9453.35	7294.24	48176.21
				Legal Felling Series (Reserve+DPF)			7495.20
				Voluntary Felling Series (UPF+UF)			33386.77
				Co-operative Felling Series (CFS)			7294.24
				Grand Total: -			48176.21

7.4 Analysis and Valuation of Crop:

The stock maps prepared of the proportion of Khair has been shown by the horizontal & vertical hatches. The horizontal hatches indicate the percentage of Khar mixture with Chil & Misc. B.L. between 2.5% to 4.5% whereas vertical hatches indicate the percentage of Khair in mixture with Chil below 2.5 %.

The quality i.e. good and the trees are of all age classes except mature. The younger age classes predominate. The density is poor. The growing stock has been completely enumerated in 50 cm diameter classes down to 5 cm d.b.h. the result of enumeration is as under: -

Estimation of Growing Stock

The size of sample depends on the variability of main characteristic in the population (say, volume/ha), allowable error in the estimate and time and cost factors. Generally, time and cost is not considered in the calculation. It is the variability of the population parameter (characteristic/attribute) allowable error that decides the sample size. This is given as below.

$$n = \frac{t_v^2 \left(\frac{CV}{AE} \right)^2}{1 + 1/N \left(\frac{CV}{AE} \right)^2}$$

Where,

n = sample size,

CV = Coefficient of variation of the main characteristic/attribute (which can be calculated through past WP or pilot survey or using correlated variable. In absence of any these it can be asked from FSI from similar nearby area of that forest type),

AE = allowable error (%),

t_v = value of t-statistic with v degrees of freedom and 5% significance level

N = total number of plots of optimum size of main characteristic in the population (division/Range etc.)

Variability in forests and optimum sample size for estimation of Growing Stock in different districts of the country: a ready reckoner for working plan preparation or any other forest resource assessment exercise". (FSI, 2020). As per this document, the recommended sampling intensity for different Allowable error (AE) values are given as below.

A. Table 3

District	CV	Sampling intensity of GS in percentage		
		AE 5%	AE 10%	AE 15%
Kangra	177.59	0.171	0.043	0.019

As may be seen from above, the recommended sampling intensity at 95% confidence or 5% Allowable Error (AE) in estimation of Growing stock is 0.171%. Also, statistically, the area to be sampled can be arrived as below. Area to be sampled = WC area X Sampling Intensity % / 100

The area to be sampled as per the above AE/SI values Khair (Overlapping)WC area as below.

B. Table 4

Sr. no.	Division	Total Area in Hac.	Sampling Area at AE 5% (approx.) = (WC area X Sampling Intensity % / 100) In Ha	No of 0.1 Ha sample plots to be laid out
1	Nurpur	48176.21	82.38	823 plots

Total 823 plots of 0.1 ha are required to be sampled for achieving 95% confidence or 5% Allowable error. Since the grids have been drawn through GIS software, 729 grids have fallen in the areas covered under Khair (overlapping) WC. The allowable error is less than 10% and is acceptable.

A. Estimation of Growing stock for Khair:

The special objective of management:

The special objective of management shall be as under:

- i. To harvest the mature and over mature stocks of khair which is in excess of the local requirement for manufacturing of Katha and thereby to realize the maximum revenue for the state.
- ii. To increase the proportion of khair in natural forest.

B. Analysis and valuation of crop:**Result of Enumeration****Table No. 7.2. Result of Enumeration**

Result of Enumeration									
Felling Series	Range	no of plots	total area enumerated	Diameter in cms					Total
				5-10	10-15	15-20	20-25	>25	
Legal Felling Series (RF+DPF)	Nurpur	44	4.4	14	17	21	41	12	105
	Kotla	32	3.2	0	0	0	278	83	361
	Jawali	51	5.1	0	0	0	325	92	417
	Rey	15	1.5	0	15	2	0	0	17
	Indora	16	1.6	0	0	0	34	7	41
	Total	158	15.8	14	32	24	678	194	941
Voluntary felling Series (UPF+UF)	Nurpur	154	15.4	0	74	75	159	19	327
	Kotla	183	18.3	90	150	150	337	95	822
	Jawali	57	5.7	0	127	200	187	87	601
	Rey	52	5.2	0	50	212	101	25	388
	Indora	70	7	0	0	3	271	48	322
	Total	516	51.6	90	401	640	1055	274	2460
CFS Felling Series	Nurpur	17	1.7	8	20	32	19	7	86
	Kotla	0	0	0	0	0	0	0	0
	Jawali	7	0.7	0	4	8	25	15	52
	Rey	12	1.2	0	14	25	20	6	65
	Indora	19	1.9	0	0	21	71	26	118
	Total	55	5.5	8	38	86	135	54	321
	G. Total	729	72.9	112	471	750	1868	522	3722

Result of Enumeration									
Felling Series	Range	Total Area in Hac	total area enumerated	Diameter in cms					Total
				5-10	10-15	15-20	20-25	>25	
Legal Felling Series (RF+DPF)	Nurpur	2858.67	4.4	9096	11045	13643	26637	7796	68217
	Kotla	1499.2	3.2	0	0	0	130243	38886	169129
	Jawali	1717.23	5.1	0	0	0	109431	30977	140408
	Rey	426.06	1.5	0	4261	568	0	0	4829
	Indora	993.33	1.6	0	0	0	21108	4346	25454
	Total	7495.2	15.8	6641	15180	11385	321622	92028	446856
Voluntary felling Series (UPF+UF)	Nurpur	8443.26	15.4	0	40571	41120	87173	10417	179281
	Kotla	6536.44	18.3	32146	53577	53577	120370	33932	293602
	Jawali	4208.24	5.7	0	93762	147656	138058	64630	444106
	Rey	7560.87	5.2	0	72700	308250	146855	36350	564155
	Indora	6637.96	7	0	0	2845	256984	45517	305346
	Total	33386.77	51.6	58233	259459	414099	682616	177286	1591693
CFS Felling Series	Nurpur	1858.47	1.7	8746	21864	34983	20771	7652	94016
	Kotla	0	0	0	0	0	0	0	0
	Jawali	629.55	0.7	0	3597	7195	22484	13490	46766
	Rey	1485.73	1.2	0	17333	30953	24762	7429	80477
	Indora	3320.49	1.9	0	0	36700	124081	45438	206219
	Total	7294.24	5.5	10610	50396	114055	179040	71616	425717
	G. Total	48176.21	72.9	74015	311260	495638	1234468	344964	2460345

7.5. Silvicultural System:

Khair will be harvested under selection system.

7.6. Exploitable Diameter:

The exploitable diameter is fixed at 25cm at breast height.

7.7. Felling Series:

There will be three felling series:

1. Legal Felling series (L.F.S.) comprising RF & DPF.
2. Voluntary Felling series (V.F.S.) comprising UPF. UFS.
3. Co-operative felling series (CFS) comprising Society forests.

7.8. Calculation of Yield:

The yield is prescribed by area and approximately

700-800 ha. is LFS. 3000-4000 ha. in VFS. and 500 Ha.in CFS Series will be gone over every year. The removals are to be made purely on silvicultural considerations and for the purpose, the yield by number of selection trees is also calculated by Brandis method as under for the three-felling series.

L.F.S**Table No. 7.3. Calculation of Yield in LFS**

Felling series	Diameter	No. of Trees enumerated	Total age of entering classes	Years taken crossing classes	Survival coefficient	No. of exploitable trees
Legal Felling Series	>25 cm.	344964	47 yrs.	-	80%	275971
	20-25 cm.	1234468	33 yrs.	14 yrs.	60%	740681
	15-20 cm.	495638	22 yrs.	11 yrs.	40%	198255
	10-15 cm.	311260	14 yrs.	8 yrs.	25%	77815
	Total	2386330				1292722

During 14 years all trees of 20-25 cm class will enter into 25 cm and over class and $1/10^{\text{th}}$ of 15-20 cm class will also pass on to 25 cm and over class.

Thus, total recruitment in 10 years/ period

$$=740681 + 1/10(198255) = 760506 \text{ trees}$$

Therefore, average annual recruitment $\frac{760506}{10} = 76050$

To harvest 76050 trees on 10 years felling cycle & working stock of $76050 \times \frac{10}{2} = 380250$ trees of 25 cm and over needed on the ground.

So the surplus $380250 - 275971 = 104279$ will be felled in 10 years.

Therefore, Total trees to be felled annually

$$\frac{104279}{10} = 10428 \text{ trees}$$

Or say 10000 trees.

V.F.S**Table No. 7.4. Calculation of Yield in VFS**

Felling series	Diameter	No. of Trees enumerated	Total age of entering classes	Years taken crossing classes	Survival coefficient	No. of exploitable trees
Voluntary Felling series	>25 cm.	177286	47 yrs.	-	80%	141829
	20-25 cm.	682616	33 yrs.	14 yrs.	60%	409570
	15-20 cm.	414099	22 yrs.	11 yrs.	40%	165640
	10-15 cm.	259459	14 yrs.	8 yrs.	25%	64865
	Total	1533460				781904

During 14 years all trees of 20-25 cm class will enter into 25 cm and over class and $1/10^{\text{th}}$ of 15-20 cm class will also pass on to 25 cm and over class.

Thus, total recruitment in 10 years period = $409570 + \frac{1}{10}$ of 165640 = 426134

Therefore, average annual recruitment = $\frac{426134}{10} = 42613$ trees

To harvest 42613 trees on 10 years felling cycle a working stock of $42613 \times \frac{10}{2} = 213065$ trees of 25 cm and over needed on the ground.

So, the surplus $213065 - 141829 = 71236$ will be felled in 10 years.

Therefore, total trees to be felled annually $71236/10 = 7124$ trees or say **7000 trees**.

C.F.S

Table No. 7.5. Calculation of Yield in LFS

Felling series	Diameter	No. of Trees enumerated	Total age of entering classes	Years taken crossing classes	Survival coefficient	No. of exploitable trees
CFS Felling series	>25 cm.	71616	47 yrs.	-	80%	57293
	20-25 cm.	179040	33 yrs.	14 yrs.	60%	107424
	15-20 cm.	114055	22 yrs.	11 yrs.	40%	45622
	10-15 cm.	50396	14 yrs.	8 yrs.	25%	12599
	Total	415107				222938

Total recruitment in 10 years period = $107424 + \frac{45622}{10} = 111986$

Therefore, annual increment = $111986/10 = 11199$ trees.

To harvest 11199 trees on a 10 years felling cycle a working stock of $11199 \times \frac{10}{2} = 55995$ trees of 25 cm and over is needed on the ground against 57293 as estimated above.

So, the surplus $57293 - 55995 = 1298$ trees will be felled in 10 years.

Total trees to be felled annually $1298/10 = 130$ trees.

Yield to be obtained annually in each felling series is as follows:

Table No. 7.6. Trees to be felled Annually in each Felling Series

Felling series	Total trees to be felled annually
Legal	10000
Voluntary	7000
CFS	130
Total	17130 or say 17000

7.9. Table of fellings:

The following table gives the felling programme for the areas to be worked during the period of this plan.

Table No. 7.7. Sequence of Felling					
Year	Felling Series	Range	Forest	Comptt. No.	Area in ha.
2025-26	L.F.S.	Nurpur	R.8.N. Chhatril	C-1a	16.19
				C-1b	123.8
				C-2	93.46
				C-3	139.19
				C-4a	74.85
				C-4b	49.36
				Total:-	496.85
			R.3.N. Bhol	C- 1	17.81
			Thakran	C- 2	19.42
				Total:-	37.23
	V.F.S.	Indora	U.115.Bharie	C-5	22.26
				C-6	22.26
				C-7	6.07
				C-8	8.09
				C-9	8.09
				C-12	29.14
				C-13	17.81
				C-26	43.7
				C-30	32.37
				Total:-	189.79
	V.F.S.	Jawali	U 13 Junat	C- 1	45.32
				C- 2	30.36
				C- 3	18.21
				C- 5	12.14
				C- 7	21.45
				C- 8	52.6
				C- 9	30.35
				C- 10	73.64
				Total:-	284.07
			UP.146. Fatehpur	C-3	34.8
				C-4	52.6
				C-5	34.4
				C-6	43.3
				C-8	29.54
				C-10	60.69
				C-13	49.77
				Total:-	284.07

	L.F.S.		P 9 N Gharoli	C- 1	5.26
			Chalaun	C- 2	8.9
				C- 3	11.74
				C- 4	10.12
				Total:-	36.02
			P.7.N. Fatehpur	C-2a	20.64
				C-2b	18.2
				Total:-	38.84
			P.1.N. Sidhpurghar C-3a		42.08
				Total:-	42.08
			P.12.N. Tung Barisar	C- 1	11.33
				C- 2	39.25
				C- 3	17.4
				Total:-	67.98
	L.F.S.	Kotla	P.3.N. Baliara	C-1a	22.66
				C-1b	23.88
				C-2a	16.19
				C-2b	19.02
				C-2c	25.88
				Total:-	107.63
			R.6.N. Mastgarh	C-.1a	16.59
				C-.1b	23.47
				C- 2	60.7
				Total:-	100.76
	L.F.S.	Rey	R 30 D Samblian	C- 1a	40.46
				Total:-	40.46
			DP. GharJunat	C-1	14.16
				C-2	12.95
				Total:-	27.11
			DP Ghar	C-1	19.83
			Bambota(P.2.0)		

				Total:-	19.83
			R.29.D. Lohjung	C-1a	48.55
				C-1b	37.23
				C-2a	31.57
				C-3a	29.14
				C-3c	52.6
				Total:-	199.09
Grand Total 2025-26					1982.33
2026-27	L.F.S.	Nurpur	R.11.N. Khanni	C-1a	39.66
				C-1c	22.24
				C-2a	22.65
				C-2b	24.28
				C-2c	17.81
				C-2d	9.71
				C-2e	28.33
				C-2f	33.18
				C-2g	26.71
				C-3	24.69
				Total:-	249.26
	V.F.S.		UP.12. Milk	C-1	17.4
				C-3	28.33
				C-4	27.92
				C-5	12.14
				C-11	219.3
				Total:-	305.09
	L.F.S.	Indora	R 12 N Damtal	C- 3	7.28
				C- 5	13.35
				C- 9	8.9
				C- 10	10.93
				C- 11	12.95
				C- 12	22.66
				C- 13	10.12
				C- 14	15.78
				C- 15	8.09
				C- 16	7.28
				C- 17	8.09
				C- 18	6.48
				C- 19	10.93
				C- 20	11.74
				Total: -	154.58

	C.F.S.		CFS Lodhwan	U -2	23.07
				U- 4	19.33
				U -8	9.71
				U- 14	12.54
				U- 23	13.76
				Total:-	78.41
			CFS Ghandran	U- 12	58.67
				U- 15	5.66
				Total:-	64.33
	L.F.S.		P.16.N. Bangal	C-2	27.52
				Total:-	27.52
	V.F.S.	Jawali	U 13 Junat	C- 11	80.92
				C- 12	64.74
				C- 14	38.45
				C- 16	28.33
				C- 22	18.21
				C- 25	61.5
				Total:-	292.15
			UP.146. Fatehpur	C-17	40.46
				C-18	32.78
				C-19	48.96
				C-20	14.57
				C-25	43.3
				C-27	58.27
				C-24	43.7
				Total:-	282.04
			UP.147. Chalwara	Whole	38.8
				Total:-	38.8
	V.F.S.	Kotla	U.79.Ambal	C-1	42.48
				C-4	28.33
				C-6	21.05
				C-9	36.42
				C-10	72.83
				C-11	44.51
				C-14	23.07
				C-15	46.53

				C-17b	46.53
				C-23	33.18
				Total:-	394.93
		Rey	U 25 Anoh	C- 1	40.46
				C- 5	48.95
				C- 6	50.58
				C- 7	19.02
				C- 8	40.86
				C- 9	48.55
				C- 10	19.02
				C- 11	41.26
				Total:-	308.7
Grand Total 2026-27					2195.81
2027-28	V.F.S.	Nurpur	UP 26 Baral	C- 2	24.28
				C- 3	12.14
				Total:-	36.42
	L.F.S.		R.7.N. Jhakhar	C- 1	55.43
				C- 2	72.43
				Total:-	127.86
			P.43.N. Chhotidhar	C- 1	24.28
				C- 2	9.71
				C- 3	11.33
				C- 4	10.52
				C- 5	8.9
				C- 6a	9.7
				C- 6 b	6.48
				C- 7	8.09
				Total:-	89.01
2027-28	C.F.S.		CFS Kulahan	U-5	55.14
					55.14
			C.F.S, GahinLagore	U-6	51.4
				U-7	3.64
				U-8	19.42
				U-9	22.66
				U-31	19.83
				U-38	7.23
				Total:-	124.18

	L.F.S.		P.40.N. Manuha Ki Dhar	C-1a	12.95
				C-1b	10.52
				C-1c	14.16
				C-1d	7.69
				C-2a	14.16
				C-2b	15.38
				C-2c	14.97
				C-2d	15.78
				Total:-	105.61
	V.F.S.	Indora	UP.114. Madholi	C-32b	61.11
				C-35	39.25
				Total:-	100.36
	C.F.S.		C.F.S. Sirit	UC-1	59.08
				UC.4	12.95
				UC.5	5.66
				Total:-	77.69
	L.F.S.		P.21.N. Hagwal	C3a	6.48
				C3b	11.32
				Total:-	17.8
	V.F.S.	Jawali	UP.78 SidhpurGhar	C- 1	49.36
				C- 2	70.81
				C- 5	14.97
				Total:-	135.14
			UP.93. Chhattar	C- 1	77.69
				C- 5	82.13
				C- 6	19.02
				Total:-	178.84
			UP.103. Jawali	C- 2	39.66
				C- 3	34.4
				C- 4	8.5
				C- 5	25.9
				C- 7	18.21
				Total:-	126.67
	L.F.S.	Kotla	R.13.N. Soldha	C 1	50.98
				C- 2	56.65
				Total:-	107.63

			R.4.N. Batuhi	C- 1	52.6
				C- 2	45.32
				C- 3	28.33
				Total:-	126.25
	V.F.S.		U 55 Bhali	C-1	85.37
				C-2	39.25
				C-3	44.5
				C-4	14.16
				C-5	52.6
				C-6	16.18
				C-7	16.18
				C-8	78.9
				C-9	16.59
				C-10	20.63
				C-11	19.42
				C-12	16.99
				C-13	16.18
				C-14	8.9
				Total:-	445.83
	V.F.S.	Rey	U 25 Anoh	C- 12	60.69
				C- 14	27.11
				C- 15	45.32
				C- 16	24.28
				C- 17	33.59
				C- 20	28.33
				C- 21	40.06
				Total:-	259.38
Grand total 2027-28					2113.82
2028-29	L.F.S.	Nurpur	P 41 N Paniaru	C- 1	12.55
				C- 2	14.16
				Total: -	26.71
			R.10.N. Talara	C- 2	44.49
				C- 6	27.52
				Total:-	72.01
			P.38.N. Janera	C- 2a	14.17
				C- 2b	19.42
				C- 2c	13.35
				Total:-	46.94

			R.16.N. Bindraban	C- 2	12.95
				C- 3b	19.02
				Total:-	31.97
	V.F.S		UP.16. Kopra	C- 6	40.46
				C- 7	28.33
				C- 14	67.57
				C- 16	41.27
				C- 1	23.07
				C- 2	25.5
				Total:-	226.2
			UP.17.Thora	C- 3	22.26
			Bhaloon	C- 5	10.12
				C- 9	14.16
				Total:-	46.54
	L.F.S.		P.36.N. Bassa Farkunda	C- 1	15.38
				C- 2a	3.24
				C- 3	26.3
				C- 4	14.97
				Total:-	59.89
			P.34.N. Aund	C- 1	14.97
				C- 2	17.8
				C- 3	16.59
				C- 4	9.31
				Total:-	58.67
	L.F.S.	Indora	P.11.N. Ghantal	C- 1	12.94
			Sanuh	C- 2	15.78
				C- 3	15.38
				Total:-	44.1
			P.13.N. Salakhar	C- 1	14.16
				C- 2	16.59
				C- 3	19.02
				C- 4	18.61
				Total:-	68.38
			P.14.N. Agra	C-2	24.69
			Da Nala		

				Total:-	24.69
			P.15.N. Sundru	C-1b	8.09
				C-1c	8.09
				C-1d	13.35
				C-2a	38.03
				C-2b	34.8
				C-2c	14.97
				C-2d	12.95
				Total:-	130.28
	C.F.S.		CFS Lodhwan	U- 44	12.14
				U- 1	46.93
				U -12	10.52
				U- 14	12.14
				U- 17	16.18
				Total:-	97.91
	V.F.S	Jawali	U-77- Bhol	C-3	33.99
				C-4	16.19
				C-5	17.81
				C-6	20.23
				Total:-	88.2
			UP.104. Nana	C- 1	13.35
				C- 3	22.26
				C- 6	71.62
				C- 16	32.37
				C- 18	30.35
				C- 20	50.58
				C- 21	15.38
				C- 22	45.32
				C- 23	28.33
				C- 25	42.48
				Total:-	352.04
	L.F.S.		P.10.N, Karahu	C-1	17.4
				Total:-	17.4
			P.8.N. Kyari	C-1a	36.4
				C-1b	24.28
				C-2b	11.74
				Total:-	72.42
	L.F.S.	Kotla	R.5.N Swarka	C-1	6.07

				Total:-	6.07
			R.15.N. Bhali	C-.1a	25.9
				C-.1b	58.67
				C-.1c	28.33
				C-.1d	36.42
				C- 2a	42.48
				C- 2b	44.52
				C- 2c	35.61
				C- 3a	50.57
				C- 3b	36.42
				C- 4a	86.97
				C- 4b	66.34
				Total:-	512.23
	V.F.S	Rey	UP.145. Hatli	C-2	25.5
				C-3	8.9
				C-5	20.23
				C-7	33.59
				C-12	34.8
				C-13	62.31
				C-17	41.26
				Total:-	226.59
Grand Total 2028-29					2209.25
2029-30	L.F.S.	Nurpur	R 1 N Tattal	C- 1b	39.66
				C- 1c	40.86
				C -2c	80.52
				C-3b	60.7
				C-3c	59.08
				Total: -	280.82
			P 41 N Paniaru	C- 4	26.7
				Total: -	26.7
	V.F.S.		U 20 Punder	C- 1	20.23
				C- 2	51.39
				C- 3	32.78
				C- 4	21.04
				C- 5	17.4
				C- 6	20.64
				C- 7	36.42
				C- 8	41.26
				C- 9	46.93
				C- 10	23.88

				C- 11	50.58
				C- 12	29.54
				C- 13	10.92
				C- 14	38.85
				C- 15	64.74
				C- 16	62.31
				Total: -	568.91
	L.F.S.		R 2 N Meh Dhar	C- 1	52.2
				C- 2	96.29
				Total: -	148.49
	C.F.S.		CFS Jachh	P- 1	4.86
				P- 2	9.71
				Total:-	14.57
	L.F.S.		R 1 N Tattal	C- 1a	87
				C- 2b	46.53
				C- 3a	27.92
				Total:-	161.45
			P 35 N Kopra	C- 1	10.52
				C- 2	9.31
				Total:-	19.83
	V.F.S.		UP 15 Galore	C- 1	29.95
			UP 16 Kopra	C- 9	32.78
				C- 11	42.89
				Total:-	75.67
			UP 14 Thora Bhaloon	C- 1	17
				C- 2	44.51
				C- 7	17.81
				C- 11	6.07
				Total:-	85.39
			UP 10 Sadwan	C- 1 to C-8	134.53
				Total:-	134.53
	V.F.S	Indora	U.56. Damtal	C-2	29.14
				C-3	42.89

				Total:-	72.03
			UP.114 Madholi	C-3	31.57
				C-26	40.46
				Total:-	72.03
	C.F.S.	Jawali	CFS Lahru	U-6	11.33
				U-8	20.23
				U-10	18.61
				U-12	17.4
				U-1	4.85
				U-3	6.47
				U-27	9.31
				U-29	8.09
				Total:-	96.29
	L.F.S.	Kotla	R.14.N. Balah	C- 1	20.23
				C- 2	40.46
				C- 3	18.21
				C- 4	38.45
				C- 5	32.76
				Total:-	150.11
	V.F.S		U 56 Bhali	C-15	22.67
				C-16	12.94
				C-17	72.83
				Total:-	108.48
	C.F.S.	Rey	CFS Rey	U-19	23.88
				U-43	7.69
				U-44	1.62
				U-80	4.04
				U-8	12.95
				U-11	2.83
				U-59	13.35
				U-36	35.61
				U-56	7.69
				U-36	16.99
				U-20	19.02
				Total:-	145.67
Grand Total 2029-30					2175.93
2030-31	L.F.S.	Nurpur	P.37.N. Khajan	C- 1	15.38
				C- 2	16.19
				C- 3	11.72

				Total:-	43.29
	C.F.S.		C.F.S. Suliali	U-1	7.29
				U-10	3.64
				U-11	6.47
				U-12	6.07
				U-15	5.26
				U-4b	11.33
				U-6	22.66
				U-8	26.3
				U-16	14.57
				U-23	23.07
				U-3	15.78
				U-4c	8.9
				U-17	31.16
				U-18	7.69
				Total:-	190.19
	V.F.S.	Nurpur	U.50.Kothiwanda	C-18	41.27
				C-19	53.41
				C-22	62.72
				C-26	62.72
				C-27	28.33
				Total:-	248.45
			U.47.Banoli Part-I	C-8	40.46
				C-6	16.59
				Total:-	57.05
	L.F.S.	Nurpur	P.26.N. Nurpur	C- 1	16.19
				C- 2	6.87
				Total:-	23.06
	L.F.S.	Indora	P.19.N. Duliana	C- 1	37.23
				C- 2	38.46
				C- 3	12.95
				Total:-	88.64
			P.23.N. Agra Da Ban	C- 1	16.19
				C- 2	23.46
				Total:-	39.65

	V.F.S.	Indora	UP-42 Pajanara	C- 1	26.3
				C- 2	28.33
				C- 3	52.6
				C- 4	5.26
				C- 5	19.41
				Total:-	131.9
			UP.62. Rit	C- 1	17.4
				Total:-	17.4
	C.F.S.		C.F.S. Indpur	P-4	35.61
				P-1	21.45
				Total:-	57.06
	V.F.S.	Jawali	UP.129. Dini	C- 1	51.38
				C- 3	59.89
				C- 4	36.42
				C- 5	49.36
				C- 6	53.81
				C- 7	14.16
				C- 8	24.28
				C- 9	34.39
				C- 10	34.8
				C- 11	49.37
				C- 12	82.13
				C- 14	37.33
				Total:-	527.32
	L.F.S.	Kotla	P.4.N. Kaldoon	C-1a	24.69
				C-1b	18.62
				C-1c	17
				C-2a	31.16
				C-2b	42.45
				C-2c	57.46
				Total:-	191.38
	V.F.S.		U.47.Banoli (Part-II)	C-1	34.4
				C-2	32.37
				C-3	32.37
				C-7	48.55
				Total:-	147.69
			U 56 Bhali	C-18	26.3
				C-19	8.09

				C-20	24.28
				C-21	32.37
				C-22	5.66
				C-23	17.79
				C-24	19.02
				C-25	16.18
				C-26	12.14
				Total:-	161.83
		Rey	UP.165. Nangal	C- 4	34.4
				C- 5	30.35
				C- 6	20.23
				C- 7	53.81
				C- 9	41.27
				C- 11	26.3
				C- 14	50.17
				C- 15	33.99
				Total:-	290.52
Grand Total 2030-31					2215.43
2031-32	V.F.S.	Nurpur	U.45.Talara	C- 1	16.19
				C- 4	29.54
				C- 5	38.45
				Total:-	84.18
			U.19. Bhadwar	C-4	24.69
				C-10	35.61
				C-13	17
				C-14	23.06
				C-16	31.57
				Total:-	131.93
	L.F.S.		P.28.N. Thora	C-1b	26.3
				C-2	20.23
				Total:-	46.53
	C.F.S.		C.F.S. Bhugnara	C-1	34.4
				UC-1	65.95
				R-2	18.21
				Total:-	118.56
	L.F.S.		P.42.N. Ladori	C-1	16.19
				C-2a	18.6
				C-2b	13.76

				C-3	28.73
				C-4	25.9
				Total:-	103.18
	C.F.S.		C.F.S. Jachh	P-3	34.4
				P-4	44.11
				Total:-	78.51
	V.F.S.	Indora	UP.69. Majra	C- 1	25.49
				C- 2	13.35
				C- 3	38.44
				C- 4	39.25
				C- 5	25.9
				C- 7	12.95
				C- 8	25.09
				C- 10	18.21
				C- 11	19.83
				C- 12	17
				C- 14	17
				C- 15	29.54
				C- 16	24.28
				Total:-	306.33
	V.F.S.	Jawali	UP.130. Bagroli	C- 1a	26.3
				C- 1b	20.23
				C- 2	18.21
				C- 3	19.02
				C- 5	48.34
				C- 8	24.28
				C- 10	15.38
				Total:-	171.76
	C.F.S.		C.F.S. Golwan	U-10	11.73
				Total:-	11.73
			CFS Palohra	P-9	46.93
				U-6	10.93
				U-8	11.33
				U-16	3.64
				U-5	11.33
				U-14	12.54
				U-10	24.68
				P-11	6.47
				Total:-	127.85
	L.F.S.		P.5.N.Khabbal	C-1a	54.21

				C-1b	59.08
				C-1c	44.9
				C-2a	21.45
				C-2b	23.06
				C-2c	32.78
				Total:-	235.48
	V.F.S.	Kotla	U.82. Sirmani	C-1	16.19
				C-2	83.35
				C-3	54.62
				C-4	89.42
				C-5	38.45
				Total:-	282.03
			U 56 Bhali	C-27 to C-28	299.42
				& C-30 to C-33	
				Total:-	299.42
	V.F.S.	Rey	UP 128 Samlet	C- 26	30.34
				C- 27	43.04
				C- 28	38.45
				C-29	24.28
				Total:-	136.11
	V.F.S.		UP.165. Nangal	C- 16	32.37
				C- 20	34.4
				C- 21	24.28
				C- 22	24.28
				Total:-	115.33
Grand Total 2031-32					2248.93
2032-33	L.F.S.	Nurpur	P.30.N. Galor	C-1b	14.57
				C-2	21.45
				C-3b	19.82
				Total:-	55.84
			P.31.N. Maira	C-2	11.33
				C-3	3.64
				Total:-	14.97
			P.32.N. Bharnun	C-1	6.88
				C-2	5.66
				C-3	6.48
				Total:-	19.02

	V.F.S.		UP.9. Aund	C-1	14.57
				C-3	31.57
				C-4	42.08
				C-10	43.29
				C-11	21.85
				C-14	4.86
				C-15	64.74
				Total:-	222.96
	L.F.S.		P.39.N.Ther Kuther	C-1a to	307.15
				C-4d	
				Total:-	307.15
			P.29.N.Maheti	C-1b	8.9
				C-1c	12.95
				C-2c	9.71
				Total:-	31.56
	L.F.S.	Indora	P.24.N. Sugarnal	C-1a	24.28
				C-1b	16.19
				C-2a	27.5
				C-2b	42.48
				C-3a	14.16
				C-3b	30.35
				Total:-	154.96
	C.F.S.		C.F.S. Raja Khassa	U-6	16.19
				Total:-	16.19
	V.F.S.		UP-92. Dharwal	C-7	38.85
				Total:-	38.85
	L.F.S.	Jawali	P.6.N.Harsar Nana	C-1a	31.16
				C-1b	23.06
				C-1c	27.1
				C-1d	21.84
				C-2a	42.88
				C-2b	48.56
				C-2c	32.78
				C-2d	44.51
				C-2e	35.21
				C-2f	21.06

				C-2g	22.66
				C-3a (i)	32.36
				C-3a (ii)	31.56
				C-3b	67.56
				C-3c	33.98
				Total:-	516.28
	L.F.S.	Kotla	P.45.N. Tiloknath	C-1	4.45
				C-3	4.05
				Total:-	8.5
			P.46.N. Bar	C-1	12.14
				C-2	16.58
				C-3	13.76
				C-4	20.64
				Total:-	63.12
			P.47.N. Anuhi	C-1	29.53
				C-2	26.7
				C-3	14.57
				C-4	25.5
				Total:-	96.3
			U.84. Dole	C-3	26.71
				C-4	37.23
				C-5	34.4
				C-6	58.27
				C-20	32.37
				C-22	30.35
				C-24	40.46
				Total:-	259.79
	V.F.S.	Rey	U.25.Anoh	C-2	44.51
				C-3	20.23
				C-4	40.46
				C-13	28.73
				C-18	40.46
				C-19	40.46
				C-22	25.09
				C-23	37.6
				Total:-	277.54
			UP.143.Sanjwan	C-4	54.22
				Total:-	54.22
Grand Total 2032-33					2137.25

2033-34	L.F.S.	Nurpur	P.33.N. Haral	C-2c	17.78
				C-3	18.21
				Total:-	35.99
			P.44.N. Kot Hatli	C-1	10.12
				C-2	11.33
				C-3	12.95
				C-4	12.54
				Total:-	46.94
	V.F.S.		UP.4.Mamun Gurchal	C-2	9.31
				Total:-	9.31
			UP.6. Danni	C-2	72.43
				C-7	23.06
				C-9	33.99
				Total:-	129.48
			UP.6a.Ladori	C-2	98.73
				C-3	89.01
				C-4	54.62
				C-5	48.55
				Total:-	290.91
			UP.7. MairaDumal	C-2	35.21
				C-5	10.12
				Total:-	45.33
	V.F.S.	Indora	U.90 Ghoran	C-1	30.55
				C-6	68.79
				C-7	52.6
				C-8	34.8
				Total:-	186.74
	C.F.S.		CFS Lodhwan	U- 18	14.57
				U-19	12.54
				U -24	10.93
				U-9	16.99
				U-10	24.28
				U 15	19.82
				U-28	20.23

				Total:-	119.36
	V.F.S.		UP.89. Balokhar Kulara	C-3	25.5
				Total:-	25.5
	C.F.S.		C.F.S. Indpur	P-2	22.66
				P-3	38.85
				U-9	38.04
				Total:-	99.55
	L.F.S.	Jawali	R.10.N. Talara	C-9	30.76
				C-10	41.25
				Total:-	72.01
			R.28.D. Junat	C-2	39.66
				C-3	20.22
				Total:-	59.88
	L.F.S.		P.1.N. Sidhpurghar	C-1b	25.08
				C-1c	21.45
				C-1d	38.45
				C-2b	54.22
				C-2c	49.35
				C-2d	12.14
				C-3b (i)	16.19
				C-3b (ii)	24.28
				C-3c	40.46
				Total:-	281.62
	V.F.S.		UP-141. Surarwan	C-1	64.74
				C-2	40.46
				C-4	38.04
				Total:-	143.24
	V.F.S.	Kotla	U.52 Soldha	C-2	68.38
				C-4	32.37
				C-6	38.45
				C-7	35.21
				C-9	1.96
				C-10	27.52
				C-13	26.3
				C-16	27.92
				C-20	32.37

				Total:-	290.48
			U.54.Bar	C-1	38.45
				C-4	11.74
				C-5	6.48
				C-6	4.86
				C-8	9.71
				C-9	19.83
				C-10	19.42
				C-11	48.15
				Total:-	158.64
	L.F.S.	Rey	R.30.D. Samblia	C-1b	33.18
				C-2b	54.61
				Total:-	87.79
	V.F.S.		UP.144. Maholi	C-5	46.54
				C-7	39.65
				C-11a	57.46
				C-11b	27.52
				Total:-	171.17
			UP.15 Dhameta	C-2	34.4
				C-3	20.23
				C-5	19.42
				Total:-	74.05
Grand Total 2033-34					2327.99
2034-35	V.F.S.	Nurpur	UP.8. Haral	C-1	33.18
				C-2	22.26
				C-3	36.83
				C-4	30.35
				C-5	18.21
				C-6	41.27
				C-7	22.66
				C-8	30.76
				Total:-	235.52
			U.13. Khanni	C-9	16.19
				C-16	60.69
				Total:-	76.88
			U.48. BholThakran	C-2	42.08
				Total:-	42.08

	L.F.S.	Indora	P.20.N. Thapkaur Hagwal	C-1	26.31
				C-2a	16.19
				C-2b	17.8
				C-3a	19.83
				Total:-	80.13
			UP.95. Batrahan	C-1	15.78
				Total:-	15.78
	C.F.S.		C.F.S. Lodhwan	U-60	25.49
				U-73	21.85
				U-34	27.11
				U-34	27.92
				U-11	37.23
				U-26	29.14
				U-27	27.52
				U-33	26.71
				U-55	49.36
				U-56	17.4
				U-72	23.07
				U-71	37.63
				U-66	20.23
				Total:-	370.66
	L.F.S.	Jawali	DP. Chakban Harsar	Whole	327.21
				Total:-	327.21
	V.F.S.		UP.149. Harsar	C-2	32.37
				C-3	23.88
				Total:-	56.25
			U.40.Katrah	C-2	54.62
				C-4	56.65
				C-5	50.58
				C-6	57.46
				C-7	40.46
				Total:-	259.77
	V.F.S.	Kotla	UP.51. Anuhi	C-1	33.18
				C-4	23.47
				C-7	22.26
				C-8	32.37
				C-9	18.21

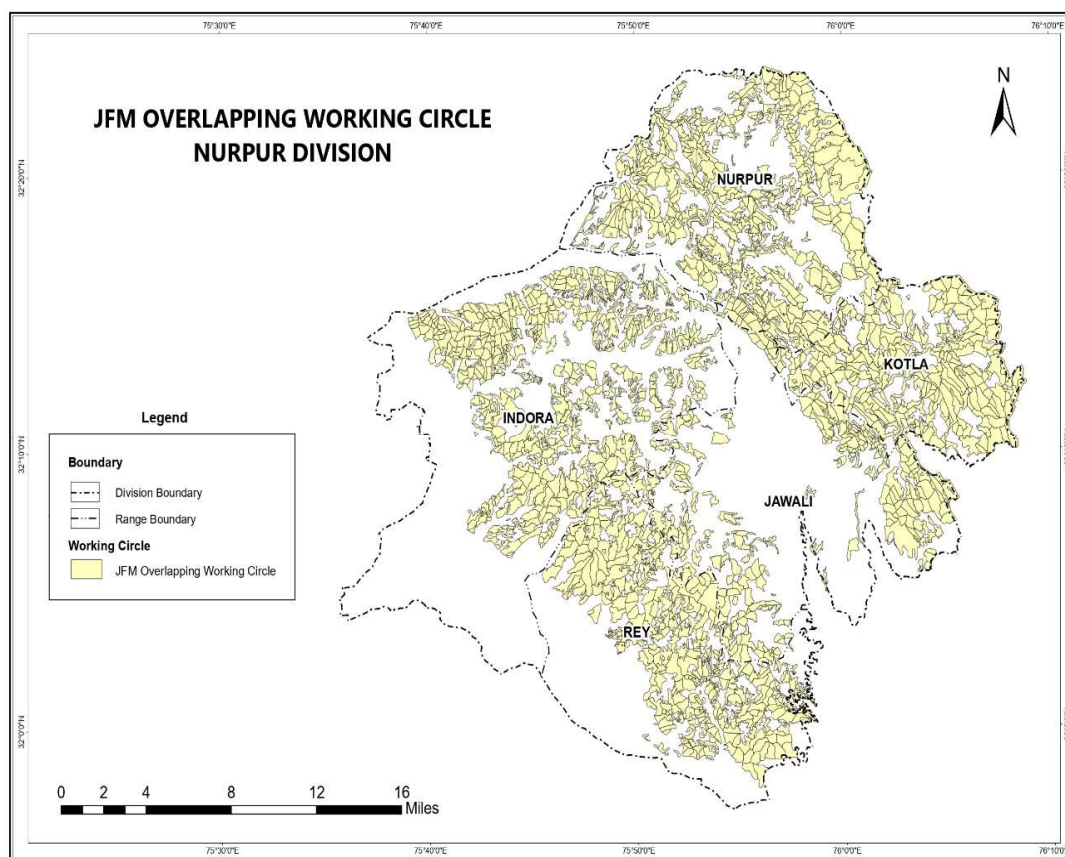
				C-11	42.08
				Total:-	171.57
	V.F.S.		UP.83. Nadholi	C- 1	42.48
				C- 2	33.18
				C- 4	10.52
				C- 5	20.23
				C- 6	30.35
				C- 8	34.4
				C- 9	18.21
				C- 10	27.11
				C- 11	14.16
				C- 12	25.5
				C- 15	31.57
				Total:-	287.71
			UP.53. Seuni	C-4	17.81
				C-5	16.19
				C-6	17.81
				Total:-	51.81
		Rey	UP.128 Samlet	C-3	14.16
				C-6	26.71
				C-11	56.84
				C-21	61.1
				C-16	48.55
				Total:-	207.36
			U.26.Barla	C-7	52.6
				C-10	34.4
				C-11	28.43
				Total:-	115.43
Grand Total 2034-35					2298.16

7.10. Method of Executing Felling:

- i) The marking will be carried out purely on silvicultural consideration irrespective of the consideration of yield. All dead, dry, uprooted and 80 % of the Khair trees 25 cm dbh and over will be marked for felling.
- ii) No uprooting or chipping of stumps will be allowed and the stumps left should not be more than 15 cm. above the grounds level so as to ensure production of coppice shoots, however, in addition the retention of number embossed on the low hill side will be ensured. The felling must be completed by the end of the February every year.
- iv) The stumps left should not be more than 15 cm above the ground so as to ensure, production of coppice shoots.
Subsidiary Silvicultural Creations:
This working circle is for the exploitation of existing Khair. The coppice shoots will be protected so far as practicable and cleaned by retaining 2-3 vigorous healthy shoots. Planting has been taken care of under Plantation Working Circle.

CHAPTER VIII

THE JOINT FOREST MANAGEMENT (OVERLAPPING WORKING CIRCLE)



MAP NO. 8.1. GIS MAP (1: 50,000) FOR JFM (OVERLAPPING) WORKING CIRCLE

8.1 GENERAL:

This working circle will be overlapping working circle and includes both degraded forests as well as good forests, which needs immediate treatment through protection, afforestation, pasture development, soil and water conservation etc. Treatment plan and memorandum of understanding will be different for degraded and good forests. As in other parts of Himachal Pradesh, most of the rural populace in Nurpur Forest Division uses significant quantities of forest goods and benefits from the services provided by the forest areas. There is lot of pressure on the forests, apart from the usual demand for fuel, fodder and timber. The other rights enjoyed by the right holders as per the

provisions of the Settlements, also are a major stake in the forests besides the livelihood issues.

8.2 THE NEED FOR JOINT FOREST MANAGEMENT:

To address the long-standing problems of deforestation and land degradation, the approach of involving local communities in an effective and meaningful manner, is gaining acceptance significantly. Even the present National Forest Policy, 1988 emphasizes on participatory management and common property management. It also specifically mentions that to achieve the objectives of the Policy, a massive people's movement should be created, especially involving women. Consistent with the NFP of 1988, the Government of India, on 1st June 1990, issued policy instruction to all state governments supporting greater participation of village communities and NGOs in regeneration, management and protection of the forests. In keeping with the above notification, the Government of Himachal Pradesh has formulated a policy vide No. Forest (c) 3-4/80-V dated 12-05-1993, supporting Joint management arrangements. Ever since village communities are being involved by the Forest department to further the aim of protection and management of forests and continuation of forest cover. The recognition of the link between socio-economic incentives and forest development has been singularly responsible in eliciting community participation. A new resolution of the Ministry of Environment and Forests dated February 21, 2000 has further strengthened the JFM programme and this circular interalia contemplates:

- (a.) Legal back up to the JFM committees;
- (b.) 50% members of the General Body should be women;
- (c.) Extension of JFM in good forests areas, with sharper focus on activities concentrating on NTFP/NWFP management.

This resolution is an attempt to evolve a proactive and people friendly framework for meaningful implementation of the programme, though the detailed operational modalities to translate these concerns have not been spelt out. There are various schemes and projects, initiated by the H.P. government and some financed through External agencies e.g. externally aided projects, that lay emphasis on people's involvement in forestry. The Sanjhi Van Yojana is a H.P. government and Forest Development Agency Nurgpur Government of India backed initiatives. In the year 2001, Government of Himachal Pradesh has

issued a notification no. Fts-II (B)15-10/87 dated 23rd August 2001, called the Himachal Pradesh Participatory Forest Management Regulations, 2001. These rules shall be applicable to such government forests and lands, including common lands, where participatory management is envisaged.

8.3 SPECIAL OBJECTS OF MANAGEMENT:

These will be

- (i) To inculcate in the people or right-holders a direct interest in forests development, conservation, protection and to make them aware of the values of the forests to the mankind.
- (ii) To involve people / communities in the treatment of degraded forests through protection planning, afforestation, pasture development, soil and water conservation so as to arrest their further degradation and for sharing of usufructs.

To achieve these objectives, it is suggested that all activities, as far as possible, should be carried out after involving local people. However, the general prescriptions of the working plan be adhered to. It is also suggested that species of local importance be preferred in afforestation activities. Such species should have economic value and should be fast growing, high yielding and of multiple use. Species that provide raw material for local industry, craftsmanship should be encouraged. Quick growing and high yielding grasses and legumes e.g. Hybrid Napier, provide immediate alternatives to fodder demand and should be introduced along with tree species to sustain people's interest in the closed areas. Bamboos should be planted in gullies, nalas and moist pockets as these would serve the dual purpose of soil conservation and fuel and fodder replenishment as these are relatively quick growing. An all-out effort should be made to evolve a "Community-State Partnership".

8.4 STEPS INVOLVED IN JOINT FOREST MANAGEMENT:

Community participation is an important aspect of any joint management plan. The process of community involvement starts from identification of the village to problem analysis and in monitoring and evaluation of the programme. The sustainability of any such practice or activity depends on the level of participation. Participation fosters ownership of the people over the resources being managed by such joint activity and ensures better results.

Participatory planning helps in

- building the “we” feeling;
- involve and ensure the community’s participation
- transparency
- brings clarity; and
- sustainability

8.5 APPROACH TO BE ADOPTED IN IMPLEMENTING JFM SCHEMES:

- Educate people on the aim and objectives of the programme/scheme before launching the programme/ scheme;
- Make extensive and intensive use of PRA techniques to formulate the plan and share the derived information with the people;
- Draw up a working scheme/ Micro plan with the active involvement of the local people, ensuring representation of the heterogeneity of the group;
- Execute works and use PRA techniques for monitoring as well;
- Exemplify spirit of participation by well defined, lucid usufruct sharing mechanisms and transparency in accounting the expenditure on the works.

8.6 PAST EXPERIENCES IN PARTICIPATORY APPROACHES:

The Social Forestry Umbrella project was a pioneering effort in which, perhaps, for the first-time people were associated with forestry works and forestry was taken outside forest areas to village lands. This Project ended in 1993. A new scheme “Van Lagao, Rozi Kamao” was launched in 1992 in which plantation over 2 ha land was awarded to a person belonging to Antodaya category and in lieu of protection and care of this area, the beneficiary was to be given remuneration depending upon the survival percentage of the plantation.

8.6.1 SANJHI VAN YOJANA:

Sanjhi Van Yojana, a community-based afforestation scheme was launched in Himachal Pradesh on 25th December 1998. Under this scheme the communities as well as the NGOs are to be involved in the protection of the existing forest

wealth as also to participate in holistic rural development. The main objectives of this scheme are -

- (a.) Involvement of grass-root level institutions e.g. gram panchayats, mahila mandals, yuvak mandals, schools, VFDCs, NGOs etc. in eco-restoration.
- (b.) Regeneration of degraded forest areas through community involvement.
- (c.) Creation of social assets for the benefit of the communities.
- (d.) Increasing the productivity of the forest areas by improvement of nursery stock through adoption of modern nursery techniques.
- (e.) Re-orientation of forest staff for facilitating community participation.
- (f.) Generation of employment opportunities in rural areas.
- (g.) To bring more area under tree cover by encouraging rehabilitation/ plantations of private wastelands on cost/ benefit sharing basis.

No specific duration for the scheme has been proposed and depending upon its success in the initial years, the scheme would be adopted as a model for natural resource management by the State Forest Department.

In order to execute the scheme, a Village Forest Development Society (VFDS) is to be constituted in the villages situated on the periphery of the forests. The VFDS will be a registered, non-political body representing almost all families of the village, migratory graziers, Antodaya/ IRDP and other landless families who are dependent on forests for their livelihood. The society will be registered by the DFO(T) under the Societies Act and the process of formation of VFDS will be assisted by the DFO or his representative, not below the rank of Range Forest Officer. The executive committee will have 10-15 members and the local Forest guard will be the Member Secretary till such time the VFDS is enabled to handle its own affairs. For this the forest guard will pick up a co-secretary from amongst the literate persons in the village to acquaint him with the process and facilitate taking over soon.

8.6.1.1 RESPONSIBILITIES AND DUTIES OF THE VFDS:

- (a.) Assist the Forest department in planning, protection, afforestation etc. as per the approved Micro plan.
- (b.) Judicious use of all existing rights and their equitable distribution;
- (c.) Inform the department about forest offenders;
- (d.) Help the Forest department in extinguishing forest fires;
- (e.) Persuade villagers to give available area for plantations

- (f.) Fair and just distribution of usufructs;
- (g.) Settlement of disputes between VFDS members;
- (h.) Protect the assets created by the VFDS;
- (i.) Honor all the commitments made with the department and the members of the VFDS.

8.6.1.2 RESPONSIBILITIES AND DUTIES OF THE FOREST DEPARTMENT:

- (a.) To recognize the VFDS and give full weightage to its recommendations;
- (b.) To explain the contents of the Microplan to the VFDS members;
- (c.) To provide technical know-how to the Executive body to carry out its responsibilities.
- (d.) To honour the commitments made with the VFDS.

The areas taken up under the SVY scheme would primarily be degraded forests, government lands, existing poorly stocked plantation. These would be notified under Section 38 of the IFA. The area should not overlap with any other scheme and those with minimal conflicts would be given priority. The micro plan would cover a period of 5-7 years and would contain 60% of the total activities for afforestation component and NTFPs. To ensure participation through creation of stakes of the communities to encourage their owning up the assets created by them, the VFDS will contribute 1% of the total cost of the micro plan in cash and 4% as “shramdaan” (Voluntary labour) for the various works to be executed under the microplan.

8.6.1.3. Schemes Launched During the Past Planned Period (2012-13 to 2021-22)

a. Ek buta beti ke naam

Table No. 8.1.

Year	Total Beneficiaries under Ek Buta Beti Ke Naam (girl child)	Plants distribution	Expenditure
2019-20 to 2021-22	1184	5920	1722440

b. Vidyarthi Van Mitar

Table No. 8.2.

Year	School covered under Vidyarthi Van Mitter Yojna	Plantation (ha)	Plants planted	Expenditure (Rs)
2018-19	GSSS Bhadpur	1	1100	52500
	GSSS Sadwan	1	1100	154200
	Total	2	2200	206700
2019-20	GSSS Tahilan	2	2200	125342
	GSSS Kandwal & Baranda	2	2200	125343
	GSSS Kuther	1	1100	62671
	GSSS Bhogarwan	2	2200	125344
	Total	7	7700	438700
2020-21	GSSS Minjgran	1	Only fencing work	47045
	GSSS Lodhwan	2	Only fencing work	62334
	GSSS Chalwara	1	Only fencing work	47045
	Total	4		156424
	Total	13 ha	9900	801824

8.6.1.4 DETAIL OF JFMCs OPERATING IN NURPUR FOREST DIVISION:

The JFMC/VFDS/VFMS wise area tackled in Nurpur Forest Division as it stood till date is given in Table 8.2. Various activities under FDA, National Bamboo Mission, National Medicinal Plants Board etc. are being carried out with their active participation

VFDS made in HP FEM and LIP (JICA) under PFM rules 2001 and area tackled:

Table: 8.3.

Sr. No	Range	Panchayat	Name of VFDS	No. Of Wards	Name of wards
1.	Nurpur	Jachh	Jachh	1,2	1.Jachh-1 2.Jachh-2
2.	Nurpur	Kopra	Kopra	5,2	1. Upreed Kopra

					2. Kopra Khas
3.	Nurpur	Aund	Aund	5,7	1. Aund 2. Nihar
4.	Nurpur	Ladori	Ladori	2,3	1. Sudiyal 2. Ladori Khas
5.	Nurpur	Punder	Jounta	8,9	1. Manhed 2. Sutyara
6.	Nurpur	Gahin Lagore	Gahin Lagore	4,6	1. Chinwa 2. Kurallian
7.	Nurpur	Minjgran	Minjgran	4,5	1. Bholthakra 2. Muglayana
8.	Nurpur	Danni	Danni	2,4	1. Kathla 2. Malera
9.	Nurpur	Nagni	Nagni	3,5	1. Kuther 2. Tanan
10.	Nurpur	Hathi Dhar	Hathi Dhar	1,5	1. Samlet 2. Kulangan
11.	Nurpur	Khanni	Khanni	3,4	1. Uppali khanni 2. Gudli
12.	Nurpur	Kot Plahri	Kot Plahri	1,3	1. Jhikli Palhari 2. Uppali Palahr
13.	Nurpur	Baduhi	Baduhi	1,2	1. Kher Nala 2. Dukiye
14	Nurpur	Bhaloon	Bhaloon	4,7	1. Bhaloon 2. Bassa Samletyan
15	Indora	Giora	Giora	3,4	1. Tareta 2. Giora
16.	Indora	Panjahra	Panjahra	5,7	1. Tiyykar 2. Panjhara Dahla
17.	Indora	Ghandran	Ghandran	7	Mand Ghandran
18	Indora	Mangwal	Mandholi	3,5	1. Tariyah Hadliya 2. Tariyah Chamarah
19	Indora	Baleer	Baleer	1,3	1. Baleer 2. Samoon
20	Indora	Mangwal	Indpur	3,4	1. Indpur 2. Jambla
21	Indora	Lodhwan	Lodhwan	5,7	1. Jatoli 2. Lodhwan Pratham
22	Jawali	Sidhpurgh ar-I	Sidhpurghar-I	7,8	1. Sandh Da Bheda

					2.Guleri Da Bheda
23	Jawali	Fatehpur	Fatehpur	4,5	1.Fatehpur 2.Dakiyara
24	Jawali	Bhol Khas	Bhol Khas	4	1. Faral Naryal
25	Jawali	Lahru	Lahru	3,4	1.Fatehpur 2.Dakiyara
26	Rey	Bari	Bari	4,5	1.Bari Khass 2.Anoh Dyal
27	Rey	Malahari	Khanda	1,2	1.Naluya 2.Khanda Kalawan
28	Rey	Sathana	Bhanth	8,9	1.Sathana Khass 2.Bhanth
29	Rey	Badukhar	Deothi	6,7	1.Deothi 2.Deothi Bahadpur
30	Rey	Lathial	Badal	2,3	1.Badal 2.Luthiyal

**JFMCs and Areas Tackled under Sanji Van Yojana
(funded under state Govt plan scheme)**

Table: 8.4

Sr. No.	Name of JFMC	Area Managed (in ha.)
1	Ballah	82
2	Soldha	60
3	Dhar	90
4	Bonka (Bar)	57
5	Niangal	60
6	Borka	70
7	Takhniar	50
8	Jole	77
9	Padhar	95
10	Bakan	59
11	Kuther	59
12	Nidholi	86.5
13	Mastgarh	80
14	Batuhi	35
15	Balad	26.5
16	Kaldoon	35
17	Harian	33
18	Thehru	55
19	Chaniaia	45
20	Bharnala	30
21	Balwar	25
22	Chachian	30
23	Tahlia	30

24	Harsar	85
25	Dehri	50
26	Bagroor	20
27	Paloura	105
28	Khabal	90
29	Nana	110
30	Dhewa	70
31	Gurial	100
32	Lahroon	70
33	Golwan	60
34	Chhatar Yogian	100
35	Sidhpur Ghar	90
36	Chandbeh	100
37	Khor Nagal	80
38	Makroli	50
39	Bhalakh	55
40	Chaloh	60
41	Ghandran	50
42	Kuralian	16
43	Damtal	90
44	Khanni	133

Name of VFMS made in HP FE and CP project (KFW) and area tackled:

Table No. 8.5.

S. No.	VFMS Name	Total MP Outlay
1	2	3
1	Thatholi	6908782
2	Chaloh	5942138
3	Indpur	4555725
4	Tappa Mandholi	4004304
5	Gagwal	3174717
6	Malot	4472726
7	Dainkwan	3380414
8	Bhadroya	7150181
9	Raja Khasa	7575505
10	Baranda	7975540
11	Ballah	8802017
12	Sirmani	8220669
13	Soldha	8762655
14	Bohrka	7407028
15	Ambal	6982857
16	Dole	6396147

17	Anuhi	7772210
18	Surhandi	6492217
19	Nadholi	7960712
20	Kothi Wanda	7647682
21	Nichali Ballah	8970258
22	Banoli	9976652
23	Jole Bharnoli	7001365
24	Sidhpurghar	8393494
25	Sarohla	7256345
26	Chalwara	4398331
27	Bhatian	3707189
28	Gurial	6896779
29	Chhattar Jogian	6536434
30	Paloura	3863421
31	Kuraliyan	8729709
32	Kherian	8602836
33	Minjhgran	8881545
34	Aund	3305402
35	Danni	5525788
36	Haral	5277554
37	Milkh	4362972
38	Ther Kuther	7589787
39	Plakh	4662274
40	Diana	3301998
41	Hatli	5232243
42	Manwala Anoh	4972219
43	Nangal	4452445
44	Lathial	3414271
45	Anoh Polian	5590224
46	Khatiar	6473915
47	Sathana	4926193
G. Total		293885869

Area treated through afforestation in KFW project: **1170.76 ha**

Area treated under 1-3 model of lantana uprooting: **1040.25 ha**

All the ranges are involved in the scheme. It is observed that activities pertaining

to afforestation, soil conservation, Assisted Natural regeneration along with some entry point activities (EPAs) are being carried.

- (a) In order to enhance the economic stake of the rural communities, forest related income generation activities shall be promoted under various schemes of state Govt or through Externally aided projects.
- (b) Inputs sharing arrangement has been made specially to promote social fencing, where in the funds normally spent on fencing will be made over to the VFDS, who would be at liberty to decide how to use these funds for the protection of the plantation.
- (c) Under both the EAP projects viz. HP FE and CP project (KFW) & HP FEM and LIP (JICA) the emphasis has also been laid on the livelihood improvement of forest dependent communities.

8.7 CONSTRAINTS TO PARTICIPATORY MANAGEMENT:

There is a general lack of enthusiasm in embracing the idea of shared management in the forestry sector by the people and though some inroads have been made with the communities, a lot more thrust needs to be given to popularize the concept among the masses. The main causes for this lack of encouraging response among people are:

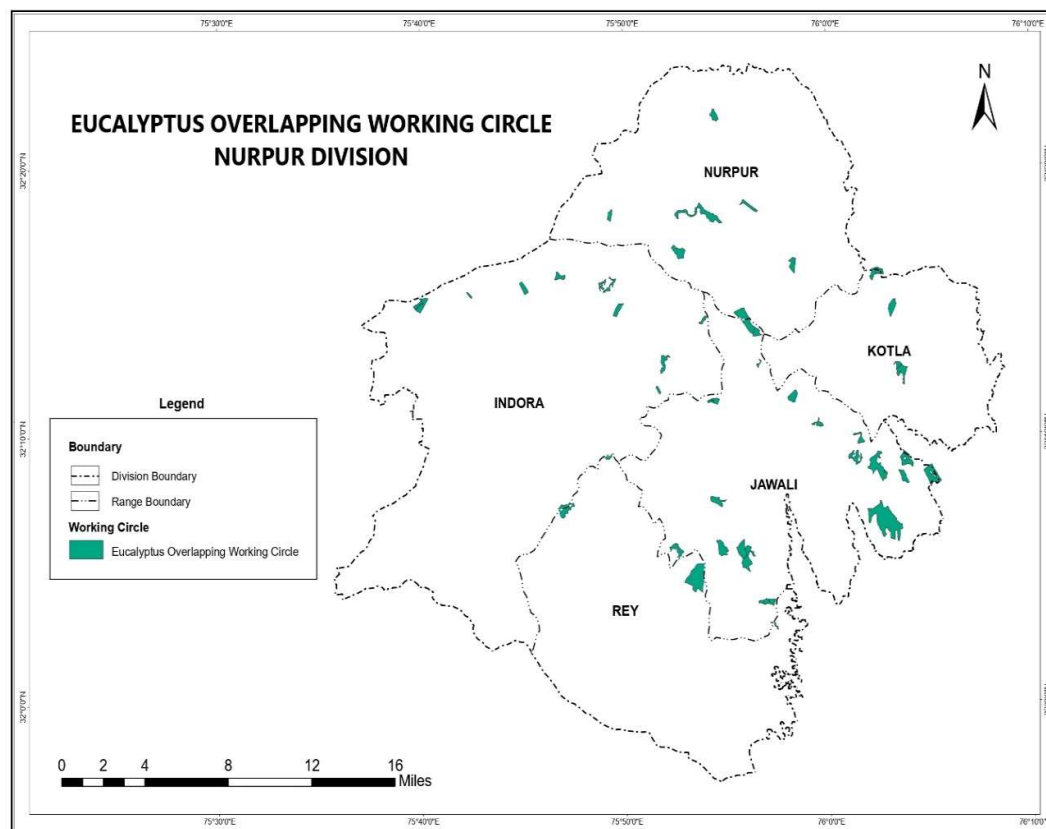
- (a) There is a general apathy of the youth to participatory programme related to rural sector because with acquiring college education all youth strive for white collared jobs and anything that keeps them back in villages does not enthuse them.
- (b) Lack of proper education of the government programme and insufficient extension activities of the department.
- (c) Long gestation period of forestry activities.
- (d) Too much dependence of the public on government and subsidy, cost sharing in such activities is generally not accepted.
- (e) Reluctance of government functionaries to hand over control of resources to people or even partially share their “power” with the people.
- (f) Lack of proper legislation on participatory management and usufruct sharing.
- (g) Frequent changes in schemes and discontinuation of old schemes which leads to mistrust of people in government.

8.8 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 at an interval of three years.

CHAPTER-IX

EUCALYPTUS (OVERLAPPING) WORKING CIRCLE



MAP NO. 9.1. GIS MAP (1: 50,000) FOR EUCALYPTUS (OVERLAPPING) WORKING CIRCLE

9.1 General Constitution and general character of vegetation:

This working circle is overlapping in nature and is created in this revision keeping in view the mature and over mature Eucalyptus tree standing in various working circle. The crop is of plantation origin raised mainly during 3rd and 4th five-year plan period when there was a trend of introducing exotic species for industrial consumption. The detail of area covered under this overlapping working circle is as under: -

Table No. 9.1. Area under Eucalyptus (Overlapping) Working Circle

Abstract	
Working Circle	Area
Coppice Working Circle	100.75
Plantation Working Circle	1528.76
Bamboo Working Circle	25.9
Chil Working Circle	131.15
Protection Working Circle	136.77
Total	1923.33

The introduction of eucalyptus was mainly done in plantation working circle with some blank areas of coppice, Bamboo, Chil and Protection working circle. The

eucalyptus was also introduced in some government lands also specially along river bed and road side which is not included in this working plan however a special management plan can be prepared after the approval of government.

9.2 Special Objects of Management:

Eucalyptus was introduced on experimental basis as it finds use as pulp, fuel wood small timber and so extensively used in various industries specially paper and pulp industry. Due to complete ban on green felling no felling has ever taken place and almost all the crop is over mature with negative increment and the specie being coppicing in nature has lost this property also being over mature. The main objective of introduction of this overlapping working is

- (i) To exploit the existing mature Eucalyptus plantations and obtain next rotation of the Eucalyptus crop of the coppice origin where ever possible.
- (ii) To restock the area with local indigenous species of fuel and fodder origin to meet the demand of local people.

9.3 Blocks and Compartments: -

Area Statement: -

Table No. 9.2. Area under Eucalyptus (Overlapping) Working Circle

Name of Division	Name of Range	Area (Ha.)
Nurpur	Nurpur	264.27
	Jawali	1041.6
	Indora	242.77
	Rey	230.24
	Kotla	144.45
	Total	1923.33

9.4 List of forests in working circle

Table No. 9.3.

Name of Range	Name of Beat	Name of Forest	Name of Comptt.	Area	Working Circle	Plan
Indora	Hagwal	UP-31 Gagwal	C-2	28.32	Coppice	Working Circle
Indora	Damtal	R-12 N Damtal	C-1	20.64	Plantation	Working Circle
Indora	Damtal	R-12 N Damtal	C-13	15.78	Bamboo	Working Circle
Indora	Gangath	R-15 N Sundru	C-2b	34.8	Plantation	Working Circle
Indora	Chhatroli	UP-22 Chhatroli	C-7	24.28	Plantation	Working Circle
Indora	Sukhar	UP-11N GhantalSanun	C-2	15.78	Plantation	Working Circle
Indora	Sukhar	UP-69 Majra	C-10	18.21	Coppice	Working Circle
Indora	Indpur	UP-150 Kathgarh	C-2	6.07	Plantation	Working Circle

Indora	Sukhar	UP-11 N GhantalSanun	C-2	15.78	Plantation Working Circle
Indora	Damtal	R-12 N Damtal	C-12	10.12	Bamboo Working Circle
Indora	Kandwal	P-24 N SuggarNal	C-2a	27.5	Plantation Working Circle
Indora	Dainkwan	CFS Lodhwan	U-56	17.4	Plantation Working Circle
Indora	Dhiala	UP-115 Bheri	C-2	8.09	Plantation Working Circle
Jawali	Harsar	DP- ChakbanHarsar	(W)	327.21	Plantation Working Circle
Jawali	Jawali	CFS Paloura	P1b	18.21	Chil Working Circle
Jawali	Jawali	UP-103 Jawali	C-1	24.69	Plantation Working Circle
Jawali	Jawali	CFS Paloura	U-17	8.5	Protection Working Circle
Jawali	Jawali	UP-103 Jawali	C-3	34.4	Plantation Working Circle
Jawali	Nana	UP-104 Nana	C-11	109.25	Plantation Working Circle
Jawali	Nana	UP-104 Nana	C-8	54.22	Plantation Working Circle
Jawali	Khabbal	UP-104 Nana	C-20	50.58	Plantation Working Circle
Jawali	Khabbal	UP-104 Nana	C-25	42.48	Plantation Working Circle
Jawali	Sidhpurghar	P1 Sidhpurghar	C3b1	16.19	Plantation Working Circle
Jawali	Golwan	CFS Golwan	U-3	2.43	Plantation Working Circle
Jawali	Hori	P7N Fatehpur	C-1	33.18	Coppice Working Circle
Jawali	Fatehpur	P7N Fatehpur	C-2-A	18.2	Plantation Working Circle
Jawali	Jawali	UP-103 Jawali	C-1	24.69	Plantation Working Circle
Jawali	Gurial	U 75 Larath	C2	5.26	Plantation Working Circle
Jawali	Hori	Up 130 Bagroli	C-5	48.34	Plantation Working Circle
Jawali	Hori	Up 130 Bagroli	C-7	40.06	Plantation Working Circle
Jawali	Fatehpur	UP 146 Fatehpur	C-19	48.96	Plantation Working Circle
Jawali	Gurial	R10N Talara	C8	27.52	Plantation Working Circle
Jawali	Gurial	R10N Talara	C9	30.76	Plantation Working Circle
Jawali	Gurial	R10N Talara	C7	28.32	Chil Working Circle

Jawali	Golwan	CFS Golwan	U-2	15.38	Plantation Working Circle
Jawali	Golwan	CFS Golwan	U-10	11.73	Plantation Working Circle
Jawali	Fatehpur	P7N Fatehpur	C-3 A	21.04	Coppice Working Circle
Kotla	Soldha	U-52 Soldha	C-4	32.37	Plantation Working Circle
Kotla	Ballah	R-14 N Ballah	C-4	38.45	Plantation Working Circle
Kotla	Bagga	UP-80 Kuther	C-1	12.95	Plantation Working Circle
Kotla	Ballah	R-14 N Ballah	C-5	32.76	Plantation Working Circle
Kotla	Bagga	UP-80 Kuther	C-2	27.92	Plantation Working Circle
Nurpur	Talara	UP-45 Talara C-1	C-1	16.19	Plantation Working Circle
Nurpur	Nurpur	CFS Gahin Lagore	C-22	96.3	Protection Working Circle
Nurpur	Khanni	R11N Khanni	C1c	22.24	Plantation Working Circle
Nurpur	CFS	CFS Jachh	P-4	44.11	Plantation Working Circle
Nurpur	Bindraban	R-16N Bindraban	C-3b	19.02	Plantation Working Circle
Nurpur	Tattal	R-1N Tattal	C-2b	46.53	Plantation Working Circle
Nurpur	Sadwan	P-39 N TherKuther	C-2d	19.88	Chil Working Circle
Rey	Nangal	UP-146 Fatehpur	C-27	28.33	Plantation Working Circle
Rey	Dhameta	U-15 Dhameta	C-1	11.33	Plantation Working Circle
Rey	Samlet	U-128 Samlet	C-24	54.62	Plantation Working Circle
Rey	Kothi	UP-127 Malahri	C-3	31.97	Protection Working Circle
Rey	Dhameta	P-1 D GharhJunat	C-1, 2 & 3	39.25	Plantation Working Circle
Rey	Dhameta	P-2 D GharhBambota	C-1, 2 & 3	64.74	Chil Working Circle

9.5. Reduced Areas: -

There is no reduced area.

Felling Series: There will be only one felling series having all type of forests (RF, DPF, UPF, UC and CFS) and will be called Nurpur felling series

Analysis and Evaluation of Crop:

Counting/ estimation of Eucalyptus trees in this overlapping working circle was done and it was found that 68445 trees mostly in the age group of 30 to 50 year

of age and mostly mature to over mature trees were recorded. The detail of field survey and estimation is tabulated as below

Table No. 9.4. Counting/ estimation of Eucalyptus trees

Name of Range	Name of Beat	Name of Forest	Co mpt t	Lat./Long. Of Area (appx. Central location)	Classificati on whether RF/DPF	Area of Plantatio n site (in ha.)	Appx. No. of trees	Appx Age of trees	Avg. diame ter of Trees (To be assess ed on the basis of at least 10 trees
1	2	3	4	5	6	7	8	9	10
Rey	Nangal	UP-146 Fatehpur	C-27	N.32°04'53.8" E.75° 51'59.6"	UPF	2	51	50 to 55 years	30-40 Cm.
Rey	Dhameta	U-15 Dhameta	C-1	N.32°02'8.58" E.75° 57'5.25"	Un-classed forest	3	380	50 to 55 years	30-40 Cm.
Rey	Samlet	U-128 Samlet	C-24	N.32°07'38.2" E.75° 50' 59.6"	UPF	1	8	50 to 55 years	30-40 Cm.
Rey	Kothi	UP-127 Malahri	C-3	N.32°04'37.5" E.75° 45' 23.7"	UPF	2	50	51 to 55 years	30-40 Cm.
Kotla	Soldha	U-53 Soldha	C-4	N.32° 15' 09.8" E.76° 03' 10.2"	UPF	1.5	250	55 years	30-40 Cm
Kotla	Ballah	R-14 N Ballah	C-4	N.32° 15' 38.2" E.76° 01' 45.6"	RF	1.5	300	55 years	30-40 Cm
Kotla	Bagga	UP-80 Kuther	C-1	N.32° 13' 37.5" E.76° 03' 21.5"	UPF	1.5	300	50 years	30-40 Cm
Indora	Damtal	R-12 N Damtal	C-1	N.32° 15' 1.42" E.75° 46' 8.98"	RF	3	150	40-50 years	1.20 to 2.50
Indora	Damtal	R-12 N Damtal	C-13	N.32° 14' 51.62" E.75° 39' 47.68"	RF	2	50	40-50 years	1.20 to 2.50
Indora	Gangath	R-15 N Sundru	C-2b	N.32° 15' 0.08" E.75° 49' 5.51"	UPF	3	45	40-50 years	1.20 to 2.50
Indora	Chhatroli	UP-22 Chhatroli	C-7	N.32° 13' 56.46" E.75° 51' 45.01"	UPF	2	60	40-50 years	1.20 to 2.50
Indora	Sukhar	UP-11 N GhantalSanun	C-2	N.32° 12' 16.7" E.75° 53' 13.6"	DPF	4	700	40-50 years	1.20 to 2.50
Indora	Sukhar	UP-69 Majra	C-10	N.32° 12' 11.2" E.75° 52' 10.0"	UPF	4.5	850	40-50 years	1.20 to 2.50
Indora	Indpur	UP-150 Kathgarh	C-2	N.32° 07' 00.0" E.75° 38' 05.0"	UPF	1	45	40-50 years	1.20 to 2.50
Indora	Hagwal	UP-31 Gagwal	C-2	N.32° 15' 31.0" E.75° 42' 07.0"	UPF	0.50	85	40-50 years	1.20 to 2.50
Nurpur	Talara	UP-45 Talara C-1	C-1	N.32° 14' 0.16" E.75° 53' 51.9"	UPF	4	120	50-55 years	30-50 Cm
Nurpur	Nurpur	CFS GehinLagore	C-22	N.32° 30' 47.66" E.75° 89' 71.37"	CFS	5	200	40-45 years	30-40 Cm
Nurpur	Sadwan	P-39 N TherKuther	C-2d	N.32° 21' 23.11" E.75° 54' 8.56"	DPF	5	8	40-45 years	90-130 Cm
Jawali	Harsar	DP- ChakbanHarsar	(W)	N.32° 6' 20.29" E.76° 2'34.69"	DPF	5	50	30 to 40 Years	30-40

Jawali	Harsar	PWD Road Side Raja Ka Talab to Dehra		N.32° 5' 55.50" E.76° 3'10.03"	Unclassed Forest	2	15	30 to 40 Years	30-40
Jawali	Jawali	CFS Paloura	P1b	N.32° 10' 25.47" E.75° 59'13.33"	UPF	5	80	30 to 40 Years	30-40
Jawali	Jawali	UP-103 Jawali	C-1	N.32° 10' 3.85" E.75° 59'47.67"	UPF	1	30	30 to 40 Years	30-40
Jawali	Jawali	CFS Paloura	U-17	N.32° 9' 54.86" E.75° 0'18.87"	UPF	2	50	30 to 40 Years	30-40
Jawali	Jawali	UP-103 Jawali	C-3	N 32°7'1.66" E76° 0'32.84	UPF	2	50	30 to 40 Years	30-40
Jawali	Nana	UP-104 Nana	C-11	N32°08'34.5" E076°04'36.4	UPF	2	25	30 to 40 Years	30-40
Jawali	Nana	UP-104 Nana	C-8	N.32°09'12.1" E.076°03'51.1 "	UPF	2	70	30 to 40 Years	30-40
Jawali	Khabbal	UP-104 Nana	C-20	N.32°08'44.2" E.076°03'01.2 "	UPF	0.15	15	30 to 40 Years	30-40
Jawali	Khabbal	Govt Land	Tika Jhara r	N.32°08'35.0" E.076°02'47.4	Edu. Dep.	0.10	8	30 to 40 Years	30-40
Jawali	Khabbal	UP-104 Nana	C-25	N.32°08'50.6" E.076°02'03.3 "	UPF	0.10	8	30 to 40 Years	30-40
Jawali	Khabbal	Govt Land	Tika Haar	N.32°08'42.3" E.076°01'33.6	UPF	2	65	30 to 40 Years	30-40
Jawali	Sidhpurghar	P1 Sidhpurghar	C3b1	N.32°11'36.6 E.075°58'07.6 "	DPF	4.5	850	30 to 40 Years	30-40
Jawali	Sidhpurghar	P1 Sidhpurghar	Govt Land	N.32°11'6 E.075°57'07"	DPF	0.5	90	30 to 40 Years	30-40
Jawali	Sidhpurghar	P1 Sidhpurghar	Niyal to Mair a Road	N.32°10'56.9" E.075°57'07"	DPF	0.5	70	30 to 40 Years	30-40
Jawali	Golwan	CFS Golwan	U-3	N.32°11'20.5" E.075°54'28.7	UPF	2.43	700	30 to 40 Years	30-40
Jawali	Golwan	CFS Golwan	U-3	N.32°11'13.8" E.075°54'20.2	UPF	2.43	800	30 to 40 Years	30-40
Jawali	Hori	BarelKhad	C-5	N.32°07'41.8" E.075°54'58.1 "	DC Land	1	450	30 to 40 Years	30-40
Jawali	Hori	Mochkhad		N.32°06'09.5" E.075°56'35.8 "	DC Land	2	300	30 to 40 Years	30-40
Jawali	Hori	Fatehpurkhad		N.32°06'7.5" E.075°56'30.3 "	DC Land	3	250	30 to 40 Years	30-40
Jawali	Hori	P7N Fatehpur	C-1	N.32°05'46" E.075°55'43"	DPF	5	1500	50 TO 55 Year	30-40
Jawali	Hori	P7N Fatehpur	C-1	N.32°05'46" E.075°55'43"	DPF	5	1500	50 TO 55 Year	30-40
Jawali	Fatehpur	P7N Fatehpur	C-2-A	N.32°05'16" E.075°55'00"	DPF	3	950	50 TO 55 Year	30-40
Indora	Sukhar	UP-11 N GhantalSanun	C-2	N.32° 12' 16.7" E.75° 53' 13.6"	DPF	4	700	40-50 years	1.20 to 2.50
Jawali	Jawali	UP-103 Jawali	C-1	N.32°9'36.91" E.76°1'21.91"	UPF	5	170	30 to 40 Years	30-40
Jawali	Golwan	Govt Land Dehri	-	N.32°10'35.4' ,	-	-	100	30 to 40 Years	30-40

				E.075°55'36.7"					
Jawali	Golwan	Govt Land Kutkana	-	N.32°10'47.4' , E.075°55'36.1"	-	-	300	30 to 40 Years	30-40
Jawali	Golwan	Raja KaTalab To Rehan Road	-	N.32°10'54.2' , E.075°54'51.02"	-	-	30	30 to 40 Years	30-40
Jawali	Rehan	Govt Land Tartial	-	N.32°10'12.7' , E.075°54'27.4"	-	-	515	30 to 40 Years	30-40
Jawali	Rehan	Govt Land Kadana	-	N.32°10'21.6' , E.075°56'02.7"	-	-	750	30 to 40 Years	30-40
Jawali	Rehan	Govt Land ManjuhiKhad	-	N.32°09'46.9' , E.075°56'33.0"	-	-	1050	30 to 40 Years	30-40
Jawali	Rehan	Govt Land Ridhi	-	N.32°10'16.7' , E.075°56'18.6"	-	-	275	30 to 40 Years	30-40
Jawali	Rehan	Govt Land MairaKhad	-	N.32°09'17.2' , E.075°55'35.9"	-	-	3000	30 to 40 Years	30-40
Jawali	Rehan	Govt Land Kandor Khad	-	N.32°09'29.6' , E.075°55'56.9"	-	-	150	30 to 40 Years	30-40
Jawali	Rehan	Govt Land Khukhnaida	-	N.32°08'57.3' , E.075°55'14.2"	-	-	450	30 to 40 Years	30-40
Jawali	Rehan	Govt Land Jhumbh Khas	-	N.32°08'32.8' , E.075°56'09.0"	-	-	450	30 to 40 Years	30-40
Jawali	Rehan	Govt Land Nahroon	-	N.32°08'24.8' , E.075°55'09.5"	-	-	130	30 to 40 Years	30-40

Rey	Dhameta	P-1 D GharhJunat	C-1, 2 & 3	N.32°02'0.63" E.75°57'5.49"	DPF	10	1500
Rey	Dhameta	P-2 D GharhBambota	C-1, 2 & 3	N.32°02'0.59" E.75°57'8.47"	DPF	8	2000
Kotla	Ballah	R-14 N Ballah	C-5	N.32° 15' 40.0" E.76° 01' 0.52"	RF	10	250
Kotla	Bagga	UP-80 Kuther	C-2	N.32° 13' 25.7" E.76° 03' 40.6"	UPF	10	350
Indora	Damtal	R-12 N Damtal	C-12	N.32° 14' 50.92" E.75° 39' 58.71"	RF	10	220
Indora	Kandwal	P-24 N SuggarNal	C-2a	N.32° 16' 11.97" E.75° 47' 3.69"	DPF	10	1600
Indora	Dainkwan	CFS Lodhwan	U-56	N.32° 42' 0.17" E.75° 32' 0.54"	CFS	10	500
Indora	Dhiala	UP-115 Bheri	C-2	N.32° 11' 37.3" E.75° 51' 37.7"	UPF	8	2800
Nurpur	Khanni	R11N Khanni	C1c	N32°18'0.56" E.075°49'10.8"	RF	8	600

Nurpur	Khanni	R11N Khanni	C1c	N32°18'0.243" E.075°49'22.9"	RF	6	800		
Nurpur	CFS	CFS Jachh	P-4	N32°25'52'32" E.075°87'61'39"	UPF	6	200		
Jawali	Gurial	U 75 Larath	C2	N.32° 12'44.5" E.075° 56'36.6"	RF	5.26	1500		
Jawali	Hori	Up 130 Bagroli	C-5	N.32° 07'26.2" E.075° 54'32.9"	UPF	6	2500		
Jawali	Hori	Up 130 Bagroli	C-7	N.32° 06'28.6" E.075° 54'58.1"	UPF	8	2000		
Jawali	Fatehpur	DC L and	-	N.32° 05'59" E.075° 56'14"	Dc Land	10	2200		
Jawali	Fatehpur	UP 146 Fatehpur	C-19	N.32° 12'15.37" E.075° 55'52.39"	UPF	10	2000		
Nurpur	Bindraban	R-16N Bindraban	C-3b	N.32° 05'59" E.075° 54'24"	RF	19.02	500		
Nurpur	Tattal	R-1N Tattal	C-2b	N.32° 27'71.98" E.075° 97'42.84"	RF	33.58	2600		
Jawali	Gharoli	DP Beh Kangar	W	N.32°10'26.5 " E.075°53'31. 0"	DPF	106.17	12500	30 to 40 Years	40-50 CM
Jawali	Gurial	R10N Talara	C8	N.32°13'59.7 " E.075°55'59. 5"	RF	27.52	3000	30 to 40 Years	40-50 CM
Jawali	Gurial	R10N Talara	C9	N.32°13'58.5 " E.075°56'01. 1"	RF	30.76	2200	30 to 40 Years	40-50 CM
Jawali	Gurial	R10N Talara	C7	N.32°14'01.1 " E.075°55'59. 0"	RF	28.32	3500	30 to 40 Years	40-50 CM
Jawali	Golwan	CFS Golwan	U-2	N.32°11'20.5 " E.075°54'25. 0"	UPF	15.38	3000	30 to 40 Years	40-50 CM
Jawali	Golwan	CFS Golwan	U-10	N.32°11'16.1 " E.075°54'14. 9"	UPF	11.73	1500	30 to 40 Years	40-50 CM
Jawali	Golwan	UP Padher	Whole	N.32°11'0.21 " E.075°54'43. 3"	UPF	27	4000	30 to 40 Years	40-50 CM
Jawali	Fatehpur	P7N Fatehpur	C-3 A	N.32°05'26" E.075°55'33' ,	DPF	15	3200	50 to 55 Years	40-50 CM
Rey	Nangal	UP-146 Fatehpur	C-27	N.32°04'53.8 " E.75° 51'59.6"		51		50 to 55 years	30-40 Cm.
Rey	Dhameta	U-15 Dhameta	C-1	N.32°02'8.58 " E.75° 57'5.25"		380		50 to 55 years	30-40 Cm.

Rey	Samlet	U-128 Samlet	C-24	N.32°07'38.2" " E.75° 50' 59.6"	8	50 to 55 years	30-40 Cm.
Rey	Kothi	UP-127 Malahri	C-3	N.32°04'37.5" " E.75° 45' 23.7"	50	51 to 55 years	30-40 Cm.
Kotla	Soldha	U-53 Soldha	C-4	N.32° 15' 09.8" E.76° 03' 10.2"	250	55 years	30-40 Cm
Kotla	Ballah	R-14 N Ballah	C-4	N.32° 15' 38.2" E.76° 01' 45.6"	300	55 years	30-40 Cm
Kotla	Bagga	UP-80 Kuther	C-1	N.32° 13' 37.5" E.76° 03' 21.5"	300	50 years	30-40 Cm
Indora	Damtal	R-12 N Damtal	C-1	N.32° 15' 1.42" E.75° 46' 8.98"	150	40-50 years	1.20 to 2.50
Indora	Damtal	R-12 N Damtal	C-13	N.32° 14' 51.62" E.75° 39' 47.68"	50	40-50 years	1.20 to 2.50
Indora	Gangath	R-15 N Sundru	C-2b	N.32° 15' 0.08" E.75° 49' 5.51"	45	40-50 years	1.20 to 2.50
Indora	Chhatroli	UP-22 Chhatroli	C-7	N.32° 13' 56.46" E.75° 51' 45.01"	60	40-50 years	1.20 to 2.50
Indora	Sukhar	UP-11 N Ghantal Sanun	C-2	N.32° 12' 16.7" E.75° 53' 13.6"	700	40-50 years	1.20 to 2.50
Indora	Sukhar	UP-69 Majra	C-10	N.32° 12' 11.2" E.75° 52' 10.0"	850	40-50 years	1.20 to 2.50
Indora	Indpur	UP-150 Kathgarh	C-2	N.32° 07' 00.0" E.75° 38' 05.0"	45	40-50 years	1.20 to 2.50
Indora	Hagwal	UP-31 Gagwal	C-2	N.32° 15' 31.0" E.75° 42' 07.0"	85	40-50 years	1.20 to 2.50
Nurpur	Talara	UP-45 Talara C-1	C-1	N.32° 14' 0.16" E.75° 53' 51.9"	120	50-55 years	30-50 Cm
Nurpur	Nurpur	CFS Gehin Lagore	C-22	N.32° 30' 47.66" E.75° 89' 71.37"	200	40-45 years	30-40 Cm
Nurpur	Sadwan	P-39 N Ther Kuther	C-2d	N.32° 21' 23.11" E.75° 54' 8.56"	8	40-45 years	90- 130 Cm

Jawali	Harsar	DP- Chakban Harsar	(W)	N.32° 6' 20.29" E.76° 2'34.69"	50	30 to 40 Years	30-40
Jawali	Harsar	PWD Road Side Raja Ka Talab to Dehra		N.32° 5' 55.50" E.76° 3'10.03"	15	30 to 40 Years	30-40
Jawali	Jawali	CFS Paloura	P1b	N.32° 10' 25.47" E.75° 59'13.33"	80	30 to 40 Years	30-40
Jawali	Jawali	UP-103 Jawali	C-1	N.32° 10' 3.85" E.75° 59'47.67"	30	30 to 40 Years	30-40
Jawali	Jawali	CFS Paloura	U-17	N.32° 9' 54.86" E.75° 0'18.87"	50	30 to 40 Years	30-40
Jawali	Jawali	UP-103 Jawali	C-3	N 32°7'1.66" E76° 0'32.84	50	30 to 40 Years	30-40
Jawali	Nana	UP-104 Nana	C-11	N32°08'34.5" E076°04'36.4	25	30 to 40 Years	30-40
Jawali	Nana	UP-104 Nana	C-8	N.32°09'12.1 " E.076°03'51. 1"	70	30 to 40 Years	30-40
Jawali	Khabbal	UP-104 Nana	C-20	N.32°08'44.2 " E.076°03'01. 2"	15	30 to 40 Years	30-40
Jawali	Khabbal	Govt Land	Tika Jharar	N.32°08'35.0 " E.076°02'47. 4	8	30 to 40 Years	30-40
Jawali	Khabbal	UP-104 Nana	C-25	N.32°08'50.6 " E.076°02'03. 3"	8	30 to 40 Years	30-40
Jawali	Khabbal	Govt Land	Tika Haar	N.32°08'42.3 " E.076°01'33. 6	65	30 to 40 Years	30-40
Jawali	Sidhpurghar	P1 Sidhpurghar	C3b1	N.32°11'36.6 E.075°58'07. 6"	850	30 to 40 Years	30-40
Jawali	Sidhpurghar	P1 Sidhpurghar	Govt Land	N.32°11'6 E.075°57'07"	90	30 to 40 Years	30-40
Jawali	Sidhpurghar	P1 Sidhpurghar	Niyal to Maira Road	N.32°10'56.9 " E.075°57'07"	70	30 to 40 Years	30-40
Jawali	Golwan	CFS Golwan	U-3	N.32°11'20.5 " E.075°54'28. 7	700	30 to 40 Years	30-40
Jawali	Golwan	CFS Golwan	U-3	N.32°11'13.8 " E.075°54'20. 2	800	30 to 40 Years	30-40
Jawali	Hori	Barel Khad	C-5	N.32°07'41.8 " E.075°54'58. 1"	450	30 to 40 Years	30-40
Jawali	Hori	Moch khad		N.32°06'09.5 " E.075°56'35. 8"	300	30 to 40 Years	30-40

Jawali	Hori	fatehpur khad		N.32°06'7.5" E.075°56'30.3"	250	30 to 40 Years	30-40
Jawali	Hori	P7N Fatehpur	C-1	N.32°05'46" E.075°55'43"	1500	50 TO 55 Year	30-40
Jawali	Hori	P7N Fatehpur	C-1	N.32°05'46" E.075°55'43"	1500	50 TO 55 Year	30-40
Jawali	Fatehpur	P7N Fatehpur	C-2-A	N.32°05'16" E.075°55'00"	950	50 TO 55 Year	30-40
Indora	Sukhar	UP-11 N Ghantal Sanun	C-2	N.32° 12' 16.7" E.75° 53' 13.6"	700	40-50 years	1.20 to 2.50
Jawali	Jawali	UP-103 Jawali	C-1	N.32°9'36.91 " E.76°1'21.91"	170	30 to 40 Years	30-40
Jawali	Golwan	Govt Land Dehri	-	N.32°10'35.4 " E.075°55'36. 7"	100	30 to 40 Years	30-40
Jawali	Golwan	Govt Land Kutkana	-	N.32°10'47.4 " E.075°55'36. 1"	300	30 to 40 Years	30-40
Jawali	Golwan	Raja Ka Talab To Rehan Road	-	N.32°10'54.2 " E.075°54'51. 02"	30	30 to 40 Years	30-40
Jawali	Rehan	Govt Land Tartial	-	N.32°10'12.7 " E.075°54'27. 4"	515	30 to 40 Years	30-40
Jawali	Rehan	Govt Land Kadana	-	N.32°10'21.6 " E.075°56'02. 7"	750	30 to 40 Years	30-40
Jawali	Rehan	Govt Land Manjuhi Khad	-	N.32°09'46.9 , 'E.075°56'33 .0"	1050	30 to 40 Years	30-40
Jawali	Rehan	Govt Land Ridhi	-	N.32°10'16.7 " E.075°56'18. 6"	275	30 to 40 Years	30-40
Jawali	Rehan	Govt Land Maira Khad	-	N.32°09'17.2 " E.075°55'35. 9"	3000	30 to 40 Years	30-40
Jawali	Rehan	Govt Land Kandor Khad	-	N.32°09'29.6 " E.075°55'56. 9"	30-40	30 to 40 Years	30-40
Jawali	Rehan	Govt Land Khukhnaida	-	N.32°08'57.3 " E.075°55'14. 2"	450	30 to 40 Years	

Rey	Dhameta	P-1 D Gharh Junat	C-1, 2 & 3	N.32°02'0.63" E.75° 57'5.49"	DPF	10	1500
Rey	Dhameta	P-2 D Gharh Bambota	C-1, 2 & 3	N.32°02'0.59" E.75° 57' 8.47"	DPF	8	2000
Kotla	Ballah	R-14 N Ballah	C-5	N.32° 15' 40.0" E.76° 01' 0.52"	RF	10	250
Kotla	Bagga	UP-80 Kuther	C-2	N.32° 13' 25.7" E.76° 03' 40.6"	UPF	10	350
Indora	Damtal	R-12 N Damtal	C-12	N.32° 14' 50.92" E.75° 39' 58.71"	RF	10	220
Indora	Kandwal	P-24 N Suggar Nal	C-2a	N.32° 16' 11.97" E.75° 47' 3.69"	DPF	10	1600
Indora	Dainkwan	CFS Lodhwan	U-56	N.32° 42' 0.17" E.75° 32' 0.54"	CFS	10	500
Indora	Dhiala	UP-115 Bheri	C-2	N.32° 11' 37.3" E.75° 51' 37.7"	UPF	8	2800
Nurpur	Khanni	R11N Khanni	C1c	N32°18'0.56" E.075°49'10.8"	RF	8	600
Nurpur	Khanni	R11N Khanni	C1c	N32°18'0.2.43" E.075°49'22.9"	RF	6	800
Nurpur	CFS	CFS Jachh	P-4	N32°25'52'32" E075°87'61'39"	UPF	6	200
Jawali	Gurial	U 75 Larath	C2	N.32° 12'44.5'' E.075° 56'36.6''	RF	5.26	1500
Jawali	Hori	Up 130 Bagroli	C-5	N.32° 07'26.2'' E.075° 54'32.9''	UPF	6	2500
Jawali	Hori	Up 130 Bagroli	C-7	N.32° 06'28.6'' E.075° 54'58.1''	UPF	8	2000

Jawali	Fatehpur	DC L and	-	N.32° 05'59'' E.075° 56'14''	Dc Land	10	2200
Jawali	Fatehpur	UP 146 Fatehpur	C-19	N.32° 12'15.37'' E.075° 55'52.39''	UPF	10	2000
Nurpur	Bindraban	R-16N Bindraban	C-3b	N.32° 05'59'' E.075° 54'24''	RF	19.02	500
Nurpur	Tattal	R-1N Tattal	C-2b	N.32° 27'71.98'' E.075° 97'42.84''	RF	33.58	2600

9.7 Stock Maps:

Since this is an overlapping working circle so no separate stock maps have been prepared and the stock has been depicted in the original compartment stock maps.

Enumerations:

It is an overlapping working circle as such the no separate grids / quadrants were laid and the estimation is a part of original allotment of working circle of compartment. However, a separate estimation was done and the results depicted in para evaluation of crop above.

9.8 Silvicultural System and Regeneration:

Clear felling system shall be adopted. The eucalyptus regeneration will be by coppice. The other species wherever required will be retained.

9.9. Choice of Species:

The eucalyptus coppice crop will be aimed at. In cases of failures/ blanks suitable indigenous species like Shisham, khair and other B/L species will be planted. In some suitable pockets the plants of religious/ medicinal Importance be planted.

9.10 Exploitable Diameter:

As the growth of eucalyptus is generally poor, no exploitable diameter is prescribed. However, a dia of 20 cm dbh will be suitable for use as pulp wood/ fuel wood.

9.11 Rotation and Regeneration Period:

It is expected that coppice crop will attain a minimum of 20 cm dbh in 15 years. Therefore, a rotation of 15 years is prescribed for coppice and 30 years for standards. In case the dbh attained is high, the produce can be used as small timber also for eucalyptus coppice crop a regeneration period of 3 years would be sufficient. However, for species other than eucalyptus, if any, planted in the area a lengthy regeneration period extending up to say 10 years may be required.

9.12. Felling Cycle:

A felling cycle of 10 years is prescribed.

9.13. Yield and Deviation:

Yield shall be controlled by area. Total area is 1907.55 ha and is to be felled in 10 years. Thus, the annual coupe comes to be 190.75 ha. The list of Forest compartment and areas to be felled is given below. Since the rotation is on higher side and the crop is generally over mature and is found in small compact patches of widely varying areas scattered here and there.

Total growing stock of eucalyptus in WC = Approx. 68445 No

Growing stock per Ha = 35 Trees Approx.40 m³

Annual Yield prescribed (190 hac coupe) =6720 trees Approx.7000 m³

9.14 Methods of Executing Felling:

The felling of Eucalyptus will be governed by following marking rules:

- (1) All Eucalyptus trees shall be marked. No other species will be felled.
- (2) Unmarked and damaged poles below 10 cm. Dia will be cut back at the time of felling.
- (3) Standards at the rate of 15.18 trees per ha. preferably of young trees giving a spacing of about 23.25 meters shall be retained.
- (4) In case where Eucalyptus is growing with other species the standards of other species will be kept.
- (5) Felling shall be completed by February end.
- (6) The stump will be about 15 cm high and will be given a sharp slanting cut facing the direction opposite to sun rays.

9.15. Sequence of Felling:

Table No. 9.5. Sequence of Felling

Year	Range	Forest	Comp.	Area
2025-26	Jawali	P7N Fatehpur	C-2-A	18.2
	Rey	P-2 D Gharh Bambota	C-1, 2 & 3	64.74
		P-1 D Gharh Junat	C-1	14.16
		P-1 D Gharh Junat	C-2	12.95
		P-1 D Gharh Junat	C-3	12.14
			Total	122.19
2026-27	Indora	R-12 N Damtal	C-12	10.12
		R-12 N Damtal	C-13	15.78
		R-12 N Damtal	C-1	20.64
	Jawali	CFS Paloura	U-17	8.5
		CFS Paloura	P1b	18.21

		UP-103 Jawali	C-1	24.69
		UP 146 Fatehpur	C-19	48.96
	Nurpur	R11N Khanni	C1c	22.24
			Total	169.14
2027-28	Indora	UP-150 Kathgarh	C-2	6.07
		UP-22 Chhatroli	C-7	24.28
	Nurpur	CFS Gehin Lagore	C-22	96.3
	Rey	UP-127 Malahri	C-3	31.97
	Jawali	UP-103 Jawali	C-3	34.4
		UP-146 Fatehpur	C-27	28.33
			Total	221.35
2028-29	Jawali	UP-104 Nana	C-20	50.58
		UP-104 Nana	C-25	42.48
	Indora	R-15 N Sundru	C-2b	34.8
		UP-11 N Ghantal Sanun	C-2	15.78
	Nurpur	R-16N Bindraban	C-3b	19.02
			Total	162.66
2029-30	Kotla	R-14 N Ballah	C-4	38.45
		R-14 N Ballah	C-5	32.76
		R-1N Tattal	C-2b	46.53
	Jawali	P1 Sidhpurghar	C3b1	16.19
		CFS Golwan	U-3	2.43
		U-128 Samlet	C-24	54.62
			Total	190.98

2030-31	Indora	UP-115 Bheri	C-2	8.09
	Kotla	UP-80 Kuther	C-2	27.92
	Jawali	UP-104 Nana	C-8	54.22
		P7N Fatehpur	C-1	33.18
		UP-103 Jawali	C-1	24.69
		UP 130 Bagroli	C-5	48.34
			Total	196.44
2031-32	Jawali	CFS Golwan	U-10	11.73
	Jawali	R10N Talara	C7	28.32
		CFS Golwan	U-2	15.38
	Kotla	U-52 Soldha	C-4	32.37
	Nurpur	UP-45 Talara C-1	C-1	16.19
		CFS Jachh	P-4	44.11
			Total	148.1
2032-33	Indora	P-24 N Suggar Nal	C-2a	27.5
	Nurpur	P-39 N TherKuther	C-2d	19.88
	Jawali	U 75 Larath	C2	5.26
		P7N Fatehpur	C-3 A	21.04
		Up 130 Bagroli	C-7	40.06
	Kotla	UP-80 Kuther	C-1	12.95
	Rey	U-15 Dhameta	C-1	11.33
			Total	138.02
2033-34	Indora	UP 6 9 Majra	C10	18.21
		UP-31 Gagwal	C-2	28.32

	Jawali	R10N Talara	C8	27.52
		R10N Talara	C9	30.76
		UP-104 Nana	C-11	109.25
			Total	214.06
2034-35	Jawali	DP Chakban Harsar	Whole	327.21
	Indora	CFS Lodhwan	U-56	17.4
			Total	344.61
			G. Total	1907.55

9.16 Subsidiary Silvicultural Operations:

Following subsidiary operations shall be carried out:

- (1) The Area felled shall be completely cleared of the felled material. Nothing will be left after felling. Debris will be collected and burnt.
- (2) Bush cutting will be carried out in the area after Felling-Fencing will be carried out well before coming out of coppice shoots.
- (3) The area will be fenced for eight to ten years i.e. period up to which plants planted in gaps/failed pockets become out of grazing/browsing danger.
- (4) In the 3rd year after felling, (when shoots area 1-2 years old) coppice shoots shall be singled out. The most vigorous shoot will be retained.
- (5) Important species like Sain, Tunu, Shisham, Sirus, khair, eucalyptus etc. Shall be planted in gaps. Where coppice fails such planting will be done in third year felling i.e. at the time of singling the coppice shoots.
- (6) Bush cutting will continue up to next two-three years.

9.17 Others Regulations:

- (1) Extension of Eucalyptus crop over areas having alternative crop shall be avoided. However, in case the adjoining area is blank, it will be taken up for planting with suitable indigenous species.
- (2) If the coppice crop of Eucalyptus does not respond favorably, the area shall be planted with other suitable fast-growing species.

9.18 Regeneration Assessment Survey:

Regeneration assessment survey will be carried out every year till the area is fully regenerated and is opened completely for exercise of rights.

CHAPTER-X

THE NON-TIMBER FOREST PRODUCE

10.1. GENERAL: -

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 non-Timber Forest products as well. There is a need to emphasize on the study, exploitation and marketing of valuable medicinal plants found in the division.

10.2. SPECIAL OBJECTS OF MANAGEMENT: -

1. To document important NTFP species found in the division.
2. To preserve and improve the quantity and quality of NTFPs in the division and manage them on a sustainable basis.

There is not much information available on the occurrence of medicinal herbs and species and there are still fewer records on the yield estimates of such species. A lot needs to be done in the field of conservation, development and management of NTFPs. This would be in accordance with the National Forest Policy of 1988, where in conservation and propagation of NTFPs and their contribution towards the local economy have been given due recognition and emphasis. In this Forest Division, resin, medicinal plants, bamboo, tannins, Katha and grasses are the important NTFPs contributing to the local economy. Resin, Khair and Bamboo are being exploited on commercial basis already and grass is being locally exploited. Information on medicinal plants is not readily available and there is a need to study and document the occurrence, yield estimates, exploitation and marketing of valuable medicinal plants in the division.

10.3. CONTRIBUTION TO INCOME AND QUALITY OF LIFE IN RURAL AREAS: -

In the rural setup, NTFPs form an integral part of the daily lives of the villagers, varying from personal hygiene, cosmetics, nutrition, household items for use of livestock medicine and even at times are a source of additional income to rural

households. The important non timber forest produce found in Nurpur Forest Division are given in Table: 10.1.

Table: 10.1 Important NTFPs found in Nurpur Forest Division:

Sr. No.	Common/ Local Name.	Botanical Name	Type	Part used	Uses
1	2	3	4	5	6
1.	Khair	<i>Acacia Catechu</i>	Tree	Heart wood	Yield '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 Linn</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. Half ripe fruit is stringent, digestive & stomachic. Leaves are useful in diabetics.

6.	Ramban	<i>Agave americana</i>	Shrub	Leaves & Stem	Fiber for rope making
7.	Kikki, Siris	<i>Albizia lebeck</i>	Tree	Root, Bark, Flowers	Uses in hemicranias, cooling, alexiteric, anthelmintic. For asthma & snake bite.
8.	Kali Siris	<i>Albizia Odoratissima</i>	Tree	Timber	Used for wheels, Oil mills & Furniture.
9.	Barbadis akie, Ghikawar	<i>Aloe barbedensis</i>	Shrub	Leaves	Source of resinous drug which is used mainly as purgative
10.	Janmani, Jonkmari	<i>Anagalis arvensis</i>		Entire plant	Cures inflammations, sores, pain in the liver & kidney, ophthalmic, dropsically swelling.
11.	Kakatundi, Kauradoodi	<i>Asclepias Curassavica Linn</i>		Roots/ Juice of leaves	Emetic, purgative, in piles & gonorrhea. Anthelmintic, sudorific.
12.	Safed musli	<i>Asparagus adscendens Roxb.</i>	Shrub	Root	Used as demulcent and also in diarrhea and dysentery.
13.	Dante	<i>Baliaspermum montanum Muell.</i>	Shrub	Roots/ Seed	Used in dropsy and Jaundice. Oil is used as hydragogue, cathartic.
14.	Tadrelu	<i>Barleria cristata</i>	Shrub	Roots & leaves	Used to reduce swelling, & and infusion is given in coughs.
15.	Kaliar, LalKachnar	<i>Bauhinia purpurea Linn.</i>	Tree	Root/ Bark Flowers	Carminative. Acts as astringent in diarrhea. Laxative.
16.	Maljhan, Taur	<i>Bauhinia vahlii</i>	Tree	Seed	Possesses tonic and aphrodisiac properties.

17.	Kachnar	<i>Bauhinia variegata</i>	Tree	Bark	Astringent to bowels, tonic to liver, cures leukoderma, leprosy, asthma, wounds and ulcers.
18.	Kashmal	<i>Berberis lyceum</i>	Shrub	Roots	Yield 'Rasaunt' used in treatment of ophthalmia. Also used for piles & as tonic & laxative, in menorrhoea, skin disease & cholera.
19.	Phutium	<i>Bidens pilosa</i>		Flowers	Dried, ground & mixed with alcohol & are used as a mouth wash in toothache.
20.	Bimol, Ciar, Khaksha	<i>Boehmeria platyphylla</i>	Shrub	Bark	For rope making & Textile purposes.
21.	Simal	<i>Bombax ceiba</i>	Tree	Wood/ Root	Wood used for planking, Toys, Well-curbs, Packing cases, Water shoots & Roots of saplings used as a nervine tonic.
22.	Dhak, Palas	<i>Butea monosperma</i>	Tree	Wood/ Bark of roots/ Flower	Wood is used for well-curbs & Piles. The bark of the roots yields coarse brown fibre. Flowers give an Orange dye use to keep out white ants.
23.	Ak	<i>Calotropis procera</i>	Shrub	Root/ Leaves	Roots bark is used in dysentery acts as diaphoretic, expectorant, emetic & is a valuable remedy

					in skin diseases. Tincture of leaves is useful in intermittent fevers & powdered flowers in cold, cough & Asthma.
24.	Bhang	<i>Cannabis sativa</i>	Shrub	leaves/ flowers	Used as stomachic, antispasmodic, analgesic & sedative.
25.	Amaltas	<i>Cassia flstula</i>	Tree	Pods/ Root bark	Fruit pulp is used as laxative, root bark is used in leprosy.
26.	Kandiari	<i>Caesalpinia sepiaria</i>	Climber	Seeds/ Bark	Medicine & Tanning.
27.	Daia	<i>Callicarpa macrophylla</i>	Shrub	Leaves	Heated & applied to rheumatic joints.
28.	Chaksu	<i>Cassia absus</i>		Leaves	Bitter, astringent & used as cough remedy.
29.	Chakunda, Kasonda	<i>Cassia occidentalis</i>	Weed	Roots	Useful in ringworm, elephantiasis & scorpion sting.
30.	Panwar, Chakunda	<i>Cassia tora</i>	Weed	Leaves	Used as laxative in form of decoction.
31.	Malkangni	<i>Celastrus paniculata Wild</i>	Climber	Seeds/ leaves	Laxative, stimulant, aphrodisiac & used in leprosy, gout & rheumatism
32.	Somraj	<i>Centratherum anthelminticum</i>	Climber	Seeds	Anthelmintic & are effective against threadworms.
33	American worm seed	<i>Chenopodium ambrosioides</i>	Herb	Entire plant	Used as an anthelmintic, effective in expulsion of hookworms.
34.	Mushkapoor	<i>Cinnamomum camphora</i>	Tree	Tree	Yield camphor oil-used in inflammations,

					rheumatic pains & sprains.
35.	Akanadi, Harjori	<i>Cissampelos pareira</i>	Climber	Roots	Used in diarrhea, dysentery, colic pains, cough & urinary troubles.
36.	Lanjai	<i>Clerodendron inerme(L) Gaertn</i>	Shrub	Leaves & roots	Juice is considered alterative in scrofulous & venereal affections.
37.	Dughi, Karanta	<i>Cryptolepis buchanani</i>	Climber	Milk	Used for repairing punctures in tyres.
38.	Akas-Bel, Sarag-Bali	<i>Cuscuta reflexa</i>	Climber	Leaves	Used in Veterinary Practice for poultice on sprains.
39.	Mircha-gandh	<i>Cymbopogon martini</i>	Grass	Roots/Leaves	Roots used as a souvenir for friends & from leaves Aromatic oil is extracted.
40.	Kaladhatura	<i>Datura metel Linn</i>	Shrub	Leaves flowering tops & seeds	Used in treatment of asthma.
41.	Thorn apple, Safed Dhatura	<i>D.stramonium Linn</i>	Shrub	Leaves flowering tops & seeds	Narcotic, used in treatment of asthma. Expectorant, antispasmodic, demulcent and anodyne in cough & asthma.
42.	Nirbisi	<i>Delphinium denudatum wall</i>	Shrub	Roots	Used as tonic and in toothache.
43.	Potato yam, Gaithi, Ratalu	<i>Dioscorea bulbifera Linn</i>		Tubers	Applied to ulcers after drying and powdering.
44.	Bhangra, Mochkand	<i>Eclipta alba Hassk</i>		Entire plant	Anthelmintic, used in hair oils

45.	Amla, Aonla	<i>Emblica officinalis Gaertn</i>	Tree	Fruits	Diuretic & laxative. Phyllembin from fruit pulp mild depressant action on central nervous system & spasmolytic action. Rich source of vitamin 'C' and good liver tonic.
46.	Dhaul Dhak, Madar, Padyara	<i>Erythrina suberosa</i>	Tree	Wood	Used for Scabbards, Ladles, Sieve- frames, Butter & Ghee-pots
47.	Lal dudhi	<i>Euphorbia hirta</i>	Shrub	Entire plant	Drug used in bronchial affections, cough, asthma & in removing worms in children & in bowel complaints.
48.	Pipal	<i>Ficus religiosa</i>	Tree	Bark	An aqueous extract shows anti-bacterial activity.
49.	Kangu	<i>Flacourtia indica</i>	Shrub	Seed	Fruit are edible, bark is astringent & diuretic & applied to eczemas. Past of the bark is given internally only once in dog bite. Fruit are digestive & stomachic.
50.	Pit-papra	<i>Fumaria parviflora Lam</i>		Entire plant	Efficacious in low fever, used as an anthelmintic, diuretic, diaphoretic & aperient.

51.	Goose grass	<i>Galium aparine</i>		Entire plant	Juice is used as diuretic & antiscorbutic.
52.	Maror-phali	<i>Helictris isora</i>	Shrub	Fruit/ Bark/ Root	Root is used in cough & Asthma. Leaf paste against skin diseases including eczema. Fruit powder is used in dysentery & vomiting. Fried fruit is given to children to kill intestinal worms.
53.	Kura	<i>Holarrhena antidysenterica</i>	Tree	Seed/ Bark	Bark is useful in dropsy & dysentery. Seeds are astringent & used as febrifuge in diarrhea & intestinal worms.
54.	Kathi, Hakna, Nil	<i>Indigofera pulchella</i>	Shrub	Root	Decoction is given for cough & powder is applied externally for pain in the chest.
55.	Rungru	<i>Kalanchoe spathulata</i>		Leaves	Used in cholera.
56.	Goma, Motapati	<i>Leucas cephalotes</i>		Flowers	Used in form of syrup for cough & cold.
57.	Barnasi	<i>Limonia crenulata</i>	Shrub	Leave/ Root	Tonic, appetizer & useful in fever
58.	Jalapapili	<i>Lippia nudiflora Rich.</i>		Leaves	Alcoholic extract shows antibacterial activity.
59.	Aam	<i>Mangifera indica</i>	Tree	Fruit/ Bark	Acrid, cooling, astringent to the bowels.
60.	Drek	<i>Melia azaderach</i>	Tree	Leaves seeds	Anthelmintic. Used in rheumatism.

61.	Jangli pudina	<i>Mentha longifolia</i> Huds	Shrub	Leaves	Carminative and stimulant.
62.	Indian wild thyme	<i>Micromeria biflora</i> Benth	Shrub	Entire plant	Used as an application for worm infested wounds of cattle.
63.	Kambel, Rohni, Kamala	<i>Mallotus Philippinensis</i>	Tree	Bark/ fruit	Drug kamela used for destroying tapeworms used externally in treatment of skin diseases.
64.	Marua-bel	<i>Marsdenia tenacissima</i>	Shrub	Bark/ Juice	Bark yields a silky-white fiber used for fishing-lines, bow-string by mountaineers, Coagulated milky juice used as Indian rubber.
65.	Sahjan	<i>Moringa pterigosperma</i>	Tree	Fruit/ Bark/ Leaves	Used in gout & acute rheumatism.
66.	Gandhela	<i>Murraya koenigii</i>	Shrub	Leaves	Used for flavour to curries.
67.	Kaiphal, Kaphal	<i>Myrica esculanta</i> Buch.-Ham	Tree	Bark	Decoction used for asthma, diarrhea, lung affection, chronic bronchitis.
68.	Banwan	<i>Myrsine africana</i>	Shrub	Fruit	Used as an anthelmintic.
69.	Kaner	<i>Nerium indicum</i> Mill	Shrub	Leaves	Anthelmintic especially for tapeworms.
70.	Tamakhu	<i>Nicotiana tabacum</i>	Shrub	Leaves	Used for Tobacco.
71.	Harsingar	<i>Nyctanthes arbor-tristis</i>	Tree	Leaves/ Flower	Leaves used for polishing wood, in medicine as a febrifuge and flower used as orange dye.
72	Sandan	<i>Ougenia oojeinensis</i>	Tree	Bark	Used as febrifuge and

					also as fish poison.
73.	Chil	<i>Pinus roxburghii</i>	Tree	Pine needles/ Oil	As liniment in rheumatic pains as stimulant, expectorant & in chronic bronchitis.
74.	Khajur/ Palm	<i>Phoenix sylvestris</i>	Tree	Fruit/ Leaves	Fruits are edible, cooling, tonic, useful in diarrhea & urinary problems.
75.	Kakkar	<i>Pistacia integerrima</i>	Tree	Galls	Kakrasingi used in native medicine.
76.	Chicha, Chita	<i>Plumbago zeylanica</i> linn	Shrub	Roots	As an appetizer, used in skin diseases, diarrhea, piles, used as application in scabies & unhealthy ulcers.
77.	Raniphul	<i>Polygonum plebejum</i> R.Br.	Shrub	Entire plant	For bowel complaints and in pneumonia.
78.	Bhekhal, Bekkra	<i>Prinsepia utilis</i>	Shrub	Entire plant	Yields oil used as a rubefacient & in rheumatism.
79.	Siali, Sural	<i>Pueraria tuberosa</i>	Shrub	Flowers Roots	Cooling, aphrodisiac. Demulcent & refrigerant in fevers.
80.	Rara	<i>Randia dumetorum</i>	Tree	Fruit	Fruit are edible & pulp of fruit is also given in dysentery.
81.	Chandra- bhaga	<i>Rauvolfia serpentina</i>	Shrub	Entire plant	Used as anti-hypertensive & as sedative. Also employed for relief of various central nervous system disorders, for intestinal disorders.

82.	Basanthi	<i>Reinwardtia indica</i>	Shrub	Stems & Leaves	Applied to wounds infected with maggots, used for treatment of paralysis.
83.	Arandi	<i>Ricinus communis</i>	Shrub	Seeds	Made into paste & are applied to sores, boils & rheumatic swellings.
84.	Kunjo, Kuja	<i>Rosa moschata</i>	Shrub		
85.	Guma	<i>Roylea elegans well</i>	Shrub	Root & leaves	Used as febrifuge.
86.	Manjith, Satavar	<i>Rubia cordifolia linn</i>	Climber	Entire plant	Used in rheumatism & several Ayurvedic preparations.
87.	Ritha	<i>Sapindus mukorossi</i>	Tree	Fruit	Used in salivation, epilepsy, chlorosis.
88.	Sahdevi	<i>Sida rhombifolia</i>	Shrub	Roots & Leaves	Aphrodisiac, tonic, useful in fever, heart diseases, burning sensations, piles.
89.	Barikatai	<i>Solanum indicum</i>	Shrub	Roots	For treating cough, catarrhal affections, colic & nasal ulcers.
90.	Kateli	<i>Solanum khasianum Clarke.</i>		Berries	Steroidal drugs.
91.	Sarpokha	<i>Tephrosia purpurea (L) pers</i>		Roots	Alexipharmac, good for ulcers & wounds, useful in enlargement of the spleen.
92.	Arjun	<i>Terminalia arjuna</i>	Tree	Bark	Cooling, alexiteric, styptic, tonic, antidysenteric, diseases of heart, anaemia, excessive

					perspiration, asthma.
93.	Bahera	<i>Terminalia bellerica</i>	Tree	Bark	Mild diuretic, useful in anaemia & leucoderma.
94.	Harad	<i>T. chebula Retz.</i>	Tree	Fruits	Astringent, useful in dysentery & diarrhea, good in ophthalmia, diseases of the spleen, piles, cold in the head.
95.	Andhahuli	<i>Trichodesma indicum linn</i>		Entire plant	Beneficial in diseases of the eye. It helps in the expulsion of the dead fetus.
96.	Sododi, Sadori	<i>Vernonia cinerea less</i>		Entire plant	Tonic, stomachic, astringent. Cures asthma, bronchitis.
97.	Banafsha	<i>V.Serpens</i>	Herb	Roots	Purgative, good febrifuge, tonic, expectorant, diuretic, removes inflammation
98.	Ban, Banda	<i>Viscum album</i>		Berry	Laxative, tonic, aphrodisiac, diuretic, cardio tonic, used in inflammations
99.	Nirgundi, Bana, Samhalu	<i>Vitex negundo</i>	Shrub	Leaves	Considered tonic, smoked for headaches and applied to rheumatic swellings of joints.
100	Akri, Ashwagandha	<i>Withania somnifera(L) Dunal</i>		Fruits	Used for liver complaints, asthma & biliousness.
101	Ber	<i>Zizyphus mauritiana</i>	Shrub	Leaves/ Fruit	Laxative, given in throat troubles, source of vitamin 'C' & Sugars.

The NTFPs should be given the due thrust and species yielding them should be included in the plantation programme. Nurseries should raise sufficient stock of medicinal and other plants of economic importance and make them available to the local population desirous of planting them. With many JFM schemes being under operation in the division, the stakeholders should be encouraged to include such species in JFM micro plans.

As in other parts of India and in the state, the rural people use plant based traditional medicines for health care. Since they are still produced using old methods, their quality, efficacy and shelf life gets adversely affected. Hence there is a need to introduce low cost, appropriate and simple technologies to encourage this dwindling practice and bring in additional income to rural households. Collection processing, value addition and marketing aspects of NTFPs need to be studied and the administration should provide all necessary help in this regard to training programme on various aspects of NTFPs i.e. collection, refinement, value addition, storage and marketing should make growing and trading of NTFPs more remunerative.

10.4 MINING ACTIVITIES: -

Apart from the plant resources, sand, stone, bajri etc. are also extracted on a large scale for local, commercial use and for use in developmental works. But presently in Nurpur Forest Division no mine is operative in the RFs, DPFs or UPFs. A few mines are, however, operational in govt. lands outside the reserve and protected forests.

10.5 REHABILITATION PLAN: -

As far as the medicinal plants are concerned, this area has not received much attention resulting in neglect and improper realization of the potential of this resource. Hence there is a need for initiation of more action-oriented plans, bearing in mind the conservation issues such that the rural household incomes could be augmented. There should be facilities for Pilot scale production and replication of positive results; development of low-cost, appropriate technologies, assurance of quality of raw materials and final products, marketing and marketability analyses, training in all aspects of medicinal plant production,

management and marketing, research and development i.e. development of superior propagation materials, improvement in quality and yield, agro technology, efficient processing technologies etc. and knowledge of procedures for registration and property rights.

CHAPTER-XI

GRAZING (Overlapping) Working Circle

11.1 General:

This is an important chapter from grazing point of view. The weaker section of the society is dependent upon the grazing ground for their domestic animals.

In this division there is neither separate grazing ground nor any high-altitude pasture lands due to the formation of Shivalik hills. The tract is highly fragile and adding silt to (national Hydel Power Project) Pong reservoir due to over grazing resulting denudation of vegetation in the catchment areas. All the forest areas are opened to grazing except Reserve Forests, Forest areas under regenerations in PB areas, plantations along with areas under Bamboo working circle. The Grazing in these areas of D.P.Fs. UP's, CFs except regeneration, plantation and Bamboos areas is going on all the season throughout the whole year as per settlement record of 1917. The local people and the Gaddi grazer are having their right over the forest areas. The forest areas are loaded with heavy rights. The availability of the total grazing ground is 31974.41 ha. over which 2,42,412 Nos. of local animal and 40126 Nos. (Sheep=25008 Goats=15118) of migratory animals (Nov. to May) visits these forest areas daily. The cow unit of all kinds of animal grazing worked out by adopting the following units as done by the grazing Advisory Committee on the Grazer Policy in Himachal Pradesh: -

Table No. 11.1.

Type of Animal	No. of Units
Sheep	1
Goat	1.5
Buffalo	6
Kine	4
Horse	4
Mule	5
Donkey	3

The grazing incidence works out 0.14 cow unit. Per ha. This clearly indicate that the incidence is far beyond the bearing capacity of the area and unfortunately it is on the increase.

11.2. II-Area available for grazing: -

The total area of this forest division under scientific management is 53,117.81 including cooperative Forest Society. Out of the total forest area 6336.73 is closed for raising plantation during the last 10 years, 3883.98 is Reserved Forests 769.92 ha. is under regeneration i.e. PB-I and 334.65 ha. area is under Bamboo working where grazing is prohibited. Thus, the net area available for grazing is 43917.36 ha.

In addition to the above 4168 ha. is Shamlat Deh under the control of Revenue Department which reserves as grazing ground for the local people. In this area there is a practice of keeping private land under Ghasanis (Kharetars). The area of the Kharetars is 12933 ha. which is used by the Gaddi Grazers during winter season. The owner of the Kharetars cut the grass during Nov./Dec. and there after give these areas to Gaddies for taking FYM. by resting their flocks in the field at night. The owners of these Kharetars also give raw food stuffs i.e. Rice, Flour, Dals and Salt etc. Which called as Got (F.Y.M.) to improve the fertility of their fields.

The following forest areas have been left out from preview of this working plan.
These will serve the purpose of grazing land.

Table No. 11.2. Areas left out from preview of this working plan

Sr. No.	Name of area	Area excluded in ha.
1	UP-80 Kuther	10.93
2	UP-81 Jangal	9.76
3	UP-53 Seuni	-
4	UP-83 Nadholi	-
5	UP-82 Sirmani	9.69
6	UP-54 Bar	0.0
7	UP-18 Kot Palahri	3.24
8	UP-12 Milk	33.58
9	UP-6 Danni	2.83
10	UP-17 Hatli	2.83
11	UP-5 Niar Sanoh	3.03
12	UP-3 Kukher Khowara	13.96
13	UP-10 Sadwan	9.51
14	UP-4 Mamun Gurchal	2.02
15	UP-6a Ladori	3.24
16	UP-7 Maira Dumal	28.28
17	UP-8 Haral	0.81
18	UP-15 Galore	8.50
19	UP-16 Kopra	45.66
20	UP-9 Aund	20.97
21	U-77 Bhol	-
22	UP-14 Thora Bhaloon	11.74
23	UP-2 Ther	18.59
24	UP-24 Baral	4.05
25	UP-55 Bhali	23.07
26	U-84 Dole	1.62
27	U-13 Khanni	19.37
28	U-52 soldha	68.45
29	U-46 Gurial	16.99
30	UP-45 Talara	16.95
31	U-20 Punder	210.76
32	U-75 Larth	1.22
33	U-28 Kherian	79.66
34	U-49 Minjgran	88.15
35	U-48 Bhol Thakran	1.21
36	U-19 Bhadwar	293.68
37	U-79 Ambal	30.63
38	UP-51 Anuhi	4.81

39	UP-165 Nangal	30.35
40	UP-185 Diana	29.95
41	UP-104 Nana	4.45
42	U-15 Dhameta	3.24
43	UP-78 Sidhpur Ghar	11.91
44	UP-130 Bhagroli	6.64
45	UP-149 Harsar	1.21
46	UP-103 Jawali	30.76
47	UP-132 Sunet	23.36
48	UP-146 Fatehpur	12.41
49	U-50 Kothiawanda	21.04
50	U-47 Banoli	2.83
51	U-26 Barla	50.16
52	U-13 Junat	43.70
53	U- Sathana	8.09
54	U-40 Katrah	15.78
55	U-25 Anoh	19.42
56	UP-129 Dini	42.08
57	UP-141 Surarwan	8.09
58	UP-63 Dagla	3.24
59	UP-64 Bhanuri	0.37
60	UP-42 Panjahra	5.67
61	UP-65 Anoh	75.75
62	UP-88 Malot	4.04
63	UP-150 Kathgarth	0.80
64	UP-89 Balkhor Kulara	1.59
65	UP-151 Ban Indorian	2.43
66	UP-114 Madholi	24.18
67	UP-69 Majra	32.72
68	UP-61 Gadwal	9.71
69	UP-95 Batrahan	11.74
70	UP-41 Aghar	4.23
71	UP-72 Bari	11.33
72	UP-91 Bharlahar	6.48
73	UP-62 Rit	6.48
74	UP-90 Ghoran	4.45
75	UP-115 Bharie	18.92
76	UP-127 Malahri	2.83
77	UP-145 Hatli	5.30
78	UP-35 Aattara	56.21
79	UP-114 Madholi	0.81
80	UP-38 Sadrahar	7.65
81	UP-67 BassaGodiala	0.40
82	UP-87 Surajpur	2.43
83	UP-59 Chaloh	12.14

84	UP-93 Chhatar	33.16
85	UP-142 Palakh	14.16
86	UP-22 Chhatroli	23.06
87	UP-21 BrandaKandwal	2.02
	Grand Total: -	1849.56

Therefore, the total area available for grazing =33724.80+1849.56=**35574.36 ha.**

11.3. Quality of livestock: -

The quality of livestock grazing in the tract is also poor. The sheep and goats as well as cows are of poor indigenous breeds. A few, orchardist, progressive farmers and leading businessmen have purchased Jersey breed cows and these are stall fed. Some local people have adopted dairy farming as their profession. The cattle population relevant to forest areas bearing grazing is as under according to 2003 census for Nurpur Sub-Division covering territorial boundaries of Nurpur forests Division is as under: -

Table No. 11.3. Cattle Population

CATTLE POPULATION			
Sr. No.	Kind of Cattle	Livestock Census 2003	Livestock Census 2019
1	Sheep	18257	6200
2	Goat	56832	42807
3	Buffaloes	54437	43687
4	Cow	130854	109789
5	Horse	1435	749
6	Mule	255	99
7	Donkey	113	19
8	Camel	28	03
9	Poultry	--	364043
10	Other i.e. pig, rabbit & dogs	53	14770
	Total: -	262264	582166

11.4 Character of Vegetation:

The forest areas of Nurpur Forest Division make a poor grazing ground except during the rainy season and a month thereafter. The condition of grazing runs for the Gaddi grazing is equally poor due to excessive grazing. The good quality of grasses and palatable bush growth has depleted and harmful shrub growth like *lantana Camara*, *caelipinia decanatala*, *Murraya koengii*, *Mimosa himalayan* and congress grass which scratch the fur of sheep have come in. The grazing is, therefore, more of sustenance and nutritious nature. The main fodder species are:

Trees: -*Acacia catechu*, *Bauhinia variegata*, *luceneae*, *Anogeissus latifolia*, *Ziziphus oenophia*, *Grewia oppositifolia*, *Terminalia blerica*, *Morusalva*, *Albizia lebbak*, *Pistacia integerrima* etc.

Shrubs: -*Crissa spinarum*, *Zizyphus mauritiana*, *Flacourtiaindica*, *Xeromphis spinosa* and *Butea monosperma*.

Climbers: *Bauhinia vahlii*, *Purperia tuberosa*, *Clamatis gourina*, *Isnocarpos frutsesence*, *Millea extensa*.

Grasses : *Hetropogan contortus*, *Chrysponogan montanus*, *Cymbonogan maître*, *cynden dactylon*, *Eulilipis binata* (Baggergrass)

The grazing advisory committee Recommendation

Charging of double grazer fee in Shamlat areas which have been vested with the Government. It was felt that the main cause of charging double grazing fee was non transfer of revenue entries of Shamlat areas in favour of Government. The people in the absence of proper mutation in favour of the Government were demanding grazing fee on the ground that they still need the area and were paying land revenues. It was decided that DFOs and Dy. Commissioners must jointly have the mutation in favour of the Government carried out and these mutations should be formally announced to the Grazers so that they are not exploited by the erstwhile owners. It was further decided that the order of the Government to transfer the Shamlat areas vested in the Government to the Department of Forest Farming and Environmental conservation should be implemented without further delay.

11.5. Control of Migratory and Nomadic Herds and Flocks:

- (a) **Registration and enumerations:** No legality is attached to the preparation of list of Grazers and the area grazed by them. It was decided that the date collected should be processed and list prepared as recommended by the Grazing Advisory Committee. The list can be at the forest Division level but should be wise ranges.
- (b) **Fixation of Routes and the check posts:** - It was decided that the existing routes should be listed. Difficulties that may arise because of the construction of the dams, raising of orchards and closure of forest etc. should be removed and in such cases possibilities of alternate routes be provided.
- (c) **Problem of Gaddis of Kangra District:** - It was decided that a circular be issued at the level of the chief conservator of Forests, Himachal Pradesh directing all the Divisional Forest Officers to ensure that double grazing fee is not charged and that permit once issued is honored.
As regards the excess numbers grazed over and above the frozen number, it was decided that the compensation at the rate of Rs. 5/- per goat may continue.
- (d) **Any Other Items:** -
Mal Distribution Migratory Grazing: It was brought to the notice of the committee by the Hon'ble Speaker that there is a scope for making available more areas for winter grazing of sheep and goats in Nalagarh and Sirmour areas. It was suggested by him that systematic and realistic survey of such grazing area should be carried out and these areas made available for winter grazing of the sheep and goats to reduce the problem. Afforestation should be carried out in Plantation working circle and these can safely be thrown to grazing again after the plantation has been established. It was agreed that the suggestion of the Hon'ble Speaker, H.P. Vidhan Sabha should be kept in view by the Forest and Soil Conservation Department and no closure should be continued beyond the period where it is

absolutely necessary. Delay, in throwing when closed areas supporting established crop, should be avoided.

11.6. Recommendation:

There can be no denying the fact that incidence of grazing is too heavy to be sustained by the forests. In addition, the goats play havoc with the vegetation. In case the forest cover is to be protected and enhanced, the curbs have to be imposed on grazing by cattle and browsing by goats. In this behalf, the following suggestions are made:

- (i) A coordination committee at District level may be constituted under the chairmanship of Deputy Commissioner and represented by local MLAs. Department of Forest farming and conservation, Animal Husbandry Departments. Agriculture Departments, Block development agencies and prominent public men to work out the details for achieving the ultimate aim to ban uncontrolled grazing and browsing by goat.
- (ii) The buffaloes which are in appreciable number cause great damage not only by trampling natural seedlings wherever these are established but also accelerating the erosion. Since Jersey breed of cows has shown good economic results, buffaloes may be replaced by better breed of cows during the currency of this plan, the stall feeding will automatically be adopted as a practice by the local people.
- (iii) The local people may be persuaded to eliminate the goats and likewise the migratory Grazers.
- (iv) In critical areas, the grazing rights may be acquired by paying compensation.
- (v) In the farm Forestry programme nutritious species of grass and fodder should be introduced.
- (vi) **Nomadic Grazers settled away from Home:** It was pointed out by the Hon'ble Speaker that some Grazers have purchased land in the lower areas and have settled there, they are paying land revenue and should be right holders like any other residents of that village, but they are not being allowed grazing of their flocks of sheep and goats. Such problems also exist in the Kanga District. It was decided that the problem should be analyzed, its implications examined and the affected Grazers identified before a final recommendation is made by the committee.
- (vii) **Eradication of Lantana:** Lantana has engulfed as number of grazing areas. The Hon'ble Speaker suggested that some steps, for example breeding of lantana bug should be taken to eradicate this harmful weed. He informed that even the grazer willing to contribute both, by way of cash at the rate of Rs.1/- per head of sheep goat grazed by them and effort. It was also suggested that the FRI should be consulted on the efficiency of lantana bug in eradicating lantana and measures taken to free vast areas of pastures of this harmful weed.
- (viii) **Sub-letting of grazing Grounds:** It was agreed that the practice of subletting of the grazing grounds should be stopped and permission given to graze only that number which was frozen in the year.

- (ix) **Opening closed areas to grazing:** It was pointed out by the Hon'ble Speaker that in some refractory forests there was no success, but efforts to re-afforest them are still continuing with the result that the closure period has got prolonged, He was of the view that there should be a time limit to afforest such areas and beyond that efforts should not be continued. He also said that some of the closed areas have been completely regenerated/ should be opened. Seed reserves of such grasses and fodder species should be created for propagation both in Govt. forests and private ownerships.

CHAPTER-XII

WILDLIFE MANAGEMENT (OVERLAPPING) WORKING CIRCLE

12.1 General Constitution of Working Circle:

This is an overlapping Working Circle and overlaps all the Working circles constituted for the tract. The elevation of the tract varies from 590 meters above sea level. Consequently, the fauna of the tract has a wide variety of wildlife falling in the categories of Carnivore, Herbivore, Omnivore, Aves and Pisces. However, because of high density of human population, inadequate and broken habitat, excessive grazing, opening up of tract by numerous roads and ruthless poaching, wildlife population has depleted. However, with the enactment and strict enforcement of the complete ban on hunting, some improvement has been noticed especially in case of Leopards and Avian.

The over for wildlife is as old as our civilization. Our sacred scriptures speak eloquently for the protection and preservation of wild animals, birds, and Pisces. The Vedas are full of hymns in veneration of wildlife. Kautilaya's Earth shattering provided for severe punishment for entrapping, Killing or molesting deer and birds, Pisces in protected areas. Ashoka's fifth pillar edict dating back to 3 B.C. depicts and eulogizes the same theme. Love for wild animals, is engrained in our conviction that wildlife is important from cultural aesthetic and recreational point of view. There is no denying the fact that the woods devoid of wildlife are soulless and life less entity.

God created all beings with a definite purpose and role in maintaining ecological balance in nature. The wildlife is highly important for maintaining ecological balance in nature. The bird's prey on harmful insects and pests. Chakor (Partridge), pheasants, Myna, and several other birds devour about 200 to 300 insects each daily. Besides, the birds help in pollination and dispersal of seeds and fruits. Snakes, Jungle cat, and birds of prey like owl, hawk, and help man by checking rodent population, which is highly inimical to agricultural crops. Some animals are used for the preparation of Ayurvedic and Allopathic medicines e.g. Monkeys are used for preparing anti polio vaccine, Musk deer gives scented musk, used in preparation of a variety of Ayurvedic medicines. Likewise, snake venom has high medicinal value. Wildlife value. Wildlife plays an important role at each trophic level of the food chain in maintaining ecological balance. Top carnivores like Leopards help to check the over population of fox and deer by preying on them. Similarly, other carnivores' prey on rodents thus checking the over population of these and maintaining the ecological balance.

12.2 Objectives of Management:

The following are the special objectives of management:

1. To preserve and protect the natural habitat of wildlife. To protect and preserve various wild animals, birds, reptiles and fishes.
2. To afford all possible protection and the most congenial conditions of food and environment for an unhindered reproduction of all forms of wild animals, birds, reptiles and fishes.
3. To curb poaching of wildlife by organized and un-organized hunters.

4. To ensure collection of scientific data for maintenance and development of viable population of fauna for scientific, aesthetic, cultural, ecological and economic purposes.
5. To identify problems of wildlife management and to formulate guidelines for its development consistent with the requirements of forestry and environment.
6. To conserve and protect the existing biodiversity of the ecosystem as a whole
7. To improve the wildlife habitat in terms of living space, forage conditions, protective and breeding cover, water holes and saltlicks 8.8. To supplement the existing natural vegetation by planting fruit and fodder species with special emphasis on trees that provide shelter to wild animals and birds.

12.3 Importance of Wild Life

A) Cultural value of Wild Life

Indian mythology, art and literature are bound intimately with animals and birds in a hundred verses are echoed in the prayers of the Vedic hymns, praising the cattle Nandi as the Vahan of Shiva, Garuda of Vishnu, Swan of Saraswati and Peacock of Kartikeya, while Lakshmi is surrounded by elephants. How Krishna leans against a Kadamba tree attended by cows or driving them home at sun set to the gates of Vrindavan is depicted in thousand pictures. Similarly, lion is the charger of Durga in her fight against the forces of darkness and barbarism. It is because of this association that lion has become the symbol of Dharma.

B) SCIENTIFIC AND BIOLOGICAL VALUES:

In some quarters there is an erroneous notion prevalent that the wild animals are instrumental in damaging the field crops and domestic animals. Hence out of ignorance many people resort to indiscriminate destruction of these animals. The fact is other way round. The herbivorous animals do not damage the field crop if sufficient food is available in their natural habitat. The animals check the cover growth of vegetation and their population provides food for the carnivore. If man does not indiscriminately destroy the wild animals, the Carnivorous animals will not lift his domestic animals or attack him. When the natural balance of wild animal population is upset by the callousness of human beings, they invade the fields and human habitations. The birds are helpful and useful to man in innumerable ways. Apart from their beautiful look, feathers and sweet songs, they devour millions of crop pests and rodents. They also scavenge the forests; bring about pollination of flowers of some of the fruit and forest trees and help in dispersal of seeds. But for the help of birds in destroying the crop pests, which multiply at a tremendous rate, it would have been rather impossible to raise field crops. These pests live on wood, living on plant leaves, flowers and fruits and eat 2 to 200 times of their body weight per day, on alarming magnitude indeed. Thus, the contribution of bird population in maintaining the vegetational cover on earth and help in raising the field crops for food cannot be over emphasized. And hence the importance of balance in the constituents of nature nevertheless, the animals damaging crops, lifting domestic animals and man eaters have to be killed and thus the balance restored.

How then, can we dis-associate ourselves from these creatures? Ancient oriental wisdom constantly emphasized on the unity of all earthly life and science is bringing us back to some point. And yet, we appear to be utterly impervious to the urges of the wisdom distilled either from ancient philosophy or from modern science. It is also wise to remember that we can destroy a species but surely, we can never recall it.

C) Economic value

There is economic side of wild life too. This implies the benefits or profits; we may get from the use of wild animals. The monkeys, for instance, have been useful in research for cures of human diseases. The musk pods of the musk deer are of great repute.

D) Recreational & Aesthetic value

The beauty of wild animals and birds fascinates the bird watchers, sport enthusiasts, photographers-both armature and professionals, animal and bird ecologists and biologists, and the gaiety hunters, the tourists from within and outside the country. The country side blessed with natural beauty bearing beautiful woods, wild animals and birds attract a multitude of tourists for sight-seeing, sport and rest in such surroundings. Tourism earns substantial revenue for the state. Besides, revenue, people of the areas including hoteliers, transporters etc. are also benefitted in many ways.

12.4 Character of Vegetation:

As already mentioned, the forests in the area comprise Dry mixed deciduous forests, Dry deciduous scrub, Dry bamboo brakes, Lower or Shivalik Chir pine forest types with predominance of trees such as *Chil*, *khair*, *simul*, *shisam*, *Mallotus*, *Rajain*, *Amaltas*, *Pyrus*, *Jamun*, *Harer*, *Bhera*, *Amla* and *Kangu* etc. The common bamboo found is *Dendrocalamus strictus*. A number of fruit and fodder trees for wildlife importance occur in the areas of which the following are important:

1. Bel (*Aeglemarmelos*)
2. Amaltas (*Cassia fistula*)
3. Dhak (*Butea monosperma*)
4. Khair (*Acacia catechu*)
5. Phaaai (*Acacia modesta*)
6. Kainth (*Pyrus pashia*)
7. Harar (*Terminalia chebula*)
8. Bohr (*Ficus glomerata*)
9. Pipal (*Ficus religiosa*)
10. Kangu (*Flacourtia indica*)
11. Amla (*Emblica officinalis*)
12. Jamun (*Syzygium cumini*)
13. Ber (*Zizyphus jujuba*)
14. Bhera (*Terminalia balerica*)
15. bekhe (*Berberis spp*)
16. Akha (*Rubus Spp*)
17. Garna (*Carissa opaca*)
18. *Dodonea viscosa*
19. *Aegle marmelos*
20. *Holoptelea integrifolia*

21. *Nyctanthes arbortristis*

The following palatable grasses are found:

1. Dhoioo (*Cymbopogon montanus*)
2. Khabbal (*Cynodon dactylon*)
3. Panni (*Dichanthium annulatum*)
4. Lunji (*Themeda anathera*)
5. *Aristida spp.*
6. *Heteropogon contortus*
7. *Dichanthium annulatum*
8. *Danthonia spp.*
9. Dholu (*Chrysopogon spontaneum*)

Therefore, there is a variety of tree and grass forage found in these forests. However, there is a persistent scarcity of water in the dry and winter months in part of Rey, Indora and Jawali ranges

12.5 Analysis and evaluation of wildlife and its habitat.

Wildlife Institute of India in its bio geographical classification has recognized Dhauladhar and Shivalik region as one of the regions of biological significance. In this 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, other animals such as Black buck, blue bull, Wild boar, Jackal, Rufous tailed hare, small Indian mongoose, fruit bat, Rhesus monkey, Indian Porcupine are common. The others noticed are Pale hedgehog, Grey Musk shrew and Indian Fox. The list of recorded animals in these forests is given in Table 12.1.

A variety of birds are also found in the area of which are crested cuckoo, red jungle fowl, peacock, koel, pied blue rock pigeon, doves, lapwings, babblers, hoopoe, bulbuls, jungle mynas, grey tit, golden backed woodpecker, 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 fly catcher. The list of birds found in the tract are given in Table 12.2.

12.6 Wildlife Conservation Measures:

The protection to wildlife can be afforded by adopting preventive, remedial and control measures. The preventive measures suggested are creation of public awareness, immunization of cattle in the surrounding areas to ensure that contagious diseases do not spread to wildlife. Controlling of grazing in the wildlife rich areas so that cattle do not encroach upon the rights of forage of wild animals. The awareness about the benefits of wildlife can be created effectively through meeting the elderly people, delivering lectures in schools and colleges, arranging public shows during village melas and Govt. functions. The public at large and concerned staff should be suitably rewarded for prevention, investigation and prosecution of cases relating to wildlife offences. Wild life club can be constituted to foster interest in wild life conservation as the town is inhabited by a large number of government employees and educated populace.

The remedial measures like habitat improvement, pasture development, creation of water holes, provision of salt licks, and periodical census of wildlife are of importance. The control measures suggested are anti-poaching measures through strengthening of infrastructure and communication network, prevention of forest fires and enforcing legal provisions of wildlife (Protection) Act, 1972.

12.7 Habitat Improvement:

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. Gap planting with species such as Amla, Bahera, Jamun, Ber, Bel, Kinu, Kachnar and Dhak should be carried out in pockets.

Lantana weed is the biggest hazard for deterioration of wildlife habitat. Measures to control its further spread, and eradication and utilization of the existing lantana weed as suggested in the Plantation Working Circle should be vigorously adopted.

Provisions have also been made in the various Working Circles to reserve the trees of wildlife importance near the water holes, bouri near temples and shrines. Similarly, 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 firing hazard.

Salt licks may be provided at important water holes where the wild animals regularly make a visit.

12.8 Provision of Water holes:

Due to high gradient and lack of suitable water harvesting structures, the area is deficient in water to meet the needs of the wild animals. As a result, the animals in the dry months of summer and winter months usually migrate to the lower foothills and the farmers' fields to find water. It is therefore absolutely necessary to construct water holes at suitable locations for storage of water in the lean months. Such water holes may be in the form of ponds, water tanks, check dams at the choe heads, but they should be constructed in a manner to allow storage of water for the maximum period. To stop the seepage of water layers of bajri /gravel, two layers of polythene sheet in between the sand layers, and the uppermost layer of bajri should be prepared. Silt retention dams should be prepared in the catchment area. No vertical concrete walls are allowed around the ponds and they should be gradually slanted, for easy approach of wild animals.

12.9 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 Protection Working Circle should be followed. The fire watch towers should be used for detection of fire outbreaks.

12.10 Anti-Poaching Measures:

Poaching is one of the main causes for destruction of wildlife. For effective protection of wildlife from poaching and hunting, preventive patrolling, establishment of check posts, arming of staff with vehicles and weapons and communication network are being done by the wildlife wing. Joint inspections by the wildlife and territorial staff should be conducted to stop the hunting of wild animals.

12.11 Census of Wild animals:

Census of wild animals give useful data for management. To have a clear picture of wildlife species and their diversity, the department should conduct at least one census during the period of Working Plan. Special census of red jungle fowl should be undertaken in the working plan period to know the population size of the species.

12.12 Coordination between Forests and Wildlife:

Coordination between forests and wildlife wings is imperative in the interest of forests and wildlife. Forest is the habitat for wildlife and wildlife is the protector of forest growth. The survival of wildlife is dependent on the existence of forests. The role of each component is required to be understood and appreciated in their respective roles. It is therefore suggested that not only the level of existing position of divisional functionaries of wildlife improved but effective wildlife management should be created.

12.13 Man-animal conflict:

Usually in the winters and in the hot month 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 the adjoining fields of farmers. Thus, damaging the agricultural crops. To compensate the farmers, the forests and Wildlife Preservation Department Punjab has framed the rules. The compensation is provided to the farmers after assessment of damage by the local forest officer, or the revenue officer of the area. The following are the compensation rates and ex-gratia relief payable to the victims of predation/depredation by wild animals as under: -

Table No.12.1. Table of Compensation rates

Sr no	Particular	Rate
1	Death of Human Being	4,00,000
2	Permanent disability to human being	2,00,000
3	Grevioux injury to human being	75,000
4	Simple injury to human being	15,000
5	Loss of horse, mule, buffalo, ox, yak and camel	30,000
6	Loss of Cow jersy and cross bred	15,000
7	Loss of Cow (Local), donkey, churu, churi and pashmina goat	6,000

8	Loss of sheep, goat and pig	3,000
9	loss of young one's of sheep, goat, cow all breeds, horse, mule, buffalo, yak, camel, churu, churi, and pashmina goat	1,500

Table 12.2 List of Wild Animals found in Nurpur Forest Division

A- GAME ANIMALS

LOCAL NAME	ENGLISH NAME	SCIENTIFIC NAME
Baghera	Leopard	<i>Panthera pardus</i>
Bhaalu	Black bear	<i>Selenarctos thibetanus</i>
Ghoral	Himalayan Goat	<i>Nemorhaedus goral</i>
Jungle Suar	Wild Boar	<i>Susscrofa cristatus</i>
Kakar	Barking deer	<i>Muntiacus muntjak</i>
Khargos	Common hare	<i>Lepus nigricollis</i>
Sambar	Sambar	<i>Cervus unicolor</i>
Shail	Procupine	<i>Hystrix indica</i>

B- NON-GAME ANIMALS

LOCAL NAME	ENGLISH NAME	SCIENTIFIC NAME
Bandar	Monkey	<i>Macca mulatta</i>
Chuha	Himalayan marmot	<i>Marmota bobak</i>
Common house rat	Common house rat	<i>Rattus rattus</i>
Gidar	Jackal	<i>Canis aureus</i>
Gilhari	Five stripped Palm squirrel	<i>Funambulus pennanti</i>
Jungle Billi	Wild Cat	<i>Felis benqalensis</i>
	Leopard cat	<i>Felis benqalensis</i>
Langoor	Common Langoor	<i>Presbytis entellus</i>
Newla	Common Mongoose	<i>Herpestes adwardsi</i>
Bhedia	Wolf	<i>Canis lupus</i>

C- GAME BIRDS

LOCAL NAME	ENGLISH NAME	SCIENTIFIC NAME
Bater	Common or grey quail	<i>Coturnix coturnix</i>
Chheer, Cher	Cheer pheasant	<i>Catreus wallichi</i>
	Koklas pheasant	<i>Pucrasia macrolopha</i>
	Chakor	<i>Alectoris graeca</i>
Harial	The wedge tailed green Pigeon	<i>Preron sphenura</i>
Jangli Murga	Red Jungle fowl	<i>Gallus gallus</i>
Kabutar	Blue Rock Pigeon	<i>Coluba Livia intermedia</i>
Lowwa	Jungle bush quail	<i>Perdicula asiatica</i>
	Grey quail	<i>Coturnix courinix</i>
	Blue rock	<i>Columba livia</i>
Sham Kukra	The spotted dove	<i>Streptopelia 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 leucogenys</i>
Chamgadar	Common yellow bat	<i>Scotophilus heathi</i>
Chemgadar	Barbas telle bat	<i>Barbas tella barbas tellus</i>
Cuckoo	Cuckoo	<i>Cuculus sparverioides sparverioides</i>
Gidh	The Himalayan griffin Vulture	<i>Gyps himalayensis</i>
Kaua	Crow	<i>Corvus macrohynchus culminatus</i>
	The Black Eagle	<i>Ictinactus malayenges</i>
	Golden eagle	<i>Aquila chrysetus</i>
Kath phora	Wood packer	<i>Picoides auriceps auriceps</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 Indian monitor lizard	<i>Varanus griseus Daudin</i>
Gobilda	Chameleon lizard	<i>Chameleon ealcaratus</i>
Kharpa	The Indian Cobra	<i>Naja naja</i>
Karait	The common Indian karait	<i>Bangarus caeruleus</i>
Sapp	The Himalayan pit viper	<i>Vipera ruselli</i>

F- FISH

LOCAL NAME
Goonch
Lanchii

12.14 General

This division has a varied topography, climate and forest cover and is as such endowed with a variety of fauna. The main among the mammals and birds found in the tract are the following.

12.15 MAMMALS: -**Leopard or Panther (*Panthera pardus*):**

It is also known as Bagh. Its population has reduced considerably. It is found up to an elevation of 2500 m and resides in isolated rocky hills. It is bolder than tiger. It is of rufous fawn color, has a fulvous or bright fulvous coat marked with dark spots grouped in rosettes. The tail is also more or less ringed. Average male is about 2m long weighing about 57 kg. Panther breeds all the year round and probably one litter of 2 to 4 is given every year. It generally remains in the neighborhoods of villages carrying off sheep, goat, calf and dogs etc, at nights. It

seldom attacks human beings without provocation. It has been ruthlessly killed for its ornamental skin and also for the safety of the goats and sheep in the forest. Although it has been declared protected animal, It is subjected to heavy onslaught.

Porcupine (*Hystrix indica*):

Locally known as Seh, Sehl or Sail, it is robust heavy and terrestrial. The whole of its back is covered with long and well-developed quills which may be nearly 60 to 70 cm long. It feeds on vegetables, principally on roots and damages the young plants in nurseries and plantations, especially of walnut, chil deodar etc., the animal is fond of gnawing bones and when alarmed it utters a gruntling sound, erects its spines and inflicts injuries. It weighs about 10 to 15 kg. and is locally very much valued for its meat.

The Goral (*Nemprhaedus goral*):

It is stocky goat like animal, smaller than domestic goat with stout limbs and coarse hair. It is found from 1000 to 3000 m elevations. Gorals are found in groups with off springs of different ages feeding on rugged grassy glades or rocky grounds in the midst of forests. Its ideal habitat is thick undisturbed forests with glades of open grassy lands which it prefers to graze at dawn and dusk. It spends most of the day time in secluded spots in dense forest. The mating season is from October to December and the young ones are dropped in April to June. The animal is often hunted for its meat in winter when forests are under snow and it descends down to the villages.

The Barking Deer (*Muntiacus muntjak*):

It is known as Kakar found between 800 to 2500 m elevation. Its colour is deep chest nut becoming darker on the back and pale and dull below. Its height shoulder is about 50 to 57 cm. The horns rarely exceed 13 cm. Generally, it utters a subdued chucking noise but when alarmed and in flight; the sound becomes a bark like cry from which the same barking deer is derived. The animal lives mostly in forests having very thick understory and comes out to graze in the out skirt of forests in open clearing during night. It is a solitary animal and is rarely found in herds. The animal is diurnal in habit and its food is mainly grass, tender leaves of trees, shrubs and wild fruits. It is unmatched for flexibility and prowess of creeping through the tangled stands. The mating season is during winter months and young are born in spring. During winter it descends down. Being small in height, it cannot run fast on snow and gets stuck up and gunned down easily. It is a sought-after animal for its meat. The high incidence of poaching has reduced the population an alarming low position. The destruction of the habitat of this animal is also the reason for its reduced population.

The sambhar (*Cervus unicolor*):

This is the largest deer carrying magnification horns. Its coat is coarse and shaggy and the general color is brown with yellow or grayish tinge. A full-grown

average male weighs about 230 to 240 kgs. The horns are about 90 cm. This animal was quite common up to an elevation of 2000m. Due to complete coverage of habitat by domestic animals, increase in the population, better mobility due to roads. More guns and the lust for cheap meat, this animal has been badly hunted in the past.

The Indian Wild Boar (*Susserofa cristatus*):

Also known as jungle Suar, it is notorious and a carnivorous wild animal living in grassy, bushy and also thickly wooded area. It feeds on field crops, wild roots, tubers and even insects. It is grayish black; the skin being covered with a sparse growth bristle which form a conspicuous mane. Wild boar is a prolific animal giving at least two litters every year, one in the beginning of rains and other after the rains, A well grown male is about 80 to 90 cm at shoulder and may weigh upto 200 kg. It is generally found in herds and causes a lot of damage to agricultural crops forest nurseries and plantations.

Common Indian Hare (*Lepus nigricollis*):

Locally known as Khar gosh, Sehru, or Kharha it is found everywhere but is more pronounced in lower regions in all ranges. It is a small size animal having about 40 to 50 cm length and about 2 kg. of weight. It feeds on grasses, seeds and fruits, it is hunted for its meat. It is harmful to nurseries and plantations.

Wolf (*Canis lupus*):

An animal little larger than domestic dogs and earthy brown in color, was common in the area but due to its alleged preying on the domestic animals, it has been made nearly extinct.

The Jackal (*Canis Aurs*):

Known as gidar, it is little smaller than the domestic dogs and grey in color. Very conspicuous due to their howling during dusk or dawn near villages. Their number has increased due to lack of competition by other animals which have been hunted down by the man. They do considerable damage to the crops and also lift the domestic poultry. Killing of these animals also require permit under big game.

The wild Cat (*Felis benqalenis*):

It is known as jangle Billi, slightly bigger than the domestic cat and has long legs. It is distributed all over but avoids severe cold during winters. Its habitat is forests fringes, open grass lands and rocky out crops. It preys on small mammals, birds and even on poultry near villages. Due to diminishing natural diet, its population has decreased.

The leopard cat (*Felis benqalenis*):

It is known as chita bill about the size of domestic cat with rather longer legs, Its skin marking resembles that of panther. It lives mostly on small birds and rodents.

Mongoose (*Herpestes edwardsii*):

It is light grey to dusty brown small animal locally called neola. It eats rats, snakes and small birds. It is found all over the division except snow bound areas.

The Monkey (*Macca mulatta*):

The common species found are Rhesus maigna Bandar which is in plenty all over due to protection afforded to it on religious grounds. Its population has also increased due to reduction of its natural predators namely panther. It avoids snow and moves down during winter. Monkeys do considerable damage to the agricultural crops, garden fruits and plantations. They live in groups in open areas to the dense forests and feed on tender leaves, wild fruits and tubers, corns are the favorite food.

The Languor (*Presbytis entellus*): -

Like monkey, Languor's are also found from Siwalik to high Himalayas but move down during winter through on lesser scale. They live on leaves, buds, fruits and flowers of forest trees, shrubs and even herbs. The ban oak acorns, horse chestnut, maple, Robinia, walnut and hazelnut seeds are the favorite dietary items. They live in a large group. These animals are shy and less troublesome, compared to monkeys. However, they do damage to the agricultural crop, fruit trees and forest plantations.

PHEASANTS AND FOWL GROUP

The Indian peafowl (*Pavo cristatus*) : Is also known as the common peafowl, and blue peafowl, is a peafowl species native to the Indian subcontinent. Male peafowl are referred to as peacocks, and female peafowl are referred to as peahens, although both sexes are often referred to colloquially as a "peacock".

The Red Jungle Fowl (*Fallus gallus*): It is known as Jungle Murgha or Kukar and is common up to 2000m altitude. It prefers lower scrub forests. It is a favorite bird of shikaris. It is believed to be the ancestor of all domestic fowls, found in pairs or parties. It is a very shy and conning bird, scuttles into cover on slightest disturbance or suspicion. The male is black below and red above. The tail has long coverts with dark metallic green, black and chestnut. The hens are plain streaked brown with rufous brown under parts. It roosts on thick crowned trees or bamboo clumps; feeds on grains, vegetable shoots, insects etc. Nesting season is generally from March to May.

PATRIDGE AND AUAILS GROUP

THE BLACK PARTRIDGE (*Francolinus francolinus*) :

Commonly **known** as Kala Titar. It is found upto 180m frequenting the grassy and scrub patches near cultivations. It is a small game bird, about half the size of a village hen, generally black and spotted white. The hens are paler and speckled black and white. It feeds on grass seeds, grains, white ants, termites, and other insects. It is a swiftly running bird relying upon its leg to escape, lives singly or in pairs, Nesting season is April to July.

The Chakor (*Alectoris Graeca*) :

Chakor is a mountain partridge being one of the best table birds. It is a large, plump, pinkish grey brown with rib like bars on flanks Bills and legs are crimson. Its color on the upper part and up to breast is plain grey. The lower parts below the breast are buff and the flanks are beautifully banded with grey, buff, and chestnut. It is distinguished at once by the beautiful bearing of flanks. The bird is very prominent due to its call in the evening and at times even during day. It prefers the barren rocky slopes with scattered bushes and grasses. It is a resident bird of Himalaya found between 1500 to 3000 mts. Generally, it is seen in parties regular visiting the cultivated fields for food. It feeds on seeds and grain as well as tender roots, green shoots and leaves of grass and food crops and a variety of insects and larvae. The breeding season is from April to August, early at low altitudes and late in the high hills. Seven to twelve eggs are laid at a time.

The Grey Partridge: (*Francolinus Pondicerianus*) :

Locally known as Fifer or Dhoola teeter. It is less common than Kala Teeter. Occasionally found in dry scrub forests. It frequents bushy jungles and cultivated lands. Its hunting is common.

Jungle Bush Quail: (*Predicula asiatica*) :

It is known as Bater and is of the size of rain quail. The bird has fulvous brown, mottled black and buff feathers above and white below. In females the lower parts are pale pinkish. It is found in open deciduous and dry scrub forests, it lives in convoys of 5 to 20 which rest together and rise suddenly when almost trodden, feeds on grass seeds, tender shoots and grains. Nesting season is not well defined; it ranges from August to April.

The Common or Grey Quail: (*Coturnix coturnix*):

It is almost the tailless partridge like bird called Bater. It is buffish- brown in color with pale reddish brown and black streaks. It is found in pairs or parties in grass land and cultivations and hides very well in grass and bushes. It flies straight for a short distance. Their population swells during winter when they migrate from Central and Western Asia to this region. It feeds on grain, grass seeds and insects etc. Nesting season is from March to May. Rain Quail (*Contrunx coromandelica*) which migrates locally is also found in the lower regions but rather very rare.

DOVES AND PIGEON GROUP

Blue Rock (*Columba livia*): Commonly known as Kabutar has a slaty grey colour with glistening metallic green purple and magenta sheen on the neck and breast. It lives gregariously on rocky cliffs and precipices. It is found throughout the division in upper reaches. Large flocks regularly visit, cultivated field in search holes. It generally feeds on grass seeds, cereals, pulses etc. Nesting season is not well defined.

Dove (*Streptopelia spp.*):

Commonly known as Ghugi, it is a commonly dove found in pairs or small parties in open places and cultivated fields. It approaches houses and even verandah if not scared. Its flight is straight and swift. It feeds on grass seeds on grass seeds grains and wild fruits. Its nesting season is also not well defined.

OTHERS

The Wood Cock (*Scolopax rusticola*):

Locally it is known as Sham Kukra. This bird is equal to Chakor in size, it is brownish with black and rufous markings.

The Wedge Tailed Green Pigeon (*Treron Spenuraj*) :

Also known as Harial and found mostly in ban oak forests in summer. It is essentially a fruit eating bird.

Aquatic Birds

Ducks, teals, goose and cranes are known to visit perennial rivers and streams but rare.

NON-GAME BIRDS

These are of two types viz. Raptors, and non-raptors. Raptors are the birds of prey such Hawks, Kestrels eagles, falcons, vultures and owls. Other birds of common occurrence are house and jungle crowns (*Corvus spp.*) the jungle babbler (*Turdoides spp*) bulbuls (*Chloropsis and Pyon-onotu*) King crow (*Dicrurus spp*) golden oriole (*Oriolus spp*) the common Myna (*Acridotheres spp*) the common baya (*Cloceus spp*) the wood pocker (*Dinopium spp*) parakeets (*Pistaccula spp*) common king fisher (*Atlthene spp*) Indian moorhens (*Gallinula spp*) herons bagula (*Egretta spp*) etc. These birds too are equally important froms aesthetic, forest cleanliness and health, farming, bird watching and balance of nature, point of view, some of the important raptors and non-raptors are described below: -

The Himalayan Griffon Vulture (*Gyps himalayensis*) :

It is the largest bird with long naked neck and un-feathered bald head. A large gathering on an old carcase of a domestic animal is the common sight. The other varieties of vultures observed in the tract are the Indian griffon long belled vultures and lammergeyer.

The Black Eagle (*Ictinactis malayenges*) :

It is a grey colored bird in size nearly equal to vulture. It lives mainly on alive smaller birds their young ones, rodents and snakes.

The Golden Eagle (*Aquila chrysetus*) :

Also known as Girja, is a very black looking large powerful eagle with size of vulture seen above the tree level of rather fierce appearance with its flat head, sharply hooked beak and feathered legs armed with sharp claws. A longish tail and often light patches in the wind and tail quills assist recognition. Its color is deep chocolate brown. Its food is mainly large birds like pheasants, partridges and even crows. It also carries away animals like fawns of barking deer goral, musk deer, foxes and martens. Frogs, lizards and snakes are readily devoured. It avoids heavy forests and camp sites.

The Shahin Faloons (*Falco peregrinus*):

It is a larger than the house crow, slaty blue above with black head, rusty red below. Its favorite habitat is vast steep blanks with rocky out crops. It lives mainly on chakor, partridges and other small birds. Other falcons commonly met are hobby and kestreal.

The Forest Eagle Owl (*Huhuna nepalensis*):

It is of a vulture size and is dark brown in colour with two black horns like tuft above its head. Underparts are tawny white barred with blackish brown. This bird is of nocturnal habits and lives mainly on pheasants or large birds and small animals especially the young ones of barking deer etc. The other owls found in the area are scops owl, great horned owl and scylyas wood owl.

Parrot/ Parakeet (*Psittacula himalayana*):

This bird is found in the lower hills and is a menaxe as it eats away the seed of chil by extracting it from the cones with its very strong beak.

The Jungle Crow (*Corvus macrorhyniches*):

It replaces the common house crow (*corvus splendens*) as a scavenger although the house crow is also found during summers.

Wood Pecker (*Picus Squanmatus*):

This is a little scaly bellied green wood pecker, distributed throughout. It is easily observed as it works its way up the trunk of a tree. Now stopping to dislodge a

piece of bark and then hammering lustily with its chisel like beak at a piece of grub- infested wood. Occasionally it feeds on the ground searching there for ants and termites. The nest hole is excavated in the trunk or branch of a tree and consists of a passage running down from 50 to 75 cm into the next chamber. It is a medium sized greenish bird with pale under parts scale with black which climbs, the trunks of trees in series of jerks, and moves from tree to tree with noisy undulating flight.

SNAKES

The common Indian Krait (*Bungarus Caeruleus*):

It has highly polished scales. It inhabits more or less open country at low altitudes, seldom ascending above 1500m.

The Himalayan Pit Viper (*Ancistrodon Himalayanus*):

Also known as saap, it is found between 2000 to 3000 m elevation. Although nocturnal in habit. It comes out at times to bask in the sun.

12.16 BRUSH PILES AND SLASH DISPOSAL:

Brush piles supply valuable safety cover for wild life in the forests, especially in the open woods. Slash disposal should be left piled rather than burnt unless hazards dictate its destruction.

12.17 ECOLOGY OF WILD LIFE:

Study of animal ecology evolving the knowledge of interdependence of plant and animal population fluctuate, food chains propagation and succession is very necessary for proper management of wild life. Hardly any information has so far been collected on this aspect for this tract. The field staff both of wild life wing and territorial wing should collect data about wild life ecology so that it may be of help in planning proper wild life management. Enlightened and improved methods of management of wild animals and birds, proposes adequate inventories and without such surveys and censuses, estimates of population of wildlife in any areas, will continue to be a matter of guess.

The tract has attraction or lack of attraction to a species according to how well it supplies, the essential. It is known to all that these essentials are food, cover and such other requirements as the species may need. Obviously, the critical time of the year will be most important and, in this area, the pinch period is usually winter. The number for which an area can provide essentials and thus carry through pinch period is designated as carrying capacity. It stands to reason that an area will not be able to maintain more than its carrying capacity in safety and that all above this capacity is subject to loss. But measuring the cover, determination of forage and range capacity, proper use factor for big game is not so easy as it may seem. In fact, determination of density and composition of the vegetation is baffling at time.

It is a fact that no sincere efforts were made in the past to save range and habitat conditions for the sake of wild animals of this tract and so, heavy incidence of grazing was recorded. Over grazing and damage to the forest as well as to the wild life has generally been underemphasized because of the economic factor involved. Reduction in grazing intensity is urgently needed in the sanctuary area at least not only for the sake of wild animals but also as a measure of protection of the range and animals in their rehabilitation. Though the principle of multiple use calls for grazing as one of the methods of utilizing forest resources, yet grazing requires rigid regulation not only from the stand point of forest reproduction but also from the stand point of wild life.

12.18 LEOPARD MENACE: -

The above stated measures have led to the disturbance in the food chain to cause increase in carnivorous wildlife like Leopard considerably, which in turn is killing domestic animals. The Govt. is, therefore, paying compensation to the owners of the domestic animals killed, and for human beings injured or killed by wild animals as per **Notification No. Fts. (F)-6-7/82 loose dated 9.4.1996**. Leopard sometimes turns man-eater or cattle lifters. This is due to the depletion of viable habitat, disturbance in food chain and loss of cover for these man-eaters. To check the menace of man-eater / cattle lifter leopards, followings measures are suggested: -

1. At the very initial stage it should be declared as man-eater as per procedure laid down.
2. Traps are to be laid around and near the affected area to trap and translocate the man-eaters to nearby zoo.
3. To make wide publicity in and around the affected localities about the attacking habits of man-eater.
4. It is suggested that professional hunters should be contacted for the killing of declared man-eater.

12.19 MONKEY, WILD BOAR ETC. MENACE: -

Monkeys, wild boars and birds cause considerable damage to agricultural crops. Eradication of said animals is permitted vide **letter 6-2/73-SF/IV dated 21.6.1994**. However, following measures are suggested to control the population of damage causing animals: -

Direct Method: - This involves lethal methods like shooting, poisoning and biological control through predators.

Physiological Control: - This method involves modification of an animal's physiological ability to reproduce. The tested chemical sterilant can be used to cause temporary or permanent sterility in monkey and wild boars.

Capturing and Sterilization: - It is one of the methods to control population in an area where there is abundance of monkeys. This method involves capturing of monkeys in and around the affected locality and transportation to nearest “Monkey Sterilization Centre”. This is an expensive method and can be very effective in monkey affected localities.

The combination of above methods can minimize the problems to some extent in the affected areas. However, some other suggested measures for the reduction in the conflict between man and animals are as under:

PROACTIVE:

- (i) The villagers are already using deterrents such as making sounds at night, beating drums, lighting a fire, or putting up a scarecrow in their fields. The alternative access to crop fields can be of some use.
- (ii) The Forest Officials need to take some proactive measures such as proper identification of the rogue animals, their tracking, and if needed “culling” or elimination.
- (iii) Feasibility of setting up of cages/radio collaring of the problem animals may be explored. The Forest Officials and the local villagers need to put up a combined defense against such animals.
- (iv) There is a need of regular census of ungulates and carnivores in the forests. The prey-predator relationship needs to be studied and worked out for the mountain animals along with the carrying capacity of their habitats.
- (v) The issue of crop insurance has a lot of promise to resolve the man-animal conflict in the Nurpur Forest Division. Possibility of paying a portion of the insurance premium by the Forests Officials for poor villagers should be explored but proper checks and balances are to be devised for such insurance.

REACTIVE:

However, once the damage is done, the provisions of compensation should be an easy and straightforward process so that the poor villagers are able to receive the compensation easily and without delay. It is also important that the forest department functionaries ensure that the poor people not only attend Panchayat or Gram Sabha meetings in good number but also participate actively so that their voice is heard. Proper checks and balances can be evolved. The removal of problem animals may be considered in case such animals have been properly identified. In fact, the main solutions lie in awareness about the large-bodied animals, their ecology and behavior; at the same time recognition of the fact that these are the poor villagers showing tolerance to the existence to the crop damaging bear or livestock lifting Leopard. This enhances the limits of human existence with the large carnivores. The future of man-animal conflict resolution lies as much in the involvement of the local communities in the wildlife habitat management, as in the measure that are taken to leave the wild habitats to the wild herbivores.

12.20 COMPANSATION PAID DURING LAST WORKING PLAN PERIOD

Table No. 12.3. Showing COMPANSATION PAID DURING LAST WORKING PLAN PERIOD

Year	No. of Cases sanct.	Human beings		Animals Killed					Compen st. paid (Rs)
		Killed	Injured	Cow	Goat	Sheep	Horse	Buffalo	
2012-13	4	0	0	2	5	0	0	0	4625
2013-14	12	0	0	9	14	2	2	3	23250
2014-15	15	0	0	3	57	39	1	0	163000
2015-16	6	0	0	1	10	15	1	0	46500
2016-17	7	0	0	0	48	6	1	0	75500
2017-18	8	0	0	3	42	32	1	0	85500
2018-19	14	0	0	5	33	0	4	0	138000
2019-20	8	0	0	3	16	2	1	0	117000
2020-21	4	0	0	1	1	12	1	0	67500
2021-22	9	0	0	2	49	0	1	0	123000
2022-23	16	1	0	4	18	1	0	0	532000
Total	103	1	0	33	293	109	13	3	1375875

ECO-Sensitive Zone:

Introduction:

The National Environment Policy (2006) defined the Eco-Sensitive Zones “as areas/zones with identified environmental resources having incomparable values which require special attention for their conservation” because of its landscape, wildlife, biodiversity, historical and natural values. In order to protect the environment and the biological integrity of the area outside the protected areas and other such areas where an eco-system has been adversely affected due to anthropogenic and climatic factors, the Ministry of Environment, Forest and Climate Change has been declaring such areas as Eco-sensitive zones/ areas. In other words, it is a type of designation of an area, which is rich in environmental resources and need special protection.

The concept of Eco Sensitive Zone was conceived during the XXI meeting of the Indian Board for Wildlife held on 21st January, 2002, when the Wildlife Conservation Strategy, 2002 was adopted. The point no.9 envisaged that “lands falling within 10kms of the boundaries of national parks and sanctuaries should be notified as eco-fragile zones under section 3(v) of the Environment (Protection) Act, 1986 and Rule 5, sub-rule (viii) and (x) of the environment (Protections) Rules”. The National Wildlife Action Plan (NWAP) (2002-2016) indicated that ‘Areas outside the protected area network are often vital ecological corridor links and must be

protected to prevent isolation of fragments of bio-diversity which will not survive in the long run. Land and water use policies will need to accept the imperative of strictly protecting ecologically fragile habitat and regulating use elsewhere'. The action plan also indicated that 'all identified areas around protected areas and wildlife corridors to be declared as ecologically fragile under the Environment (Protection) Act, 1986.

In pursuance to the decision taken by the National Board of Wildlife (NBWL) and to facilitate the site-specific proposal for the ESZ from the State Government, Ministry had issued the Guidelines for declaration of Eco-Sensitive Zone in 2011 with an indicative list of activities which are to be Prohibited, Regulated or Promoted.

Purpose:

Protect environment and avoid its degradation due to anthropogenic activities.

- Create some kind of barrier/ shock absorber for the specialized ecosystem (PAs).
- Act as transition zone from areas of higher protection to areas involving lesser protection.

Objective:

- To maintain the response level of an ecosystem within the permissible limits w.r.t environmental parameters.
- To notify the area as an Eco- sensitive zone and to regulate the developmental activities in a sustainable manner taking into consideration the needs and aspiration of the local people.

Salient Features of ESZ :

The ESZ Notification captures the following features:

1. Brief on the Protected Area
2. Area of ESZ and Extent of ESZ (Minimum and Maximum)
3. Available Flora, Fauna [Including Endemic, Rare, Endangered and Threaten (RET) species]
4. Boundary Description of ESZ
5. Maps of the ESZ
6. Geo-coordinates of prominent locations of PA and ESZ along with Shape/ KML files
7. List of villages along with Geo-co-ordinates
8. General guideline on Zonal Master Plan
9. Measures to be taken by the State Government
10. Prohibited and Regulated Activities along with Promoted Activities
11. Details of Monitoring Committee

The ESZ Notification does not involve displacement and evacuation of farmers/people living in the villages. The activities in the ESZ are generally regulated and not prohibitory in nature barring a few such as

- (i) commercial mining, stone quarrying and crushing units;
- (ii) major hydroelectric project;
- (iii) handling of hazardous substances;

- (iv) discharge of untreated effluents;
- (v) setting up of brick kilns;
- (vi) setting up of polluting industries, which have high potential for environmental damage.

As such, there is no prohibition on ongoing agriculture and horticulture practices by local communities, dairy farming, aquaculture, fisheries, poultry farm, goat farm, food related units etc. Further, the activities like infrastructure augmentation including civic amenities, widening of roads, non-polluting industries etc. are also under regulated category.

No new commercial construction of any kind is permitted within one Kilometre from the boundary of the Protected Area or up to extent of the Eco-Sensitive Zone whichever is nearer. However, there is no restriction for local people, they may undertake construction in their land for their use.

The Eco sensitive zone of Pong Dam Wild life sanctuary is in draft stages and the salient features of the draft ESZ are tabulated below:

List of activities prohibited or to be regulated within Eco-sensitive Zone.-All activities in the Eco-sensitive Zone shall be governed by the provisions of the Environment Act and the rules made there under including the Coastal Regulation Zone, 2011 and the Environmental Impact Assessment Notification, 2006 and other applicable laws including the Van (Samvardhan Evam Sanrakshan) Adhiniyam, 1980 (69 of 1980), the Indian Forest Act, 1927 (16 of 1927), the Wildlife (Protection) Act 1972 (53 of 1972), and amendments made there to and be regulated in the manner specified in the Table below, namely:-

Table No. 12.4. List of Activities

S.No.	Activity	Description
A. Prohibited Activities		
1.	Commercial mining, stone quarrying and crushing units.	(a) All new and existing mining (minor and major minerals), stone quarrying and crushing units shall be prohibited with immediate effect except for meeting the domestic needs of bona fide local residents including digging of earth for construction or repair of houses within Eco- sensitive Zone; (b) The mining operations shall be carried out in accordance with the order of the Hon'ble Supreme Court dated the 4th August, 2006 in the matter of T.N. Godavarman Thirumulpad Vs. UOI in W.P.(C) No.202 of 1995 and dated the 21st April, 2014 in the matter of Goa Foundation Vs. UOI in W.P.(C) No.435 of 2012.

2.	Setting of industries causing pollution (Water, Air, Soil, Noise, etc.).	New industries and expansion of existing polluting industries in the Eco-sensitive Zone shall not be permitted: Provided that, non-polluting industries shall be allowed within Eco- Sensitive Zone as per classification of Industries in the guidelines issued by the Central Pollution Control Board in February, 2016, as amended from time to time, unless so specified in this notification and in addition, the non-polluting cottage industries shall be promoted.
3.	Treatment of Biomedical Waste	(a) The Bio-Medical Waste disposal in the Eco Sensitive Zones shall be carried out in accordance with the BioMedical Waste Management, Rules, 2016 published by the Government of India in the Ministry of Environment, Forest and Climate Change vide notification number G.S.R343(E), dated the 28 th March, 2016. No BioMedical Waste treatment facility shall be located within the Eco Sensitive Zone (b) All waste generated from bio-medical units within the ESZ shall be taken outside the ESZ for treatment and disposal. No Bio-medical waste generated outside the ESZ will be allowed to be handled, processed or treated inside the ESZ
4.	Use or production or processing of any hazardous substance.	Prohibited
5.	Discharge of untreated effluents in natural water bodies or land area.	Prohibited
6.	Setting up of new sawmills.	New or expansion of existing sawmills shall not be permitted with in the Eco-sensitive Zone.
7.	Setting up of brick kilns.	Prohibited
8.	Commercial use of fire wood	Prohibited.
9.	Use of polythene bags.	Prohibited.
10.	Introduction of exotic species.	Prohibited

B. Regulated Activities		
11.	Commercial establishment of hotels and resorts.	New commercial hotels and resorts shall be permitted from boundary of the Protected Area up to the extent of Eco-sensitive provided that they shall be in conformity with the Tourism Master Plan and guidelines as applicable.
12.	Construction activities.	(a) New commercial construction shall be permitted from the boundary of the Protected Area up to extent of the Eco-sensitive Zone provided they shall be in conform it with the Zonal Master Plan and guidelines as applicable. Local people shall be permitted to undertake construction in their land for the use including the activities listed in sub-paragraph (1) of paragraph 3 as per building bye-laws to meet the residential needs of the local residents and for governmental purposes. Provided that the construction activity related to small scale Industries not causing pollution shall be regulated and kept at the minimum, with the prior permission from the competent authority as per applicable rules and regulations, if any.
13.	Small scale non-polluting industries.	Non polluting industries as per classification of industries issued by the Central Pollution Control Board in February, 2016, as amended from time to time, and non-hazardous, small-scale and service industry, agriculture, floriculture, horticulture or agro-based industry producing products from indigenous materials from the Eco-sensitive Zone shall be permitted by the competent Authority.
14.	Felling of trees.	(a) There shall be no felling of trees in the forest or Government or revenue or private lands without prior permission of the competent authority in the State Government. (b) The felling of trees shall be regulated in accordance with the provisions of the concerned Central or State Act and the rules made there under.

15.	Collection of Forest Produce or Non-Timber Forest Produce.	Regulated under applicable laws.
16.	Erection of electrical and communication towers and laying of cables and other infrastructures.	Regulated under applicable laws Implementation of aerial bunched cables and Laying of underground cabling may be promoted.
17.	Infrastructure including civic amenities.	Taking measures of mitigation, as per applicable laws, rules and regulation and available guidelines.
18.	Widening and strengthening of	Taking measures of mitigation, as per applicable laws, rules and

	existing roads and construction of new roads.	Regulation and available guidelines.
19.	Undertaking other activities related to tourism like over flying over the Eco-sensitive Zone area by hot air balloon, helicopter, drones, Microlites, etc.	Regulated as per the applicable laws.
20.	Protection of Hill Slopes and river banks.	Regulated as per the applicable laws.
21.	Movement of vehicular traffic at night.	Regulated for commercial purpose under applicable laws.
22.	Ongoing agriculture and horticulture practices by local communities along with dairies, dairy farming, aquaculture and fisheries.	Permitted as per the applicable laws for use of locals.
23.	Discharge of treated waste water/effluents in natural water bodies or land area.	The discharge of treated waste water or effluents shall be avoided to enter in to the water bodies and efforts shall be made for recycle and reuse of treated waste water. Otherwise, the discharge of treated wastewater/effluent shall be regulated as per the applicable laws.
24.	Commercial extraction of surface and ground water.	Regulated under applicable laws.
25.	Establishment of large-scale commercial livestock and poultry farms by firms, corporate and companies.	Regulated as per applicable laws except for meeting local needs.
26.	Open Well, Bore Well, etc. for agriculture or other usage.	Regulated and the activity should be strictly monitored by the appropriate authority.
27.	Solid Waste Management.	Regulated as per the applicable laws.

28.	Eco-tourism.	Regulated as per the Tourism Master Plan and applicable laws.
29.	Commercial Signboards and hoardings.	Regulated as per the applicable laws.
30	Establishment of Hydro Electric Projects	Establishment of all Hydro Projects shall be regulated and Mitigation measure shall be in place to ensure there is no adverse impact on wildlife.

C. Promoted Activities

31	Rain water harvesting.	Shall be actively promoted.
32.	Organic farming.	Shall be actively promoted.
33.	Adoption of green technology for all activities.	Shall be actively promoted.
34.	Cottage industries including village artisans, etc.	Shall be actively promoted.
35.	Use of renewable energy and fuels.	Bio-gas, solar light etc. shall be actively promoted.
36.	Agro-Forestry.	Shall be actively promoted.
37.	Plantation of Horticulture and Herbals.	Shall be actively promoted.
38.	Use of eco-friendly transport.	Shall be actively promoted.
39.	Skill Development.	Shall be actively promoted.
40.	Restoration of Degraded Land/ Forests/ Habitat.	Shall be actively promoted.
41.	Environmental Awareness.	Shall be actively promoted.

CHAPTER-XIII

BIO-DIVERSITY CONSERVATION (OVERLAPPING) WORKING CIRCLE

13.1 Constitution of the Working Circle:

Biodiversity is the totality of genes, species and ecosystem in a region. Richness of biodiversity of a region or country shows its richness of biological heritage, high conservation values and the richness of its population's socio-economic culture, as the biodiversity directly or indirectly affects the living standards of the human populations, health conditions and overall prosperity. In a bio-diversity rich country, there are multiple food choices, multiple choice of medicinal plants and multiple economic avenues. While biodiversity provides the people with a host of organic products, it is the people's duty to conserve the biodiversity which is the product of hundreds of millions of years of evolutionary history.

In the recent past, biodiversity as a subject was not given the due importance. It is only after the Earth Summit held in 1992 at Rio de Janeiro, where on Convention on Biological Diversity' (CBD) was adopted. The CBD having near universal membership has set out commitments for maintaining the biological resources underlining three main goals: conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits from the use of genetic resources. India is a party to the CBD and committed to conserve the natural heritage.

Biodiversity is conveniently studied into genetic diversity, species diversity and ecosystem diversity. Genetic diversity refers to the variation of genes within species, covering distinct populations of the same species or genetic variations within a population. Species diversity refers to the variety of species within a region. Ecosystem diversity is harder to measure than species or genetic diversity.

The Shivalik hills are the area in Himachal having remnants of biodiversity which needs to be preserved. The forests dealt in this working plan are situated in the Shivalik hills. It is imperative to have special consideration of these forests for conservation of biodiversity by constituting a separate Working Circle. The biodiversity Working Circle will encompass all areas of the Working Plan.

13.2 Objectives of Management:

The state has prepared the strategy and Action Plan for Conservation of Biodiversity.

The principal objectives of the plan are to:

1. Assess the existing status of biodiversity.
2. Identify the causes of its deterioration, if any.
3. Promote conservation and sustainable use of the state's biological resources.
4. Promote awareness among and dissemination of information amongst government departments and the public for realizing people's involvement and participation in conservation activities.
5. Create mechanisms required to plan for natural resource management and long-term conservation.
6. Promote cooperation between all stakeholders including government, public institutions, social and economic groups and them asses.
7. Incorporate principles of restoration, conservation and sustainable use of biodiversity in planning and execution of sectoral and cross-sectoral policies.
8. Identify legal and financial instruments to achieve these objectives.

The conservation strategy is guided by the following principles:

1. Recognizing the right of survival of each species.
2. Identifying the root causes of biodiversity loss and taking corrective action.
3. Restoring degraded habitat components to recover dwindling species.
4. Promoting in situ and ex-situ conservation of particular species.
5. Ensuring the share of local communities in the benefits obtained from use of natural resources which they have helped to conserve over long periods of time.
6. Ensuring sustenance of common property resources through local institutions.
7. Promoting biodiversity education
8. Generating biodiversity database.
9. Adopting a multi-disciplinary approach in biodiversity research.
10. Taking up economic evaluation of bio resources.

The above objectives and principles will guide the conservation of biodiversity of this working Circle.

BIOLOGICAL DIVERSITY ACT, 2002

Ministry of Environment and Forests, Govt. of India, New Delhi has enacted Biological Diversity Act, 2002 and Biological Diversity Rules, 2004 for the conservation and sustainable use of the biological resource on equity and gender basis and regulation and management of biodiversity in the Country. Biological Diversity Act, 2002 envisages the formulation of various bodies for the regulation and management of biodiversity at three levels namely:

- i) National Biodiversity Authority at National Level
- ii) State Biodiversity Board at the State level.
- iii) Biodiversity Management Committees at every local body/Panchayats level in the State.

Salient Features of Biological Diversity Act. 2002 are:

- a) to regulate access to biological resources of the country with the purpose of securing equitable share in benefits arising out of the use of biological resources; and associated knowledge relating to biological resources.
 - b) to conserve and sustainably use biological diversity.
 - c) to respect and protect knowledge of local communities related to biodiversity.
 - d) to secure sharing of benefits with local people as conservers to biological resources and holders of knowledge and information relating to the use of biological resources.
 - e) Conservation and development of areas of importance from the standpoint of biological diversity by declaring them as biological diversity heritage sites.
 - f) Protection and rehabilitation of threatened species.
- Involvement of institutions of State Governments in the broad scheme of the implementation of the biological diversity Act through constitution of committees.
The Biological Diversity Act, 2002 may have provisions for penalties along with imprisonment for any cognizable offence committed under the Act which is as follows:
 - Whoever contravenes or attempts to contravene or abets the contravention of the provisions of section 3 or section 4 or section 6 shall be punishable with imprisonment for a Term which may extend to five years, or with fine which may extend to ten Lakh rupees and where the damage caused exceeds ten Lakh rupees such fine may commensurate with the damage caused, or with both.
 - Whoever contravenes or attempts to contravene or abets the contravention of the provisions of section 7 or any order made under subsection (2) of section 24 shall be punishable with imprisonment for a term which may extend to three years, or with fine which may extend to five lakh rupees, or with both.
 - If any person contravenes any direction given or order made by the Central Government, the state Government, the National Biodiversity Authority or the State Biodiversity Board for which no punishment has been separately provided under this Act, he shall be punished with a fine which may extend to one Lakh rupees and in case of a second or subsequent offence, with fine which may extend to two Lakh rupees and in the case of continuous contravention with additional fine which may extend to two Lakh rupees every day during which the default continues.

Himachal Pradesh is situated in the lap of north-western Himalaya having beautiful landscapes, lush green forests, bubbling streams, emerald meadows, enchanting lakes, eternal snows, ethnic communities and joyful people. It is bounded by Tibet in the east, Jammu and Kashmir in the north, Uttarakhand in Southeast. Haryana in the south and Punjab in the west. It is located between 30° 22' 40" to 33° 12' 40" North Latitude and 75° 47' 55" to 79° 04' 20" East Longitude having geographical area 55,673 km² which is 1.7% of the country's area and 10.54% of the Himalayan landmass.

Himachal Pradesh is a hilly state and harbours one of the richest diversities of mountain landscapes with altitude ranging from 350 msl at boundary along Punjab plains to 6816 msl at Reo-Purgial in The Zaskar range in Kinnaur.



The altitude increases from west to east and south to north. The general landscape presents an intricate mosaic of mountain ranges, hills and valleys. Important mountain ranges in the State include the Shivaliks, Dhauladhar, Pirpanjal, Great Himalaya and the Zaskar. Separated by valleys, ranges and hills, there are distinct physiographic zones which run almost parallel throughout the length of the State from west to east.

The state can be divided into three main topographic regions.

1. **the Shivaliks**
2. **the Lesser Himalaya**
3. **the Greater Himalaya.**

The climate of Himachal Pradesh varies from semi—tropical to semi-arctic from place to place depending upon the altitude of the region. Varied physiographic and climate factors have given rise to diverse natural ecosystems, namely, forests, grasslands and pastures, rivers, lakes and wetlands, glaciers etc. which are the store house of the rich biodiversity.

WHAT IS BIODIVERSITY?

Biodiversity or Biological diversity is the variability within and between all micro-organisms plants and animals both wild and domesticated and the ecological systems which they co-exist and inhabit. It is one of the greater wealth of the planet. It starts with genes and manifests itself as organisms, species, populations and communities which lead to the formation of ecosystems, landscape and ultimately biosphere. Biodiversity manifests at three levels

- **Species Diversity** - diversity among species in an ecosystem.
- **Genetic Diversity** - diversity of genes within a species. There is genetic variability among the populations and the individuals of the same species.
- **Ecosystem diversity** - diversity at higher level of organization, the ecosystem.

IMPORTANCE OF BIODIVERSITY

Biodiversity has direct consumptive value in food, agriculture, medicine and industry. Approximately 80,000 plants have been used at one time and the another in the human history of which only 150 have been cultivated on a large scale. Today 10 to 20 species provide 80-90% of food requirements of the world. At one time, nearly all medicines were derived from the biological resources. Even today, 67- 70% of modern medicines are derived from natural products. In addition to food and medicines, biodiversity provides us with many other products without which life would be difficult. Wood, fuel, fodder, clothing and shelter, material for industries are some of the examples.

Biodiversity also has aesthetic and recreational values. Biodiversity maintains ecological balance and continues evolutionary process. The indirect ecosystem services provided through biodiversity are photosynthesis, pollination, transpiration, chemical cycling, nutrient cycling, soil maintenance, climate regulation, air, water system management, waste treatment and pest control. Conservation and sustainable use of biodiversity are therefore, fundamental to ecological sustainable development. In fact, the very survival of mankind is dependent on biological diversity i.e. plants, animals and microbes.

13.3 The Present Status of Biodiversity:

Because of different geological formations, physical geographical conditions and climate regime of the area, there are different bio-forms, ecosystems and forest types in the area. The Sal are unique forest ecosystems of the area. Among the tree components *terminalia tomentosa* and *Diospyros montana*, *Lannea grandis*, *Carissa opaca* and *Flacourtia indica* are characteristics of the vegetation. The biodiversity of the area was studied during the Resource Assessment Survey. The tree component was assessed by laying out quadrats of 36.2m×36.2m, the shrubs component by laying out quadrats of 3m×3m and herbs and grasses in 1m×1m quadrats. The list of recorded trees, shrubs and herbs is given in Table 13.1

The analysis shows that there is a high species diversity as many equally or nearly equally abundant species are found in the population. The number of tree species in the Dry deciduous forests is high. It is also seen that the number of tree species is as high as the number of herb species. This is because the survey was done in one season and also due to thick mass of invasive species. the diversity of herb species has declined.

Importance Value Index (IVI) is the sum of relative density, relative frequency and relative dominance for each species involved. It may be expressed as a range from 0 to 3 to give importance percentage, which will range from 0 to 1 or 100 per cent, may be divided into 300 per cent. In the present case, 300 per cent has been considered. Importance value provides an overall estimate of the influence or importance of a species in a community. IVI of tree species found in three different forests were calculated and given in Table 13.1.

It is noticed that *Acacia catechu* has highest *IVI* in Khair working circles forest, Chil in Chil working circle and *Eucalyptus in Eucalyptus working circle* forest. The other species having *IVI* more than 20 are Jamun, Sain, Jhingan and other miscellaneous broad-leaved species.

Among the economically important species are *Acacia catechu*, *Dalbergia sissoo*, *Diospyros tomentosa*, *Embllica officinalis*, *Eucalyptus*, *Lannea grandis*, *Mangifera indica*, and *Chhal*.

There are a number of medicinal plants as well. Among them are *Acacia catechu*, *Adhatoda vesica*, *Aegle marmelos*, *Azadirachta indica*, *Cordia myxa*, *Embllica officinalis*, *Nyctanthes arboretristis* and *Murraya koengii*.

Species recorded were screened for their uniqueness with references in the literature. No species under Red Data Book was recorded. All the species were found abundant in nature. No rare plants were encountered during the survey.

Table 13.1.: Biodiversity recorded in the Working Plan area

S. No.	Family/ Botanical Name ¹	Habit	Local Name
Acanthaceae			
1	<i>Barleria noctiflora</i> (= <i>Barleria cristata</i>)	Shrub	-
2	<i>Eranthemum pulchellum</i>	Tree	-
3	<i>Justicia adhatoda</i> (= <i>Adhatoda vasica</i>)	Shrub	Basuti
4	<i>Lepidagathis cuspidata</i>	Shrub	-
5	<i>Phlogacanthus thyrsiformis</i>	Shrub	-
6	<i>Strobilanthes auriculata</i>	Shrub	Kapur mingar
Actinidiaceae			
7	<i>Saurauia napaulensis</i>	Tree	Bhakara
Amaranthaceae			
8	<i>Deeringia amaranthoides</i> (= <i>D. celosioides</i>)	Climber	Bhirang
Anacardiceae			
9	<i>Cotinus coggygia</i> (= <i>Rhus continus</i>)	Small Tree	Tung
10	<i>Lannea coromandelica</i>	Tree	Kehmal
11	<i>Mangifera indica</i>	Tree	Am
12	<i>Pistacia chinensis</i> subsp. <i>integerrima</i>	Tree	Kakrain
13	<i>Spondias pinnata</i>	Tree	Ambara
Apocynaceae			
14	<i>Carissa spinarum</i> (= <i>C. opaca</i>)	Shrub	Garna
15	<i>Holarrhena pubescens</i> (= <i>H. antidysenterica</i>)	Small Tree	Keor
16	<i>Ichnocarpus frutescens</i>	Climber	Bakkar Bel
17	<i>Nerium oleander</i> (= <i>N. odorum</i>)	Shrub	Ghanira

18	<i>Tabernaemontana divaricata</i>	Shrub	Tagar
19	<i>Trachelospermum lucidum</i> (= <i>T. fragrans</i>)	Climber	Barora, Dudhi
20	<i>Vallaris solanacea</i>	Climber	Dudh Khal
21	<i>Wrightia arborea</i> (= <i>W. tomentosa</i>)	Tree	Khalwa
Apocynaceae (Asclpiadaceae)			
22	<i>Calotropis procera</i>	Shrub	Akh
23	<i>Cryptolepis buchananii</i>	Climber	Jaman Khumb
24	<i>Dregea volubilis</i>	Climber	Murud bel
25	<i>Periploca calophylla</i>	Climber	Spari
Areaceae			
26	<i>Phoenix loureiroi</i> (= <i>P. humilis</i>)	Small Tree	Khajur
27	<i>Phoenix syvestris</i>	Small Tree	Khajur
Asparagaceae			
28	<i>Agave americana</i> ²	Shrub	-
29	<i>Agave wightii</i> ²	Shrub	-
30	<i>Asparagus adscendens</i>	Shrub	-
Bignoniaceae			
31	<i>Jacaranda mimosifolia</i> ²	Tree	Jacrandia
32	<i>Oroxylum indicum</i>	Tree	Tat Palanga
33	<i>Stereospermum chelonoides</i> (= <i>S. suaveolens</i>)	Tree	Padal
Boraginaceae			
34	<i>Cordia dichotoma</i>	Tree	Lasura
35	<i>Cordia macleodii</i>	Tree	Kluhman
36	<i>Cordia myxa</i>	Tree	Lasura
37	<i>Cordia vestita</i>	Tree	Lasuri
38	<i>Ehretia acuminata</i>	Tree	Puna
39	<i>Ehretia aspera</i> (= <i>E. laevis</i>)	Tree	Chamrod
Cannabaceae			
40	<i>Celtis tetrandra</i>	Tree	Khirk
41	<i>Trema politoria</i>	Shrub	Kasa Kuri, Jeevani
Capparidaceae			
42	<i>Capparis sepiaria</i>	Shrub	Hiun Garna
43	<i>Crateva adansonii</i>	Small Tree	Barna
Celastraceae			
44	<i>Celastrus paniculatus</i>	Climber	Sandhren
45	<i>Elaeodendron glaucum</i> (= <i>Cassine glauca</i>)	Tree	Morindu, Mirgu
46	<i>Gymnosporia royleana</i>	Shrub	Bhadrun
Combretaceae			
47	<i>Terminalia anogeissiana</i> (= <i>Anogeissus latifolia</i>)	Tree	Dhao

48	<i>Terminalia bellirica</i>	Tree	Bahera
49	<i>Terminalia chebula</i>	Tree	Harar
50	<i>Terminalia elliptica</i> (= <i>T. tomentosa</i>)	Tree	Aisan
Convolvulaceae			
	<i>Poranopsis paniculata</i> (= <i>Porana paniculata</i>)	Climber	Faindal Jhol
Coriariaceae			
	<i>Coriaria nepalensis</i>	Shrub	Nachhar
Ebenaceae			
	<i>Diospyros cordifolia</i>	Tree	Kendu
	<i>Diospyros montana</i>	Tree	Kaldoh
	<i>Diospyros exsculpta</i> (= <i>D. tomentosa</i>)	Tree	Kinu
Euphorbiaceae			
	<i>Euphorbia royleana</i>	Shrub	Thor
	<i>Jatropha curcas</i> ²	Shrub	Japota
	<i>Leptopus cordifolius</i> (= <i>Arachne cordifolia</i>)	Shrub	-
	<i>Mallotus philippensis</i>	Tree	Kamal
Fagaceae			
	<i>Quercus glauca</i>	Tree	Banni
	<i>Quercus leucotrichophora</i> (= <i>Q. incana</i>)	Tree	Ban
Juglandaceae			
	<i>Engelhardia spicata</i>	Tree	Samma
	<i>Juglans regia</i>	Tree	Khor
Lamiaceae			
	<i>Clerodendrum phlomidis</i>	Small Tree	Dhakkari
	<i>Colebrookea oppositifolia</i>	Shrub	Dusen, Dussa
	<i>Duranta erecta</i> ²	Shrub	-
	<i>Gmelina arborea</i>	Tree	Ban
	<i>Holmskioldia sanguinea</i>	Shrub	-
	<i>Isodon rugosus</i> (= <i>Plectranthus rugosus</i>)	Shrub	-
	<i>Lantana camara</i> ^{2&3}	Shrub	-
	<i>Pogostemon benghalensis</i>	Shrub	Kali Basuti
	<i>Premna barbata</i>	Small Tree	Ginani
	<i>Premna mollissima</i> (= <i>P. mucronata</i>)	Small Tree	Gin, Bhankar
	<i>Pseudocaryopteris bicolor</i>	Shrub	Ban Basuti
	<i>Roylea cinerea</i> (= <i>R. calycina</i>)	Shrub	Karhkharche
	<i>Salvia officianalis</i> ²	Herb	-
	<i>Vitex negundo</i>	Shrub	Bana
Lauraceae			
	<i>Litsea monopetala</i> (= <i>L. polyantha</i>)	Tree	Ghian
	<i>Neolitsea pallens</i>	Tree	Chirindi
Lecythidaceae			

	<i>Careya arborea</i>	Tree	Handbahera
Leguminosae (Caesalpinaceae)			
	<i>Bauhinia purpurea</i>	Tree	Karal
	<i>Bauhinia racemosa</i>	Small Tree	Karali
	<i>Bauhinia variegata</i>	Tree	Kachnar
	<i>Biancaea decapetala</i> (= <i>Caesalpinia sepiaria</i>)	Climbing Shrub	Relan
	<i>Cassia fistula</i>	Tree	Kaniar
	<i>Phanera vahlii</i> (= <i>Bauhinia vahlii</i>)	Liana	Taur
	<i>Piliostigma malabaricum</i> (<i>Bauhinia malabarica</i>)	Tree	Karal
	<i>Senna obtusifolia</i> (= <i>Cassia obtusifolia</i>) ²	Shrub	-
	<i>Senna occidentalis</i> (= <i>Cassia occidentalis</i>) ²	Shrub	-
	<i>Senna tora</i> (= <i>Cassia tora</i>)	Shrub	-
Leguminosae (Fabaceae)			
	<i>Abrus precatorius</i>	Climber	Rattak
	<i>Codariocalyx motorius</i> (= <i>Desmodium gyrans</i>)	Shrub	
	<i>Dalbergia sissoo</i>	Tree	Tahli
	<i>Delonix regia</i> ²	Tree	Gulmohar
	<i>Erythrina abyssinica</i> (= <i>Erythrina suberosa</i>)	Tree	Grelu, Parjaru
	<i>Flemingia semialata</i>	Shrub	Ban Chola
	<i>Indigofera cassioides</i> (= <i>I. pulchella</i>)	Shrub	Kathi
	<i>Indigofera heterantha</i> (= <i>I. gerardiana</i>)	Shrub	Kathi
	<i>Leucaena leucocephala</i> ^{2&3}	Tree	Lasoonia
	<i>Millettia extensa</i> (= <i>M. auriculata</i>)	Liana	Solangen
	<i>Ougeinia oojeinensis</i> (= <i>O. dalbergioides</i>)	Tree	Sannan
	<i>Pleurolobus gangeticus</i> (= <i>Desmodium latifolium</i>)	Shrub	Jajra
	<i>Pueraria tuberosa</i>	Climber	Salorh
	<i>Tateishia concinna</i> (= <i>Desmodium concinnum</i>)	Shrub	-
Leguminosae (Mimosaceae)			
	<i>Albizia chinensis</i> (= <i>Albizia stipulata</i>)	Tree	Ohi
	<i>Albizia lebbeck</i>	Tree	Shrin
	<i>Albizia odoratissima</i>	Tree	Karmaru
	<i>Albizia procera</i>	Tree	Safed Shrin
	<i>Mimosa rubicaulis</i>	Shrub	Dadrar
	<i>Parkinsonia aculeata</i>	Small Tree	-
	<i>Senegalia caesia</i> (= <i>Acacia caesia</i>)	Tree	Relan, Dhangar
	<i>Senegalia catechu</i> (= <i>Acacia catechu</i>)	Tree	Khair
	<i>Senegalia modesta</i> (= <i>Acacia modesta</i>)	Tree	Phulai
	<i>Vachellia farnesiana</i> (= <i>Acacia farnesiana</i>)	Tree	-

	<i>Vachellia leucophloea</i> (=Acacia leucophloea)	Tree	Reru, Karer
	<i>Vachellia nilotica</i> (=Acacia nilotica)	Tree	Kiker
Linaceae			
	<i>Reinwardtia indica</i> (=R. trigyna)	Shrub	Basant
Loranthaceae			
	<i>Dendrophthoe falcata</i>	Epiphyte	Parand
Lythraceae			
	<i>Lagerstroemia indica</i> ²	Tree	-
	<i>Lagerstroemia parviflora</i>	Tree	Kala dhaun
	<i>Punica granatum</i>	Tree	Daran
	<i>Woodfordia fruticosa</i>	Shrub	Dhawin
Malpighiaceae			
	<i>Aspidopterys wallichii</i>	Climber	Dhur Bel
	<i>Hiptage benghalensis</i>	Liana/Tree	Want
Malvaceae			
	<i>Bombax ceiba</i>	Tree	Simal
	<i>Kydia calycina</i>	Tree	Pula
Malvaceae (Sterculiaceae)			
	<i>Helicteres isora</i>	Shrub	Maror Phali, Chamar Daman
	<i>Pterospermum acerifolium</i> ²	Tree	Kanak Champa
	<i>Sterculia villosa</i>	Tree	Udal
Malvaceae (Tiliaceae)			
	<i>Grewia asiatica</i> (=G. hainesiana)	Tree	Dhaman
	<i>Grewia eriocarpa</i> (=G. elastica)	Small Tree	Phalsa, Pheru
	<i>Grewia optiva</i>	Tree	Dhaman Phali
	<i>Grewia serrulata</i>	Small Tree	Dhamrjana
	<i>Grewia tenax</i> (=G. populifolia)	Small Tree	-
Meliaceae			
	<i>Azadirachta indica</i>	Tree	Nim
	<i>Melia azedarach</i> ²	Tree	Bakain, Drek
	<i>Toona ciliata</i> (=Cedrela toona)	Tree	Tun
Menispermaceae			
	<i>Cissampelos pareira</i>	Climber	Katorrhi
	<i>Pachygone laurifolia</i> (=Cocculus laurifolius)	Small Tree	Paror
Moraceae			
	<i>Artocarpus lacucha</i>	Tree	Dheu
	<i>Broussonetia papyrifera</i> ^{2&3}	Tree	Japani Tut

	<i>Ficus auriculata</i> (=F. roxburghii)	Tree	Trembal
	<i>Ficus benghalensis</i>	Tree	Barh
	<i>Ficus hederacea</i> (=F. scandens)	Climber	-
	<i>Ficus hispida</i>	Tree	Dagur, Dadurhi
	<i>Ficus palmata</i>	Tree	Dhoorha, Fagoorha
	<i>Ficus racemosa</i> (=F. glomerata)	Tree	Rumbal
	<i>Ficus religiosa</i>	Tree	Pipal
	<i>Ficus rumphii</i>	Tree	-
	<i>Ficus sarmentosa</i> (=F. foveolata)	Climber	Ruddar
	<i>Ficus semicordata</i> (=F. cunia)	Tree	Kandrol, Khaloa
	<i>Ficus subincisa</i> (=F. clavata)	Shrub	Kharandal
	<i>Ficus virens</i>	Tree	Palakh, Pakhar
	<i>Morus alba</i>	Tree	Tut
	<i>Morus indica</i>	Tree	Sia tut
	<i>Morus laevigata</i>	Tree	Shah tut
	<i>Morus serrata</i>	Tree	Karun
Moringaceae			
	<i>Moringa oleifera</i> (=M. pterygosperma)	Tree	Suhanjna
Myricaceae			
	<i>Myrica esculenta</i> (=M. nagi)	Tree	Kaphal
Myrtaceae			
	<i>Eucalyptus</i> spp. ²	Tree	Safeda
	<i>Syzygium cumini</i> (=Eugenia jambolana)	Tree	Jaman
Oleaceae			
	<i>Jasminum arborescens</i>	Shrub	Dhurmalti
	<i>Jasminum dispersum</i>	Shrub	Sarain
	<i>Jasminum grandiflorum</i>	Shrub	Malti
	<i>Jasminum multiflorum</i> (=J. pubescens)	Shrub	Banmalti
	<i>Ligustrum compactum</i>	Tree	Lalaun
	<i>Nyctanthus arbor-tristis</i>	Tree	Harshingar
	<i>Olea europaea</i> var. <i>cuspidata</i>	Tree	Kao
Phyllanthaceae			
	<i>Antidesma acidum</i> (=A. diandrum)	Shrub	Amblu
	<i>Bischofia javanica</i>	Tree	Marak
	<i>Bridelia retusa</i>	Tree	Gadi Kuri
	<i>Bridelia verrucosa</i>	Tree	-
	<i>Flueggea virosa</i> (=F. macrocarpa)	Shrub	Girthan
	<i>Glochidion velutinum</i>	Tree	Saman
	<i>Phyllanthus emblica</i> (=Emblica officinalis)	Tree	Aonla
Pinaceae			
	<i>Pinus roxburghii</i>	Tree	Chil
Poaceae (Bambusaceae)			

	<i>Bambusa bambos</i> (= <i>B. arundinacea</i>)	Bamboo	Kanta Bans, Bontlu
	<i>Bambusa nutans</i>	Bamboo	Banj, Nal
	<i>Dendrocalamus somdevai</i>	Bamboo	Magar
	<i>Dendrocalamus strictus</i>	Bamboo	Bans
Primulaceae (Myrsinaceae)			
	<i>Ardisia solanacea</i>	Shrub	-
	<i>Embelia tsjerium-cottam</i> (= <i>E. robusta</i>)	Shrub	Baobring
	<i>Maesa indica</i>	Shrub	Burkain
	<i>Myrsine africana</i>	Shrub	Chhota mendru
Proteaceae			
	<i>Grevillea robusta</i> ²	Tree	Silver Oak
Putranjivaceae			
	<i>Putranjiva roxburghii</i> ²	Tree	Putajan
Ranunculaceae			
	<i>Clematis gouriana</i>	Climber	Jhol
	<i>Clematis grata</i>	Climber	Chibru Machrun
Rhamnaceae			
	<i>Helinus lanceolatus</i>	Climber	Murian
	<i>Rhamnus triquetra</i>	Small Tree	Galodan
	<i>Sageretia filiformis</i>	Scandent Shrub	-
	<i>Sageretia thea</i> (= <i>Sageretia theezans</i>)	Shrub	Phax
	<i>Ziziphus mauritiana</i>	Small Tree	Ber
	<i>Ziziphus nummularia</i>	Shrub	Ber
	<i>Ziziphus oenopolia</i>	Small Tree	Kokal Ber
Rosaceae			
	<i>Prinsepia utilis</i>	Shrub	Bhekal
	<i>Prunus cerasoides</i> (= <i>P. puddum</i>)	Tree	Paja
	<i>Prunus cornuta</i>	Tree	Jamu
	<i>Pyrus pashia</i>	Tree	Kainth
	<i>Rosa brunonii</i> (= <i>R. moschata</i>)	Scandent Shrub	Gulabrhi
	<i>Rubus ellipticus</i>	Shrub	Akha
	<i>Rubus paniculatus</i>	Shrub	Akha
Rubiaceae			
	<i>Catunaregum spinosa</i> (= <i>Randia dumetorum</i>)	Shrub	Rara
	<i>Himalrandia tetrasperma</i> (= <i>Randia tetrasperma</i>)	Shrub	Jindru
	<i>Hymenodictyon orixense</i> (= <i>H. excelsum</i>)	Shrub	Barthuan
	<i>Mitragyna parvifolia</i>	Tree	Kalam
	<i>Spermadictyon suaveolens</i> (= <i>Hamiltonia suaveolens</i>)	Shrub	Guilhain
	<i>Wendlandia heynei</i> (= <i>W. exserta</i>)	Tree	Pansara

	<i>Wendlandia puberula</i>	Tree	-
Rutaceae			
	<i>Aegle marmelos</i>	Tree	Bil
	<i>Bergera koenigii</i> (=Murraya koenigii)	Shrub	Gandla
	<i>Citrus medica</i>	Shrub	Galgol
	<i>Citrus limon</i>	Shrub	Sangtara
	<i>Murraya paniculata</i> (=M. exotica)	Shrub	Nargan
	<i>Naringi crenulata</i> (=Limonia crenulata)	Shrub	Barhahi, Bilan
	<i>Skimmia anquetilia</i>	Shrub	Kali, Nehra
	<i>Zanthoxylum armatum</i>	Shrub	Tirmar, Ti mar
Sabiaceae			
	<i>Meliosma simplicifolia</i> subsp. <i>pungens</i> (=M. <i>pungens</i>)	Tree	Larandu
Salicaceae			
	<i>Populus ciliata</i>	Tree	Pialash
	<i>Populus nigra</i>	Tree	-
	<i>Salix pyrina</i>	Tree	-
	<i>Salix tetrasperma</i>	Tree	Badah, Badhia
Salicaceae (Samydaceae)			
	<i>Casearia graveolens</i>	Tree	Chilla
	<i>Casearia tomentosa</i>	Tree	Chilla
Salicaceae (Flacourtiaceae)			
	<i>Flacourtia Indica</i>	Small Tree	Kangu, Kakoa
	<i>Xylosma longifolia</i>	Small Tree	Chirindi
Santalaceae			
	<i>Osyris lanceolata</i> (=O. arborea)	Shrub	Sanson
Sapindaceae			
	<i>Dodonaea viscosa</i>	Shrub	Mendru
	<i>Litchi chinensis</i> ²	Tree	Lichi
	<i>Sapindus mukorossi</i>	Tree	Retha
Sapotaceae			
	<i>Madhuca longifolia</i> (=Bassia latifolia)	Tree	Mawa
Scrophulariaceae (Loganiaceae)			
	<i>Buddleja asiatica</i>	Shrub	Dhur bana
	<i>Buddleja crispa</i>	Shrub	Durpa siaru
Smilacaceae			
	<i>Smilax aspera</i>	Climber	-
Solanaceae			
	<i>Datura stramonium</i> ²	Shrub	Datura

	<i>Solanum erianthum</i> (= <i>S. verbascifolium</i>)	Small Tree	Ulah
	<i>Solanum surattense</i>	Shrub	-
	<i>Withania somnifera</i>	Shrub	Asgandh
Ulmaceae			
	<i>Holoptelea integrifolia</i>	Tree	Rajain
Vitaceae			
	<i>Ampelocissus latifolia</i> (= <i>Vitis latifolia</i>)	Climber	Chamar Bel
	<i>Causonis trifolia</i> (= <i>Vitis trifolia</i>)	Climber	Gidar dakh
	<i>Leea asiatica</i>	Shrub	Basant Jari
	<i>Tetrastigma serrulatum</i>	Liana	-
	<i>Vitis heyneana</i> var. <i>heyneana</i> (= <i>V. lanata</i>)	Liana	-

Notes:

- 1 Family and Botanical Names follow Kew Garden's 'Plant of the World Online (POWO)', as accessed from 01 to 15 April 2025.
- 2 Non-Native/ Exotic
- 2&3 Exotic Weeds

Family	Name*	Habit	Local Name
Acanthaceae	<i>Barleria noctiflora</i> (= <i>Barleria cristata</i>)	Shrub	-
Acanthaceae	<i>Eranthemum pulchellum</i>	Tree	-
Acanthaceae	<i>Justicia adhatoda</i> (= <i>Adhatoda vasica</i>)	Shrub	Basuti
Acanthaceae	<i>Lepidagathis cuspidata</i>	Shrub	-
Acanthaceae	<i>Phlogacanthus thyrsoformis</i>	Shrub	-
Acanthaceae	<i>Strobilanthes auriculata</i>	Shrub	Kapur mingar
Actinidiaceae	<i>Saurauia napaulensis</i>	Tree	Bhakara
Amaranthaceae	<i>Deeringia amaranthoides</i> (= <i>D. celosioides</i>)	Climber	Bhirang
Anacardiceae	<i>Cotinus coggygria</i> (= <i>Rhus continus</i>)	Small Tree	Tung
Anacardiceae	<i>Lannea coromandelica</i>	Tree	Kehmal
Anacardiceae	<i>Mangifera indica</i>	Tree	Am
Anacardiceae	<i>Pistacia chinensis</i> subsp. <i>integerrima</i>	Tree	Kakrain
Anacardiceae	<i>Spondias pinnata</i>	Tree	Ambara
Apocynaceae	<i>Carissa spinarum</i> (= <i>C. opaca</i>)	Shrub	Garna
Apocynaceae	<i>Holarrhena pubescens</i> (= <i>H. antidysenterica</i>)	Small Tree	Keor
Apocynaceae	<i>Ichnocarpus frutescens</i>	Climber	Bakkar Bel
Apocynaceae	<i>Nerium oleander</i> (= <i>N. odorum</i>)	Shrub	Ghanira
Apocynaceae	<i>Tabernaemontana divaricata</i>	Shrub	Tagar
Apocynaceae	<i>Trachelospermum lucidum</i> (= <i>T. fragrans</i>)	Climber	Barora, D udhi

Apocynaceae	<i>Vallis solanacea</i>	Climber	Dudh Khal
Apocynaceae	<i>Wrightia arborea</i> (= <i>W. tomentosa</i>)	Tree	Khalwa
Apocynaceae (Asclpiadaceae)	<i>Calotropis procera</i>	Shrub	Akh
Apocynaceae (Asclpiadaceae)	<i>Cryptolepis buchananii</i>	Climber	Jaman Khumb
Apocynaceae (Asclpiadaceae)	<i>Dregea volubilis</i>	Climber	Murud bel
Apocynaceae (Asclpiadaceae)	<i>Periploca calophylla</i>	Climber	Spari
Arecaceae	<i>Phoenix loureiroi</i> (= <i>P. humilis</i>)	Small Tree	Khajur
Arecaceae	<i>Phoenix syvestris</i>	Small Tree	Khajur
Asparagaceae	<i>Agave americana</i>	Shrub	-
Asparagaceae	<i>Agave wightii</i>	Shrub	-
Asparagaceae	<i>Asparagus adscendens</i>	Shrub	-
Bignoniaceae	<i>Jacaranda mimosifolia</i>	Tree	Jacaranda
Bignoniaceae	<i>Oroxylum indicum</i>	Tree	Tat Palanga
Bignoniaceae	<i>Stereospermum chelonoides</i> (= <i>S. suaveolens</i>)	Tree	Padal
Boraginaceae	<i>Cordia dichotoma</i>	Tree	Lasura
Boraginaceae	<i>Cordia macleodii</i>	Tree	Kluhman
Boraginaceae	<i>Cordia myxa</i>	Tree	Lasura
Boraginaceae	<i>Cordia vestita</i>	Tree	Lasuri
Boraginaceae	<i>Ehretia acuminata</i>	Tree	Puna
Boraginaceae	<i>Ehretia aspera</i> (= <i>E. laevis</i>)	Tree	Chamrod
Cannabaceae	<i>Celtis tetrandra</i>	Tree	Khirk
Cannabaceae	<i>Trema politoria</i>	Shrub	Kasa Kuri
Capparidaceae	<i>Capparis sepiaria</i>	Shrub	Hiun Garna
Capparidaceae	<i>Crateva adansonii</i>	Small Tree	Barna
Celastraceae	<i>Celastrus paniculatus</i>	Climber	Sandhren
Celastraceae	<i>Elaeodendron glaucum</i> (= <i>Cassine glauca</i>)	Tree	Morindu , Mirgu
Celastraceae	<i>Gymnosporia royleana</i>	Shrub	Bhadrun
Combretaceae	<i>Terminalia anogeissiana</i> (= <i>Anogeissus latifolia</i>)	Tree	Dhao
Combretaceae	<i>Terminalia bellirica</i>	Tree	Bahera
Combretaceae	<i>Terminalia chebula</i>	Tree	Harar
Combretaceae	<i>Terminalia elliptica</i> (= <i>T. tomentosa</i>)	Tree	Aisan
Convolvulaceae	<i>Poranopsis paniculata</i> (= <i>Porana paniculata</i>)	Climber	Faindal Jhol
Coriariaceae	<i>Coriaria nepalensis</i>	Shrub	Nachhar
Ebenaceae	<i>Diospyros cordifolia</i>	Tree	Kundu

Ebenaceae	<i>Diospyros montana</i>	Tree	Kala dhao
Ebenaceae	<i>Diospyros exsculpta</i> (=D. tomentosa)	Tree	Kinu
Euphorbiaceae	<i>Euphorbia royleana</i>	Shrub	Thor
Euphorbiaceae	<i>Jatropha curcas</i>	Shrub	Japota
Euphorbiaceae	<i>Leptopus cordifolius</i> (=Arachne cordifolia)	Shrub	-
Euphorbiaceae	<i>Mallotus philippensis</i>	Tree	Kamal
Fagaceae	<i>Quercus glauca</i>	Tree	Banni
Fagaceae	<i>Quercus leucotrichophora</i> (=Q. incana)	Tree	Ban
Juglandaceae	<i>Engelhardia spicata</i>	Tree	Samma
Juglandaceae	<i>Juglans regia</i>	Tree	Khor
Lamiaceae	<i>Clerodendrum phlomidis</i>	Small Tree	Dhakkari
Lamiaceae	<i>Colebrookea oppositifolia</i>	Shrub	Dusen, Dussa
Lamiaceae	<i>Duranta erecta</i>	Shrub	-
Lamiaceae	<i>Gmelina arborea</i>	Tree	Ban
Lamiaceae	<i>Holmskioldia sanguinea</i>	Shrub	-
Lamiaceae	<i>Isodon rugosus</i> (=Plectranthus rugosus)	Shrub	-
Lamiaceae	<i>Lantana camara</i>	Shrub	-
Lamiaceae	<i>Pogostemon benghalensis</i>	Shrub	Kali Basuti
Lamiaceae	<i>Premna barbata</i>	Small Tree	Ginani
Lamiaceae	<i>Premna mollissima</i> (=P. mucronata)	Small Tree	Gin, Bhankar
Lamiaceae	<i>Pseudocaryopteris bicolor</i>	Shrub	Ban Basuti
Lamiaceae	<i>Roylea cinerea</i> (=R. calycina)	Shrub	Karhkha rhe
Lamiaceae	<i>Salvia officianalis</i>	Herb	-
Lamiaceae	<i>Vitex negundo</i>	Shrub	Bana
Lauraceae	<i>Litsea monopetala</i> (=L. polyantha)	Tree	Ghian
Lauraceae	<i>Neolitsea pallens</i>	Tree	Chirindi
Lecythidaceae	<i>Careya arborea</i>	Tree	Handbah era
Leguminosae (Caesalpiniaceae)	<i>Bauhinia purpurea</i>	Tree	Karal
Leguminosae (Caesalpiniaceae)	<i>Bauhinia racemosa</i>	Small Tree	Karali
Leguminosae (Caesalpiniaceae)	<i>Bauhinia variegata</i>	Tree	Kachnar
Leguminosae (Caesalpiniaceae)	<i>Biancaea decapetala</i> (=Caesalpinia sepiaria)	Climbing Shrub	Relan
Leguminosae (Caesalpiniaceae)	<i>Cassia fistula</i>	Tree	Kaniar
Leguminosae (Caesalpiniaceae)	<i>Phanera vahlii</i> (=Bauhinia vahlii)	Liana	Taur

Leguminosae (Caesalpiniaceae)	<i>Piliostigma malabaricum</i> (<i>Bauhinia malabarica</i>)	Tree	Karal
Leguminosae (Caesalpiniaceae)	<i>Senna obtusifolia</i> (= <i>Cassia obtusifolia</i>)	Shrub	-
Leguminosae (Caesalpiniaceae)	<i>Senna occidentalis</i> (= <i>Cassia occidentalis</i>)	Shrub	-
Leguminosae (Caesalpiniaceae)	<i>Senna tora</i> (= <i>Cassia tora</i>)	Shrub	-
Leguminosae (Fabaceae)	<i>Abrus precatorius</i>	Climber	Rattak
Leguminosae (Fabaceae)	<i>Codariocalyx motorius</i> (= <i>Desmodium gyrans</i>)	Shrub	
Leguminosae (Fabaceae)	<i>Dalbergia sissoo</i>	Tree	Tahli
Leguminosae (Fabaceae)	<i>Delonix regia</i>	Tree	Gulmohar
Leguminosae (Fabaceae)	<i>Erythrina abyssinica</i> (= <i>Erythrina suberosa</i>)	Tree	Grelu, Parjaru
Leguminosae (Fabaceae)	<i>Flemingia semialata</i>	Shrub	Ban Chola
Leguminosae (Fabaceae)	<i>Indigofera cassioides</i> (= <i>I. pulchella</i>)	Shrub	Kathi
Leguminosae (Fabaceae)	<i>Indigofera heterantha</i> (= <i>I. gerardiana</i>)	Shrub	Kathi
Leguminosae (Fabaceae)	<i>Leucaena leucocephala</i>	Tree	Lasoonia
Leguminosae (Fabaceae)	<i>Millettia extensa</i> (= <i>M. auriculata</i>)	Liana	Solangen
Leguminosae (Fabaceae)	<i>Ougeinia oojeinensis</i> (= <i>O. dalbergioides</i>)	Tree	Sannan
Leguminosae (Fabaceae)	<i>Pleurolobus gangeticus</i> (= <i>Desmodium latifolium</i>)	Shrub	Jajra
Leguminosae (Fabaceae)	<i>Pueraria tuberosa</i>	Climber	Salorh
Leguminosae (Fabaceae)	<i>Tateishia concinna</i> (= <i>Desmodium concinnum</i>)	Shrub	
Leguminosae (Mimosaceae)	<i>Albizia chinensis</i> (= <i>Albizia stipulata</i>)	Tree	Ohi
Leguminosae (Mimosaceae)	<i>Albizia lebbeck</i>	Tree	Shrin
Leguminosae (Mimosaceae)	<i>Albizia odoratissima</i>	Tree	Karmaru
Leguminosae (Mimosaceae)	<i>Albizia procera</i>	Tree	Safed Shrin
Leguminosae (Mimosaceae)	<i>Mimosa rubicaulis</i>	Shrub	Dadrrar
Leguminosae (Mimosaceae)	<i>Parkinsonia aculeata</i>	Small Tree	-
Leguminosae (Mimosaceae)	<i>Senegalia caesia</i> (= <i>Acacia caesia</i>)	Tree	Relan, Dhangar

Leguminosae (Mimosaceae)	<i>Senegalia catechu</i> (= <i>Acacia catechu</i>)	Tree	Khair
Leguminosae (Mimosaceae)	<i>Senegalia modesta</i> (= <i>Acacia modesta</i>)	Tree	Phulai
Leguminosae (Mimosaceae)	<i>Vachellia farnesiana</i> (= <i>Acacia farnesiana</i>)	Tree	-
Leguminosae (Mimosaceae)	<i>Vachellia leucophloea</i> (= <i>Acacia leucophloea</i>)	Tree	Reru, Karar
Leguminosae (Mimosaceae)	<i>Vachellia nilotica</i> (= <i>Acacia nilotica</i> / <i>A. arabica</i>)	Tree	Kiker
Linaceae	<i>Reinwardtia indica</i> (= <i>R. trigyna</i>)	Shrub	Basant
Loranthaceae	<i>Dendrophthoe falcata</i>	Epiphyte	Parand
Lythraceae	<i>Lagerstroemia indica</i>	Tree	-
Lythraceae	<i>Lagerstroemia parviflora</i>	Tree	Kala dhaun
Lythraceae	<i>Punica granatum</i>	Tree	Daran
Lythraceae	<i>Woodfordia fruticosa</i>	Shrub	Dhawin
Malpighiaceae	<i>Aspidopterys wallichii</i>	Climber	Dhur Bel
Malpighiaceae	<i>Hiptage benghalensis</i>	Liana/Tree	Want
Malvaceae	<i>Bombax ceiba</i>	Tree	Simal
Malvaceae	<i>Helicteres isora</i>	Shrub	Chamar Daman
Malvaceae	<i>Kydia calycina</i>	Tree	Pula
Malvaceae (Sterculiaceae)	<i>Helicteres isora</i>	Small Tree	Maror Phali
Malvaceae (Sterculiaceae)	<i>Pterospermum acerifolium</i>	Tree	Kanak Champa
Malvaceae (Tiliaceae)	<i>Grewia asiatica</i> (= <i>G. hainesiana</i>)	Tree	Dhaman
Malvaceae (Tiliaceae)	<i>Grewia eriocarpa</i> (= <i>G. elastica</i>)	Small Tree	Phalsa, Pheru
Malvaceae (Tiliaceae)	<i>Grewia optiva</i>	Tree	Dhaman Phali
Malvaceae (Tiliaceae)	<i>Grewia serrulata</i>	Small Tree	Dhamria na
Malvaceae (Tiliaceae)	<i>Grewia tenax</i> (= <i>G. populifolia</i>)	Small Tree	-
Meliaceae	<i>Azadirachta indica</i>	Tree	Nim
Meliaceae	<i>Melia azedarach</i>	Tree	Bakain, Drek
Meliaceae	<i>Toona ciliata</i> (= <i>Cedrela toona</i>)	Tree	Tun
Menispermaceae	<i>Cissampelos pareira</i>	Climber	Katorrhi
Menispermaceae	<i>Pachygona laurifolia</i> (= <i>Cocculus laurifolius</i>)	Small Tree	Paror
Moraceae	<i>Artocarpus lacucha</i>	Tree	Dheu
Moraceae	<i>Broussonetia papyrifera</i> **	Tree	Japani Tut
Moraceae	<i>Ficus auriculata</i> (= <i>F. roxburghii</i>)	Tree	Trembal
Moraceae	<i>Ficus benghalensis</i>	Tree	Barh

Moraceae	<i>Ficus hederacea</i> (=F. scandens)	Climber	-
Moraceae	<i>Ficus hispida</i>	Tree	Dagur, Dadurhi
Moraceae	<i>Ficus palmata</i>	Tree	Dhoorha , Fagoorh a
Moraceae	<i>Ficus racemosa</i> (=F. glomerata)	Tree	Rumbal
Moraceae	<i>Ficus religiosa</i>	Tree	Pipal
Moraceae	<i>Ficus rumphii</i>	Tree	-
Moraceae	<i>Ficus sarmentosa</i> (=F. foveolata)	Climber	Ruddar
Moraceae	<i>Ficus semicordata</i> (=F. cunia)	Tree	Kandrol, Khaloa
Moraceae	<i>Ficus subincisa</i> (=F. clavata)	Shrub	Kharand al
Moraceae	<i>Ficus virens</i>	Tree	Palakh, Pakhar
Moraceae	<i>Morus alba</i>	Tree	Tut
Moraceae	<i>Morus indica</i>	Tree	Sia tut
Moraceae	<i>Morus laevigata</i>	Tree	Shah tut
Moraceae	<i>Morus serrata</i>	Tree	Karun
Moringaceae	<i>Moringa oleifera</i> (=M. pterygosperma)	Tree	Suhanjna
Myricaceae	<i>Myrica esculenta</i> (=M. nagi)	Tree	Kaphal
Myrtaceae	<i>Eucalyptus crebra</i>	Tree	Safeda
Myrtaceae	<i>Syzygium cumini</i> (=Eugenia jambolana)	Tree	Jaman
Oleaceae	<i>Jasminum arborescens</i>	Shrub	Dhurmalti
Oleaceae	<i>Jasminum dispersum</i>	Shrub	Sarain
Oleaceae	<i>Jasminum grandiflorum</i>	Shrub	Malti
Oleaceae	<i>Jasminum multiflorum</i> (=J. pubescens)	Shrub	Banmalti
Oleaceae	<i>Ligustrum compactum</i>	Tree	Lalaun
Oleaceae	<i>Nyctanthus arbor tristis</i>	Tree	Harshingar
Oleaceae	<i>Olea europaea</i> var. <i>cuspidata</i>	Tree	Kao
Phyllanthaceae	<i>Antidesma acidum</i> (=A. diandrum)	Shrub	Amblu
Phyllanthaceae	<i>Bischofia javanica</i>	Tree	Marak
Phyllanthaceae	<i>Bridelia retusa</i>	Tree	Gadi Kuri
Phyllanthaceae	<i>Bridelia verrucosa</i>	Tree	-
Phyllanthaceae	<i>Flueggea virosa</i> (=F. macrocarpa)	Shrub	Girthan
Phyllanthaceae	<i>Glochidion velutinum</i>	Tree	Saman
Phyllanthaceae	<i>Phyllanthus emblica</i> (=Emblica officinalis)	Tree	Aonla
Pinaceae	<i>Pinus roxburghii</i>	Tree	Chil
Poaceae (Bambusaceae)	<i>Bambusa bambos</i> (=B. arundinacea)	Bamboo	Kanta Bans, Bontlu

Poaceae (Bambusaceae)	<i>Bambusa nutans</i>	Bamboo	Banj, Nal
Poaceae (Bambusaceae)	<i>Dendrocalamus somdevai</i>	Bamboo	Magar
Poaceae (Bambusaceae)	<i>Dendrocalamus strictus</i>	Bamboo	Bans
Primulaceae (Myrsinaceae)	<i>Ardisia solanacea</i>	Shrub	-
Primulaceae (Myrsinaceae)	<i>Embelia tsjerium-cottam</i> (=E. robusta)	Shrub	Baobring
Primulaceae (Myrsinaceae)	<i>Maesa indica</i>	Shrub	Burkain
Primulaceae (Myrsinaceae)	<i>Myrsine africana</i>	Shrub	Chhota mendru
Proteaceae	<i>Grevillea robusta</i>	Tree	Silver Oak
Putranjivaceae	<i>Putranjiva roxburghii</i>	Tree	Putajan
Ranunculaceae	<i>Clematis gouriana</i>	Climber	Jhol
Ranunculaceae	<i>Clematis grata</i>	Climber	Chibru Machrun
Rhamnaceae	<i>Helinus lanceolatus</i>	Climber	Murian
Rhamnaceae	<i>Rhamnus triquetra</i>	Small Tree	Galodan
Rhamnaceae	<i>Sageretia filiformis</i>	Scandent Shrub	-
Rhamnaceae	<i>Sageretia thea</i> (=Sageretia theezans)	Shrub	Phax
Rhamnaceae	<i>Ziziphus mauritiana</i>	Small Tree	Ber
Rhamnaceae	<i>Ziziphus nummularia</i>	Shrub	Ber
Rhamnaceae	<i>Ziziphus oenopolia</i>	Small Tree	Kokal Ber
Rosaceae	<i>Prinsepia utilis</i>	Shrub	Bhekal
Rosaceae	<i>Prunus cerasoides</i> (=P. puddum)	Tree	Paja
Rosaceae	<i>Prunus cornuta</i>	Tree	Jamu
Rosaceae	<i>Pyrus pashia</i>	Tree	Kainth
Rosaceae	<i>Rosa brunonii</i> (=R. moschata)	Scandent shrub	Gulabrhi
Rosaceae	<i>Rubus ellipticus</i>	Shrub	Akha
Rosaceae	<i>Rubus paniculatus</i>	Shrub	Akha
Rubiaceae	<i>Catunaregum spinosa</i> (=Randia dumetorum)	Shrub	Rara
Rubiaceae	<i>Himalrandia tetrasperma</i> (=Randia tetrasperma)	Shrub	Jindru
Rubiaceae	<i>Hymenodictyon orixense</i> (=H. excelsum)	Shrub	Barthuan
Rubiaceae	<i>Mitragyna parvifolia</i> (=Stephegyne parvifolia)	Tree	Kalam
Rubiaceae	<i>Spermadictyon suaveolens</i> (=Hamiltonia suaveolens)	Shrub	Guilhain
Rubiaceae	<i>Wendlandia heynei</i> (=W. exserta)	Tree	Pansara
Rubiaceae	<i>Wendlandia puberula</i>	Tree	-

Rutaceae	<i>Aegle marmelos</i>	Tree	Bil
Rutaceae	<i>Bergera koenigii</i> (=Murraya koenigii)	Shrub	Gandla
Rutaceae	<i>Citrus medica</i>	Shrub	Galgol
Rutaceae	<i>Citrus limon</i>	Shrub	Sangtara
Rutaceae	<i>Murraya paniculata</i> (=M. exotica)	Shrub	Nargan
Rutaceae	<i>Naringi crenulata</i> (=Limonia crenulata)	Shrub	Barhahi, Bilan
Rutaceae	<i>Skimmia anquetilia</i>	Shrub	Kali, Nehra
Rutaceae	<i>Zanthoxylum armatum</i>	Shrub	Tirmar, T imar
Sabiaceae	<i>Meliosma simplicifolia subsp. pungens</i> (=M. pungens)	Tree	Larandu
Salicaceae	<i>Populus ciliata</i>	Tree	Pialash
Salicaceae	<i>Populus nigra</i>	Tree	-
Salicaceae	<i>Salix pyrina</i>	Tree	-
Salicaceae	<i>Salix tetrasperma</i>	Tree	Badah, Badhia
Salicaceae (=Samydaceae)	<i>Casearia graveolens</i>	Tree	Chilla
Salicaceae (=Samydaceae)	<i>Casearia tomentosa</i>	Tree	Chilla
Salicaceae (Flacourtiaceae)	<i>Flacourtia Indica</i>	Small Tree	Kangu, Kakoa
Salicaceae (Flacourtiaceae)	<i>Xylosma longifolia</i>	Small Tree	Chririndi
Santalaceae	<i>Osyris lanceolata</i> (=O. arborea)	Shrub	Sanson
Sapindaceae	<i>Dodonaea viscosa</i>	Shrub	Mendru
Sapindaceae	<i>Litchi chinensis</i>	Tree	Lichi
Sapindaceae	<i>Sapindus mukorossi</i>	Tree	Retha
Sapotaceae	<i>Madhuca longifolia</i> (=Bassia latifolia)	Tree	Mawa
Scrophulariaceae (Loganiaceae)	<i>Buddleja asiatica</i>	Shrub	Dhurban a
Scrophulariaceae (Loganiaceae)	<i>Buddleja crispa</i>	Shrub	Durpa siaru
Smilacaceae	<i>Smilax aspera</i>	Climber	-
Solanaceae	<i>Datura stramonium</i>	Shrub	Datura
Solanaceae	<i>Solanum erianthum</i> (=Solanum verbascifolium)	Small Tree	Ulah
Solanaceae	<i>Solanum surattense</i>	Shrub	-
Solanaceae	<i>Withania somnifera</i>	Shrub	Asgandh
Ulmaceae	<i>Holoptelea integrifolia</i>	Tree	Rajain
Vitaceae	<i>Ampelocissus latifolia</i> (=Vitis latifolia)	Climber	Chamar Bel
Vitaceae	<i>Causonis trifolia</i> (=Vitis trifolia)	Climber	Gidar dakh
Vitaceae	<i>Leea asiatica</i>	Shrub	Basant Jari

Vitaceae	<i>Tetrastigma serrulatum</i>	Liana	
Vitaceae	<i>Vitis heyneana</i> var. <i>heyneana</i> (= <i>Vitis lanata</i>)	Liana	-

Table 13.2: IVI of Tree Species in Nurpur Forest Division

Working Circle	Species	Relative Density	Relative Frequency	Relative basal Area	IVI=RD+RF+RBA
Bamboo	<i>Acacia catechu</i>	41.86	50.00	28.73	120.59
	<i>Bauhinia verigata</i>	18.60	25.00	1.04	44.64
	<i>cassia fistula</i>	18.60	25.00	1.04	44.64
	<i>Diospyros Cordifolia</i>	37.21	25.00	13.51	75.72
	<i>Ehretia laevis</i>	13.95	50.00	4.24	68.19
	<i>Eugenia Jambolana</i>	9.30	25.00	1.04	35.35
	<i>Ficus roxburghii</i>	27.91	25.00	1.81	54.72
	<i>Grewia elaeticaver</i>	9.30	25.00	0.59	34.89
	<i>Lannea coromandelica</i>	18.60	25.00	19.59	63.20
	<i>Mallotus phillippensis</i>	43.41	75.00	21.14	139.55
	<i>Melia azadirachta</i>	9.30	25.00	0.59	34.89
	<i>Ziizyphus Mauratiana</i>	9.30	25.00	6.69	40.99
Bamboo Total		100.00	100.00	100.00	300.00
Chil	<i>Acacia catechu</i>	25.76	57.35	9.36	92.47
	<i>Acacia modesta</i>	3.01	0.74	0.03	3.78
	<i>Aegle marmelos</i>	4.22	3.68	0.04	7.94
	<i>Albezia lebbeck</i>	4.35	6.62	0.38	11.35
	<i>Albezia odoratissima</i>	6.02	2.94	0.03	9.00
	<i>Anogeissus latifolia</i>	10.88	13.24	1.93	26.05
	<i>Bauhinia belahii</i>	6.02	2.21	0.05	8.28
	<i>Bauhinia verigata</i>	11.55	4.41	0.31	16.27
	<i>Bombax ceiba</i>	3.01	4.41	0.19	7.61
	<i>Butea monosperina</i>	9.04	9.56	0.64	19.23
	<i>Casaeria tomentosa</i>	6.72	9.56	0.40	16.68
	<i>cassia fistula</i>	8.13	36.76	0.67	45.57
	<i>Dalbergii sisoo</i>	12.37	13.97	0.86	27.19
	<i>Diospyros cordifolia</i>	4.66	8.09	0.13	12.88
	<i>Diospyrus tomentosa</i>	16.40	6.62	0.85	23.87
	<i>Emblica officinalis</i>	11.25	11.03	0.86	23.13
	<i>Eucalyptus</i>	9.64	3.68	1.45	14.76
	<i>Eugenia jambolana</i>	7.91	11.76	0.61	20.28

	<i>Ficus bangalensis</i>	3.51	4.41	1.33	9.25
	<i>Ficus glomerata</i>	6.02	2.21	0.10	8.33
	<i>Ficus religiosa</i>	3.01	1.47	0.11	4.59
	<i>Ficus roxburghii</i>	6.30	16.18	0.90	23.38
	<i>flacourtia indiacae</i>	7.03	4.41	0.13	11.57
	<i>Gravia optiva</i>	14.56	13.24	0.97	28.76
	<i>Holoptellea iontegrifolia</i>	3.01	0.74	0.02	3.77
	<i>Krembal</i>	3.01	0.74	0.09	3.84
	<i>Kydia calycina</i>	16.87	3.68	0.26	20.80
	<i>Lannea coromandelica</i>	7.63	11.03	0.69	19.35
	<i>Lannea grandis</i>	23.85	8.82	1.15	33.82
	<i>Leucaenea leucocephala</i>	6.02	5.15	0.10	11.27
	<i>Litsaea umbrosa</i>	9.54	4.41	0.20	14.15
	<i>Madhuca indica</i>	3.01	0.74	0.02	3.77
	<i>Mallotus phillippensis</i>	40.44	69.12	9.65	119.21
	<i>Mangifera indica</i>	13.34	5.15	2.13	20.62
	<i>Morus alba</i>	6.53	4.41	0.23	11.17
	<i>Nerium oleander</i>	15.61	8.09	0.45	24.14
	<i>Oroxylum indicum</i>	3.01	0.74	0.00	3.75
	<i>Other/BL</i>	13.91	40.44	3.96	58.31
	<i>Ougeina dalbergiedes</i>	7.03	2.21	0.14	9.37
	<i>Persicaria maculosa</i>	3.01	0.74	0.03	3.77
	<i>Phoenix dactylifera</i>	3.01	1.47	0.11	4.60
	<i>Pinus roxbnrghir</i>	40.31	61.76	55.91	157.98
	<i>Pistacia integerrima</i>	3.01	1.47	0.00	4.48
	<i>Premna mueronasa</i>	6.02	0.74	0.02	6.78
	<i>Psidium guajava</i>	3.01	0.74	0.01	3.75
	<i>Pyrus pashia</i>	8.13	7.35	0.28	15.77
	<i>Randia dumetorum</i>	3.01	2.21	0.03	5.24
	<i>Sageretia theezans</i>	12.05	0.74	0.02	12.81
	<i>syzgium cumini</i>	6.48	14.71	1.33	22.51
	<i>Terminalia arjuna</i>	4.52	1.47	0.06	6.04
	<i>Terminalia bellarica</i>	4.02	4.41	0.11	8.54
	<i>Terminalia chebula</i>	6.02	0.74	0.02	6.77
	<i>Tonna cilta</i>	11.04	2.21	0.31	13.56
	<i>Wendlandia heynei</i>	13.55	1.47	0.06	15.08
	<i>Wendlendis exerta</i>	10.24	3.68	0.14	14.06
	<i>Xylosma longifolium</i>	7.03	2.21	0.10	9.34
	<i>Ziizyphus mauratiana</i>	4.02	4.41	0.07	8.50
Chil Total		100.00	100.00	100.00	300.00
Coppice	<i>Acacia catechu</i>	22.46	66.15	12.47	101.08
	<i>Acacia modesta</i>	5.51	3.08	0.06	8.65
	<i>Aegle marmelos</i>	3.67	1.54	0.01	5.22

	<i>Albezia lebbeck</i>	6.37	23.08	1.84	31.28
	<i>Albezia odoratissima</i>	5.51	3.08	0.20	8.78
	<i>Anogeissus latifolia</i>	28.15	18.46	8.47	55.09
	<i>Azadirachta indica</i>	11.02	1.54	0.06	12.62
	<i>Bauhinia verigata</i>	4.59	6.15	0.17	10.91
	<i>Bombax ceiba</i>	4.20	10.77	1.35	16.32
	<i>Butea monosperina</i>	12.85	3.08	0.76	16.69
	<i>Casaria tomentosa</i>	5.25	10.77	0.68	16.69
	<i>cassia fistula</i>	9.72	26.15	0.97	36.85
	<i>Dalbergia sisoo</i>	4.72	10.77	0.46	15.95
	<i>Diospyros cordifolia</i>	5.97	12.31	0.71	18.99
	<i>Diospyros tomentosa</i>	18.36	3.08	0.62	22.06
	<i>Emblica officinalis</i>	4.72	10.77	0.44	15.93
	<i>Eucalyptus</i>	65.18	6.15	14.50	85.84
	<i>Eugenia jambolana</i>	7.34	6.15	0.26	13.76
	<i>Ficus glomerata</i>	13.95	7.69	1.10	22.74
	<i>Ficus palmata</i>	3.67	1.54	0.09	5.30
	<i>Ficus religiosa</i>	3.67	4.62	0.85	9.14
	<i>Ficus roxburghii</i>	6.73	18.46	0.55	25.75
	<i>flacourtia indiana</i>	12.24	9.23	0.41	21.89
	<i>Gravia optiva</i>	6.61	7.69	0.36	14.66
	<i>Holarrhena antidysentria</i>	3.67	1.54	0.05	5.26
	<i>holoptellea integerrima</i>	6.61	7.69	1.17	15.48
	<i>Kydia calycina</i>	4.90	4.62	0.26	9.77
	<i>Lannea coromandelica</i>	11.02	23.08	5.52	39.61
	<i>Lannea grandis</i>	15.61	6.15	0.75	22.52
	<i>Leucaena leucocephala</i>	6.30	10.77	0.32	17.39
	<i>Litsea umbrosa</i>	3.67	4.62	0.08	8.37
	<i>Mallotus philippensis</i>	44.00	78.46	16.49	138.95
	<i>Mangifera indica</i>	17.44	6.15	3.00	26.60
	<i>Melia azadirachta</i>	5.51	6.15	0.14	11.81
	<i>mitragyna parvifolia</i>	9.18	3.08	0.10	12.36
	<i>Morus alba</i>	4.59	6.15	0.22	10.97
	<i>Nerium oleander</i>	24.33	12.31	1.08	37.72
	<i>Oroxylum indicum</i>	3.67	1.54	0.04	5.25
	<i>Other/BL</i>	17.33	49.23	8.58	75.14
	<i>Persicaria maculosa</i>	4.90	4.62	0.23	9.74
	<i>Pinus roxburghii</i>	15.15	24.62	10.88	50.65
	<i>Pistacia integerrima</i>	7.34	1.54	0.13	9.02
	<i>Psidium guajava</i>	3.67	1.54	0.02	5.23
	<i>Pyrus pashia</i>	6.61	7.69	0.28	14.58
	<i>Randia dumetorum</i>	9.18	3.08	0.11	12.37
	<i>syzigium cumini</i>	9.18	9.23	0.57	18.98

	<i>Terminalia arjuna</i>	3.67	1.54	0.01	5.22
	<i>Terminalia bellarica</i>	4.90	4.62	0.28	9.79
	<i>Terminalia chebula</i>	14.69	1.54	0.17	16.40
	<i>Tonna cilta</i>	7.34	4.62	0.76	12.72
	<i>Wendlandia heynei</i>	22.03	1.54	0.16	23.73
	<i>Wendlendis exerta</i>	12.59	10.77	0.61	23.97
	<i>Xylosma longifolium</i>	4.59	6.15	0.24	10.98
	<i>Ziizyphus mauratiana</i>	9.79	9.23	0.35	19.37
Coppice Total		100.00	100.00	100.00	300.00
Plantation	<i>Acacia catechu</i>	28.81	71.01	17.10	116.93
	<i>Acacia koa</i>	3.78	0.19	0.00	3.98
	<i>Acacia modesta</i>	6.80	1.95	0.07	8.82
	<i>Acacia nilotica</i>	3.78	0.58	0.01	4.37
	<i>Aegle armelos</i>	11.76	1.75	0.12	13.63
	<i>Albezia family</i>	11.34	0.19	0.06	11.59
	<i>Albezia lebbeck</i>	7.18	13.42	0.92	21.53
	<i>Albezia odoratissima</i>	9.45	3.89	0.19	13.53
	<i>Anogeissus latifolia</i>	18.82	17.51	3.25	39.58
	<i>Azadirachta indica</i>	7.56	0.39	0.01	7.96
	<i>Azadircachta indica</i>	8.51	1.56	0.08	10.14
	<i>Bauhnia belahii</i>	5.04	0.58	0.01	5.63
	<i>Bauhnia verigata</i>	7.40	4.67	0.24	12.31
	<i>Bombax ceiba</i>	4.75	8.37	0.76	13.87
	<i>Breidelia veruucossa</i>	26.46	0.19	0.05	26.70
	<i>Butea monosperina</i>	16.07	3.89	0.54	20.50
	<i>Casaeria tomantosa</i>	6.75	5.45	0.38	12.58
	<i>cassia fistula</i>	11.19	38.72	7.14	57.05
	<i>Celtis australis</i>	3.78	0.39	0.01	4.18
	<i>Citrus sedolimon tanaka</i>	11.34	0.19	0.02	11.55
	<i>cordia myxa</i>	4.73	1.56	0.06	6.34
	<i>Dalbergii sisoo</i>	10.09	18.87	2.02	30.99
	<i>Datasal stramonium</i>	3.78	0.19	0.00	3.98
	<i>Dendro clamus strictus</i>	94.51	0.19	0.14	94.84
	<i>Diosphros melanoxyton</i>	3.78	0.19	0.00	3.98
	<i>Diospyros cordifolia</i>	7.10	11.28	0.51	18.90
	<i>Diospyrus tomentosa</i>	17.13	6.23	1.00	24.36
	<i>Ehretia laevis</i>	9.45	0.39	0.06	9.90
	<i>Emblica officinalis</i>	7.56	14.98	0.63	23.17
	<i>Eucalyptus</i>	45.93	3.89	3.93	53.76
	<i>Eugenia jambolana</i>	8.59	6.42	0.63	15.64
	<i>Ficus bangalensis</i>	9.07	3.89	3.00	15.96
	<i>Ficus glomerata</i>	5.59	4.47	0.64	10.71
	<i>Ficus religiosa</i>	4.32	1.36	0.20	5.88
	<i>Ficus roxburghii</i>	7.96	9.14	0.52	17.63

	<i>flacourtia indiaca</i>	9.29	4.67	0.19	14.15
	<i>Gravia optiva</i>	8.32	12.65	0.83	21.79
	<i>Grewia elaeticaver</i>	5.04	0.58	0.01	5.63
	<i>Holoptellea iontegrifolia</i>	9.20	4.47	0.40	14.07
	<i>Jatropha Curcas</i>	30.24	0.19	0.01	30.44
	<i>Krembal</i>	3.78	0.39	0.04	4.21
	<i>Kydia calycina</i>	12.18	1.75	0.11	14.04
	<i>Lannea coromandelica</i>	11.73	15.18	3.75	30.65
	<i>Lannea grandis</i>	14.05	10.31	1.17	25.53
	<i>Leucaenea Leucocephela</i>	16.15	8.56	0.85	25.56
	<i>Litsaea umbrosa</i>	9.38	4.86	0.22	14.46
	<i>Mallotus philippensis</i>	37.47	77.43	13.68	128.58
	<i>Mangifera indica</i>	6.30	5.84	1.24	13.38
	<i>Melia azadirachta</i>	5.43	3.11	0.10	8.65
	<i>mitragyna parvifolia</i>	6.05	4.86	0.22	11.14
	<i>Morus alba</i>	6.66	4.09	0.47	11.21
	<i>Nerium oleander</i>	15.90	12.26	0.86	29.02
	<i>Oroxylum indicum</i>	9.45	0.39	0.02	9.86
	<i>Other/BL</i>	17.14	37.94	7.31	62.38
	<i>Ougeina dalbergiedes</i>	7.56	2.72	0.22	10.50
	<i>Persicaria maculosa</i>	6.38	3.11	0.11	9.60
	<i>Phoenix dactylifera</i>	3.78	0.19	0.02	4.00
	<i>Pinus roxbnrghii</i>	27.57	27.24	20.31	75.12
	<i>Pistacia integerrima</i>	5.29	1.95	0.10	7.34
	<i>Poplus cylitia</i>	3.78	0.19	0.01	3.98
	<i>Premna mueronasa</i>	3.78	0.39	0.00	4.17
	<i>Prunus persica</i>	3.78	0.19	0.01	3.99
	<i>Pyrus pashia</i>	10.91	8.56	0.51	19.99
	<i>Randia dumetorum</i>	9.18	1.36	0.02	10.56
	<i>Sageretia theezans</i>	5.04	0.58	0.01	5.64
	<i>Stemtheygyne</i>	3.78	0.19	0.03	4.00
	<i>syzgium cumini</i>	5.40	6.81	0.54	12.75
	<i>Tectona grandis</i>	37.14	3.31	0.32	40.77
	<i>Terminalia arjuna</i>	5.67	2.33	0.25	8.25
	<i>Terminalia bellarica</i>	4.16	1.95	0.27	6.37
	<i>Terminalia chebula</i>	3.78	0.78	0.02	4.57
	<i>Tonna cilta</i>	9.33	5.84	0.52	15.68
	<i>Wendlandia heynei</i>	8.40	1.75	0.07	10.23
	<i>Wendlendis exerta</i>	12.83	7.39	0.39	20.62
	<i>Wrightia Tomentosa</i>	3.78	0.19	0.00	3.98
	<i>Xylosma longifolium</i>	6.45	6.61	0.23	13.30
	<i>Ziizyphus mauratiana</i>	5.13	5.45	0.26	10.83

Plt. Total		100.00	100.00	100.00	300.00
Protection	<i>Acacia catechu</i>	25.58	59.46	13.37	98.40
	<i>Acacia lodesta</i>	7.10	4.05	0.10	11.26
	<i>Acacia nilotica</i>	5.68	4.05	0.37	10.10
	<i>Albezia lebbeck</i>	9.95	4.05	0.19	14.20
	<i>Anogeissus latifolia</i>	10.23	6.76	0.72	17.70
	<i>Azadirachta indica</i>	10.66	5.41	0.59	16.66
	<i>Bauhinia verigata</i>	4.26	2.70	0.07	7.03
	<i>Bombax ceiba</i>	6.87	24.32	2.70	33.89
	<i>Butea monosperina</i>	22.95	17.57	4.10	44.62
	<i>Casaeria tomentosa</i>	4.26	9.46	0.23	13.95
	<i>cassia fistula</i>	12.23	31.08	1.90	45.21
	<i>cordia vestita</i>	4.26	1.35	0.04	5.66
	<i>Dalbergia sisoo</i>	8.05	12.16	1.41	21.63
	<i>Diospyros cordifolia</i>	7.99	10.81	0.70	19.50
	<i>Diospyrus tomentosa</i>	19.42	12.16	2.31	33.89
	<i>Emblica officinalis</i>	8.53	4.05	0.28	12.86
	<i>Eucalyptus</i>	27.71	2.70	3.36	33.77
	<i>Ficus bangalensis</i>	4.26	2.70	1.12	8.08
	<i>Ficus blomerata</i>	8.53	6.76	1.81	17.09
	<i>Ficus religiosa</i>	4.26	2.70	0.18	7.15
	<i>Ficus roxburghii</i>	12.18	9.46	1.08	22.71
	<i>flacourtia indica</i>	4.26	2.70	0.11	7.08
	<i>Grewia optiva</i>	8.53	20.27	0.91	29.70
	<i>Holoptellea iontegrifolia</i>	11.84	12.16	2.12	26.13
	<i>Lannea coromandelica</i>	20.37	12.16	4.57	37.10
	<i>Lannea grandis</i>	13.95	14.86	2.34	31.15
	<i>Leucaenea leucocephella</i>	34.10	17.57	4.76	56.42
	<i>Mallotus phillippensis</i>	25.21	62.16	9.08	96.44
	<i>Mangifera indica</i>	10.66	2.70	0.43	13.78
	<i>Melia azadirachta</i>	10.66	2.70	0.14	13.50
	<i>mitragyna parvifolia</i>	4.26	4.05	0.20	8.52
	<i>Morus alba</i>	4.26	1.35	0.04	5.66
	<i>Nerium oleander</i>	10.96	18.92	1.00	30.88
	<i>Other/BL</i>	41.31	56.76	23.91	121.98
	<i>Ougeina dalbergiedes</i>	12.79	6.76	1.13	20.67
	<i>Persicaria maculosa</i>	4.26	1.35	0.10	5.71
	<i>Phoenix dactylifera</i>	25.58	2.70	1.19	29.47
	<i>Pinus roxbnrghir</i>	28.93	18.92	9.88	57.73
	<i>Pyrus pashia</i>	9.95	4.05	0.24	14.25
	<i>syzgium cumini</i>	4.26	1.35	0.01	5.63
	<i>Terminalia arjuna</i>	17.05	1.35	0.34	18.74
	<i>Tonna cilta</i>	8.53	1.35	0.10	9.98

	<i>Wendlandia heynei</i>	11.37	4.05	0.12	15.54
	<i>Wendlendis exerta</i>	12.79	6.76	0.40	19.95
	<i>Ziizyphus Mauratiana</i>	5.68	4.05	0.26	9.99
Protection Total		100.00	100.00	100.00	300.00

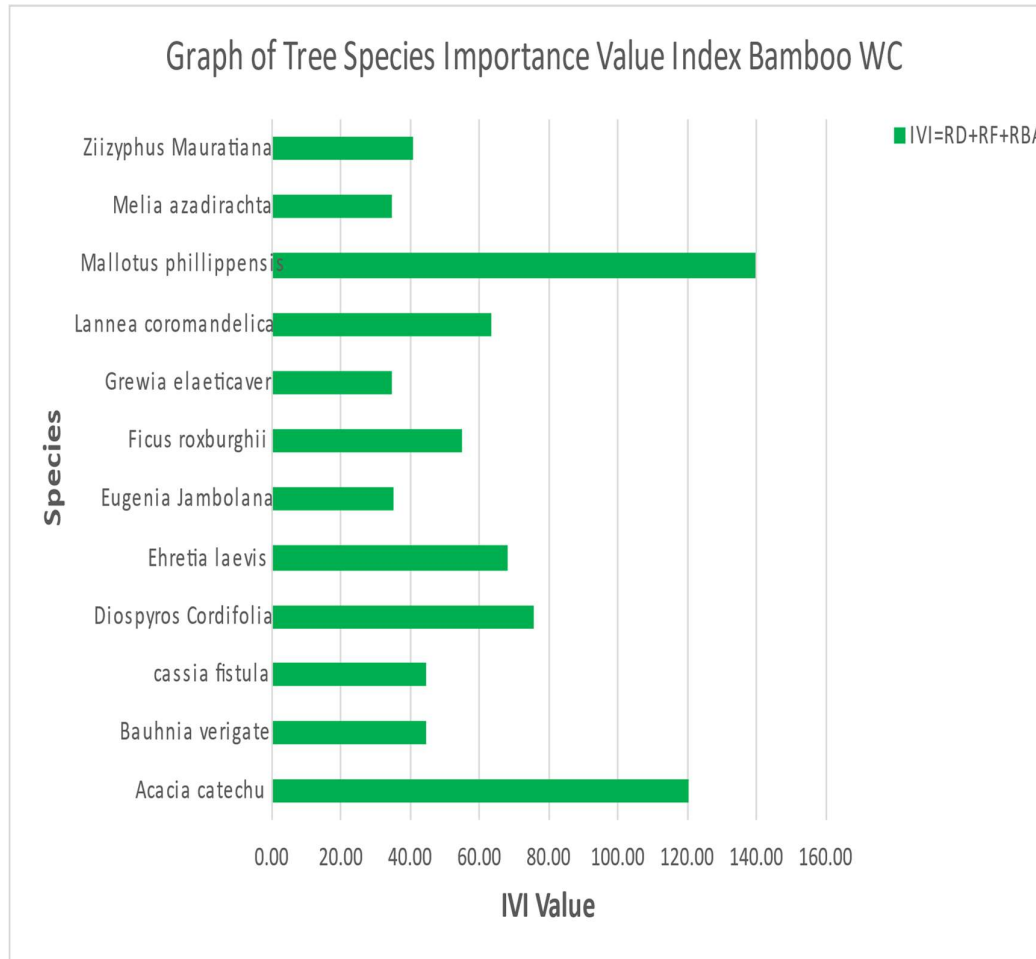


Chart No. 13.1. Graph of Tree Species Important Value Index Bamboo W.C.

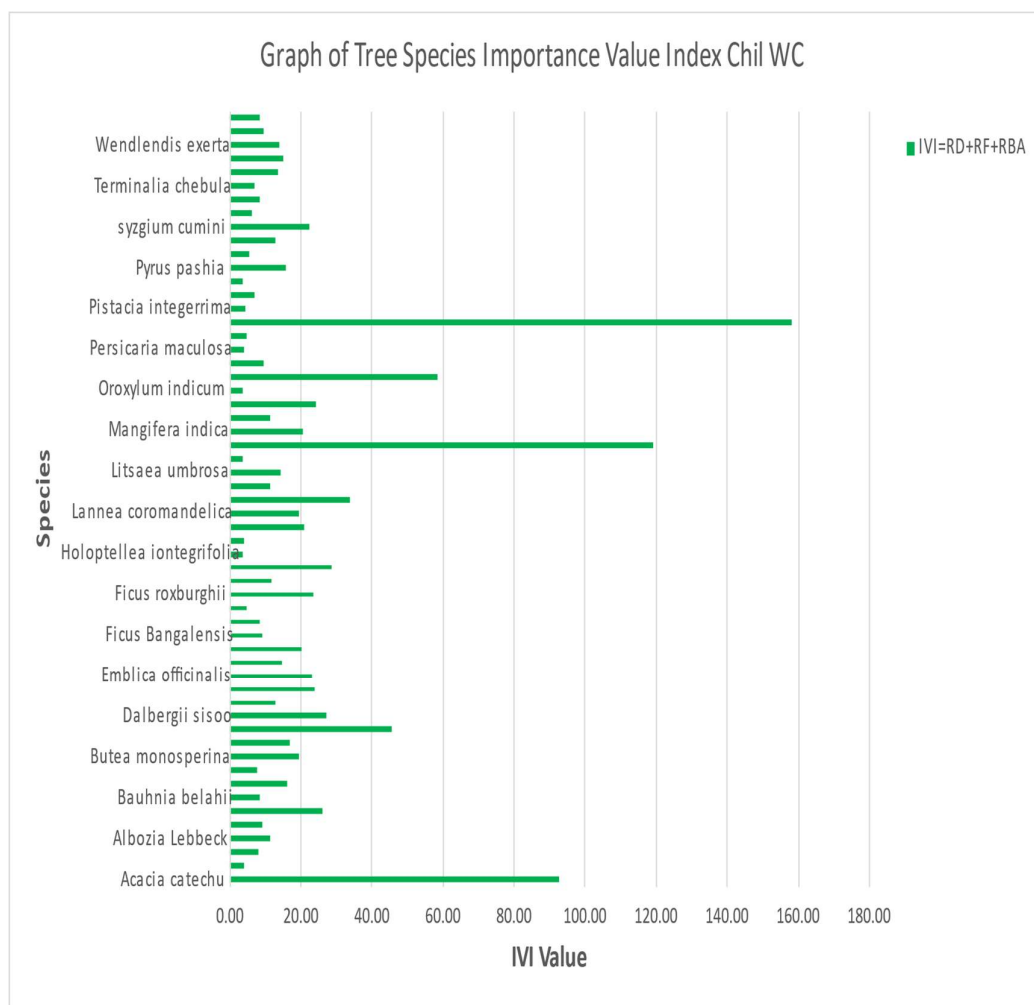


Chart No. 13.2. Graph of Tree Species Important Value Index Chil W.C.

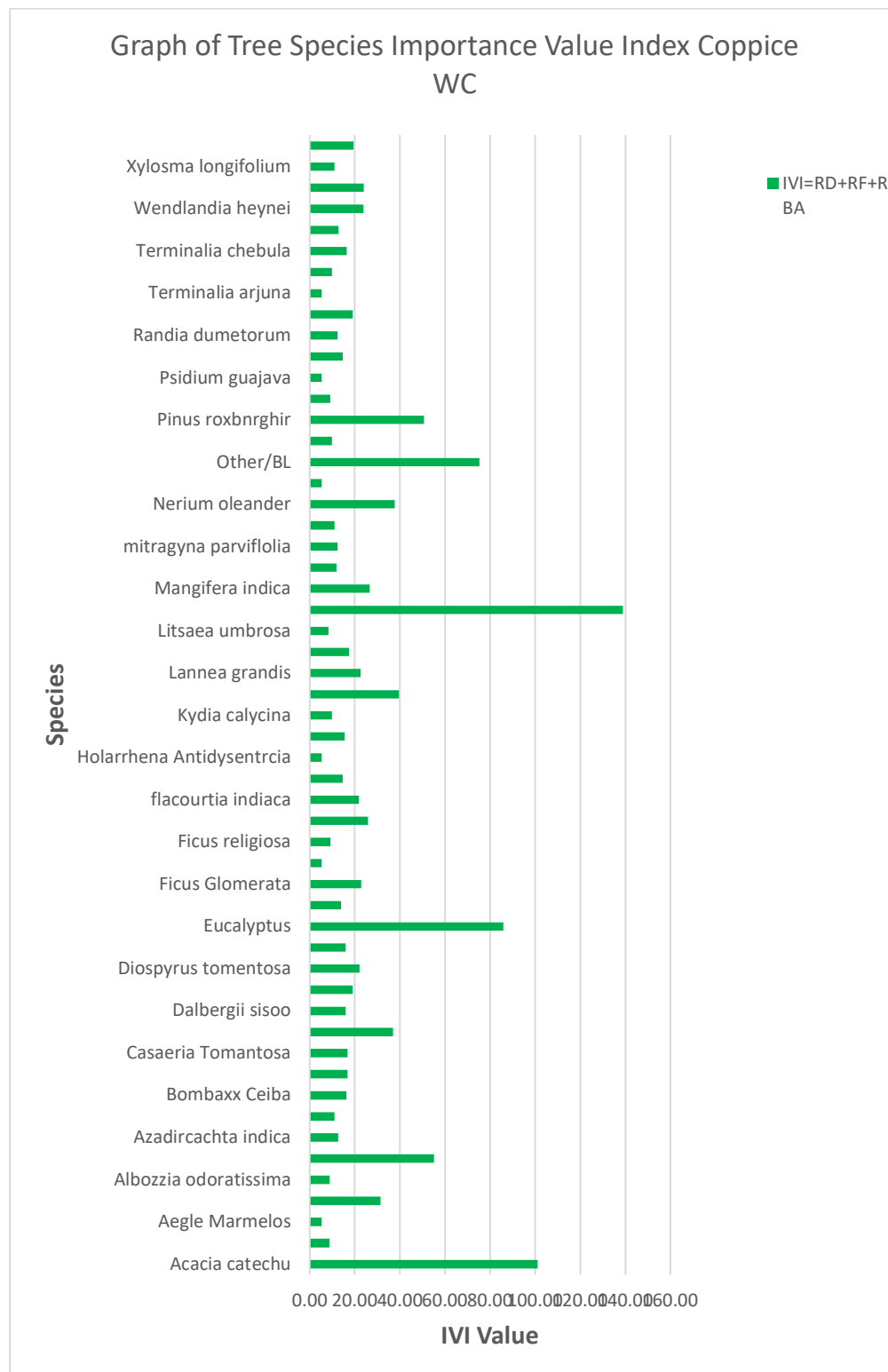


Chart No. 13.3. Graph of Tree Species Important Value Index Coppice W.C.

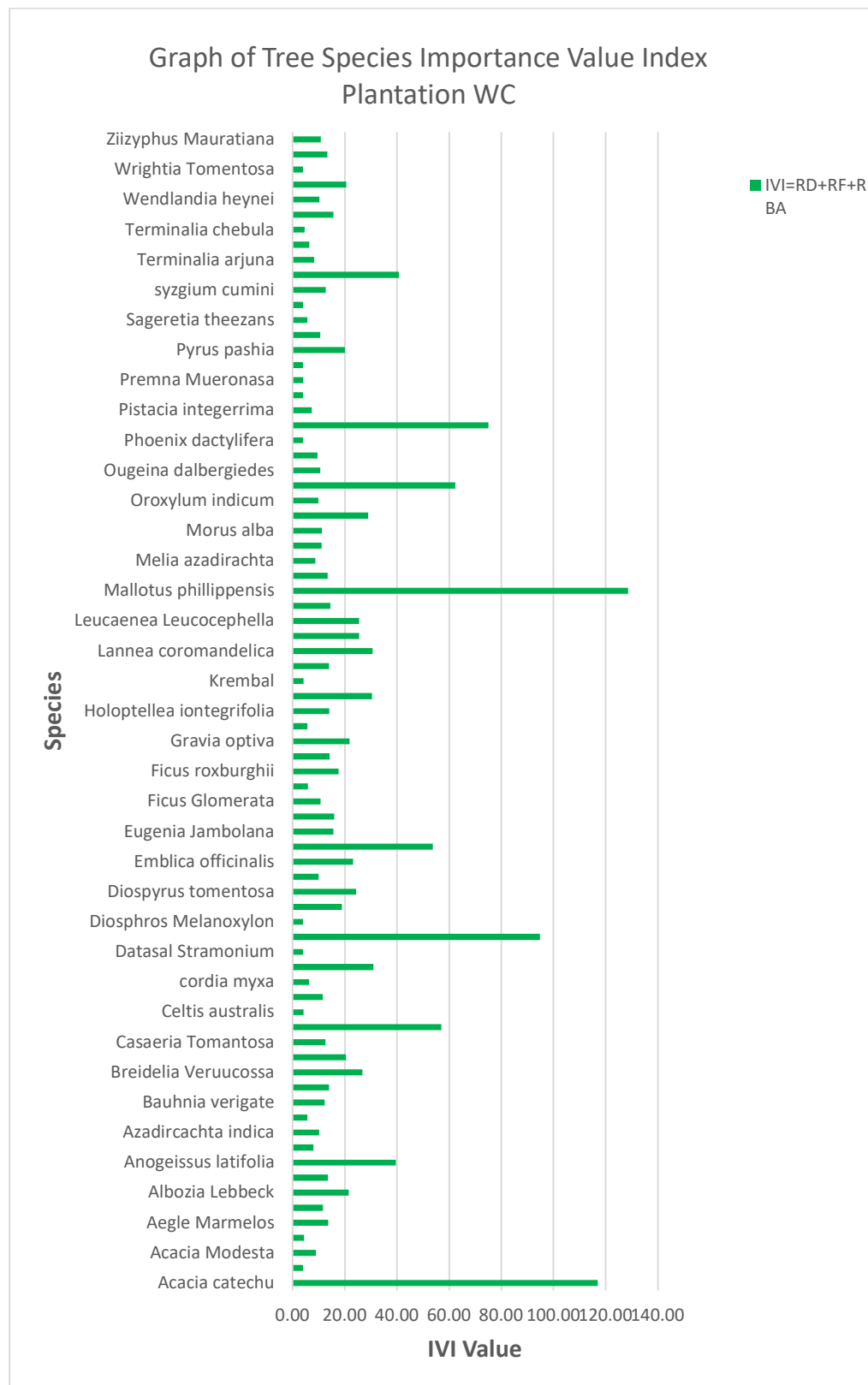


Chart No. 13.4. Graph of Tree Species Important Value Index Plantation W.C.

Table No. 13.2. Ecological parameters of Shrub species

Importance Value Index Shrubs				
Species	Relative Density	Relative Frequency	Relative Cover	IVI= RD+RF+RCo
<i>Calotropis gigantea</i>	0.05	0.25	18.98	19.27
<i>Croton bonplandianu</i>	0.09	0.25	37.96	38.30
<i>Justicia adhatoda</i>	4.68	13.05	35.81	53.54
<i>Murraya koenigii</i>	47.41	84.98	55.79	188.17
<i>Carrissa opaca</i>	15.33	43.60	35.17	94.10
<i>Lawsonia inarmis</i>	1.31	2.96	44.29	48.55
<i>Ageratum conyzoides</i>	0.65	0.99	66.43	68.07
<i>Lantana camara</i>	30.20	63.79	47.34	141.34
<i>Achyranthes aspera</i>	0.28	0.74	37.96	38.98
	100.00	100.00	100.00	300.00

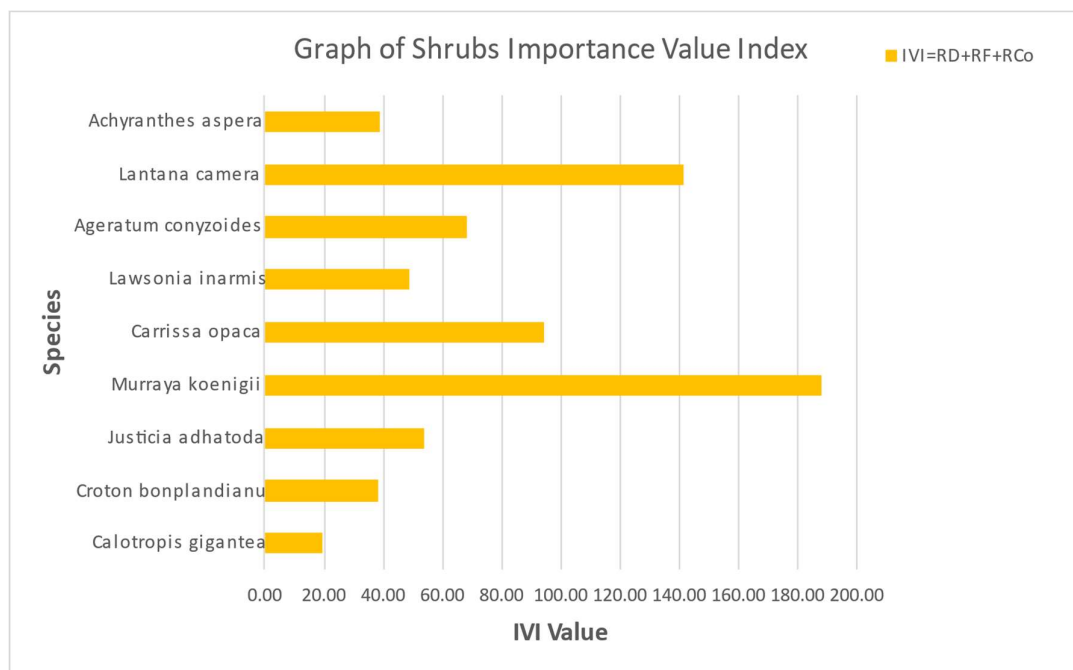


Chart No. 13.5. Graph of Shrubs Importance Value Index

13.4 Proposed Management

The following guidelines are proposed for follow-up:

1. Tree species whose IVI is less than 5.00 will be promoted by planting and preservation.
2. Fruit trees such as Mango, Amla, Bel, *Diospyros*, Jamun, Bahera, Bohr and Pipal will not be felled during any operation.
3. Areas infested with dense lantana and *Parthenium* be replaced by useful economical species.
4. Fire protection will be done to save the biodiversity.
5. Compartments or parts of compartments which have population of fruit trees, or trees of lesser known species shall be preserved against any exploitation activity.
6. During plantation or felling operations, care should be taken not to sacrifice the rarely found species or their regeneration.

13.5 Treatment Proposed: -

Natural regeneration or assisted natural regeneration shall be promoted. The regenerative capacity of the species shall be studied and on the basis of their capacity to regenerate, exploitation of medicinal herbs and plants shall be followed.

A total ecosystem conservation concept needs to be adopted for conservation of these forests. An effective naturalization plan needs to be devised based on principles for maintaining natural diversity. To enrich the low diversity areas, efforts should be made to restore native complementing natural species rather than planting as many different kinds of trees as possible without looking into the natural regeneration and the needs of the natural fauna of the site. Further, introduction of exotic species in the area 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 women in forest and wildlife protection through awareness, participatory planning and equitable sharing of responsibility and benefits needs to be promoted. Excluding local population can often lead to illegal activities which can cause further degradation of the environment. The efforts therefore be to impose minimum restrictions on local populations and allow traditional practices to continue to ensure their long-term success. For this purpose, capacity building programmes may be taken up. Further efforts should be made to preserve as many patches of natural communities as possible. This will help to sustain regional diversity.

Wherever possible, fragmentation of large patches of natural vegetation be avoided. Even a narrow access road through a forest can act as a barrier to movement of small organisms and effect their habitats.

Ecotones between natural communities support a variety of species from both communities. Hence, these should be allowed to develop naturally between adjacent communities.

Regular monitoring and updation of species data through R & D activities needs to be taken up taking the present data as the base. Ethno biological information also needs to be generated.

13.6 Permanent Preservation Plot

Due to increasing biotic pressure and imminent climatic change, the natural regeneration of most of the tree species has not been coming. To preserve the natural floristics of the forest, it is proposed to establish a permanent preservation plot in each working circle. The area preserved will be demarcated on the ground with erection of suitable stone structures. The various coordinates of longitude, latitude, altitude will be recorded along with a map. This preservation plot shall not be less than 3 ha area and will be studied for ecological succession and biodiversity of the area. No grazing shall be allowed in this area nor 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 Conservator of Research Circle shall inspect the area annually along with the Divisional Forest Officer of Nurpur Forest Division to record their findings. A copy of the findings should be sent to the Central Silviculture's, FRI Dehradun for further investigations.

CHAPTER-XIV

THE RESIN TAPPING

14.1 GENERAL: -

Resin is a metabolic exudes being tapped from *Pinus roxburghii* commonly known as Chil. In fact, it is the most important source of revenue to the Government and also the local people owning Chil trees. The large numbers of local people find employment in its extraction and carriage. Resin tapping up to 1975 used to be done departmentally. This operation is now being done by H.P. State Forest Corporation Ltd. Resin extracted from this Division is supplied to Corporation Factories at Bilaspur and Nahan.

14.2 TECHNIQUE: -

Prior to 1984, the resin tapping was done by conventional French cup and lip method. This method involved deep and rather uncontrolled depth of blaze, coupled with frequent fires and high velocity wind was responsible for heavy salvage removals. Improved “German Rill Method” of resin tapping and tapping since 1988 is being done only through this method gradually replaced the conventional. This method has been enunciated in field guide to modern methods of resin tapping by Sh. V.P. Verma, I.F.S. published by Forest Research Institute and Colleges, Dehradun. A detailed guideline manual about this method has also been published by Directorate (North) of the H.P. State Forest Corporation Ltd. Recently “Bore Hole Method” of resin tapping has been introduced at the trial stage in H.P. Its quantitative and qualitative results in H.P. are yet to be analyzed.

14.3 TAPPABLE DIAMETER: -

Tappable diameter for rill method is fixed as 35 cm. This however is on the lower side resulting into large scale drying of chil trees. It is recommended that tappable diameter should be increased to 40 cm. Trees to be tapped are enumerated, punch

marked and grouped in to sections of 1000 blazes each after every five years. This work of enumeration is to be completed during winter.

14.4 CROP SETTING: -

Crop setting must be started by 15th of Feb. and completed 15th March. It is important that the crop setting is completed in time so that tapping season is not delayed. The tree to be tapped should be cleared of inflammable material over a radius of 1m.

14.5 BARK SHAVING: -

With the help of Bark Shaver the loose bark over a surface area of 45 cm. in length and 30 cm. in width is removed leaving a space of about 15cm. from the ground level. The bark left should not be more than 2 mm. in thickness to facilitate freshening.

14.6 MARKING OF BLAZE AND GROOVE: -

Blaze frame is put in vertical position on the debarked area and outer boundaries of the blaze marked with black Japan so that lowest point is 15 cm. from the ground level. Position of blaze and central groove are marked with the help of wooden board and marking gauge.

14.7 CENTRAL GROOVE CUTTING: -

Central groove cut by drawing the groove cutter from above downwards. Since in the first year the blaze is just 15 cm. from the ground level the groove cutter is moved upwards.

14.8 FIXING THE LIP: -

The lip is fixed with the help of two horseshoe nails so that it makes an angle of 45 degrees with the tree. A 5-cm. long wire nail is driven in to the tree about 2 cm. below the mid-point of the lip hanging the collection pot on it. The nail is driven at an angle so that the pot hangs snugly against the tree. It is suggested that instead of

wire nails, bamboo nails should be used for hanging the pot with the tree. During fire in the forest these wooden nails will get burnt and the pot will be dislodged quickly from the tree. The iron nails hold the pot fast to the tree and the burning resin in the pot act like a blowlamp.

14.9 FRESHNING: -

First rill should be drawn by moving the freshening knife from the lowest point of the central groove upwards along the blaze boundary in a way that the rill makes an angle of 40 degrees with the central groove. The process is repeated on the other side of the central groove. For the second and subsequent freshening which are repeated approximately at weekly intervals, the guide of the freshening knife should move touching the upper side of previous rill. The rills should be parallel to each other with an uncut bark (inter rill bark) of 5 mm. in between two successive rills. The width of the rill is 6-7 mm. and depth 2 mm. (excluding 2 mm. depth of unshaved bark). The length of the rill should neither not fall short of the blaze limit. One freshening is given almost every week and the blaze thus attains a height (length) of 36-38 cm. in one season. The tapping season is from 15th March to 15th November i.e. 8 months. The freshening is given 4 times in a month and thus the total number of rills is to be limited to 32 in a season. The width of the blaze is 20cm i.e. 10 cm on either side of the central groove.

14.10 APPLICATION OF STIMULANT: -

The stimulant is nothing but a 20% solution of the mixture of sulphuric and nitric acids mixed in equal proportion w/w. It should be sprayed on the freshly cut rills by squeezing the plastic bottle and moving its nozzle in a steady motion along the rill. For obtaining good spray the plastic bottle should be held at 45-degree angle to the tree and its nozzle 3-5 cm away from it. Precaution should be taken to remove the pot till the extra acid has run down the lip. The tendency to apply acid more frequently and in higher concentration to obtain higher yield should be curbed.

14.11 COLLECTION OF RESIN AND CLEANING OF GROOVE: -

Resin is collected into collection Can (Balti) by removing pot from the tree. The resin adhering to the pot is removed with the help of scraper. Central groove is also cleaned after each collection with groove cleaner to avoid accumulation of resin in it. For improving labour output, collection of resin from the pots should be done with alternate freshening in March, April and August to October. However, from May to July, collection may be done with each freshening.

14.12 REMOVAL OF LIPS AND POTS: -

At the end of the tapping season, the nails should be pulled out and lips removed.

14.13 INSTALLATION IN SUBSEQUENT YEARS: -

In 2ND year, the position of the blaze is marked above the top of the first year's blaze and other operations of the first year remain the same and repeated. After tapping for two years the blaze reaches a height at which it is not possible to pull the freshening knife upwards. Hence during 3rd year freshening is given by pushing the freshening knife upwards from the central groove towards the outer edge of the blaze. Like this blaze is extended upwards for four years. During 5th year a new blaze is made at the bottom leaving 7.5cm. wide space from the outer edge of the first year's blaze.

14.14 USE OF GUIDE: -

The use of guide with the freshening knife by the tapper is compulsory.

14.15 TAPPING SEASON: -

Tapping season extends from 15th March to 15th November. Freshening is not made from 16th November to 30th November, and during this period resin is scraped (raghod).

14.16 RESIN DEPOTS: -

The resin collected from the forests is brought to the resin depot at roadsides closed to the tapped areas. A number of sections are attached to each depot under the charge

of a Resin Watcher who maintains the accounts of the depot and supervises the works of labour in the forests.

14.17 Resin blazes: -

The detail of the blazes tapped and Handed over to Forest corporation and royalty details are tabulated in Table: 14.1. below.

Table: 14.1.

Sr No	Year	No. of resin blazes handed over to HPSFDC	Quantity extracted in Qtl	Royalty received (Revenue in Rs)
1	2012	35,393	---	12,44,545
2	2013	24,377	---	14,32,880
3	2014	27,050	---	20,36,865
4	2015	28,451	---	17,29,920
5	2016	33,920	1480.08	22,04,800
6	2017	38,388	1601.09	19,19,400
7	2018	38,409	1338.55	15,36,360
8	2019	38,324	1389.95	14,20,062
9	2020	35,729	1570.24	15,00,618
10	2021	36,341	1520.20	11,92,992
11	2022	40,206	1420.45	15,45,930

- **The resin yield in last plan period has been fixed at 3.5 kg per blaze.**
- **In last 7 years the average yield stood at 3.94 kg per blaze, which is on higher side**
- **The yield has not been uniform due to fire incidences leading to burning of resins in cups and again resetting of crop.**

Year	Total Resin Obtained	Yield Per Blaze
2016	1480.1	4.363443396
2017	1601.1	4.170808586
2018	1338.6	3.484990497
2019	1390	3.626839578
2020	1570.2	4.394861317
2021	1520.2	4.183154013
2022	1420.5	3.532930408

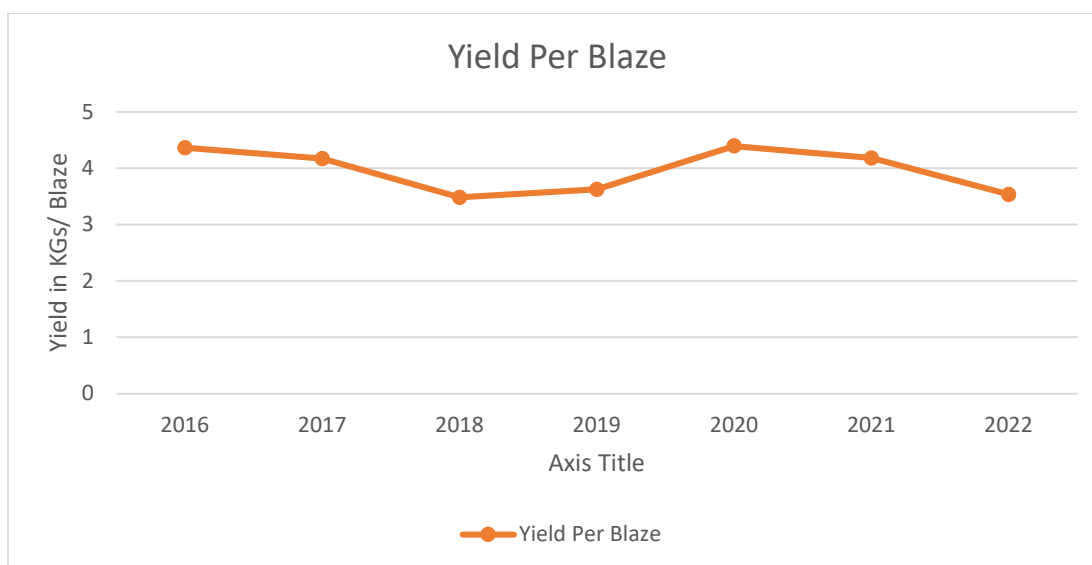


Chart No. 14.1. Yield Per Blaze

14.18 AREAS AVAILABLE FOR RESIN TAPPING: -

All the felled P.B. I and P.B.IV areas of Chil Working Circle are kept out of the purview of resin tapping. Only P.B.II and P.B.III areas of Chil working circle are prescribed for resin tapping. The Chil trees found in other working circles are banned for resin tapping on account of poor growth, open density and limited extent. The Divisional Forest Officer may stop resin tapping in any forest where it is felt that the resin extraction work is likely

to interfere with the growth of the trees. Only Rill Method shall be used to carry out resin tapping.

14.19 SUSPENDING RESIN TAPPING OPERATIONS: -

In case, drying up of trees due to resin tapping is observed in some forests it should be closed immediately for tapping for a minimum period of three years. Re-tapping in these forests should be taken up only after the reasons for drying up of the trees are analyzed and effective steps taken to prevent recurrence.

14.20 FIRE PROTECTION: -

All needles and other refuse within 1 m radius of the trees tapped for resin should be removed and other instructions laid down in the H.P. Forest Manual Vol. IV and other latest instructions must be observed carefully. It is better if bushes within 2 m of these trees are cut. Areas being tapped for resin are very susceptible to fire and need intensive fire protection. Some sort of firefighting equipment should be provided in all resin depots to meet an emergency. All staff put on resin work should be taught the use of this equipment.

14.21 Yield calculations:

During this plan period the yield calculation will be revisited by tapping a section in each range.

CHAPTER-XV

Ecotourism

15.1. Background

MoEFCC vide its letter no. F.No. 1-57/2014 WL (part-8) dated 29.10.2021 has issued “Guidelines for sustainable Ecotourism in forest and wildlife areas-2021”. In these guidelines it is mentioned that *“Ecotourism shall be promoted on the basis of science-based planning. The plan shall form part of the duly approved Working Plan or Management Plan or Conservation Plan of the forest of wildlife area as the case may be, and shall include the carrying capacity analysis-based description of the eco-tourism site, time, duration, route, mode of travel and number of persons for visitations, and any support infrastructure needed”*

MoEFCC vide its letter no. File No.5-2/2017-FC-Part (1) dated 25.10.2021 has also clarified and amended the Para 11.10 of the Handbook of FCA, which now shall read as

"Development/construction of facilities which are not of permanent nature, in forest areas for the purpose of ecotourism by Government authorities shall not be considered as non-forestry activity for the purpose of Van (Samvardhan Evam Sanrakshan) Adhiniyam, 1980."

Recently The Forest (Conservation) Amendment Act, 2023 has provided vide amendment to Section 2 of the principal act that breaking or clearing of any forestland or portion thereof for eco-tourism facilities included in the Forest Working Plan or Wildlife Management Plan or Tiger Conservation Plan or Working Scheme of that area will not be a non-forestry activity and will not attract provisions of FCA, 1980.

Further Pr.CCF (HoFF), HPFD vide his letter no. Ecotourism/Ecotourism Policy/130/483-528 dated 25.08.2023 has also directed in reference to the above-mentioned guidelines to prepare a chapter on Ecotourism in respect of each division which shall be a part of Working plan or Management Plan or Conservation Plan of the forest or wildlife area.

Therefore, this new chapter on Ecotourism has been prepared keeping in view the guidelines issued by MoEFCC and Re-revised Ecotourism Policy of Himachal Pradesh, 2017 notified vide Govt. of HP Notification No. FFE-B-C915)-3/2005-III dated 25.02.2017.

15.2. ECOTOURISM CONCEPT IN HIMACHAL PRADESH

Himachal Pradesh is a small Himalayan State having a population of 67 Lakhs (as per Census 2011) with 90% of its population living in rural areas. The State's agrarian economy is sustained largely by the Himalayan ecosystem and its natural

resources, with forests, which is two-thirds of the geographical area of the State, being crucial for the State's environmental, ecological and economic wellbeing. Globally, ecotourism has been recognized as an influential tool for conservation of forests, biodiversity/ wildlife and scenic landscapes. It does so by creating sustainable alternative livelihoods for forest-dependent communities and by generating conservation awareness among the masses and decision-makers. In order to strengthen community control and management of the forests, it is important to generate a sustainable flow of non-extractive financial benefits of forests for the communities, to ensure that the communities take interest in the conservation of forests and wildlife. Ecotourism is perhaps the only means of achieving this end. So, the Ecotourism development aims to devise ways to build a resilient local community and developing their skills and competencies to deal with resource depletion, changing climate and related environment challenges. Site communities need to be made aware of the pressures on their available resources, the impact of their decisions on the environment as well as choices available to them for following a sustainable development pathway.

The Revised Policy on Development of Eco-Tourism in Himachal Pradesh, 2017 aims at bringing the wilderness and virgin ecosystems of Himachal Pradesh closer to visitors and at the same time ensure adequate safeguards and systems for the protection and conservation of these natural resources. By involving local communities, the policy would help in increased livelihood opportunities as well as their involvement in awareness building, protection and conservation.

The Government of Himachal Pradesh in the Forest Department is identifying sites in the State which have the potential to be developed as ecotourist sites in accordance with the ecotourism principles as set out in the H.P. Eco-Tourism Policy, 2017 which provide that such ecotourist projects shall be environmentally sustainable and shall promote environmental conservation, knowledge and understanding of nature as well as employment generation for local

communities and raising public awareness about environmental conservation and sustainable use of environmental resources. The Government desires to promote ecotourism in the State of Himachal Pradesh by adoption of low-impact practices that result in water security, food security and livelihood security for the local communities besides encouraging sustainable use of indigenous materials through financially viable value chains thereby helping such local communities.

Himachal Pradesh is known for its picturesque landscapes and popular hill stations. Himachal Pradesh gives an opportunity to one and all to enjoy nature in its pristine state and is one of the top tourist destinations in the country, both for domestic and international visitors. Ecotourism is a new era of nature enjoyment and learning keeping in view the 4Cs of Ecotourism i.e. Conservation, Community, Commerce and Culture. Ecotourism is responsible travel to natural areas for conserving the environment, sustaining the well-being of the local people and involving interpretation and education especially to the visitors. The ecotourism activities in Himachal Pradesh are based on the involvement of local communities to help them in providing livelihood opportunities as well as their involvement in environment awareness and conservation.

The ecotourism activities are in consonance with the "Guidelines for sustainable Ecotourism in forest and Wildlife areas-2021" issued by the ministry of Environment, Forest and Climate Change and as per the instructions provided in the Forest (conservation) Amendment Act, 2023.

The vision, mission, goal and objectives of promoting ecotourism activities in the State are:

15.3 VISION

The vision is to preserve and protect the natural (both flora and fauna) and cultural heritage of Himachal Pradesh, provide opportunities to enhance livelihood of local people, generate resources for sustainable development and promote greater understanding and appreciation for this heritage through authentic Eco-Tourism initiatives.

15.4. MISSION

The mission is to make Himachal Pradesh a leading Eco-tourism destination, with attracting at least 10% of overall tourists visiting the State by the year 2030 at ecotourism destinations.

15.5. GOAL

The goal is to promote better understanding of nature and wildlife conservation while generating income and opportunities for the local communities.

15.6. OBJECTIVES

The following are the broad objectives of the Eco-tourism:

- i. Adopting low impact nature tourism which ensures ecological integrity.
- ii. Promoting biodiversity richness and heritage values of State's wilderness.
- iii. Engaging local communities and developing mechanisms with a view of enriching the local economy and promoting sustainable use of indigenous materials Eco-Tourism related providing interpretation & education to the visitors.
- iv. Establishing partnerships with all stakeholders for developing and promoting nature tourism.

15.7. GUIDING PRINCIPLES FOR ECOTOURISM

The guiding principles are laid down by Ministry of Environment, Forest and Climate Change for the development of Ecotourism which are as under:

- a) Eco-tourism planning
- b) Eco-tourism zoning
- c) Resource mobilization and community participation
- d) Eco-tourism site development
- e) Inter-sectoral synergy

- f) Promoting Eco-tourism entrepreneurship.

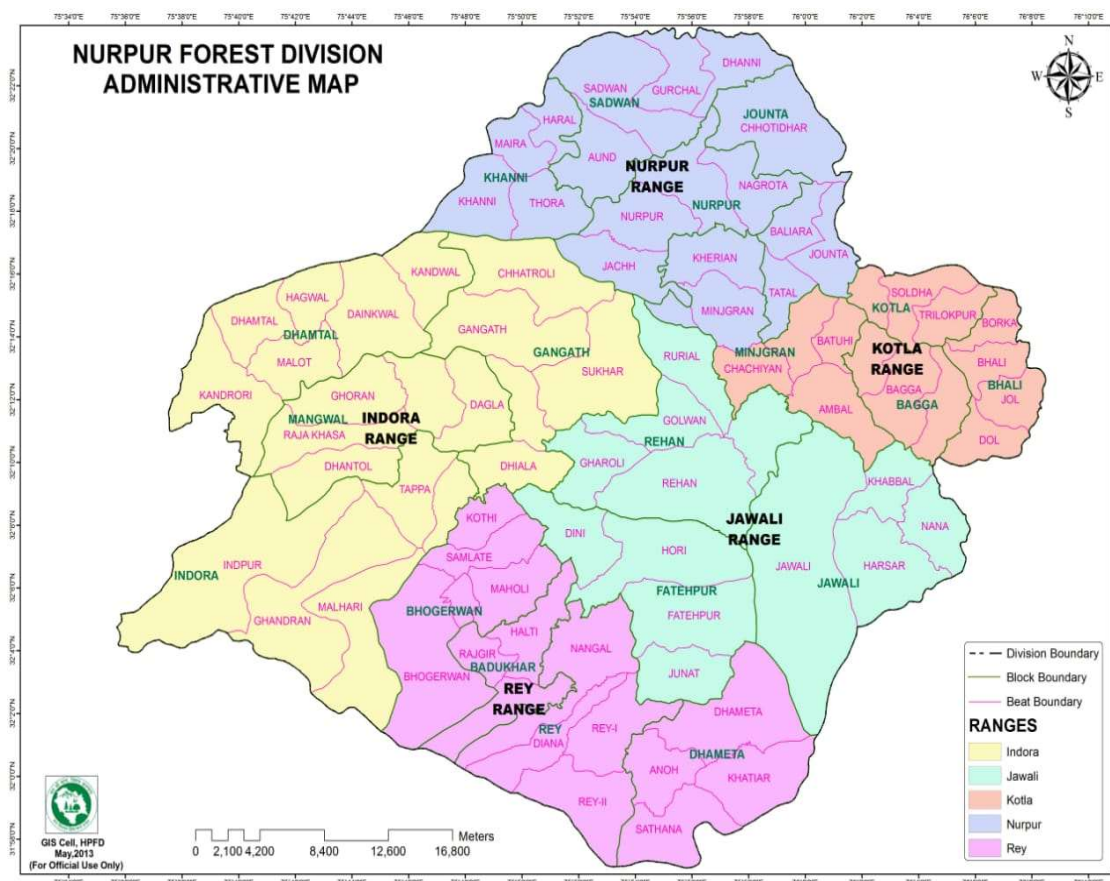
15.8 ECOTOURISM IN NURPUR FOREST DIVISION

Nurpur Forest Division is situated in the Shivalik's and surrounded by Beas River on the eastern and south eastern side, whereas northern boundary is Chakki River. Afterward it breaks into series of spurs running into the main valley at a gentle gradient. Nurpur area does not provide that enthralling experience of High Himalayas but its close proximity to Pong Dam Wildlife sanctuary provides an opportunity for nature based tourism and livelihood opportunities for local communities.

At present following sites/FRHs/IHs are being managed under Ecotourism activities:

1. Tahlian FRH In Jawali (Pong Dam Reservoir)
2. Nurpur FRH, British era old Forest Rest House
3. Nurpur Eco-Park, At Nurpur

Figure 15.1: Administrative Map of Nurpur Forest Division



15.9 Nurpur Eco-Park

The Nurpur and its adjoining town are industrial town with not much spaces available for nature-based recreation. The Nurpur nature Park has been created to develop the potential of tourism and particularly to streamline the energy of youth towards environmental conservation and protection of natural resources and provide a space for locals for walking and recreation.

15.10 LOCATION

Nurpur Nature park is located on Mandi -Pathankot National Highway near division office.

15.11 APPROACH

1. By road: It is linked with pucca road and buses/local taxies are available from Nurpur and Jasur town. `
2. By train: Nearest Railway Station is at Jasur from where park is 5 Km on road.
3. By air: Nearest Airport is Gaggal (Dharamshala) located at a distance of 60 Kms.

15.12 OBJECTIVES

- i) To create awareness amongst youths about nature and environment conservation.
- ii) To inspire youth for patriotism.
- iii) To promote the interest of local youth/people in water sports and allied activities
- iv) To provide a beautiful picnic spot for the tourists.
- v) To promote eco-tourism activities.
- vi) To create and conserve flora and fauna for environmental conservation.

15.13 MANAGEMENT OF NURPUR ECO PARK

Nurpur Eco Park is under the control/ management of DFO Nurpur since its inception. However, it always faced the resource crunch in meeting the budgetary requirement for its management. To make the Eco Park self-sustained it was required to generate funds from its own resources in the form of entry ticket etc. which was possible only in society mode.

Now in compliance to the Govt. of HP Notification No. FFE-B-C915)-3/2005-III dated 25.02.2017 w.r.t. Re-revised Ecotourism Policy of Himachal Pradesh, 2017, the Governing Board of Circle Level Eco Tourism Society (ECOSOC), Dharamshala Forest Circle has been re-constituted vide CCF, Dharamshala Forest Circle office order no. 76 dated 05.08.2023 and the Nurpur Eco park has been now brought under the folds of Circle level ECOSOC.

The overall affairs of all circles in the state shall be administered by Rules & Regulations and orders of the society, by an Executive Committee (shall meet at least once in a half year), which shall consist of the following:

1.	Principal Secretary (Forests) to the Govt. of H.P.	Chairperson
2.	Pr. Chief Conservator of Forests, HP	Member
3.	Pr. Chief Conservator of Forests (Wildlife)	Member
4.	Representative of Secretary Finance	Member
5.	Representative of Secretary Tourism	Member
6.	Two Conservator of Forests & two Divisional Forest Officers from the prioritized forest circles/divisions	Members
7.	Director GHNP, Shamshi	Member
8.	CCF cum Chief Executive Officer	Member Secretary
9.	Eminent personalities and NGOs (1 year tenure)	Not more than 3 members

The Governing Body will be responsible for approving the annual budget, action plan, etc. for ecotourism activities in the circle.

The Constitution of Governing Board of Circle Level Eco Tourism Society is as under:

1.	Chief Conservator of Forests, Dharamshala Forest Circle	Chairman
2.	Representative of Deputy Commissioner	Member
3.	Representative of Superintendent of Police, Nurpur/Kangra	Member
4.	Representative of Chairman, Zila Parishad, Kangra	Member
5.	Representative of Block Development Committees in Dharamshala (to be nominated by Chairman BDC, Dharamshala.)	Member
6.	Three Gram Panchayat Pradhans (to be nominated by District Panchayat Officer, Kangra)	Member
7.	Deputy Director, Tourism & Civil Aviation, Dharamshala	Member
8.	Deputy Director, Mountaineering Institute, Mcleodganj at Dharamshala	Member
9.	Representative of Waste Warrior/ Dhauladhar Cleaners	Member
10.	Summit Adventures, Mcleodganj	Member

11.	High Point Adventures, Mcleodganj	Member
12.	DFO Nurpur, Dharamshala & Palampur	Member
13.	Divisional Manager, HPSFDCL, Dharamshala	Member
14.	DFO (HQ) O/o CCF Dharamshala	Member Secretary

Similarly, the Executive Committee of Circle Level Eco Tourism Society (ECOSOC), Dharamshala Forest Circle has been constituted vide CCF, Dharamshala Forest Circle office order no. 95 dated 16.09.2023. The Constitution of Executive Committee of Circle Level Eco Tourism Society is as under:

1.	Chief Conservator of Forests, Dharamshala Forest Circle	Chairperson
2.	DFO (HQ) Dharamshala O/o CCF Dharamshala	Member Secretary
3.	Division Forest Officer, Nurpur	Member
4.	Division Forest Officer, Dharamshala	Member
5.	Division Forest Officer, Palampur	Member
6.	ACFs Dharamshala, Nurpur and Palampur	Member

The Executive Committee will work under the General Body and will be responsible for guiding Divisional Level Supervision Committee on preparation and implementation of the annual plan of operation of the Society. The Executive Committee shall seek guidance of the General Body on policy issues.

Similarly, Divisional Level Supervision Committee of Nurpur Forest Division was approved vide CCF, Dharamshala Forest Circle office letter no. 3672-73 dated 26.08.2023.

This committee will be responsible for all day to day operations and preparing budget and annual plans etc. for approval of the Governing Body.

The constitution of Divisional Level Supervision Committee is as under:

1.	Deputy Conservator of Forest Cum Divisional Forest Officer (Nurpur)	President
2.	Assistant Conservator of Forests, Nurpur	Member – cum-Sub Disbursers
3.	All Range Forest Officers of Nurpur Forest Division	Member
4.	Zilla Parishad Member, Nurpur	Member
5.	BDC Member, Nurpur	Member
6.	Assistant Engineer, MC Nurpur	Member
7.	Pradhan, Gram Panchayat Gahin lagore	Member

The Circle/Divisional level societies will send their proposal for fresh ecotourism sites to HP ECOSOC for securing Government approval and further action for getting project

proposals prepared and securing partners for their operations, by following the procedures laid down in the policy.

15.14. EXISTING INFRASTRUCTURE

Table No. 15.1. Existing Infrastructure

Sr. No.	Particulars
1.	Parking
2.	Entry Gate Ticket Counter
3.	Water Body
6.	Souvenir Shop
8.	Burma Bridge
9.	Children Play Area with Swings, Rock Climbing Wall, Slides, etc.
10.	Nature trails
11.	Yoga & Meditation Center
13.	Toilets

The existing infrastructure is being managed by the society.

15.15. PROPOSED INFRASTRUCTURE

It is required to develop certain points/properties to provide better facility to the tourists visiting the Nurpur Eco park. The detail of the prioritized works is as under:

- Development of Open parking.
- Souvenir shop/ museum.
- Development of Entry gate.
- Providing locomotive facility to senior citizen/Especially Abled Persons to visit the park (Toy train, Battery operated vehicles etc)

15.16. POTENTIAL ECOTOURISM SITES

In addition to the above, following potential ecotourism sites have been identified keeping in view the guidelines for sustainable ecotourism in forest. No. of visitors allowed per day for different sites are calculated similarly as shown in topics 2.17.3.1.7 & 2.17.3.1.8.

Table No. 15.2. Proposed Business Model

Sr. No	Name of site	Proposed Area for Eco tourism activities	No. of visitors allowed per day/ Carrying capacity	Proposed Potential Business model /Activities
1.	R 12 N Damtal	1.00 Ha	50	• Camping inside FRH enclosure • Sunset viewpoint
2.	U52 Soldha C-16,17,18,19,20,21,22,23	1.00 Ha	50	• Bird watching trail • Herbal garden/ Nursery for medicinal herbs
3.	U79 Ambal C1,C3	1.00 Ha.	50	• Selfie point, • Railing and Development of waterfall area • Signage
4.	P 46 N Bar C1,C2	1.00 Ha	100	• Bird watching trail • Trek Path • Sunset viewpoint. • Swiss tent Camping & prefabricated huts.
5.	P47N Anuhi C2 to C4	1.00 Ha	50	Temporary camping site Bird watching trail Local product shop

7.	U50 Kothiwanda	5.00 Ha	50	Repair of existing Bridal Path and Bird Watching Trail O/D 2 K.M. Watch Tower Ornamental plants plantation along with bridal path Forest Rest House Mastgarh under construction. Students/Children nature learning facilities like tree climbing, Burma bridge, tree huts / machans Camping site and tenting facility Nature trail and hiking Bird watching
8.	P3 Bhalera	13.00 Ha	50	Nature trail around Temple site and Native Shrubs and herbs Plantation along the trail.
9.	UP83 Nadholi C5,C6,C7	2.00 Ha	50	• Camping • Yoga and Meditation centre • Open gym
10.	U-26 Badla, Dhameta	1.50 Ha.	50	• Camping site and tenting facility • Nature trail and hiking • Bird watching in Pong dam • Canoeing and boating

				• fresh water fishing
11.	Nana	1.00 Ha	50	• Trekking trail • Bird watching trail • Camping site to be developed • Pong dam birding • Canoeing and boating

The list of the sites and the activities identified as detailed above is indicative and can be changed with the approval of the Circle Level ECOSOC in addition to this Government can provide sites on PPP mode if required after getting necessary approvals and sites can be provided to entrepreneur's/ PPP mode for temporary use/for temporary structures as per revised ecotourism policy of state.

15.17. Trekking Route In Nurpur Forest Division:

In addition to above there are good numbers of potential trek routes existing under Nurpur Forest Division. These routes are being used by the tourists to explore the natural beauty and the amazing landscapes available along the routes. Some of these routes are also used by local villagers for pilgrimage to the local deity and also by the shepherds as their migratory grazing routes.

One such potential trekking route has been identified as follows

Description of Trekking Route (Ten Lines)	Moderate level trek, located near Hathidhar in Shivalik Range , ends at Kunjar Mahadev with extremely beautiful view of Dhauladhar and Shivalik Ranges. The trek offers excellent opportunity to bird lovers & trekker can also experience rich floral diversity.
Trek Start Point (Name and Coordinates)	Samlet Village (32°20'13"N 76°01'18"E)
Altitudinal range of Start and end points	960m to 1500m
No of Trekking Days	5 hours Approx.
Carrying Capacity of the trek	Upto 50
Trek End Point (Name and Coordinates)	Kunjar Mahadev (32°20'08"N 76°01'41"E)

Resting Point/ Camping Points in the Trek (Name and Coordinates)	Near Kunjar Mahadev temple. (32°20'08"N 76°01'41"E)
	

ESTIMATION OF CARRYING CAPACITY OF TREKKING ROUTE

The estimation of Physical, real and effective carrying capacities has been assessed by using Cifuentes's methodology (Cifuentes 1992) which was suggested by the IUCAN (Ceballos-Lascurain 1996). The logic of the method is based on the site specific factors which reduce the level and quality of visit and which are considered as the limitation of the area.

According to the methodology, the **Physical carrying capacity (PCC)** is defined as "the maximum number of visitors that can physically fit into a defined space, over a particular time" and formulated as follows:

$$PCC = A \times V/a \times R_f$$

Where A is the available area for public use, V/a is one visitor per m², and R_f is the rotation factor (number of permissible visits per day) which is formulated as:

$$R_f = \text{opening period} / \text{average time of one visit.}$$

The characteristics of the trek related to PCC are: the two-way visitor flow on the trails; linear length per visitor is 1.0 m; total length of the trails is 14,000 m; average visitation time is 6 hours; trek is open 8 hours a day; maximum group size is 20 people; and minimum evaluative distance between the groups is 250 m.

$$\text{Therefore } R_f = 8 / 6 = 1 \text{ Visit}$$

Fifty groups each consisting of 20 visitors can fit into the trek's total 14,000 m length with 250 m distance between them [(50×20)+(49×250)= 13,250 m]. Theoretically 50

groups are assumed to be visiting the site simultaneously. Therefore, the available area for the visitors is 1,000 m (20×50=1,000 m) and the PCC is calculated as:

$$PCC = 1,000 \times 1 \times 1 = 1,000 \text{ visitors/day}$$

This means that 1,000 visitors physically (and theoretically) can trek per day. However, it is practically impossible to admit this number of visitors in one day. The PCC only provides a base level to calculate the real carrying capacity.

Real carrying capacity (RCC) is defined as "the maximum permissible number of visits to a site, once the corrective (i.e. reductive) factors derived from the particular characteristics of the site have been applied to the PCC" and expressed by the following general formula where Cf is a corrective factor:

$$RCC = PCC - Cf1 - Cf2 - \dots - Cfn$$

The following formula better explains the RCC with corrective factors in percentages:

$$RCC = PCC \times (100 - Cf1) / 100 \times (100 - Cf2) / 100 \times \dots \times (100 - Cfn) / 100$$

Corrective factors are closely linked to the specific conditions and characteristics of each site and obtained by bio-physical, environmental, ecological, social and management variables. They are expressed in percentages as:

$$Cf = MI / Mt \times 100$$

Where, Cf is the corrective factor, MI is the limiting magnitude of the variable, and Mt is the total magnitude of the variable.

In case of this particular trek, rainfall & snowfall, erosion, accessibility and disturbance to wildlife are identified as the corrective factors (Cf) which limit the trekking on this route.

Rainfall & Snowfall: The eroded stones and the mud on trails can be very slippery particularly during rainy weather. Also mist in the air decreases the quality of photographs or videos to be taken. Further the trek route is inaccessible due to snow cover for the period of 15th December to 28th February. Limiting magnitude is calculated as 196 days/year (122 rainy days + 74 days of snow cover). This weather and climate data has been downloaded from <https://en.climate-data.org/asia/india/himachal-pradesh/bir-486085/>. The rainfall and snowfall correction factor (C_{frs}) is calculated as:

$$C_{frs} = 196 / 365 \times 100 = 53.69\%$$

Erosion: The erosion of trails is considered as a corrective factor as the main activity is trekking. In particular, steep trail sections have been subjected to erosion due to recreational use. The erodibility of any place by visitor use varies with slope range and soil types. This particular trail has 5,680 m section as high erosion risk and soil type is

generally lime to sand. Limiting magnitude is 5,680 m and total magnitude is 14,000 m. The erosion corrective factor (C_{fe}) is calculated as:

$$C_{fe} = 5,680 / 14,000 \times 100 = 40.57\%$$

Accessibility: Accessibility is related with the degree of difficulty of the longitudinal trail slope for hiking or trekking. In general, slopes more than 5.0% decrease the average walking rate and increase the difficulty in the urban context (Harris and Dines 1998). The trail sections that have less than 20% slope were considered reasonable and comfortable for trekking. Thus, slopes over 20% were used as the limiting magnitude (2,160 m).

The accessibility corrective factor (C_{fa}) is calculated as:

$$C_{fa} = 2,160 / 14,000 \times 100 = 15.42\%$$

Disturbance to wildlife: This particular trek has a wide variety of birds. Overuse of the trek and uncontrolled behavior of visitors cause problems particularly during the mating and nesting season of the birds. Thus, disturbance to wildlife is considered as a limiting factor. The mating season for the bird species April-May (2 months); so the limiting magnitude is a total of 2 months and total magnitude is 12 months. The disturbance to wildlife corrective factor (C_{fw}) was calculated as:

$$C_{fw} = 2 / 12 \times 100 = 16.66\%$$

Finally, RCC is calculated by converting four corrective factors into coefficients as follows:

$$RCC = 1000 \times (100 - 53.69)/100 \times (100 - 40.57)/100 \times (100 - 15.42)/100 \times (100 - 16.66)/100 = 194 \text{ visitors /day.}$$

Effective carrying capacity (ECC) is defined as "the maximum number of visits that a site can sustain, considering the management capacity (MC)" and formulated as:

$$ECC = RCC \times MC$$

The management capacity of this particular trek is around 80%. Therefore effective carrying capacity of this trek is calculated as:

$$ECC = 194 \times 0.8 = 155 \text{ visitors /day}$$

15.18. CONVERGENCE WITH OTHER SCHEMES, OTHER DEPARTMENTS

- Necessary linkages and synergies in the policies and programmes of all concerned departments/agencies will be aimed at by establishing effective coordination mechanisms at the state and the district levels.
- Linkages with other partner Departments shall be established in the HP ECOSOC (at the level of Governing Body and Executive Committee) and other societies.
- Linkages with other policies/programs of the State Government/other States & Ecotourism Societies of India will be established, such as the State Forest Policy and the New Sustainable Tourism Development Policy 2013, etc.

PROPOSAL FOR CREATION OF ECO-TOURISM CIRCUIT TO SHRINES LOCATED IN FOREST AREAS OF THE DHARAMSHALA FOREST CIRCLE

15.19. Background

Shrines located inside forest areas often carry unique cultural, religious, and ecological significance. There are various advantages of integrating eco-tourism with religious tourism to shrines located within forest areas. Some of them are discussed below.

1. **Spiritual Connection with Nature:** Forests are often considered sacred in various cultures, representing a connection between the divine and the natural world. Shrines in forest areas may symbolize a deep spiritual connection with nature, where individuals seek a sense of peace, tranquility, and communion with the environment.
2. **Cultural Traditions:** Many cultures have traditions that associate certain deities or spiritual figures with the natural elements, including forests. The placement of shrines within forests may be rooted in cultural practices that honor and worship these deities within their natural settings.
3. **Biodiversity Conservation:** Some religious beliefs emphasize the importance of protecting the environment and maintaining ecological balance. Various cultures have placed shrines within forest areas, to provide an inherent recognition of the need to preserve biodiversity and maintain the sanctity of natural habitats.
4. **Pilgrimage and Spiritual Retreats:** Forests offer serene and secluded environments that are conducive to meditation, introspection, and spiritual retreats. Shrines within these areas may serve as pilgrimage sites or places for individuals to engage in contemplative practices away from the distractions of urban life.
5. **Symbolism of Growth and Renewal:** Forests are often associated with growth, renewal, and the cyclical nature of life. Shrines located in forested areas may

symbolize spiritual rebirth, transformation, and the continuous cycle of life and death.

6. **Conservation of Sacred Groves:** Some communities establish shrines within sacred groves, which are patches of untouched forests considered sacred. These areas are protected by local customs and beliefs, contributing to the conservation of biodiversity and the preservation of ancient ecosystems.
7. **Traditional Practices and Rituals:** Certain rituals and ceremonies may be performed in forested areas as part of religious traditions. These rituals could include offerings, prayers, and other practices that are culturally significant and have been passed down through generations.

Some Shrines located on established Treks within Forest areas in Kangra District

1. Kunal Pathri Temple located in the popular Triund Trek Route

At a distance of 6 km from Dharamshala, Kunal Pathri Mata Temple is situated at Kunal Pathri town in Kangra district. It is a rock temple dedicated to local goddess Kapaleshwari which was consecrated by local people to offer their prayers many centuries back. Although this temple is located close to Dharamshala town, it is widely believed that the ancient temple was founded near Triund Top on the Triund trek route. This still exists and some people still offer prayers to the temple located at an altitude of 11,000 feet.

2. Kunjar Mahadev temple:

The temple is situated on the border of Kangra and Chamba on Hathi Dhar Ridge. The temple is approachable from both Bhatiyat (Chamba) and Kangra (Nurpur side) side on foot. One side of the trek produces a Panoramic view of Dhauladar Ranges and other side of the trek gives a very pleasant site of nested villages in Lower Shivalik hills of Nurpur. The abundant bird biodiversity is another added advantage enroute. The Name Kunjur is synonymous to Hathi (Hindi meaning of elephant) and as per old legend Lord Shiva emancipated the Elephant who gave his head to Lord Ganpati at place, now called Hathidhar

3. Khabru waterfall

Khabru waterfall is in Boh valley 45 kms from Dharamshala, it is a 2-hour drive to the hike starting point. Hike towards Khabru waterfall starts from Boh village. It is a 3km hike from Boh village to Khabru waterfall. It takes about 2 hours to reach the waterfall at an average walking speed.

Route: DHARAMSHALA - BOH VALLEY - KHABRU WATERFALL

Total Duration: 1 DAY .

Total Duration of the trip: 1 DAY

Days on Trek: 1 DAY

Maximum Elevation: 1900 Mtrs.

Starting Point of the Trek: Dharamshala

Rating: Easy

Best time: March - June & October to December

4. **Triund :**

Triund is the crown jewel of Dharamshala, situated in the laps of dhauladhar mountains, it has the perfect view of the Dhauladhar mountains on one side and kangra valley on the other. Triund is a very popular trekking spot. Triund attracts a lot of tourist every year from India and all over the world. Triund trek can be described as a tranquil trek which can be easily accomplished by almost all age groups. Triund has an unambiguous by way which goes through a beautiful mixed forest of Oak, Deodar and Rhododendron. Trek is fairly easy for the first five kilometers but the last one kilometer may require a bit of toil, the last one kilometer is popularly know as the “22 curves”. Along the way there are many small chai shops where one can refresh during the hike. The traipse is worth it as the panorama when you reach Triund is awe-inspiring and exhilarating.

5. **Chamunda Devi**

Shri Chamunda Devi Mandir also known as **Chamunda Nandikeshwar Dham** is a temple dedicated to Shri Chamunda Devi, a form of Goddess Durga, located at 19 km away from Palampur town in Dharamshala Tehsil of Kangra district of the Northern Indian state of Himachal Pradesh. This is one of the most prominent temples in Himachal Pradesh and one of the most popular all over India. It is believed that whatever vow is prayed here manifests in reality. The much older Aadi Himani Chamunda which is also the original shrine, is situated at the hilltop, and is beautiful Hill trek giving panoramic view of Dhauladhar on one side and Kangra Valley on the other side.

6. **Bola wali Mata**

The temple is situated on the Gwal tikkar to Bola Wali Mata trek which is 14 Km bothways. The scenic view of Dhuladhar Range during trekking and mesmerising view from the temple adds to enrich the visitor experience on this trek.

7. Lehri Mata

The temple is situated on the Sukeri to Lehri Mata trek which is 18 Km long.

8. Birni Mata

From Gallu Langha, there is a moderate trek to Birni Devi Temple, which takes from 3hrs to 5hrs to complete. Perched on a hill, the temple overlooks the majestic Kangra Valley and offers a panoramic view of Dhauladhar range.

9. Hill Top Durga Mata Temple

Situated in the last leg of Shiwalik Hill Ranges and in the last recorded forest of Himachal Pradesh on the boundary with Punjab RF Damtal, the Temple provides a stopover for the pilgrims visiting Vaishno Devi, Mani-Mahesh in Chamba and Amarnath Shrine in Kashmir. The temple is situated on a hill top and provides panoramic views of Punjab Plains. The temple is situated on national highway 44 connecting Srinagar with National capital New Delhi.

All these above-mentioned Shrines are located within forest areas and are already part of the list of treks submitted to HP ECOSOC.

Proposal to include Damtal temple under HPECOSOC

However, the Damtal temple is managed by the Forest Department and a brief history and factual position of the same which was earlier sent to HP ECOSOC/CCF Eco-Tourism vide DFO Nurpur letter 5609 dated 30.8.2013 dated is given as below.

- i. Eviction orders in the encroachment case were passed by DFO Nurpur in 1996 under HP Public Premises (RC&R) Act, 1971 pertaining to Durga Mata Hill Top Temple, Damtal. On 22.3.1013
- ii. In Pursuance of Honble High Court of HP direction in CWP 2228/2012 in Pawan Kumar Vs State of HP it was ordered to vacate all premises in which eviction order was passed and compliance be reported by 31.3.2013. However, due to stiff resistance from local people and also keeping in view of the religious belief, demolition of the premises was not carried out and it was proposed that the temple be managed by the Forest Department.
- iii. DFO Nurpur and CCF Dharamshala submitted a proposal on 22.3.2014 for development of Damtal temple as an Eco-Tourism spot under State Level HP Eco-tourism Society of the HP Forest Department. However, at that point of time, the temple was considered as an encroachment and therefore CCF Eco-Tourism directed CF Dharamshala to seek directions from the Hon'ble High Court regarding removal of encroachment.

- iv. After this, CCF Dharamshala took up the matter with PCCF HoFF and a proposal for management of the temple was recommended to the Government. It was proposed that the management of the Temple located in R12 N Damtal C15 maybe carried out by a committee constituted for the purpose.
- v. The Secretary (Forests) vide letter No.FFE-B-F(9)4/2009-L dated 3.12.2014 opined that as the possession of the temple is already with the Forest Department, this should not be considered as an encroachment and directions were issued to manage the day to day activities of the temple under the suitable bylaws by a management committee as proposed by CCF, Dharamshala.
- vi. It was reported by DFO Nurpur that the encroachment was vacated after following due procedure under HP Public Premises and Land (E&R) Act, 1971 and the management of the temple was taken over by the Forest Department as per directions of ACS (Forests) to the Govt of HP vide letter FFE-B-F(9)4/2009-L dated 3.12.2014.

Since then, the Temple is being managed by a Governing Body headed by SDM, Indora and an Executive committee headed by Range Officer, Bhadroya. This committee was constituted by CF Dharamshala in continuation to the orders of the State Government. However, this committee has been recently reconstituted vide this office order I/259258/2023 dated 11.10.2023 in view of the request received from DC, Kangra and the Governing Body is now chaired by DFO, Nurpur and the EC is now chaired by ACF, Nurpur.

Also, a proposal for bringing the Durga Mata Hill Top temple into the ambit of HP ECOSOC/Circle level ECOSOC was sought from CEO, HPECOSOC, keeping in view the request for the same from DFO Nurpur. The matter was also agreed to by the EC of the Circle level ECOSOC held on 26.9.2023 in Dharamshala.

MANAGEMENT OF ECO-TOURISM SITES UNDER ECOTOURISM POLICY OF HIMACHAL PRADESH, 2017

The development and management of all the sites being run and the sites which have been identified/additional sites will be in consonance with Re-revised Ecotourism Policy of Himachal Pradesh, 2017 notified vide HP Notification No. FFE-B-C915)-3/2005-III dated 25.02.2017. Some important articles pertaining to management, mode of operation and revenue sharing are produced as under:

DEVELOPMENT AND MANAGEMENT OF ECO-TOURISM ASSETS

The policy vide article no. 6 (G) provides for:

- i. The State already boasts of a few van Eco Parks as nature awareness centers. It shall be the endeavor to bring all the facets of such nature tourism related assets into a common fold under the aegis of the institutional arrangements envisaged in this policy.
- ii. Development of nature parks/ van Eco Parks, nature trails etc. that are important from eco-tourism point of view shall be carried out so that not only the tourists outside the state have access to nature, state dwellers shall also have an opportunity for nature

appreciation and recreation. **Decisions with respect to utilization and management of these assets shall be taken by the Division/Circle level Societies.**

- iii. Eco-tourism circuits shall be created, which will allow the visitors to access the existing infrastructure of Forest Rest Houses/Eco-Tourism camping sites.
- iv. HP ECOSOC shall facilitate selection of partners for Eco-Tourism sites in PPP mode after taking approval of Government of HP. The guidelines about the management of existing Eco-Tourism sites are also provided in this policy document. Adherence to guidelines will be overseen by the Division/Circle level societies.
- v. Trekking routes shall be popularized and arrangements shall be worked out to offer trekking packages to the discerning tourist, who may like to visit rural and Interior areas of the State.
- vi. Eco-Tourism societies at Division level shall endeavor to tie up with school groups and colleges for organizing camps in selected Forest Rest Houses /Eco-Tourism Camping sites operating under its aegis.
- vii. Eco Circuits shall be created by these societies to link the potential sites.

MODE OF OPERATION

The policy vides article no. 6 (H) (ii) provides as:

The sites may be operated in the following modes:

- a) By the societies
- b) directly on departmental mode.
- c) By the HP Tourism Development Corporation/HP. Forest Development Corporation and;
- d) Through a private party/outsourcing agency/PPP mode. These will be given directly by the Forest Department.

Even in departmental mode some services may be outsourced or given in PPP mode. Detailed terms and conditions and model agreement will be developed for the sites.

FUNDING SUPPORT FOR ECOTOURISM ACTIVITIES

The funding support for ecotourism will be done through various channels and stakeholders including forest department, HP ECOSOC, DC funds, tourism department schemes such as Nai Raahein Nai Manzilen Scheme, Swadesh Darshan Scheme, ADB project, local area development funds, and tribal area development and schemes of Central/state governments etc.

DISTRIBUTION OF REVENUE GENERATED THROUGH ECO-TOURISM

The policy vides article no. 6 (H) (viii) (e) provides for as under:

- 1. HP ECOSOC and Division Circle Level Eco-Tourism Societies shall act as the repository of all possible sources of funding, like grants in State Tourism Department, Tourism Department of Gol, HP State CAMPA and other such sources.

2. HP ECOSOC and Division/Circle Level Eco-Tourism Societies shall generate resources from (a) levy of user charges/concession fee on eco- tourism sites in PPP mode, (b) fees from Van Eco Parks, camps, trek, tails, film shooting, rest houses etc.
3. Distribution of Revenue generated through Eco-tourism sites, Van Eco Parks, Van Chetna Kendra and Nature Awareness Centers and use of government assets such as rest houses all be at under:
 - a) State Government Share: 20% of the total revenue realized shall be deposited in Government treasury.
 - b) HP ECOSOC Share: 20% of the total revenue realized shall go to the HP ECOSOC
 - c) Division Circle Level Eco-Tourism Society Share: Remaining 60% revenue shall remain with the Division/Circle Level Eco-tourism Society to implement the action plans and also for further sharing with the local Gram Panchayats/communities for which appropriate guidelines shall be framed.
 - d) HPSFDC Ltd/ HPTDC Share: The HPSFDC Ltd. /HPTDC shall make use of 60% share for the Promotion of Eco-Tourism as well as a proportion out of this amount shall as revenue to the Corporation. Appropriate guidelines will be framed for this purpose.

ECOTOURISM STRATEGIES

The ecotourism strategy for all the sites being run and the sites which have been identified/additional sites will be in consonance with Re-revised Ecotourism Policy of Himachal Pradesh, 2017 notified vide HP Notification No. FFE-B-C915)-3/2005-III dated 25.02.2017. A step wise strategy which helps in preparing site specific Ecotourism Plan will be followed for each site- and site-specific Ecotourism Development and management plan will be prepared. A model strategy is as under:

ECO-TOURISM SITES/ POTENTIAL ECO-TOURISM SITES TO BE IDENTIFIED AND DOCUMENTED

- i. Areas inside and adjoining designated forests with Eco-Tourism potential beidentified and listed.
- ii. Eco-Tourism development plan to be programmed and implemented with the carrying capacity.
- iii. Capacity building of eco-guides.
- iv. Records of tourist inflows and commensurate benefit to the community.

STAKE HOLDERS MEETING

A consultation meeting with all the stakeholders was conducted with District Level Supervision Committee, Gram Panchayat representatives, local people, people

dependent on SVV for their livelihood etc. and the observations of various stakeholders were taken into account for activities to be carried on in the ecotourism site.

At the State level, governing body of HP ECOSOC is comprising of Representatives from Government Departments as Principal Secretaries. Various departments constitute the 40%, representatives from Institutions like WII, Biodiversity Conservation Society etc constitute another 20% and the eminent personalities & NGO representatives constitute another 40 % of the governing body. Under the rules of HP ECOSOC, the governing body meeting with all the stakeholders is being held regularly and inputs are incorporated in the formulation of ecotourism plan.

Composition of the Governing Body of HP ECOSOC:

9. **Composition of the Governing Body**

The Governing Body will consist of members from Govt. Departments (40%) Institutions (20%) and Eminent Personalities and NGOs (40%).

Chief Minister, HP Secretariat Shimla-171001, Chairman
Forest Minister, HP Secretariat, Shimla
Tourism Minister, HP Secretariat, Shimla

Members:

- i) Principal Secretary Tourism, HP Secretariat Shimla-171002.
- ii) Principal Secretary, Finance, HP Secretariat Shimla-171002.
- iii) Principal Secretary, Rural Development HP Secretariat Shimla-171002.
- iv) Principal Secretary, Fisheries, H.P. Secretariat Shimla-171002.
- v) Principal Chief Conservator of Forests, Himachal Pradesh, Taland, Shimla
- vi) Principal Chief Conservator of Forests (Wildlife), H.P., Taland, Shimla
- vii) Chief Executive Officer of the ECOSOC.
- viii) Principal Secretary (Forests) H.P. Secretariat Shimla-171002, Member Secretary.

Institution: (not more than 5, all ex officio)

- i) Director Wildlife Institute of India, Post Box-18, Chandrabani, Dehradun-248001 Uttarakhand (Tel: 0135-2640112)
- ii) Director, G.B. Pant Institute of Himalayan Environment & Development Kosi-Katarnal, Almora, Uttarakhand (Tel. 05962-241015)
- iii) Member-Secretary, Biodiversity Conservation Society, Shamshi (Kullu).
- iv) Director, Western Himalayan Mountaineering Institute Manali.
- v) CEO of Uttarakhand Eco-Tourism Society.

Eminent Personalities and NGOs: (not more than 8, tenure 2 years)

- i) Kanwar Ajay Bahadur Singh, Nahan, District Sirmour, H.P.
- ii) Mr. Vijay Soni, President Fish & Wildlife Conservancy, Member IUCN-Species Survival Commission, 43, Golf Links, New Delhi-110003, email: vijay.wildfish@gmail.com. Website: www.indianwildfish.org.
- iii) Mr. M.P. Bezbaruah, Permanent Representation, World Tourism Organization Jeevan Bharati Bldg., Tower I, 7th Floor, 124 Connaught Circus, New Delhi 110001 (Tel: 011 23725445; Fax: 23725218; email: mpbezbaruah@yahoo.co.in.)

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CEO-cum-CCF,
Eco-Tourism, Shimla

- iv) Dr. Ganesh Balachander, Representative, Ford Foundation, 55, Lodi Estate, New Delhi 110003, Telephone: 24619441, 24648401, email: g.balachander@fordfound.org, website: www.fordfound.org, Fax: 91-11-24627147, 24617738
- v) Director, SAHARA, Village Kalwari, Tehsil Banjar, Distt. Kullu, (Tel: 94180 45363; email: saharaghnp@hotmail.com).
- vi) Payson R. Stevens Village Ghiyaghi, Tehsil Banjar, Distt. Kullu, H.P. (Tel: 01903 227109; email: inm@aol.com)
- vii) Ms. Prabhavati Dwabha, Ramana's Seva Samiti, Vill. Tapovan, Laxman Jhula PIN-249192, Distt. Tehri Garhwal, Uttarakhand (Tel: 0135 2435558; email: dwabha@hotmail.com).
- viii) Shri Rajesh Ojha of Banjara Camps (Address: Banjara Camps & Retreats Pvt. Ltd., 1A, Hauz Khas village; N.Delhi-110016. Tel no. 011-26861379, 26851552/53, 9810040397), www.banjaracamps.com).
- ix) Col. Pavan Bakshi, General Manager, 11th Floor, Mohan Dev., 13 Tolstoy Marg, New Delhi-110001, Tel. no. 011 23327564/60, Fax: 011-412 2231, email: pavanbakshi@ascot-hotels.in

INFRASTRUCTURE DEVELOPMENT

Infrastructure will be developed in eco-friendly manner infrastructure will be so designed that those merge with the ambient environment. Non-permanent structures need to be proposed. Natural Profile and ecological integrity of forest and wildlife areas along with the biodiversity values shall be maintained. All the proposed activities will be eco-friendly and no permanent structures will be established in violation of Van (Samvardhan Evam Sanrakshan) Adhiniyam, 1980. The extent of the infrastructure developed will be limited to the carrying capacity of the area. All new Eco-tourism activities or expansion of existing ecotourism activities within the

Eco-sensitive Zone (on non-forest land) shall be as per the Management Plan for the Eco-sensitive Zone.

CARRYING-CAPACITY ANALYSIS AND IMPACT ASSESSMENT

For sustainable ecotourism carrying capacity of visitors and vehicles those may be allowed to enter inside the identified area will be assessed and ceiling on number of visitors/vehicles will be fixed.

Carrying capacity assessment will include:

- Number of persons visiting the site
- No. of vehicles entering the site
- Infrastructure
- Duration of the visit
- Duration of exposure of site to ecotourism activities.

$$\text{Carrying Capacity} = \frac{\text{Area used by the tourist}}{\text{Average Individual Standard}}$$

The average individual standard (often measured in square meter per person) is the space a tourist requires for an acceptable experience in an area, which will vary depending on the area, activity and management.

The total number of allowed daily visits is then obtained by multiplying carrying capacity and Rotation Coefficient.

$$\text{Where Rotation Coefficient} = \frac{\text{No. of daily hours area is open for tourists}}{\text{Average time of visit}}$$

Another way of setting carrying capacity limits is by examining in hindsight is the impact of visitors on the area in question. In other words, when managers observe a level of use above which degradation ensued, that level becomes the carrying capacity.

For calculation of carrying capacity of each ecotourism site, the data w.r.t. no. of visitors/tourist visiting the particular site is required. Nurpur Forest Division has sought these details from the District Tourism Development Office. The carrying capacity of each ecotourism site will be calculated on the basis of this data.

CAPACITY BUILDING

Tourism industry demands not only infrastructure development but also development of soft skills i.e. customer relationship management. For success of any tourism project human capital becomes a critical factor and it becomes utmost important that substantial investment is done to recruit and train human resources.

The Eco-tourism Capacity Building Program is aimed at increasing the skills of tourism professionals. This can be achieved through non-formal education, training

and workshops on a variety of issues such as the environment, eco-tourism, conservation, heritage and languages, mountain safety and First Aid.

It is proposed to conduct specialized training on Ecotourism for Field functionaries. For capacity building of local people training programme need to be framed for nature guides, birdwatchers, hospitality management, natural science interpreters, patrol partners for protection work, entrepreneurs for small scale home stay-based hospitality industries, small business operators like souvenir shops, photography etc. In addition to this a chapter on Ecotourism or vocational course on Ecotourism can be blended in school and other institutional curriculum.

1. HPECOSOC will concentrate on the capacity building through experience sharing, workshops, training programmes and field visits etc, either in-house or through carefully selected organizations/entities.
2. To inculcate the spirit of environmental awareness at an early age, the Division level Societies would engage students at various levels beginning at the primary level
3. HP ECOSOC will develop appropriate training modules (continuous, practical & participatory) and training material/case studies for the various stakeholders and ensure that emergence of appropriate technologies is to be advanced.
4. Training programmes for nature guides, appreciation of flora/fauna shall be organized. It shall be the endeavour of the Division level societies to train a pool of certified nature guides and provide them livelihood opportunities.
5. Division/Circle level Societies shall liaise with Community Based Organizations working in the field of Natural Resource management for providing them training and other material relevant for eco-tourism.
6. For their education and awareness activities, HP ECOSOC and Division level Societies shall leverage funds through the Externally Aided Projects, the CAT Plans, Capacity Building programmes of HP State Tourism Development Board and resources generated from projects developed under PPP mode

Circle level ECOSOC will try to collaborate with Himachal Pradesh Kaushal Vikas Nigam (HPKVN) for Skill Up gradation Training and Entrepreneur Development Programme to the host communities in order to build capacity and quality human resource for Ecotourism. Further Industrial Training Institutes (ITIs) and other such institutes will be encouraged to develop specific programmes for local communities and small operators engaged in ecotourism.

A tentative list of priority areas for training is as under:

A. For local communities:

- i) Tourism and Hospitality Training
- ii) Guide Training Programme
- iii) Cook Training with special emphasis on local cuisine preparation
- iv) Camp Management Training
- v) Adventure Activity Training

- vi) Bird watching
- vii) Nature Interpretation Training.
- viii) Artisan Training for quality local handicraft and souvenir.

B. For Forest Officers/Employees

i) PPP in Ecotourism

- ii) Ecotourism Training Programme involving estimation of site specific Carrying Capacity, impact assessment of ecotourism and monitoring & evaluation of ecotourism activities.

CAPACITY BUILDING IN COLLABORATION WITH FOOD CRAFT INSTITUTE

For capacity building of field functionaries involved in Ecotourism areas in respect of hospitality, housekeeping, welcoming etiquettes with tourists/guests, training program has been designed by Narpur Forest Division in collaboration with Food Craft Institute Khanyara (Dharamshala) under Capacity Building and IEC Programme of Nai Rahen Nai Manzilen Scheme. This certified course is to train around 50 participants at the rate of Rs. 5610 per trainee for 6 days.

COMMUNITY PARTICIPATION

As per the "*Guidelines for sustainable Ecotourism in forest and Wildlife areas-2021*" the local communities are the principal stakeholders. Thus the provision of the benefits flowing from the visitation in the area must also accrue to the local communities by way of providing livelihood opportunities arising from the proposed Ecotourism activities by involving local Eco Development committees (EDCs), VFDs, JFMCs local youths etc.

1. The endeavour would be to extend maximum benefit to the local community either in the form of employment or resource generation. Local communities will be encouraged to come forward to take up various economic or promotional activities in their areas for furthering the vision and objectives of this policy.
2. Such local communities could be in the form of PRIs CBO, User Groups, Mahila Mandal, Yuvak mandal, Forest development Committees, watershed development committees, Eco-clubs, Self-help groups etc.
3. Members of the local community will be represented in the Division/Circle level societies as well as in the Executive Body

The participation of local community is key to success of ecotourism as the benefits of visitors' visitation should help local economy by increase in expenditure of visitors' in the area, employment generated for local people and purchase of materials from the local area. This Ecotourism program will increase visitation to nearby places of tourism interest and in turn will lead to more facilities being created which will create multiplier effect in the local economy.

- Local community can be employed by ecotourism ventures starting in and around the region for all the activities related to ecotourism.
- Local community can be employed in specialist positions of naturalist/guides for their knowledge about the flora and fauna of the local area.
- Each ecotourism venture can have a souvenir shop which can be run by local community with involvement of local NGO and village level institutions.
- A commitment to local cause can be done by ecotourism ventures by purchasing things locally without compromising on quality. The ecotourism ventures can contribute some amount of revenue back in the local community by supporting education, healthcare, farming or animal husbandry.

The tender document of the ecotourism sites is also laying emphasis on low impact ecotourism, large involvement of local communities, importance to local culture & artifacts. The below is the extract from a ecotourism tender document:

“The Selected Bidder/ Operator shall maximize the participation of the local communities in the Project by involving them in various activities including operation, maintenance and providing of services at the Ecotourism Site. The Selected Bidder/ Operator shall also endeavor to:

- i. **use energy efficient and ecologically sustainable infrastructure as well as practices to minimize the carbon footprint which has the least impact on natural resources and local culture;**
- ii. **seek to harness or amplify the resources unique to the region with minimal interventions, adopting renewable energy sources and sustainable design approaches for promoting the Ecotourism Site as ecotourism destination;**
- iii. **create opportunities for larger participation by the local communities in the Project;**
- iv. **source fruits, vegetable, milk and other products as far as possible from locals of the area;**
- v. **promote sale of local products by setting up nature haat where the locals can set up stalls for sale of their local products to public;**
- vi. **providing a positive experience to tourists/ visitors through various ecotourism activities;**
- vii. **building environmental and cultural awareness among the masses;**
- viii. **promoting local cuisine, architecture and local culture of Himachal Pradesh.**

LIVELIHOOD OPPORTUNITIES AND BENEFIT SHARING:

Ecotourism development results in following benefits to the community:

- **Direct economic benefits in the form of resource use:** Ecotourism leads to the development of Ecotourism activities and facilities like homestays, eco-lodges, camping etc creating employment, business opportunities for the local people. It also creates demand for resources vegetables-fruits or grocery items, ghee, milk, organic food items (under Pramparagat Krishi Vikas Yojana in HP) to be used in daily operation of tourist activities.

- **Generating alternative employment opportunities:** Ecotourism act as a tool for natural resource conservation by way of employing local community, which are otherwise depending on unsustainable use natural resources. They can be employed as lodge staff-naturalists-launch operators and other subsidiary services.

- **Development of local arts and crafts:** Ecotourism aims at developing local arts and crafts by way of highlighting the existing handicrafts through a souvenir shop. Such souvenir shops can be developed at the reception centers with crafts available for sale. NGOs or local level institutions can be used as a capacity builder and as an interface between the community and the customers as they are in a position to push the sales up by attractive packaging and marketing. The merchandise which can be promoted for sales can be household items, jewellery, textile, musical instruments, combs, basketry works and bamboo, wood carving, Organic food items and decorative objects.

- All the operators of Ecotourism sites will provide a certain space on the site for the exhibition and sale of local products (food, handicraft, etc.). Further the possibility of collaboration with already established brand and federation under external aided project like JICA Forestry Project, State Handicraft and Handloom Corporation will be explored to provide marketing opportunities to the local people.

- **Development of local culture:** The Eco tourists are keen in the local culture and they can use this opportunity to understand them. Every evening or on weekends cultural shows can be organized for which the local artists can be paid along with promoting local festivals.

- **Promote Entrepreneurship and Social Responsibility of business:** Promotes more entrepreneurs, business entities near Ecotourism areas. After the success of pilot projects more homestays, business ventures can be floated and can be brought in to develop-Human Capital and Social Capital of the region. The business

enterprises can sponsor conservation programmes, organize vocational training courses, health camps and education.

• **Employment to Bonafide Himachali:** As per the Industrial Policy of Himachal Pradesh, all the Industrial Units are supposed to employ at least 70% bonafide Himachalis at all levels. Further to encourage employment to bonafide Himachalis, *The Himachal Pradesh Industrial Investment Policy, 2019*, provides that existing as well as new Enterprise giving employment to Bonafide Himachlies over and above 80% on regular basis would be eligible for incentive of Rs.1000 per month per additional employment generated over and above of 50 Bonafide Himachlies for ten years from the date of production.

REVENUE SHARING

Considering that eco-tourism is an economic activity, it is important that the eco-tourism plan incorporates a feasible revenue sharing mechanism for the stakeholders. Provision will be made for establishment of foundations, either for each of the identified area an umbrella Foundation to cover multiple areas. The funds accrued from eco-tourism activities in the Foundations will be utilized for community development, and running of eco-tourism facilities. Benefit sharing will be done as per the provisions of Re-revised Ecotourism policy 2017. Fair and equitable benefit sharing of common eco-tourism revenues with the local community is key to sustainability.

In case of Community based ecotourism, an indicative revenue sharing Model is as under:

40% for payment of remuneration to local community directly involved in running eco-tourism facilities.
40% for maintenance of the Eco-tourism facilities
10% to HP ECOSOC, HPFD
10% as revenue to Government.

MONITORING

A dynamic monitoring mechanism, covering multiple biological parameters to monitor stress on wildlife vis-a-vis number and patterns of tourist visitation and their level of satisfaction, involvement of local people, scope for improvement in flow of eco-system services, etc. will be developed. At the Division Level endeavor shall be made to initiate a ranking system for the respective ecotourism sites. There shall be regular monitoring by the Division Level Supervision Committee on the implementation of the guidelines spelt out in the Guidelines for Sustainable Ecotourism in forest and wildlife areas 2021.

A generalized list of five indicators which can be used for monitoring and evaluation of an Ecotourism site is given as under:

There are five general types of indicators that must be monitored in some way by an ecotourism project:

- Environmental (Biophysical)
- Socio-cultural Aspects
- Experiential
- Economic
- Managerial

Environmental (Biophysical) indicators:

- soil erosion at a particular site
- site spreading (vegetation loss in campgrounds or along trails)
- sea floor litter at mooring sites
- stress on a particular wildlife species (nesting success, animal aggression against visitors, etc.)
- illegal fires or campfires
- landslides along a road
- coliform bacteria count in river X, site X
- visibility from point X
- number of damaged trees in picnic area

Experiential (on visitors) indicators:

- number of encounters with other groups per day
- number of safety violations per month
- number of complaints about noisy visitors
- number of students using area for environmental education
- number of illegal hunters encountered in X location

- percent of visitors pleased with their visit to the area/site
- evidence of human waste
- number of return visitors
- visitor perception of naturalist guides

Economic indicators:

- number of ecotourism entrepreneurs in neighboring communities
- amount of entrance fees collected in a month
- average length of stay in the site/community
- overall contribution of ecotourism to site's budget (percentage)
- level of tourism employment
- level of investment in local public services and facilities

Socio-cultural (on communities) indicators:

- maintenance of traditional practices
- change in population
- reports of negative behavior by visitors towards residents
- change in crime rate
- number of visitors at local cultural events/sites
- perception of guides to ecotourism activity
- general perception of residents to ecotourism activity(ies)

Managerial (infrastructure) indicators:

- number and length of trails
- amount of time spent on infrastructure maintenance
- amount of graffiti found in campgrounds

adapted from Stankey et al., 1985

The site-specific monitoring and evaluation strategy will be drafted by the Divisional Level Supervision Committee keeping in view these indicators and the strategy will be finalized by the Circle level ECOSOC.

EDUCATION AND OUTREACH

For effective use of the eco-tourism potential of the area, an effective education and interpretation plan will be prepared. Efforts will be made to put in place electronic visual tools, well equipped interpretation center, appropriate signages, audiovisual presentation centers, interactive learning tools, and safety protocol and information material on the area for the visitors.

- Starting regular programmes in conservation education for the local schools, village communities, and the tourists.
- The HP Gyan Vigyan Samiti (National Literacy Mission) could also be associated with the ecotourism society of HP.
- Facilitate introduction of nature conservation education in school and college curriculum in HP.
- Encourage research and documentation for the best efforts made in ecotourism sites in HP.
- Develop schemes and plans such as nature camps, nature education and awareness for the local school/ college students and teachers around an FRH/FIH/Camp site/forest trails etc.

MARKETING AND BUSINESS PLAN

A business plan outlines a path for a business to follow and describes the core goals and strategies the business will pursue. In the modern business environment of ecotourism operations, sound financial and business planning plays an increasingly important role. Like all well-managed organizations, ecotourism enterprises require sound business planning to succeed, but the planning process differs from those of other industries because social and environmental factors must also be considered. If the business is to rely on using a protected area, the business plan should occur in the context of a Management Plan that balances economic and environmental considerations. For example, building infrastructure and operating in remote and environmentally sensitive areas is more expensive than traditional forms of tourism. Providing educational experiences through interpretation requires a lower guide to customer ratio, and smaller group sizes mean higher costs per person. These special considerations required to be kept in mind throughout the process of developing the business plan.

As discussed above, Ecotourism Business Plan is a specialized activity. Forest officials lack the experience in writing a business plan; therefore, it would be wise to work with a consultant or advisor who can provide advice, input and revision of the business plan.

A thorough Business Plan should address the following components:

- Industry Analysis
- Competition Analysis
- Marketing Plan
- Operations
- Management & Organization
- Financial Projections
- Monitoring & Evaluation.
- HP ECOSOC shall provide a platform for effective marketing through website and website linkages, which shall provide information for online booking of facilities.
- Tie ups shall be facilitated with organizations/ entities/ tour operators/ travel agents/ hoteliers engaged in tourism promotion.
- HP ECOSOC shall utilize the services of Publicity Wing of Forest Department for popularizing the ecotourism destinations during fairs and festivals.
- The services of print and electronic media shall be utilized for dissemination of ecotourism hot spots and potential sites so as to lure the discerning tourist.
- Forest Rest Houses included under ecotourism shall be used for marketing of ecotourism products like camps/ nature walks/ trekking etc. by enhancing its infrastructure.

INSTITUTIONAL MECHANISMS

HPECOSOC will work with the Ecotourism societies at Division and Circle level to facilitate ecotourism activities in the State. Other than this Divisional level Ecotourism committees will take ground level decisions.

15.20 COMMUNICATION PLAN

Effective communication plan covering all eco-tourism sites of Division will be developed at Division level.

CHAPTER-XVI

Water Resource Management Working Circle

16.1 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 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 (in that order!) 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 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."

16.2 Sustainable water management

At present, only about 0.08 percent of all the world's fresh water is accessible. And there is ever-increasing demand for drinking, manufacturing, leisure and agriculture. Due to the small percentage of water available, optimizing the fresh water we have left from natural resources has been a growing challenge around the world.

Much effort in water resource management is directed at optimizing the use of water and in minimizing the environmental impact of water use on the natural environment. The observation of water as an integral part of the ecosystem is based on integrated water resources management, based on the 1992 Dublin Principles (see below).

Sustainable water management requires a holistic approach based on the principles of Integrated Water Resource Management, originally articulated in 1992 at the Dublin (January) and Rio (July) conferences. The four Dublin Principles, promulgated in the Dublin Statement are:

1. Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment;

2. Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels;
3. Women play a central part in the provision, management and safeguarding of water;
4. Water has an economic value in all its competing uses and should be recognized as an economic good.

Implementation of these principles has guided reform of national water management law around the world since 1992.

Further challenges to sustainable and equitable water resources management include the fact that many water bodies are shared across boundaries which may be international (see water conflict) or intra-national (see Murray-Darling basin).

16.3 **Special Objects of Management:** The special 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 zone.
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.

Constitution of working circle

The working circle is overlapping in nature and will include all working circles

16.4 **Identification of spring sheds**

The field survey was conducted, and different information sources was compiled, and the list has been prepared which has been tabulated as Table 1

Table No. 16.1. LIST OF SPRING SHEDS

Range/ Block	Beat Comptt.	Name of Source	GPS Coordinate	Permanent Seasonal	Dis charge	Purpose
Jawali/ Rehan	Sidhpurg har	Sidhpur ghar	N.32.187431 E.75.970521	Permanent	15 Ltr.	Domestic and drinking water
Kotla/ Mastgarh	Banoli Chachian	Badi di Bowabri	N.32.2264027 E.75.9733861	Permanent	0.526 LPM	Domestic and drinking water

Kotla/ Bhalli	Dole	Mariamah Bowrie	N.32215956 E.76.080237	Permanent	25 Ltr.	Domestic and drinking water
Kotla/ Bhalli	Bohrka	Bari-da- Ballah	N 32.232104 E 76.105235	Permanent	-	Domestic and drinking water
Kotla/ Bagga	Anuhi	Rajol	N 32.220990 E 76.035977	Permanent	20.00ltr	Domestic and drinking water
Kotla/ Bagga	Nadoli	Spade di Bawrie		Permanent	22 Ltr.	Domestic and drinking water
Kotla/ Kotla	Ballah	Rajan di ban	N32.252997 E 76.035745	Permanent	23 Ltr.	Domestic and drinking water

16.5 PROPOSED 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 operations
6. The funding be ensured from various schemes like state plan, centrally sponsored schemes, EAP and CAMPA etc.

CHAPTER-XVII

TREES OUTSIDE FOREST (TOF)

17.1 INTRODUCTION:

Trees outside of forests refer to individuals 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 are 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.

17.2 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.

17.3 ECOLOGICAL SIGNIFICANCE:

TOF species contribute to soil conservation, preventing erosion in hilly terrains like those in Suket 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.

17.4 SOCIO-ECONOMIC BENEFITS:

The local communities in Suket 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.

17.5 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.

17.6 SUSTAINABLE MANAGEMENT STRATEGIES:

Following strategies can be implemented to address the challenges associated with TOF management, 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.

17.6.1 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.

17.6.2 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.

17.6.3 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.

17.7 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-XVIII

MONITORING, ASSESSMENT AND REPORTING

18.1 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 an 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:

18.1.1 FELLING CONTROL FORM:

For controlling and maintaining the record of all trees marked for felling and trees retained.

18.1.2 SILVICULTURAL CONTROL FORM:

For the control of all silvicultural operations such as fellings, subsidiary cultural operations, cleanings, thinning's, burnings, etc., which may be prescribed or suggested to be carried out in a given management unit for the duration of the working plan.

18.2 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 spelled out. The check is through control forms and reporting is through deviation statements. Deviation beyond 20% of the target is considered to constitute a major deviation. Following is the format of Deviation Statement. Statement showing deviations from working plan prescriptions

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.

18.3 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 plantations 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 spring sheds at various places in the division.

18.4 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-XIX

MISCELLANEOUS REGULATIONS

19.1 PETTY FELLING:

The following kinds of trees may be marked for petty felling:

- Trees required for scientific investigations at the Research Circle, FRI, Dehradun.
- Trees required to be felled for establishing new nurseries, extension, or alteration of nurseries.
- Trees required for establishing new fire-lines.
- 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 that do not count towards yield will not appear in the control forms and their felling shall be regulated by the Conservator of Forests/Chief Conservator of Forests, Dharamshala 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 Annexures. 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 Annexures.

CHAPTER-XX

FINACIAL FORECAST AND COST OF THE PLAN

20.1 GENERAL:

In view of the rising price trend of timber and other forest produce and because of the fact that this tract is being opened by more motorable roads, it is difficult to make any accurate estimate of the price which the forest is likely to fetch during the period of the plan.

Similarly, it is equally difficult to correctly assess the expenditure likely to be incurred in carrying out the prescriptions of this working plan. An attempt has however been made to estimate the future surplus on the basis of the current prices of the forest produce and keeping in view its rising trend. Similarly, the expenditure for carrying out various prescriptions for this working plan has been projected. The price of timber expected has been calculated at current rate i.e. for 2023-24.

20.2 PAST YIELD:

The details of past yield removed have been given in chapter III.

20.3 PAST REVENUE AND EXPENDITURE.

The details of past revenue and expenditures are given in chapter III.

20.4 FUTURE YIELD:

The prescribed annual yield in cubic under various working circles is as follow:

Chil:

Table 20.1.

PB	Annual yield m3	Remarks
I	4200	Chil working circle
II	500	
III	500	
IV	1000	
UA	500	
Total	6700	

Khair:**Table No. 20.2.**

Circle	Yield (trees)
Khair OWC	17000
Khair coppice	1000
Total	18000

20.5 FUTURE REVENUE:

It is difficult to make any definite financial Forecast since the prices keep in fluctuating. However, there has been general trend of hike in the timber prices. Taking into consideration the market price of standing trees for the year 2023-24, the annual future expected revenue is thus estimated as under: -

Table No. 20.3. Future Revenue

Spp.	Volume (m3)	Rate/ m3	Anticipated Amount in rupees
Khair	2000	139145/-	27,82,90,000/-
Shisham/Tun	250	23052/-	57,63,000/-
Chil	6700	55596/-	37,24,93,200/-
Sagwan	50	32000/-	16,00,000/-
B/L/Eucalyptus	250	20102/-	50,25,500/-
Grass Cutting		L/S	15000/-
Medicinal Plants		L/S	10,00,000/-
Resin Blazes	45000	45	20,25,000/-
Other Misc Revenue		L/S	15,00,000/-
		Total	66,77,11,700/-

Thus, the estimated future revenue during the plan period (10 Years) will be as:- $667711700 \times 10 = 6677117000/-$ (or say rupees 667 crores)

20.6 FUTURE ANNUAL ANTICIPATED EXPENDITURE

Table No. 20.4. Future Expenditure

Sr. No.	Particulars	Amount in Crores
1.	Felling and extraction by Govt. agency	3.50
2.	Marking and numbering of trees to purchasers	0.15
3.	Purchase of stores, tools and plants	0.13
4.	Demarcation and construction and repair of BPs	2.50
5.	Const of roads and Paths	1.70
6.	Construction and repair of building	1.90
7.	Maintenance of compound and Water supply	0.70
8.	Regeneration and cultural works	0.60
9.	Cost of raising new plantations and maintenance	4.50
10.	Forest Protection	1.50
11.	Research and experiments	0.30
12.	Compensation for acquiring land etc.	0.30
	Total	17.78
	Establishment	
1	Establishment charges	15.00
2	Contingencies and Sundries	2.70
	Total	17.70

Total expenditure during the plan period (10 years) will be as under: -

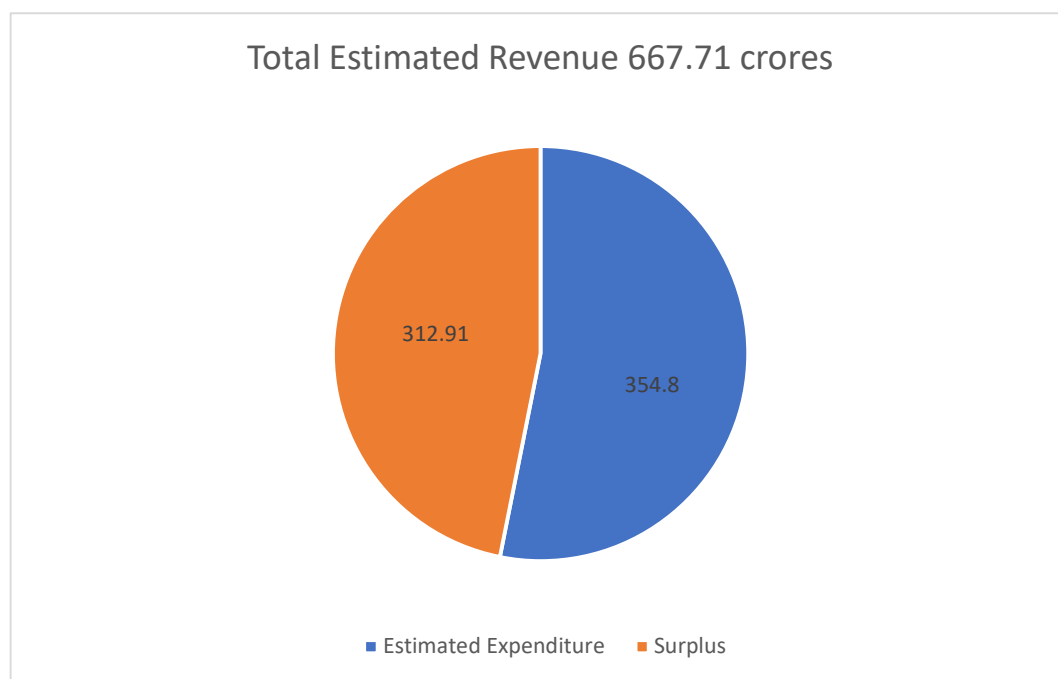
$(17.78 + 17.70) \times 10 = \text{Rs. } 354.80/-$ Crores.

20.7 FUTURE ESTIMATED SURPLUS: -

Based on the above figures of estimate revenue and expenditure, the surplus works out as under:

Table No. 20.5. Future Estimated Surplus

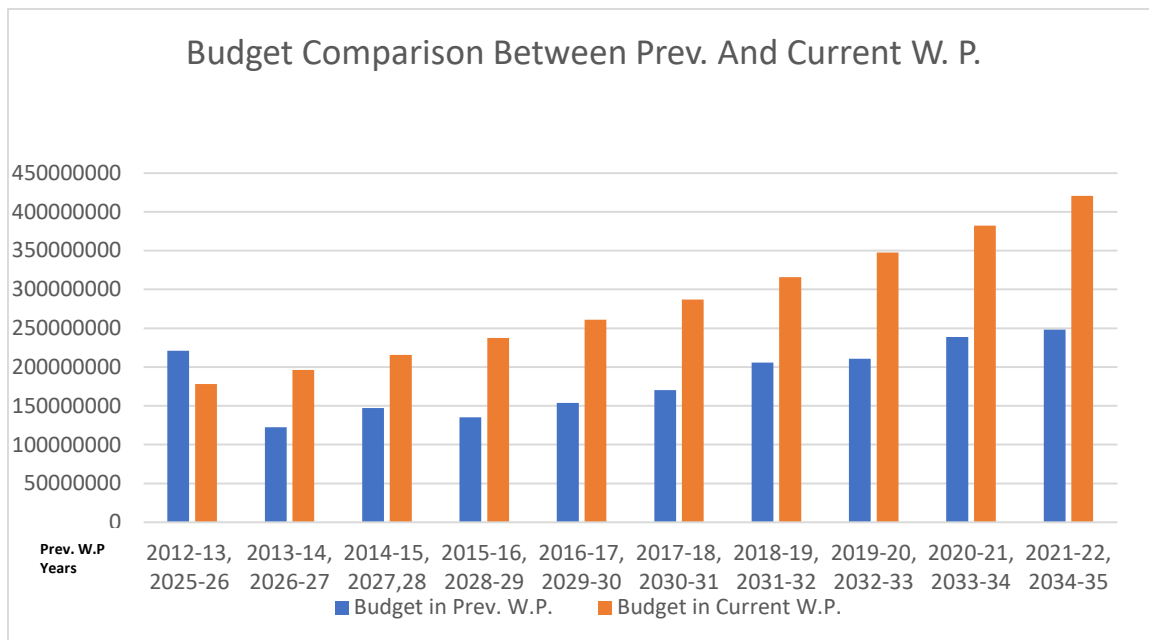
Sr. No.	Particulars	Amount in Crores
1.	Estimated Revenue	667.71
2.	Estimated Expenditure	354.80
3.	Estimated Surplus	312.91 crores



20.8 BUDGET AVAILABLE DURING THE PREVIOUS PLAN PERIOD (2012-13 TO 2021-22) AND FUTURE SOURCE OF BUDGET AND ESTIMATES: -

year	Budget and scheme for the period 2012-13 TO 2021-22			Year	Budget estimates for the current plan period i.e. 2025-26 to 2034-35		
	State schemes	CAMPA	Total		State schemes	CAMPA	Total
2012-13	101807487	119132295	220939782	2025-26	155874049	22410819	178284868

2013-14	104133580	18267796	122401376	2026-27	171461454	24651901	196113355
2014-15	109751084	37397574	147148658	2027-28	188607599	27117091	215724690
2015-16	101167925	34052839	135220764	2028-29	207468359	29828800	237297159
2016-17	120121894	33828887	153950781	2029-30	228215195	32811680	261026875
2017-18	143942831	26238997	170181828	2030-31	251036715	36092848	287129563
2018-19	160315979	45368135	205684114	2031-32	276140386	39702133	315842519
2019-20	190802818	19760964	210563782	2032-33	303754425	43672346	347426771
2020-21	201937742	36762334	238700076	2033-34	334129867	48039581	382169448
2021-22	198386168	49618570	248004738	2034-35	367542854	52843539	420386393



20.9 COST OF THE PLAN: -

The expenditure incurred on the preparation of this working plan is summarized below: -

Table No. 20.6. Cost of Plan

Sr. No	Particulars	Amount in Lacs	Remarks
1.	Pay and allowances of WPO.	Nil	No extra salary and allowances was paid.
2.	Pay and allowances of executive staff and Ministerial staff.	Nil	-do-
3.	Enumeration and other filed works including technical assistance.	12,10,000	-----
4.	Preparation/ composition and Geo Marking-digitization of stock maps of all compartments.	3,50,000/-	-----
5.	Requirement of martial.	1,50,000/-	-----
6.	Office expenditure including printing of documents and CH files.	2,99,087/-	-----
	Total	20,09,087/-	

The cost of this working Plan is insignificant keeping in view the efforts involved in the preparation of this document.

Chapter-XXI

WEED MANAGEMENT

21.1 Weed management

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. There are several factors which favour their invasion. Control measures such as mechanical,

chemical and biological measures are prescribed to control the further spread to save the rich floral diversity of the forest.

21.2 **Lantana camara** (Phul lakdi, Fulnubuti, Lantana)

This Tropical American species belongs to family Vibrionaceae. It has occupied most of the forests and non- forests areas in the sub-tropical belt and badly affecting the native floral diversity and availability of grasses. It is a perennial shrub with fragrant evergreen foliage, dark green in colour. The flowers are pink, yellow and orange

- **Interaction with animals** –The success of lantana may be attributed to the presence of a range of pollinators, accounting for high percentage of fruit set. Pollinators are Lepidopteran species and trips. The process of invasion is further augmented by nutrient additions, with animal droppings, canopy removal, and soil disturbances creating good seed bed. Lantana itself benefits from the destructive foraging activities of vertebrates, such as pigs, cattle, goats, horses, sheep, and deer, through enhanced vegetative propagation. 16.2.2 Geographical range- The plant is tolerant to Drought, heat and wind. It can grow in sandy to clayey loam soil and prefers unshaded habitats but can tolerate some shade. It is intolerant to frequent and prolonged freezing. It can sustain in wide annual rainfall range i.e., between 1000-4000 mm. thus it has the ability to consistently maintain its population over a range of environments. It can grow in slopes and exposed sites. It has wide range of phenotypic plasticity which makes it adaptable to broad range of environment.
- **Vegetative reproduction**-Once established, the rapid vegetative growth of Lantana facilitates the formation of large, impenetrable clumps and high seed production. The more common means of vegetative spread is through layering, where horizontal stems produce roots when they come in contact with soil in addition, suckering also can occur. Prostrate stems can root at the nodes if covered by moist soil, fallen leaves or other debris. Dumped Lantana stems can develop roots and grow into plants and eventually flower.
- **Fire tolerance**- Although Lantana burns readily during hot dry conditions, even when green, moderate and low intensity fires can promote the persistence and spread of Lantana thickets, rather than reducing them. After a low intensity fire, the removal of competing

neighborhood plant species and increases in soil nutrients following burning can increase its germination.

- **Competitive ability**-Under conditions of high light, soil moisture and soil nutrients, the mortality rate of mature Lantana plants in its naturalized range is very low. Lantana infestations are very persistent and, in forest communities, have the potential to block succession and displace native species, resulting in a reduction in biodiversity. At some sites, Lantana infestations have been so persistent that they impede the regeneration in forest. Lantana is a very effective competitor with native colonizers and is capable of interrupting the regeneration processes of other indigenous species by decreasing germination, reducing early growth rates, and increasing mortality. This results in marked changes in the structural and floristic composition of natural communities. Therefore, as the density of Lantana in forests increases, species richness decreases. Lantana does not invade intact forests but is found on its margins
- **Allelopathy**- The allelopathic effect of Lantana results in severe reductions in seedling recruitment of nearly all species under its cover. No growth or only stunted growth has been observed for other species growing close to Lantana due to allelopathic effects. Allelochemicals promote or inhibit the crop growth based on their concentration, and the concentration increases from root, stem to leaf, making the leaf toxic to grazing animals. Lantadene A and lantadene B as more potent allelochemicals.
- **Physical Control Measures**-The best time for removal of Lantana is just before rainy season, i.e. when the plants are not in flowering and fruiting. However, prescribed period for lantana removal in Himachal Pradesh is from 01 Nov to 31 Jan. For restoration of lantana eradicated areas broadcast sowing of grass seed is done in January and February.
- **RECOMMENDATIONS**- for lantana removal
 1. Lantana removal has both ecological and socio-economic benefits. The need is to continue efforts at removal combined with regular training and increased monitoring.
 2. Regular training of field staff in techniques of removal of Lantana viz. CRS Method, Calendar of activities and maintenance of documents.

3. Site selection should follow watershed approaches like ridge-to-valley, removing lantana from upper areas first. Larger patches of area need to be preferred. Highly infested areas need to be considered first.
4. Disposal of removed lantana needs to be strategized in an SOP for undulating and steep areas. Incentives to locals and firms need to be promoted.
5. Lantana infested areas could be mapped using satellite imagery and ground truthing by field staff. This will help in prioritising areas.
6. As Lantana removal would be an extensive activity, the need to have a portal like FONIS, to plan and monitor the lantana eradication work. It should have systems to upload kml boundaries, update registers and photographs from the site. The portal may also have a system that integrates manuals and site-specific recommendations using Artificial Intelligence.
7. During maintenance operations, weeds like Ageratum, and Eupatorium need to be removed. The norms for the removal of these should also be formulated.
8. For soil moisture conservation, trenches and other measures are recommended to prevent soil erosion and promote retention after the removal of Lantana.
9. Rehabilitation - fast-growing species to be marked specific to the site. The same needs to be raised in the nurseries.

Planning at least 3years in to the future

- a. There is a need for a proper plan to link the sites systemically to be automatically taken up for plantation in next year.
- b. Protection measures from fire, grazing, others need to be linked
- c. There is a need to create along-term plan for targeted areas where fast growing species are a part of nursery protocol. Further the species suggestions need to be provided based on forest types and local ecological conditions and needs of local people.
10. Non-Forest land surrounding Lantana removal sites need to be considered as part of treatment. Convergence with other schemes like MGNREGA and incentives to landowners as well as firms focusing on value addition of lantana needs to be promoted.

21.3 Hysterophorus- (Carrot Weed, Congress Grass, Gajarghas, Chandni)

A member of family Asteraceae and a native of Tropical America, this herb is an aggressive colonizer of degraded areas with poor ground cover and exposed soil such as agricultural fallows, wastelands, roadsides, soil dumps, overgrazed pastures and degraded forests. The species, in addition to its adverse ecological impacts, has become a serious health hazard, causing allergic reactions in human beings. The weed was first revealed in India in 1955.

- **Habitat**-This weed is spotted on bare lands, industrial areas, developing residential colonies, railway tracks, roads, drainage and around the ditch etc. High temperature is favorable for the development of this noxious weed production. Low temperature represses the development of the plant and the seed productivity. It invaded sites mostly have sandy loam soil with pH ranging from 5.4 to 7.4 and water holding capacity 16.8 to 63%.
- **Life cycle**-It can flower at any time of the year, but commonly occurs during raining season. After 24-48 days of germination flowering takes place. The best alternating temperature regime for its weed seed germination is 21/16°C (day/night). Further its seeds can live for between 4-6 years in the soil as seed bank.
- **Causes of rapid spread**- Seeds of Parthenium can survive under harsh conditions and remain viable for a long time period. These qualities of this weed help in its fast spreading. Seeds of Parthenium can germinate any time of the year, when suitable moisture is available.
- **Fast growth rate**- It is vigorously growing annual herbaceous weed. Generally, Parthenium flowered when it is only 4-8-week-old and can flower for several months. Under unfavorable conditions like salt and drought stress, the weed can complete its life cycle within 4-5 weeks.
- **Allelopathic potential**-This noxious weed suppresses the development of near by plants by allelopathy. Leachate and extract of leaves and in florescence prevent the germination and growth of associated economically important crops.
- **Unpalatable to animals**: Parthenium hysterophorus is unpalatable to the animals. Generally, animals do not eat Parthenium hysterophorus because of its bitter taste and intense odour. Earlier investigations in India had revealed its serious health hazards to the livestock in Parthenium hysterophorus invaded areas.

- **Control measures**

- a) **Mechanical measures**

- i. Controlling overgrazing: Overgrazing decreases the vigor and diversity of grassland that enable the spread of *Parthenium hysterophorus* weed luxuriously. Grazing during winter is generally safe since the period has low risk of *Parthenium* spread. However, *Parthenium* may grow and germinate in this time also.
- ii. Burning: Mass vegetation of the weed can be destroyed by this practice. But it cannot be considered as safe control strategy for the weed since there is great risk to soil, air and existing plant and animal diversity.
- iii. Manual control: Manually, weed can be controlled by simple hand plucking. But this is not recommended since it might cause serious health hazard. Further, the seeds may drop off and increase the area of infestation.

21.4 *Eupatorium adenophorum* (Crofton Weed)

Eupatorium adenophorum is a member of family Asteraceae, this shrub is a native of Mexico. It forms dense thickets in fallow and wastelands, degraded forests and forest fringes out-spacing the indigenous species. The plant also causes allergic reactions and is a potential health hazard.

It is found upto 2200 meters above mean sea level, in ravine slopes and grassy localities. The plant inhabits moist conditions, extremely aggressive competitor, especially in shaded conditions although seeds do not germination dense shade. The plant increases its competitive advantage through allelopathic action and by altering the soil microbial activity. Flowering occurs in spring and summer around 10,000 to 100,000 seeds are produced per year when mature, mid to late spring with high Germination rates. It is reported to produce seed by means of apomixes. It is therefore likely that there is limited genetic variation within populations, especially in its introduced range, which in turn may make it easier to control.

Causes for rapid spread It is perennial, fast growing and due to wide adaptability, it is able to colonize vast tracts in Himachal Pradesh. It is light demander and its seed remain

dormant in the absence of direct sun-light, continuous slashing of stem give rise to fairly thick root stock.

- **Mechanical measures**

- Manual uprooting, Mowing, cutting with machete or burning of live plants. Furthermore, at the maturity stage, uprooting of plants results in dispersal of seeds to other areas. 16.5

Ageratum conyzoides (Goat Weed, Neel-phulnu)

Ageratum conyzoides is a noxious herb, a member of family Asteraceae present in many tropical and subtropical environments. It thrives best in rich, moist, mineral soils with high humidity and tolerates shading. It may grow from sea level to at least 2400 meters in altitude. In Himachal Pradesh, India, the weed is established up to 1800 meters.

- **Lifecycle Stages**-It can complete its life cycle (germination to flowering) in less than two months. The plant flowers almost throughout the year, precisely from June to March. The seeds germinate in response to light (photoblastic) and are often no longer viable within 12 months. *A. conyzoides* has the potential to produce many seeds (94,772 seeds per plant) and to shed seeds over extended times (5 to 8 months), as well as its extraordinary physiological plasticity, has enhanced its persistence in arable fields.
- **Features imparting invasiveness**- Fast growth and rapid spread Wide ecological amplitude; High reproductive potential
- **Long flowering and fruiting periods**; Absence of natural predators/enemies/competitors; resistance to predators; Unpalatable due to high phytotoxin content; and resource competition along with novel weapons such as allelopathy.
- **Management Physical methods**- These include manual uprooting, mowing, cutting with machete or burning of live plants. In general, these are of some use when the plant is at the vegetative stage. However, certain limitations are associated with these methods, for example the high cost of labour, ill-effects on workers' health, vegetative regeneration from stolons, etc. Furthermore, at the maturity stage, uprooting of plants results in dispersal of seeds to other areas.
In conclusion *lantana* Camara, *Parthenium heterophorias*, *Eupatorium adenophorum* and *Ageratum conyzoides* are highly invasive exotic weed in subtropical and temperate forest of North Western Himalaya. *Lantana* is recorded most dominating shrub in the forest ecosystem. The main reasons of their invasion are fast growth and rapid spread, wide geographical range, high reproductive potential and allelopathic effect. Due to their allelopathic effect and gregarious habitat they affect the native biodiversity and also the regeneration process. Preventing the spread of these weed species is most cost-effective

management tool. However, various control measures (mechanical) are being undertaken throughout the world to reduce the further spread of these weeds. This would require the restriction of further importation to our country, sale and use of these weeds and strategically controlling infestations wherever it currently occurs.

CHAPTER-XXII

ENVIRONMENT AND CLIMATE CHANGE



22.1 Environment

The word environment is derived from a French word "environia" which means to surround. It refers to both abiotic (physical or non-living) and biotic (living) environment. The word environment means the environment in which living beings live. Environment and organisms are two organized and complex components of nature. Environment controls the life of living beings including humans. Humans interact with the environment more rapidly than other organisms. Generally, environment refers to the substances and forces that surround living organisms.

Environment can be defined as the surroundings or conditions in which a person, animal or plant lives or operates. The term "environment" refers to all the elements of the physical and biological world, as well as the interactions between them. Environment plays a major role in the life cycle of humans, animals and plants as their life is highly dependent on the environment. Environment is the condition in which an organism has to survive or maintain its life process. It affects the growth and development of organisms. In other words environment refers to those surroundings that surrounds living beings from all sides and

affect their lives in toto. It consists of atmosphere, hydrosphere, lithosphere and biosphere. Its chief components are soil, water, air, organisms and solar energy. It has provided us all the resources for leading a comfortable life.

Thus, environment refers to anything that is in the immediate vicinity of an object and has a direct effect on it. Our environment refers to those things or agencies that affect our daily life or activity even though we are separate from us. The environment in which man or animal is surrounded and is influenced by factors which may be natural, artificial, social, biological and psychological.

Components of the environment:

The environment mainly includes the atmosphere, hydrosphere, lithosphere and biosphere. But it can be broadly divided into two types such as (a) micro environment and (b) macro environment. It can also be divided into two other types namely (c) physical and (d) biological environment.

- a) Microenvironment means the immediate local environment of the organism.
- b) Macro environment means all those physical and biological conditions which surround the organism externally.
- c) Physical environment refers to all the abiotic factors or conditions like temperature, light, rainfall, soil, minerals etc. This includes the atmosphere, the lithosphere and the hydrosphere.
- d) Biological environment includes all biological factors or living forms such as plants, animals, micro-organisms.

22.2 What is Climate Change?

Climate change refers to changes in environmental conditions such as changes in temperature and weather patterns. This is caused by many internal and external factors. Climate change has become a global concern in the last few decades. In addition, these climate changes affect life on Earth in different ways. Climate change refers to the adverse changes in the environment and its effects on the living organisms on the earth. Earth's climate has warmed over the past two million years, for which climate change and global warming are responsible. The absurd increase in atmospheric temperature causes various drastic changes in the Earth, for example, the change of seasons. Deforestation, burning of fossil fuels and other human activities are the most important causes of global warming, which cause changes in climate. These changes that we have made to the ecosystem are not reversible. The only thing we can do is try to make the biosphere a better place to live. Because in the coming days it is predicted that the temperature of the earth will increase day by day due to which life will end and the reason for this is increasing quantity. There are signs that **rising temperatures are affecting biodiversity**, while changing rainfall patterns, extreme weather events, and ocean acidification are putting pressure on species already threatened by other human activities.

How climate change is affecting flora and fauna: -

Apart from human interference and over exploitation of natural resources, climate change is now another global factor affecting our planet's ecosystems, biodiversity and human in many ways: -

- Changes in climate and weather can force species to migrate to new areas.

- Changes in climate may threaten native species, as invasive species (both predators and competitors) expand their range.
- Species that are already threatened are highly vulnerable to environmental change, particularly vulnerable to extreme events, invasive species, disease outbreaks and further habitat loss.
- Climate change also changes the life cycle of plants and animals. Rising temperatures reduce the survival rates of many species, leading to less food, less successful breeding, and environmental interference for native wildlife.
- The effects of climate change in the Himalayan region are increasing the extinction rate of flora and fauna species, changing rainfall patterns, changing the duration and maturity of vegetation growth and the overall growth of crop plants.
- Climate change destroys the environment, especially the natural habitats on which animals rely for food, shelter and other vital resources. Local plants and animals will wither or die.
- The climate of an area affects the types of plants that grow there. Plant growth depends on rainfall and temperature. Plants may not grow well if rainfall levels are too high or too low or if temperatures are too high or too low. Vegetation influences the climate at macro and micro levels. Growing evidence suggests that undisturbed forests can help to maintain the rainfall in its immediate vicinity by recycling water vapour at a steady rate back into the atmosphere, and also through the canopy's effect in promoting atmospheric turbulence.
- The IPCC (Inter-governmental Panel on Climate Change) cautions that malicious actions can damage biodiversity and ecosystem resilience and may also disrupt ecosystem services. Warming and increased frequency, severity and duration of extreme events will put many terrestrial, freshwater, coastal and marine ecosystems at high or very high risk of biodiversity loss.

22.3 Strategy to be adopted to cope with the effects of climate change

- **Climate change adaptation planning** –Adaptation planning is a process of adjustment to the impacts of climate change, including actions taken to reduce the negative impacts of climate change, or to take advantage of emerging opportunities. Some of the most promising ways to mitigate climate change are what we call “natural climate solutions”: the **conservation, restoration, and improved management of land**, in order to increase carbon storage or avoid greenhouse-gas emissions in landscapes. We have to identify the real threat that climate change poses to species and ecosystems. How biodiversity may be affected in protected sites due to climate change needs to be identified and strategies developed to address these vulnerabilities. We have to recognize how the flora and fauna of sanctuaries are being affected by climate change and how to respond to these changes without destroying their local ecosystem.
- **Protect the habitats**– Habitat loss has significant, consistently negative effects on biodiversity. Habitat loss negatively influences biodiversity directly through its impact on species abundance, genetic diversity, species richness, species distribution, and also indirectly. Land degradation is a significant contributor to climate change. Deforestation, the destruction of wetlands and other forms of land conversion can release massive amounts of carbon into the atmosphere, which may worsen global warming. Forests are

perhaps most recognized for their role in regulating atmospheric gases (and therefore climate), nearly all ecosystems play a role in the storage of carbon, from grasslands and soils to rivers and oceans. There is therefore a need to protect threatened species and ecosystems with the added benefit of preserving these carbon reserves, and ensuring that they function healthily and perform this important service. Animals and their interactions increase the amount of carbon stored in soils and trees. When carbon is stored, this helps to slow down climate change, because that carbon is removed from the atmosphere. But animal populations worldwide are decreasing. There is need to control or restrict over grazing and over exploitation of the natural resources of the protected areas by the surrounding dwellers/villagers for sustainability. Aware and help them with alternative livelihood and resources. Habitat loss is the single greatest threat to biodiversity on Earth today and in fact it is the second largest threat to our existence on this planet next to Climate Change.

- **Scientific guidance, consultation of the experts-** Biodiversity is affected by climate change at different levels from low land to high mountains and from small rivers to deep seas. Some species have become extinct while others are endangered. Extinctions can disrupt fundamental ecological processes. So from time to time requires field survey, monitoring of the biodiversity & habitat status of the protected area for updating with scientific reports by the experts (ecologists, field biologists, scientists, etc) for sustainable habitat protection and management of the protected areas. This scientific data will be very useful for studying the impact of climate change and based on this data future planning of protected area can be done. Field staff also needs education, training, and conservation awareness.

Destroying natural ecosystems, especially various types of forests, and then trying to compensate for this loss by poor planning is an example of how our approach to mitigating climate change is causing more problems. That is why we need good and scientific planning to reduce climate impact. Regular studies especially through experts would be conducted in protected areas to study the impact of climate change.

Chapter-XXIII

Establishment and Labour

23.1 Establishment: -

The existing Ranges, Blocks and Beats have been given in Chapter 1 of Part-I. The staff position is indicated in Chapter 9 i.e. 9.10 of Part-I which is fairly adequate. However, to strengthen the check posts, the check posts are required to be equipped with CCTV cameras, hand held Tablets to scan permits issued on NTPS. There is a vacancy of Field staff in field at FG & BO level which needs to be filled up in a timely manner. The *Van Mitras*, one per beat are being recruited which will be deployed for all forest protection duties within the beats. To enable the Range staff to devote more time for field job, it is necessary to provide one Range clerk and Patwari in each range. Ranges must also be provided with one vehicle for patrolling and efficient protection of forests. One additional vehicle must be provided to sensitive ranges. Provision of a GIS expert and an ADA/Govt. empaneled lawyers be made at division office.

23.2 Labour: -

There is no specific problem with regard to labour as such.

SHRUBS



Ampelocissus latifolia (Roxb.) Planch.



Antidesma indicum Retz.



Bismiana decapetala (Roth) O.Deg.



Calotropis procera (Aiton) W.L.Aiton



Carissa spinarum L.



Helicteres isora L.



Mimosa rubicandis Lam.



Woodfordia fruticosa (L.) Kurz



Albizia julibrissin DuRoi.



Albizia lebbekii (L.) Benth.



Albizia odoratissima (L.f.) Benth.



Albizia procera (Roxb.) Benth.



@vaneet_jshu

Butea monosperma (Lam.) Kuntze.



Cassia fistula L.



Cordia vestita (A.DC.) Hook.f. & Thomson



Oxyginis oxyginensis (Roxb.) Hochr.

TREES



Bauhinia variegata L.



Bridelia retusa (L.) A.Juss.



Erythrina variegata L.



Ehretia acuminata R.Br.



Ehretia aspera Willd.



Ficus hispida L.f.



Kydia calycina Roxb.



Wrightia arborea (Dennst.) Mabb.