GOVERNMENT OF HIMACHAL PRADESH
FOREST DEPARTMENT

REVISED WORKING PLAN

OF

NALAGARH FOREST DIVISION

FOR THE PERIOD

2012-13 TO 2026-27

Volume-I

By

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INTRODUCTION

The revised working plan of Nalagarh/Kunihar Forest Divisions was prepared for the year 1991-2006 by Shri V.K.Singh, IFS, in which he had made sincere efforts to segregate the data of both the divisions. Prior to this the forests of Nalagarh Division were dealt by Bajaj's Plan, Mathauda's Plan & Shagotar's Plan and prescribed felling in different working circles as per actual requirement and the needs of the people. Nalagarh Forest Division consists of 706.13 Sq Kms. of geographical area which covers 102.33 Sq Kms. of DPFs. The main emphasis of the prescription of this working plan is for the conservation of Chil forests for its sustainable use in chil working circle and improving of the forest area by planting economically viable species in other working circles to improve the existing forests.

The work of revision of this working plan was started about six months back, but the spade work for the collection of data for the preparation of PWPR had been initiated much before that. The growing stock of all the forests has been ascertained by taking 100% enumeration in PB-I and PB-IV areas and approximately 10-18% enumeration works were carried out in PB-Inter of chil working circle and in other working circles.

New chapter on Five Year Plan, Activities of H.P.S.F.D.C. Ltd., Bhabbar Grass Management etc. have been discussed. All out efforts have been made to make this plan as per the requirement of Govt. of India within the ambit of National Working Plan Code-2004.

The prescriptions laid out in this working plan is quite detailed and exhaustive and will be of great help and convenience to the staff in day to day forestry operations and future planning as well.

The efforts made by the staff of this division especially AWPO Nalagarh would not have yielded much result without the able guidance/support of Pr. CCF, HP. Shimla and his officers.

WPO NALAGARH

Glossary of local and botanical names of common plants

Local Name	Botanical Name
A – TREES	
Aam	Mangifera indica
Amaltas	Cassia fistula
Anwala	Emblica officinalis
Bahera	Terminalia balerica
Ban	Quercus incana
Bans	Dendrocalamus strictus
Bar	Ficus bengalensis
Barnasi	Feronia limonia
Bel	Aegle marmelos
Beli	Limonia acidissima
Chamror	Ehretia laevis
Chhal	Anogeissus latifolia
Chil	Pinus roxburghii
Darek	Melia azadirachta
Dauri	Toona serrata
Deodar	Cedrus deodara
Dhak	Butea monosperma
Dhamman	Grewia oppositifolia
Dhaul	Erythrina suberosa
Dhauri	Lagerstroemia parviflora
Fafura	Ficus palmata
Fagura	Ficus recemosa

Gamhar	Treqia nudiflora
Harad	Terminalia chebula
Jamun	Syzygium cumini
Jhingan	Lannea coromandelica
Kachnar	Bauhinia variegata
Kahu	Olea cuspidata
Kail	Pinus wallichiana
Kaimb	Mitragyna parviflora
Kakari	Pistacia integerrima
Kala siris	Albizzia odoratissima
Kamela	Mallotus philippinensis
Kangu	Flacourtia indica
Kath ber	Zizyphus mauritiana
Khair	Acacia catechu
Khajur	Phoenix humilis
Khaksa	Cornus macrophyla
Khirk	Celtis austrailis
Kusum	Schelicher aleosa
Major phalli	Holarrhena antidysenterica
Palang	Acer oblongum
Pandayan	Ehretia serrata
Phaldu	Mitragyna parviflora
Pipal	Ficus religiosa
Popular	Populus ciliata
Pula	Kydia calycina
Ritha	Sapindus mukurossi

Safed siris	Albizzia lebbek
Safeda	Eucalyptus sps.
Sain	Terminalia tomentosa
Sandan	Ougeinia oojeinensis
Sanjana	Moringa oleifera
Saru	Cupresus torulosa
Semal	Bombax ceiba
Shahtoot	Morus alba
Shisham	Dalbergia sissoo
Tittri	Rhus punjabensis
Toon	Cedrela toona

B – SHRUBS AND HERBS

Alai	Caesalpinia decapetala
Anchhu	Rubus ellipticus
Ban nimbu	Glycosmis pentaphylla
Ban gulab	Rosa moschata
Ban chameli	Jasminum humile
Ban tambaku, Bhut kataia	Solanum indicum
Bans	Bambusa arundinacea
Banwan	Myrsine africana
BAsuti, Arusa	Adhatoda vasica
Bekhal	Prinsepia utilis
Bhang	Cannabis sativa
Binda	Colebrookia oppositifolia
Charmar	Artemisia vulgaris
Chilla	Casearia tomentosa

Dhatura	Datura suaveolens
Dhau	Woodfordia fruticosa
Gandhela	Murraya koenigii
Harshingar	Nyctanthes arbortristis
Kali kathi	Indigogera hirsuta
Karaunda	Carissa spinarim
Kashmal	Berberis lycium
Keor	Holarrhena antidysenterica
Kingora	Berberis asiatica
Lantana, Phulnu	Lantana camara
Mithiari	Hedera helix
Nil, Kali kathi	Indigofera pulchella
Panibel	Vitis parviflora
Panwar	Cassia tora
Ruinsh	Cotoneaster bacillaris
Safed kathi	Desmodium tiliaefolium
Saun	Crotalaria albida
Taur	Bauinia vahlii
Thor	Euphorbia royleana
Trimal	Zanthoxylum alatum
White Jasmine	Jasminum offcinale

C – GRASSES

Bhabhar	Eulaliopsis binata
Dhaulu	Chrysopogon fulvus
Dub	Cynodon dactylon

Kans	Sachharum spontneum
Lamb	Heteropogon contortus
Makora	Cymbopogon martinii
Munj	Saccharum munja

LOCAL NAME & BOTANICAL NAME OF MEDICINAL PLANTS

Sr.No.	Botanical Name	Local/Common Name
1	Acacia catechu	Khair
2	Acacia nilotica	Kikar
3	Achyranthes aspera	Chirchitta, Puth kanda
4	Acorus calamus	Bach
5	Adhatoda vasica	Basooti
6	Aegle marmelos	Bel, Shriphala
7	Albizia lebbeck	Kala siris
8	Aloe vera	Gwar patha
9	Alstonia scholaris	Chitvan, Devil's tree
10	Andrographis paniculata	Kalmegh
11	Anogeissus latifolia	Chhal, Axel wood
12	Anthocephalus cadamba	Kadam
13	Artocarpus heterophyllus	Kathal, Jack fruit tree
14	Asparagus adscendens	Shatawar
15	Asparagus racemosus	Shatawari
16	Azadirachta indica	Neem
17	Bacopa monnieri	Brahmi butti
18	Bambusa arundinacea	Bamboo, Bans
19	Bambusa vulgaris	Yellow Bamboo
20	Bombax ceiba	Semal
21	Butea monosperma	Dhak,Flame of the forest
22	Calotropis procera	Aak
23	Carica papaya	Papaya

Sr.No.	Botanical Name	Local/Common Name
24	Carrissa opaca	Karonda, Garna
25	Casuarina equisetifolia	Vilayati Saru, Beef wood tree
26	Celastrus paniculata	Malkanghni
27	Centella asiatica	Brahmi, Mandukparni
28	Cestrum nocturnum	Raat ki rani
29	Cynodon dactylon	Dub
30	Dalbergia sissoo	Shisham, Rose wood tree
31	Delonix regia	Lal gulmohar
32	Dendrocalamus giganteus	Giant Bamboo
33	Dendrocalamus hamiltonii	Magar
34	Desmostachya bipinnata	Kush
35	Dodonaea viscosa	Mehndu
36	Duranta repens	Neelkanthi
37	Dioscoreya deltoidea	Singli-Mingli
38	Eclipta alba	Bhringraj
39	Elaeocarpus sphaericus	Rudraksh
40	Emblica officinalis	Amla
41	Eucalyptus hybrid	Safeda
42	Euphorbia antiquorum	Bajr kantak
43	Euphorbia royleana	Thor
44	Ficus benghalensis	Bargad,Banyan tree
45	Ficus benjamina	Java,fig, Golden fig
46	Ficus religiosa	Pipal
47	Grevillea robusta	Silver oak

Sr.No.	Botanical Name	Local/Common Name
48	Jacaranda mimosfolia	Neeli gulmohar
49	Lagrestroemia indica	Harshingar, Crepe flower
50	Lannea coromandelica	Jhingan
51	Melia azedarach	Darek, Bead tree
52	Michelia champaca	Champak
53	Mimosa pudica	Lajwanti
54	Murraya koenigii	Gandella, Kadi patta
55	Nerium indicum	Kaner
56	Nerium odorum	Oliender
57	Nyctanthes arbor-tristis	Har Singhar
58	Ocimum bailicum	Kali tulsi, Sweet Basil
59	Ocimum grattisimum	Lemon tulsi, Ram tulsi
60	Ocimum sanctum	Puja Tulsi, Holy Bisel
61	Oroxylum indicum	Tat palanga, Aralu,Sheyo-nak
62	Oliya grandifoliya	Jharinu
63	Papaya coorge	Papaya
64	Piper longum	Piplee, Maga
65	Plumbago zeylanica	Chitrak
66	Polyalthia longifolia	Asoka, Indian fir
67	Populus ciliata	Himalayan popular
68	Prosopis cineraria	Khejri, Jand
69	Pterospermum acerifolium	Kanak champa
70	Punica granatum	Anar
71	Santalum album	Chandan

Sr.No.	Botanical Name	Local/Common Name
72	Sapindus mukorossi	Ritha
73	Sapium sebiferum	Valaite shisham
74	Saraca longifolia	Ashoka
75	Schleichera oleosa	Kusum
76	Spilanthes acemella	Akarkara
77	Stevia rebaudiana	Madhupatri
78	Syzygium cumini	Jamun
79	Tamarindus indica	Imli
80	Tectma grandis	Teak
81	Terminalia arjuna	Arjuna
82	Terminalia bellirica	Bhera
83	Terminalia chebula	Harad
84	Tinospora malabarica	Gloe
85	Toona ciliata	Toon
86	Tylophora indica	Damabooti
87	Vetiver zizanioides	Khus
88	Withania somnifera	Ashwagandha

A. GAME ANIMALS

CARNIVORA:

Panther (tendua, bagh) – Panthera pardus

HERBIVORA:

Deer group

1. The Barking deer (kakar) Muntiacus muntijac

Pigs

1. The Indian wild bore (jungle suar) – Sus scrofa

RODENTS

1. The Indian hare (khargosh) – Lepus nigricollis

2. The Indian Porcupine (sayal or sahi) – Hystrix indica

B. NON-GAME ANIMALS

1. The Indian fox (lomri) – Vulpes bengalensis

2. The Jackal (gidhar) – Canis aureus:.

3. The Jungle cat (jangli billi orban billi) – Felis chaus

4. The Common Mongoose (neola) – Herpestes edwardis.

5. The Monkeys (bandar) – Macaca mulatta:

6. The common Langur (langur, hanuman) – Presbytis entellus

2.4.2 Birds:

Game Birds

Land Birds

Pheasants and Fowl group

1. The Red jungle fowl (jungle murga) – Gallus gallus

2. The Common peafowl (mor) – Pavo cristatus:

Partridges and Quails group

1. The Grey Partridge (teetar) – Francolinus pondicerianus

.2. The Black Partridge (kala teetar) – Francolinus francolinus:

3. Jungle Bush Quil (bater) – Perdicula asiatica:

.

Doves and Pigeons group

1. The Blue Rock Pigeon (kabutar) – Columba livia:

2. Dove (ghughi) – Streptopelia spp:

Aquatic Birds:-

1. Indian Moorhen (jal murgi) – Gallinula chloropus

2. White breasted Water (dahuk) – Amaurornis phoenicurus:

Non Game Birds:

Crows, King crows, Tree pies, Magpies, Jays and Nut crackers are some of the main birds of this category which are found commonly in the tract. Vultures, Eagles, Kites and Falcons are the common scavengers found in the area. In addition to this the owls, thrushes, babblers, flycatchers, finches, sparrows buntings, woodpeckers, tree creepers, barbets, bulbuls, tits, parakeets, wagtails and hill myna etc. are also found in the divisions and are important from aesthetic, forest cleanliness, health, farming and bird watching points of view.

2. Reptiles

Snakes

1. The Rat Snake – Ptyas mocosus:

2. The common India Krait – Bungarus caeruleus

.3. The Himalayan Pit Viper – Ancistrodon himalayanus

4. The Indian Cobra – Naja naja:

Lizards

1. The Common Indian Monitor – Varnus monitor:.

2. The Common House Lizard – Gecko hemidactalus:

Glossary of vernacular terms

Local terms	English terms
Abadi	A village habitation.
Ara-ul-dust	A kind of official letter.
Balli	A round pole having a diameter of 10 to 30 cm at butt.
Bartan	Rights of users.
Bartandar	An individual who enjoys rights in forest.
Baoli	A small water spring.
Banjar	Waste land
Banjar Kadim	A field lying fallow for more than four years.
Banjar jaded	A field lying fallow for less than four years.
Chak	Included cultivation.
Chal	Second year's shoot of bamboo.
Chowkidar	Watchman.
Coolie	Labourer.
Charand	Grazing land.
Chhang	Lopping.
Chhattaan	Thinning.
Dhar	A Ridge.
Devta	A local diety.
Dochi or dogri	Temporary field residence.
Darat	Sickle used for lopping purpose.
Dehat	Village.
Dhulaan	Manual carriage.
Dhulanee	Labour used for manual carriage.

Dimdima	An odd size of wood roughly axed.
Gaddies	The professional shepherds of Chamba, Kangra and Kinnaur.
Ghal	Timber floating in stream or river.
Ghalu	Labour engaged on floating of timber.
Ghasni	Grass land.
Gharat	Water flour mill.
Ghat	A saddle in a hill.
Gairmumkin	Land under building, roads or streams.
Gorkha labour	Labour from Nepal.
Gujjar	A professional nomadic buffalo grazier.
Gar morusi	Non hereditary rights.
Kakries	Small triangular piece of wood.
Hadbas number	Serial number allotted to a village at the time of Revenue Settlement.
Illaqua	Locality.
Ijlas-ul-khas	Special court in Pepsu State.
Jamabandi	Record of land maintained by Revenue Department.
Jungle Mehfuza	Reserved forest.
Jughti	Torch wood.
Jungle Mehdooda	Demarcated protected forest.
Kanaits	Rajputs.
Kanungo	A revenue official immediately above Patwari
Kiar	Irrigated field in which generally paddy is grown.
Kilta	A conical basket for carrying materials.
Khad	A small stream.

Kokat	Miscellaneous inferior tree species.
Karam	A linear measurement unit equal to 146.05 cms.
Katha	A tennin extracted from heart wood of Khair trees.
Mandi	Market.
Morusi	Hereditary right.
Mehkama Jangalat	Forest Department.
Makbooza	In possession.
Misal haqaiyat	Revenue document containing information regarding customs, rights and concessions.
Muslajir	Lease holder.
Mauza	A unit of revenue administration.
Majdoor	Labourer.
Mohal	Revenue estate.
Muawza	Compensation.
Manu	Current year’s shoot of bamboo.
Nala	Water source.
Nadi	River.
Nautor	Land granted for fresh cultivation.
Nazrana	A fee leviable on the fresh breaking up of land.
Panchayat	A village council.
Parao	Halting place.
Rakha	Keeper or watchman.
Rawana	Permit for exporting forest produce.
Sahukar	Money lender.
Shamlat	Village common land.

Samudha	A category of timber for sale purpose which only included the best grades of timber.
Sehada	Tri junction pillar of three Mauzas.
Tal	Lake.
Tibba	Hillock.
Wazib-ul-arz	Regulation regarding land rights, etc.
Zamindar	Owner of land assessed to land revenue.
Zamindari	Land assessed to land revenue of which owner is the sole proprietor.

PART-I

SUMMARY OF FACTS ON WHICH THE PROPOSALS ARE BASED

CHAPTER – I

THE TRACT DEALT WITH

1.1 Name and Situation:

This Working Plan covers the forests of Nalagarh Forest Divisions. It is a revision of Revised Working Plan of Kunihar & Nalagarh Forest Divisions (1991-92 to 2005-06) by Shri Vijay Kumar Singh, IFS. During the year 1984 the Kunihar forest Division was divided into Kunihar and Nalagarh Forest divisions. However, two divisions were again merged during April 1992 by transferring the area of Kunihar Forest Division to Nalagarh forest division and making Kunihar an overlapping social forestry Division. During April 1993 reorganization took place, when Kunihar Social forestry Division was abolished and status quo of erstwhile Kunihar and Nalagarh divisions was maintained. This working plan covers the territorial jurisdiction of present Nalagarh Division. All efforts have been taken care for the future planning of the demarcated forest areas (covering more than 10000 hectares) and Shamlat areas (constitute more than 15000 Hectares) as well.

1.1.1 Nalagarh Forest Division covers Nalagarh Tehsil of erstwhile Nalagarh state of Solan Distt. It is bounded on the north by Bilaspur Forest Division, on the east by Kunihar forest Division on the south by Panchkula district of Haryana state and on the west by Ropar District of Punjab state. The entire area of the division lies between 76^0-40'-35" to76^0-54'-10" East Longitude and 30^0 -52'-30" and 31^0-14'-25" North Latitude.

1.1.2 The total geographical area of Nalagarh Forest Division is 706.13 Sq. Kms, forest Area is 102.33 Sq. Kms and the forest area is 14.5% of the geographical area.

1.1.3 The headquarters of Nalagarh Forest Division is at Nalagarh. All weather roads connect divisional headquarters with Shimla, Bilaspur, Solan, and Chandigarh. A National highway 21A also passes through Nalagarh Forest Division. The Division is further divided into four ranges namely Nalagarh, Baddi, Ramshahr and Kohu.

1.2 Configuration of ground:

The altitude of the tract varies from 300 meters to 1200 meters above mean sea level. However, major portions are below 1000 meters. Slopes vary from gentle to

precipitous. At lower elevation the terrain is flat to undulating whereas it is gentle to moderate and precipitous in the catchments of Ghamber Khad along the Sutlaj River.

The general direction of main hill range is North West to South East whereas many sides' spurs run in all directions. The Shiwalik hills in the west are immensely rugged and form ravines which is locally known as Khols.

1.3. Geology, Rock and Soil:

1.3.1 The main geological formations in this tract are as under:-

Formations	**Age**
Terraces Alluvium	Quarternary
Shiwalik group	Pliocene to Middle Miocene.

1.3.2 *Shiwalik Group:*

These are divided into four different stages as described below:-

a. *Kundlu Stage:*

The name is after the name of village Kundlu. This stages forms the lower stage of the Shiwalik exposed in the area. This stage occurs in the anticline valleys east of Nalagarh town.

b. *Nalagarh stage:*

Kundlu stage is overlained by Nalagarh stage which comprises of sandstone largely micaceous and forms major feature, running north form Nalagarh town. The top zone of this stage consists of maroon clays and buff sandy clays all alternating rhythmically with a few fossil fragments in places.

c. *Sutlaj stage:*

It overlies the Nalagarh stage and has exposed sandstones in NW of Riwalsar. The massive beds of sandstone up to 16 meters and more in thickness are interbeded with bright clay bands. The sandstone is gray or of light brown color forming the topmost horizon of the lower Shiwaliks.

d. *Middle Shiwalik:*

These consist of brown to whitish colored sandstone and bright colored clays. In the east they are cut by the Gambhar Thrust, which has brought older rocks over them. Their western boundary is also affected by a fault in this area.

1.3.3 SOIL:

Soil varies from sandy loam to clayey. It is generally dry, shallow and deficient in organic maters. However, on the dip-slopes, the depth is good unlike on the scarp and along tops of ridges and spurs in the Sirsa valley, the soil is deep alluvium.

The effect of geology and soil on the distribution of Agricultural crops / vegetation growing on different types of soil in Nalagarh Forest Division is depicted in the Table 1.1

Table 1.1

Sr.No.	Particulars	Type of Soil	Type of vegetation growing on such Soil.
1	Nalagarh & Around	Clay	Soyabean, Maize, Paddy, Wheat, Mash, Bean, Peas & Radish etc.
2	Baddi & Around	Sanday clay	Ground nut, Til Ginger, Termeric, Paddy, Wheat & Peas.
3	Ramshehar & Around	Sandy & loam	Tomato, Capsicum,Peas, Couliflowers, Cabagge, Ginger, Lady finger & Maize.
4	Kohu & Around		Tomato, Capsicum, Peas, Ginger & Termeric.

1.4 Climate:

The climate is mainly subtropical in the lower reaches and temperate in the upper reaches. Winter, summer, rain and autumn season are well marked.

Droughts are frequent from middle of April to the monsoon. There is deficiency of water for cattle and human population. The ponds go dry and water has to be carried out form long distances particularly in lower tract. Only a few places in high hills have perennial springs.

The figures for monthly average rainfall, rainy days, maximum & minimum temperature and Monthly average Sunshine hour for the period 1991-2010 are adopted as per the metrological data of Y. S. Parmar University of Horticulture & Forestry, Nauni for Nalagarh Forest Division, are given in the Table 1.2 to 1.6

Table 1.2

Monthly average Rainfall Data (mm) for the period Jan 1991 to December 2010

Month	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Jan	8.4	142.8	117.6	43.6	77.0	96.6	54.0	15.1	195.0	64.7	25.8	26.4	39.6	112.4	67.8	68.0	Nil	44.1	21.3	11.5
Feb	84.6	71.3	66.4	106.2	92.7	110.6	15.0	87.1	17.3	121.5	5.0	101.8	101.6	9.4	142.4	4.4	228.0	31.0	29.3	97.0
Mar	85.4	52.4	107.8	4.6	60.7	88.4	58.6	125.5	15.6	5.8	56.4	119.4	57.6	0.0	56.9	106.7	174.0	0.0	43.2	1.0
Apr	67.6	10.0	5.2	85.8	38.8	4.6	129.2	46.6	0.0	59.4	55.0	89.4	43.4	35.0	5.0	24.6	6.2	38.4	26.5	2.7
May	51.0	39.2	49.0	23.8	4.0	26.6	60.4	63.0	196.3	119.0	68.2	26.6	33.0	64.8	11.4	78.8	19.6	95.9	30.2	48.2
Jun	80.3	148.8	130.0	121.6	95.4	176.2	94.2	185.1	133.4	392.5	320.2	92.6	102.6	91.8	27.0	103.4	86.0	261.5	37.3	168.8
Jul	182.2	158.1	305.8	246.4	350.1	85.2	69.5	206.4	462.2	587.9	155.6	118.4	318.2	87.2	368.6	243.9	111.1	120.2	183.1	484.6
Aug	272.4	315.8	45.0	210.2	465.4	353.2	422.0	100.8	148.2	109.3	210.8	302	192.4	339.6	58.2	252.2	342.6	243.3	67.5	171.4
Sep	114.4	172.7	183.4	57.6	235.2	198.2	43.2	199.7	149.4	9.9	1.0	230.6	131.0	88.8	157.6	47.8	59.8	348.9	408.0	346.6
Oct	13.0	0.0	0.0	57.6	0.0	36.8	45.6	264.0	0.0	0.0	0.0	15.0	0.0	95.8	0.0	9.4	52.8	13.5	2.2	41.7
Nov	0.0	24.6	9.3	3.4	4.6	0.0	59.2	0.0	0.0	0.0	0.0	0.0	4.8	4.0	0.0	14.2	0.0	5.4	14.7	21.8
Dec	97.2	0.0	0.0	19.1	8.8	3.4	85.2	0.0	3.0	0.0	12.4	0.4	37.0	6.0	11.4	16.0	10.0	8.7	0.0	70.2

Table 1.3

Monthly Rainy days for the period 1991-2010

year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Jan	4	7	10	4	6	7	4	5	10	7	3	3	4	5	9	4	0	4	4	2
Feb	7	5	7	6	9	6	5	7	3	6	1	6	6	1	9	2	10	6	1	5
Mar	9	6	10	2	7	8	9	7	3	5	3	6	5	0	8	10	8	0	5	1
April	4	2	2	8	7	4	12	5	0	3	5	4	4	5	2	2	1	5	4	1
May	4	3	6	4	1	5	9	5	13	8	6	2	3	3	2	7	4	12	6	3
June	9	9	12	7	7	4	11	8	11	11	13	9	6	11	5	11	10	20	4	10
July	13	20	14	16	23	8	14	15	17	16	13	7	16	10	20	19	10	13	11	22
Aug	18	8	7	18	23	17	18	14	13	9	9	6	9	14	7	19	13	18	8	23
Sep	5	9	11	7	7	10	7	10	7	5	0	10	7	3	10	7	6	6	10	16
Oct	1	0	0	1	0	3	9	3	0	0	0	2	0	6	0	3	0	3	1	2
Nov	0	3	1	0	1	0	5	0	0	0	0	0	1	2	0	2	0	1	3	2
Dec	5	0	0	4	1	1	5	0	1	0	1	0	2	1	1	5	3	2	0	2

Table 1.4

Monthly average maximum temperature (^{0}C) for the period Jan 1991 to December 2010

Month	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Jan	16.0	16.0	15.7	17.9	15.5	16.4	17.4	17.6	17.9	18.7	19.8	18.2	19.9	20.6	21.6	17.2	21.0	19.8	17.9	18.0
Feb	17.5	16.8	20.6	17.4	17.2	18.8	18.1	18.7	22.5	17.0	22.6	19.5	19.6	21.1	18.8	20.0	30.6	19.9	22.4	17.9
Mar	21.6	20.8	20.2	24.9	21.9	22.8	22.8	20.8	25.6	22.6	24.5	24.4	23.5	23.9	23.9	27.2	24.9	26.8	28.6	24.0
Apr	25.1	26.6	27.5	24.7	26.1	27.5	24.5	28.3	32.3	30.8	27.8	29.0	29.2	29.2	30.9	29.1	28.8	31.8	30.9	28.5
May	31.3	29.7	32.8	32.4	32.2	31.2	29.2	32.3	31.7	32.3	31.7	33.3	31.8	32.1	33.2	30.0	30.8	32.5	33.1	31.9
Jun	30.6	30.9	31.5	32.3	33.8	30.0	29.5	31.5	30.4	28.6	28.4	31.4	33.0	31.4	32.5	27.5	33.3	39.3	30.5	34.9
Jul	30.9	28.0	27.5	27.5	27.8	28.2	29.5	29.4	28.2	27.3	28.5	30.6	28.7	29.0	30.4	28.8	29.0	27.7	20.4	29.0
Aug	27.2	27.5	29.1	27.0	26.1	27.2	27.0	28.3	28.3	28.7	28.4	27.9	28.8	29.0	29.0	27.9	28.4	27.7	27.9	29.0
Sep	27.8	27.7	26.5	27.3	27.3	27.2	27.5	27.2	27.9	28.5	29.8	26.6	28.1	29.6	28.1	27.6	27.1	26.9	31.0	29.1
Oct	25.8	26.5	26.5	26.0	26.5	26.1	22.7	26.4	27.4	28.2	28.1	26.4	27.8	28.1	28.4	27.0	26.2	27.1	25.3	27.1
Nov	21.2	22.1	23.9	22.7	23.2	23.3	20.6	24.4	24.7	23.3	24.5	23.9	23.6	24..2	25.0	25.2	22.2	24.4	23.8	24.6
Dec	17.8	20.5	21.0	18.8	18.5	20.9	17.1	23.0	21.8	22.0	21.0	20.7	20.6	21.7	22.3	24.0	19.2	19.9	22.5	21.8

Table 1.5

Monthly average minimum temperature (^{0}C) for the period Jan 1991 to December 2010

Month	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Jan	1.7	3.8	2.2	3.8	1.6	1.9	1.0	2.4	2.5	3.7	1.8	2.3	3.4	1.2	2.4	2.3	1.5	1.8	2.7	2.7
Feb	4.8	3.2	5.8	3.3	3.9	4.7	2.7	4.8	5.2	2.4	4.3	4.5	7.8	4.8	4.0	3.0	3.7	5.0	4.7	4.7
Mar	8.2	8.2	6.2	9.5	7.3	9.2	8.3	5.8	8.0	7.7	8.0	8.8	8.2	7.5	8.9	8.4	9.3	8.4	10.1	8.5
Apr	11.1	11.8	11.3	10.4	10.2	12.3	10.9	11.2	13.5	13.1	13.0	12.9	12.2	13.3	12.5	16.6	13.8	12.4	14.1	11.2
May	16.3	15.1	16.3	15.7	16.7	15.7	13.9	15.6	16.9	17.8	17.2	17.0	17.3	16.7	15.1	15.9	16.3	15.4	16	15.3
Jun	18.3	17.8	19.5	19.1	20.0	18.4	17.3	18.5	18.0	18.4	18.6	19.1	17.9	19.1	18.7	18.5	18.3	19.7	17.8	19.0
Jul	20.2	19.4	19.9	20.5	20.2	20.0	20.5	20.4	20.0	20.0	20.7	20.2	20.9	20.0	20.2	19.5	20.5	20.5	19.6	20.3
Aug	19.9	19.9	19.5	20.2	24.2	19.7	19.4	19.4	19.2	19.7	20.2	19.9	19.8	20.0	19.7	18.8	20.2	20.1	19.2	19.4
Sep	17.3	16.7	17.3	16.6	16.3	17.0	16.9	17.9	17.9	16.0	15.2	15.4	16.6	17.7	15.8	15.6	17.3	18.3	16.6	17.8
Oct	9.7	10.4	9.2	9.9	11.1	9.7	9.6	12.6	10.3	10.8	11.2	10.0	11.3	9.2	10.9	9.7	10.5	9.5	10.4	10.4
Nov	5.2	6.6	6.2	6.1	5.8	5.0	6.4	6.3	5.6	7.2	6.6	6.1	6.7	5.1	5.9	5.0	6.1	4.9	5.9	5.0
Dec	3.5	2.9	3.0	3.8	3.8	1.3	2.9	2.2	2.6	2.7	3.6	3.5	3.5	2.3	4.0	1.9	1.2	3.5	4.1	1.4

Table 1.6

Monthly average Sunshine hour for the period 1991-2010

year	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Jan	6.9	5.6	5.7	6.0	6.3	6.3	6.7	6.6	0	0	7.8	6.7	7.3	5.7	6.0	6.0	7.6	4.7	5.7	6.7
Feb	6.0	7.7	6.8	6.9	6.1	6.7	7.7	6.0	0	0	7.3	5.9	6.5	7.8	3.8	6.0	4.2	6.5	7.8	6.4
Mar	6.8	6.2	6.9	8.4	7.4	6.7	6.0	6.8	0	0	8.1	8.4	7.6	9.1	6.8	6.6	8.2	8.3	7.4	8.1
April	8.0	8.5	-	7.8	8.2	9.0	8.2	8.6	0	0	8.1	8.1	8.7	6.5	8.2	7.2	9.5	-	9.2	7.2
May	9.9	9.7	9.6	9.9	8.6	9.6	9.1	9.2	0	0	9.3	9.7	9.8	9.7	8.7	7.7	8.2	6.3	5.5	7.1
June	8.9	7.4	8.6	7.7	8.7	5.4	5.5	3.4	0	0	5.1	6.5	6.8	6.6	4.2	5.9	5.3	1.6	7.9	6.1
July	7.1	4.4	5.1	3.4	4.0	4.9	4.,4	0	0	0	4.2	7.3	4.1	6.2	2.7	2.8	4.3	3.3	4.8	2.4
Aug	4.4	4.5	7.7	3.4	2.6	3.6	4.2	0	0	5.7	5.9	3.8	4.3	3.7	6.5	3.7	3.3	4.0	5.1	2.4
Sep	7.4	7.0	6.0	6.8	7.7	6.1	6.6	0	0	7.7	9.0	6.6	5.1	7.2	4.8	7.0	5.7	7.4	6.5	4.3
Oct	9.8	9.3	10.2	9.4	8.8	9.3	6.0	0	0	9.5	8.9	9.1	9.6	7.0	9.2	8.5	8.9	8.5	8.7	8.2
Nov	8.0	7.8	8.7	8.5	8.9	8.9	6.6	0	0	7.3	8.6	8.4	7.4	8.0	8.4	7.6	7.0	8.1	6.6	7.4
Dec	6.7	7.4	8.2	5.9	6.0	8.0	5.3	0	0	7.8	7.5	6.7	5.8	6.2	7.6	5.5	6.4	7.9	5.7	6.3

1.5 Water Supply:

The tract is a part of catchment area of the tributaries of the Shiku, Mahadev Ki Khad, Kundlu–Ki-Khad, Ratra Nala and Palli Khud. Majority of these streams and nallahas have discharge only during the rains. The volume of the flow and its duration depends upon intensity of the rain.

The water supply schemes catering water demand of people of various villages of the Nalagarh Forest Division are depicted in the Table 1.6.

Table 1.7

Sr.No.	Particulars	Name of Schemes	No. of people/villages being catered by the scheme.
1	Mahadev Khud	1. FIS Ram Kuhl 2. T/well Nawanagar, 3 T/Well Aduwal- I & II, 4. T/Well Souri Rajputan, 5.T/Well Guriwala, 6. T/Well Mahadev, 7. WSS Dabhota Majra, 9. T/Well Palli, 10 T/Well Suri Gujjran, 11 T/Well Bothuan. 12. T/Well Gulabpura I&II. 13 T/Well Gulabpura-I&II.14. LIS Majra-I&II	Village. Ambwala, Palli, Nawangar, Aduwal, Souri, Guriwala, Mahadev, Dabhota & Majra etc.
2	Kundlu Khud	1. FIS Joghon Kuhl, 2. LWSS Joghon, 3. T/Well Riya, 4. T/well Kashmirpur, 5. T/Well Androla, 8.T/Well Miyapur, Thoda, 9.Panjehra.	Village Joghon, Jagatpur, Banyala, Riya, Kashmirpur & Androla etc.
3	Chikni Khud	1.IFS Dattowal, 2.T/Well Plasra, 3. T/Well Plasra Gharuan, 4. T/Well Seri Jhandian, 5. LWSS Dattowal, 6. T/Well Dattowal, 7. LWSS Nalagarh, 8. T/Well Nangal Saner, 9.T/Well Dhana I, 10.T/Well Dhana-II, 11.LIS Salewal, 12. T/Well Rajpura, 13. LWSS Dhana Plassi, 14.LIS Kanganwal, 15.LIS Dhang Plassi, 16.LIS Dhang Uperli, 17. LIS Kanganwal, 18.T/Well Seri Pahad, 19. Seri Des, 20. LWSS Jhandian, 21.T/Well Ghansot, 22. T/Well Buta Plassi, 23. T/Well Nangal, 24. LWSS	Village Dattowal, Plasra, Plasra Gharuan, Seri, Jhandian, Ghansot, Nalagarh town, Plasra Dittu, Saner, Dhana Salewal, Rajpura, Kanganwal, Dhang uperli, Saini Majra, Bir Plassi, Manjholi etc.

		Ramshehar-I & II, 25. LIS Saini Majra, 26. T/Well Manguwal, 27. T/Well Rajpura-I&II. 28. LWSS Bir Plassi, 29. LWSS 30. Manjholi, LIS Buta Plassi.	
4	Luhand Khud	LWSS Kulari Padyana, 2. LIS Kulari, 3. T/Well Kulari.	Vllage Kulari, Padyana.
5	Gamber Khud	1. LWSS Datla Changer, 2. LWSS RugDahar Khateta, 3. LIS Lerech, 4. LWSS Sai Kund Chamyas, 5. LIS Sai Kund Chamyas, 6. LIS Manlog kalan, 7. LWSS Audda diggal, 8. LWSS Kairi Patta, 9. LIS Jaged, 10. LWSS Chamdar, 11. LIS Chamdar, 12. LWSS Suna Badkhoa, 13. LIS Bheunkhary, 14. LWSS Kawarni Gendu-ki-Dhar, 15. LIS Gaged Badyakh, 16. LWSS Nand, 17. LIS Sour, 18. LIS Kohu, 19. LWSS Kohu, 20. LWSS Rajwaha Randhala.	Village Dalta Changer, Rug Kheteta, Johri, Larech, Sai Khud, Chamaysi, Manlogkalan, Changer, Auda Diggal, Kamal, Pandal, Luna, Kayari, Patta, Gager, Chamdar, Bithen, Changer, Nisal, Nanoa, Gandu-ki-dhar, Gaged, Badyakh, Nand, Karlata, Katli, Sour, Rajwah, Kohu, Rajwaha, Randhala, Lunas.

1.6. Distribution of area:

Nalagarh Forest Divisions comprises of four ranges namely Nalagarh, Ramshahr, kohu and Baddi .

1.6.1 Range wise and legal classification wise forest areas in the division have been shown in the following table:-

Table- 1.8

Division	Range	Demarcated Protected Forest (ha)	Un-demarcated Protected Forest (ha)	Total (ha)
Nalagarh	Nalagarh	3360.97	--	3360.97
	Kohoo	1264.48	--	1264.48
	Ramshahr	2462.10	--	2462.10
	Baddi	3146.34	--	3146.34
	Total	**10233.89**	**--**	**10233.89**

1.6.2 Government Waste Land: The Government Waste Lands (ex Shamlat) are out of the scope of this working plan. In Nalagarh Forest Division an area of 15,530 ha has been vested with the Government under the Himachal Pradesh village common Lands Vesting and Utilization Act, 1974. Out of this, at least 50% of these areas required to be set apart for the use by the village community for grazing and other common purpose including raising of forests. A very good Chil crop covers an area of 2151 hac out of these lands. These areas still required to be brought under regular forest management after settlement and included as addendum in working plan.

1.7 State of boundaries:

1.7.1 Nalagarh Tract:-

The demarcated Protected Forests have been well defined on the ground with boundary pillars and detailed map of the same exist. There are 61 DPFs (vide notification appended as **Appendix no.XXVIII page no 103)** with boundary pillars around them. The boundary pillars are found on the ground but by and large none in good state. The number on most of the boundary pillars is not easily decipherable. There are no Undemarcated Protected Forests in the division, however, the Government waste land exists which still require proper demarcation and notification by the HP Govt. in order to bring it under the scientific management by the Forest Department.

1.8 Legal Position:

The ownership of the forest and waste lands (*Shamlat*) were vested in rulers of respective states, before the constitution of the Himachal Pradesh as a separate State. Provisions of chapter IV of IFA 1927 have been applicable in respect of these areas the formation of Himachal Pradesh by the following notification which are reproduced in Appendix VII.

1. *Notification No.Ft.29-241-BC/49 dated 25.2.52* marking provisions of chapter IV of the Indian Forest Act applicable to all forest and waste lands which are the property of the Government or on which the Government is entitled as recorded in the Forest Settlement or land revenue records.
2. *Notification No Ft.29-241-BC/49 dated 25.2.52* declaring all trees on the above forests as reserved trees.

3. *Notification No Ft.43-241-A/49-3 dated 25.2.52* farming rules under section 32 of the Indian forest Act for Protected Forests in the old Kumarsain, Khaneti, Sangri, Darkoti, Theog, Ghund, Balson, Madhan, Keonthal, Koti, Ratesh and Bhajji States including Pepsu enclaves.

4. *Notification No Ft.43-241-E/49-3 dated 25.2.52* prohibiting the breaking up of land for cultivation, for building, for herding cattle for any purpose.

5. *Notification No Ft.43-241-A/49-4 dated 18.6.06,* giving Schedule of the Notification no Notification No Ft.43-241-A/49-4 dated 25.2.52.

6. *Notification No. Ft.14 (17) E/51 dated 16.7.55* vesting the particular rights in village common lands in the Gram Panchayat which were previously enjoyed by Raja of Nalagarh.

Special forest settlements were carried out in respect of Nalagarh (1931) States. In respect of other areas the provisions of *wajub-ul-arj* as per land revenue settlement are being followed.

1.9 Rights and Concession:

The salient feature of rights and concession exercised by the people in these forests, details of which are given in appendix, are given below:

i. Breaking of land for cultivation.

ii. Timber for construction and repair of houses and for agriculture implements.

iii. Wood for cremation and obsequious and marriage ceremonies.

iv. Charcoal for agricultural implements.

v. Dry fuel and inferior shrubs for house hold use.

vi. Grass cutting and grazing.

vii. Chil needles and dry leaves for litter.

viii. Surface stones for building and other purposes.

ix. Earth for plastering and marking vessels.

x. Water.

xi. Paths.

1.9.1 Breaking of land for agriculture:

In Demarcated Protected forests no breaking of land is permissible. The Nautors which have been granted in Un-demarcated Protected Forests Charand and

Government Waste Lands have not been entered in the revenue records. Grant of such Nautors have created chuck in plantation and well wooded areas. This has made the management and protection very difficult. After the Forest Conservation Act, 1980, coming in to force, no forest land can be diverted for non-forest purpose without the prior approval of the central Government.

1.9.2 Timber for construction and repair of house:-

Ordinarily trees for the construction and repair of houses are to be given only once in five years according to the right holders actual requirements to enable them to have and maintain a suitable building typical to the locality and sufficient for his bonafied requirements. This used to be the past practice prior to the enactment of timber distribution rules in the year 2009 copy enclosed as annexure 2. But now with the advent of these timber distribution rules the grant of timber to right holders has come down to almost nil as no tree is granted to any of the right holders uptill now w.r.t. Nalagarh Forest Division.

Table 1.9

Year	No.of trees granted	Volume in (m3)
1994-95	271	377.154
1995-96	471	749.223
1996-97	422	508.699
1997-98	312	407.779
1998-99	533	613.787
1999-00	410	487.259
2000-01	403	530.991
2001-02	296	369.530
2002-03	162	223.946
2003-04	194	289.227
2004-05	173	229.721
2005-06	264	406.223
2006-07	135	135.859
2007-2011	----	---------

However the demand of timber is being fulfilled from imported timber being brought from the adjoining states for both commercial as well as domestic use.

Grant of trees at shorter intervals is permitted in case of calamities like fire, flood and earthquake etc., when the trees can also be given free of charge under specific recommendations from the Collector. Again the building for which the trees are granted should be constructed within the limits of the village in which the applicant’s cultivated

land is situated, unless the contrary has been specifically allowed. If available, the trees are normally given from the Undemarcated Protected Forests.

The trees are given on payment of nominal fee fixed from time to time. The existing right holder's rates for sale of timber trees and other produce prevalent in various parts of the division are given in Appendix. The trees species generally in demand are Chil, Tun, Jhrinu Kakar, Khair, Chhal, Binus, Siris, Jaman, Sain and Bahera.

Wood for agriculture implements for farmers is also given. The IV and V class trees of hard wood species like Khair, Kainth, Chhal, and Jhrinu are generally preferred for making agricultural implements. With the introduction of new agricultural implements by the Government, the demand of these trees is drastically reduced.

1.9.3 Wood for cremation, obsequies and marriage ceremonies:

Trees or wood for cremation are taken by right holder without permit. Inferior species like karmaru, Kuri, Barnasi, Ber, Kangu and Karounda are normally used for the purpose. In case they are not available, useless stems of the valuable species are taken. Trees for obsequies and marriage etc. are given on application.

1.9.4 Dry fuel wood and inferior shrubs for house hold use:

The right holders may remove fallen wood from all the forests with hand, only without using axe. They may also remove dead and dry trees of inferior species such as Karmaru, Biuhl, Kuri, Kamal, Barnasi, Ber, Kainth, Padyara, Saharu Kangu, Beuns, Taymal, Karounda, Kashmal and all other brush wood not more than 60 cm in girth from the Un-demarcated Protected Forests and Demarcated Forests. Removal of timber or standing trees from burnt areas is specifically prohibited. Right holders may lop trees of the above mentioned species with permission in Demarcated Protected Forests. No trees under 45 cm girth may be lopped. Lopping is to be confined to the lower one third part of the trees. These rights are permissible only within the mauza limits. Further they are subject to any restriction laid down in forests settlement report. *Wajub-ul-arj* or sanctioned Working Plan of Schemes of the concerned erstwhile States.

1.9.5 Grazing and grass cutting by local people:

The grazing in Nalagarh tract with respect to four types of areas have been distinguished in the Settlement, viz (a) areas where free grazing is allowed, (b) where grazing is allowed on fixed rental,(c) where no grazing is allowed and (d) where grazing

is allowed only in portions. It has been made clear that only one fourth of the area under categories (a) and (b) can be closed. All areas under category (c) can be closed. While only areas mentioned in the settlement need to be kept open and all other can be closed like those under category (d).

1.9.6 Grazing Policy:

In view of the importance of the forests in providing adequate grazing to the cattle wealth of the State, the H P Government vide Notification No Ft. 784-13/66 (M) dated 29th Feb. 1968, appointed a high level Grazing Advisory Committee to review the entire grazing policy of the State.

1.9.7 Migratory Graziers:

They are mostly Gaddies and there are no Gujjar graziers in this Division. In Nalagarh Forest Division tract grazing is not allowed on the Government forests, however, it is only allowed in ex-Shamlat lands which now vested with Government. Following statement shows the number of migratory cattle in this division during the year 1991-92 to 2010-11:-

Table -1.10

Number of Sheep, Goats & Horses Grazed Year wise

Year	Sheep	Goat	Kid	Horse	Lame
1991-92	2920	1560	370	17	100
1992-93	2180	1180	-	15	-
1993-94	1910	1360	-	15	-
1994-95	2216	1330	-	15	-
1995-96	5270	1930	-	31	-
1996-97	1520	880	-	17	-
1997-98	2582	1048	-	2	-
1998-99	5267	2431	-	48	-
1999-2k	3807	2403	-	34	-
2000-01	4630	2781	-	55	-
2001-02	4290	2460	-	43	-

2002-03	3197	1455	-	33	-
2003-04	4984	2609	497	52	1016
2004-05	5054	2489	388	52	1280
2005-06	4904	2409	412	52	1907
2006-07	5194	2499	372	56	1406
2007-08	5444	2659	402	58	1633
2008-09	5244	2539	358	56	1245
2009-10	4834	2475	317	53	1326
2010-11	4834	2478	302	53	1325

1.10 CHANGE OF LAND USE IN THE TRACT DUE TO EXTENSIVE INDUSTRIALIZATION AND ITS IMPACT:

In Nalagarh, Baddi and Barotiwala areas, land use pattern has undergone immense change due to: -

a) Extensive Industrialization: Large scale of private lands both cultivable and non cultivable, have been diverted for industrial, infrastructure and housing purposes. There is no separation of industrial area and residential area, leading to increase in level of pollution. Domestic garbage is strewn over the area and open defecation is common in absence of adequate sanitation facilities for the industrial labour.

(b) With change of land use, and rapid industrialization, local labour is scarce leading to influx of migratory workers, who are bereft of adequate housing facilities and fuel. Migratory labour fixes their Jhuggi wherever vacant space is available. For fuel, labour depends mostly on forest and Kerosene.

(c) Inadequate infrastructure results in huge pressure on land, roads, forest and water. There is a spurt in demand of minor minerals like sand and grit material for construction activities, thus putting immense pressure on nallhas , Khuds & Chos. Major minerals are extracted not only illegally, but on unscientific lines.

2) In Nalagarh, Baddi and Barotiwala areas the demands for LPG has increased many fold.

3) As per information received from PCB, there are 2087 industries established in BBN area in small, large and Medium sector. The main Sector are Pharma both Allopathic and Ayurvedic, Cement, Pesticide& Insecticide, Electroplating, Steel rolling mills, Computer, Bikes , Textile, Packaging etc. As per norm of PCB, effluent treatment plant is necessary, but still complaints keep on coming of nonfunctional/ non operations of ETP by industries. Certain industries direct their effluents without treatment into nallahs and khuds affecting quality of water and immense damage to flora and fauna downstream.

4) The availability of water had dwindled on following counts:-

a) Deficient Rain Fall

b) Over-utilization of water by industries. A large number of tube-wells have been established in the industry and agricultural sector leading to lowering of water table.

5) Agriculture itself has undergone tremendous changes, with many farmers shifted from growing wheat & maize to off season vegetables, horticulture, floriculture etc in big way by adopting new technologies.

1.11 CHANGE OF LAND USE DUE TO DIVERSION OF FOREST LAND:

Diversion of forest land for developmental purposes results in change of land use and sometimes may have affect on the landscape. Road construction activity has a major impact on the hydrology and ecology of the area. Compartment forests may become fragmented and wildlife corridors threatened.

Table 1.5 shows the Forest Area diverted under Forest Conservation Act, 1980 for undertaking various developmental activities in Nalagarh Forest division.

Table 1.11

Category	**Area diverted (Area in ha.)**	**No of trees involved**
Transmission lines	131.4207	5299 & one clump of Bamboo
Roads& Bridges	17.4787	2769
Buildings	1.2113	15

Cement Plant	24.5105	3050
Biotechnology Park	12.4239	432
Total	187.0451	11565

1.12 Change of land use by H.P.Government in D-190 Rakh Nalagarh.

The area of DPF Rakh Nalagarh in the jamabandi for the year 1954-55, was 1729.4 Bighas. The area of Rakh Nalagarh is lying under possession of other departments prior to 1980 for the construction of state highway of length approx 4. KMs., Construction of Hospital, Schools, College, Police station, Mini Secretariat , Office of IP & H, PW Department, cremation ground, and the main bazaar of Nalagarh etc. In the Jamabandi for the year 1977-78 the area of Rakh Nalagarh is 1309.19 Bighas which is nearly 98.58 Hactares. Out of the gross area the total area lying under possession with forest department is 98.58 hactares and since this area is just lying in the precincts of the old Nalagarh town and is quite prone to be grabbed by miscreants because of its sky rockitting prices. So forest Department has installed boundary pillars of rail girder joist and also good amount of area has been fenced by the wire mesh fencing to curb this menance. The trial cases of encroachment on this land are under way in different courts.

Chapter – II

FLORA AND FAUNA

Part – A. Flora

2.1 Occurrence and Distribution of Species:

The altitudinal difference as well as aspect and biotic influences have caused diversity in vegetation of Nalagarh Forest Divisions. The climate difference in the tract, which is tropical in lower elevation and sub tropical at higher elevation, results in development of two main types of forests, (1) Tropical Dry Deciduous Forest and (2) Sub Tropical pine Forest. The microclimate changes due to aspects and exposures of local changes of rocks and soils, however are found projected in the lower zones and vice versa. In lower elevation Khair, Bamboo with other broad leaved species like Chhal, Simbal, Jhingan, etc. are met with whereas in upper elevation Chil is the main species.

2.2 Composition and condition of the crop:

The floristic of individual areas are given in concerned compartment history files. In the Forest Divisions following forest types and sub-types, confirming to Champion and Seth classification (Revised survey), occur:

Group 5 Tropical Dry Deciduous Forests.

Sub-group 5 B-Northern Tropical Dry Deciduous Forests.

i. Type 5 B/C2 Northern Dry Mixed Deciduous Forests.
ii. Type 5B/C2-DSI-Dry Deciduous Scrub Forests.
iii. Type 5 B/C2-E9-Dry Bamboo Brakes.

Group 9 Sub-Tropical Pine Forests.

iv. Type 9/C/1 a Lower or Shiwalik Chirpine Forests.

2.2.1 Type 5 B/C 2 – Northern Dry Mixed Deciduous Forests:

Forests of this type occur at lower altitude (between 300 meters and 1200 meters) and mainly confined to the western and southern aspects. They are at their best

on the sites with deep soil with favorable soil moisture conditions. The upper canopy is usually very open with the scrubby undergrowth. Due to adverse biotic influences in most of the areas, the natural regeneration of almost all the species is deficient. In the forests like Sobal (Ramshehar Range), Khair has been successfully introduced, after clear felling the existing growth. The entire plantations require adequate protection and maintenance.

The main species met within the top canopy are:

Chhal (Anogeissus Latifolia), jhingan (Lannea grandis), siris (Albizzia lebbek) simal (Bombox ceiba), pula (Kydia calycina), amaltas (Cassia fistula), chamror (Ehretia laevis), sandan (Ougeinia ougeinensis, Kaimb (Mitragyana Parviflora), Kangu (Flacourtia indica), Khair (Acacia catechu), jamun (Syzygium cumini), chilla (Casearia tomentosa), amla (Emblica officinalis), Kachnar (Bauhinia variegata), Kambel (Mallotus philippinensis), dhak (Butea monosperma).

Under growth consists:

Harsingar(Nyctanthes arbortristis), Karaunda (Carissa spinarum), dhavi (Woodfordia fruticosa), Kathi (Indigogera pulchella), gandhela (Murraya koenigii), basuti (Adhatoda vasica), keor (Holarrhena antidysenterica).

The important grasses:

Bhabar (Eulaliopsis binata), mokora (Heteropogon contortus), dub (Cynodon dectylon), dhaulu (Chrysopogon montanus), lamb (Cymbopogon spp), munj (Erianthus munja),

The important climbers are:

Tour (Bauhinia vahlli), sarali (Pueraria tuberosa), Kairinghan (Caesasalipinia sepiara), kurar (Acacia pennata), bel kangu (Clematis gouriana), dhudi (Crypotolepis buchanani),

2.2.2 Type 5b/C2-DSI Dry Deciduous Scrub Forests:

Some of the miscellaneous forests, especially those situated near the urban habitations, have been deteriorated into this type due to adverse biotic factors. The existence of this type of forests is mainly due to varying intensity of grazing and browsing. The forests which fall under this type are confined to lower reaches, mainly of

Nalagarh Block. In this type of forests, the growth of trees has become stunted and canopy is quite open. Some tree species are reduced to smaller size usually many stemming from the base.

Common species in these forests are:

Cassia fistula , Pyrus pashia, Euphorbea royleana, Aegle marmelos, Carrisa spinarum, Holarrhena antidysenterica, Acacia catechu, Lannea coromandelica, Dodonaea viscose, Woodfordia, Andropogon contortus, Ischaemum augustifolium, Eulaliopsis binata, etc.

2.2.3 Type 5 B/E 9 Dry Bamboo Breaks:

This type occurs on well drained and loose textured Shiwalik Formations. It closely resembles the foregoing type; the only difference being that in this case bamboos *(Dendrocalamus strictus)* is met within the top canopy. The development of Bamboo in Ramgarh, Baddu, Makru, Ratwali and Dassaura in Nalagarh tract is good, In Nalagarh division the forests like Retwali and Ambika have very good quality of bamboos. The general condition of the bamboo forests is very deplorable. Good sized clumps with well distributed healthy and vigorously growing clumps are rare. Clumps are generally very open and over congested.

The floristic characteristics are the same as that of previous type but the main associates are as under:

Chhal(Anogeissus latifolia), jhingan (Lannea coromandelica), bel (Aegle marmelos), dhavi (Woodfordia fruticosa), ghandhela (Murraya koenigii), basuti (Adhatoda vassica), karounda (Carissa opaca), kangu (Flacourtia indica), Chrysopogon montanus, Heteropogon spp., Cymbopogon spp., etc.

2.2.4 Type 9C/a Lower or Shiwalik Chirpine Forests:

This type covers the major parts of tracts of Nalagarh with Pinus roxburghii (Chil) is the main species. Its zone of occurrence is generally between 700 meters to 1800 meters but at places it has come down even at 600 meters (on northern aspect) Biotic influences play an important role in the regeneration and distribution of this species. Regeneration can naturally establish itself easily, if proper protection is afforded and mother trees are well distributed over the area. Dhar Chamba and Ukhu of Kohu Range and Kamal Pandal of Ramshehar Range are examples of good regeneration.

The main floristic are:

Upper storey:-

Chil (Pinus roxburghii)

Middle storey:

Kainth(Pyrus pashia), kamal (Mallotus philippinensis), amla (Emblica officinalis), khair (Acacia catechu) and daru (Punica granatum).

Under growth:

Karounda(Carissa opaca), adha (Rubus ellipticus), chhota hunjra (Myrsine Africana), adhavi, kathi (Indigogera pulchella), and gandhela (Murraya koengii).

Grasses:

Chrysopogonfulvus, Cymbopogon spp,. Dichanthium annulatum, Heteropogon contortus and Themeda anathera.

Climbers:

Taur (Bauhinia vehlii), gulab (Rosa moschata) are commonly found.

2.3 Injuries to which crop is liable:

The main agencies causing injuries to the forest crop, may be classified under two heads, namely, (A) Biotic and (B) Natural.

A. Biotic agencies causing damages:

2.3.1 Fire:

Fire causes a lot of damage to the forests of this division. Forests fires are generally caused by men. To get maximum fodder and grass for their cattle, the local people burn the adjoining forests. Most of the Chil forests are near the habitation and thus get damaged due to fires. Fires kill young poles and wipe out seedling and saplings. They destroy the micro flora and fauna and thus impede soil forming processes. In Chil forests considerable number of trees dry every year on this account, consequently such fires lead to the spread of weeds like Lantana.

The forest fire occurred during the period from 1993-94 to 2010-11 in different ranges is given in the table 2.1

Table 2.1

Fire incidence from 1993-94 to 2010-11 in Nalagarh Forest Division							
Range-wise Forest Fire Record Since 1993-94							
Year	Nalagarh Range (Ha.)	Kohu Range (Ha.)	Baddi Range (Ha.)	Ramshahar Range (Ha.)	Total Division (Ha.)	Total No. of Incidences	Estimated Loss (Rs.)
1993	0.00	0.00	0.00	155.20	155.20	NA	
1994	0.00	195.00	0.00	149.30	344.30	NA	
1995	18.00	340.00	227.30	191.93	777.23	28	178000
1996	0.00	0.00	76.00	0.00	76.00	4	25200
1997	0.00	0.00	30.00	0.00	30.00	2	0
1998	0.00	0.00	16.00	10.90	26.90	3	2300
1999	110.00	112.00	452.61	790.98	1,465.59	34	201000
2000	4.00	0.00	0.00	113.08	117.08	5	37400
2001	14.00	0.00	0.00	0.00	14.00	1	0
2002	8.50	0.00	0.00	50.95	59.45	11	57300
2003	168.93	9.00	265.76	232.07	675.76	32	297200
2004	20.00	1.00	0.00	197.88	218.88	9	168857
2005	31.00	0.00	14.00	228.32	273.32	10	219400
2006	50.00	0.00	0.00	15.50	65.50	4	99536
2007	52.50	15.00	0.00	17.19	84.69	10	45000
2008	11.95	7.75	0.00	20.50	40.20	18	95000
2009	70.50	8.50	10.00	15.80	104.80	18	52200
2010	49.50	61.30	27.45	53.50	191.75	38	219000

The Forest Fire incidences took place from the year 2005 to 2010 in different working Circles has been shown in Table 2.2

Table 2.2
Statement of Fire incidences from year 2005 to 2010 in Various Working Circles of Nalagarh Forest Division

Number of fire incidences 2005-2010		
Chil Working Circle		
No. of fire incidences	No. of compartments affected	Area burnt (Ha.)
18	**24**	**106.54**
Rehabilitation Working Circle		
No. of fire incidences	No. of compartments affected	Area burnt (Ha.)
0	**0**	**0**
Plantation Working Circle		
No. of fire incidences	No. of compartments affected	Area burnt (Ha.)
8	**9**	**53**
Bamboo Working Circle		
No. of fire incidences	No. of compartments affected	Area burnt (Ha.)
18	**20**	**93.2**

2.3.2 Invasive species

Invasive alien species, particularly Lantana, has invaded vast tract of forest areas. It is little limited in the Chil forests, but has major impact on the other working circles. The infestation has reached up to 100% in several compartments and is a major reason for decline of grass production. Working Circle-wise figures of forest compartments infested with Lantana are given below:

Table 2.3

Extent of Lantana Infestation in various Working Circle-wise.

Chil Working Circle							
No. of compartments infested with Lantana (Area in Ha.)							
<=25%		<=50%		<=75%		<=100%	
No.	Area	No.	Area	No.	Area	No.	Area
47	**995.52**	**38**	**817.22**	**13**	**271.19**	**4**	**24.28**
Rehabilitation Working Circle							
No. of compartments infested with Lantana (Area in Ha.)							
<=25%		<=50%		<=75%		<=100%	
No.	Area	No.	Area	No.	Area	No.	Area
12	**925.44**	**0**	**0**	**12**	**1441.22**	**0**	**0**
Plantation Working Circle							
No. of compartments infested with Lantana(Area in Ha.)							
<=25%		<=50%		<=75%		<=100%	
No.	Area	No.	Area	No.	Area	No.	Area
14	**486.78**	**22**	**1035.04**	**7**	**266.03**	**4**	**163.5**
Bamboo Working Circle							
No. of compartments infested with Lantana(Area in Ha.)							
<=25%		<=50%		<=75%		<=100%	
No.	Area	No.	Area	No.	Area	No.	Area
65	**2311.02**	**26**	**944.45**	**15**	**522.42**	**1**	**30.35**

2.3.3 Fungi:

By and large forests are comparatively free from fungal damage. During 1998-2000, the spp. of Shisham, khair & babul dried up on a large scale in Nalagarh Division due to fungal attack

2.3.4 Grazing:

Unrestricted grazing by an excessive number of cattle has changed the very complexion of natural vegetation in most of area. The damage has caused the elimination of useful species and their replacement by weeds like Euphorbia royaleana, Carissa opaca and Lantana camara. Uncontrolled grazing has caused serious problem of regeneration and has accelerated the process of soil erosion. It has created scrub forest particularly near habitations. Goat is the most damaging animal in this respect. Cattle population is much more than the carrying capacity of the grazing lands are available in the divisions.

2.3.5 Grass cutting:

Careless grass cutting in Chil and bamboos area is the most harmful. The young Chil seedlings are sometime deliberately cut because the Chil crop hampers the growth of grasses. Similarly young bamboo manus are cut for fodder.

2.3.6 Lopping:

Lopping is done by local people for fuel, fodder and animal beddings. It is prevalent in the forests around the habitations. Keeping of a large number of cattle necessitates the loping of trees. Chhal, Buil, Karyal, Simal, Khair, Siris, Sain and Taur trees and lopped very heavily in these forests. Lopping of these species leads to the opening up of the canopy, exposure and degradation of soil and consequent poor growth of the crop.

2.3.7 Wild Animals and Birds:

Porcupines cause considerable damage to the young regenerations especially in Chil and Khair areas. They also eat new bamboo shoots and girdle the base of the Khair trees. Pigs and barking deer also damage the young manus of bamboos. The monkeys also cause considerable damage to the Chil crop. Nurseries are more susceptible to the damage by monkeys and flying squirrels.

2.3.8 Insects:

No particular insect has so far been reported to have caused any appreciable damage in the area. Occasionally, white ants cause damage to Khair and eucalyptus plants in the early stage of their growth. The damage due to insects is only mild and noticeable only on a few trees here and there. Chil trees are attacked by Platypus biformis and Colytus minor which reduce the wood to powder. Chil cones and seeds are destroyed by Chlorophorus strobilicola.

2.3.9 Climber and Weeds:

Bauhinia vahlii (taur) is most dangerous in mixed deciduous forest as it often completely covers trees crowns, constricts the boles, retards their overall growth and leads to their ultimate death. Lantana camara are the most dangerous weed which is constantly eliminating all other vegetation. Euphorbia royaleana is another weed which has occupied vast areas.

B. Natural Agencies causing damages:

2.3.10 Drought:

The pre monsoon and post monsoon drought periods play an important role in the success of natural as well as artificial regeneration. The variation in annual rain fall influences the growth and development of the forest species. Manus in bamboo clumps do not appear in the event of poor monsoon. Drought also leads to forest fire.

2.3.11 Frost:

Frost is common in the lower portions and cause severe damage to the young seedlings of Khair, especially from sowing. In the upper hills, frost is not a serious factor as most of the species are frost hardy.

2.3.12 Wind:

Wind storms cause considerable damage to the standing trees, which are broken or uprooted. Such damage is confined to the lower areas of the tract.

2.3.13 Erosion:

Adverse biotic influences have caused denudation upto various intensity. In Nalagarh division particularly in Khols the erosion has reached to its maximum and ravines have been created. Erosion caused by man by misuse of land by adopting faulty

agricultural practices, uncontrolled grazing, quarrying, cutting of hill slopes for construction of roads etc. Frequent forest fires also cause soil erosion.

Part-B: Forest Fauna

This part of the chapter is duly approved/vetted by Addl.Pr. CCF (WL) H.P. vide his letter no. WL/working plan/7414 dt 24/03/2012 as per annexure xxx at page no. 108.

2.4 General Description:

The altitudinal variation of the tract results in variety of vegetation and due to this there occurs a variety of fauna. Apart from these, catchment of Sutluj River, balad khad, Sirsa River and other streams provide good habitat for wild animals.

The Wildlife plays an important role in maintaining the ecological balance. The value of Wild-Life from scientific, aesthetic, economic and recreational points of view is also immense. The wild life adds additional beauty to the land bearing woods. Thus forests with wild-life became paradise for bird-watchers, photographers, biologists, naturists, ecologists and tourists.

The important species of wild animals and birds distributed in the tract are as under:

2.4.1 ANIMALS (MAMMALS):

A. *Game Animals:*

CARNIVORES:

1. **Panther (tendua, bagh) – Panthera pardus:** People usually come across with this animal of cat family. It has a fulvous or bright fulvous coat marked with small close-set back rosettes. Average male is about two meters long weighing 57 kgs. It generally remains in the neighborhood of village, carrying off sheep, goats and dogs etc. in night. It seldom attacks human beings without provocation.

HERBIVORES:

Deer group:

1. **The Barking deer (kakar) – Muntiacus muntijac:** The antlers are small, consisting of a short brow-tine and an un-branched beam. They are set on bony hair

covered pedicels which extends down each side of face as boy ridges. Old males are browner in color. The upper canines of the males are well developed and are used by the animal in self defense. It is also a much sought after animal for its meat. Its height is about 50 to 75 cms. The horns rarely exceed 3 cms. It is fairly diurnal in habit. The call from a distance sounds like the bark of a dog.

PIGS:

1. ***The Indian wild boar (jungle suar) – Sus scrofa:*** It is an omnivorous animal inhabiting grassy, bushy and thickly wooded areas. It feeds on field crops, wild roots, tubers, insects, etc. it is greyish black and skin is covered with sparse growth of bristles which from a conspicuous mane. It is a prolific animal giving at least two litters every year, one in the beginning of rains and second after the rain. A well grown male is about 80-90 cms, at the shoulders and weight up to 200 kgs. It causes a lot of damage to agricultural crops, forests nurseries and plantations.

RODENTS:

1. The Indian hare (khargosh) – Lepus nigricollis: A small size animal having about 40-50 cms. length (of head and body) and about 2 kgs. of weight. It feeds on grasses, seeds and fruits. It is hunted for its meat. It is found almost all over the tract.

2. The Indian Porcupine (sayal or sahi) – Hystrix indica: It is robust, heavy and terrestrial animal. The whole of its back is covered with long and well developed quills which may be nearly 60-70 cms, long. It feeds mainly on roots and is extremely damaging to young plantations and nurseries. When alarmed it utters a gruntling sound and erects its quills. It weighs about 10-15 kgs, and is found almost all over the tract.

B. *Non-game Animals*

1. *The Indian fox (lomri) – Vulpes bengalensis:* It is found all over the Division and inhabits bushy areas in and around cultivation and human habitations. Many live in cultivated lands, bordering irrigation channels. It feeds on small mammals, reptiles and insects. The main breeding season is the cold weather. The cubs, usually four in number, are raised in burrow, but mother and young are rarely seen. Cubs are born in between February and April.

2. The Jackal (gidhar) – Canis aureus: It is also found all over the tract. It is one of the common scavengers. It moves around single or in herds of 10-15. It usually

comes out at dusk and retires at dawn. Cubs are born at any time in the year, usually in a hole in the ground, in a drain, or any natural shelter. The life span is about 12 years.

3. ***The Jungle cat (jangli billi orban billi) – Felis chaus*****:** It found in the drier and open scrub areas of the tract. It preys on small animals and birds. It is found frequently in the day, more usually in the mornings and evenings. Birth has been recorded between January-April and in August and November. Littre size is 3 to 5.

4. ***The Common Mongoose (neola) – Herpestes edwardis:*** It is light grey to dusty brown small animal. It lives in hedge rows and thickets, among groves of trees and cultivated fields. It hunts its food by day or by nights. It eats rats, snakes and small birds.

5. ***The Monkeys (bandar) – Macaca mulatta:*** It is found all over the division and generally moves around in herds. It thrives mainly on wild fruits and seeds.

6. ***The common Langur (langur, hanuman) – Presbytis entellus:*** It is also found everywhere in the division and lives on wild fruits and seeds. Young plantations and nurseries are prone to its damage. It is more arboreal in habit.

2.4.2 BIRDS:

Game Birds Land Birds

Pheasants and Fowl group

1. ***The Red jungle fowl (jungle murga) – Gallus gallus:*** It is found everywhere in the tract, particularly in the periphery of the forests. It is the most important game bird of the area. It gives a crow like call, sometimes shriller and ending more abruptly. Nesting season is from March to May.

2. ***The Common peafowl (mor) – Pavo cristatus:*** This beautiful bird having religious sentiments attached to it, beside our national bird. The male bird spreads its wings and feathers in a systematic pattern. It is mainly found in the lower reaches of the division. It is protected bird and is not a game bird.

Partridges and Quails group

1. ***The Grey Partridge (teetar) – Francolinus pondicerianus:*** It is commonly found in scrubby and bushy area of Ramshehar Range. It inhabits bushy localities around cultivations. Its hunting is very common in the tract.

2. ***The Black Partridge (kala teetar) – Francolinus francolinus:*** It is a small bird, generally black and spotted with white. Like the grey partridge, it feeds on grass seeds, grains, white ants and the other insects. It is not so commonly found as the grey partridge. Its occurrence is also confined mainly to the lower reaches of the division.

3. ***Jungle Bush Quil (bater) – Perdicula asiatica:*** It is found at lower elevations in the tract. The male is fulvous brown above and white below, while the female has pale pinkish rufous in the lower part.

Doves and Pigeons group

1. ***The Blue Rock Pigeon (kabutar) – Columba livia:*** A slaty-grey colored bird having glistening metallic green and purple sheen on the neck and breast. It lives gregariously on cliffs and precipices. Large flocks regularly visit cultivated fields in search of food during the winters. It is found almost everywhere in the division.

2. ***Dove (ghughi) – Streptopelia spp:*** It is found generally in pairs or in groups in open places and cultivated fields everywhere in the division. Its flight is swift and straight. It feeds on grass seeds, wild fruits and grains.

Aquatic Birds:

1. ***Indian Moor hen (jal murgi) – Gallinula chloropus:*** A slaty-grey marsh bird with white edges to the closed wings and conspicuous white under tail-coverts.

2. ***White breasted Water hen (dahuk) – Amaurornis phoenicurus:*** A slaty-grey stub-tailed, long-legged marsh bird with prominent white face and breast, and bright rusty red under the tail sexes alike. They are found singly or in pairs, near reeds and thickets on marshy ground.

Non Game Birds:

Crows, King crows, Tree pies, Magpies, Jays and Nut crackers are some of the main birds of this category which are found commonly in the tract. Vultures, Eagles, Kites and Falcons are the common scavengers found in the area. In addition to this, the owls, thrushes, babblers, flycatchers,

finches, sparrows buntings, woodpeckers, tree creepers, barbets, bulbuls, tits, parakeets, wagtails and hill myna etc. are also found in the divisions and are important from aesthetic, forest cleanliness, health, farming and bird watching points of view.

2.4.3 REPTILES

Snakes

1. The Rat Snake – Ptyas mocosus: It is widely distributed and usually frequents the open country in the vicinity of human habitations.

2. The common India Krait – Bungarus caeruleus: It inhabits more or less open country at low altitudes.

3. The Himalayan Pit Viper – Ancistrodon himalayanus: It is nocturnal in habit, it comes out at times to bask in the sun. it is found in higher reaches of the tract.

4. The Indian Cobra – Naja naja: It is found in all parts of the tract but very commonly in Nalagarh area. This snake being very fond of water is seldom found away from water sources during the hot weather before the monsoons.

LIZARDS

1. The Common Indian Monitor – Varanus monitor: It is found both in forest as well as in the outskirts of human habitations.

2. The Common House Lizard – Gecko hemidactalus: This is very common reptile and found all over the tract.

2.5 INJURIES TO WHICH FAUNA IS LIABLE:

2.5.1 Hunting:

The varying types of wild animals have been attraction for hunters. In spite of ban on hunting there are many reports of hunting of these animals in different areas of the tract. They are killed for meat or other valuable products like fur, trophies or only for sport. Sometimes local people kill the animals to save their lives and cattle. Some animals are killed to save agricultural crops.

2.5.2 Fires:

When there is a fire in the forests the wild animals get trapped in it and gets killed. The fires destroy the eggs and the young ones in the hollow rocks, dead stumps and nests built in shrubs and on the ground.

2.5.3 Climatic disturbances:

The adverse climatic conditions affect the life of wild animals, particularly of the young ones. The hatching of birds is badly affected by abnormal rains. In severe drought condition the water sources are reduced and wild animals are killed for want of water.

2.5.4 Ecological imbalance:

The wild animals live in forest by maintaining food chain. The relationship between predator and prey is disturbed by human interference. The ecological imbalance has led to reduction in population of some important animals and birds.

2.6 MAN - WILD ANIMAL CONFLICTS:

Massive infestation of forests by alien species, and other factors like road construction, buildings, various developmental projects, industrialization etc have led to disturbance, fragmentation and degradation of the habitat and consequent increase of cases of man-animal conflict.

Table 2.4 shows the position of domestic cattle / animals killed by the wild animals' w.e.f. 1991-92 to 2010-2011.

Table 2.4

Year	Human Only injuries	Buffalos Nos	Cow Nos	Ox/Calf Nos	Horse/ Mule	Goat/ kid	Sheep/ lamb	Total No. of animals killed	Compensation Paid by Deptt
91-92			10	1		10	5	26	14550
92-93		1	10	5		66	6	88	26100
93-94		2	25	14	3	46		90	41200
94-95			35	18	2	40	36	131	54850
95-96		3	15	9	3	43	2	75	47500
96-97		3	12	10	1	55		81	39050
97-98			5	6	4	29		44	21600
98-99			3			43		46	13810
99-00		3	5	7	1	24		40	24418
00-01			8	4		19	8	39	25137
01-02			7	1	1	4	5	18	14876

02-03	1			1		5		6	5000
03-04			1	1		6		8	4400
04-05				1		6		7	3650
05-06				2				2	2500
06-07						4		4	1600
07-08								0	
08-09			2	1		61	11	75	31775
09-10			2	2		16		20	14775
10-11	1		2	1		12		15	14750

Table 2.5 depicts Number of wild animals found dead or alive due to injuries.

Animals found dead				
W.L. Boar	Sambhar	Leopard	Kakar	Total
2	9	1		12
Animals found Alive				
0	8	1	1	10

CHAPTER – III

UTILIZATION OF THE PRODUCE

3.1 Agricultural customs and wants of the population:

According to 2000-01 census the human population of the tract is 155619. It comprises of 88832 male and 66787 female population. However in the year 2009 Baddi tehsil was carved out of Nalagarh Tehsil and the population wrt Nalagarh Forest Division (comprising of Nalagarh Tehsil, Baddi Tehsil and committee areas of Baddi and Nalagarh as per 2011 census is 194396 which includes 106893 males and 87593 females.

Agriculture is the main occupation of the people. Agricultural practices are still primitive in most of the villages. However the farmers in Nalagarh division are adopting mechanized farming. Horticulture and Animal Husbandry supplement agriculture practies. People are also growing vegetables as cash crop.

Earlier villagers and local people used to rely on forest for the timber for the construction for residential purposes, but with the industrialisation of the towns like Baddi, Barotiwala and Nalagarh ,the people residing in the precincts of these towns have got occupational oppurtunities in these industries and getting good remuneration. Moreover the residents have also become very well off by selling their lands at quite an exhorbitant prices. The populations living in the vicinity of forests in the villages have also got the jobs for hundred days under MNREGA scheme. All these factors contribute for the increased paying capacity of the villagers and with this local residents have started buying better and good quality of timber for the construction of their houses. Which inturn justifies the less reliance of the villagers on forests.

Many small and medium scale industries have come up at Baddi, Barotiwala and around Nalagarh. A big cement factory has also come up at Bagheri. These industrial units have opened new occupational avenues for the local people.

3.2 Market and marketable products:

Main markets for timber fuelwood and bamboo are at Baddi and Ambala respectively which are well connected with divisional headquarter Nalagarh with all weather roads. The main marktable products of the divisions are resin, katha, bamboo,

timber, fuelwood and bhabbar grass. Chil timber is also utilized for paper pulp as well as timber for the constuction of houses mainly in the state of Rajasthan.

Since the entire tract is connected with motorable roads, the carriage of the forest produce has become easy and less expensive. The main markets for the export of forest produce of the area are:

Table – 3.1

Produce	Market
Chil timber and pulopwood	Baddi corporation depot, Yamunanagar
Resin	Nahan , Bilaspur,Hoshiarpur
Bamboos	Baddi , Kalka and Ambala
Bhabber grass	Yamunanagar
Fuelwood and charcoal	Shimla, Solan and Chandigarh
Katha	Delhi
Medicinal Plants and Minor forest produce	Industrial unit Baddi

3.3 Lines of Export:

There is a network of all weather, metalled and unmetalled fair weather roads in the area. Therefore the forest produce is mostly transported by road. From the forest to road sides the produce is generally transported manually and by mules or camels. Following roads are main lines of export in the area:

Table – 3.2

Sr. No.	Name of road	Length	Condition
1.	Nalagarh-Shimla via kalka	135 kms	All weather
2.	Swarghat-Nalagarh	32	-do-
3	Nalagarh- Ramshahr kunihar shimla 103 kms	-do-	
4	Nalagarh-Ropar	22kms	-do-
5	Nalagarh-Pinjore	35 kms	-do-
6	Baddi Sai –Ramshahr	42 Kms	-do-
7	Ramshahr- Swarghat	26 kms	-do-

8	Ramshahr- Gambhar	32kms	-do-
9	Jai nagar- Loharghat	8kms.	-do-
10	Nalagarh-Bharatgarh	11kms	-do-

Railways are also utilized as means of export/transport for distant places. The nearest railway stations are Kalka, Ghanauli and Chandigarh.

3.4 Distances

Distance from Nalagarh to other important places as under:

Table – 3.3

Places	**from Nalagarh (kms)**
Arki	77
Darlaghat	99
Piplughat	91
Domehar	64
Kunihar	62
Kuthar	57
Kasauli	70
Solan	85
Dharampur	70
Kalka	40
Baddi	16
Nalagarh	0
Ramshehar	20
Kohu	44
Sowarghat	32
Ropar	22
Chandigarh	62
Delhi	300

3.5 Methods of Exploitation and their Costs:

3.5.1 Timber and Pulpwood:

Exploitation of timber is done by the H.P. State Forest Corporation. Method of exploitation is conventional. Felling is done by the axe or the axe and the saw. The trees are cut into logs of different lengths with the help of saws. These logs are further squared with the help of axe and then sawn into scantlings by using frame saws. The timber is carried manually to road side depots or to suitable points in the forests from where it is roped down by rope-ways to the road side depots. It is also generally noticed that the timber is mostly rolled down when the timber is converted into the log forms down the hills and in case of sawing of different sizes of the timber so made are either manual transported to the road side depot or manual carriage is involved. Thereafter it is carried in trucks to the depots of the HPSF Corporation. Logs for packing cases, pulpwood are also extracted by conventional method. The pulpwood is mostly utilized by the Balarpur Paper Industries, Yamunanagar. The pulpwood is extracted and marketed through the H.P. State Forest Corporation. Approximate cost of extraction per cum of sawnwood and per quintal of pulpwood excluding royalty are as under (as per the record of H.P. State Forest Corporation)

3.5.2 Methods of Exploitation and the cost

Table – 3.4

Exploitation cost of Timber and pulpwood

Sr. No.	Item of work	Timber (Cost per cum-Rs.)	Pulpwood (Cost per quintal-Rs.)
1.	Lopping and felling	60.25	--
2.	Sawing and conversion	924.93	110.83
3.	Carriage by Manual and Tractor	1966.20	687.52
	Total	**2891.13**	**858.60**

3.5.3 Resin

Resin is being extracted by the H.P. State Forest Corporation for supply to Government Resin and Turpentine factories at Bilaspur and Nahan. Setting of crop commences in February/March every year. Instances of illegal trade of resin not much noticed in area of this division. Transportation to out of HP has become easy. The resin extraction in Govt. forests. is required to be done as per the instructions contained in H.P. Forest Manual Volume IV. The procedure as laid in Standing Order 2 (Appendix)is

being followed for resin working in Bilaspur Circle. Cost of extraction per quintal of resin delivered at Rosin and Turpentine Factories; excluding royalty is as under

Table – 3.5

Resin extraction cost statement

Sr. No	Item of work	Cost per quintal (Rs.)
1.	Crop setting and extraction charges	855.15
2.	Carriage from forest to road side depot.	50.60
3.	Carriage from roadside depot to the factories.	72.20
4.	Repair and maintenance of tools, roads, paths etc.	12.64
5.	Rent of store, depot etc.	10.00
6.	Loading and unloading charges	35.50
7.	Mate commission	20.00
8.	Miscellaneous charges. (Tins, Pots, etc.)	190.00
	Total	**1246.09**

3.5.4 Bamboo:

The exploitation of bamboo is carried by H.P. State Forest Corporation. The common sizes in which the bamboos are extracted are Bahi, Majhola, Sota, Chhari, Chhar and Pore. After the gregarious flowering in these areas; efforts to improve the crop structure, are being done under National Bamboo Mission and FDA; so that sizeable exploitation area available for working to HP State Forest Corporation is increased. The average cost of extraction excluding royalty, is as under:

Table – 3.6

Bamboo exploitation cost statement

Sr. No.	Item of work	Cost per Bundle bamboos (Rs.)
1.	Exploitation charges	22.50
2.	Carriage from forest to roadside depot	3.00
3.	Carriage by Tractor	1.00
4.	Loading and unloading charges	1.61
	Total	**28.11**

3.6 Katha:

The exploitation of khair for katha from government forest is very limited. The cost of manufacturing of per quintal of katha, excluding royalty, is estimated as under:

Table – 3.7

Katha manufacturing cost statement

Sr. No.	Item of work	Cost per quintal (Rs.)
1.	Felling and conversion of khair trees	1350.00
2.	Carriage of cut material to boiler.	1200.00
3.	Chipping at boiler site	1850.00
4.	Manufacture of katha	3200.00
5.	Carriage of katha to market	400.00
	Total	**8000/-**

It has been estimated that for manufacture of one quintal of katha 20 quintal of heartwood of khair is required which is converted from 40 quintals of khairwood.

3.7 Chil Timber and Pulpwood:

Quantity of chil timber extracted as a salvage lots being exploited by the HPSFDC during last twenty years i.e. from 1991-92 to 2009-10 is as under:

Table – 3.8

Record of salvage lots handed over to HPSFDC

Year	Chil	B.L.	Total
	Vol	Vol	Volume Cum
1991-92	0	81.9146	81.9146
1992-93	202.47	15.674	218.144
1993-94	1624.97	111.5314	1736.5014
1994-95	1359.57	150.599	1510.169
1995-96	2525.15	165.248	2690.398
1996-97	7212.380	188.664	7401.044
1997-98	8113.370	301.508	8414.878
1998-99	1777.07	226.99	2004.06
1999-2000	3080.32	296.053	3376.373
2000-2001	3258.794	224.397	3483.191

2000-2001	6598.263	164.928	6763.191
2002-03	2580.160	294.492	2874.652
2003-04	4923.138	594.338	5517.476
2004-05	3544.448	255.986	3800.434
2005-06	3198.616	239.746	3438.362
2006-07	2753.87	276.888	3030.758
2007-08	2902.154	222.704	3124.858
2008-09	2540.682	213.432	2754.114
2009-10	4233.858	309.347	4543.205
2010-11	5102.10	330.07	5432.178
2011-12	6786.80	263.066	7049.868

3.7.1 Resin:

The resin yield for last twenty years i.e. from 1991 to 2010 of the division is as under:

Table – 3.9

Nalagarh Forest Division

Year	Number of blazes	Yield obtained in Qtls.
1991	123376	5242.74
1992	129530	5605.02
1993	134177	5750.1
1994	126279	5491.62
1995	125281	1017.1
1996	67417	2996.28
1997	72157	3042.91
1998	58010	2554.38

1999	54439	2116.54
2000	53844	2279.2
2001	50098	2122.93
2002	82470	3551.5159
2003	79863	3485.201
2004	78000	3421.02
2005	51458	3370.57
2006	79127	3404.73
2007	72173	3105.71
2008	61423	2645.96
2009	59220	2505.63
2010	57008	2402.44
2011	54753	2221.56

Resin tapping is generally of poor quality and has deteriorated in the last 10-12 years. There are number of defects which are commonly noticeable These include (i) excess number of rills, (ii) excess width of the blaze (iii) not maintaining the minimum distance between two side by side blazes (iv) tapping non-linearly and (v) wastage of tappable space between two successive blazes. This has led to girdling of trees. The use of acid-mixture of higher concentration is common. Due to several defects, there are hardly any trees that have been tapped for 20 years. The number of blazes shows a decreasing trend.

3.7.2 Bamboo:

Following quantity of bamboos were extracted from the division during last ten years i.e. from 2000-01 to 2010-11

Table – 3.10

Nalagarh Forest Diviion

Year	Area worked (ha.)	Bamboos extracted (in bundles)
2000-01	1283.88	4071
2001-02	1199.42	4228
2002-03	1228.44	9703
2003-04	619.51	3235
2004-05	335.69	6037
2005-06	659.15	10618
2006-07	93.08	1930
2006-07 to 10-11	No felling was carried out.	

CHAPTER IV

ACTIVITIES OF FOREST CORPORATION

The H.P.State Forest Corporation came into existence in the year1974 and had started executing Resin extraction Works from the two R&T factories situated at Bilaspur and Nahan in the first phase, earlier the H.P. Forest Department used to look after these two factories. To achieve complete nationalization of forest working; the H.P. Govt. then decided to transfer the departmental resin tapping works being executed under state govt. in Kangra, nurpur Hamirpur, Una,Mandi Nachan Suket, Bilaspur Kullu Seraj, Rajgarh Solan forest Division. The lease period was for ten years. In the third phase in the year 1978 the Govt. decided to transfer the departmental timber,operation in kullu forest circle and Sawra Forest Division of Shimla Circle. Slowly and gradually all the timber exploitation works in the govt owned forest, Resin extraction in govt. forest and felling of coniferous timber of private attorneys, HPSFDC Ltd. had been made the only authenticated govt agency to do the business in order to curb the incidence of illicit felling and to save the farmers having trees on private land from exploitation by the private contractors in the earlier years.

4.1 EXTRACTION OF SALVAGE LOTS:-

The salvage lots consisting of dead, dying, diseased, wind broken, uprooted and dry trees are handed over to HPSFDC every year latest by 15,September every year for exploitation as per pricing committees decision's which was initially constituted in the year 1984 vide notification no. Fts. (F)2-2/79 dated 15/10/1982 and 24/2/84. and amendments made thereafter in other pricing committees decisions.

The detail of salvage lots handed over to forest corporation from both DPF's and Shamlats is shown as below.

Table 4.1

Record of salvage lots handed over to HPSFDC			
Year	Chil	B.L.	Total
	Vol	Vol	Volume Cum

1991-92	0	81.9146	81.9146
1992-93	202.47	15.674	218.144
1993-94	1624.97	111.5314	1736.5014
1994-95	1359.57	150.599	1510.169
1995-96	2525.15	165.248	2690.398
1996-97	7212.380	188.664	7401.044
1997-98	8113.370	301.508	8414.878
1998-99	1777.07	226.99	2004.06
1999-2000	3080.32	296.053	3376.373
2000-2001	3258.794	224.397	3483.191
2000-2001	6598.263	164.928	6763.191
2002-03	2580.160	294.492	2874.652
2003-04	4923.138	594.338	5517.476
2004-05	3544.448	255.986	3800.434
2005-06	3198.616	239.746	3438.362
2006-07	2753.87	276.888	3030.758
2007-08	2902.154	222.704	3124.858
2008-09	2540.682	213.432	2754.114
2009-10	4233.858	309.347	4543.205
2010-11	5102.10	330.07	5432.178
2011-12	6786.80	263.066	7049.868

These salvage lots are allotted to contractors through either by tendering or by giving these lots on schedule of rates. These are felled, converted into marketable sizes and transported to roadside depots either manually or by mule carriage. Thereafter from these roadside depots, this converted timber is brought to designated five depots of

HPSFDC namely Baddi, Swarghat Mantaruwala, Nurpur, Bhadroya and Dhanotu through trucks. The timber so received in the depot is then put to auction and is sold to different purchasers from whole of north India.

In addition to the extraction of salvage lot, the corporation is also instrumental in getting the coniferous timber of private owners sold in open auctions after following the procedure right from its felling, conversion and transportation to main depots and disposing off the timber through auctions The sale proceed is then finally made to private attorneys after deducting corporation's profit.

4.2 EXTRACTION OF RESIN:-

The resin from the govt. owned forest is extracted by HPSFDC through rill method. . The details of resin blazes for the last twenty years are as under:

Table 4.2

Year	Number of blazes	Yield obtained in Qtls.
1991	123376	5242.74
1992	129530	5605.02
1993	134177	5750.1
1994	126279	5491.62
1995	125281	1017.1
1996	67417	2996.28
1997	72157	3042.91
1998	58010	2554.38
1999	54439	2116.54
2000	53844	2279.2
2001	50098	2122.93
2002	82470	3551.5159
2003	79863	3485.201

2004	78000	3421.02
2005	51458	3370.57
2006	79127	3404.73
2007	72173	3105.71
2008	61423	2645.96
2009	59220	2505.63
2010	57008	2402.44
2011	54753	2221.56

The resin so extracted in the forests is transported to roadside depots either manually or by mule and which in turn is transported to two R&T factories at Bilaspur and Nahan. Then the raw resin is processed in these two factories and high grade resin and another different grade of resin are produced along with good amount of Turpentine. These are disposed off to different consumers at the Govt. fixed prices. The corporation in the past has got very high prices for the processed resin.

CHAPTER – V

FIVE YEAR PLAN

5.1 GENERAL: -

Ever since the launching of Five Year Plans regular provisions have been made for forestry development and forest based programmes. In first five year plan a sum of Rs. 9.5 crore was spent on forestry programmers in which emphasis was laid on afforestation, forest transport and communication, forest administration and small scale plantation by state governments. Similarly the central government gave priority to forest research, forestry education and wild life conservation.

5.1.1 In second Five Year Plan 193 million rupees was allocated for forestry development programmes. Here main focus was towards afforestation, development of plant species of commercial and industrial importance, increase production of timber and important minor forest produce, wild life conservation, improvement in the living conditions of forest personnel, forestry research, extension of new technological facilities and widening the scope of cooperation with the Central Government. Due to these efforts value of major forest products increased from 190 million rupees to 590 million rupees and minor forest products from 69.3 million rupees to 111.3 million rupees during 1951-61.

The area of reserved forests also increased from 27.3 million sq. km. to 36.5 million sq.km and the number of forest personnel grew from 4 to 50 lakhs.

5.1.2 In Third Five Year Plan a provision of Rs. 510 million was made for forestry development which laid to the planting of quick growing varieties of trees of 64,000 ha. and trees of economic importance on 240,000 ha. of area about 2 lakh hectares of forest land was replanted and 11000 km long new road were constructed besides the repairing of 4000 Km long old roads.

5.1.3 During Fourth Five Year Plan quick growing varieties of tree were planted on 4 lakh ha of land to meet industrial demand (paper, plywood and match industries) besides the a forestation on 3.4 lakh ha. of area for economically important trees (teak and shisham) and 75 lakh ha. for fuel wood. During this period about 2 lakh ha, of old forest land was reforested. For the proper development of forest about 16,000 km. long new

roads were constructed and 2,000 long old roads were repaired. About 2 lakh ha, of forest land was also developed for fodder to the cattle.

5.1.4 During Fifth Year Plan provision was made of planting quick growing varieties of trees on 8.6 lakh ha. of area along the roads, rivers, canals and rail lines and trees of economic and industrial use on 16 lakh ha of area. The plan also proposed the construction of about 60,000 km long roads for the maintenance and development of forest areas.

5.1.5 During Sixth Year Plan an outlay of 692.64 crore rupees was made for forestry development with main objectives for the conservation of existing forests and the launching of country wide afforestation and social forestry programmes to fulfill three sets of needs: (a) ecological security, (b) fuel, fodder and other domestic needs to the population; and (c) the needs of village, small scale and large scale industries.

The programmes included conservation, social forestry, fuel wood, forest labour, forest survey, forest research and people's participation in forest development. The new thrusts included 'trees for every child programme.' Eco-development force, eco-development camps and agro forestry programmes. During this period afforestation was made over 21.5 lakh ha of area. The Forest Conservation Act, 1980 restricted the transfer of forest land to other uses.

5.1.6 During Seventh Five Year Plan (1985-90) a sum of Rs, 1859.10 crore was allocated for forestry development. It fixed up target for planting trees on 50 lakh ha. of area with main programmes like (i) conservation of important flora and fauna for ecosystem, (ii) increasing forest area through afforestation programmes like social forestry, agro forestry etc, (iii) fulfilling the needs of fuel wood, fodder, timber and minor forest products, (iv) maintaining balance between forestry programmes and welfare of tribal's dependent on forests, (v) laying emphasis on forestry research, forestry education, and forestry training, and (vi) seeking people's participation for forestry development under JFM (Joint Forest Management) Scheme.

5.1.7 During the Eighth Five Year Plan an outlay of Rs. 525 crore has been provided for forestry development under Central Sector. The programmes include: (i) rehabilitation of degraded forests, (ii) soil and moisture conservation, (iii) farm forestry, (iv) road side and canal bank plantation, (v) creation of wind-breaks, and (vi) wood lots

on community land and pasture development. Under these programmes besides social forestry scheme, rural fuel wood plantation has been introduced in 101 districts of the country which are chronically deficient in fuel wood and fodder resources.

- The plan targeted an annual growth rate of 5.6% in GDP and at the same time keeping inflation under control.

5.1.8 9th Plan (1997-2002)

It was observed in the eighth plan that, even though the economy performed well, the gains did not percolate to the weaker sections of the society. The ninth plans therefore laid greater impetus on increasing agricultural and rural incomes and alleviate the conditions of the marginal farmer and landless laborers.

5.1.9 10th Plan (2002-2007)

- The aim of the tenth plan was to make the Indian economy the fastest growing economy in the work, with a growth target of 10%. It wanted to bring in investor friendly market reforms and create a friendly environment for growth. It sought active participation by the private sector and increased FDI's in the financial sector.
- Increase in forest land tree cover to 25 percent by 2007 and all villages to have sustained access to potable drinking water.

5.1.10 11th Plan (2007-2012)

- The eleventh plan has the objective to increase GDP growth to 10%
- Ensure electricity connection to all villages and increase forest and tree cover by five percentage points.

The Nalagarh Forest Division was part of Kunihar Forest Division prior to 1984 and the revenue and expenditure shown as per Mathuda's and Shagotar's plan were also inclusive of the revenue and expenditure made in the part of Nalagarh Forest Division as per statements shown below in different five years plans.

Table 5.1

5.1.11 Expenditure and Revenue of Kunihar/ Nalagarh Forest Division during First Five Year Plan

Year	Revenue	Expenditure	Surplus
1951-52	142584	125116	17468
1952-53	141495	103175	38320
1953-54	167071	101477	65594
1954-55	142556	111511	31045
1955-56	167195	109015	58180

Table 5.2

5.1.12 Expenditure and Revenue of Kunihar/Nalagarh Forest Division during IInd Five Year Plan

Year	Revenue in (Rs.)	Expenditure (in Rs.)	Difference (in Rs.)
1956-57	327903	174262	153641
1957-58	340408	196561	143847
1958-59	203687	147844	55843
1959-60	242963	291997	-49034
1960-61	560454	313939	246515

Table 5.3

Yield (in m^3) of Chil during IIIrd Five Year Plan

Year	Chil PB I	PB Inter	Total
1961-62	1585	1138	**2723**
1962-63	1585	560	**2145**
1963-64	240	113	**353**
1964-65	240	0	**240**
1965-66	2130	390	**2520**
Total	**5780**	**2201**	**7981**

(Source: Kunihar WP by D.D. Shagotar)

Table 5.4

5.1.13 Expenditure and Revenue of Kunihar/Nalagarh Forest Division during IVth Five Year Plan

Year	Revenue in (Rs.)	Expenditure (in Rs.)	Differende (in Rs.)
1969-70	1186743	1250397	-63654
1970-71	1000395	1620165	-619770
1971-72	1365013	2046166	-681153
1972-73	1553494	2803309	-1249815
1973-74	2876171	2948708	-72537

Table 5.5

5.1.14 Expenditure and Revenue of Kunihar/Nalagarh Forest Division during Vth Five Year Plan

Year	Revenue in (Rs.)	Expenditure (in Rs.)	Difference (in Rs.)
1974-75	1892246	2673494	-781248
1975-76	1799557	2200973	-401416
1976-77	1580393	2303454	-723061

(Source: Kunihar WP by D.D. Shagotar and V.K Singh)

5.1.15 VIth Five Year Plan (1980-85):-

With the launching of social forestry programme, the focus shifted towards raising of fuel, fodder, small timber and grasses to meet the domestic needs of rural communities.

Table 5.6

Year	Area planted in ha.
1980-81	369.5
1981-82	396.75
1982-83	308
1983-84	316.5
1984-85	893
Total	**2283.75**

(Source: DFO Kunihar/ Nlagarh)

5.1.16 VIIth Five Year Plan (1985-90)

The social forestry works were in full swing, main emphasis being on raising fuel, fodder, small timber and grasses to meet the domestic needs of rural communities. The year wise plantations raised in Kunihar Division are tabulated below.

Table 5.7

Year	Revenue in (Rs.)	Expenditure (in Rs.)	Difference (in Rs.)
1985-86	1609006	5792752	4183746
1986-87	4141139	7141429	3000290
1987-88	556884	8968624	8411740
1988-89	337256	10419316	10082060
1989-90	289449	11590632	11301138

(**Source: Kunihar WP by V.K Singh)**

5.1.17 VIIIth Five Year Plan (1992-97) The JFM approach started in the division and the forestry activities were implemented under departmental schemes. As ban on green felling continued, the objective remained afforesting denuded/degraded forests. The constitution of forest development committees and their participation in planning and implementation was sought. Plantation done during this period is given in table 5.8 as under:

Table 5.8

Plantations Raised during 1992-97 in Nalagarh Division

Year	Total area in ha.
1992-93	264
1993-94	606
1994-95	**701**
1995-96	**318**
1996-97	**601**

(Source: Nalagarh Forest Division)

5.1.18 IXth Five Year Plan (1997-2002) :- The works of afforestration, soil conservation, entry point activity started by the VFDCs /JFMCs and microplan process learnt and executed. Sanjhi Van Yojna started on the principles of JFPM. Himachal Pradesh Participatory Forest Management Regulations, 2001were made during this period. Here again the focus remained on restocking/regeneration of degraded forests. Detail of plantation raised during this period is given in table 5.9 as under:

Table 5.9

Plantations Raised during 1997-2002 in Nalagarh/Kunihar Division

Year	**Total area in ha.**
1997-98	550.5
1998-99	540
1999-2k	547
2000-01	284
2001-02	112.04

(Source: Nalagarh Forest Division)

5.1.19 Xth Five Year Plan (2002-2007):- Both the JFM programmes FDA & SVY created mass awareness about forestry but the focus was again on raising plantations besides soil works and entry point activities.

Table 5.10

Plantations Raised during 2002-07 in Nalagarh Division

Year	Total area in ha.
2002-03	230.36
2003-04	162.85
2004-05	253
2005-06	261.76
2006-07	347.35

(Source: Nalagarh Forest Division)

5.1.20 XIth Five Year Plan (2007-2012):-Forestry works were carried out in participatory as well as departmental modes. JFM programmes created mass awareness about forestry but the focus was again on raising plantations besides soil works and entry point activities. JFMCs started helping in forest fire management.. Some forestry activities were also done in MNREGA. From 2009-10 Rehabilitation of areas infested by invasive alian species has been started which is showing good results. Details of plantation raised and works under rehabilitation during this period are given in table 5.11 as under.

Table 5.11

Plantations Raised during 2007-12 in Nalagarh Division

Year	Total area in ha.
2007-08	88.9
2008-09	326.448
2009-10	107
2010-11	136
2011-12	229.86
Total	**888.208**

(Source: Nalagarh/kunihar Forest Division)

CHAPTER – VI

Staff and Labour supply

6.1 Executive Charges:

Nalagarh Forest Division is divided into 4 ranges, 13 blocks and 45 beats. A detailed list of territorial units is given below:

Table – 6.1

Nalagarh Forest Division				
Division	**Range**	**Block**	**Beat**	
Nalagarh	Nalagarh	Nalagarh	Nalagarh	
			Silnu	
			Hatra	
		Manpura	Khol-beli	
			Plahwala	
			Handa-khundi	
			Mandiarpur	
		Sainimajra	Bir Plassi	
			Lakhanpur	
			Majra	
			Rakh Plassi	
		Joghon	Joghon	
			Gujjarhatti	
			Bagheri	
			Rakh-raipur	
	Baddi	Baddi	Baddi	
			Dassaura	
			Malku-majra	
			Kishanpura	
		Sai	Bhalawa	
			Majroo	
			Talli	
		Dharampur	Dharampur	
			Ambika	
			Nandpur	
	Ramshehar	Ramshehar	Ramgarh	
			Baheri	
			Kawarni	
			Kot-kahi	

		Kumarhatti	Khumrhatti	
			Phulwala	
			Bhipar	
			Palli	
		Diggal	Diggal	
			Chillar	
			Hatheora	
	Kohu	Kohu	Kohu	
			Bhiunkhary	
			Rajwala	
		Suna	Suna	
			Loharghat	
			Salyach	
		Galot	Chamba	
			Bhini	
			Sai	
	4	13	45	

6.2 Staff position in respect of Nalagarh Forest Division.

6.2 Table

ALLOCATION OF POSTS FOR THE YEAR 2011-12 [REF. CF. BILASPUR LETTER NO.D.1.17/3828-30 DATED 12/8/11]					
S. No.	**Name of Category**	**Sanctioned/ Agreed strength**	**Existing strength**	**Variation**	**Remarks**
1	HPFS/ ACF	2	2	0	
3	Forest Ranger (T)	7	2	-5	
5	Deputy Ranger (T)	17	13	-4	3 DR are in MHWDP [DWDO Swarghat]
7	Forest Guard (T)	49	47	-2	
8	Forest Guard (WP)	0	0	0	
9	Supdt. Gr. II	1	1	0	
10	Sr. Assistant	3	3	0	
11	Jr. Asstt./ Clerk	6	6	0	
12	Kanungo	2	1	-1	
13	Patwari	1	1	0	
14	Jeep Driver	1	1	0	
15	Mali	8	8	0	
16	Chowkidar	13	10	-3	
17	Peon	12	15	3	
18	Peon-cum-Khalasi	0	0	0	
19	Forest Worker	65	56	-9	
20	Boat man	1	0	-1	
	Total	**188**	**166**	**-22**	

CHAPTER – VII

PAST SYSTEM OF MANAGEMENT

7.1 General History of the Forests:

The old Kunihar Forest Division comprised of the former princely States of Baghal, Kunihar Mangal, Dhami, Kuthar, Mailog, Beja and Nalagarh. Little is known about the old history of these forests. The forest conservancy as such started receiving attention for the first time towards the middle of the last century. Up to that time the ruling Cheifs usually reserved a few forest areas for *Shikar* for their personal use and paid little attention to the remaining wastelands. Nomadic graziers were admitted in all states for the sake of revenue as well as for manuring the agricultural fields. After the advent of the British, the demand for firewood and timber in the plains and various hill stations sprang up, creating a pressure on the hill forests. In 1872, the Superintendent, Shimla Hill States issued directive to the various Chiefs calling upon them to afford adequate protection to the forest areas. In 1886, decision was taken to divide the waste lands into two categories, viz. (a) better wooded areas, to be maintained as permanent forest, and (b) forests which covered the far more extensive remaining areas, was to be left for the use of the right holders. This led to the creation of the present Demarcated Protected Forests (DPF) and their systematic management. The position, however, varied greatly from one stage to the other according to its situation vis-à-vis the markets for forest produce. After independence these States were merged into Union of India and became part of Himachal Pradesh. At present these States form Nalagarh, Baddi and Arki Tehsils and parts of Kasuali Tehsil of Solan District and part of Shimla Tehsil of Shimla District.

7.2 Past Management:

For the convenience of review, the past management of forest of Kunihar Forest Division (Nalagarh Division was part of kunihar division) is described under following heads:

(a) Transitional period up to the period of regular management under Working Plans.

(b) Period of regular management under Working Plans, i.e. up to 1960-61.

(c) Post merger period i.e. from 1961-62 to 1976-77.

(d) Period of management under Working Plan under revision, i.e. from 1977-78 to 1990-91.

7.3 Transitional period up to the period of regular management under Working Plans:

7.3.1 Nalagarh:-

The demarcation and survey of forest originally started in the year 1886 and the work was completed in the year 1914. Punjab government notification No.125 dated 5th January, 1904 laid down definite instruction for the management of these forests. It was stated therein that in case, the Rajas of Shimla hill states did not execute the instructions,the needful could not be done by the suprintendent of the hill states at the cost of concerned states. A forest department was created which was headed by forest jamadar with 33 forest guard under him to look after the forests in the states. A regular working plan by Pishori Lal (1915-1934) came into force, which catagorised the undemarcated forests into two groups viz.(a) workable and (b) unworkable, it constituted (a) the coppice working circle with a rotation of 20 years and retention of 62 to 75 standards per hactare; (b) the chil working circle to be worked under thinning and improvement felling system on a 10 year felling cycle and (c) The Bamboo Working Circle for the felling of bamboo on three year felling cycle under specific felling rules. Some khair and chhal sowings were attempted in the khols and in the grassy blanks on exposed spurs in the scrub forest from time to time but with no success. Peshawri Lal's working plan was succeeded by J. Singh's Working Plan(from 1934-35 to 1958-59) which removed all the short comings and laid down definite objects of management.

7.4 Period of regular management under Working Plan upto 1960-61:

Before merger, managed their forest under the guidance of the Punjab Forest Department who arranged for the preparation of the Working Schemes, and Annual Plan of Operations, as necessity. In spite of the large variation with respect of the progress of demarcation and preparation of Working Scheme, there was close similarity in the methods of working throughout the tract because the guiding principles and agency of control was one and the same i.e. the Punjab Government. The primary objectives were to afford adequate protection to demarcated forests and work the accessible forest for benefits of the States concerned. Only thinning and improvement feelings were

prescribed for the Chil forests, as these were immature. But the works were generally not carried out for lack of demand for the produce. After merger of the States during 1948 the management continued on the old pattern in the Kunihar tract where as the work in Nalagarh tract was done under J. Singh's Working Plan which remained in operations from 1934-35 to 1958-59. During the period, the entire work was carried out in Demarcated Protected Forests and no work was done in Un-demarcated Protection Forests though they constitute major part of the forest area of the division. These forest were left to meet the requirements of the local people. Due to inadequate protection and no steps having been taken to obtain regeneration, most of these areas became denuded and devoid of tree growth and were rendered unproductive due to loss of soil through erosion.

7.5 Systems of Management and their results:

7.5.1 Chil Forests: In Nalagarh tract, the chil forests were worked under J. Singh's Working Plan under the Chil Working Circle. The method of treatment prescribed was thinning cum improvement fellings as the crop was immature. The felling were prescribed on a 15-year cycle. It prescribed C-grade thinning and removal of dead, dying trees and those 60 cm and over in diameter standing on established patches of saplings and poles. During the war (1939-45) the young poles were supplied to the army and the congested groups were thinned out and also over mature and malformed trees were removed for charcoal. There being no provision of fire lines or periodic departmental burnings, the incidence of fires increased and a good number of trees died and young crop was damaged in certain forests. Chil sowing in blanks though prescribed was not carried out till 1946 Resin tapping was also started in Nalagarh forests.

7.5.2 Mixed deciduous forests: In Nalagarh tract these forests were worked under J. Singh's Working Plan in the Coppice Working Circle. A rotation of 25 years with 60 to 75 standards to be retained per hectare was prescribed. After felling each coupe was to remain closed to grazing for 10 years. In order to improve stock, sowing of sain, neem and planting the shisham stumps were prescribed. Felling were carried out according to the plan but for want of prescription regarding cleaning and thinning the crop suffered from congestion till 1942. Due to congestion, the crop could not attain the anticipated average growth of 30 cum d.b.h. in 25 years. Sowing and planting were also not successful to the desired extent due to drought and various other factors. The

operations were however successful in DF Lohanda, DF Baddu and DF Ratwari forests because of effective closures.

7.5.3 Mixed Deciduous Forests with Bamboos: In Nalagarh tract, the bamboo forests were worked under J. Singh's Working Plan. It divided the bamboo forests into 5 felling series with different objects of management. Thakardwara, Silnu and Phulwala Felling series meant for Thakardwara temple, the State Government at Nalagarh and Baila respectively. Ropar and Kalka Felling series meant for Ropar and Kalka merchants. A two years cycle was prescribed and thus series was divided into equiproductive coupes. The felling rules prohibited extraction of rhizomes and cutting of manus and leading external shoots. Cutting season was fixed from November to February. It was prescribed that 5 No. of grazing was to be permitted from 1st July to the end of September. Clearing of congested clumps and removal of dry, dead and useless bamboos was also prescribed. The condition regarding keeping 5 culms resulted in cutting of every thing except 5 culms and by resorting to excessive felling, rhizomes received severe shock. Cleaning around congested clumps were got done with the help of local right holders who damaged the clumps to secure their own end. There was gregarious flowering in the year noted against each forest:

Table – 7.1

Forest	Year of Flowering
Silh	1936-37
Kala Amb	1936-37
Ratwari	1945-46
Phulwala	1955-56
Ramgarh	1956-57
Plahwala	1956-57
Baddu	1956-57
Rajwain	1958-59

In all these forests, sufficient natural regeneration appeared but suffered for want of proper tending.

7.5.4 Protection Works:

In Nalagarh tract, such forests were worked under Protection Working Circle in J. Singh's Working Plan. This circle consisted of Rakhs of Nalagarh, Raipur and Plassi, and the brushwood scrub type forests. These forests were divided into Fodder Felling Series and Afforestation Felling Series. In Fodder Felling Series closures of one fourth of each forest for 10 years in turn was prescribed and sowing of fodder trees of Grewia spp. and Zizyphus spp was suggested. In the Khols where erosion was extreme, 15-year closure to grazing, stoppage of sale of grass and trees and patch sowing of kikar, maindar and khair were prescribed. Along stream banks plantation of munji was done. Rakh Nalagarh, Rakh Plassil, Rakh Raipur, and DF Khobal were closed for 15 years and sowing of khair, siris, neem and planting of shisham along nallas was prescribed. Intensive afforestation and soil conservation work were carried out in Nalagarh and Dharampur Khols in the first two five year plans. In the initial stages, only khair, kikar, ber sowing and shisham planting were carried out near Sitalpur, where the success was good. After 1947, extensive soil conservation works were carried out in these two Khols. Between 1951-52 to 1958-59 Rs. 2,09,362 were spent in these two Khols (Nalagarh and Dharampur) on various works such as contour trenching, check dams, construction of earthen dams, sowing and planting, tending, ravine training, etc. These measures saved the soil from further denudation to some extent.

7.6 Post merger period:

The Nalagarh forests were managed under Bajaj's Plan from 1958-59 onward up to 1978-79. The system of management was more or less the same in both the tract. The salient features of the Mathuada's Working Plan were the total enumeration of chil trees down to 20 cm. d.b.h. for bringing the large areas of deteriorating Un-demarcated Protected Forests under proper management; introduction of coppice with standard system for oak; and creation of Plantation Working Circle. The assessment of results of the prescriptions of each working circle in each tract is discussed in the following paragraphs.

7.7 The Chil Working Circle:

7.7.1 Nalagarh Tract:-

The chil forests of Nalagarh Forests were first brought under proper management of Peshawri Lal's Working Plan of 1915-16 to 1933-34 and then under J.Singh's working

Plan from 1934-35 to 1958-59, In both the plans, no enumeration were carried out and the yield was prescribed by the area.Although the revised draft plan for Nalagarh tract by Y.P.Bajaj was prepared from 1959-60 onwards. The works were carried out on the basis of Annual Plan of Operations. The draft plan was again revised by Bajaj for the period 1968-69 to 1978-79 but the management continued according to the Annual Plan Of Operation.

7.7.2 Result of working

All PB I areas could not be worked during the 10 years period according to the prescriptions of the plan. Only accessible areas were worked in both the tracts. Very few areas were fully regenerated. The main cause of failure were fire, lack of protection and retention of more standards than required. In the absence of timely tending operations, young crop suffered from congestion and at times destroyed by fire. In other PBs no thinning were done but dead, dry and fallen Chil trees were got removed from time. The trees which were considered unfit for resin tapping were also removed.

7.7.3 Resin Tapping:

During this period, resin tapping has been carried out regularly in all Chil bearing areas in spite of remoteness and difficult approach. Heavy resin tapping was also carried out in PBI areas where regeneration feelings were done.

7.7.4 Result of working:

Lack of tending operations in early stage has resulted in congestion of coppice shoots and poor development. On the other hand, where effective closures were enforced, for example DF Lohanda, DF Baddu and DF Ratwari result were encouraging. Seeing the poor result in some of these forests, coppice with standard system was changed to the modified clear felling system and after 1967-68 these forests were being worked under this system under annual plan of operations. Khair and bamboo were introduced. With clearing of shoots of chhal, Khair has come up well in some forests such as DPF Sobal and DPF Khobal forests of Ramshahar Range.

7.8 The Bamboo Working Circle:

7.8.1 Nalagarh Tract:

Scrub forest of bamboos of Nalagarh tract was allotted to this circle. This was an overlapping working circle. After the expiry of J.Singh’s working plan in 1960 bamboo

forests were worked on a trienniel felling cycle by M/s Ballarpur Paper Mills, in the areas leased out to the demand

by purchaser from unleased forests. Silviculture system was almost the same as was applicable in the forest of Kunihar tract.

7.8.2 Result of Working:

Felling rules had not been properly observed by the purchasers. Tending and cleaning operations were never carried out resulting in congested clumps. During 1962, the Paper Mill over worked these forests and by 1971, the firm had felled 720 ha in excess. However, clear feeling of scrub forest had been beneficial for bamboo which came up in DF Dassaura, DF Ambika and DF Baddu in Nalagarh tract

7.9 The Plantation Working Circle:

7.9.1 ***Nalagarh Tract:-***

Bajaj made some changes in the forest of the previous Protection working Circle of J.Singh's plan. Some Forests like DPF Khobal C1, DPF Didu C2, DPF Lohanda C1 were included in the circle whereas the forests like Rakh Nalagarh, Rakh Raipur, Bir Plassy, DPF Aduwal, DPF retwali, DPF Nissal chamdar DPF Luna Silh were taken out from the circle and added to the plantation working circle. Removal of dead dying trees on a 15 years rotation was prescribed where necessary and the plantation were to be carried out where considered suitable.

7.9.2 Result of Working:

Very little attention was paid to implement the prescriptions of the plan. It is reported that co-operations from the local people was not forth coming and the available funds were also inadequate

7.10 Period of Working Plan under revision (Shagotar's Plan) i.e. from 1977-78 to 1990-91:

During this period frequent territorial reorganization took place. During 1984, the Kunihar Forest Division was bifurcated into two territorial divisions namely, Kunihar and Nalagarh, except for a short spell of one year, i.e. from April 1992 to March 1993 when Social Forestry Division Kunihar was created after transferring the area of Kunihar Forest Division to Nalagarh Forest Division.

7.11 V.K SINGH'S WORKING PLAN (1991-92 TO 2005-06) :

The following working circles were constituted: -

1. The Chil Working Circle
2. The Bamboo Working Circle.
3. The Plantation Working Circle
4. The Rehabilitation Working Circle.

7.12 THE CHIL WORKING CIRCLE:

7.12.1 GENERAL CONSTITUTION

All demarcated protected forests bearing a predominantly chil crop and the established chil plantations were included in the working circle. The Forests allotted to this working circle lie between 750 meters and 1800 meters altitude and represent various types of crop combination in which chil (*Pinus roxburghii)* is the dominant species. The total area of this working circle was 5646.01 Ha. Out of this 2179.03 Ha. was in Nalagarh Felling Series. The forests are generally understocked, having large variation in density, and normal distribution of age classes is lacking except in PB IV. Young to middle aged classes predominate and mature trees are rather seen scattered in them. Total enumeration of all the ares allotted to P.B.I and P.B.IV except the newly established chil plantation area, has been carried out in 10 cm diameter class down to 10 cm d.b.h In the case of areas alloted to P.B.Inter partial enumeration to the extent of approximately 20% was carried out and then final result was calculated. The exploitable crop diameter was fixed at 50 cm d.b.h over bark with a rotation of 120 years and regeneration period at 30 years. PB-I included areas – having maximum number of exploitable trees with almost non regeneration, areas which had remained un-generated during the last pan and areas with density below 0.3. The yield was to be controlled by volume and the total deviation for a single year would not exceed more than 10% of the pescribed yield which would be adjusted at the end of five years when it should be checked with in plus and minus 10%. The annual yield prescribed from PB-I was 1100 m3 and PB-IV 400 m3 and no green felling were prescribed in the PB-Inter. Only dead wind fallen or otherwise damaged trees were allowed to be removed. The yield would be adjusted against the yield of the working circle.

Table 7.1

The yield removed and prescribed are depicted in the following table.

Year	PB I			PB IV			PB Inter		
	Annual prescription	Total removal during the year (in m^3)	Deviation Plus/ minus (in m^3)	Annual prescription	Total removal during the year (in m^3)	Deviation Plus/ minus (in m^3)	Annual prescription	Total removal during the year (in m^3)	Deviation Plus/ minus (in m^3)
1991-92	1100	54.67	-1045.33	400	4.25	-395.75	900	86.399	-813.601
1992-93	1100	81.01	-1018.99	400	0	-400	900	292.2	-607.80
1993-94	1100	104.74	-995.26	400	9.58	-390.42	900	201.73	-698.27
1994-95	1100	81.68	-1018.32	400	7.72	-392.28	900	1066.18	166.18
1995-96	1100	668.786	-431.214	400	11.95	-388.05	900	1583.86	683.86
1996-97	1100	1593.51	493.51	400	61.05	-338.95	900	2402.91	1502.91
1997-98	1100	1762.1	662.1	400	112.6	-287.4	900	3185.61	2285.61
1998-99	1100	597.98	-502.02	400	37.47	-362.53	900	769.21	-130.79
1999-00	1100	430.54	-669.46	400	98.1	-301.9	900	1438.53	538.53
2000-01	1100	475.55	-624.45	400	0	-400	900	3587.89	2687.89
2001-02	1100	785.554	-314.446	400	190.19	-209.81	900	3073.64	2173.64
2002-03	1100	615.009	-484.991	400	292.28	-107.72	900	1275.52	375.52
2003-04	1100	872.87	-227.13	400	300.77	-99.23	900	2716.05	1816.05
2004-05	1100	856.674	-243.326	400	277.109	-122.891	900	1599.23	699.23
2005-06	1100	920.722	-179.278	400	4.95	-395.05	900	1447.09	547.09
2006-07	1100	304.74	-795.26	400	619.614	219.614	900	734.816	-165.184
2007-08	1100	505.227	-594.773	400	568.868	+168.868	900	1049.728	149.728
2008-09	1100	543.872	-556.128	400	325.694	-74.306	900	877.676	-22.324
2009-10	1100	877.80	-222.20	400	406.752	6.752	900	1293.164	393.164
2010-11	1100	920.124	-179.876	400	875.386	475.386	900	1712.74	812.74
G.Total	**22000**	**13053.158**	**-8946.842**	**8000**	**4204.333**	**-3795.667**	**18000**	**30394.173**	**12394.173**

Table 7.2

THE ABSTRACT OF DEVIATION IS AS UNDER:

PB	Total prescription	Total removal	Deviation
I	22000	13053.158	-8946.842
IV	8000	4204.333	-3795.667
Inter	18000	30394.173	12394.173
G.Total	**48000**	**47651.664**	**348.336**

7.12.2 RESULT OF WORKING:

Prescription of the working plan has not been adhered to. No green felling was carried-out in the areas where seeding fellings were required to be done during the period. However as far as yield is concerned its removal is only as a result of salvage markings. PB-I areas remained un-felled and therefore remained un-regenerated. However, on the other hand, trees to right holders were marked without giving consideration to silvicultural aspect.

7.13 BAMBOO WORKING CIRCLE:

7.13.1 GENERAL CONSTITUTION:

The working circle comprised of mixed deciduous with a preponderance of bamboo. The silvicultural system adopted was selection system with thinning in each clump as an independent unit of the working. Three years felling cycle was prescribed. Two felling series namely Nalagarh Commercial felling series and Nalagarh local demand felling series were formed. The yield was prescribed by area. Definite rules were suggested for executing felling and annual felling programs were laid out. Sowing and planting was suggested wherever necessary in this working circle. Planting and nursery techniques for bamboo were prescribed. Total area of this working circle was 5442.21 ha out of which 3808.21 ha was of Nalagarh felling series.

7.13.2 RESULTS OF WORKING

The prescription of the working plan has not been followed in working of bamboo forests. The Bamboo’s have continuously been exploited during the planned period

either through the purchasers or through the H.P.State Forest Corporation. Lack of effective control and non-provision of subsidiary cultural operations, adversely affected the crop which is now badly degraded. The clumps have become congested with deformed and stunted culms. The prescriptions regarding *manu* and *chhals* remained only on paper prescriptions. In some of the areas of this working circle, such as D-153 Malaun, chil has been planted.

The year-wise removal of yield of this working circle for the period of 1991-92 to 2002-03 is given below:-

Table 7.3

Year	Annual prescription.	Total removal During the year		Deviation plus/minus
1991-92	1052.17 ha.	487.86 ha.	(-)	564.31
1992-93	889.03 ha.	142.23 ha.	(-)	746.80
1993-94	867.80 ha.	519.65 ha.	(-)	348.15
1994-95	1052.17 ha.	485.75 ha	(-)	566.42
1995-96	914.65 ha.	393.61 ha.	(-)	521.04
1996-97	857.82 ha.	519.65 ha.	(-)	338.17
1997-98	1052.17 ha.	485.75 ha.	(-)	566.42
1998-99	889.03 ha.	869.49 ha.	(-)	19.54
1999-00	857.80 ha.	202.56 ha.	(-)	655.24
2000-01	889.03 ha.	376.25 ha.	(-)	512.78
2001-02	889.03 ha.	376.25 ha.	(-)	512.78
2002-03	857.20 ha.	519.65 ha.	(-)	337.55
2004-05	889.03 ha	235.07 ha.	(-)	653.96
2005-06	857.20 ha	453.14 ha.	(-)	404.06
2006-07	889.03 ha	93.08 ha	(-)	795.95
2007-08				
2008-09				
2009-10				

7.13.3 CRITICAL APPRAISAL

7.13.4 Nalagarh local demand felling series: - In Nalagarh local demand felling series such forests has been allotted which are predominately of miscellaneous broad leave species with scattered clumps of bamboo**.** During recent inspections, it was noticed that:

i) Due to gregarious flowering in past the bamboo from such forests has virtually ceased to exist and further, due to repeated fires, these forests has been invaded by lantana.

7.13.5 Nalagarh Commercial felling series:- The forest allotted to this felling series were predominantly having good stock of bamboo in the past but presently the status of these forests is not healthy. Recent inspections have brought out the following facts that:

i) Due to gregarious flowering in the past the bamboo from such forests has been heavily damaged and further, due to repeated fires, these forests has been invaded by lantana.

ii) Though after gregarious flowering, these areas started to regenerate in the past and some bamboo clumps established again, yet considerable damage has been done to these forests by repeated fires and heavy invasion by lantana.

iii) As per prescription of the Working Plan joint inspection of the areas by RO and AM were conducted when the areas were due for felling and from the joint inspection report it emerges that the bamboo was found available approximately in 5% of the area prescribed for the felling.

iv) From such joint inspection reports, it can easily be inferred that slowly these forests are turning in to miscellaneous broad leave forests.

v) Lantana has almost invaded in 80% to 90% of the area, though, clumps of bamboo and trees of B/L species are there in the upper storey.

vi) The congestion of clumps and lack of thinning & cleaning operation are also responsible for present state of these forests.

If special emphasis is given on eradication of lantana from these forests and sufficient protection is provided against forest fire these forests can again regain past glory of the good bamboo forests.

WPO had suggested **50** ha of planting every year in this WC and **353.4** ha has been planted since1990-91 upto 2009-10.

7.13.6 Result of working:

The prescriptions of the working plan have not been followed in working of bamboo forests. The bamboos have continuously been exploited during the plan period either through the purchasers or through the H.P. State Forest Corporation. Lack of effective control and non provision of subsidiary cultural operations, adversely affected the crop which is now badly degraded. The clumps have become congested with deformed and stunted clumps. No extraction of Bamboo could take place becasuse of Hon'ble High Court's order for ban on green felling after 2006-07 to 2011-12.

7.14 THE PLANTATION WORKING CIRCLE

7.14.1 GENERAL CONSTITUTION:

The Plantation Working Circle comprisies of areas:-

i) Mixed deciduous forest without bamboo and which wre not included under the bamboo working circle
ii) Scrub and blank area suitable for planting, but not included under the Rehabitation Working Circle.
iii) Young and Established plantations of broad leaved species.
iv) Unestablished chil plantation areas.

The special object of the management was to meet the demands of local people and also to rehabilitate the blank areas. The area of working circle was 12198.95 Ha out of which 1951.35 ha was of present Nalagarh Forest Division. The forest was stock mapped. 20% partial enumeration was carried out in case of khair and other broad leaved species. Complete enumeration of Eucalyptus was done in areas having predominantly Eucalyptus crop. The silvicultural system adopted was modified clear felling system. Clear felling of the existing crop with retention of 20-30 trees per ha. scattered all over the area, was prescribed. The areas were to be stocked with coppice shoots and by planting of khair, chhal, buil, and shisham. No rotation was prescribed. The main objects of management in this working circle is to nurse the existing plantation and to restock the blank area under useless scrubs with species of higher utility and economic value and also to meet the requirement of local people for fuelwood, fodder and small timber.

7.14.2 RESULTS OF WORKING:

The broad leaved miscellaneous forests which mainly constitute the plantation working circle have deteriorated due to heavy biotic interference. The prescriptions of the working plan have not been followed. The different plantation areas which were worked in the early part of plan period could not regenerate satisfactorily due to heavy grazing. The closure was not effective and the control was very loose. In A-type areas, the prescriptions of the plan could not be adopted due to ban on green felling. The plantation programme was ignored and more and more areas had been taken under plantation without effective protection. The plantations done in later part of the plan

period are not satisfactory. In the established plantations tending operation could not be done due to scarcity of funds.

PLANTATIONS CARRIED OUT W.E.F 1990-91 TO 2009-10 ARE SHOWN IN THE FOLLOWING **TABLE-7.4**

Information regarding Plantation done in the field w.e.f. 1990-91 to 2010-2011 in respect of Nalagarh Forest Division is as under:

Sr. No.	Year	Area planted in Ha.	Plantation in ex-Shamlat Areas not covered in w- plan	Working circle wise area planted out of the total area planted during the year					Grand Total
				Chil WC	Plantation WC	Rehabilitation WC	Bamboo WC	Total	
1	1990-91	644.5	614.5	0	0	20	10	30	644.5
2	1991-92	438	341	10	4	35	48	97	438
3	1992-93	264	117	22	88	15	22	147	264
4	1993-94	606	532	12	7	40	15	74	606
5	1994-95	701	656	13	2	30	0	45	701
6	1995-96	318	300	10	8	0	0	18	318
7	1996-97	601	522	10	6	42	21	79	601
8	1997-98	550.5	448	9	48	30.5	15	102.5	550.5
7	1998-99	540	379	7	24	87	43	161	540
8	1999-00	547	340	13	48	94	52	207	547
9	2000-01	284	220	24	13	18	9	64	284
10	2001-02	112.04	71.71	27.33	10	3	0	40.33	112.04
11	2002-03	230.36	136.4	57.46	15	4.5	17	93.96	230.36
12	2003-04	162.85	108.5	21.35	28	5	0	54.35	162.85
13	2004-05	253	167	41	40	0	5	86	253
14	2005-06	261.76	164	41.42	38	0	18.34	97.76	261.76
15	2006-07	347.35	278.6	15	18.75	0	35	68.75	347.35
16	2007-08	88.9	81.4	7.5	0	0	0	7.5	88.9

17	2008-09	326.448	244.58	3.8	15	20	43.06	81.86	326.44
18	2009-10	107	97	0	10	0	0	10	107
19	2010-11	136	35	51	5	20	25	101	136
	Grand Total	**7519.708**	**5853.69**	**395.86**	**427.75**	**464**	**378.4**	**1666.01**	**7519.708**

7.15 THE REHABILITATION WORKING CIRCLE

7.15.1 GENERAL CONSTITUTION

This Working Circle included mostly open, steep, seriously eroded and degraded forests such as khols of Dharampur and Nalagarh and all other forests which were not included in other working circles. The main objective was to protect the areas from further degradation, improve the stocking of degraded forests by introducing suitable species of high-economic value and to augment the supply of fuel, fodder, timber, agricultural implements etc to local people. Total area of this working circle was 4773.32 Ha out of which 2366.12 Ha was in jurisdiction of present Nalagarh Forest Division. Forests generally, included in this working circle were sparsely stocked, having good many blanks and commercially unimportant species. All forests were stock- mapped on 1: 15000 scales. The site quality was not ascertained. All age classes were found with preponderance of young aged trees.

7.15.2 METHOD OF TREATMENT

No definite silvicultural system was prescribed..

7.15.3 RESULT OF WORKING:

i) No marking of trees was done in this working circle, however, dry, fallen trees were removed to meet the demands of local people.

ii) The planting programme laid down in the plan was not strictly followed. However, against a prescription of 445 Ha, 444 Ha has been planted upto the year 2009-10. No tending operations were attended to in the case of

existing plantations carried out during the plan. The plantations are generally of questionable quality.

7.15.4 SOIL CONSERVATION WORKS

In addition to planting, partial soil conservation works also carried out where ever needed. The areas of Khols of Nalagarh and Dharampur are highly denuded and deep ravines have been formed and silt discharge is very heavy. Efforts to establish the unstable slopes and landslips by planting plants like Vitex negundo, Ipomea spp, Agave spp and other soil binders were made during the plan period.

7.15.5 ROAD AND PATHS:

A list of forest roads and paths with the year of construction has been given in appendix. As per records available only 4.25 kms length of road was constructed in the entire tract. The suggestions regarding construction of roads and paths proposed in the plan have not been considered. Maintenance and repair of roads and paths remained neglected probably due to want of funds.

To facilitate the inspections, supervision and execution of various forestry works, a network of roads and paths is needed. In the recent past the maintenance of old Roads and Paths was ignored probably due to paucity of fund. Adequate funds for the construction of proposed B/paths were not provided. The list of proposed roads/Paths in the plan period is as under:-

Range	Road/Path	Particular	Apprx.length(kms)
Kohu	Bridle Path	In D.145 Chamba Forest	2
-do-	-do-	In D.150 Dhar Chamba Forest	3
-do-	-do-	In D.151 Ukhu Forest	5

7.15.6 Building:

The list of buildings with the year of construction has been given in appendix. A good number of buildings have been constructed during the plan period, especially due to creation of Nalagarh Forest Division during 1984. The repair of the old buildings,

particularly of those situated in remote areas continued to suffer for want of sufficient funds.

Most of the Forest Rest Houses and Inspection Hut are in bad shape and require thorough repair and improvements. Some New buildings as given below was proposed to be constructed during plan period and the list of proposed buildings are given below:-

Range	Type of building	Place
Kohu	Forest rest house	Swarghat (near Chamba DPF)
-do-	Guard Hut	Sai and Rajwaha.
-do-	Peon quarter	Kohu
-do-	(Type-I quarter for R.A.)	Kohu
Ramshehar	Guard Hut	Matuli,(for Kotkahi beat)Kothi (for Bhipper beat),Theora
Baddi	Guard Hut	Dassaura, Baddi.
Nalagarh	Guard Hut	Plahwala, Mandiarpur, Jhiran, Majra, Bagheri and Hatra.

7.15.7 Boundaries:

The condition of boundary pillars is far from satisfactory. The repair and maintenance was not done systematically as per the repair programme prescribed in previous plan. Boundary registers have not been maintained properly for most of the forests. The existing BPs and the repairs carried out during last sevn years is tabulated below:

List of exsiting Boundary Pillars in respect of Nalagarh Forest Division.					Repair of Boundary pillars																				
Name of Range	Name of Forests	Existing Boundary Pillar			2009-10			2008-09			2007-08			2006-07			2005-06			2004-05			2003-04		
		Large	Small	Total	L	S	T	L	S	T	L	S	T	L	S	T	L	S	T	L	S	T	L	S	T
Ramshehar	D 162 Nisal Chamdar	48	15	63	0	0	0	0	0	0	10	0	10	0	0	0	6	0	6	5	0	5	10	0	10
	D 163 Luna Silh	11	8	19	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	5	0	5	0	0	0
	D 164 Pongni	9	7	16	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	5	0	5	4	0	4
	D 165 Kamal Pandal	19	23	42	0	0	0	0	0	0	5	0	5	0	0	0	2	0	2	5	0	5	5	0	5
	D 166 Dattala	13	10	23	0	0	0	0	0	0	8	0	8	0	0	0	0	0	0	5	0	5	8	0	8
	D 167 Mamla	30	1	31	0	0	0	0	0	0	4	0	4	0	0	0	5	0	5	4	0	4	4	0	4
	D 171 Kot Kahai	49	0	49	0	0	0	0	0	0	4	0	4	0	0	0	7	0	7	4	0	4	4	0	4
	D 172 Baddu	33	0	33	0	0	0	0	0	0	4	0	4	0	0	0	3	0	3	4	0	4	4	0	4
	D 173 Phoolwala	34	17	51	0	0	0	0	0	0	4	0	4	0	0	0	9	0	9	4	0	4	4	0	4
	D 174 Sobal	16	21	37	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	4	0	4	0	0	0
	D 175 Ramgarh	25	13	38	0	0	0	0	0	0	6	0	6	0	0	0	7	0	7	4	0	4	6	0	6
	D 176 Behri	22	6	28	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	4	0	4	3	0	3
	D 177 Jor Joharu	12	2	14	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	4	0	4	2	0	2
	D 178 Jaglog	11	9	20	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	4	0	4	4	0	4
	D 179 Bankaha	33	0	33	0	0	0	6	0	6	2	0	2	0	0	0	8	0	8	4	0	4	2	0	2
	D 180 Kallari	17	0	17	0	0	0	0	0	0	5	0	5	0	0	0	0	0	0	4	0	4	5	0	5
	D 181 Retwari	15	0	15	0	0	0	0	0	0	5	0	5	0	0	0	0	0	0	4	0	4	5	0	5
	D 182 Rajwai	11	3	14	0	0	0	0	0	0	5	0	5	0	0	0	0	0	0	4	0	4	5	0	5
	D 183 Dagoh	12	0	12	0	0	0	0	0	0	5	0	5	0	0	0	0	0	0	4	0	4	5	0	5
	D 187 Adduwal	10	5	15	0	0	0	0	0	0	5	0	5	0	0	0	0	0	0	4	0	4	5	0	5
	D 188 Khobal	70	40	110	0	0	0	24	0	24	9	0	9	0	0	0	0	0	0	4	0	4	9	0	9
	D 189 Gharuan Palasal	72	0	72	0	0	0	24	0	24	9	0	9	0	0	0	0	0	0	4	0	4	9	0	9
Total Ramshehar		**572**	**180**	**752**	**0**	**0**	**0**	**54**	**0**	**54**	**103**	**0**	**103**	**0**	**0**	**0**	**53**	**0**	**53**	**93**	**0**	**93**	**103**	**0**	**103**

Baddi	D 168 Bhalwa DPF	53	103	156	15	10	25	10	0	10	4	0	4	0	0	0	4	0	4	7	0	7	4	0	4
	D 169 Talli	41	44	85	15	5	20	9	0	9	4	0	4	0	0	0	6	0	6	4	0	4	4	0	4
	D 194 Majru DPF	53	41	94	15	0	15	12	0	12	8	0	8	0	0	0	2	0	2	5	0	5	8	0	8
	D 170 Sidh Chalon	17	0	17	10	0	10	6	0	6	4	0	4	0	0	0	4	0	4	2	0	2	4	0	4
	D 195 Dharampur	22	3	25	10	0	10	4	0	4	4	0	4	0	0	0	0	0	0	0	0	0	4	0	4
	D 196 Ratwali DPF	48	20	68	10	0	10	4	0	4	4	0	4	0	0	0	4	0	4	0	0	0	4	0	4
	D 197 Ambika DPF	36	0	36	10	0	10	5	0	5	4	0	4	0	0	0	3	0	3	0	0	0	4	0	4
	D 198 Dassora	26	0	26	10	0	10	5	0	5	10	0	10	0	0	0	2	0	2	0	0	0	10	0	10
	D 199 Bhud Bandi	84	11	95	10	0	10	5	0	5	15	0	15	0	0	0	0	0	0	18	0	18	15	0	15
	D 200 Khol D'pur	53	3	56	10	0	10	5	0	5	15	0	15	0	0	0	0	0	0	11	0	11	15	0	15
Total Baddi		**433**	**225**	**658**	**115**	**15**	**130**	**65**	**0**	**65**	**72**	**0**	**72**	**0**	**0**	**0**	**25**	**0**	**25**	**47**	**0**	**47**	**72**	**0**	**72**
Kohu	D 154 Kalti	12	0	12	10	0	10	4	0	4	5	0	5	0	0	0	0	0	0	0	0	0	5	0	5
	D 153 Malon	12	8	20	10	6	16	6	4	10	5	0	5	0	0	0	0	0	0	0	0	0	5	0	5
	D 156 Diddu	8	5	13	5	0	5	2	5	7	3	0	3	0	0	0	0	0	0	0	0	0	3	0	3
	D 157 Sunna	37	49	86	30	20	50	15	10	25	5	10	15	0	0	0	5	7	12	8	0	8	5	10	15
	D 155 Chalwana	16	31	47	4	20	24	9	10	19	0	10	10	0	0	0	0	3	3	0	0	0	0	10	10
	D 160 Baddal	7	0	7	2	0	2	2	0	2	2	0	2	0	0	0	0	0	0	0	0	0	2	0	2
	D 161 Dabrota	13	0	13	8	0	8	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	D 159 Lunna	22	3	25	15	3	18	6	0	6	4	0	4	0	0	0	4	0	4	7	0	7	4	0	4
	D 158 Surajpur	33	3	36	20	3	23	11	0	11	0	0	0	0	0	0	7	0	7	7	0	7	2	0	2
	D 146 Dharel	8	0	8	8	0	8	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2
	D 145 Chamba	10	0	10	8	0	8	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2

7.15.8 Boundary Registers:

Boundary register for most of the forests have not been maintained properly DFO (T) is hereby suggested to maintain all the boundry pillars registers.

Chapter – VIII

STATISTICS OF GROWTH AND YIELD

8.1 General:

The following records were consulted for compilation of growth and yield statistics of chil, khair and other broad leaved species:

1. The Working Plan under revision (Shri V.K.Singh's Plan)

2. The Working Plan Code.

3. The Working Plan of Nahan Forest Division.

8.2 Chil:

8.2.1 AGE-DIAMTERE RELATION:

The chil forests of the Kunihar and Nalagarh Forest Division are generally uneven aged and under stocked. The average quality of chil corresponds to F.R.I. quality III. There are a few patches of quality II/III. The diameter growth of average crop of III quality has been adopted as it is given in F.R.I. yield table for chil III quality class (as per V.K.Singh's Working Plan) and is reproduced as under:

Table – 8.1

Age-diameter relation in chil

DBH (OB) in cm	10	15	20	25	30	35	40	45	50
Age in years	33	43	54	64	75	85	96	108	120

8.2.2 Volume Table:

Volume factors for chil (Class V and above) have been adopted from the plan under revision (V.K.Singh's Plan). The volume factor for V Class tree were compiled by calculating the volume by felling the trees. Volume factors for chil are as under:

Table – 8.2

Volume factors for chil

Diamtere (cms)	Class	Volume (m3)
10-20	V	0.056
20-30	IV	0.14
30-40	III	0.70
40-50	IIA	1.27
50-60	IIB	2.12
60-70	IA	3.22
70 and above	IB and above	4.25

8.2.3 Volume increment:

Volume increment percent for each diameter class has been derived by Pressler's Formula.

$$P = \frac{200\ V - v}{n\ V + v} \quad \text{or} \quad P = \frac{200}{n} * \frac{V - v}{V + v}$$

Where, P = Rate of volume increment percent.

v = Initial volume

V = Volume after n years.

This formula calculates increment percent as simple interest on the means of the two volumes.

As the height remains more or less constant within short period, and assuming form factor also be constant, the volume will vary as the basal area or sequence of diameter. Therefore Pressler's formula may be substituted by (diameter).

$$P = \frac{200}{n} * \frac{D1 - d1}{D1 + d1}$$

Where, d = Initial diameter

D = Diameter after n years.

To determine the volume increment percent of each diameter class, data for Age-diameter relation, from para 8.2.1. has been used. For example.

In Class V

d = 10 cm

D = 20 cm

n = 54 – 33 years = 21 years.

$$P = \frac{200}{21} * \frac{20 - 10}{20 + 10}$$

$$= 5.71$$

Volume increment percent for different diameter class is tabulated below:

Table – 8.3

Volume increment percent

Diameter class in cm								
V	IV	III	IIA	IIB	IA	IB	IC	ID
10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
Volume Increment percent.								
5.71	3.66	2.66	1.8	(1.16)	(0.76)	(0.40)	(0.16)	(0.06)

(The figures within brackets are extrapolated).

8.3 Khair, Eucalyptus : -

Volume factors for khair, and eucalyptus have been adopted from Nahan Working Plan by Sh. B.S. Chauhan. This is reproduced here and is recommended to be used for calculation of yield of these species:

Table – 8.4

Dia class	D.B.H. (OB)	Khair (commercial timber)	Eucalyptus	Ban oak
		Volume in m3	*Volume in m3*	*Volume in m3*
V	10-20	0.064	0.114	0.170
IV	20-30	0.170	0.312	0.500
III	30-40	0.411	0.500	1.100
IIA	40-50	0.906	0.600	2.000
IIB	50-60	1.487	0.600	3.050
IA	60-70	1.487	0.600	3.600
IB	70-80	1.487	0.600	3.600
IC	80-89	1.487	0.600	3.600
ID	90-100	1.487	0.600	3.600

8.4 Other miscellaneous species:

Volume factors for miscellaneous broad leaved species have been adopted from Nahan Working Plan by SH. S.R. Arya, which is as under:

Table – 8.5

Dia class	D.B.H. (OB) in cms	Volume in m3
V	10-20	0.064
IV	20-30	0.184
III	30-40	0.418
IIA	40-50	0.885
IIB	50-60	1.515
IA	60-70	2.294
IB	70-80	3.193
IC	80-89	3.193
ID	90-100	3.193

8.5 Quality class:

The All India quality class, as given in FRI yield table for chil has been adopted. The quality class has been determined for each compartment on ocular basis and is recorded in the compartment history files.

8.6 Density:

The density of crop in each compartment/sub compartment has been estimated occualarly and recorded in the respective compartment history files.

8.7 Stock maps:

Stock maps have been prepared for each compartment/sub-compartment on 1:15000 scale and have been pasted in the concerned compartment history file.

CHAPTER- IX

Estimate of the capital value of the forests

GROWING STOCK:-

The estimated capital value of the growing stock based on the existing average volume is as under.

TABLE 9.1

S.N.	Species	Growing Stock	Rates (Rs)	Amount (Rs)
1	CHIL	86142.14 m3	18630/-	1604828068.00
2	BAMBOO	72536x60=4352160 culms	15/-	65282400.00
3	KHAIR	149878.95 m3	28813/-	4318462186.35
	SHISHAM	1927.85 m3	23711/-	45711251.35
4	MISCELLANEOUS/ BL	404521.03 m3	4704/-	1902866925.12
	TOTAL	**642469.97 m3 4352160 culms.**	**-**	**7937150830**

9.1 Detail of trees growing on the area falling under Chil Working Circle.

Species	Number of trees- Diameter Class wise										
	V 10-20	IV 20-30	III 30-40	IIA 40-50	IIB 50-60	IA 60-70	IB 70-80	IC 80-90	ID 90-100	Total	Volume (M3)
Chil	156593	94441	31168	11686	5708	2841	1132	264	23	303856	85929.498

Species	Dia classes in cm.											
	10-20.	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	Total	Vol.	No.of Bamboo clumps
	V	IV	III	IIA	IIB	IA	IB	IC	ID & above.			
Khair	5326	1978	162	6	0	0	0	0	0	7472	749.142	0
Shisham	43	15	2	0	0	0	0	0	0	60	6.326	0
BL Misc.	70175	16740	3077	656	160	40	11	1	6	90866	9810.582	0

9.2 Detail of trees growing on the area falling under Bamboo Working Circle.

Area in ha.	Spp.	V	IV	III	IIA	IIB	IA	IB	IC	ID & above.	Total	Volume m3	Estimated No.of trees for 3808.24 ha.	Volume
	Chil	394	243	131	16	0	0	0	0	0	784	168.104	5462	1171.119
546.64	Khair	14932	17707	9986	2085	520	0	0	0	0	45230	10732.334	315101	74768.227
	Shisham	114	242	81	9	0	0	0	0	0	446	96.508	3107	672.336
	Others	63321	36205	16499	4549	1382	271	83	13	0	122323	24658.643	852179	171787.704
	Total	78761	54397	26697	6659	1902	271	83	13	0	168783	35655.589	1175849	248399.386

9.3 Detail of trees growing on the area falling under Plantation Working Circle.

Area in ha.	Spp.	V	IV	III	IIA	IIB	I A	IB	IC	ID & above.	Total	Volume m3	Estimated No.of trees for 1880.50 ha.	Volume
	Khair	9311	6984	1918	336	11	0	0	0	0	18560	2892.255	213481	33267.390
163.49	Shisham	2	2	0	0	0	0	0	0	0	4	0.480	46	5.521
	Other BL	21466	19718	11790	5211	2261	2	10	0	0	60458	18003.824	695402	207084.170
	Total	30779	26704	13708	5547	2272	2	10	0	0	79022	20896.559	908929	240357.081

9.4 Detail of trees growing on the area falling under Protection Working Circle.

Area in ha.	**Spp.**	**V**	**IV**	**III**	**IIA**	**IIB**	**IA**	**IB**	**IC**	**ID & above.**	**Total**	**Volume m3**	**Estimated No.of trees for 2366.12 ha.**	**Volume**
	Khair	17014	14928	6049	759	0	0	0	0	0	38750	6800.449	231130	40562.349
396.69	Shisham	1456	453	63	10	0	0	0	0	0	1982	212.103	11822	1265.122
	Other BL	13031	7990	1630	25	0	0	0	0	0	22676	3007.609	135255	17939.358
	Total	**31501**	**23371**	**7742**	**794**	**0**	**0**	**0**	**0**	**0**	**63408**	**10020.161**	**378207**	**59766.829**

PART-II

FUTURE MANAGEMENT DISCUSSED AND PRESCRIBED

CHAPTER-I

1 BASIS OF PROPOSALS

1.1 General Objects of Management:-

In accordance with the objective of National Forest Policy and the revised State Forest Policy, the emphasis on managing forests for collection of revenue has been relegated to back seat and the needs of local population while managing the forests have assumed priority. The emphasis is also on sharing responsibility by involving people in the protection and development of forests.

The revised Working Plan is in coherence with this paradigm shift and is reflective of the ecological services provided by the forests for all agriculture, horticulture and their role in climate moderation.

Therefore the general objects of management of these forests will be as follows:-

ii) To conserve and improve the forest cover so as to full fill the objectives of conservation of ecological diversity of species, watershed protection, recreational values etc.

iii) To manage the forests scientifically for the present and future generations and to increase their historical, cultural, religious, economic and aesthetic values for the communities and the environment on a sustainable basis.

iv) To provide efficient ecological services to the communities for sustained agriculture, horticulture and other livelihood means dependent on natural resources.

v) To harvest the standing mature/ over mature chil trees on a sustainable principle, with an aim to regenerate the forests and also to free from suppression the established regeneration of over head shade to allow optimum conditions for growth. This can be achieved

provided the general moratorium enacted by the govt. of HP in the early 1980 for the felling of green trees is taken back.

vi) To protect and preserve the hill slopes against erosion, denudation and ravages, to conserve, improve the environment and soil underneath and to ensure even and equitable flow of water in streams.

vii) To provide for the bonafide domestic and agricultural requirements of the local people for timber, fuel, fodder and other forest produce within the capacity of the forests.

viii) To ensure the regeneration of all areas closed for regeneration or afforestation and to replace less valuable species in consistence with the environmental conservation.

ix) To provide for the maintenance, expansion and creation of resources of rural fuelwood, fodder and timber to cater the local demands of the people.

x) Consistent with the aforesaid objects, provision for the maximum sustained annual yield of forest produce from the forests.

1.2 Method of Treatment:-

To achieve the above objectives of management, the following silviculture system and methodology will be followed:-

(i) The chil forests will be managed under Indian Irregular Shelter wood System. The mode of regeneration will be both natural and at places supplemented with artificial regeneration for ensuring the completion of regeneration of the blank areas within the currency of plan period.

(ii) Subsidiary silivicultural operation should be carried out strictly to improve the quality of the crop.

(iii) Special attention will be given to bamboo forests. Bamboos are generally exploited by the HPSFDC Ltd. as per triennial felling programme but these are not exploited as per the guidelines laid down as per existing bamboo felling rules. This

resulted into congestion in the clumps and reduced the economic value of the produce which hindered growth of bamboos.

(iv) Platation of the species preferably local and economical viable species will be done to ensure forest of good quality so that these forests can meet the just and genuine demands of the people living in the vicinity of these forests for the healthy life.

(v) Scrub forests along with the poorly stocked one will be reforested by planting suitable species to meet local demand of fodder, fuel and forest based industries.

(vi) The ravine areas such as khols of Nalagarh and Dharampur and denuded areas will be planted with drought hardy and fast growing species like *Prospopis juliflora, Accaia nilotica,* etc. These areas are generally very dry, difficult and hardy species will be opted for plantation. No felling what so ever will be proposed to be done in these areas falling under protection working circle.

(vii) Forest having khair spp. or predominantly khair species will be worked under this working circle. Khair species will generally be seen with other broad leaved spp. like shisham, toon, kachnar and eucalyptus etc. There is lot of area under Nalagarh jurisdiction having very good crop of Khair Forest and also have attained the age of maturity but the blanket ban on the felling of green trees have brought down the economical and commercial value of these trees resulting into direct loss to state exchequer.

(viii) The policies of government as well as forest department is being implemented for the protection and its management in most effective way through the participation of local villagers and their know-how is incorporated for the better management of forest with the unique idea of owning government forest for its usufruct sharing, which leads to healthy way of managing forests. These areas have been brought under the JFM working Circle.

1.3 Constitution of Working Circles:-

In conformity with the objectives of management outlined above, the following working circles have been constituted:-

1. The Chil Working Circle.
2. The Bamboo Working Circle.

3. The Plantation Working Circle.
4. The Protection Working Circle.
5. The Khair overlapping Working Circle.
6. The Joint Forest Management Overlapping Working Circle.
7. Wildlife Management Overlapping Working Circle.
8. The Non Timber Forest Produce Overlapping Working Circle.

1.3.1 The Chil Working Circle:-

All the demarcated protected forests in which chil occurs either pure or in fair proportion have been allotted to this working circle. The forests will be managed under the Indian Irregular Shelter wood System. The area of this working circle is 2179.03 ha.

1.3.2 The Bamboo Working Circle:-

The mixed deciduous broad leaved forest with preponderance of bamboo or where bamboo can be propagated easily, have been included in the working circle. These bamboo forests will be worked on a triennial felling cycle under definite felling rules. The area of this working circle is 3808.24 ha.

1.3.3 The Plantation Working Circle :-

Mixed deciduous broad leave forests devoid of bamboos; blank and scrub areas suitable for planting; young plantations of chil; and all old plantations of other species which are not established shall comprise this working circle. Degraded areas shall be stocked with local economic species like Khair, Chil, Shisham, Kikar and Bamboo etc. The area of this working circle is 1880.5 ha.

1.3.4 The Protection Working Circle.

The areas of Khol Dharampur and Nalagarh will form part of this protection working circle, as most of the area is completely infested with invasive alien species like lantana, parthenium and other weeds and the areas mostly having ravines and denuded hills make it really difficult to regenerate.

These areas will be protected against felling of any kind and soil and water conservation measures both engineering and vegetative measures will be adopted to conserve the soil. All forest protection measures including encroachments, against fires, illicit felling, mining operations and procurement of non timber forest produce shall be taken into account. The total area of this working circle is 2366.12 hectare.

1.3.5 Khair overlapping Working Circle

Forests having khair spp. or predominantly khair species will be worked under this working circle. Khair species will generally be seen with other broad leaved spp. like shisham, toon, kachnar and eucalyptus etc. There is lot of area under Nalagarh jurisdiction having very good crop of Khair Forest and also have attained the age of maturity but the blanket ban on the felling of green trees have brought down the economical value of these trees resulting into direct loss to state exchequer. Since this being overlapping working circles the areas of whole of the Nalagarh Forest Division is brought under this working circle where the Khair trees exist in good numbers.

1.3.6 The Joint Forest Management Overlapping Working Circle

The policies of government as well as forest department are being implemented for the protection and its management in most effective way with the participation of local villagers and their know-how is incorporated for the better management of forest with the unique idea of owning government forest for its usufruct sharing, which leads to healthy way of managing forests. These areas have been brought under the JFM working Circle.

1.3.7 Wildlife Management Overlapping Working Circle:-

The Nalagarh Forest Division is habitat of much wildlife that varies from their economic importance to ecological importance on one hand and also from their existence point of view. Snakes, lizards, barking deer, sambhar, wild hares, monkeys, porcupines, fowls, peacocks, and leopards etc. are found in abundance and sometimes attack the people living in the precincts of these forests.

1.3.8 Non timber forest Produce Overlapping working circle:-

Under this chapter resin extraction by HFSFDC along with the procedure adopted shall be made the stellar attraction and also the different parts of the medicinal plants and their usage from the time of their sowing till its final harvest and its uses will be made part of this chapter.

1.4 Area of Working Circles :-

The following table shows the area and distribution of the working circles in different ranges. However the forest wise detail according to the working circle and areas wise is given in **Appendix- I** page 1(Volume-II).

Table- 1.1

Range wise areas of working circles

Name of Division	Name of Range	Class of Forests	Chil W.C.	Bamboo W.C.	Plantation W.C.	Protection W.C.	Total
Nalagarh	Kohu	DPF	964.26	145.63	154.59	0	1264.48
	Ramshehar	DPF	888.6	1084.48	559.85	0	2532.93
	Baddi	DPF	326.18	1595.17	299.53	925.44	3146.32
	Nalagarh	DPF	0	982.93	937.38	1440.68	3360.99
		Total	2179.04	3808.21	1951.35	2366.12	10304.72

However the areas of other working circle like Khair overlapping Working Circle, Wildlife Management Working Circle, The Joint Forest Management Working Circle and Non Timber Forests Management Working Circle will have whole of the areas of Nalagarh forest Division as all these will overlap one another. So specific areas of these working circles have not been prescribed.

1.5 Blocks and Compartments :-

The names and numbers of the forest blocks have been retained as such. No new compartments or sub-compartments have been proposed.

1.6 Period of the Plan:-

The period of the plan shall be for 15 years with effect form April 1, 2012 to March 31, 2027. The working plan for the year 1991 to 2006 written by Sh. V.K. Singh was up to 2006, and all the works carried out i.e. salvage marking and plantation programme after the expiry of working plan till the preparation of the ensuing working plan wef 2012 have been duly accounted for. The yield prescribed for the years 1991-2006 being considered prescribed for the year 2006 to 2012 and the deviation so happened has also been accounted for in the control forms prepared and the necessary approval of the same has been got accorded from the competent authority. Moreover the plantation carried out in these intervening years from 2006-2012 have duly been approved as per the approved annual plan of operation. So that period wef 2006-07 to 2011 -12 be considered as gone over period.

CHAPTER-II

THE CHIL WORKING CIRCLE

2.1 General Constitution :-

This working circle includes all demarcated protected forests bearing a predominantly chil crop and the established chil plantations. Area of this working circle is 2179.03 ha.

2.2 General Character of Vegetation :-

The forests allotted to this working circle lie between 750 meters and 1200 meters altitude and represent various types of crop combination in which chil (*Pinus roxburghii)* is the dominant species. The details of the forest types have been discussed in Chapter-II of Part-I.

2.3 Blocks and Compartments: -

Forest blocks and compartments are the same as in the previous plan. The list of forests allotted to this working circle is given in **appendix-XI** page 35 of Volume-II.

2.4 Felling Series: -

Only one felling series has been constituted.

2.5 Special Objects of Management :-

Consistent with the general objects of management, the special objects of management are:-

i) To convert the present irregular crop to more or less a regular one and to bring the stocking per hectare as close to normal as possible by natural regeneration supplemented with artificial planting.

ii) To meet the bonafide requirements of right holders in respect of timber, fire wood, grazing and grass cutting.

iii) To harvest the standing mature/ over mature chil trees on a sustainable principle, with an aim to regenerate the forests and also to free from suppression the established regeneration of over head shade to allow optimum conditions for growth.

iv) To maximize the yield of timber, resin etc. on a sustainable basis.

v) To harvest sustained yield of forest produce in perpetuity.

2.5.1 Area and allotment :-

Total area of the working circle is 2179.03 hactare. The forest, with detail of allotments has been given in appendix. The following tables give the area of each felling series allotted to different periodic blocks:

Table 2.1

Area Statement of Chil Working Circle

Nalagarh Forest Division

Range	**Class of Forests**	**P.B.I (ha)**	**P.B.IV (ha)**	**P.B.Inter (ha)**	**Total (ha)**
Kohu	DPF	314.74	118.17	531.34	964.25
Ramshehar	DPF	218.45	119.35	550.8	888.6
Baddi	DPF	102.88	46.12	177.18	326.18
Nalagarh	DPF	--	--	--	--
	Total	**636.07**	**283.64**	**1259.32**	**2179.03**

The comparative area figures of forest allotted to this working circle in plan under revision (V K Singh's) and current plan is given in the following table:

Table 2.2

Comparative Area Statement

Class of Forests	Area under Chil W.C. in Sh. V.K.Singh's Plan	Area under Chil W.C. in current Plan
Nalagarh Tract		
DPF	2108.21	2179.03
Total	2108.21	2179.03

There is change in the area as compared to the area under Sh. V. K. Singh's plan because of non inclusion of area of some of compartments which were managed in the previous working plan in the chil working circles.

2.6 Analysis and Valuation of Crop :-

The crop's analysis for different characters of vegetation as under:**-**

2.6.1 Stock Maps :-

All the forests have been stock mapped on 1:15000 scale and these along with detailed descriptions have been placed in the concerned compartment history files.

2.6.2 Site quality and Age Classes :-

The site quality of each compartment and sub-compartment has been assessed and noted in the compartment history files. In general, the forests correspond to the F.R.I. quality-II with few exceptions which are of quality-II/III. The example of this site quality are D-165 Kamal Pandal, D-171 Kothkahi etc. The crops are irregular and uneven aged. However, the crop of younger age classes is in preponderance. It is worth mentioning here that since there is blanket ban for the green felling in H.P has been imposed in the late eighties of last century and due to this reason the felling now takes place for salvage trees having decayed and dried up defects which results into dead, mouribund, diseased, uprooted, wind damaged trees. The another reason like not bearing the vagaries of different extreme climatic conditions along with the most destructive damage/havoc caused due to forest fire which constitutes the bulk of salvage lots comprising of large number of trees.

2.6.3 Density :-

An ocular estimate of the density of the crop has been made and incorporated in the concerned compartment history files. On the whole, the density is quite variant from 0.2 to 0.7. The detail of the compartments, PB wise, with occular density and other relative information is enclosed as **appendix-XI** at page 35.

2.6.4 Enumeration and their results :-

Total enumeration of all the areas allotted to P.B.I. and P.B.IV has been carried out in 10 cm diameter class down to 10 cm d.b.h. In the case of areas allotted to P.B. Inter (formed by merging PB111& PB IV), partial enumeration to the extent of approximately 10% plus was carried out. The selection of the compartment falling under PB inter has been done by adopting random generator table and the area of each compartment was also taken into account. selected 10% compartment out of the total compartment of PB inter and 100% enumeration of those selected compartment was done. The details of the enumeration are given in **appendix-II-a** at page 10.

The abstract of enumeration result for Nalagarh Forest Division is given as under:-

Table 2.3

Abstract of enumeration

Nalagarh Forest Division Felling Series

Periodic block	Area ha	Number of trees- Diameter Class wise										
		V 10-20	IV 20-30	III 30-40	IIA 40-50	IIB 50-60	IA 60-70	IB 70-80	IC 80-90	ID 90-100	Total	Volume (M3)
I	636.08	62845	27329	12647	6545	3229	1409	483	145	11	114643	38608.64
IV	283.64	34205	24938	8919	1616	785	384	130	32	7	71016	17321.35
Inter-Enumerated (19.82%)	249.67	11707	8292	1888	693	333	206	102	19	1	23241	5905.962
Estimated	1009.65	47836	33882	7714	2832	1361	842	417	78	4	94966	24136.05
G.Total of PB-Inter-	1259.32	59543	42174	9602	3525	1694	1048	519	97	5	118207	30042.012
G.Total	2179.03	156593	94441	31168	11686	5708	2841	1132	274	23	303866	85972.002

Table 2.4

Periodic block	Area ha	Species	Dia classes in cm.									Total	Vol.	No.of Bamboo clumps
			10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100			
			V	IV	III	IIA	IIB	IA	IB	IC	ID & above.			
PB-I	636.07	Khair	184	20	2	0	0	0	0	0	0	206	15.998	0
		Shisham	6	2	0	0	0	0	0	0	0	8	0.736	0
		BL	18663	3416	672	158	57	20	5	1	5	22997	2395.095	0
PB-IV	273.11	Khair	82	21	2	0	0	0	0	0	0	105	9.640	0
		Shisham	37	13	2	0	0	0	0	0	0	52	5.590	0
		BL	2334	350	59	10	1	2	0	0	1	2757	253.391	0
PB-Inter	249.67	Khair	995	381	31	1	0	0	0	0	0	1408	142.097	0
		BL	9669	2551	572	96	20	3	1	0	0	12912	1452.631	0
Estimated	1020.18	Khair	4065	1556	127	5	0	0	0	0	0	5753	581.407	0
		BL	39509	10423	2337	392	82	15	5	0	0	52763	5944.799	0
G.Total		Khair	5326	1978	162	6	0	0	0	0	0	7472	749.142	0
		Shisham	43	15	2	0	0	0	0	0	0	60	6.326	0
		BL Misc.	70175	16740	3640	656	160	40	11	1	6	91429	10045.919	0

Growing stock of Chil Working Circle is as given below.

Chil	**85972.002 M3**
Khair	**747.553 M3**
Shisham	**6.348 M3**
B/L	**10065.074 M3**
Total growing stock	**93813.056 M3/2189.56 = 42.845 M3 /hactare.**

2.6.5 Increment :-

Annual volume increment for each felling series worked out on the basis of rate of increment, as given in para adopted from the previous plan of Sh.V.K.Singh and is reproduce as given below:-

Table 2.5

	Diameter Class in Cms									
	V 10-20	IV 20-30	III 30-40	IIA 40-50	IIB 50-60	IA 60-70	IB 70-80	IC 80-90	ID 90-100	Total
Number of trees	156593	94441	31168	11686	5708	2841	1132	274	23	303866
Volume (M3)	8769.208	13221.74	21817.6	14841.22	12100.96	9148.02	4811.00	1122.00	97.75	85929.498
Increment (m3)	500.72	483.91	580.34	267.14	66.23	69.52	19.24	17.95	5.87	2011.01

The increment work out of 1.82% for Nalagarh Felling Series only. This has been adopted from the record of the plan of V.K.Singh's

2.6.6 Comparative statement of existing Growing Stock with Normal Growing Stock :-

Following table indicates comparative position of the existing growing stock (G.S.), the normal growing stock (as per the yield table figures corresponding to the crop age.).The information regarding growing stock has also been adopted from the previous plan.

Table 2.6

Periodic Block	No. of Trees/ha.	Present G.S./ ha(m3)	Normal G.S./ ha (m3)
I	195	87	234
IV	492	88	86
Inter	173	122	183

2.7 Silvicultural System :-

The forests allotted to this working circle will be managed under the Indian Irregular Shelter wood System with fixed periodic blocks (synonymous to Punjab Shelter wood System) which provides retention of advance growth and also selection marking in rugged terrain. Primarily attempts will be made to induce natural regeneration by closing the area effectively immediately after seeding felling. Artificial regeneration will be resorted in case of problematic areas after two years of closure in patches or portions where the regeneration may be deficient or may not coming up naturally. It is also pertinent to mention here that there is complete ban on green felling as envisaged by the government of H.P. as notified in the year 1984, so felling has not taken place in the past and all the felling which have taken place is salvage felling and the exploitation of such forests were done by HPSFDC. Ltd. Moreover even the trees which used to be distributed to right holders have also not been demanded by the right holders for their usage.

2.8 Choice of Species :-

Chil (*Pinus roxburghii*) will be the principal species and preferred to the miscellaneous broad leaved species. All cultural works shall aim at encouraging chil in the forests of this working circle.

2.9 Rotation and Conversion Period :-

These forests have been worked with a rotation of 120 years in the past which is adopted to obtain maximum yield of timber, pulpwood and resin. At the age of 120 years

crop diameter is expected to attain 50cm d.b.h..

The forests of Nalagarh Felling Series were required to be worked under a conversion period equal to rotation i.e. 120 years, was suggested. The conversion period of 120 years is adopted for this working circle because at that age the average overbark diameter of chil in almost all the forests will be over 50 cm. The rotation period is also suggested to be 120 years for this plan and the area is distributed to different PBs i.e. PBI, PBIV and PB inter as per the previous plan period.

2.10 Regeneration Period :-

As per the prevailing growth trend the regeneration period will be 30 years. It has been estimated that chil seedling will attain a height of 15 meters in 25years which can be considered established and be allotted to P.B.IV. But keeping in view unforeseen calamities, like fire, grazing, etc. the regeneration period of 30 years is being adopted.

2.11 Reducing Factors and Reduced areas:-

There is not much variation in the site qualities of forests. Though, density is quite variable yet as the yield is being regulated by volume it is considered unnecessary to reduce the areas for site quality and density. Though the enumeration results shows that the chil dominated forests in the earlier plans have now become open canopied and lantana has more or less invaded the vaccant area and also it is quite commonly seen that broad leaved species have come up nicely at many places in different compartments.

2.12 Division into Periodic Blocks and Allotment to Periodic Blocks :-

With a rotation of 120 years and regeneration period of 30 years, there will be four Periodic Blocks. From management point of view P.B.III and P.B.II have been grouped as P.B. Inter. The forests have been divided into different periodic blocks.

2.12.1 Periodic Block I (P.B.I):-This periodic block includes following types of areas :-

(a) Areas having maximum number of exploitable trees with almost no regeneration.

(b) Areas which have remained unregenerated during the last plan.

(c) Areas with poor density (below 0.3) of chil trees.

2.12.2 Periodic Block IV (P.B.IV):- This periodic block comprise of:-

(a) Forest which were worked in the past and where regeneration is established.

(b) New chil plantation areas which are established.

2.12.3 Periodic Block Inter (P.B.Inter):- This periodic block comprises:-

(a) Forest having middle aged to mature crop of chil.

(b) All the remaining areas of this working circle having pole to middle aged crop.

Area under each periodic block has been given as per following tables.

Table 2.7

Name of Range	Periodic Block 1	Periodic Block IV	Periodic Block Inter	Total
Kohu	314.74	541.87	107.64	964.25
Ramshahr	218.45	550.8	119.35	888.6
Baddi	102.88	177.18	46.12	326.18
Total	636.07	1269.85	273.11	2179.03

2.13 Calculation of Yield:-

The yield will be of two types:

2.13.1 Main Yield: - All felling from P.B.I and P.B.IV will constitute the main yield.

2.13.2 Intermediate Yield: - It will be from marking of dead dying, wind fallen or otherwise, and seriously damaged trees. This will meet the demand of right

holders.

2.14 Calculation of Yield from Nalagarh Felling Series:-

2.14.1 Total Yield:-

The annual increment in this felling series is 2011.01 m3 (table 2.4). The yield according to Simmon's modification of Van Mentel's Formula is 1550.09 m3 or say 1500 m3 as calculated below :-

$$Y = 2xRx\ V/\ (R2)-(X2)$$

Where, Y = Annual yield in m3

R = Rotation i.e. 120 years.

X = Age corresponding to diameter d.b.h. of 10 cm i.e. 33 years

V = Volume of growing stock in m3.

$$\frac{2 * 120}{2x120x\ 85972.002} = 1550.0924$$
$$13311$$

= Or say 1500.00 m3

2.14.2 Yield from P.B.I:-

The yield from P.B.I will be realized through seeding felling. It has been calculated by *Hufnagle's formula.* Keeping in view the number of seed bearers to be retained, it is proposed to remove 70% of the volume available in IIA and above classes' trees and 30% removal in lower (III & IV) class of the periodic block.

The yield form P.B.I using *Hufnagle's formula* is as under :-

$$Y = C1\ V1 + C2\ V2/P$$

Where, Y = Annual yield in m3

C1 = Constant representing proportion of volume of IIA and above class trees.

C2 = Constant representing proportion of volume of III and IV class trees

V1 = Volume of IIA and above class trees,

	V2	=	Volume of III+IV class trees,
	P	=	Period of felling (regeneration period),
Here,	C1	=	0.7
	C2	=	0.3
	V1	=	22410.36 m3
	V2	=	12678.96 m3
	P	=	27 years
			(30-3=27 Years already over)
			(22410.36 * 0.7) + (12678.96* 0.3)
Therefore	Y	=	----------
			27
		=	440.13 m3 or say 440 m3

2.14.3 The yield form P.B.IV using *Hufnagle's formula* is as under:-

	Y	=	C1 V1 + C2 V2/P
Where,	Y	=	Annual yield in m3
	C1	=	Constant representing proportion of volume of IIA and above class trees.
	C2	=	Constant representing proportion of volume of III and IV class trees
	V1	=	Volume of IIA and above class trees,
	V2	=	Volume of III+IV class trees,
	P	=	Period of felling (regeneration period),
Here,	C1	=	0.8
	C2	=	0
	V1	=	14039.34 m3
	V2	=	12625.76 m3
	P	=	27 years
			(30-3=27 Years already over)
			(14039.34 * 0.8) + (12625.76* 0)

Therefore Y = ----------

27

= 415.98 m3 or say 416 m3

2.14.4 Yield from P.B.Inter:-

No green felling is prescribed in this periodic block. Only dead and wind fallen or otherwise seriously damaged trees will be marked to meet the demand of right holders. This yield will be counted against the yield of the working circle.

2.14.5 Total annual yield prescribed in Nalagarh Felling Series :-

The total yield from chil working circle as calculated above has been 1500 m3. The yield available from P.B.I and P.B.IV is 855 m3, i.e. 440 m3 from P.B.I and 415 m3 from P.B.IV. Thus 645 m3 (1500-855) will be adjusted against salvage marking annually. It is also envisged that the yield if obtained from species other than chil will be counted towards the main prescribed yield of this working circle. Therefore, total annual prescribed yield is as under:-

(i)	Yield from seedling felling in P.B.I	440 m3
(ii)	Yield from final felling in P.B.IV	415 m3
(iii)	Yield from salvage removal i.e. from P.B.Inter	645 M3
	(Reserved for right holders or for salvage felling)	
	Total for the felling series	1500 M3

2.15 Control of Yield :-

All removals down to V class trees shall count towards the yield of the working circle. The yield prescribed is inclusive of trees marked to meet the right holder's demand or for any other purpose. Total deviation for a single year will not exceed more than 10% of the prescribed yield, which will be adjusted at the end of 5 years and it should be checked whether it is with in the prescribed limit or not.

2.16 Sequence of Felling :-

Following sequence of felling for each felling series is laid down :-

Table-2.8

Seeding Felling in P.B.I

Year	Range	No. & Name of Forests	Compt.No	Area (ha)	Estimated Yield (m3)
2012-13	Ramshehar	D.167 Mamela	C.3	28.26	440
2013-14	Ramshehar	D.167 Mamela	C.3	28.26 part	440
2014-15	Kohu	D.145 Chamba	C.2	19.81	440
2015-16	Baddi	D.169 Tali	C.2b	25.93	440
2016-17	Ramshehar	D.180 Kalahari	C.2b	21.07	440
2017-18	Kohu	D.155 Chalwana	C.2c	22.21 part	440
2018-19	Kohu	D.155 Chalwana	C.2c	22.21 part	440
	Ramshehar	D.177 Johru	C.1	16.18	
2019-20	Kohu	D.158 Surajpur	C.1	16.18	440
	Baddi	D.169 Tali	C.2d	22.23	
2020-21	Kohu	D.151 Ukhu	C.2e	22.22	440
	Ramshehar	D.165 Kamal Pandal	C.2b	18.00	440
2021-22	Kohu	D.150 Dhar Chamba	C.2b	11.70	
2022-23	Kohu	D.157 Sua	C.2f	30.37	440
2023-24	Kohu	D.157 Sua	C.2f	30.37	440
2024-25	Ramshehar	D.167 Mamela	C.3	28.26	440
2025-26	Ramshehar	D.167 Mamela	C.3	28.26 part	440
2026-27	Kohu	D.145 Chamba	C.2	19.81	440

Final felling in P.B.IV

Year	Range	No. & Name of Forests	Compt.No	Area (ha)	Estimated Yield (m3)
2012-13	Kohu	D.151 Ukhu	C.1	32.38 part	415
2013-14	Kohu	D.151 Ukhu	C.1	32.38 part	415
2014-15	Ramshehar	D.176 Baheri	C.1	13.75	415
2015-16	Kohu	D.155 Chalwana	C.1	18.21	415
2016-17	0	0	0	0	0
2017-18	Baddi	D.172 Tali	C.1	32.37	415
2018-19	0	0	0	0	0
2019-20	0	0	0	0	0
2020-21	Ramshehar	D.171 Kotkahi	C.1	32.37	415
2021-22	0	0	0	0	0
2022-23	0	0	0	0	0
2023-24	Ramshehar	D.165 Kamal Pandal	C.1	20.23	415
2024-25	Kohu	D.151 Ukhu	C.1	32.38 part	415
2025-26	Kohu	D.151 Ukhu	C.1	32.38 part	415
2026-27	Ramshehar	D.176 Baheri	C.1	13.75	415

2.17 Method of executing felling: -

Only two kinds of felling namely, seeding felling and final felling are suggested.

2.17.1 Seeding felling in P.B.I:- Following general principles for seeding felling are laid down for the guidance of the marking officer: -

(i) About 15 to 18 trees per hectare will be retained as seed bearer on the

northern and eastern aspects and other favourable locations. But on the hot southern aspect particularly with poor soil and steep, slopes the number of seed bearer will be 20 to 25 ha.

(ii) The seed bearers should preferably be IIA class, but II and IIB class also be retained where IIA trees are not available. The seed bearer should have well developed crown, long clear cylindrical bole and be free from diseases.

(iii) The seed bearers, in moderately sloping areas, should be as far as possible, uniformly distributed giving an average spacing of 20-25 meters.

(iv) Compact groups of young crop up to 30 cm d.b.h. occurring over an area of not less 0.2 ha, with a density of not less than 0.7 should be retained as part of future crop. Isolated poles should not be retained. All trees of larger dimensions occurring in patches of such advance growth shall be removed.

(v) Congested groups of the pole crop being retained as advance growth shall be thinned conforming to the C-grade of thinning.

(vi) On steep and broken ground, along the banks of nalas and other vulnerable situations marking shall be conservative confirming to the selection principle.

(vii) Marking along periphery of forest especially near the villages should be lighter.

(viii) A note on advance growth retained, areas where selection marking carried out and state of regeneration in particular, will be submitted by the marking officer along with the map and marking list filed in the concerned compartment history file.

2.17.2 Method of executing felling in P.B.IV:-

The following guidelines are laid down for guidance of marking officer:-

(i) Final felling will be carried out only when the regeneration is fully established and has attained a height of 3 meters.

(ii) About 5 seed bearers which are tall, healthy and vigorously growing will be retained per ha until the end of regeneration period as a fire insurance measure and increment trees.

(iii) Advance growth retained at the time of seeding felling shall, in no case, be felled. Thinning may, however, be carried out if required.

(iv) Seed bearers shall be lopped before felling to minimize damages to the young crop.

2.17.3 Method of executing felling in P.B.Inter:-

No felling shall be carried out in this periodic block in order of safe guard the future yield. Removal of only the dead, dying and wind fallen and trees is permitted to improve the hygiene of crop.

2.18 Subsidiary Silvicultural Operations in P.B.I Areas:-

The following subsidiary silvicultural operations in PBI areas will be prescribed.

i) Disposal of the felling refuse and debris.
ii) Sowing and planting.
iii) Bush cutting and weeding.
iv) Cleaning.
v) Mechanical thinning wherever required.
vi) Removal of Lantana through cut root stock method

These will be dealt with reference to the specific requirement of the chil forests of this working circle and prescriptions made accordingly.

2.19 OPERATIONS IN OTHER PB's:

As per data collected, Lantana has invaded several areas. The reason for invasion is the opening in canopy as a result of salvage removals. The eradication of lantana has become the most important exercise to make the forest area available for regeneration with grasses, which will help in increasing the grazing capacity of the forest and also planting these areas with species of economic value. The detail of the area with a detailed programme for rehabilitating the Lantana infested areas is enclosed as **appendix-XXI & XXI- a** at page 74 & 83 respectively. The following strategy needs to be adopted:

(i) Removal of Lantana through cut root stock (CRS) method.

(ii) Broadcast of local grass seed

(iii) Removal of Lantana sprouts and seedlings for three years

(iv) Involving local stakeholder groups in maintaining the areas

2.20 Watershed Development Works

The chil areas being at the summit of the landscape, should be given due attention for watershed development. The components of watershed development would be (i) moisture retention works (ii) soil conservation (iii) landslides and slip stabilization (iv) drainage line treatment etc.

There is greater need to arrest the dislodging of upper soil so as to increase fertility of the soil it is vehmently proposed that smaller catchment area plan is prepared at beat level and all soil conservation measures are taken. These operations would be carried out by the DFO on an annual basis through preparation of site-specific plans.

2.20.1 Disposal of Felling debris:-

Immediately after the felling is over, all felling refuse should be collected in open areas and in nalas far away from mother trees and advance growth and thoroughly burnt so as to provide a clean and receptive bed for the germination of seed. Local people should be encouraged to take away the debris for use as fuel wood. Collection and burning of the debris should commence from top of the forests and progress down hill. Chips should be thoroughly raked to ensure complete burning. Detailed instructions on the subject are contained in Technical Order No.6 of Punjab Forest Manual, Vol.III, which should be always followed.

2.20.2 Shrub-cutting :-

In some forests shrubs like Lantana, Mysrine, Dodonea, etc. do not allow young regeneration to establish. All such shrub and bush growth in the regeneration areas should be cut repeatedly till the young plants become free from suppression.

2.20.3 Cleaning:-

In the clustered groups of young plants cleaning is essential for proper growth of stems. Before it attains a height of one meter, the crop should be cleaned so that saplings are spaced about one meter apart. However, in all cleaning operations, the vigour and quality of the crop should be given more consideration than the spacing. When the crop is two meters in height, the second cleaning shall be carried out so that the saplings are spaced 3 meters apart. Cut material, unless required by local people, should be collected at open places or in nalas and burnt in order to reduce the fire hazard.

2.20.4 Sowing and Planting:-

If adequate protection against fire and grazing is ensured, sufficient natural regeneration of chil expected to come up in areas having sufficient number of uniformly distributed seed bearers. If on account of some unfavorable factors, adequate natural regeneration of chil does not come up within four years of seeding felling, artificial regeneration may be restored immediately. A fixed sowing and planting programme is not being prescribed and it is left to the discretion of Divisional Forest Officer.

The earth work for sowing and planting should be done during March and April, before 15th April. Temporary nursery should be raised near to the area where the water is available. The plants should attain a height of 23 cm at the time of planting. The planting of plants should be completed latest by July end so that the plants get more than a month's period of rains to establish well and to withstand the drought of autumn and next summer. The failures should be beaten up till the areas are fully stocked.

2.21 Other Regulations:-

2.21.1 Closures:-

All P.B.I areas shall be closed to grazing by proper fencing immediately after the felling is over and shall remain closed throughout the period of this plan. Though the regeneration period is 30 years, the chil saplings will get beyond the stage of damage within a period of 15 years. Therefore, it will not be always necessary to enforce closures for full regeneration period. In case of undermarcated protected forests, steps to complete the necessary codal formalities must be taken well in advance so that the closures are duly notified before commencement of regeneration.

2.21.2 Grazing and Grass-cutting:-

Grass cutting will be prohibited in all the P.B.I areas after commencement of regeneration operation till the young crop is established beyond the stage of damage, i.e. 50 cm and above. Grass cutting shall be allowed to be carried out under the strict supervision of the forest guard so that seedlings are not cut along with grass. Grazing shall be strictly prohibited in the regeneration areas during the plan period.

2.22 Fire Protection and Control burning :-

The chil forests of the tract are highly susceptible to fire of accidental and incendiary types. Large areas of chil get burnt every year. Fire causes upsetting of normal growth condition and also impedes the implementation of the prescriptions as also in the achievement of results aimed at. Therefore, it is most essential that forests allotted to this working circle are adequately protected against fire. Apart from various measures of fire protection, earning of good will and co-operation of the local people; by meeting their genuine demands; educating the local people about fire protection; and taking punitive action against cases of incendiarism are also necessary. The control burning is most important and should never be neglected. Detailed instructions of control burning as contained in the Punjab Forest Leaflet No.2 are summarized below:-

i) The control burning should be done always, in January-February.

ii) Burning should progress from up hill in calm weather and special care should be taken to keep the line of fire as straight as possible and under control.

iii) The control burning should start along the ridge.

iv) Chil needles and other inflammable material should be fully raked to ensure thorough burning.

v) In forest under resin tapping it must be ensured that all chips, fallen resin, needles etc. are cleared about 1.5 cm. away from the base of the trees by the resin coolies.

vi) Cleaning and early thinning in young regeneration areas must be completed before the control burning.

vii) Burning shall be done always under strict supervision and control of the executive staff and shall never be left to the engaged labourers.

A triennial programme of control burning is given in **APPENDIX-XXIV** at page 97 which should be followed in letter and spirit.

2.22.1 Fire Lines :-

The existing fire lines have not been maintained properly in the past. Apart from the fire lines, the roads, bridle paths, inspection-paths must be kept clear of the inflammable materials so as to serve as internal fire lines.

Following new fire lines are proposed to be constructed which were also proposed in the previous plan also.

Table-2.9

Sr.No	Range	Forest	Length (km)	Width (m)
1	Ramshehar	D.171 Kotkahi D.167 Mamela	1.5	10
2.	-do-	D.163 Luna Silh	0.5	10
3.	-do-	D.162 Nisal Chamdar	1	10

2.22.2 Fire Protection Staff :-

Sufficient number of trained fire watchers should be employed during the fire season to help the field staff and they should be provided with necessary equipments. The services of the field functioneries of HPSFDC Ltd. May also be summoned.

No felling operations, even for the right holders, should be allowed during the fire season.

2.22.3 Fire Maps:-

All cases of fire should be promptly reported giving the extent of damage. A tracing of all the burnt areas 0.4 ha and above in extent, should be prepared on 16"=1 mile scale and sent along with the report as per FDI and its copy be placed in the concerned compartment history fire.

2.23 Resin tapping:-

GENERAL:

Resin tapping in the forests of Nalagarh Forest Division was started in way back during early sixties. These forests were, infact, first to be tapped and used to be, in past a major source of revenue of this division. Resin tapping up to the year 1975 used to be done departmentally. This operation is now being done by H.P. State Forest Development Corporation Ltd.

2.23.1 TECHNIQUE:

Prior to 1984, the tapping was done by conventional "French cup and lip method". This method involved deep and rather uncontrolled depth which used to inflict deep cuts and used to take longer time for coagulation of bark of the blaze involved. This coupled with frequent fires and high velocity winds were responsible for heavy salvage removals. Besides, quantitative and qualitative output of timber also used to be affected adversely. The French cup and lip method usually resulted into the loss of most valuable part of chil timber i.e. butt end which considered to be the best in size and quality for sale in the open market.

The conventional method was gradually replaced by improved 'Rill method' of resin tapping and the tapping since 1988 is being done only by the Rill Method. This method has been enunciated in field (guide to modern methods of resin tapping by V.P. Verma, I.F.S. published by Forest Research Institute) and Colleges by Directorate (North) of the H.P. State Forest Corporation Ltd. Lately the Ex-Conservator of Forests Bilaspur Sh.Rajiv Kumar, IFS has done a commendable job by initiating the permanent inventory system and got the chil trees marked above tappable diameter with indelible

paint so as to ensure that the resin tapping is done properly and in planned manner and any instance of illegal tapping could be pointed out easily. In this regard he had issued a technical order No.2 to manage/control this resin tapping.

2.23.2 TAPPABLE DIAMETER:

Vide Pr. C.C.F. memo. No. A-1259-15/67(s) dated 21st Jan, 1997 the tappable diameter for Rill method is fixed as 30cm. This however is on the lower side resulting in large scale drying up of trees. It is recommended that tappable diameter be increased to 40cm.

2.23.3 CROP SETTING:

Crop setting must be started by 15th Feb, and completed by 15th March. It is important that the crop setting is completed in time so that tapping season is not lost. The tree to be tapped should be cleared of inflammable material over a radius of 1m.

2.23.4 SHAVING OF BARK:

Loose bark over a surface area of about 45 cmx30cm is removed with the help of bark shaver leaving a space of about 15cm from ground level. The debarking should not exceed 2 mm in thickness to facilitate freshening.

2.23.5 MARKING THE POSITION OF BLAZE AND GROOVE:

Blaze marked with black Japan or with good quality of paint. Position of blaze and the central groove are marked with the help of wooden board and marking gauge.

2.23.6 CUTTING THE CENTRAL GROOVE:

Central groove is cut by drawing the groove cutter from above downwards. Since in the first year the blaze is very near to the ground, the groove cutter is moved upwards. Central groove should be centrally placed.

2.23.7 FIXING THE LIP:

The lip is fixed with the help of two horse shoe nails so that it makes an angle of 45 degree with the tree. A 5 cm long wire nail is driven into the tree about 2cm below the mid point of the lip for 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/wooden nails should be used for hanging the pot with tree. In the event of a fire breaking out in the forest these wooden nails will get burnt and the pot will be dislodged from the tree. The iron nails holds the pot fast to the tree and the burning resin in the pot acts like a blow lamp.

2.23.8 FRESHENING:

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 rill makes an angle of 40 degree 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 app. at weekly intervals, the guide of the freshening knife should move touching the upper side of the previous rill. The rill should be parallel to each other with an uncut bark (inter rill bark) of 5 mm in between two successive rills. Width of the rill is 6-7mm and depth 2mm (excluding 2mm.depth of unshaved bark). The length of rill should neither exceed nor 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 Nov. i.e. 8 months. The freshening are given 4 times in a month and thus the total no. of rill is to be limited to 32 in a season. The width of the blaze is 20cm i.e. 10cms.on either side of the central groove.

2.23.9 APPLICATION OF STIMULANT:

The stimulant is nothing but a 20 percent solution of the mixture of sulphuric and nitric acids mixed in equal proportion w/w. It should be sprayed on the freshly cut rill by squeezing the plastic bottle and moving its nozzle in a steady motion along the rill. Precaution should be taken to remove the pot till the extra acid has run down the lip. The tendency to apply stimulant more frequently and in higher concentration to obtain higher yield should be curbed since it affects the tree adversely.

2.23.10 COLLECTION OF RESIN AND CLEANING OF GROOVE:

The pot should be removed from the tree and the resin should be poured into collection can (Balti). The resin still adhering to the pot should be removed with the help of scrapper. Central groove should also be cleaned after each collection with groove cleaner to avoid accumulation of resin in it. For improving labor output, collection of resin from the pots should be done with alternate freshening in March, April and August to

October. If necessary, the pots of bigger size may be used. However, from May to July collection may be done with each freshening.

2.23.11 TAPPING SEASON:

Tapping season extends from 15th March to 15th November. Freshening are not made from 16th Nov. to 30th Nov. and during this period resin is scrapped (Raghod).

2.23.12 USE OF GUIDE:

The use of guide with the rill knife by the tapper is compulsory.

2.23.13 INSTALLATION DURING SUBSEQUENT YEARS:

For installation during second year of tapping the position of the blaze is marked above the top of first year blaze and other operations of first year are 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 third year freshening is given by pushing the freshening knife downwards (from the central groove towards the outer edge of the blaze).

Like this the blaze is extended upwards for four years. During fifth year it may be necessary to use a ladder. During 6th year or in some cases during 5th year a new blaze is made at the bottom leaving 7.5 cm wide space from the outer edge of the first year blaze.

Resin tapping should be carried out strictly in accordance with the instructions laid down in H.P. Forest Manual Volume IV and directions issued from time to time. Though the resin tapping operation is now being carried out by the H.P.State Forest Corporation Ltd; the responsibility of the territorial staff to enforce the instructions remains paramount.

The chil forests of the tract have been under resin tapping for quite a long time. Some of the areas have started showing adverse effects of constant tapping. It has resulted into premature drying and dying of the trees. The old cup and lip method of resin tapping has caused extensive damage to the trees causing loss to timber and making the trees less resistant to the wind and storms. Now, the Rill method of resin

tapping has been adopted. The main advantages of this technique are summarized below:-

(i) The guide provided in the freshening knife controls the depth of blazes to 2 mm in live bark and sapwood. This eliminates the damage to the heartwood.

(ii) Fast healing up of shallow blazes makes it possible to tap the trees for a second cycle thereby increasing the tapping life of tree.

(iii) The essential use of stimulant facilitates a prolonged tapping season resulting in increased resin production and employment to the tappers for almost the whole year.

(iv) About 25 percent more yield of resin per tree per season.

(v) There being practically no scrap resin, the loss of turpentine is negligible.

CHAPTER III

THE BAMBOO WORKING CIRCLE

3.1 General Constitution:-

The working circle comprised of mixed deciduous forests with a preponderance of bamboo. The silvicultural system adopted is selection system with thinning in each clump as an independent unit of the working. Three years felling cycle is prescribed. Instead of two felling series namely Nalagarh Commercial felling series and Nalagarh local demand felling series as formed in the plan under revision only one felling series is made as Nalagarh Commercial Felling Series, as the green bamboos earlier allotted to Banjras have now ceased to exit and no Banjras have come forward for the allotment of green bamboos for the manufacture of baskets etc.in the past. This is due to the fact that due to immense industrialization in baddi and Nalagarh areas, the Banjras have opted for other means of livelihood for better remunerations. The yield is prescribed by area. Total area of this working circle is 3803.24 ha of Nalagarh felling series.

This working circle includes mixed deciduous forests i.e. DPF's or part thereof, with predominance of bamboos justifying their regular exploitation and independent management. It also includes bamboo growing on degraded areas which are suitable for raising the species. The bamboo forests have also lost its sheen with the higher incidences of forest fires which made these forests for having poor quality stock. These bamboo forests have no more recognised as forest having only bamboo crop but instead of this the bamboo crop at places have even lost its existence. The enumeration result clearly shows the dominance of other broad leaved species over this bamboo crop. It is therefore suggested that all out efforts are required by the staff to replenish these poorly stocked bamboo forests.

3.2 General character of vegetation :-

The general description of vegetation met within these areas has been given in Chapter II of Part I. An area having 250 Clumps per hectare has been considered as completely stocked with bamboos. Though majority of the forests allotted to this Working Circle have far less than the optimum 250 clumps per hectare and it ranges less than even 20 clumps per hectare and thus it shows quality of the clumps is poor. The reason

for the poor growth of the forest is because of the fact that the working of these bamboo forest is required to be supervised frequently by a forest official capable of deciding the silvicultural limit of exploitation so that the congestion of the clumps is to be minimized and cleaning is to be done to get good quality bamboo size which can fetch maximum remuneration in the market at the time of auctions. The average life of the culms is about six years. The culms thus have to be harvested between the third and sixth year of its life. The detailed description of the individual forests is available in the concerned compartment history file.

3.3 Blocks and Compartments :-

There has been no change in the constitution of blocks and compartments.

3.4 Felling Series: -

Following Felling Serie has been constituted:-

Instead of two felling series namely Nalagarh Commercial felling series and Nalagarh local demand felling series as formed in the plan under revision only one felling serie is made as Nalagarh Commercial Felling Serie.

(i) Nalagarh Commercial Felling Series:- This consists of Bamboo Forests of Nalagarh Forest Division to meet the market demand and as such required to be exploited it commercially.

It is also worth mentioning here that the rights of the banjras will remain as per the previous practices and shall be allowed to get green bamboos as per past practice and from the same forest areas from where they were earlier exercising their rights for the procurement of bamboos.

3.5 Special objects of management:-

The special objects of management of this working circle are:-

i) To improve the productive capacity of the Bamboo forests by working them scientifically.

ii) To manage these forests in such a manner so as to get maximum sustained yield.

3.6 Area statement: -

. The range wise distribution of the area is as under:-

Table-3.1

Range wise distribution of area

Range	Type of Forests	Total (Area in ha)
Kohu	DPF	145.63
Ramshehar	DPF	1084.48
Baddi	DPF	1595.17
Nalagarh	DPF	982.93
	Total	**3808.21**

The detail of the area statement under Bamboo working circle is given in **Appendix-XII** page number **No. 38**

3.7 Analysis and valuation of the crop:-

3.7.1 Stock maps:-

The forests have been stock mapped afresh on 1:15000 scale and the stock maps have been pasted in the concerned compartment history files.

The Bamboo areas are generally degraded and unscientifically worked. This is due to lack of observance of felling rules, uncontrolled grazing and hacking for fuelwood. The incidence of grazing is very heavy in these areas because these are closely located to habitations. The prescriptions regarding closures have not been followed. Congestion in the clumps is very common. A large number of old and dry bamboos are present in most of the clumps and these are restricting the expansion of clumps and normal production of *manus.* In addition to this the blank areas have been invaded by the alien invasive weeds which have further suppressed the growth of bamboo forest as a whole and the young shoots (manus) in particular. Now to counter the spreading of lantana, main emphasis shall be for the eradication of lantana through cut root stock method.

3.7.2 Density: -

An area having 250 and more clumps per hectare has been considered fully stocked high density area. Area with clumps up to 150 and 150 to 250 per hectare has been taken as low and medium density respectively. But on an average the clumps per hactare has been more or less as 50-60 in most of the forests and considered to be sparsely stocked. The yield estimation from these forest will be quite low. Estimation to this effect has been done occularly and has been mentioned in concerned compartment history files.

3.7.3 Enumeration of clumps:-

The compartments are selected on the basis of random number generator from all the forest covered under Bamboo Working Circles and total enumeration in these compartments were carried out and the enumeration result are shown in the **Appendix II-b** at page number 17. On an average each clump consists of 60-70 extractable bamboos per year in three year felling cycle in the ratio given below.Enumeration results of the areas under bamboo working circle is given as per table.

Table 3.2

Name of Range	No.of Forest	Name of Forest	Comptt./sub comptt. No.	Working Circle	Area in ha.	No.of Bamboo clumps
Kohu	D-153	Malloun	c-3	Bamboo	30.35	0
Ramshehar	D.172	Baddu	C.1	Bamboo	44.52	5698
Ramshehar	D.173	Phulwala	C.3	Bamboo	36.42	1191
Ramshehar	D.174	Sobal	C.3	Bamboo	21.86	0
Ramshehar	D.188	Khobal	C.1	Bamboo	116.14	0
Baddi	dD-196	Ratwali	C.1b	Bamboo	32.37	0
Baddi	D-168	Bhalawa	C.5a	Bamboo	64.75	307
Baddi	D-195	Dharmpur	C 2	Bamboo	28.33	36
Nalagarh	D-191	Silnoo	C-2	Bamboo	39.22	0
Nalagarh	D-191	Silnoo	C-7	Bamboo	70.32	980
Nalagarh	D-191	Silnoo	C-8	Bamboo	62.36	2200
					546.64	**10412**
Estimated Bamboos for Total area of Bamboo Working Circle i.e. **3808.24 ha.**						**72536**

3.8 Method of treatment and Silvicultural System:-

The Silvicultural system will be selection system with thinning. Each clump will be treated as an independent unit of working. The culms attain its entire height and thickness during the first year of its growth. Deterioration sets in during 5^{th} to 6^{th} years of growth. The culms, thus, has to be harvested between 4^{th} to 6^{th} years.

Special treatment will be given to congested clumps. These will be opened in a horse-shoe pattern and be cleaned to give better yield. All dead and dry culms left over in the clumps will be removed.

3.9 Felling cycle:-

Calculation of rotation for bamboos is of theoretical interest only, has no bearing on the practical forest management. In bamboo, rotation has reference to the individual culm and not the clump. Three years old bamboos are marketable, Four to five years old bamboos find good market. Older bamboos are not liked because they are not easy to work as a result of hardening of their walls by deposition of silica. Old and dry bamboos are fit for fuel only. In view of these, the culms of 4 to 5 years old should be felled. The forest will be worked on three years felling cycle. It is also worth mentioning that if the bamboo forests are not worked as per prescription then these even loose its calorific value also.

3.10 Calculation of yield: -

The yield is prescribed by area as given in Table of Felling.

The yield obtained from the associates of bamboo working circle will be accounted towards the total annual yield prescribed for the Division.

3.11 Table of Felling:-

Felling will be carried out in the sequence indicated below. It is also pertinent to add here that due to flowering/other biotic factors, there is sparse growth of bamboos in certain forest so the out turn from these forests may be considered after attaining full growth by the clumps in the forest. However the staff at the time of handing over of the bamboo lots will access the actual out turn by number of bamboo bundles.

Table – 3.3

Table of felling

	(i) Nalagarh Commercial Felling Series :-		
Year of felling	**Range**	**Name of Forests**	**Area in ha.**
2012-13 2015-16 2018-19 2021-22 2024-25	Ramshehar	D.172 Baddu C.to C8	269.13
		D.175 Ramgarh C.1 to C8	185.74
		Total	454.87
	Nalagarh	D.192 Rakh Thakurdwara C.1	20.23
	Baddi	D.194 Majroo C.1 to C.6	314.85
		D.195 Dharampur C.1 to C 4	130.71
		D.196 Retwali C.1a to C.1d	131.51
	Ramshehar	D.163 Nisal Chamdar C.2d	34.39
		D.173 Phoolwala C.2	33.82
		D.174 Sobal C.1 to C4	90.65
		D.188 Khobal C.2a to C2b	93.08
	Kohu	D.153 Malaun C.1 to C.3	0
		Total FS	**1304.11**

	(i) Nalagarh Commercial Felling Series :-		
Year of felling	**Range**	**Name of Forests**	**Area in ha.**
2013-14 2016-17 2019-20	Baddi	D.60 Bhalawa C.5a to C5f	314.41
		D.196 Retwali C.1e to C.1h	140.83
		Total	455.24

2022-23 2025-26	Nalagarh	D.184 Shil C.1 to C4	154.18
		D.185 Kala Amb C.1 to C.4	180.99
		D.186 Lohand C.2	73.03
		D.192 Rakh Thakurdwara C.2a	26.70
	Nalagarh	D.191 Shilnu C.1 to C8	294.20
	Kohu	D.153 Malaun C.1 to C.3	0
	Kohu	D.153 Malaun C.4	0
	Total FS		**1184.34**

	(i) Nalagarh Commercial Felling Series :-		
Year of felling	**Range**	**Name of Forests**	**Area in ha.**
2014-15 2017-18 2020-21 2023-24 2026-27	Ramshehar	D.173 Phoolwala C.1 & C.3	75.26
		D.181 Ratwali C.1 & C.2	60.28
		D.182 Rajwain C.1 & C.2	42.88
		D.183 Dangho C.1 & C.2	62.71
		D.188 Khobal C.1	116.54
	Nalagarh	D.192 Rakh Thakurdwara C.1b	20.23
	Baddi	D.197 Ambika	251.70
		D.198 Dasoura	228.20
	Kohu	D.159 Lun C.2a & C2b 7 C.3	73.20
	Nalagarh	D.193 Palahwala C1 to C.7	214.48
	Baddi	D.197 Ambika C.8	82.96
	G.Total of FS		**1228.44**

3.12 Method of executing felling:-

i) Both cleaning and main felling will be carried out under close supervision of forest official well conversant with the silvicultural requirements of the species.

ii) Cleanings comprising of removal of dead, dry and unmarketable culms will precede the main felling as far as practicable.

iii) Felling shall be carried out in the second week of October month so that the bamboos so extracted should reach in the market during Diwali days in order to fetch maximum price. In no way it should be delayed after March because that is the season when these bamboos fetch lowest price.

Iv) Culms shall be cut using sharp tools in order to avoid splitting of culms.

v) All culms shall be cut above a node within 15 cm of the ground, but where support is needed for the adjoining *manus,* the cut may be higher.

vi) No flowering culms or clumps shall be cut, till the seed has been shed.

vii) Digging out of rhizomes not to be allowed.

viii) All the manus of current year, culms of first year, second year along with support and the culms at the periphery are not to be cut. The rest of the culms is to be cut and cleaned properly in order to minimize congestion.

ix) Cut portion of bamboos will not be left in the clumps unless required to support manus*.*

3.13 Subsidiary Silvicultural Operations:-

3.13.1 Sowing and Planting:-

The forests allotted to the Bamboo Working Circle also bear some miscellaneous broad leaved species. The main boards leaved species occurring in these areas are Khair, Chhal, Jhingan, Sain etc. In the past, some of these areas were already worked under coppice with standard system and subsequently planting of Khair and bamboos was done. Keeping in view the poor progress of regeneration in some of the forests, it is necessary to carry out planting. In the past the bamboo forest has become more prone to summer fires with the result huge openings has been noticed. The lantana has invaded in these areas to quite an extent. In order to bring back the areas under forest, sincere efforts are made to eradicate lantana through cut root stock method. The bamboos are also being planted under National Bamboo Mission.

3.13.2 The Planting Programme:-

In this Working Circle , 1496 ha. of area in Nalagarh Forest Division is either blank or scrubby, and infested with Lantana and other invasive species to the extent of from less than 25% to 100% as per the detail given in **Appendix-XXI-b**, which is required to be eradicated and planted with bamboo. The care should be taken that the Lantana Eradication should be done on a land having less intensity of Lantana at the initial stage and in the concentrated form, so that the Lantana from other adjoining areas have lesser effect. Therefore, approximately 100 ha. Area in Nalagarh Forest Division will be available annually for planting for the remaining period (15 years) of this plan. DFO will priortise the areas to be taken up for each year for Lantana Eradication followed by planting depending upon the budget allocation. The remaining area around 2000 hectare, which is sparsely stocked may be planted for improving quality and density with economical valuable and fast growing species The detail of area available for planting after lantana eradication in different forests is proposed as under:-

Table- 3.4

Annual planting programme

Year	Range	Name of Forest	Gross area (ha)
2012-13	Ramshehar	D.188 Khobal C.1	116.54
	Baddi	D.194 Majroo C.1	52.62
	Nalagarh	D.184 Silh C.2	50.98
	Kohu	D.153 Malaun C.4	16.19
2013-14	Ramshehar	D.173 Phoolwala C.1	38.84
		D.168 Bhalawa C.5b	52.60
		C.5c	50.58
	Nalagarh	D.186 Lohanda C.2	72.03
	Kohu	D.153 Malaun C.3	30.35
		D.159 Luns C.2a	26.30
		C.2b	22.22
2014-15	Ramshehar	D.172 Baddu C.1	44.52

		D.175 Ramgarh C.3	24.28
	Baddi	D.168 Bhalawa C.3	36.42
	Nalagarh	D.184 Silh C.5a	64.75
2015-16	Ramshehar	D.173 Palahwala C.3	36.42
		D.181 Ratwari C.1	25.89
	Baddi	D.168 Bhalawa C.5e	60.70
	Nalagarh	D.191 Silnu C.2	39.92
2016-17	Ramshehar	D.172 Baddu C.4	48.56
		D.183 Dangoh C.1	34.39
	Baddi	D.194 Majru C.5	50.59
	Nalagarh	Silnu C.7	24.32
		Silnu C.8	62.36
2017-18	Ramshehar	D.162 Nisal Chamdar C.2b	34.39
	Baddi	D.196 Ratwari C.1e	39.66
	Nalagarh	D.185 Kala Amb C.3	38.45
2018-19	Ramshehar	Baddu C.6	30.35
		Baddu C.7	38.45
	Baddi	D.168 Bhalawa C.5f	40.46
		D.194 Majru C.2	46.13
		D.196 Retwali C.1f	38.45
	Nalagarh	D.193 Phalwala C.1	20.35
2019-20	Ramshehar	D.188 Khobal C.2a	52.61
	Baddi	D.195 Dharampur C.2	28.33
		D.195 Dharampur C.3	34.40
		D.195 Dharampur C.4	35.61
		D.197 Ambila C.2	36.42
	Nalagarh	D.192 Rakh Thakurdwara C.1a	26.70
		D.192 Rakh Thakurdwara C.1b	20.23
		D.193 Plahwala C.4	24.35

2020-21	Ramshehar	D.181 Ratwari C.2	34.39
		D.188 Khobal C.2b	40.47
	Baddi	D.194 Majru C.3	56.25
	Nalagarh	D.192 Rakh Thakurdwara C.1e	20.23
		D.193 Plahwala C.6	40.35
2021-22	Baddi	D.194 Majru C.5	50.59
		D.196 Retwali C.1g	30.35
	Nalagarh	D.185 Kala Amb C.1	54.23
		D.185 Kala Amb C.2	52.60
		D.191 Silnu C.5	24.32
	Ramshehar	D.173 Phoolwala C.2	53.82
2022-23	Baddi	D.197 Ambila C.8	82.96
		D.196 Retwali C.1b	32.37
	Nalagarh	D.185 Kala Amb C.4	35.60
		D.191 Silnu C.1	36.32
		D.191 Silnu C.3	32.32
		D.193 Plahwala C.7	36.38
2023-24	Baddi	D.194 Majroo C.6	54.63
		D.197 Ambika C.3	30.35
		D.197 Ambika C.4	32.37
		D.198 Dassura C.8	26.30
	Nalagarh	D.191 Silnu C.3	32.32
		D.191 Silnu C.4	12.32
	Ramshehar	D.174 Sobal C.4	28.27
		D.175 Ramgarh C.1	26.30
2024-25	Ramshehar	D.188 Khobal C.1	116.54
	Baddi	D.194 Majroo C.1	52.62
	Nalagarh	D.184 Silh C.2	50.98
	Kohu	D.153 Malaun C.4	16.19
2025-26	Ramshehar	D.173 Phoolwala C.1	38.84

		D.168 Bhalawa C.5b	52.60
		C.5c	50.58
	Nalagarh	D.186 Lohanda C.2	72.03
	Kohu	D.153 Malaun C.3	30.35
		D.159 Luns C.2a	26.30
		C.2b	22.22
2026-27	Ramshehar	D.172 Baddu C.1	44.52
		D.175 Ramgarh C.3	24.28
	Baddi	D.168 Bhalawa C.3	36.42
	Nalagarh	D.184 Silh C.5a	64.75

3.13.3 Method of Planting:-

Following planting technique will be followed:-

i) Pits of a size of 30 cm3 at 4 m × 4 m spacing on an average will be dug during the previous winter or spring and refilled with shifted soil mixed with humus at least a month before planting.

ii) Healthy and vigorously growing nursery plants not less than one year in age or less than 30 cm in height shall be planted out in the field. Three seedlings shall be planted in each pit.

iii) The seedlings must have all their rootlets and rhizomes intact.

iv) The plants must be firmly embedded in the pits with all the roots in their natural form together with the rhizomes.

v) A fair proportion of the foliage shall be stripped off all scrubby growth.

vi) A space of up to one meter around the pits shall be cleared off all shrubby growth.

vii) Plants with balls of earth shall be used in refractory areas to reduce mortality.

vii) The slope of the bamboo planted pit shall be done in such a manner that the slope of the pit makes it more slanting towards the upper side in order to conserve more moisture.

3.13.4 Cleaning:-

Cleaning will be an essential part of the felling so as to remove dry, malformed, twisted and gnarled bamboos so that cleanliness of the clumps improves and production increases.

3.13.5 Weeding:-

Young clumps will be weeded once in July/ August after the onset of rains so as to free them from competition of weed growth. Surrounding up to one meter diameter of each pit will be kept clear of all undergrowth.

3.13.6 Closures:-

Grazing has done a great harm to bamboos. For the protection of seedlings and for production of *manus,* the closure against grazing for 3 month i.e. from July to September will be strictly observed. Atleast three year closures will be provided for areas to be taken up for Bamboo and Khair planting. The bamboo plantations have suffered a lot due to the reason that it has been attacked by porcupine, wild boar and at times by monkeys so at the time of planting extra care is needed to protect bamboo plantation from these.

3.14 FELLING OF BAMBOOS FROM PVT.LAND

The Bamboo of private areas were earlier used to be managed by the Forest Department, but about a year back Govt. of HP had issued notification making it amply clear that these bamboos will be allowed for felling as per triennial felling programme and has been made open for its conversion and transportation. The emphasis for its conversion was mainly not to attract 41, 42 of IFA 1927. The staff of forest department will only supervise to the extent that these bamboos are extracted from the private areas as per approved three year felling programme by Divisional Forest Officer concerned.

The bamboos so extracted are converted into different sizes as per the table and are transported to the markets in bundles having different number of bamboo culms.

Sr.No.	DESCRIPTION	LENGTH	GIRTH	No. In a bundle.
1	Chawar	14’	Over 6”	5
2	Bahi 1	6 ½ ‘	5”-6”	10
3	Bahi 11	6 ½ ‘	4”-5”	15
4	Majhola	6 ½ ‘	3”-4”	20
5	Lathi	6 ½ ‘	2 1/2'”- 3”	30
6	Chari	6 ½ ‘	2 1/2'	40
BAMBOO TOPS				
1	Pore -1	14’	Over 3”	10
2	Pore -11	12’	2”-3”	15
3	Char	9’	2”	30

The felling programme of private areas up to 2011-12 has been approved by HP Govt. and the approval for the areas to be felled during the subsequent year up to 2026-27 will be approved by DFO (T) Nalagarh against the years during which these will be allowed for felling and the same has been duly prescribed in the annexure stated above.

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CHAPTER – IV

THE PLANTATION WORKING CIRCLE

4.1 GENERAL CONSTITUTION AND CHARACTER OF VEGETATION:

This working circle includes:

Some areas of the demarcated protected forests which were earlier under chil working circle but have been invaded by scrub to such an extent that now makes chil regeneration almost impossible and some other steep sloping areas in urgent need of protection against erosion.

Total area of this Working Circle is 1880.50 hac.

The areas are generally open, degraded and under threat of erosion due to overgrazing. These areas carry generally scattered trees of Chil, Khair, Shisham and occasional bamboo clumps along the nallas. These mostly lie close to habitations. The regeneration in areas not closed to grazing is practically absent. Plantations, mainly of chil and khair have been raised during the last 15-20 years by obtaining voluntary closures on favorable sites.

4.2 SPECIAL OBJECTS OF MANAGEMENT: The special objects of management for these forests shall be as under:-

i) To nurse the young plantation and nature young growth under a systematic regime of cleanings and thinning.

ii) To stock the existing blanks and the areas under scrub growth with species of higher utility and economic value.

iii) To meet the requirements of local population of fuel, fodder, fruits, small timber etc. To check denudation and soil erosion and to conserve moisture

4.3 AREA AND ALLOTMENT: The distribution of the area (ha) in different ranges is tabulated below:-

Table-4.1

Sr. No	Range	Class of Forests	Area in ha.
1	Nalagarh	DPF	937.36
2	Ramshehar	DPF	489.02
3	Baddi	DPF	299.53
4	Kohu	DPF	154.59
		Total	**1880.5**

4.4 BLOCKS AND COMPARTMENTS: The boundaries of the forest blocks remain the same as in the previous working plan. The compartments and sub-compartments also remain the same.

4.5 PLANTATION SERIES: There will be only one plantation serie as per legal status of the forests with regard to closures as described below:-

i) Nalagarh Plantation Series (Plantation Series-I) comprising of DPFs.

4.5.1 PLANTATION PRACTICES

Under the current departmental policy a mixture of species in departmental plantations is required in the following proportion:-

30% medicinal trees suitable for the area, 20% wild fruit trees suitable for the area and the remainder to be the main species of the forest type either conifers or broad leaved. It has, therefore, to be ensured that for plantation programmes sufficient diversity of tree species is grown and available in the nurseries. Similarly broad leaved species should be atleast 1 year old. Deciduous broad leaved species are to be planted during winter while conifers are to be planted during the rainy season. For carrying out plantation, the Nalagarh Division has sufficient stock in the nurseries. Earlier there used to be many nurseries in the Nalagarh Division but now in order to reduce the initial recurring cost, there exist only four nurseries in the division namely Sainimajra nursery in Nalagarh Range, Shitalpur Nursery in Baddi Range, Sobal Nursery in Ramshahr Range and Kohu Nursery in Kohu Range which cater to the requirement of whole of the

Nalagarh Division and also sufficient to meet the demand of local people. The rate of growing of one seedling has come down quite considerably.

4.5.2 Plantation Journals

It is essential that whenever a site is selected for plantation a proper hard bound plantation journal is prepared for that site. The plantation journal must have a large sketch may be of the area showing boundaries and other details like nallas, rocky area, crops, existing patches of trees etc. It is important that GPS coordinates of atleast 6 to 8 points around plantations are recorded and entered in the plantation journal along with the altitude of the area. Details of all works carried out must be entered in the plantation journals and signed by the concerned officials showing date of signature. All inspecting officers are duty bound to record their comments/observations in the plantation journals. Once a plantation journal is complete i.e. in the fourth and fifth year of the plantation, it should be transferred to the division office and kept in proper record.

4.5.3 No Site Clearance is to be done

In the past it has been a practice to cut and remove all bushes & shrubs from the plantation area. This practice is to be discontinued as shrubs & bushes help prevent soil erosion and add in moisture retention. However, if the area has exotic weeds/ aliens' species like lantana, Parthenium etc. then these are to be removed when the area is fenced.

4.5.4 Choice of Species

The choice of species depends on various factors such as climatic, edaphic, topographic and biotic but the surviving indigenous species give a clear indication of the most suitable species. Indigenous, fast growing, hardy species should be preferred which can survive under adverse conditions. Very sincere efforts should be made to bring the blank areas at lower elevation under forest cover. Efforts should be made to first afforest/ reforest areas near habitation with species of immediate use (mainly fuel, fodder) and then focus should be on blank areas away from habitation.

The species to be planted altitude-wise are suggested as under. However, Divisional Forest Officer is at liberty to change/add/raise new species suitable to a

particular site. Requirements and demand of the local people must get precedence over the economic value of the species to be raised subject, of course to the site suitability. Species yielding fuel, fodder, small timber and fruit such as dhaman, kachnar, ohi, mulberry, leucaena (subabul), drek, dheu, kikar, harar, bhera, amla, ritha and bamboos will be planted in the areas close to the habitations. In other areas species like poplar, shisham, siris, semal and khair may be raised according to the suitability of the site. Planting of chil should be discouraged and in no case safeda should be planted.

4.6 ANALYSIS AND VALUATION OF THE CROP:

4.6.1 STOCK MAPS:

All forests have been stock mapped on 1:15000 scale and stock maps have been placed in the respective compartment history files.

4.6.2 SITE QUALITY: Site quality has not been ascertained for these forests.

4.6.3 DENSITY: Density of the compartment which carries some crop has been estimated occularly and recorded in the compartment history files.

4.6.4 ENUMERATIONS: Ten percent plus enumerations were carried out since these were required to know the availability of species and growing stock.The enumeration were carried out in the forests under plantation working circle and the detail is given in Appedix-II-c page number 20 and the total growing stock of the species has been estimated and depicted in the appendix referred above supra.

4.7 SILVICULTURAL SYSTEM:

Need of prescribing any silvicultural system is not felt as no fellings are required. However there is presence of Eucalyptus crop in the forest of Bir Plassy, DPF Hatra, Rakh Plassy which had been planted in the late sixties and have attained the age of maturity. These are required to be removed under selective felling otherwise these will be subject to negative growth which will result into loss of its economic value and resultantly loss to state exchequer. DFO should ensure to initiate process for its disposal. Also steps be taken to replenish the area after the felling of these trees is carried out.

4.8 ANNUAL TARGET: Approximate area to be planted during the plan and corresponding annual targets is as under. The detail of the area having infested with Lantana and other invasive species has been shown in **Appendix-XXI-d page 83** clearly shows that the area available for planting after eradicating these weeds will be 435 ha. In total which should be taken up approximately 30 ha. Approximately 100 ha. of area annually be taken up for the improvement of the existing stock with economical valuable species and is reqiured to be decided by the DFO by priortising these areas keeping in view the availability of funds.

Table-4.2

Planting Series	**Area to be Planted (ha)**	**Annual target (ha)**
Total	435.00	30.00

4.9 TREATMENT OF EXISTING PLANTATIONS:

All existing young plantations must be strictly protected and tended properly. Maintenance operations such as fence repair, weeding, bush cutting and beating up of failures should be carried out for a minimum period of 5 years. Chil plantation must be control burnt, pruned and thinned as per the requirement of the crop.

4.9.1 Nurseries

It is axiomatic that the degree of survival of plantations is directly linked to the quality of nursery stock raised in nurseries. More so, when we are faced with increasing swings in seasonal fluctuations, both in terms of erratic rainfall and rising temperatures. These recent changes in weather patterns exacerbate our historical woes of compacted soil, damage by fire and cattle and general lack of interest (and therefore concern) of local communities in our plantations. Vastly improved nursery stock can in a major way address most of these impediments coming in the way of establishing successful plantations in and outside forests.

4.9.2 Few important qualities of any good nurseries would include:

a. It should be large in size (atleast 0.5ha) so that it is cost effective and also proper infrastructure including water supply, germination chamber (poly-house), Mali-hut, soil mixing yard, vermicompost etc can de developed.
b. Adequately trained, dedicated staff should be available in each nursery. Mali and laboureres should be trained and guided from time to time about raising of quality planting stock.
c. Each nursery should specialize in 5-6 species suited to the area and have large stock of each species, which is graded from time to time so that only quality stock goes for planting.
d. Soil mixture is most vital component for raising quality stock. Thus care must be taken not to compromise with quality of soil mixture (ideally 1:1:1 of soil, sand and vermicompost)

There are just four nurseries in Nalagarh Forest Division (as on 31st May'11) namely, Sainimajra in Nalagarh Range, Shitalpur Nursery in Baddi Range, Kohu Nursery in Kohu Range and Sobal nursery in Ramshahr Range which cater to the requirement of whole of the Nalagarh Division. The heavy reduction in the number of nurseries has resulted into lower cost per plant.. Thus average number of plants per nursery is 118000, which can further be increased (and the average plant cost reduced) with development of more infrastructure in nurseries.

4.9.3 NEW PLANTATION, METHODS OF ESTABLISHMENT ETC.

Only few areas allotted to this working circle are blanks in the true sense. Most of them carry scattered to open crop of chil and miscellaneous scrub species or sapling to young crop of natural origin or some failed plantations. Emphasis has therefore to be at the enrichment of under-stocked/ poorly stocked areas through gap planting rather than a mechanical method of planting 1100 plants/ ha at a spacing of 3X3 m resulting in under planting which has actually been observed having been done in the past. Number of plants to be raised per ha shall vary from area to area and this decision should not be left entirely to the labour and Forest Guard. This assessment must be made before closure of the area by at least Range Officer and nursery stock raised accordingly. It should be ensured that only the sturdy nursery stock of proper age, height and other positive specifications is planted in the field. Another important factor is timely planting and careful transportation Advantage must be taken of the potential areas to regenerate

through coppice shoots, root suckers etc. while making such assessment. The requirement of grazing and grass cutting of right holders must be given due consideration while selecting of site.

4.9.4 NOTIFICATION OF CLOSURES:

Every area to be taken up for plantation should be notified for closure one year in advance. The period of closure may be 10-15 years, depending upon the growth of the crop.

4.9.5 FENCING:

Fencing needs to be done around plantation sites only where it is necessary. Fencing along the steep slopes, cliffs, should be avoided where it serves no purpose. However, it is advisable to plant bio-engineering species suitable for the area along three strand barbed wire fencing especially in areas where grazing incidence is high. Fencing work should be taken up during the rainy season along with live fence support even for area which is to be planted in the ensuing winter. Where economical, and especially along roads, treated bamboo posts should be used for fencing. Where adequate live fence material is planted, only 2 strands of barbed wire may be sufficient. Tall plants of broad leaved species (6 -8 ft high) wherever available can also be planted along the fence. The poles selected for fencing the areas should be of such species which can coppice so that this fencing of such poles do not get decayed with the passage of times

4.9.6 SITE CLEARANCE: The site will be cleared of bushes and other unwanted growth only to the extent absolutely necessary. However, on hot aspects, staggered bushes of dodonea. Flacourtia, Pyrus etc. should be left to afford side shade. The shrubs should be allowed to be removed by the villagers.

4.9.7 ADVANCE WORKS : Pits of the standard size (30 cm X 30cm X 30 cm for Chil and 45cm X 45cm X 45 cm for broad-leaved) should be dug about 3-4 months in advance and the soil heaped on the lower side of the pit. This helps in weathering and improvement of the soil.

4.9.8 MAINTENANCE OPERATIONS: The after-care and maintenance of the plantations is of utmost importance, as most of the species to be raised are very

palatable and may become the first target of the cattle. Failures should be beaten up for 5 years. Weeding, bush cutting, etc. may be required 3-4 years. The fence must always be kept well intact.

4.9.9 CLEANING AND THINNINGS: There is no necessity of cleanings and thinning in most of existing young plantations at present. These may be carried out in future, wherever considered necessary

4.10 OTHER REGULATIONS: The other regulations for plantation areas will be as under:

4.10.1 CLOSURES: All areas taken up for planting will remain closed to grazing for a period of 10-15 years, a period normally sufficient for establishment of the plantations. Grass- cutting may be allowed after about 5-6 years depending upon growth of the plants/ saplings.

4.10.2 SUITABILITY/TREATMENT MAPS: These maps will be prepared for each area before taking up for artificial regeneration. These will indicate broadly the type of soil and its depth, along with the species with which different parts of the area is to be stocked.

4.10.3 FIRE PROTECTION: All old and new plantations must be protected against fires. To ensure this, fire watchers during the fire-season may be engaged wherever considered necessary. 5-6 m wide strips around fire tender plantations and at 100 m intervals within plantation areas be kept clear of inflammable material. These will act as fire lines.

CHAPTER-V

THE PROTECTION WORKING CIRCLE

5.1 General Constitution

This working circle includes all the forests which are located on broken terrain, unstable strata, precipitous slopes, loose soil resulting into active soil erosion comprising of open crop of broad leaved species and requires rest for recuperation. These forests are mainly situated on difficult and erodible terrains adjoining Punjab and Haryana border. It also includes areas of Rehabilitation Working Circle of the plan under revision and warrant protection from future degradation. The growing stock is thinner and of poorer quality as compared to other working circles.

5.2 General Prescriptions

1. These forests are to be strictly protected; only salvage marking is to be done.
2. These areas are quite prone to fires during scorching heat of summer months because of having lot of under growth in the form of grasses and other seasonal bushes. These areas are also susceptible to forest fires from adjoining states. Fire vulnerability of each forest to be assessed and preventive measures against fires is required to be taken in advance.
3. Soil and moisture conservation, treatment of landslips, gully plugging, through extensive use of bio-engineering and contour trenching where feasible (on gentle slopes) to be planned. Areas indicated as available for planting in the forests allotted to this WC should actually be treated with staggered contour trenching and left to regenerate naturally.
4. Regular assessment of spread of invasive alien species in this WC to be monitored and priority given to their removal in APOs
5. Some assessment of the presence / absence/ abundance levels of key wildlife species to be got done in forests of this WC
6. Budget for these works to be tapped from MNREGS, NPV and regular Soil & Moisture Conservation (Plan/Non-Plan) Schemes
7. Extra care and caution to be exercised when dealing with FCA cases in forest allotted to this WC

5.3 General Character of the Vegetation The forests allotted to this Working Circle have their scattered distribution in areas namely Khols of Nalagarh and Dharampur. Highly denuded deep ravines have been formed and discharge of silt is quite heavy..

5.4 Special Objects of Management

The special objects of management are as under:-

Since the area is devoid of much of vegetation due to heavy erosion and ravine formation. Work plan of this area should be properly made with the special provision for engineering structures where ever required supplemented with gully treatment by brush wood, live hedge, thorny bushes along side prone areas as a special operative measure in the annual plan of operation. At suitable locations, percolation and silt detention dams be built at streamlets.

i) To protect the hill sides from further denudation and erosion by preserving and enhancing the forest cover and by undertaking soil conservation works in a planned manner, where ever necessary.

ii) To conserve moisture and streamline the flow of water in streams and *nalas* by protecting and enhancing vegetation cover in the watershed.

iii) To improve the growing stock in quality as well as in quantity by sowing and planting of suitable species.

iv) To provide a suitable habitat for wild life and to protect non timber forest produce naturally growing.

vi) Consistent with the principles of soil conservation, to provide grasses for grazing of sheep goats and buffaloes of local and migratory graziers who come to these areas and also to meet the genuine demands of right holders for timber and other forest products.

5.5 Area Statement:

Area statement of this WC is given in Table 5.1. This protection working circle has been constituted of one group namely Khol Group consisting of all the areas falling under Khol Nalagarh and Khol Dharampur. Forests of Nalagarh Forest Division which requires complete protection and the area of such forests are being tabulated as follows.

Table 5.1

Area Statement

Range	**DPF**	**Total**
Nalagarh	D-201 Khol Nalagarh	1440.68
Baddi	D-200 Khol Dharampur	925.44
Total		**2366.12**

5.6 Analysis and Valuation of the Crop

5.6.1 Stock Maps.

All forests have been stock mapped on 1:15000 scales and placed in respective compartment history files.

5.6.2 Quality Class/ Density.

The general assessment of site quality class and ocular assessment of density have been made during field inspections in respect of each forest compartment or sub-compartment and recorded in the compartment history files.

5.7 Enumerations.

Since no regular felling is to be prescribed, no elaborate enumerations were required. With the objective of making reliable assessment of growing stock in these forests, partial enumerations were carried out. To assess the growing stock, 100% enumeration is carried out in the ten percent selected compartments as per random number generator table. The emphasis is also given to the extent of area while selecting compartments for enumeration. No yield has been prescribed. The salvage or incidental removals/petty felling will count within prescribed annual yield of the division.

5.7.1 Enumeration Results: - 10% plus enumeration are carried out in the forests falling under Protection Working Circle and the enumeration results are given as per **Appendix-II page number 21.** The total growing stock of the area has been calculated duly extrapolated for whole of the circle and the total growing stock so obtained is given in the appendix supra.

5.8 Method of Treatment

The prescriptions in this chapter have been subdivided into following parts

i. Fire Management
ii. Invasive Alien Species Management
iii. Soil Moisture Conservation

5.8.1 Fire Management

Out of the total forest area of 10233.89 ha in Nalagarh Forest Division 2108.21 ha (21%) is under Chil Working circle in the previous plan. The list of pine forests, fire lines, bridle paths is given in para 2.22.1 in table number 2.9 .It is estimated that about one to three tons needles fall per hectare per season depending on the density of the forest. Thus taking an average of 1.5 tons per ha the volume of pine needles that fall each season is estimated to be 3200 tons approximately. It is well known fact that fire is an evil in the chil predominant forests. Dry pine needles are a fire hazard to the forest. Every year thousands of hectares of forest area gets burnt up because of pine needle accumulation. The decomposition of pine needle is extremely slow. Number of forests affected by fires in past, clearly indicates that Ramshahr, Kohu and part of Baddi Range will be the main focus in addressing fire problem. The strategy for fire management will include the following:

For the purpose fire protection notice boards and other warning notices should be issued and displayed at public places conspicuously. In addition to this forest protection measures being taken, public should be made aware through both electronic and print media so as to get maximum attention for this havoc being caused by the occurrence of fire and remedial measures to curb it at the very onset.

The forest staff must maintain good and cordial relation with the public and all the forest staff should keep the phone numbers of all the Panchyat Pradhans, Yuvak Mandal, local bodies and vice versa.

Protection of forest from fire is of great importance. Various fire protection measures as mentioned in the Punjab Forest Leaflet number VI issued by the CCF Punjab and contained in the Punjab Forest Manual Vol.III are prescribed for putting them in practice in toto. Apart from this other preventive remedial measures should be enforced in bringing the damages under control which fire causes to the community and nation at large.

a. Deployment of fire watchers In areas where cooperation from local people is not forthcoming or habitations too far from the forest to keep a vigil against fire, fire watchers may be deployed who will patrol the forests and alert the Rapid Response Team specially constituted at Range level during fire seasons.

b. Use of Pine needles.
c. Another way of addressing the issue of fire is to make use of the pine needles. It could be in any form like handicrafts, fire briquettes, check dams etc.

In forest compartments that are under active resin tapping, HPFDC resin workers or resin agents should get such compartments cleared of fallen pine needles atleast twice in the fire season. This condition should be built into the agreement with the Corporation at the time of handing over the forest to them. Failure to comply should attract a penal price to the Corporation

5.8.2 Invasive Alien Species: Strategy for Control and Rehabilitation of Affected Areas

Introduction:-

Lantana camara is perhaps one of the most important invasive alien plant species (exotic weed) in forest ecosystems. Other alien invasive plant species with significant impact on the forests include *Parthenium hysterophorus*, *Eupatorium* (=*Chromolaena*) *adenophorum* and *Ageratum conyzoides.* Whereas the incidence of *Parthenium* popularly known as *'Congress*

Grass' is largely restricted to degraded and newly opened drier sites along roads and forest fringes, the other three invasive alien species tend to occupy all possible vacant places even under tree canopy. Even as *Eupatorium* and *Ageratum* show a clear preference for moister locales and show gregarious occurrence, at many places these share the niche and grow in an intimate mix with *Lantana*.

A reconnaissance was made during January 2011 to map the distribution of exotic weeds in various compartments in this Division. Whereas, it was possible to record the incidence of *Lantana* fairly accurately, the area infested with the other 3 main invasive alien species could not be recorded comprehensively due to these species being still in dormant condition.

Strategy for rehabilitation of forests infested with these four most noxious exotic weeds is dealt in detail as under:

5.9 Lantana Infestation in Nalagarh

The lantana eradication in the areas as per the **Appendix-XXIc page 83,** clearly shows the extent of the areas invaded by lantana and other invasive species which is required to be eradicated through cut root stock method. It is pertinent to mention here that lantana infected areas should be taken in such a way that all the areas of particular forest of a beat, or one beat per range is taken where extensive lantana eradication works are taken depending upon the budget constraints so that the area once cleared from such weeds should not get re-effected or reinvaded. These area once cleared of lantana should immediately be planted with fast growing spp. or with grasses etc. so that this becomes deterrent for the weeds to grow again.As per the appendix referred above it clearly shows that the Lantana and other weeds have invaded the forest area to quite an extent and has resulted in to less available area for planting. There is 606 ha,of area duly designated having Lantana invasion and required to be eradicated followed by planting to the extent of 40 ha each year as per availability of the funds.

The methodology to eradicate lantana will be as follows:

- Method of cutting *Lantana* will be Cut Root Stock (CRS) method i.e. cutting the bushes below the soil to prevent coppicing.

- Forest beat will be the unit for rehabilitating *Lantana* infested sites. Financial resources available under various schemes will, therefore, be converged towards this end.
- Local people, through existing community groups, will be encouraged to participate in rehabilitation of *Lantana* infested areas. Stake of local people will be built into this initiative under the available JFM instruments.
- The following will be, based on local practices, standardized for effective implementation of *Lantana* management initiative:

    - Cutting tools/ techniques
    - Calendar of rehabilitation activities
    - Cost models

- A three year active maintenance of the treated areas and triennial follow up thereafter will form integral part of the rehabilitation program till the areas gets fully rehabilitated. During this period, constant vigil will be maintained on any opportunistic springing back of sprouts/ seedlings of the invasive alien species and the same will be immediately removed. At the same time, progress of establishment of the native species will be actively monitored and encouraged.

- An average of 40 hectares of *Lantana* infested areas will be taken up for rehabilitation per year.
- **Avenue planting:-** Since this Nalagarh Forest Division is dissected by National High Way and the area along these high way is required to be planted up with ornamental as well as shade bearing plants so as to maintain and manage proper emankment of the high way.

Management of other Invasive Alien Species (*Parthenium, Ageratum, Eupatorium*)

The spread of these three species is largely restricted to the open lands including forest fringes, degraded pastures and areas having soils that are recently exposed due to landslips, erosion, soil cutting or muck dumping. The reconnaissance has shown that there is a large overlap of areas under different invasive alien species with these three noxious weeds also occurring, though each of these occupying different niches, in most of the forests that are infested with *Lantana*.

The basic approach to rehabilitate areas infested with these three invasive species will be as under:

- **Approach-I (areas where infestation overlaps with *Lantana*):**
- Such situation occurs under Chil, miscellaneous broad-leaved and scrub forests. In such areas removal of these three exotic weeds will be taken up simultaneously with removal of *Lantana* and the treated areas rehabilitated with fast growing native species/ grasses.
- **Approach-II (areas where there is no or little *Lantana* infestation):**
- Such situation usually comes across in pastures, degraded forests and recently exposed sites. In such areas, manual uprooting of these exotic weeds just on the onset of monsoon, when the soil is moist, will be employed.

5.9.1 Soil and Moisture Conservation

The main objective is to protect hill slopes from further denudation, erosion and to maintain the equitable flow of water in the rivers, streams, perennial *nallas* that originate from these hills, thus constant efforts should be made to maintain and increase the protective vegetative cover in such areas. These forests shall, therefore, be simply protected as such. No fellings shall be carried not even salvage removals as these areas are highly prone to soil erosion owing to steep slopes. Comprehensive Catchment Area Treatment Plan is required to be made in Khols of Nalagarh and Dharampur areas in order to conserve moisture by developing water harvesting structures, gabion, check dams and other infrastructure to reclaim under ground water level. Total rainfall in these watersheds is reduced up to 53% which directly does not absorb as far as charging of under ground water system is concerned. To hold this run off water can be collected in natural ponds large or small, natural or man made depending upon the sites by putting submersible check dams across natural streams where ever situation permits, so that water is kept rejuvenated naturally

Most of the forests in lower elevations are poorly stocked, carry scattered tree growth or are devoid of adequate vegetation cover. Such areas shall be tackled by sowing, planting of suitable species and carrying out soil conservation works. In order to have better forest cover this area needs extensive planting supplemented with broad cast sowing of good quality grass which will change the ecology of the area.

5.9.2: Encroachments

No encroachment has been noticed in the forest falling under this working circle. However the old boundry pillars of Nalagarh Forest range are being replaced by the Railway Girder Joist reinforced with cement concrete mortar as a prioritization of replacing existing boundary pillars. The same very process of replacing the boundary pillars of other ranges will follow suit as per availability of programme /funds from CAMPA. at head quarter. However, very few cases of encroachment had come to the notice and the detail of the same has been given in **Appendix-XXVII page number 102.**

5.9.3 Preventive Remedial Measures

- The forest officials must be well conversant with boundaries of the forests under their jurisdiction. The range officers, block officers and forest guards must check the boundary pillars frequently and in case of damage to boundary pillars, immediate legal action to punish the guilty and repair work should be undertaken on priority. DFO/ACF should also inspect the boundary pillars while inspecting forests, plantations and other forestry works.
- All the encroachment cases on forest land are within the jurisdiction of DFO as collector of the division under H.P. Public Premises and Land (Eviction and Rent Recovery) Act, 1971. Range officers should challan all such cases before collector for speedy trial.

Railway girders should be used in encroachment prone areas and all BP s should be depicted in digitized maps of the area which will be maintained as a permanent record.

i. As a deterrent, FIRs should be registered as soon as an encroachment is detected. Court proceedings will then follow.
ii. Latitude, longitude and altitude readings of all Boundary Pillars(old and new) to be recorded in the BP register and database in the Division office

5.9.4 Smuggling of Timber: -

The high price of timber in the market has attracted/created tendency to become rich overnight and hence the smuggling of timber takes place more than often. The illicit felling and smuggling are both related, many times organized. The incidences of smuggling have, however, reduced after the amendment in Indian Forest Act (H.P.2nd Amendment 1991) vide which DFO has been designated as Authorized Officer to trial the cases pertaining to illegal transportation of Govt. property i.e. .timber, resin, khairwood and katha and may order confiscation of both forest produce and the vehicle involved. The detail of the cases being trial in the court of Authorized Officer-cum- DFO Nalagarh is given as **Appendix- XXVI page 101.**

5.10 Yield :-

No yield is prescribed for this working circle. However, salvage/incidental removals if any should be accounted towards the main yield prescribed for the division.

CHAPTER-VI

Khair Overlapping Working Circle

6.1 Constitution and general character of vegetation:-

This working circle overlaps with the areas of all other Working Circles. Khair occurs as important economic species in the scrub areas lying in the foot hills of Shiwalik. The area under Khair spp. has increased quite to an extent in the plan under revision and for this reason separate Khair overlapping working circle has been evolved. There are some forests like DPF Rakh Nalagarh, DPF Lohand, DPF Rakh Raipur and few others where khair occurs as a good quality Khair forest. Whereas in other scrub forest the Khair constitute up to 30% having sufficient Khair regeneration.

6.2 Special Object of Management:-

The main objectives are as under:-

i) To harvest mature and over mature Khair trees growing distantly or in clusters which are not feasible to be worked in a concentrated manner.

ii) To get good quality crop of Khair nearby replacing the species of economically less value in the forests having different broad leaved species.

iii) Working of these forest have really become most essential because the moratorium imposed by the HP Govt. for the complete ban on the green felling since late eighties resulted into degradation to rotten of this specie in particular which consequently left these trees with almost no content of Catechin.

6.3 Enumeration:-

Only partial enumeration up to ten percent of the species has been carried along with broad leaved and bamboos etc. in the compartment selected as per random number generator system.The detail of the enumeration carried out in all the working circles clearly indicates that the Khair species is growing to a greater extent in the areas falling under Nalagarh Forest Division and the khair species growing on this land is to the extent of approximately 1.5 lac cubic meters after extraplolating it on the basis of total area of Nalagarh Forest Division and is given in the table 9.1 of chapter-IX of part-I.

6.4 Silvicultural system:-

Khair will be harvested under selection system. Selection system has been preferred instead of coppice with standard system because of the fact that the trees have not been exploited for the last more than thirty years and have become over mature loosing their vigour and vitality for coppicing.

Cleaning and singling of young coppice shoots will be carried out to reduce the competition amongst bushes, weeds lantana etc.

The natural regeneration of seed origin if any will also be relied upon.

6.4.1 Rotation, Exploitation diameter:-

The rotation period will be 30 years during which the exploitable diameter of 25 cm at breast height will be achieved.

6.5. Felling cycle:-

The felling cycle of 15 years has been adopted. The felling programme has been framed so as to avoid overlapping with the forest beats open for felling under 10 year felling programme in private areas.

6.6 Calculation of yield:-

The yield by number of selection trees is calculated as per the volume table prescribed for Nahan Forest Division as the edaphic factors of Nalagarh Division are alike Nahan Division.

6.7 Method of executing felling:-

i) the area will be properly delimited before carrying out markings.

ii) All khair trees above 25cm d.b.h will be marked except those removal, which may cause soil erosion or permanent gap.

iii) Trees of any size and species within 6 m of all nalas, roads and slips shall be retained.

iv) No Khair trees will be felled unless marked for felling.

iv) The felling should be completed by 28th Feb, and conversion by 31st March. The converted material should be carried out of forest area by 30th June. The converted material should not be stacked over stumps.

v) All dead and fallen trees will be marked.

vi) uprooting or chipping of stumps will be allowed and the stumps left should not be more than 15cm, above the ground 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 February every year.

6.8 Control of yield and Regulation of Yield: - The yield is prescribed and regulated by the number of trees of and above the exploitable size. The yield is calculated by the smithies formula as under:-

X = f
------------------- (11-Z% of II) &
t

Y = x
-------------------------x (100+A)
x
1+ -----------------------
2

Where f = felling cycle i.e. 15 years

T = time taken by the trees of sub exploitable diameter class i.e. 20 to 25 cm class to go to 25 to 30 cm class= 15 years.

II = Existing number of trees in the sub-exploitable diameter Class= 90016 excluding Protection Working Circle.

I = Existing number of trees of and above the size of

Exploitable trees= 113925 excluding rehabilitation Working Circle.

Z = Percentage of II class trees that disappear in t years due to various reasons= 30%

A = An arbitrary constant.

It is evident that approach class (20-25cm dia) trees pass on to the exploitable class (25cm d.b.h.& over) in about 15 years. It is also presumed that 30% trees disappear during this 15 years period when they pass on to the exploitable class.

The yield is therefore estimated as under:-

$$X = \frac{15}{15} \text{ (90016-30\%of 90016)} = 90016-27004=63012$$

The annual yield works out as under:-

$$Y = \frac{x}{1+\frac{x}{2}} \times 100 + A = \frac{63012}{162751 + \frac{63012}{2}} \times 100 + A$$

$$= \frac{16935}{\frac{20713}{2}} \times 100 \times \pm A = 81.76 \pm A$$

Giving a value of +-) 7.43 to A the annual yield becomes 25% of the exploitable trees present in the area. Thus one out of every four trees of exploitable diameter (25cm & above) will be harvested. In all 194257 trees of 25 cm d.b.h and above will be available for felling in next 15 years. The yield prescribed is 4856 trees per annum with a deviation of 15% which should be squared up during the following 5 years so that at the end of block of 5 years the total deviation should not increase 10%

The yield will be prescribed by area and controlled by the number of khair trees subject to the availability of trees of exploitable diameter. The area will be gone over as per prescription. The khair trees, marked in salvage, which have the d.b.h less than the exploitable diameter, should not be taken into account for the purpose of control of yield by numbers. How ever such number of trees removed under salvage will be indicated in the control forms separately. The yield of khair trees above exploitable diameter is fixed below as per enumeration and estimated results. At the time of five yearly review of working plan if the yield exceeds +10% further felling should be deferred till the deviation comes within limit.

Working Circle	Area in ha.	Dia											
		10-15	15-20	20-25	25-30	30-35	35-40	40-45	TOTAL	Felling period	T		
		No.of trees	No.of trees	No.of trees	No.of trees	No.of trees	No.of trees	No.of trees	No.of trees				
C.W.C	2189.56	3196	2130	1187	791	162	6	0	7472				
B.W.C	546.64	8959	5972.8	10624.2	7083	5991.6	3994	2605	45230				
	3808.24	62415	41610	74015	49343	41741	27828	18148	315100				
Plt.W.C.	163.49	5587	3724	4190	2794	1918	336	11	18560				
Prot.WC	1880.5	64258	42839	48199	32133	22061	3865	127	213481				
				90016					599843	15	15	194257	32.43
			X	63012									
			y	32.43									
			A	7.43									
				194257	25%	48564							

Felling sequence of areas having Khair Crop of the Division is appended in Annexure No XXIX at page 107

6.9 SUBSIDIARY SILVICULTURAL OPERATIONS: The following subsidiary silvicultural operations shall be carried out.

6.10 CLEARING OF THE FELLED AREA

All the tree and shrub growth other than the natural regeneration required shall be felled. After the main felling, the villagers should be encouraged to remove the cut brushwood and other unwanted bushes. All unsaleable material should be dumped in depressions and nallas. The rank growth of *Lantana, Carrisa, Dodonea etc.* must be cleared off the area. If possible and if need is felt, the area may be given a burn.

6.11 ARTIFICIAL REGENERATION:

The area should be planted in the year following the one in which it is worked. Planting will be done at a distance of 3mx3m. The earth work must be completed during March-April.

The felled areas shall be regenerated with the singling of coppice shoots if any and should be followed by artificial regeneration to have good crop of khair species in future.

6.12 WEEDING, BUSH CUTTING, CLEANING AND THINNING:

Weeding and bush cutting shall be carried out twice in the first year and once in subsequent year's for at least 3-4 years to save the seedlings from being smothered by the profuse growth of coppice shoots, grass and shrubs. Climbers will be stubbed out completely. Thinning of coppice shoots to two per stool should be carried out during third year of coppice felling. In the 8^{th} to 10^{th} year, singling of coppice shoots will be carried out. Cleaning including thinning shall be done as per requirement of the crop.

6.13 GRASS CUTTING: The right holders will be allowed grass cutting from closed areas only under proper supervision till the plants grow above grass height, so that the plants are not cut along with grass.

6.14 CLOSURES:

Plantation has to be carried out only after the closure has been notified. No area will be marked unless papers for closures have been prepared. A period of 10-12 years is considered sufficient for establishment of the plantations after which these can be thrown open for grazing.

6.15 INTERMEDIATE FELLINGS:

First thinning will be required when the trees planted at 3x3 m in spacing are of 10years of age. Crop dia at this age for khair will be about 10cm. At this age mechanical thinning to space them to 3x6 m will be required and thinning will also be mechanical in nature to space the trees about 6x6 m. This will be required at the age of about 20 years. Average crop dia for khair at this stage will be about 18-20cm. Third thinning will be at about 30-35 years of age and will be decided depending upon more than one third overlapping of the crown.

A separate felling scheme for thinning may be got approved by the Divisional Forest Officer. The proposals in this regard will be made by D.F.O. in the year's annual plan of operation and got approved from the competent authority through proper channel.

6.16 FELLING OF KHAIR TREES FROM PRIVATE LAND

Apart from the khair trees extracted from the DPFs there is provisions of felling of Khair trees from private lands under Ten years felling programme duly approved by Principal Secretary (Forests) to the Govt. of H.P. vide Letter No. FFE-B-F (13)36/2004 dated 28/02/2004. The detail of area open for felling these private khair trees during the period of Working Plan under revision is as **Appendix-XVIII page 62**:-

The felling programme up to 2013-14 has been approved as per Govt. letter number referred supra and the notification for the areas to be felled during the year 2014-15 to 2026-27 will be got approved by DFO (T) Nalagarh as per detail given above against the years during which these will be allowed for felling.

6.17 The Method for preparation of Progress Report:-

The progress report of the trees being felled during the particular year is prepared on the basis of following examples. On the basis of hypothetical consideration the progress report of the trees being felled is as per table given below:-

CLASSIFICATION

	IV	III	IIA	Total	
No. of trees	50	50	50	150	Conversion %age= 90%
Volume	8.50	20.55	45.30	74.35	Volume= 66.91%

Conversion %age of	
Heartwood	Khairwood
43%	**57%**

CONVERTED MATERIAL

Heartwood 66.91x43% = 28.77 Khairwood 66.91x57%=38.138m

No. of billets	IV	III	IIA	Total Billets	Meter Girth
Stnd. size billets	5	6	6		
(length 1mtr)	50x5+	50x6+	50x6=	850 Billets	850.00
Non Std. size billets	2	3	4		
(Length 1mtr)	50X2+	50x3+	50x4=	450Billets	450.00
		Total:		1300 Billets	1300 meter Girth =30.012m3

The volume of Khair wood including wastage= 38.138 m3

The weight of one cubic meter heartwood is equal to approximately 13 Qtls. and that of Khair fuel wood is equal to approximately 11 Qtls. per cubic meter. So the total weight of Khair heart wood will be approx. 28.77x13 = 374.01 Qtls. & the total weight of left over of Khair fuel wood and wastage will come out to 38.138 x11 = 419.5 Qtls. The

permit to export the total quantity of Khair wood so converted will be 793.528 Qtls. for the 150 trees of different classes shown above. Apart from this if uprooting of Khair stumps are allowed in case of cultivated land, then 1 meter length of standard size is obtained from IV & III class of trees and 2 numbers of 1 meter length of khair stumps are obtained from IIA and above class of Khair trees. The weight of uprooted stumps are taken as 30, 35, and 35 Kgs for IV, III & IIA classes respectively. The above method of preparation of progress report is based on the report analysis from the field during the prescribed year felling 2009-10 of this division.

The extracted heartwood is then transported to the premises of Katha Bhatti Boiler having IBR installed. There are two boilers installed in Nalagarh Forest division at Manpura of Nalagarh Range and Kusri of Kohu Range. The demands of heartwood of these 2 boilers are met from the felling of Khair trees either from this division or from other adjoining division of the state or from the neighbouring states. The heartwood is chipped into small pieces and put into the boiler with water and then this mixture is passed through hot steams and collected into other big pots as liquid. This liquid is again allowed to pass through steamed boiler 2-3 times more to get more concentrated liquid saturated with catechin contents. This Liquid Katha is allowed to settle into different trays and is kept in a air conditioner room to increase the consistency of this liquid to get dry katha. The left over solution or residual is allowed to settle as such and transported as liquid katha. The chipped heartwood after going through steaming 2-3 times are dried up and used as a f/wood for Bhatties and brick kilns. The %age of katha obtained from heartwood is approximately 9% of the total converted Khair wood obtained from whole of the Nalagarh Forest Division except from the Kohu Range, which is around 11% for the khair conversion. This may be due to fact that the moisture contents in these khair trees are more with respect to the area falling under Kohu Forest Range.

CHAPTER-VII

JOINT FOREST MANAGEMENT OVERLAPPING WORKING CIRCLE

7.1 GENERAL:

Joint management of forest lands is sharing of responsibilities, control, decision-making of authority and products over forest lands between Govt. and local user groups. The primary purpose of JFM is to create conditions at the local level which enable improvement in forest conditions and productivity. Another goal is to support equitable distribution of forest products. It is a movement towards a more democratic management of natural resources founded on the principle of equity, transparency and social justice which aims to build collective community action deeply rooted in rural communities.

It is widely recognized that Government and development agencies at their own can not solve the growing problem of forest degradation and natural resources depletion. Success will now depend to a high degree on identifying measures to stimulate the active participation of rural communities in the management of forests. Villagers have little incentive to participate in the management of forests unless they benefit directly and have sufficient authority to be effective. Traditional approaches of management worked satisfactorily in the past when the population was less but now depleting natural resources have necessitated to concept and practice of participatory management.

7.2 POLICY FRAME WORK:

Participation of rural communities in the development and protection of forest has been emphasized in the National Forest Policy, 1988. Guidelines on JFM were subsequently issued by Govt. of India on 1st June, 1990. A notification in this regard has been issued by H.P. Govt. vide No. Forest (C)-3-4180-V dated 12.5.1993 (Appendix-XII)

7.3 IMPLEMENTATION STRATEGY:

Strategy for implementation of JFM should include.

7.4 PUBLICITY:

An aggressive publicity should be adapted to disseminate the information about the concept of JFM amongst masses. Use of local radio, media, public relations department and other audio visual tools like posters, documentaries etc. should be made to achieve this goal.

7.5 CAPACITY BUILDING:

Frequent and intimate interaction of the forest department officials with the rural communities should be assured during the process of JFM implementation. It will bring change in the attitude of officials thus, envisaged to function effectively as an extensionist.

It is, therefore, suggested that a series of workshops at circle, division, range, block, beat and local levels should be organized to help capacity building & disseminate information about this concept in a time bound and effective manner. Range officers and other field officials should attend the meeting of general house of the panchayats and local people should be briefed about this concept.

Forest staff should be given training on communication skills, stake-holders analysis, PRA tools, micro plan preparation, participative monitoring etc. in such workshops.

7.6 FORMATION OF VFDC:

VFDCs should be constituted in potential sites. General house of this committee will comprise of one adult male and female member from each household in such committee. VFDC general house can subsequently elect/select an executive committee from amongst itself. Local forest guard who should invariably act a member-secretary of this executive should ensure that all types of stakeholders are adequately represented in the executive. Local NGOs, mahila mandals and PRIs etc. should also find representation in this committee.The detail of VFDCs registered under Society Act, 1860 is given as per **Appendix-XXV page 99.** These VFDCs have been involved in carrying out plantation works for both the schemes under FDA as well as NBM after having sought approval of the work plans from the higher authorities. DFO will take necessary steps to get all the forestry works done with the complete participation of the societies,

so that the usufruct sharing of the final harvest as per agreement and the policy of the Government in this regard could be taken by these VFDCs.

It must be ensured that the job of executive committee will be facilitation of the process of JFM in the area. Final power regarding preparation and approval of micro-plans must rest with the general house.

7.7 MICROPLANNING:

Potential sites for JFM should be selected through detailed consultative process with the field officials. It is suggested that to begin with one site per range should be selected to serve as pilot location.

A detailed list of forestry related activities to be taken up in the area for the improvement of forest and environment should be chalked out through a process of detailed consultation with the community making use of appropriate PRA tools. Such activities should be prioritized to be executed over a period of 5-7 years and documented in the form of a micro plan.

7.8 MONITORING OF THE PROGRAMME

There should be a nodal officer of the rank of A.C.F. in the division for proper monitoring of the various activities of the programme. The details of work done should also be placed before the review committee of the Govt. of India.

The works under Joint Forest Management committees are being carried out in the Shamlats areas under National Bamboo Mission and state Forest Development Agency. This entire outcome is achieved through the participatory approach and sensitization of the field staff and local villagers as well.

CHAPTER-VIII

WILD LIFE MANAGEMENT OVERLAPPING WORKING CIRCLE

8.1 General:-

All the area under Nalagarh jurisdiction lies in the Shiwalik and sub Himalyan zone. There are number of streams perennial in nature flows through the forest areas providing an ideal habitat for different varieties of wild animals, birds and aquatic fauna. These forest and shamlats are also surrounded by human habitations. There is continuous human and cattle movement through the roads/ paths and khad beds of the forests That is why no wild life sanctuary could be carved out of it. Nevertheless the need of protections and promotion of the existing species of wild life and education of people about the harmonious co-existence with wild life should be given proper importance in managing the forests of the tract.

This Working Circle is constituted for emphasizing the necessity of conservation of wildlife and collection of information for better management of wild life. The whole tract has a variety of wild animals and birds. Therefore, this working circle overlaps all other working circles.

8.2 Importance of Wild Life:-

Due to the spread of education and awareness there is a growing concern for production and preservation of wild life and there is a steady opposition to their killing and to the destruction of their habitat. With the increased availability of information on biodiversity, a widespread and intelligent recognition of the immense value of the myriad species of plants and animals to human kind has been established. Forests provide an excellent opportunity to man to study living beings in their natural environment. In addition to this there are material consideration as well, especially ecological. The delicate balance of nature is maintained by these animals and plants through the intricate food web and any breach in this chain can cause over population of any one species which may prove detrimental to human interests. Wildlife is a source of sport and enjoyment to people and fetches revenue to the State as well. If the people are led to know the importance and worth of wild life they will appreciate it as an asset and put in efforts to conserve them.

8.3) Special Object of Management:-

The primary goal of management of wildlife in the Nalagarh Forest Division is to conduct wildlife surveys and mitigate human wildlife conflicts. In order to achieve this goal, it is imperative to integrate the functions at two fronts, i.e.

i) Working with the local communities to reduce their dependence on the forests to minimize human-wildlife conflict and

ii) Interventions to manage, monitor and protect wildlife.

8.3.1 Working with the local communities to reduce their dependencies on the forests to minimize human-wildlife conflict

i. Help resolve man-animal conflict with emphasis on social and environmental justice for the poor people living in the Nalagarh Forest Division.

ii. Facilitate organizing of community based organizations, user groups of rural poor, preferably with strong linkages to the Panchayats. Establish the wildlife conservation efforts at Panchayat level through the consultative process.

8.3.2. Interventions to manage monitor and protect wildlife

i. Maintain and protect the natural vegetation communities (remove exotics and Invasive Alien Species), populations of large ungulates (with emphasis on Sambhar, Ghoral) and pheasants.

ii. Provide facilities and opportunities in natural areas for purposes of formal and informal education, research and the study

8.4. Leopard problem: There have been many cases of damage to cattle by leopards in the division, who target these cattle in the forests or grazing lands. Instances of cattle lifting from cattle sheds are also not uncommon. Injury and causality in case of human beings has also reported and there are have been few instances when a leopard has created a panic venturing into dwelling houses in villages and had to be captured by setting traps and cages. There are number of incidence of cattle killing and some times human beings by the big cat and the loss to human being and cattle etc. is well compensated as per the Govt. policy and the rates of the same has been given as per **Appendix-XIX page 65.**

8.5 Monkey problem:- Monkey population has increased many fold in the division and there are a lot of complaints of crop depredation by them. Some steps to curb and cull the monkey population are urgently required and wildlife management practices

need to be enforced.The Forest Division Nalagarh has taken elaborate measures as per guidelines received from higher ups in the year 2010 and 2012 for the monkey estimation and capturing them for sterilization. The guidelines issued by the Deptt. Is given as per **Appendix-XX** page 67.. In this context, it is also worth mentioning that the DFO has been given absolute power to deal the compensation cases as per Govt. Notification given in **Appendix XXa** page 72. The guidelines issued by the H.P. Forest Department for the capturing and transportation of monkeys as per **Appendix-XXb** page 73

8.6 Wild bores: These animals also pose a nuisance both in agricultural fields as well as forest areas, especially plantations. In the forest areas they dig out the plants, especially rhizomes of bamboo while they destroy standing crop and vegetables.

8.7 Management Strategy:-

The strategic approach of wildlife protection/conservation in the Nalagarh Forest Division aims at recognizing the fact that the wildlife conservation is possible only through active support of the local community. There is a need to gain more informed understanding of the different stakeholder groups and the major influences that shape them.

8.7.1 Timing of Predation by the Wildlife:

The timing of the predations by the wild animals is very crucial to understand human-animal conflict. The leopard killings are mostly in July to September. The wild carnivores remain active in the months of June to October when the livestock is in the forests/pastures of the forests.

8.7.2 Compensation:-

Human-wildlife conflicts have assumed different dimensions in terms of human casualties, livestock killings and agricultural and horticultural crop raiding at the interface of wildlife habitats and human use dominated landscape. Such a situation affects the diverse sections of the village society, differently. Those who live closer to the forest areas and away from the road-head are mostly poor and bear most of the brunt of the human-wildlife conflict.

The Himachal Pradesh Forest Department has a provision of providing compensation (Table 5.1) to the person whose sheep, goats or cattle have been killed by the wild animals. A close look at the Department’s rules reveals their inadequacy with reference

to the damage done by the wild animals in the field. The rules provide for postmortem report, and verification by the high authority in the villages such as Pradhan/up-Pradhan of Gram Panchayat/ and a forest official, not less that the rank of a Forest Ranger. For a poor person, it is difficult to approach these high authorities, as a result we find that very few cases of damage by the wild animals are reported for the claim of compensation. Moreover, the rules have been framed for the damage of domestic animals done by the big-bodied animals, mostly the carnivores. This also reflects the inadequacy as most of the damage done relates to the crops and horticulture trees for which there is no provision of compensation.

Man-animal interface filter down to the base of the pyramid where the people are most directly affected by the depletion of physical resources, least able to fend off the ill-effects of man-animal conflict, and ill-equipped to take remedial action. Providing relief or compensation for damage to the crops and animals of the poor populations living close to the forests should become the priority for the Forest Officers. The H.P.Govt has notified all DFOs in HP as final sanctioning authority for compensation vide its notification No FFE-B-A-(10)-1/2005 dated 15th Dec.2011

8.8 Measures for Protection and Promotion of Wild life:-

Following guide lines should be adhered to for protection and promotion of wild life.

i) Wild Life Protection, Act.1972 prohibits shooting and hunting of certain animals (list enclosed as Appendix-VIII). All the prohibitory and regulatory provisions of Wild Life Protection Act, 1972 should be enforced strictly.

ii) Though the rivers flowing through the areas under Nalagarh division are perennial in nature but due to the extreme hot conditions during summer month makes these rivers dry and causes problem to the wildlife .That is why it is worth mentioning to construct as much as possible water pond in the forest which can be useful to the wildlife in these extreme condition.

iii) Fires in summer cause considerable damage to the existing wild life. There-fore effective fire protection measures and control of fires will help to a great extent in protection of wild life.

iv) Notice boards having useful information and restrictions should be established at prominent entry points at boundaries of forests. These should be in Hindi.

v) Wild life week should be celebrated every year. Wild Life Awareness Camps should be organized in Panchayats. Essay and poster competitions should be organized in the schools and colleges.

vi) Illegal hunting and shooting by poachers and use of better arms in the garb of crop protection nearby forest areas be curbed.

8.9 Conflict between man and animals

There is problem of cattle lifting by Leopard in the area. This is because of non availability of enough prey in the forests. The Leopard often ventures in the nearby villages/ habitations and lifts cattle and some times turns man eater. Govt. of H.P. pays compensation for any losses that occur. The compensation is often insufficient. Early detection/ identification of such Leopards and their capture are the only feasible solution to the problem. Enough equipment and trained staff should be planned for this purpose

Massive infestation of forests by alien species, and other factors like road construction etc have led to degradation of habitat and consequent increase of cases of man-animal conflict

Data pertaining to incidents of wild animals found or injured in Nalagarh Forest Division, data pertaining to compensation cases, Census data of monkeys (2012), is given in Table 8.1,8.2 and 8.3 respectively.

Table 8.1

Incidents of wild animals found dead or injured in Nalagarh Forest Division

Sr. No.	Division	Range	Location	Species	Sex	Approx age	Alive or dead.	Remarks
1	Nalagarh	Nalagarh	Bir Plassi	Wild Boar.	Male	2 years	Dead.	-
2	-do-	Baddi	Sarsa River	Samber	Male	4-5 years	Dead	-
3	-do-	Baddi	-do-	Samber	Male	3.4	Dead	-

						years		
4	-do-	Baddi	-do-	Samber	Male	2.5 Years	Dead	-
5	-do-	Baddi	Baddi	Samber	Male	Young 3 Years	Dead	-
6	-do-	Baddi	Baddi	Samber	Male	1.5 years	Dead	-
7	-do-	Nalagarh	Bagheri Nala	Wild Boar	Male	1.5years	Dead	-
8	-do-	Baddi	Sarsa Bhud	Samber kid	Male	1 year	Alive	Released in Forest.
9	-do-	Baddi	Landawal	Samber kid	Male	1.5 year	Alive	-do-
10	-do-	Baddi	Sarsa	Samber	Female	1.5 year	Alive	-do-
11	-do-	Baddi	Sarsa	Samber Kid	Female	1 year	Alive	-do-
12	-do-	Baddi	Sarsa	Samber Kid	Female	1 year	Alive	-do-
13	-do-	Nalagarh	Khairawala	Samber	Female	1.5years	Dead	-
14	-do-	Baddi	Sarsa River.	Leopard	Female	1.5 Year	Dead	-
15	-do-	Baddi	Bhud	Samber Kid	Male	6 Month	Alive	Released in Forest
16	-do-	Baddi	Malku majra	Kakar kid	Male	6 Month	Alive	-do-
17	-do-	Baddi	Sarsa	Samber	Male	1.5 Year	Alive	-do-
18	-do-	Nalagarh	Gaguwal	Samber	Female	1.5 Year	Alive	Sent to Kufri Zoo
19	-do-	Baddi	Baddi	Samber	Male	2 years	Dead	-

20	-do.-	Baddi	Baddi	Samber	Female	8 Month	Dead	-
21	-do-	Nalagarh	GPI Textile	Samber	Male	1/1/4	Dead	-
22	-do-	Baddi	Majro beat	Leopard	Male	2 Year	Alive	The Leopard was found trapped in Majro beat of Baddi Range after giving medical aid, the animal was sent to Gopalpur Zoo as per medical advise received .

Abstract

	Animals found dead							
	W.L. Boar	Sambhar	Leopard	Kakar	Total			
	2	9	1		12			
	Animals found Alive							
	0	8	1	1	10			

Table 8.2

Data of cattle killing by wild animals and compensation paid w.e.f. 1991-92 till date

Year	Human Only injuries	Buffalow	Cow	Ox/Calf	Horse/ Mule	Goat/ kid	Sheep/ lamb	Total No. of animals killed	Compen sation
1991-92			10	1		10	5	26	14550
1992-93		1	10	5		66	6	88	26100
1993-94		2	25	14	3	46		90	41200

1994-95			35	18	2	40	36	131	54850
1995-96		3	15	9	3	43	2	75	47500
1996-97		3	12	10	1	55		81	39050
1997-98			5	6	4	29		44	21600
1998-99			3			43		46	13810
1999-2000		3	5	7	1	24		40	24418
2000-2001			8	4		19	8	39	25137
2001-2002			7	1	1	4	5	18	14876
2002-03	1			1		5		6	5000
2003-04			1	1		6		8	4400
2004-05				1		6		7	3650
2005-06				2				2	2500
2006-07						4		4	1600
2007-08								0	
2008-09			2	1		61	11	75	31775
2009-10			2	2		16		20	14775
2010-11	1		2	1		12		15	14750

Some of the suggested measures for the reduction in the conflict between man and animals:

8.9.1 PROACTIVE

- 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.
- The Forest Officials need to take some proactive measures such as proper identification of the rogue animals, their tracking, and if needed capturing “culling” or elimination.

- 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 defence against such animals.
- 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.
- The issue of crop insurance has a lot of promise to resolve the man-animal conflict in the Nalagarh Forest Division. Possibility of paying a portion of the insurance premium by the Forests Department for poor villagers should be explored.

8.9.2 REACTIVE

However, once the damage is done, the provisions of compensation should be an easy and straight forward 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 and the govt. can place the funds for compensation at the disposal of a Panchayat. 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 behaviour; 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.

The loss of cattle due to attack by wild animals was drawing attention of the government for some times in view of public entreaties in this regard. The owner of the cattle was entitled to monetary compensation, as fixed, on production of relevant verification documents from the Pradhan, Range Officer, Veterinary officer, etc. Some relief has also been granted in case of loss of human life/ injury to human being after production of supporting documents. In case of loss of human life due to attack by a wild animal , postmortem report incase of injury to human being, medical certificate is necessary for

claiming the compensation. The orders were first issued vide H.P. Notification No Fts(F) 6-7/82 dated 25.2.1988 and revised vide notification No. Fts (F)6-7/82- Lose, dated 16th May, 1996. The rate of relief has been recently revised as per Notification No. Fts(F) -6-7/82-II dated 28th August, 2001, and No.FFE-B-A(10)-2005 dated 20th July 2006 in which the rate of relief for injury/ loss of life in case of human beings has been significantly raised.

Monkeys and wild pigs damage seedlings and coppice shoots in the forests and crop in agricultural fields. There is no scheme of compensations for crop damage and villagers often find themselves helpless. Consequently they tend to kill these animals. A suitable crop compensation policy will be helpful in getting support of local people in protection of these species. However the problem of monkeys is also on account of their feeding by locals and tourists, out of religious sentiments, which should be discouraged. There has been a steady rise in the population of monkeys which are menace to agricultural crops.

Table8.3

Monkey Incidence Estimation figures for NALAGARH Forest/Wildlife Division (Monkey estimation done between 8 and 8.30 AM on same date all over HP)

	Ramshahar Range					
Sr. No.	**Organisation address**	**Total Troops**	**Total Adult**	**Total Infant**	**Nearness to Garbage Dump, Road/Temple/ Pilgrim Site.**	**Total**
1	Ghat Dochi	2	45	7	on tree	52
2	Diggal Bazar	1	7	2	open	9
3	Dhar	1	34	6	Open, Tree, rooftop	40
4	Manlog Kalan	2	38	11	Open, Tree, roof, top	49
5	Chamasi	1	9	4	Open, Tree top	13
6	Rajwain DPF C-1	2	46	19	Open, Tree	65
7	Ratwari DPF C-2	1	11	7	Open, Tree	18
8	DPF Behri	2	36	8		44
9	Barog/Jaglog Village	2	44	12		56
10	Behri/Bakounta village	2	33	8		41
11	Ramshahar Bazar	2	34	8	Roof Top, open, trees	42
12	Pahari Chikni	2	43	6	Roof Top, open, trees	49
13	Baha	2	45	6	Open/Tree Top	51
14	Tunsu	2	76	13	Open/Tree Top	89

15	Mamla	2	49	8	Open/Tree Top	57
16	Kuwarni Village	2	80	15		95
17	Dhar Village	2	68	12		80
18	Bhatlog Village	2	45	9		54
19	Dharmana Village	2	74	15		89
20	Gajer Badyakh Village	1	28	7		35
	Total Ramshahar Range	**35**	**845**	**183**		**1028**
	Nalagarh Range					
Sr. No.	**Organisation address**	**Total Troops**	**Total Adult**	**Total Infant**	**Nearness to Garbage Dump, Road/Temple/ Pilgrim Site.**	**Total**
1	Jaggo Baba Gurudwara	1	25	75	0	100
2	Basantpura	1	25	65	0	90
3	Baha(S)	1	14	60	0	74
4	Kundloo(S)	1	17	70	0	87
5	Janon(S)	1	9	33	0	42
6	Behandu(S)	1	22	48	0	70
7	Bhagheri(Tikri)	1	4	26	0	30
8	Bansai(S)	2	25	85	0	110
9	Jalpa Maa Mandir	3	50	100	0	150
10	Lambi Dori	1	20	50	0	70
11	Plahwala Beat	1	50	30	On the Tree	80
		1	38	18	On the Tree	56
		1	30	15	On the Tree	45
		1	45	22	On the Tree	67
	Total Nalagarh Range	**17**	**374**	**697**		**1071**
	Baddi Range					
1	Village Talli	1	9	4	Near Temple/Gurdwara	13
2	vill.Patta	1	12	5	Near Temple	17
3	Vill.Talli	1	18	7	-do-	25
4	Vill.Salyar	1	16	5	Near Tallar Road	21
5	Vill.Tofat	1	21	7	-do- sallar	28
6	Vill Majra	1	18	6	Near Temple	24
7	Vill Nawa Nagar	1	21	7	Crowded Space	28
8	Vill.Souri	1	22	4	Near Temple	26
9	Vill Majroo	1	18	6	Open	24
10	Vill Aberni	1	21	7		28
	Total Baddi Range	**10**	**176**	**58**		**234**
	KohuRange					
1	Suna Beat	2	18	10	On tree	28
2	Youth Club Suna	1	10	8	On tree	18
3	Vice President of Gram Panchyat Lug	1	15	6	On tree	21
4	Loharghat Beat	1	20	12	On tree	32
5	Vill. Malaun, Tehsil Nalagarh	1	16	10	On tree	26
6	Vill. Jobi,P.O. Kohu	1	17	12	On tree	29

7	Vill.Dobi,(Behandi) Tehsil Nalagarh	1	16	8	On tree	24
8	Vill.Dhaleri,Tehsil Nalagarh	1	25	15	Temple	40
9	Vill Machoun, Tehsil Nalagarh	2	50	30	On tree	80
10	Salyach Beat	1	15	5	On tree	20
11	Rajwah Beat	1	96	28	Near Village	124
12	NGO	1	76	23	Near Village	99
13	Bhiunkhary Beat	1	75	30	Near Market	105
14	NGO	1	49	15	Near Village Kusri	64
15	Amar Singh,Fgd.I/c Sai Beat	1	26	8	Near Village Rachhoh	34
16	Ward Member Sai	1	17	6	Near Village Bahlam	23
17	Sai Beat	1	56	18	Near market Bhini	74
18	Ward Member Behli	1	40	14	Near Village Behli	54
19	Vice President Luns Panchyat	1	28	10	Near Village Rajwahan	38
20	Chamba Beat	1	56	14	Near market	70
21	NGO	1	38	10	Near Village Panjhali	48
22	Galot Member G.P. Ghadyach	1	45	12	Near Bus Stand Galot	57
	Total Kohu Range	**24**	**804**	**304**		**1108**
	Grand Total	**86**	**2199**	**1242**		**3441**

8.10 Damage caused by wild animals from forest point of view:-

Porcupines cause considerable damage to the young regenerations especially in chil, Bamboos and khair areas. It also feeds on vegetables principally on roots and is thus destructive to plantations. The animal is fond of gnawing bones and when alarmed it utters a grunt ling sound, erects its spines and inflicts injuries. It weighs 11-18kg. and is locally very much valued for its meat. They also eat new bamboo shoots and girdle the base of the khair trees. Pigs and barking deer also damage the young manus of bamboos. The monkeys also cause considerable damage to the chil crop. Nurseries are more susceptible to the damage by monkeys and flying squirrels.

8.11 DISTRIBUTION:

The important species of wild animals and birds distributed in the tract are as under:-

8.11.1 WILD ANIMALS:

i) **LEOPARD OR PANTHER** (*Felis pardus, panther)* Locally know as Bragh, Bagh or Mirg, It is found throughout the division in scrub forests as well as in chil areas and remains generally in the vicinity of habitations especially during winters where it preys upon domestic animals and stray dogs. Leopard is good climber and its prey consists of practically anything that it can capture. It often hides part of a kill.

ii) **INDIAN MARE** (*Lepus nigricallis):*

It is a common species found throughout the division preferring scrub forests area. It generally lives near the cultivation and is harmful to wheat crop. The young ones are born in singles or twins during early winter months. It is a very shy animal and is often captured during nights by blinding its vision by headlights of a vehicle.

iii) **INDIAN PORCUPINE** (*Mystrix indica):*

This destructive rodent is abundant throughout the division and adopts itself to any type of land but favours rocky hill sites, where it lives in burrows dug by it. The porcupines are characterized by spines born on the neck, back and hind quarter. They feed on field's crops, roots and tubers. They also destroy the young plantations. The young ones are born in spring.

iv) **WILD BOAR**: (Susscrofa cristatu):

Commonly known as jungle soor, it is found mostly in scrub forest. It is also found in chil forests and pockets of dense bushes. It feeds on field crops, wild roots and tubers and visits fields when the crops are nearing maturity causing lot of damage. It generally moves in herds of 3 to 4. It is a prolific breeder and gives at least 2 litters a year, one in the beginning of rains and second after the rains.

v) **BARKING DEER** (*Oervulus muntiac):*

It is locally known as kakar and is available throughout the division, preferring scrub forests. It is about 1 m long and about 60 cm in height at the shoulder. Horns of males are about 7 to 10 cm long bearing antlers. It is generally dark brown in colour. It feeds on grass, leaves and wild fruits. When heard from a distance, its call resembles dog barking.

vi) **MONKEY** (*Macaca radiata) :*

Among the primates, monkey is found in abundance throughout the division specially in areas around Ramshahr, Galot block of Kohu range and Joghon Block of Nalagarh.. It has, in fact, become a menace causing lot of damage to practically every agricultural crop and young chil plantations. It moves in large groups which can destroy a maize field within minutes.

vii) **SNAKES:**

Snake is a common sight in agricultural fields and forests. The common poisionous snakes found are Himalayan pit viper (Ancistrodon himalayanes), common Indian Krait (Bungarus caerulus) and Indian cobra (Naja naja). In addition to the animals mentioned above, several others viz, Jackal (Fanis aureus), Fox (Vulpes bengalans) and Sambhar are commonly met with.

viii) The Rat Snake – Ptyas mocosus:

It is widely distributed and usually frequents the open country in the vicinity of human habitations.

ix) **Mangoose** (Hepestes adwardsi):

It is light grey to dusty brown animal varies from 60-80 cms. It eats rats snakes and birds. It is fussorial animal.

x) **Monitor Lizard** (Varanus monitor):

It is dark coloured and dull in appearance. When fully grown its length is approximately one metre. It is found both in forest as well as outer skirts of villages.

8.11.2 WILD BIRDS:

A number of game birds are found in this division, the important of which are described below:-

i) **PEACOCK** (*Pavo cristatus):* It is found within the scrub forests of this division.

ii) **CHUKOR** (Alectoris gracea): It is found throughout the tract especially in bushy and grassy situations close to the cultivation. It is valued for its delicious meat and

is one of the important game birds. It is a large, plump.pinkish, grey brown partridge with rib like bars on flanks. Bill and legs are crimson. It is also found on open hill sides and rocky slopes dotted with bushes and grass. Generally it lives in groups of 5-20 and keeps in neighborhoods of fields throughout the division.

iii) **RED JUNGLE FOWL** (Gallus gallus):

It is also found mainly in the scrub forests in Nalagarh, Baddi Ramshahr areas. Locally known as jangli murgi or kukkarh and is important game bird of the tract. It is also sought after for its tasty meat.

iv) **BLACK PARTIDGE** (Francolinus francolinus): It is also known commonly as kala titar and is valued for its delicious meat. It lives in small flocks and roost at night. It is small game bird about half the size a village hen generally black and spotted with white.

v) **GREY PATRIDGE** (Francolinus pondicerianus):

Commonly known as safed titar or dhaula titar, it is found hiding in bushes adjoining cultivation and roosts at night.

8.12 Injuries to which Fauna is liable:

8.12.1 Hunting:

The varying types of wild animals have been attraction for hunters. In spite of ban on hunting there are many reports of hunting of these animals in different areas of the tract. They are killed for meat or other valuable products like fur, trophies or only for sport. Sometimes local people kill the animals to save their lives and cattle. Some animals are killed to save agricultural crops.

8.12.2 Fires:

When there is a fire in the forests the wild animals get trapped in it and killed. The fires destroy the eggs and the young ones in the hollow rocks, dead stumps and nests built in shrubs and on the ground.

8.12.3 Climatic disturbances:

The adverse climatic conditions affect the life of wild animals, particularly of the young ones. The hatching of birds is badly affected by abnormal rains. In severe drought condition the water sources are reduced and wild animals are killed for want of water.

8.12.4 Ecological imbalance:

The wild animals live in forest by maintaining food chain. The relationship between predator and prey is disturbed by human interference. The ecological imbalance has led to reduction in population of some important animals and birds.

8.12.5 Protection and management of the fauna:

The work plan to manage and promote wildlife is prepared to check the wildlife menace by the local denizens for future requirement/need.

8.13 FIELD CRAFT - HOW TO OBSERVE AND UNDERSTAND THE JUNGLE

(Adopted from an account by Dr. AJT Johnsingh of WII)

When guards/officers/others venture into the forest they should be equipped with certain indispensable articles: a small sharp knife, a compass, a lighter or a match-box (covered in a water-proof polythene bag), leech-proof socks (if it is a leech country), a small rope, rain-coat (if it is in the rainy season or in an area of high rainfall), a good pair of field shoes and field dress (olive green or khaki), which will merge with the background.

Animals such as Himalayan Black Bear, Brown Bear and Leopard can move much faster than humans. At the first close encounter they may snore, roar or scream. These sounds when heard in the setting of the jungle can frighten us terribly and only experienced lucky persons who have survived these encounters will be able to tell us how week and wobbly their knees became after the first nerve-wrecking encounter. We should not think that we can easily out turn and escape these animals which, as said earlier, are much faster than we are. Also the terrain on which we will have to run- with slope, many holes, sharp wooden stumps, tangle of creepers, dense tall grass, logs, and rocks- is not an ideal place to outrun these beasts which run with four legs while we have only two teetering legs.

Therefore, go with caution in a forest where there are dangerous animals. Please follow the dictum “I should see these animals before they see me and should hear them before they hear me". Do not talk unnecessarily. Human voice can be heard, even from a long distance, by the jungle animals, in the "silence" of the forest. If there is a need to communicate, better whisper and signal. The objective of our visit to the forest is to see as many animals as possible and observe them. This can be accomplished only when we move as quietly as possible. We spend a fraction of our life looking for and observing animals in the forests. During this brief period, we should be as quiet as possible and observant of the events that happen around us.

Silence is an essential part of jungle-craft.

In the jungle, smokers should become non-smokers. This is necessary for several reasons: by not smoking (i) the animals will not be alerted by the smell of the smoke, (ii) we avoid setting fire to the jungle, (iii) we show the utmost reverence to the jungle which we have resolutely determined to conserve. When we walk along a forest trail, particularly when the wind carries our smell down the train, we should proceed with utmost caution. This is because animals like bear (particularly those which have had encounters with people earlier and therefore are not shy of people) can smell your approach and then either slink away or wait for your arrival. When the wind carries your smell down the path, walk slowly and silently, stop for a few seconds every 50-100 m, listen for sounds and then proceed. Most animals like bear make some sound and indicate their presence. All these can be heard if you walk silently.

8.14 FOREST RULES

i) Never approach dangerous animals like black bear (particularly with the cubs) very close when they are in a flat terrain. With caution it is possible to approach them in a hilly or rocky terrain where the chances of escaping these animals are much greater.

ii) If there is a fresh blood trail on the path one should proceed carefully. A wounded animal (e.g. a bear wounded by a poacher) may be ahead of us and should turn aggressive if approached very close. The same is applicable to other potentially dangerous animals like the leopard.

iii) A leopard carrying its fresh kill may cause the fresh blood trail. Approaching a leopard on its fresh kill could be dangerous.

iv) While on a blood trail if there are alarm calls of monkeys, and birds ahead of us it could be an indication of the predator going ahead. Go with caution.

v) If you are returning to your camp alone on foot late in the evening and if you see a dangerous animal (e.g. a bear with cubs), stop immediately. Stay at a safe distance. Hide behind a tree or rock, observe the animal and then by talking, by tapping on the tree with a stone or wood, or even by allowing the wind to carry your smell let the animal know that a human being is somewhere in the vicinity. The presence of the unseen human being makes most animals nervous and they make a slow but steady retreat away from your direction. Who will enter in to a patch of tall dense grass where you hear the hissing of a cobra but don't see the snake? He will move away from the area. The great naturalist Dr. George B. Schaller has successfully used the above technique of remaining unseen and scaring away the Himalayan black bears in Dachigam National Park, Kashmir, India.

vi) Do not stumble through the forest without carefully looking at the path.

vii) Climbing a steep hill slope by clinging on to trees, climbers and rocks. Particularly in a tropical habitat, needs to be done with great caution. Before placing the palms, which like the feet are not protected, to hold on to something, watch carefully. There could be a scorpion, a nettle plant or a wasp nest nearby.

viii) People often fail to differentiate between chasing and charging by a bear. Charging may stop with a forward aggressive rush for 20-50 m but chasing can go much beyond that even for a few hundred meters which could be very dangerous. When chased by an animal throw a conspicuous object (e.g. a white hand-kerchief) on a bush and run down a slope or run zig-zagging among the bushes. Put up as much distance as possible between you and animal. While chased, do not crouch inside a bush hopping to hide.

ix) When chased by an animal, never try to climb a tree. A jungle- living tribal can do that but not a guard if he is recruited from a town or a Manager who is not used to tree-climbing. The fear would drain all the energy needed to climb.

x) Sometimes you will be forced to walk through the forest at night. If you are in a group, stay together. As you walk along make some noise (talk, sing, or tap on a tree or rock at regular intervals). Don't surprise animals by walking in to them. Tap the ground periodically, as you walk along, either with your foot or a stick. The vibrations will keep the snakes away and most animals will also move away when they are warned from a distance.

Practicals

Each guard/officer should be persuaded to tell an interesting experience he has had in the jungle during his career

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CHAPTER-IX

NON TIMBER FOREST PRODUCE OVERLAPPING WORKING CIRCLE

9.1 General:

This working circle overlaps with area of all the forests falling under Nalagarh Forest Division's jurisdiction. It is quite uncommon to harvest in a cyclic way these non forest produce other than resin from Govt as well as private and katha from private areas only. Though the availability of NTFP is there in the forest areas, but the quantity extracted from these areas is quite small and it is not economically viable to extract these NTFP in such a small quantity. Moreover the extreme climatic conditions do not support its optimum growth especially in low lying forests

Earlier the management of forests was based on production of timber and earning of revenue. The Non Timber Forest products were considered to be much lesser importance. [After 1980 the earning of revenue from the forests and their management for commercial production of timber has been removed from the policy frame work and objects of management. The 1988 National Forest Policy emphasizes on insitu conservation of natural ecosystems. Conservation and propagation of non timber forest products and their contribution towards local/ tribal economy has also been given importance in the policy.

The forests covered under this working plan have plenty of species giving minor forest products. Resin, katha, material of medicinal importance, tennin, bamboos and grasses etc. are the important MFPs.

9.2 Occurrence and utility:- The main species yielding MFPs, and their utility, are listed below:-

Name	Botanical Name	Plant type	Part used	Uses
Chil Pine	Pinus roxburghii	Tree	Resin extract	Resin, turpentine
Khair	Acacia catechu	Tree	Heartwood Bark	Katha
Kikar	Acacia nilotica	Tree	Bark	Tennin
Amaltas	Cassia fistula	Tree	Fruit	Ayurvedic medicine

Name	Botanical Name	Plant type	Part used	Uses
Amla	Emblica officinalis	Tree	Fruit	Ayurvedic medicine
Anardana/ Daru	Punica granatum	Tree	Seed	Spice
Arjun	Terminalia arjuna	Tree	Bark	Ayurvedic medicine
Basuti	Adhatoda vasika	Herb	Whole	Alkaloids and essential oils
Behera	Terminalia belerica	Tree	Fruit	Ayurvedic medicine
Brahmi	Centelia asiatica	Herb	Whole	Ayurvedic medicine
Safeda	Eucalyptus spp.	Tree	Leaves	Oil extracts
Dhara-phool	Woodfordia-fruticosa	Shrub	Flower	Ayurvedic medicine
Harar	Terminalia chebula	Tree	Fruit	Ayurvedic medicine
Aam	Mangifera indica	Tree	fruit	Fruit, Pickle
Ak	Calotropis procera	Shrub	Leaves	Veternary medicine
Jamun	Syzygium cuminii	Tree	Fruit	Fruit
Jung	Diascorea deltoides	Shrub	Roots	Ayurvedic medicine
Sal	Shorea robusta	Tree	Seed	Oil
Kachnar	Bauhinia veriegeta	Tree	Fruit/Flower	Vegitable/Pickle
Nim	Azaderechta indica	Tree	Leaves/ Fruit	Ayurvedic medicine
Gandla	Murraya Koenigii	Shrub	Leaves	Spices
Ritha	Sapindus mukrossi	Tree	Fruit	Detergent
Mahua	Madhuca indica	Tree	Flower/Seed	Alcoholic extract/ Marijuana

Apart from the above species following grasses and bamboos also occur throughout the tract:-

9.3 Grasses:

Lambi	Aristida depressa
Dholu	Chrysopogan Montana
Makora	Cymbopogon martini
Bagar	Eulaliopsis binata
Lambh	Hetropogan contortus
Kahi	Saccharum spontaneum
Lunji	Sorghum nitidum

9.4 Bamboos

Magar	Bambusa arundinacea
Bans	Dendrocalamus strictus
Mohar	Dendrocalamus hemiltonii

The above MFP species occur throughout the tract, both in the forests and non forest areas which include land ceiling areas and shamlats also.

9.5 Conservation and development plan:

For the extraction, processing and marketing of resin and katha sufficient number of agencies already exist. Forest department does not need to do much except to ensure enforcement of legal provisions of various Acts. For all other MFP species forest department needs to intervene in following manner.

1. Important MFP species should be retained as reserves in coppice coupes while marking.
2. MFP species should be given due importance in plantation programme exclusive MFP plantations should be raised at suitable sites. Elsewhere 5 to 10% of the seedlings of MPF species be planted at suitable locations in

a plantation area. Healthy nursery stock of such species should be made available to the private people desirous of planting them in their fields.

3. Villagers should be encouraged to include MFP species in JFPM micro plans.
4. District administration should be requested to provide all help to the local people in establishment of small scale processing and marketing units for MFPs. This will help in marking collection/growing of MFPs remunerative.

CHAPTER-X

FOREST PROTECTION

10.1 GENERAL: - Forests are the integral part of the mankind and none can dare to survive without its existence. We being the foresters, our responsibility to manage and maintain these forests as the best resources being provided in perpetuity to all the living beings in this world. This forest can meet the basic needs but not the greed of the people on this globe. These forests are just like an open treasure and subjected to various damages from different agencies. For which the protection of the forests are required. The various factors responsible for the degradation /depletion of forest wealth are smuggling of timber, illicit felling, forest fires, encroachments, poaching, and unscientific management etc.

In order to know the amount of benefits being driven out from the forests for all the public in general and right holders in particular, all persons living in the precincts of the forests should be made aware through both from print media and electronic media about the usefulness of the forests so that they have the feeling of own ness these forest and start rendering help to the forest official in curbing the offences of different nature. In order to manage the forest, the help of locals is to be ensured in decision making and procuring of usufruct sharing of the produce at the time of harvest as is envisaged in the agreement between the local people through VFDC and the staff of Forest Department.

The protective measures required to be taken for the different offences are as follows:-

10.2 For Smuggling of timber:-

All the field staff should conduct frequent inspection of the areas under their jurisdiction so as to check the incidence of illicit felling. Frequent night raids /Nakas should be made to apprehend the offenders who are involved in smuggling activities. Who so ever found indulging into such activities should be booked as per rules. The six number of trucks apprehended in the past and proceeded as per section 52b of IFA

10.3 For Encroachments

In recent years encroachment of forest land has emerged as a big threat to forest land. Thus the boundary pillars of forests must be maintained regularly, if any shifting is

noticed, action must be initiated immediately under IFA, 1927. The land rates of the area of Baddi and Nalagarh towns have increased many times during the industrialization in the early part of the decade of 21st century and people started making attempts to grab the forest land with a view to become rich overnight. In order to curb and check the incidence of encroachments the forest department executed a plan to replace all the old existing boundary pillars with the iron joist girders being fixed in reinforcement cement concrete. This process has certainly helped in checking encroachment on forest land nearing towns. The process of replacing these B/P is on the verge of completion in Nalagarh Forest Range and will follow in other adjoining ranges. The main advantage of replacing the B/P with the iron pillars seems to be not spending in the future for their maintenance as it was being provided in the old B/P during quadrennial programme of B/P repairs.

10.3.1 Preventive Remedial Measures

i) The forest officials must be well conversant with boundaries of the forests under their jurisdiction. The range officers, block officers and forest guards must check the boundary pillars frequently and in case of damage to boundary pillars, immediate legal action to punish the guilty and repair work should be undertaken on priority. DFO/ACF should also inspect the boundary pillars while inspecting forests, plantations and other forestry works.

ii) The field staff should be made accountable and sensitive towards the ever increasing menace of encroachments. The forest guard must initiate legal action as soon as the encroachment is noticed by him. He should chalk out the damage report and report the matter to range officer through block officer. The block officer should immediately seek demarcation and Challan the case in the appropriate court. Range officer must act quickly to file the case in the court; the laxity at any level must be dealt with under CCS (CCA) Rules.

iii) All the encroachment cases on forest land are within the jurisdiction of DFO as collector of the division under H.P. Public Premises and Land (Eviction and Rent Recovery) Act, 1971. Range officers should challan all such cases before collector for fast trials.

iv) The powers of carrying out demarcation are vested with the revenue officers under H.P.Land Revenue Act, 1954 and as such, many times, the demarcation of forests is delayed due to their pre-occupation. It is therefore,

suggested that the Tehsildar, Kanungo who are on deputation with the forest department be delegated the powers of demarcation of forests to process encroachment cases expeditiously

10.3.2 Strategy

i. Repair all existing boundary pillars and construct more boundary pillars close to habitation. For this, areas need to be identified that are prone to encroachments. It is also emphasised that the boudaries of the forests is repaired as per the quadrennial programme given in **Appendix XXIII** page number 96
ii. Railway girders should be used in encroachment prone areas and all BPs should be depicted in digitized maps of the area which will be maintained as a permanent record.
iii. As a deterrent, FIRs should be registered as soon as an encroachment is detected. Court proceedings will then follow.
iv. Latitude, longitude and altitude readings of all Boundary Pillars(old and new) to be recorded in the BP register and database in the Division office

10.3.3 Fire Management

Out of the total forest area of 10233 ha in Nalagarh Forest Division 2180. ha approximately (21%) is under Chil Working circle in the previous plan. The list of pine forests and triennial programme of departmental control burning is enclosed as per **Appendix XXIV page no.97**

It is estimated that about one to three tons needles fall per hectare per season depending on the density of the forest. Thus taking an average of 1.5 tons per ha the volume of pine needles that fall each season is estimated to be 13350 tons. Dry pine needles are a fire hazard to the forest. Every year thousands of hectares of forest area gets burnt because of pine needle accumulation. The decomposition of pine needle is extremely slow. The strategy for fire management will include the following:

I) **Clearing of Roads** Accidental fires in Chil forests are caused by lit cigarettes negligently thrown by passersby. As all Chil forests have sufficient fallen needles during summers (April –June), it easily catches fire and results in forest fires most of which are restricted to ground. To address this, both sides of roads upto

10m will be cleared off the pine needles twice a fortnight. The needles thus collected will be either control burnt in presence of forest official (FG/FW) or will be made use of in making check dams/briquettes.

II) Another important and probably the most common reason for fires in Chil forests are the intentional fires lit by locals to get fresh flush of grass from the forests. To combat such fires following strategies may be adopted singly or in combination:

iii) **Participation of local people :** Since all such fires are caused by local people especially those having cattle, thus involving these stakeholders in fire management may help. Awareness programmes combined with monetary incentives could be tried here. Fire management committees may be constituted at Panchayat level or existing /new JFMCs may be involved. The government should formulate some policy to give incentive for protecting forest. The area chosen for such schemes will thus save on deployment of fire watchers and the amount so saved will be used towards paying the incentive.

iv) **Deployment of fire watchers** : In areas where cooperation from local people is not forthcoming or habitations too far from the forest to keep a vigil against fire, fire watchers may be deployed who will patrol the forests and alert the Rapid Response Team specially constituted at Range level during fire seasons.

v) **Use of Pine needles** is another way of addressing the issue of fire is to make use of the pine needles. It could be in any form like handicrafts, fire briquettes, check dams etc.

Pine briquette has also been tried in several places. This activity will not only save the forest but also help to improve seasonal livelihood of rural people. State Council for Science Technology & Environment has tried this enterprise in certain Panchayats

The collection of needles may be executed through JFMCs .This will result in dual advantage to JFMCs from Chil forests and will help in creating stake in Chil forests which otherwise generally being a monocrop of timber species (which means no immediate use/ access to resource) are neglected by people.

In forest compartments that are under active resin tapping, HPSFDC resin workers or resin agents should get such compartments cleared of fallen pine needles at least twice in the fire season. This condition should be included into the agreement with the Corporation at the time of handing over the forest to them. Failure to comply should attract a penal price to the Corporation

10.4 Hunting and Poaching Of Wild Animals

Such activities in the forest should be discouraged at each instance of citing it. Provisions of Wild Life Protection Act, 1972 be enforced as and when required to firmly deal with illicit hunters/poachers to add balance to the animal chain in nature.

CHAPTER XI

WATERSHED MANAGEMENT PLAN

11.1 Watershed or a drainage basin is a natural unit draining runoff water to a common point. It can be demarcated based on the ridges and gully lines. Mini catchment or sub catchment could be basis for planning and execution.

11.2 AIMS AND OBJECTIVES:-

- Protect conserve and improve the land resources for efficient and sustained production;
- Protect and enhance water resource, moderate floods and reduce silting up of tanks, increase irrigation and conserving rain water for crops and thus mitigate droughts;
- To utilize the natural local resources for improving agricultural and allied occupation or industries (small and cottage industries) so as to improve socio economic condition of local residents.

11.3 CRITERIA FOR PRIORITY WATERSHEDS:-

The basis for identification of the priorities will be governed by the following objectives.

a. Areas yielding maximum silt load per unit need to be identified in the catchment areas, costly dams and reservoirs;

b. For flood control areas contributing maximum runoff need to be determined;

c. Potentility of different areas for maximum water harvesting possibility coupled with nature and type of cultivable soils would be important criteria in drought prone areas programme, dryland and rainfed farming programmes. There is also a need to demarcate watersheds/areas having different potentialities for development of forests, grassland and agricultural.

d. Reclaimation of ravines for growing forest trees species and for permanent vegetation will need ravine areas with maximum area under shallow, medium as well as deep and narrow ravines respectively.

e. The hill area development, the suitability classification of the afforestsation, grassland and development.

11.4 Collection of data:

Toposheets which give details of contours, streams, rivers, etc. of the watershed under consideration, have to be obtained, The watershed boundary is demarcated on the toposheet. With the topsheet plan as a guide, delineation of the land is done.

Prepare a Master Plan of the watershed management which will include needed land treatment measures both, vegetative and structural (namely engineering measures required for arable lands and non-arable land. Forestry and grass land management in non-arable lands treatment of special problems like landslides, stream bank erosion, gully control, road-side erosion etc. met in the watershed.).

The plan should also indicate benefits accruing from implementation of the proposed soil conservation and land reclamation programmes as ecological (protection of soil against erosion), economic and employment.

11.5 Ecological benefits comprise : i) prevention of on site erosion : ii) direct protection of land from getting out of production through gullying , stream bank erosion, landslide etc. and iii) protection of existing production from land getting lost as a result of restoration /reclamation etc.

11.6 Economic benefits include additional production as a result of i) land treatment; ii) increased irrigation potential and iii) restoration/ reclamation of land. Employment generation benefits should include categories preferably under casual, regular, technical and allied employment.

11.7 Major problem needs and protential of the area

What are the major problems, needs and potentials of the areas as conceived by the team? What is the technical assessment of soil and water conservation production problems on forest land, wasteland, special problem are (like landslides, stream bank erosion etc) control, flood moderation, sediment reduction etc., but also to the needs of the people in quantitative terms of food, fodder, fuel, fruit, fibre, timber and water.

11.8 Proposed management plan.

This is the most important part of the planning format. It explains not only what physically needs to be done to rehabilitate and develop the micro-watershed but how to do it. It deals with all the physical components to be financed under the project how they would be implemented.

11.9 Erosion control structures for Non-agricultural, denuded and waste lands.

Land capability classes V, VI, VII & VIII have one or more limitation of slope,erosion, stoniness, rockiness, shallow soils , wetness , flooding , climate etc. with the limited use as forests and wildlife. Out of the total 26% of forest land is subject to soil erosion and are maximum source of sediment , run off and floods. As they have maximum potential for producing Fodder,Fuel,Fibre, Minor fruits and low quantity timber these are in fact termed as " Wasted Lands". To achieve this it is necessary to adopt following suitable soil and water conservation engineering measures supplemented with proper afforestation techniques, grass land developments, etc.

- Contour and staggered trenches and plantation along hill slopes and waste lands.
- Gully control structures for arresting gully erosion.
- Permanent drop structures for narrow and deep ravines.
- Contour stone walls on steep slopes of hilly areas, especially inside plantations.
- Retaining walls for stabilizing precipitous hilly slopes.

Vegetation (Perenial or annual trees, or shrubs or climbers or grasses) on the site is one of the four main factors that govern the run off water which affects erosion, it follows that vegetative control would be one of the essential anti-erosion measures.

Since it can be manipulated and improved upon as required unlike rainfall. Hence one of the main functions of forestry would be to counteract the biological factors and calls for organized maintenance of all perenial vegetation in site.

Artificial regeneration by sowing in strip, Patches, Pit, Trench/ridge mound etc.

Pits into ordinary, saucer, ring, etc.

Ditch into small ridge, Large ridge, shallow ridge, slope ridge, Slanting side halt, small, shallow, Deep, Shelved trench, indined trench mound ,straight trench, wahli.

11.10 Forest lands: Give classification; propose forestry land use as an integral part of project for both protection and production. Tree growing should be incorporated not only for definite forest lands, but also interwoven into the whole project structure-on bounds, in corners, in farmsteads, along roads and streams and in all shallow areas where cultivation means only uneconomic agricultural venture. Fuel is as much necessary as food. Biomass may soon be come an important sourse of energy. Vegetation both for protection and production is, therefore, of vital importance.

Management of the forests

Vegetation, silvicultural system proposed, rotation and yields and management practices ;

Management of degraded forests ;

Management of scrub areas with potential of development;

Farm forestry ; and

Engineering measures to be adapted in forest lands (guidelines as given in agricultural lands), Measures to improve soil moisture conditions for better and quicker growth may be given preference.

11.11 Grasslands

For present grazing lands and those which should be put under this land use. This is a crucial part on which hopes of controlling the livestock number and improvement of quality depend :

i) Pastures,

ii) Grasslands management and improved practices including grazing

11.12 Grassland improvement:

The first step for the improvement of any deteriorated grass land/ pastures is to protect it form biotic factors. Apart from barbed wire enclosure other fencing suggested include ditch-cum-wall with planting of thorny vegetation, or sowing of useful trees like prosopis julifera, Acacia tortulis along the border.

Soil and water conservation measures as per water shed management basis. Balancing numbers of animals and grazing capacity is probably the biggest and most serious problem. The scant forage production, the poor development and low production of animals, the catastrophic periodic starvations looses of live stock particularly drought and serious erosion of soil join in stark testimony of this lack of balance. Carrying capacity is defined as ability of grass land unit to give adequate

support to a constant number of live stock for a stated period each year without deteriorating with respect to this and / or other proper land use

11.13 Special problems

Landslides; Torrents

Mineral exploitation in the area, if any; Roadside erosion

Brick Kiln areas and their rehabilitation after use and other special problems.

11.14 Gully control

Checking further spread; utilization of the gullied land; water development possibilities in the fullied land

11.15 Water harvesting: Water harvesting and silt retention structures including restoration of degraded land and recycling of harvested water. Ponds should be given a high priority. The social problems of water distribution need equal attention, however, if the developed water is to be used efficiently ad equitably.

11.15.1National Level

A National Land and Water Use Board with a Secretariat to process not only the overall policies, but also the appraisal and sanction of individual projects of Watershed Management to be nationally and internationally financed.

11.15.2 State Level

a) Multi-disciplinary *Watershed Management Directorate* is proposed which cand be developed around the nucleus of the present soil conservation organizations in the States. This will deal with Project Identification, Priority Determination, Planning, Monitoring, Evaluation and other overall interdisciplinary issues. To begin with a State Land Multidisciplinary and Multi-agency Watershed Group is to be set up in each of concerned States.

b) *Implemetation* should be done by the existing like departments of Agriculture, Animals Husbandry. Forestry etc. under system of time and money tagged sub-projects.

c) Watershed Planning Groups for individual projects.

d) Porject Officer to manage the implemention coordination for one or more watershed projects.

11.15.3 Local Level

A watershed Management Committee or Cooperative should be organized at the watershed level.

11.15.4 Built- in Monitoring and Evaluation System.

A built-in system of multi-point monitoring and evolution in necessary. Gauging stations for hydrology and sedimentation should be part of this built-in system. As many items of costs and benefits will be quantified as possible and systems set up for their periodic monitoring and evaluation. Information and data systems of other organizations relevant for the project should also be used.

CHAPTER-XII

DIVERSION OF FOREST LAND UNDER FCA, 1980

12.1 Diversion of forest land for developmental purposes results in change of land use and sometimes may have affect on the landscape. Road construction activity has a major impact on the hydrology and ecology of the area. Compartment forests may become fragmented and wildlife corridors threatened. Numerous pressures from various agencies put to the Forest Department of Nalagrh Forest division for the diversion of forest land especially in the last decade during the industrialization of Baddi and Nalagarh areas. Widening of roads for the easy plying of small to very heavy vehicles, to meet the ever increasing demand of electricity by the industrial units, the installation of various hydel project and upcoming of various industries including cement plants on the forest land or on the the Shamlats land, for the installation of Transmission lines from and up to Power Grid centre situated at Adduwal near Nalagarh, widening of NH 21A and other roads connecting village circuits along with construction of big industrial unit for the manufacture of cement etc., resulted into preparation of FCA cases for seeking the approval from Govt. of India. In the year 1980 a new act was promulgated which has made it mandatory to seek permission of Government of India for diverting forest land for non forestry purpose. In the event of carrying out any such activity with prior approval of Government of India, compensatory afforestation equal to twice the area diverted for non forestry is stipulated. This is required to be done over identified land banks.

12.2 Impact of Mining:-

In any course of development, the negative consequences are also inevitable.In fact; mining is the source of all the substances that cannot be obtained by industrial processes or through agriculture. Mining reaps huge profits for the companies that own them and provides employment to a large number of people. It is also a huge source of revenue for the government. Despite its economic importance, the question arises that how does mining affect the environment in particular.

The environmental impact of mining includes erosion, formation of sinkholes, loss of biodiversity and contamination of soil, groundwater and surface water.

Erosion of exposed hillsides, mine dumps, tailings dams and resultant siltation of drainages, creeks and rivers can significantly impact the surrounding areas. In areas of wilderness mining may cause destruction and disturbance of ecosystems and habitats and in areas of farming it may disturb or destroy productive grazing and croplands.

It creates noise pollution, dust pollution and visual pollution.

Mining has several other bad effects. It leaves behind a huge hole after mining is done. Secondly it damages natural beauty. A beautiful landscape which once existed is now a huge piece of dug up earth. The main effects are that trees are cut down, and forests are deforestated

12.3 Road Construction:

Roads are life line of people particularly in hill states like Himachal Pradesh. It is also inevitable to avoid use of forest land in road construction in all cases. In some cases use of forest land is unavoidable. In one hand the roads are necessity of people and time, on the other hand it has some negative impact on the environment. Some of the effects of road construction are given as under:

- Habitat is lost for wild animals (fauna) due to construction of roads.
- It increases soil erosion and sedimentation impacts on streams.
- In road construction species patterns are also altered.
- Human access increases due to this which results disturbance in remote areas.
- It affects the wild life movement .Fragmentation of forests takes place which results in rise in human-animal conflicts.

12.4 Hydrology: An impact of roads, in forests, on water resources is soil compaction. This soil compaction reduces soil pore space, which lowers the internal movement of water, decreases the amount of soil water storage, and decreases infiltration. Construction of roads across slopes by cutting them into the side of a hill creates hillside springs and seeps. These freshwater seeps flowing from the sides of hills are an intercept of groundwater flow and bring it to the surface, concentrating diverted surface water flow, and increasing surface water volume, which in turn increases the potential for landslides and erosion

12.5 Remedies:

(a) The road construction should be done in scientific way so as to minimize above mentioned effects.

(b) All the stipulations imposed by the MOEF should be adhered strictly.

(c) Field staff should not allow road construction in forest areas without prior approval from MOEF.

(d) Field staff should ensure the dumping of muck on approved dumping side. Once the dumping is completed after construction of road , this site should be stabilized by green solutions.

(e) Care is also needed to avoid spillage of petrol, oil and lubricants near streams, ditches or culverts

Table-12.1

The FCA diversion cases for the Nalagarh Division are tabulated below:

FCA Diversions with name/location							
Division	**Sr. No.**	**Name of Project**	**Dt of final approval**	**Area in ha**	**Location**		**No. Of trees**
					DPF	**Shamlat**	
		Transmission Lines					
Nalagarh Forest Division	1	400 KV Dhar Bhawani Transmission line.	26.2.87	3.1936	Chamba		560
	2	400 KV Jakhari Koldam Transmission line.	28.09.1994	7.54	Kishanpura, Sakedi, Baroi, Khillian,	Dolan, Kotla	0
	3	400 KV Jakhari Koldam Bhawani Transmission line double Circuit.	24.8.98	33.27	Mahadev, Okhu, Kyardu, Randala		587
	4	400 KV Double Circuit Nalagarh Hisar Transmission.	19.8.98.	4.95		Majra	552

	5	Construction of Singal circuit 400 KV Transmission line from (Reru) Nalagarh to Kunihar.	21.6.2000.	47.5111	Khobal,	Bhatoli, Dora, Behli, Boanta, Kuri, Khled Uperli, Behal-Meh Dhundan, Ramgarh, Badu	2781
	6	220 KV double Circuit T/L fro Nalagarh to Manimajra.	11.2.2002.	5.826		Malku Majra, Kishanpura, Reru, Jhiriwala, Panjehara	416 & 1 Bamboo clump
	7	Const. of 400 KV D/C Transmission line Kol Dam to Nalagarh	22.04.2008	11.73		Loharghat, Jobhi, Chalwana, Kohu Uperla, Lunas, Bhinni,	103
		Roads & Bridges					
	9	Construction of Nalagarh Bhawani Sai Road.	25.10.99.	0.49		Nalagarh, Bhosni, Sai	28
	10	Diversion of 1.2265 ha. Construction of Behal-Da Kiar Jabbal Tapprian road.	11.10.2002.	1.2265		Behl, Jamadi	77
	11	Diversion of 1.16 ha C/o of Link Road Bihini Johri- Lunas Road	19.09.2005	1.16		Bhini, Johri, Lunas	403
	12	Diversion of 2.306 ha C/o Link Road to village Dharmana	29.12.2005	2.306		Dharmana, Ghabhar More	591
	13	Diversion of 0.890 ha. C/o of Link Road to village Dhar	16.12.2005	0.89		Dhar, Kalri	470
	14	Diversion of 1.51 ha. C/o Begbania Salehran Road.	21.12.2005	1.51	Plahwala,	Nalka & Salehra	352
	15	Diversion of 7.44 ha. for the C/o Sitalpur-Nanowal Road	18.12.2007	7.44	Khol Dharampur (DPF)	Khas Khol, Dassu Majra, Kishanpur (S)	235

	16	Diversion of 1.783 ha C/o of Galot Rajwain Road	24.12.2009	1.783	Dhar Chamba, Okhu	Gharyach, Randala Galot Rajwain	510
	17	Construction of 346 mt. Over Sirsa Bridge (Nalagarh Range)	26.7.2004.	0.6732		Sirsa Bridge (Gheer shamlat)	103
		Miscellaneous					
	18	Water Pump House at Bhiunkhary.	9.10.89.	0.2113		Bhiunkhary	0
	19	C/o of Bus Stand Nalagarh	11.03.08	1.00		Mini Secretariat	15
	20	Diversion of 12.4239 ha for the C/o Biotechnology Park at Aduwal	27.05.2008	12.4239		Aduwal, Janodri	432
	21	Jay Pee Himachal Cement Project (A) unit of Jai Parkash Associates Ltd. Cement Grinding and Blending plants at Village Tikri (Bagheri unit)	09.08.2005	24.5105		Tikkri Bhageri Shamlat	3050
			Total	**169.6461**			**11565**

ABSTRACT OF FCA DIVERSION CASES

Category	**Area diverted**	**No of trees involved**
Transmission lines	114.0207	4999 & one clump of Bamboo
Roads& Bridges	17.4787	2769
Buildings	1.2113	15
Cement Plant	24.5105	3050
Biotechnology Park	12.4239	432
Total	169.6451	11565

CHAPTER-XIII

MISCELLANEOUS REGULATIONS

13.1 Petty Fellings:- Minor fellings, the produce of which is within low limits and one for the following purpose, will be allowed on silvicultural considerations by the Divisional Forest Officers and counted towards the petty fellings. All such markings shall be recorded in the concerned compartment history files for the control of the yield.

1. Dry trees required for ordinary departmental uses or for other Government departments.
2. Trees required to meet the bonafide requirements of the local population i.e. free grantees and the right-holders.
3. Trees required meeting special grants for sufferers of the natural calamities, as per the provisions of the Government orders.
4. Trees coming in alignment of roads and electric transmission lines, as per Government approval.
5. Other department uses, such as temporary construction of bridges, charcoal manufacture, research work, etc.

13.2 Deviation:

All fellings beyond the prescription of this working plan will constitute a deviation and special sanction of the competent authority shall have to be obtained well in time.

13.3 Roads and Paths:-

To facilitate the inspections, supervision and execution of various forestry works, a network of roads and paths is needed. A list of existing roads and paths has been given as per table 13.1 below. In the recent past their maintenance has been ignored probably due to paucity of fund. Adequate fund for the maintenance of existing roads and paths should be provided. The forest road and paths, if kept clear, serve also as fire line and, therefore, expenditure on their maintenance will be amply rewarded. Following roads/paths are proposed to be constructed during the plan period:-

Table 13.1

Division	Range	Road/Path	Particulars	Apprx.length(km.)
Nalagarh	Kohu	Bridle path	In D.145 Chamba forest	2
Nalagarh	Kohu	Bridle path	In D.150 Dhar Chamba forest	3
Nalagarh	Kohu	Bridle path	In D.151 Ukhu forest	5

13.4 Buildings:-

A list of existing forest rest houses, inspection huts and other forest buildings of the division is given in **Appendix-IX page 33**. Most of the forest rest house and inspection huts are in bad shape and require effective repairs and improvements. Some new buildings given as per table 13.2 below, are proposed to be constructed during the plan period so as to provide necessary and better accommodation to the field staff and thereby increasing their efficiency:-

Table 13.2

Division	Range	Type of building	Place
Nalagarh	Kohu	Guard hut	Sai, and Rajwaha
Nalagarh	Kohu	Peon quarter	Kohu
Nalagarh	Kohu	(Type-I quarter for R.A.)	Kohu

Nalagarh	Ramshehar	Guard hut	Matuli, (for Kotkahi beat) Kothi (for Bhiper beat), hatheora.
Nalagarh	Baddi	Guard hut	Dassaura, sai, Talli.
Nalagarh	Nalagarh	Guard hut	Mandiarpur, Kholbeli, Handa khundi, Lakhanpur, Gujjarhatti. Rakh Raipur
Nalagarh	Kohu	Range office cum residence	Kohu
Nalagarh	Baddi/Nalagarh	BO residence	Sai, Joghon
Nalagarh	Ramshahr	Range office cum residence	Ramshahr

13.5 Water Supply:

Most of the existing buildings situated in the interiors lack regular water supply. Provisions should be made for providing this facility as considerable time and energy is wasted on carriage of water from far off places. Existing Bore well may be redigged in order to augment water supply to forest colony Baddi/FRH complex.

13.6 Telephones:-

All the range head quarters are connected by telephone with divisional headquarters. Besides this all of the staff have mobile phones with them and always remain in contact with each other so as to check the incidence of smuggli ng of timber as

well as illegal mining incidences. It is proposed that the user charges towards mobile phones be provided to the staff in order to have more efficient services from staff.

13.7 Fire Protection:-

Forest fires in Chil forests are quite frequent. Usually large areas of pure Chil forests are affected by these fires, specially the young regeneration. Following fire protection measures are suggested:-

i) Earning of goodwill of local people:- This can be done by meeting the reasonable bonafide demands of right holders without any delay. The field staff should always remain in constant touch with the local people.

ii) Publicity: - Wide publicity should be given against the harms caused by the forest fires. For this, timely action should be taken for distribution of the pamphlets and other educative material during the fire season, well in advance, so as to acquaint the local people through panchayats. The front level staff must hold meetings with local people frequently to discuss the harms of forest fire.

iii) Fire-protection staff: - Divisional Forest Officer will engage sufficient number of fire-watchers during the fire season. Fire-watchers (preferably the local villagers) will patrol the area extensively for detection and protection against fires, will ensure all preventive measures wth the forest guards.

iv) Fire-protection equipments:- Sufficient fire fighting equipments, such as, brooms, shovels, mattocks, slashers, axes, hatchets, forks, buckets, gunny bags, rakes, etc. should be provided to field staff to meet any emergency.

v) Fire-lines: - The existing fire lines be properly maintained and kept clear of all bushes, needles, etc. to avoid any chance of fire. Further, any

inspection paths/ other patches should also be cleared to act as fire lines during the fire season.

vi) Control burning:- This should be ensured in all regeneration areas and other young chil forests. The control burning should be done departmentally and under the supervision of the trained and experienced forest guard. In the forest, being tapped for resin, all chip, resin and needles etc, should be cleared away from the base of the trees.

vii) Legal action/ Punitive measures:- All case of incendiarism should be properly investigated and punitive measures should be taken against the culprits.

13.8 Drought and Mortality:-

In low lying areas of Nalagarh Forest division drought is very frequent. Special care should be taken for the young plantations in these areas. If possible the young seedlings should be irrigated in case of drought.

13.9 Maintenance of Boundaries:-

In most of the forests, the boundary pillars are not properly maintained and need immediate repair. Keeping in view the increased value of the land adjoining Nalagarh and Baddi areas because of the influx of industries, the people living in the vicinity of the forests have started grabbing this government/ forest land. In order to check such type of incidences the department has initiated the process to replace these BPs with the iron girder joist pillar duly reinforced in cement concrete. This process of replacing boundary pillars has since been near completion in Nalagarh block and the process to replace boundary pillars of Baddi range and Ramshahr range in particular those beats which are vulnerable to encroachments. The process to replace all the bondry pillars with these iron joist pillars in whole of the Nalagarh Division has been started and is likely to be

completed during the plan period. Field staff should take all possible care in replacing the existing boundry pillars and fixing the same at appropriate places. The detail of the boundry pillars with respect to Nalagarh Forest Division is given as follows. The quadriennial programme of boundary pillar repair and boudary checking has been laid out and appended as **ANNEXURE XXIII page 96.**

Name of Range	**Name of Forests**	**Existing Boundary Pillar**			**Priority for replacing existing BP with good permanent BPs**
		Large	**Small**	**Total**	
Ramshehar	D 162 Nisal Chamdar	48	15	63	L
	D 163 Luna Silh	11	8	19	L
	D 164 Pongni	9	7	16	L
	D 165 Kamal Pandal	19	23	42	L
	D 166 Dattala	13	10	23	L
	D 167 Mamla	30	1	31	L
	D 171 Kot Kahai	49	0	49	H
	D 172 Baddu	33	0	33	L
	D 173 Phoolwala	34	17	51	L
	D 174 Sobal	16	21	37	L
	D 175 Ramgarh	25	13	38	L
	D 176 Behri	22	6	28	L
	D 177 Jor Joharu	12	2	14	L
	D 178 Jaglog	11	9	20	L
	D 179 Bankaha	33	0	33	L
	D 180 Kallari	17	0	17	L
	D 181 Retwari	15	0	15	L

	D 182 Rajwai	11	3	14	L
	D 183 Dagoh	12	0	12	L
	D 187 Adduwal	10	5	15	VH
	D 188 Khobal	70	40	110	L
	D 189 Gharuan Palasal	72	0	72	VH
Total Ramshehar		572	180	752	
Baddi	D 168 Bhalwa DPF	53	103	156	L
	D 169 Talli	41	44	85	L
	D 194 Majru DPF	53	41	94	L
	D 170 Sidh Chalon	17	0	17	L
	D 195 Dharampur	22	3	25	VH
	D 196 Retwali DPF	48	20	68	L
	D 197 Ambika DPF	36	0	36	L
	D 198 Dassaura	26	0	26	L
	D 199 Bhud Phandi	84	11	95	VH
	D 200 Khol Dharampur	53	3	56	VH
Total Baddi		433	225	658	
Kohu	D 154 Kalti	12	0	12	VH
	D 153 Malon	12	8	20	H
	D 156 Diddu	8	5	13	L
	D 157 Sunna	37	49	86	H
	D 155 Chalwana	16	31	47	H
	D 160 Baddal	7	0	7	L
	D 161 Dabrota	13	0	13	L

	D 159 Lunna	22	3	25	L
	D 158 Surajpur	33	3	36	VH
	D 146 Dharel	8	0	8	L
	D 145 Chamba	10	0	10	VH
	D 150 Dhar Chamba	28	0	28	H
	D 151 Ukkhu	35	17	52	L
	D 152 Nand	6	0	6	L
	D 148 Lohanda	10	3	13	L
	D 149 Shiarli	9	0	9	L
	D147 Bushar	13	0	13	L
Total Kohu		279	119	398	
Nalagarh	D 201 Khol Nalagarh	69	3	72	VH
	D 193 Palahawala	27	18	45	L
	D 185 Kala Amb	16	0	16	L
	D 184 Silh	16	0	16	L
	D 186 Luhand	18	0	18	L
	D 205 Rakh Rai pur	28	257	285	VH
	D 190 Rakh Nalagarh	409	0	409	VH
	D 192 Rakh Thakur Dawara	19	7	26	H
	D 191 Silnoo	38	0	38	H
	D 204 Hatra	53	5	58	VH
	D 202 Bir Palasi	37	96	133	VH
	D 203 Rakh Palasi	25	533	558	VH
Total Nalagarh		**755**	**919**	**1674**	

Grand Total		**2039**	**1443**	**3482**	

With such an action there will be no need for the repeated repairs of the boundry pillars and government expenditure will also be minimised**.**

13.10. Timber Distribution :-

The new timber distribution rules as well as the rate at which the TD shall be distributed/granted has been notified by the HP Govt. and is given as per **Appendix-XVII page 54 and XVIIa page 60.**. It is also worth mentioning that from 2007 onwards none of the right holder has applied for the grant of TD. In case if there is any trees to be granted to right holders great care should be exercised in order to stop misuse and pilferage should be checked.

13.11 Maps:

Each forest has been stock mapped on 1:15000 scale and have been prepared and pasted in the concerned range and divisional copies of compartment history files. The following maps are available with the Division.

Table-13.1

S. No.	Scale	Year of survey
1	1: 50000	64-65
2	1:250000	62-63 &63-64
3	1˝ : 4 miles	1912-14
4	1:15000	1984-85 &1985-86

The last survey on 1:15000 scale was done during 1984-85 and it is more than 25 years old. There has been a lot of developmental activity since then. Further, some survey sheets covering portions of Divisions are not available and should be procured.

The data of existing and required survey sheets is as under:

Table-13.2

Sr.No.	Name of Range	Survey Sheet applicable	Scale	Year of Survey	Survey sheet available or not
1	Nalagarh	53A/12/SE	1:15,000	1984-85 & 1985-86	Yes
		53A/16/SW	1:15,000	1984& 1985-86	Yes
		53A/12/NE	1:15,000	1984& 1985-86	Yes
		53A/12/SW	1:15,000	1984& 1985-86	No
				1984& 1985-86	
2	R/shehar	53A/12/SE	1:15,000	1984& 1985-86	Yes
		53A/16/SW	1:15,000	1984& 1985-86	Yes
		53A/16/NW	1:15,000	1984& 1985-86	Yes
		53A/12/NE	1:15,000	1984& 1985-86	Yes
		53A/16/SE	1:15,000	1984& 1985-86	Yes
				1984& 1985-86	
3	Kohu	53A/16/NW	1:15,000	1984& 1985-86	Yes
		53A/12/NE	1:15,000	1984& 1985-86	Yes
4	Baddi	53A/16/SW	1:15,000	1984& 1985-86	Yes
		53B/13/NW	1:15,000	1984& 1985-86	Yes
		53B/13/NE	1:15,000	1984& 1985-86	Yes
		53B/9/NE	1:15,000	1984& 1985-86	No

Management map of Nalagarh Forest Division have been adopted from the previous plan as there being no change is noticed.

13.12 Rain Gauges:-

Rain gauges earlier installed in Nalagarh Division at various places have gone out of order and lying defunct since many years. It is because of this the rainfall data has to be relied upon HAU Nauni, Distt. Solan, central Soil conservation Research and Training Station at Mansa Devi Panchkula or Forest Division Ropar Punjab.

13.13 Lopping Scheme:

The number of cattle both domestic and nomadic is much more than the bearing and productive capacity of the area. Lopping of broad leaved trees is resorted indiscriminately especially during winter months by right holders. The rules for lopping given in the settlement are good enough for checking serious damages to tree crop. However, emphasis is laid on the following:-

1. Tree having dia 15 cm at b.h or less should not be lopped.
2. Size of branches to be cut should not exceed 45 cm in length and a finger thickness.
3. The tree should not be lopped above half of its height.

13.14 Development of Forest Based Industries:-

There are no major industries on forest produce except a few saw mills, furniture units and cottage industries based on bamboos

13.15 Encroachments:-

Encroachments are not uncommon in Nalagarh Forest divisions. Due to growing urbanization and the lust for the land, the forest lands, especially nearer to the habitation are very prone to encroachment. Many cases of encroachment have been challaned under Land Revenue Act with various revenue authorities. To control the encroachments effectively, the Government has declared all Divisional Forest Officers as Collector under the Himachal Pradesh Public Premises and Land (Eviction & Rent Recovery) Act, 1971, within their respective jurisdiction, vide notification No.1-21/71 L.S.G dated 8-6-94. This power may be enforced effectively only when a competent revenue officer is posted in each division to facilitate demarcation process. Further a better communication between the department and local community may be beneficial in solving this problem. A list of identified encroachments has been given in **Appendix-XXVII** page number 103.

13.16 Forest area diverted for non forest use:-

With the development of the area, the forest land has always remained under pressure. In last two decades, the development activities like growth of industries, transmission lines for power projects, construction of road and others infrastructures have come up in the divisions. After the enactment of Forest Conservation Act, 1980, the prior approval of the Central Government is required for diversion of forest land for non-forest use has been elaborated in the **Chapter XII**

13.17 Rights and Concession:-

The records of rights in different areas, are given in Appendix-V page 25 . While marking the trees for right holders, great care should be exercised and any misuse and pilferage should be checked. However the gaddis pay visit in these areas of Nalagarh Forest Division for getting their cattles fed as per their recorded rights.

Considered from the point of view of grazing and fodder, the utilization of grass in forest areas is one of the important factors in the agricultural economy of India. The national economy is largely agricultural and livestock still plays a vital role in it. Speaking generally, all grazing in forests, particularly unlimited or uncontrolled grazing, is incompatible with scientific forestry, but it has to be tolerated as a necessary evil; it can only be regulated so that it may cause the least possible damage. A distinction has, however, to be made between graziers and browsers, and the latter, particularly goats, rigorously excluded from forests. Apart from grazing, forests are a source of considerable amount of fodder in the form of cut grass and leaves. The subject will be dealt with under two main heads, grazing and fodder.

13.18 EFFECTS OF GRAZING ON FORESTS:-

Grazing is one of the biotic factors conditioning forest vegetation. The many adverse effects and the few beneficial ones of forest grazing from the silvicultural and management points of view are summarized below:-

13.19 Adverse effects:

(1) Consumption of tender seedlings which are often taken along with grass.

(2) Exposure and wounding of roots by the heavy hooves of the graziers.

(3) Compaction of the soil by treading: percolation is reduced, runoff and evaporation are increased and germination of seeds is often rendered impossible.

(4) Dislodging of soil particles and destruction of protective cover: these lead to erosion.

(5) Mechanical damage to seedlings and saplings by the passage of animals.

(6) With unrestricted grazing, the progressive replacement of edible grasses and plants by inedible ones: this leads to the dwindling of grazing resources.

13.20 Beneficial effects:

(1) Grazing keeps down rank growth of grass and reduces fire hazard. This is particularly so on level or gently undulating ground.

(2) Grazing, controlled as to season and intensity, may help natural regeneration by lessening herbaceous cover and by wounding the soil and disturbing accumulated littered. This is particularly helpful in coniferous forests.

13.21 FACTORS CONDITIONING DAMAGE BY GRAZING:-

The extent of damage done to forests by grazing is conditioned by:

(1) the kind of cattle,

(2) the grazing incidence,

(3) the season of grazing, and

(4) The type of grazing area.

These facts are discussed below.

(1) *Kind of cattle*- Speaking generally, grazing includes browsing though, strictly interpreted, browsing implies the eating of vegetation under the grass and herbs. Browsing is therefore more harmful in forestry than grazing proper. For purpose of grazing, animals may be divided into grazers and browsers. But this is only a broad division, as even grazers take a browsing in the absence of grass. Camels, goats and sheep are included among browsers. Sheep are the least noisious of the three as they take to browsing only when an abundance of edible grass is not available. Camels and

goats are the most destructive animals; but owing to their great numbers, they are the chief source of damage in the plains. Buffaloes, too, prefer grass, but are dangerous on steep slopes as their heavy tread dislodges the soil and lays bare the roots of trees.

(2) *Grazing incidence:-* This refers to the amount of grazing prevalent in an area, usually expressed in terms of area units (per cow unit). It is also called *grazing intensity.* The greater the number of cattle, the greater will be the damage done to the forest.

(3) *Season of grazing.-* The season in which the demand for grazing is most and when the greatest harm is done varies locally. In this division the incidence of grazing in the forests on the lower slopes is greatly increased during winter as the forests higher up and the alpine pastures of other areas are then under snow. Most damage is done in the hot season when the grass and herbage have dried up and even cattle that normally grazes take to browsing. Bamboos are very vulnerable during the rains as this is the time when the new shoots appear; closure of bamboo areas during rains is thus imperative.

(4) *Type of grazing area:-*The steeper the terrain, the greater is the damage. Grazing should also be excluded from badly degraded sites, in order to help their rehabilitation.

13.22 REGULATION OF GRAZING:-

Efficient forest management requires that grazing should be regulated as regards the time and place, as also the number of cattle admitted. Grazing in forests may be regulated by:

(A) *Indirect measures:* - Of the several method adopted, the following may be mentioned:

(1) Control of cattle population.

(2) Provision of alternative fodder.

(3) Imposition of a suitable fee.

(B) *Direct measures:* The following are among the more important direct measures calculated to regulate forest grazing as regards time, place and the number of cattle:

(1) Limiting grazing incidence to grazing capacity.

(2) Deferred grazing.

(3) Rotational grazing,

(4) Closure to grazing.

(1) *Limiting grazing incidence to grazing capacity:*-This has been referred to earlier. The intensity of grazing has to be limited to what the forests can bear. The carrying capacity of the forest, i.e.> the grazing capacity= will vary with locality.

(2) *Deferred grazing:-* This is method in which the time of grazing is postponed from the start of spring growth until after a definite stage of forage development has been reached or the seeds of important forage plants have ripened; it ensures replenishment of the stock of edible grasses. It involves long closures and is not practicable every year; the method may be periodically adopted to prevent depletion of valuable forage. It is often combined with rotational grazing by ensuring closure of each

area during the monsoon or other season when the local fodder grasses seed in alternate years or at less frequent intervals germinates.

(3) *Rotational grazing:-* Experiments have shown that continuous grazing, even with a small number of cattle, is far more damaging to vegetation than grazing for shorter, discontinuous periods with a large number of cattle. The method of rotational grazing is based on this principle and consists of grazing in rotation over different portions of the pasture, i.e. intermittent grazing in different portions. The use of this term is sometimes restricted to grazing with short rotational closures of a week or a month or a little more at different seasons in the year, grazing involving longer closures, i.e. a year or more at a time, being called periodic grazing. The initial closures, up to 5 years or a little more, following main fellings in fuel coupes and regeneration areas make for a system of periodic grazing in this sense.

In organizing rotational grazing, the grazing, capacity of the area is first fixed and the number of animals to be permitted decided upon. The grazing area is divided into several paddocks, depending on the rotation aimed at, and the grazing restricted to one paddock at a time in rotation. It is so organized that rotation as regards both time and place is secured, each area getting equal benefit of rest and replenishment.

(4) Closure to grazing:- This may be resorted to for punitive or silvicultural reasons or for improving the forage. In the case of persistent fires attributed to graziers, the area concerned is closed to grazing for a year, besides discouraging future fires; the closures prevents the further deterioration of site by continued grazing and enable it to recover from the damage done by fire. Coppice coupes, regeneration areas and plantations are usually closed to grazing for several years after the main fellings in order

to enable the regeneration to establish itself and get beyond the reach of cattle. The temporary closures widely adopted in coupes, plantations and regenerations areas result in a pattern of periodic grazing. Beneficial as the practice is from a silvicultural point of view, it is generally not so far the purpose of grazing, because; (i) closure beyond a certain period, which varies with sites, does not lead to further improvement of the grasses, and (ii) if the grasses are not cut or grazed but are left to rot, their quantity and quality deteriorate. There may, however, be some improvement in the grass stand after closure, but this is soon lost due to the subsequent continuous and often unrestricted so far the purpose of grazing over a period that is usually much longer than the period of closure.

13.23 Village Common Land/Ex Shamlats land:-

The detail of the shamlats has been procured from the field and is enclosed as **Appendix-XXII page 84**. Since all the management as far as salvage marking, resin tapping, diversion of forest land for develomental works and plantations are concerned, the forest department is taking care of these Shamlats. The area falling under these shamlats are more than 15000 hactares. So efforts are required to be initiated to bring these shamlats under the purview of forest department by getting these declared /notified as UPF/DPF as the case may be at the earliest through revenue department.

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CHAPTER-XIV

Establishment and Labour

The position of staff presently employed as it stood on 1/4/2012 has been detailed in chapter IV of part 1. The existing strength of staff is adequate according to the work load but keeping in view the retirement of the staff of all catagory, the department should take advance measures to recruit staff to the required strength so that the work of the Nalagarh Forest Division should not suffer on the pretext of shortage of staff. Since all the forestry works are being managed with the help of people's participation therefore as per latest instructions , the staff at all level should be imparted specialized skill to cope up with changing/emerging trends in forestry like JFM/PRI techniques. The availability of labour for various forestry operations on present schedule of rates in the department does not match with the labour rates prevalent in the open market hence the labour do not come forward to carry out forestry works on the rates as fixed by forest department. The higher rates being asked by the labours in and around Nalagarh and Baddi ranges is because of the facts that the industrial houses deploy these labour at quite an exhorbitant rates. So the rates for the labour are required to be fixed particularly in these areas in accordance with the rates made available to the labour by other private organization.

The conservator of forest Bilaspur notifies the labour rates keeping in view the prevalent price index. This information (being only of statistical interest) has not been incorporated herein as the rates of daily wages are constantly changing/ rising as per feed back.

CHAPTER-XV

CONTROL AND RECORDS

15.1 Records:-

The following records are to be maintained and updated, for the proper check, control and implementation of the prescriptions of this working plan.

15.2 Compartment History Files:

The compartment history files for all D.P.F of Nalagarh Forest Division have been prepared in duplicate (one each for division and range). Compartment description, stock map, regeneration map, past history, control forms A, B, C and miscellaneous regulation forms, etc. along with old compartment files have been tagged in these files. To exercise control over the prescription of the plan it is imperative that all relevant control forms be maintained properly. Any event resulting in deviation from prescription and notes of the superior officers should be attached in these files.

15.3 Plantation journals:-

Plantation journals for all plantation areas, showing the year of planting, species and cost of various operations, will be maintained. The success percentage of each year along with subsequent maintenance be entered invariably. It should also contain the copies of inspection notes of superior officers.

15.4 Nursery journals:-

Nursery journals will be maintained for nurseries and these should show all necessary operations carried out stepwise, viz. site preparation, origin of seed, date of sowing with distance in bed, date of germination, germination percentage, cultural operations/ treatments along with cost of each operation. At the end of each season, the cost of raising plants shall be worked out.

15.5 Control forms:-

The Divisional Forest Officer shall submit control forms A, B, C, compartments miscellaneous regulations etc. to the Conservator of Forests annually. These forms have

been standardized, as given in the “Code for Working Plan Procedure” and have been appended with respective compartment history files for maintenance of these records for each compartment/sub-compartment.

15.6 Fire records:-

A complete record of fire will be maintained in range and division offices. Year wise annual fire incidences be mapped in Divisional office in concerned divisional map on the scale 1:50000 which is to be maintained/updated regularly. Fire reports be reported without delay along with relevant date, place from where the fire originated, nature of fire, extent of area effected and damages/ loss occured along with information to police- outcome thereof etc.The copy of this be also made to concerned c.h. files.

15.7 Forest Guard Beat books:

All Forest Guards in charge of beats must have a beat book containing relevant information about their beats such as map of the forest areas, the details of the areas, record of rights and concessions, roads, paths, buildings area closed for regeneration, store etc. It should be given top priority in order to ensure effective information and management. Range Officer will ensure the Proper maintenance of this record and the Divisional Forest Officer should check while on tour.

15.8 Divisional note book:-

The Divisional note book will be maintained by the Divisional Forest Officer. It will contain a gist of all important activities such as exploitation results; out-turn percentage, regeneration of species, records of seed years and any other information regarding divisional working. Apart from giving a glance of the divisional working, this book may prove helpful at the time of the revision of Working Plan.

Chapter XVI

FINANCIAL FORECAST AND COST OF THE PLAN

16.1 Annual Revenue:-

Since the H.P. Government's policy is for the watching welfare of the people and have framed policies accordingly. Earlier the forests used to be exploited for the purpose of generating revenue for the state but after the moratorium enacted by the govt. in the late eighties, in order to save the forests by putting complete ban on the green felling. As a result no green felling of any sort gets underway, only salvage trees are felled through HPSFDC Ltd. on royality fixed by the pricing committee. Since the price index is growing at a quite pace and it is not feasible to forecast the expenditure that will be incurred and the amount of revenue that will be generated in the future from the working of forests as well as other relating works. However the following financial forecast will be of some good use to have an estimate of annual future revenue:-

Table 16.1

Estimate of annual future revenue

S.N.	ITEM	PRICE/UNIT	QUANTITY	ESTIMATED REVENUE
1	Sale of standing chil trees	572/-	6765.3	3869752/-
2	Sale of standing B/L trees	182.194	Different rates	305051/-
3	Bamboo	3000 Bundles	200/- Appx. Per bundle	600000/-
4	Resin Blazes	54753	65/- Per Blaze	3558945/-
5	Sale of Bhabbar Grass	Lump sum		92800/-
6	Grazing	Fee etc. for 2010-11	8367 No. sheep/goats	2238/-

Miscellaneous revenue, based on revenue of 2011-12.

a)	Sale of trees to right holders	nil
b)	Compensation under Section 68 of IFA	750882
c)	Rent of Building	121550
d)	Registeration and export permit fee etc.	1475
	Total	**9302693/-**

The above revenue is seemingly to be realized by way way of selling at prevailing royality/market rates and it could have reaped much higher profits if the felling as per prescription is carried out.

16.2 Future Expenditure:-

Future estimates of annual expenditure are given as below;-

A**) ESTABLISHMENT**

S.N.	ITEM	Estimated Expenditure (Rs.)
1	SALARY OF STAFF INCLUDING MEDICAL ALLOWANCE/REIMBURSEMENT	3,81,53,000/-
2	T.A.	3,84,500/-
3	UNIFORM/LIVERIES	42,000/-
4	CONTIGENCIES AND OFFICE EXPENSES	4,70,000/-
5	MAINTENANCE OF VEHICLES.	3,18,474/-
6	TOTAL	3,93,67,974/-

CONSERVANCY WORKS:-

1.	Demarcation and maintenance of boundries.	38,300/-
2	Construction of new building, roads	10,42,000/-
3	Repair/Maintenance of buildings, roads and compound	10,30,000/-

4	Fire protection of forests	12,97,300/-
5	Raising of plantation and subsidiary works.	60,78,419/-
6	Material and supply	5,46,200/-
7	**Total**	**4,94,00,193/-**

ABSTRACT OF ANNUAL FUTURE REVENUE AND EXPENDITURE;-

Revenue (Rs.)	**9302693/-**
Expenditure (Rs.)	**49400193/-**
Surplus/deficit	**-40097500/-**

COST OF PLAN

The expenditure incurred on the cost of this working plan is as under:-

S.N.	PARTICULARS	EXPENDITURE
1	Pay and allowance of the staff including medical expenses.	8,88,536/-
2	Travelling Allowance	19,000/-
3	Contigency charges including office expenses, maintenance of vehicle, livery, uniform,etc.	1,33,000/-
4	Wages on account of enumeration and other field works.	14,77,000/-
5	Total	25,17,536/-

Average cost of preparation of working plan per hectare = 246/-

CHAPTER-XVII

BAMBOO MANAGEMENT.

17.1 GENERAL: - Bamboo is considered to be capable of meeting multifarious needs of the man. This green gold of the earth was known for its versatile use besides referred to as, poor man's timber' and being elevated to the status of "the timber of the 21st century".

Germplasm means plants in whole or in parts and their propagules including seeds, vegetative parts, tissue culture, genes and DNA based sequences that are held

Bamboo is socie-economic-cum- environmentally friendly renewable resource in a repository or collected from wild. Bamboo germplasm is infact the hereditary material transmitted to offspring through the germ cells. Traditional approach means to the generation old methods through conscious or subconscious ways of selection, propagation sustainable utilization and conservation for livelihood and lifestyles.

The improvisation of methods of preservation of bamboo for food, building, manufacture, finished products of novelty and handicraft value for regional and foreign export is by and large known to the sub-rural and urban section of people for developing the trend in market by holding the demand and supply aspects.

It will not be an exaggeration to say that the bamboo is savior of livelihood and economic support system in the region where there has been environmental, economic, social and unforeseen natural disaster.

17.2 Planting:

There are various methods of propagating bamboo through seed and vegetative methods. The vegetative method is mainly through rhizome. Although, for early income generation, rhizome as planting material is desirable, due to non availability for rhizome in large quantity for developing as high as 1000 ha. is a constraint. Threrefore, seedlings may be better option. The planting should be taken up with the onset of monsoon. Pits of 60cm X 60 cm may be dug and seedlings planted at a spacing of 5m X 4m. The number of plants per acre may be 200. A provision should be made for casualty replacement to the extent of 20% depending upon the locality factors.

17.3 Intercropping: The gestation period in bamboo plantation is five years. During the first three years, it is possible to cultivate profitable intercrops such as turmeric, ginger, chilles etc. and various shade loving medicinal and aromatic plants.

17.4 Fertilisation:

The application of fertilizer is most important during transplantation from nursery to main field. Bamboo is a heavy feeder and therefore, even a rich soil might become depleted after a few years if no fertilizer is added. The fertilizers although may be applied at any time in a year, it is preferred to apply after harvest and before irrigations. It should be noted that rhizomes continue to be active (growing) except in the coldest part of the year. It is therefore proper to apply small quantities of fertilizers round the year than one/two large doses. Bamboo responds well to nitrogen and potassium which are found in compost, green manure, wood ash and chemical fertilizers. Lime is often applied to neutralize soil acidity.

17.5 Harvesting and yield:

The annual yield of a bamboo clump depends on the number of new culms produced each year. This in turn is related to the production of young culms. Culms become mature after two to three years. To maximize shoot output some shoots must be left each year to develop into leafy young clumps. It is reported that bamboo clump on an average produce 10 culms in a year under good growing conditions. Considering a 30 year of life cycle one clump may produce 300 culms on the whole.

The harvesting can be done from fifth year onwards, however, for commercial production, harvesting will start from sixth year. In the first year of harvest i.e. sixth year, 6 culms per clump will be harvested followed by 7 in seventh year, 8 in eighth year and 9 from ninth year onwards. The culms which are one or two year old are generally left for regeneration. Considering the average weight of a culm at 10 kg, the yield in the first year of harvest is 9.6 tonnes per acre, which will stabilize at 14.4 ton by ninth year.

17.6 Productivity of Bamboo:

Srtictus: 3t/ha (Bamboo paper mills)

17.7 Planting schedule to one hectare

Species	:	Dendrocalamus strictus
Seed weight	:	32000 per kg
Spacing	:	400 per hectare (5 X 5m)
Plot size	:	1 ha.

17.7.1 First year

Site preparation

Cleaning

Digging pits (60X60X60cm) 400 no,

Nursery including raising plants (500 no)

Transporting and planting

Weeding, cleaning etc.

Watering/fertilizers

17.7.2 Second Year

Causality filling

Weeding cleaning etc.

Watering/fertilizers

19.7.3 Planting Methods of Propagating Bamboo

Seed and Seedlings

Vegetative

17.7.4 Rehizome (Early income generation)

Non availability for large area

Seedlings better option

60 X 60 cm pit

5 X 4 m pit

200 number of plants per acre

Causality replacement upto 20%

17.7.5 Intercropping

Gestation period is 5 years

1-3 years grow profitable intercrops

Ginger, turmeric, chillies etc.

Gladioulus and other bulbous plants

Medicinal and aromatic plants (Shade loving)

17.7.8 Fertilizer

Bamboo heavy feeder and prefers moderately acidic loamy soil

Any time but preferred before irrigations and after harvest

Rhizome non active in coldest time only

Nitrogen, Potassium, Calcium

Compost, green manure, wood ash and chemical fertilizers, Mulch of grass (Ne & Si)

17.8 Harvesting and Yield

Depends on number of culms each year

Culms mature in 2-3 years

Some to be left to develop into leafy young culms

10-15 culms produced in a year

30 year of life cycle (one clump may produce 300-450 culms)

17.8.1 Harvesting

After 5th Year onwards

Commercial production from 6th year

1st year of harvesting (6th year)- culms per clump

2nd year (7th year)-7

3rd year (8th year)-8

17.8.8 Average weight of a culm

Yield in the 1st year of harvest – 9.6t/acre

Stabilize by 9th year – 14.4 ton

17.9 Watering

Can live in less than 40 inch (100 cm) rainfall

Drip irrigation

Sprinklers (to water the ground to 5-7 cm depth)

Water the rhizome/root balls entirely than running sprinklers for long hours.

Self watering in Bamboo (Sas. Biswa 2006)

17.10 Winter Protection

Subject bamboo to hardening from the first winter

Mulch heavily

Bamboo dry leaves and culm sheaths

17.11 TECHNICAL INSTRUCTIONS FOR OPERATIONS TO BE EXECUTED UNDER IMPROVEMENT OF GROWING STOCK

17.11.1 Cleaning /thinning of congested mature clumps:

This is an essential aspect of Bamboo management and thinnings are to be done regularly in the bamboo clumps as they are beneficial for the health and hygiene of the clumps.

Only young, good quality clumps that are likely to respond to treatment will be chosen.

Clumps that are raised above the ground or consisting of thin switches will not be worked as the whole clump may collapse.

17.11.2 Felling rules-

A horse-shoe shape working of clumps is prescribed to prevent congestion and facilitate proper growth and working of clumps. A horse-shoe cut will be given from the downhill side in the middle of the clump and culms are retained on the periphery (particularly on the uphill side) of the clump.

All manus (new shoots) and chals (2 year culms) are to be retained. Culms over 2 years age are to be removed but care should be taken to retain a few (minimum 6-8) older healthy culms uniformly all over the clump for support to the young tender shoots as also to help in food supply to the rhizome.

Dry bamboos if required for support will not be removed. The material so removed from the forests should be used for fencing or be utilized by the concerned FDA.

17.11.3 Gregariously flowered areas having profuse natural regeneration:

Many forests of Bilaspur and Nahan Circles have experienced gregarious flowering in 2005. In such areas, the following operations will be carried out :

- All dried culms will be cut down as close to the ground as possible, along with green shoots if any, to minimize the fire risk.
- The young regeneration will be retained in patches/plots of 1m X 1m at a spacing of 5m in rows along the contour. The distance between rows will be 4 m and a staggered pattern of retaining the plots will be followed.
- All other regeneration (except the 1m X 1m plots) will be removed completely by uprooting. These uprooted seedlings/rhizomes can be used as planting material in nurseries/plantation areas if required. While planting it should be ensured that the buds on the rhizome face upwards.

- Within each 1m2 patch, identify and retain at least 2 vigorously growing culms/ shoots. The rhizome of this culm would not extend beyond a radius of 20cm from the base. Hence after retaining all vegetation upto 20cm from the base to the selected culm, all other vegetation be removed by uprooting. The aim is to retain just 2 shoots/seedlings/rhizomes in each 1m2 plot.

17.11.4 Open forest of bamboo (having low density of clumps):

In such bamboo forests there are large intervening spaces between green clumps. There gaps should be planted up with bamboo saplings from the nursery/regenerated areas to improve the density and quality of the growing stock. The forests of Dendrocalamus strictus should have about 250-300 healthy clumps per hectare.

CHAPTER-XVIII

Bhabbar Grass

18.1 GENERAL:- The botanical name of bhabbar grass is Eulaliopus binata. This grass is very good soil binder. It does not constitute to be a fodder grass. This bhabbar grass is also known as bagar. This bhabbar grass covers large chunk of khols of Nalagarh and Dharampur across Sirsa River bordering Punjab areas. Being an economical important species this is required to be grown on larger areas. It can easily be propagated by tuft planting also or raising the stock by sowing the seeds in the nursery. For planting tufts on the berms of staggered contour trenches of 1x0.45 x0.45 meters keeping a distance of three meters apart which will also help in the conservation of soil and water.

18.2 Distribution of area:-

In Nalagarh forest Division the area most suitable place for both the grasses bhabbar and Kharkana is found in the Khols of Nalagarh, Baddi and at places in the Phipher beat of Ramshahr range and also on Shamlats falling under these ranges . The detail of area is shown as per table given below:-

TABLE-18.1

Lot No.	**Name of Forest with compartment No. and Shamlat.**	**Area in hectares.**	**Kind of grass to be auctioned.**
	DPF AREAS		
1/2011-12	D-201 Khol Nalagarh C-1 to C-4	443.13	Bhabbar Grass
2/2011-12	D-202 Khol Nalagarh C-5 to C-12	997.55	-do-
3/2011-12	D-200 Khol Dharmpur C-1 to C-4	315.65	-do-

4/2011-12	D-200 Khol Dharampur.C-5 to C-8	298.91	-do-
5/2011-12	D-200 Khol Dharampur C-9 to C-12	331.78	-do-
1/2011-12	DPF-Bir Plassi C-9 to C-12	417.62	Kharkana Grass
2/2011-12	D-189-Plasra (Part)	55.85	-do-
	Plasra (S) Part	40.00	-do-
NALAGARH RANGE			
1.	Bara Basot and Majra Shamlats	300.00	Bhabbar grass
2.	Garjewal, Tauranwala, Behrampur, Telewala, Barohwala and Ghir Shamlats	540.00	-do-
3.	Lakhanpur & Jhiran Shamlats	845.60	-do-
4.	Bela-Manjholi, Maganpura and Messa Tibba Shamlat	347.45	-do-
5.	Kotla Phalai, Dabhota & Bhanglan Shamlats	250.00	-do-
6.	Khol-Beli and Handa-Kundi Shamlats	114.00	-do-
7.	Nanowal Shamlats.	149.00	-do-
BADDI RANGE			
1.	Baddi, Sitalpur, Landewal, Kalyanpur & Malpur Shamlats	253.20	-do-
2.	Kishanpur shamlat	104.40	-do-
3.	Malku Majra, Dasso Majra & Khol Khas Shamlats	330.40	-do-
4.	Bhud Shamlat (Lot No. 3/2011-12)	14.08	Kharkana Grass

The above areas are sold every year in the open auction on year to year lease basis. The bhabbar and Kharkana grass is also distributed to the right holders as per their rights recorded in settlement. The conditions on which these areas are given on lease are as follows.

18.3 CONDITIONS FOR AUCTION SALE OF BHABBAR GRASS /KHARKANA GRASS FROM VARIOUS AREAS OF NALAGARH FOREST DIVISION.

The following condition of sale for auction sale of Bhabbar/Kharkana grass DPF and shamlat areas are hereby set-forth for the due performance/adherence of the same by intending purchasers: -

1. Auction sale of being conducted on behalf of the governor of H.P.
2. The sale is in pursuance of the India Forest Act. 1927 and rules made there under with up-to date amendments.
3. It is presumed that the bidders have inspected the areas put to auction-sale before bidding.
4. Every bidder shall have to deposit earnest money of Rs 5000/- only in cash or in the shape of demand draft payable at any scheduled bank at Nalagarh in favour of Divisional Forest Officer Nalagarh before bidding. No person will be allowed to bid in the auction without depositing of this amount. This earnest money shall be refunded to the concerned persons after the auction except in case of successful bidder (s), which shall be adjusted towards the last installment of Govt. dues.
5. The Sale of Bhabbar/Kharkana grass is offered on "AS IT IS WHERE IT IS BASIS". The areas falling in wild life sanctuaries are excluded from auction sale.
6. The rate of Kharkana grass in DPF will be quoted in lump sum. The rate of dry Bhabbar grass shall be quoted per quintal for DPF area and in lump sum for shamlat areas. The rate for sale of Bhabbar grass in some shamlat areas where quantity has been mentioned, in such areas the rates should be quoted per quintal.
7. The successful bidders will have to deposit 10 % of the bid amount as security duly pledged to the undersigned in the post Office saving account or in the shape of FDR before the actual sanction for exploitation of Bhabbar and Kharkana grass is conveyed, which will be refunded or appropriated toward balance Govt. dues.
8. Cutting, collection and removal of areas will be done by the successful bidder (s) at his own expense.

9. The export of the grass will be regulated by DFO Nalagarh through issue of export permit under relevant Act/rules in force.

10. The cutting collection and removal of grass will be allowed up to the end of financial tear..

11. The authority competent to sanction sale, reserves the right to reject any or all bids without assigning any reasons.

The successful bidder (s) will have to pay the full sale amount including taxes as leviable for the minimum quantity fixed for each such Forest/lot in DPF areas, as detailed below , at the rate(per qtls)quoted by him/them, even if he does not extract any or extract less quantity of Bhabbar/Kharkana grass: -

12. However, if additional quantity of Bhabbar grass over and above the minimum quantity as fixed above, is extracted by the purchaser (s) from DPF areas the cost of additional quantity all taxes, will also be charged up to the end of financial tear..

14. The buyer will supply the quantity of Bhabbar grass as required by Ban markers and small-scale paper Units.

a) That ' Ban makers will be allowed to cut grass in the areas near to their villages where they enjoy traditional rights and make 'Pullas' for their requirement themselves if they so desire and the buyer will afford them facility for the same without any hesitation.

b) Where the 'Ban' makers do not want to cut grass themselves they will be allowed selection of Pullas to their satisfaction from the grass cut by the buyer.

c) Where the Ban makers feel that the Buyer is hesitating in allowing them cutting or not allowing them selection or not allowing them to cut according to their requirement they will immediately request the undersigned who will depute R.O. concerned on spot for ensuring that they are allowed to cut or assist in selection of 'Pullas'.

d) Where 'Ban makers choose to cut and prepare 'Pullas' themselves they will not be charged cutting and collection charges but will only pay royalty amount of Rs.3/- per quintal to this Department. Where they select 'Pullas' and do not report for cutting themselves, they will be charged sales tax including expenditure on cutting and collection etc.

e) That the last date of lifting of ' Bhabbar grass' by the local 'Ban' making units as well as small scale paper Units will be up to the end of February month of the year.

15 The small scale Industrial Units and the 'Ban makers' will be supplied Bhabbar grass at the rate determined by this department taking into account cost of extraction.

16 The Himachal Pradesh Khadi Board may on behalf of the local 'Ban' making units purchase Bhabbar grass in lump sum by the end of month of february on full payment on agreed rates and store the same for piece-meal distribution to the "Ban" manufacturers.

17. The weighment of the Bhabbar grass extracted from DPF and shamlat areas be done in the presence of the Range Officer concerned and the quantity verified by the Ro shall be final.

18. Sale tax and other taxes will be paid extra by the buyer as applicable in H.P. from time to time alongwith value of the grass. In case of failure to do so, the buyer will any penalty as assessed by the Assessing Authority along with interest and till such time the security money will not be released.

19. The forest Officer may close, to grazing and grass cutting any part or parts of the Forest areas covered under this sale for propagation of Bhabbar/Kharkana grass or other Afforestation works and such closures shall not entitle the Buyer for compensation what so-ever on this score.

20. The Buyer shall issue token to one and all employed for grass cutting who will keep such token with them while in forest.

21. The Buyer will allow the cutting of grass by right-holders or concessions at the rates fixed (in hundred Rs.) as follows: -

Table -18.2

Kind of grass	*Unit*	*Cart load.*	*Camel load.*	*Ox load*	*Horse & mule load*	*Donkey load.*	*Head load.*	*Monthly*	*Yearly*
All kind of grass	Rupees	0.31	0.19	0.16	0.12	0.06	0.06	1.00	1.50
PETTY GRASS	Rupees	0.62	0.37	0.31	0.25	0.19	0.06	0.06	5.00
Bhabbar grass.	Rupees	0.50	0.25	0.19	0.16	0.09	0.06	-	-

The sale proceeds of all such supplies will be credited as revenue of this Division and will be in addition to the sale value grass extracted by the Buyer.

22. If the Buyer fails to pay the installment of money payable on due date or within the extended period as allowed by the conservator of forests, the DFO will seize and retain all Bhabbar/Kharkana grass cut and collected from the forest as may be

lying in the forest, on the road-side or lying at any other place The Buyer will loose all claim to the Bhabbar/Kharkana grass and DFO will proceed further to realize the government dues by disposing such grass in a manner as deemed fit including recalling tender or through open auction. If there is shortfall in the money to be realized from the Buyer, the same will be realized by forfeiting the security deposit and even then if some dues. remain to be realized, the same will be realized as arrears of land revenue.

23. The Buyer shall not be entitled to transfer the contract to any person without the prior permission of the competent authority.

24. The export of Bhabbar/Kharkana grass by river or land shall be subject to such rules as the Himachal Pradesh Govt. or any other Govt. concerned, as the case may be, may promulgate under section-41 of the Indian forest Act. 1927 and in their absence under such instructions as Divisional Forest Officer Nalagarh may issue from time to time with regard to its removal from the forests, storage in transit and export within the territorial jurisdiction of the Nalagarh Forest Division.

25. No consignment of Bhabbar/Kharkana grass will be allowed to be removed from the forest unless covered by an export permit or rawana to be issued by the forest Officer or his authorized subordinate.

26. The Buyer shall keep an account of the Bhabbar/Kharkana grass extracted to the satisfaction of the Forest Officer. They will submit fortnightly progress report on the prescribed Performa detailing the quantity of Bhabbar/Kharkana grass extracted from time to time.. The forest officer or his authorized subordinates shall have access to Bhabbar extraction operation, purchaser’s depot and the accounts of Bhabbar/Kharkana extracted. The buyer will have no objection and will provide all facilities for a check of forest working or ' depot' stock accounts.

27. That the buyer holds himself responsible for the due observance by himself and his agents and servants the terms and conditions of this sale and shall furnish the forest officer with written statement of the names of all agents or servants whom they propose to employ within the Nalagarh forest Division before they are so employed and the Forest officer shall be at liberty to fore bid the employment of any person whom he may consider undesirable.

28. That the Buyer shall not cause any abstraction or damage to the forest and other roads or fire line or any Govt. or private property during collection or removal of Bhabbar/Kharkana grass.

29. That the taking or kindling of fire in the forest is strictly prohibited. In case of fire breaking out in forest through negligence of any act of commission or commission

of the Buyer, his agents, employees or laborers, the buyer will be held responsible for the damage there to as assessed by the forest Officer.

30. That in the event of fire from whatever cause breaking-out in a forest or forests in which the Buyer is carrying on the operation., the Buyer, his agents, employees or labourers employed on such operation shall at once proceed to the scene of fire and do their best to extinguish/assist in extinguishing it.

31. That nothing in this sale shall be held exempt the Buyer or his agents or servants from the liability to proceeding, civil, criminal or both, for any breach of the terms of this sale or of the laws for the time being in force committed by him or them.

32. That the Bhabbar grass/Kharkana sold to the buyer under this contract shall remain in the forest and Depot at Buyer's risk from the date of approval of bid and seller will not be responsible for any loss or damage which may occur from any cause whatsoever.

33. That Buyer not the seller shall be liable to pay compensation to the labour employed on the works under the workman compensation Act.

34. That in the event of breach of any of the terms and conditions of the agreement by the Buyer or his against or servant for which a special penalty or compensation has not been provided for, the Buyer shall be liable to pay a sum as determined by the forest officer which may extend to Rs. Two Thousand five hundred only (Rs. 2500/-) for each such breach as the case may be.

35. That any court proceedings connected with this sale will be subject to jurisdiction of the court within Himachal Pradesh.

36. That the condition of sale will form the part of agreement deed for this sale.

37. The terms and condition as mentioned above w.r.t. extraction, transportation etc. shall be applicable for Kharkana grass also.

It is stressed that adequate fire protection measures be taken to protect the area against fire as the grasses lose its vitality and vigour if it gets burnt in the fire. It also become difficult to reclaim the area with such grasses and does not come up on their own if seeds of these grasses perish.

CHAPTER XIX

A summarized account of principal prescriptions and suggestions mentioned in this working plan is given as under:-

Table – 19.1

S. No.	Headings	Prescription/ suggestion	Paragraph	Page
	2 CHIL WORKING CIRCLE	ONE		
1	Felling Series	Felling series	2.4	103
2	Silvicultural system	Punjab Irregular Shelterwood System	2.7	109
3	Rotation and conversion period	120 years	2.9	109
4	Regeneration period.	30 years	2.10	110
5	Periodic Blocks (P.Bs.)	Three P.Bs.: PB-1, PB-IV and PB-III & PB-II has been grouped as PB Inter.	2.12	110
6	Yield calculation.	By Volume.	2.13	111
7	Annual Yield: Nalagarh Felling Series:	1500 cum.	2.14.5	114
8	Control of yield:		2.15	114
9	Sequence of felling:	Sequence laid down.	2.16	115
	Nalagarh Felling series:			
10.	Method of executing felling in PB-1.	General principles.	2.17.1	116
11	Method of executing felling in PB-IV	General principles.	2.17.2	117
12	Method of executing felling in PB Inter.	No felling in PB Inter; only dead, dry, dry or wind fallen trees shall be removed.	2.17.3	118
13	Subsidiary Silvicultural Operations:		2.18	118
	a. Disposal of felling debris.	Clean bed recommended as per Technical order No. 6 of Punjab Forest Manual, Vol. III.	2.20.1	119

S. No.	Headings	Prescription/ suggestion	Paragraph	Page
	b. Shrub cutting	-	2.20.2	120
	c. Cleaning	Spacing and timing of cleaning suggested.	2.20.3	120
	e. sowing and planting	Artificial regeneration has been suggested for areas where natural regeneration is a problem.	2.20.4	120
14.	Other regulations:	-	2.21	120
	a. Closures:	All PB-I areas to be closed.	2.21.1	121
	b. Grazing and grass cutting.	No grass cutting till the seedling attain more than 50cm height.	2.21.2	121
	c. Fire Protection.	Control burning, cutting of fire lines and employing fire watchers during fire season.	2.22	121
	d. Resin tapping.	Rill method of resin tapping suggested.	2.23	123
	3. BAMBOO WORKING CIRCLE			
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2	Silvicultural System.	Selection system with thinning. Each clump will be unit of working.	3.8	132
3	Felling Cycle.	Three years felling cycle.	3.9	132
4	Calculation of yield.	By area.	3.10	132
5	Sequence of felling	Sequence of felling laid down.	3.11	133
6	Method of executing felling.	Felling rules for bamboo has been prescribed.	3.12	135
7	Subsidiary Silvicultural Operations:		3.13	135
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	c. Method of planting.	Planting technique described.	3.13.3	139

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APPENDIX

DIVISIONAL FOREST OFFICERS, NALAGARH.			
S. NO.	**NAME**	**FROM**	**TO**
	S/SHRI		
1	HUKAM CHAND TEJ, IFS	2/5/1984	1/7/1987
2	HARDIP SINGH KINGRA, IFS	1/7/1987	25/7/1989
3	JASJIT SINGH WALIA, IFS	25/7/1989	7/5/1993
4	MAGAN BIHARI SHRIVASTAVA, HPFS	7/5/1993	16/2/1994
5	DARSHANA RAM CHAUDHARY, HPFS	16/2/1994	6/7/1994
6	HARDIP SINGH KINGRA, IFS	6/7/1994	17/1/1996
7	P.K. SINHA, IFS	30/1/1996	30/3/1998
8	M. M. KHUSHDIL, HPFS	31/3/1998	10/7/1998
9	AJAY SHRIVASTAVA, IFS	11/7/1998	23/3/2001
10	TEJINDER SINGH, IFS	23/3/2001	15/11/2001
11	SUSHIL KUMAR, IFS	16/11/2001	11/11/2005
12	R.L. THAKUR, HPFS	11/11/2005	25/6/2006
13	R.S. KANWAR, HPFS	19/7/2006	23/7/2007
14	ANIL JOSHI, IFS	24/7/2007	21/12/2009
15	S.K. GUPTA, IFS	21/12/2009	30/5/2011
16	R.S. JASWAL, HPFS	30/5/2011	

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Addl. PCCF WP & S
Mandi, H.P.
Addl. Pr. C C F (WP&S)
H.P. at Mandi
(Dr. Tejinder Singh) IFS

Deputy Commissioner
Solan
Deputy Commissioner,
Solan District,
Solan (H.P.)
(Madan Chauhan) IAS

Divisional Commissioner
Shimla
Divisional Commissioner,
Shimla Division, Shimla-2

Pr.C.C.F. H.P. Shimla
(R.K. Gupta) IFS (HOFF)