REVISED WORKING PLAN

KUNIHAR FOREST DIVISION

(2012-2013 TO 2026-2027)

(VOLUME-I)

BY

P.R. MAHAJAN, HPFS

DFO-cum- WPO Kunihar

Himachal Pradesh Forest Department

HIMACHAL PRADESH GOVERNMENT
FOREST DEPARTMENT

REVISED WORKING PLAN

FOR THE FORESTS OF

KUNIHAR FOREST DIVISION

VOLUME-I

PART-I & II

(2012-13 TO 2026-27)

By

P.R. MAHAJAN, HPFS

Divisional Forest Officer
Cum WPO Kunihar

ACKNOWLEDGEMENT

The preparation of the revised working plan for Kunihar Forest Division has been challenge and learning experience for the undersigned. I had been successful in preparation of this document as DFO cum WPO in today's scenario where territorial division has already preloaded priorities. It has been a great team effort and was impossible to be accomplished singe handily. Efforts have been made to add maximum available information which otherwise would have remained in the office files.

Special thanks are due to the PCCF, H.P., Shri R.K. Gupta and CCF (Working Plan) Shri Tejinder Singh, for their constant guidance, encouragement and help during preparation of this working plan.

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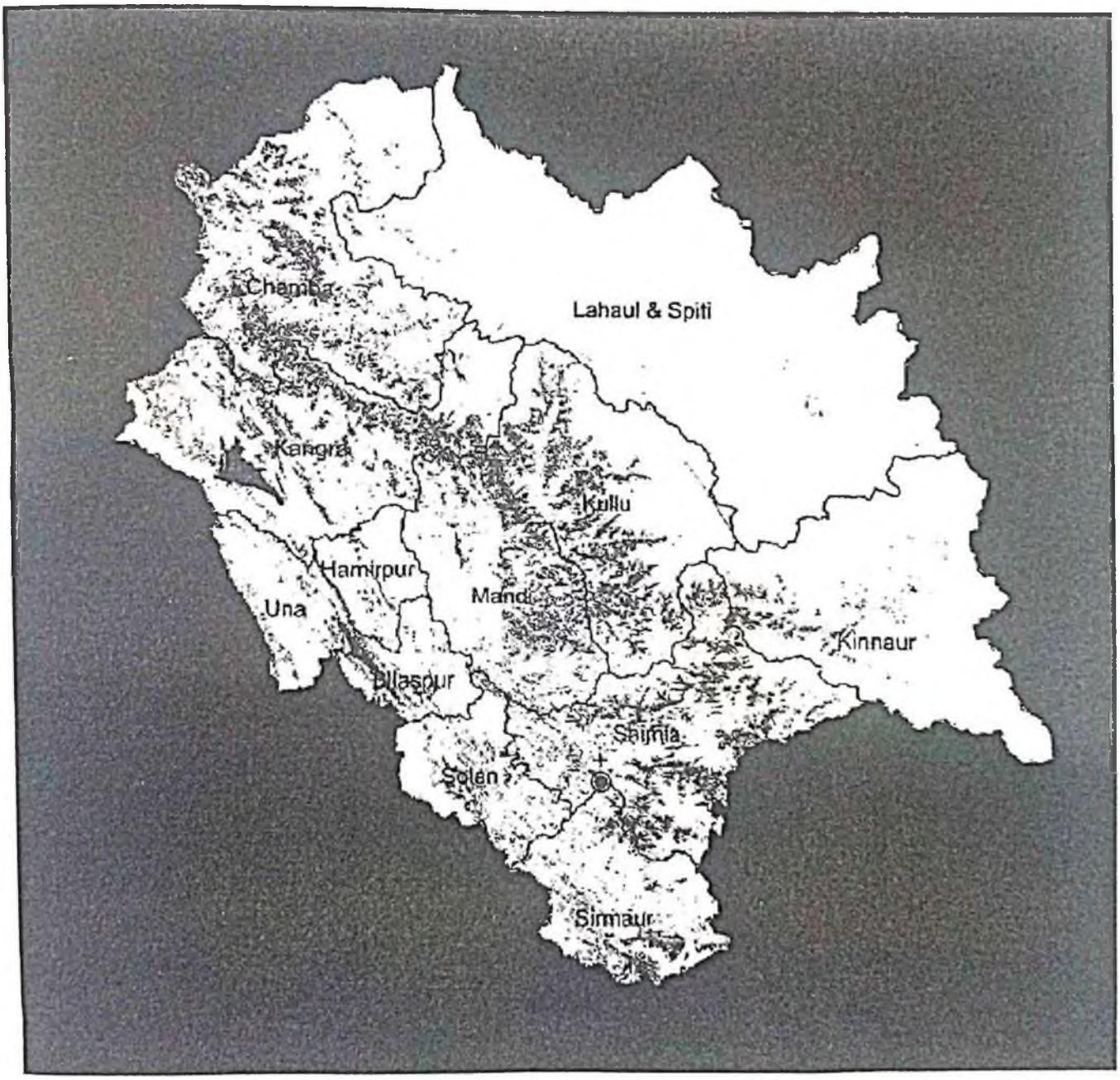
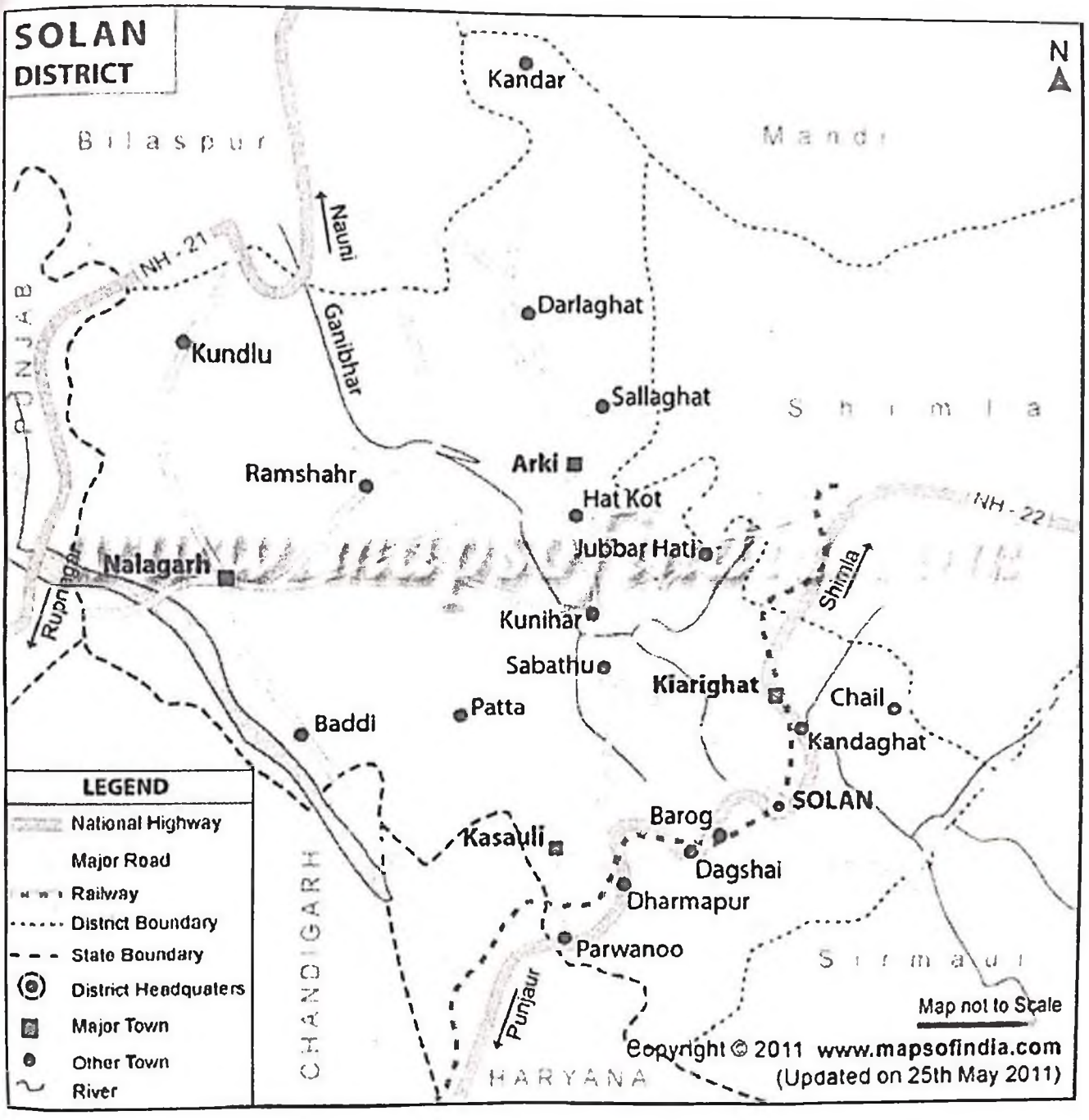
I would like to acknowledge the valuable contribution made by all the field staff of Kunihar forest division who completed this challenge despite of many day to day busy schedules in their territorial jurisdiction.

(P.R. Mahajan, HPFS)
Divisional Forest Officer, Kunihar

Map of Himachal Pradesh

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Sirmaur
Punjaur
CHANDIGARH
HARYANA
Map not to Scale
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LEGEND
National Highway
Major Road
Railway
District Boundary
State Boundary
District Headquaters
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River

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GLOSSARY OF BOTANICAL TERMS

A – TREES

S No	Local Name	Botanical Name
1	Aam	*Mangifera indica*
2	Akhrot	*Juglans regia*
3	Amaltas	*Cassia fistula*
4	Amla	*Emblica officinalis*
5	Badah	*Salix alba*
6	Bahera	*Terminalia belerica*
7	Baloje	*Sapium insigne*
8	Ban	*Quercus incana*
9	Bans	*Dendrocalamus strictus*
10	Bar	*Ficus bengalensis*
11	Bel	*Aegle marmelos*
12	Barnasi	*Limonia acidissima*
13	Biuhl	*Grewia oppositifolia*
14	Chamror	*Ehretia laevis*
15	Chhal	*Anogeissus latifolia*
16	Chil	*Pinus roxburghii*
17	Chilla	*Casearia tomentosa*
18	Darek	*Melia azadirachta*
19	Daru	*Punica granatum*
20	Dauri	*Toona serrata*
21	Deodar	*Cedrus deodara*
22	Dhak	*Butea monosperma*
23	Dhaul	*Erythrina suberosa*
24	Dhauri	*Logerstromia parviflora*
25	Fegra,Dhur	*Ficus palmate*
26	Gamhar	*Trewia nudiflora*
27	Harar	*Terminalia chebula*
28	Jacaranda	*Jacaranda mimosaefolia*
29	Jamun	*Syzygium cumini*
30	Jharinu	*Olea glandulifera*

31	Jhingan	*Lannea grandis*
32	Kachnar	*Bauhinia variegate*
33	Kahu	*Olea cuspidate*
34	Kail	*Pinus wallichiana*
35	Kaimb	*Mitragyna parviflora*
36	Kakkar	*Pistacea integerrima*
37	Kala siris	*Albizzia odoratissima*
38	Kamela	*Mallotus philippinensis*
39	Kaner	*Neriun indicum*
40	Kangu	*Flacourtia indica*
41	Karal	*Bauhinia recemosa*
42	Kath ber	*Zizyphus mauritiana*
43	Kainth	*Pyrus pashia,*
44	Khair	*Acacia catechu*
45	Khajoor	*Phoenix sylvestris*
46	Khaksa	*Cornus macrophyla*
47	Khirk	*Celtis australis*
48	Kusum	*Schleichera oleosa*
49	Lasura	*Cordia dichotoma*
50	Major phalli	*Holarrhena antidysenterica*
51	Neem	*Azadirachta indica*
52	Paja	*Prunus padam*
53	Palang	*Acer oblongum*
54	Pandayan	*Ehretia serrata*
55	Phaldu	*Mitragyna parviflora*
56	Pipal	*Ficus religiosa*
57	Popular	*Populus ciliate*
58	Pula	*Kydia calycina*
59	Ritha	*Sapindus mukorossi*
60	Robinia	*Robinia pseudoacacia*
61	Safed siris	*Albizzia lebbek*
62	Safeda	*Eucalyptus spps.*
63	Sain	*Terminalia tomentosa*
64	Sandan	*Ougenia oojeinensis*

65	Saru	*Cupresus torulosa*
66	Sanjana	*Moringa oleiofera*
67	Semal	*Bombax ceiba*
68	Shahtoot	*Morus alba*
69	Shama	*Milletia auriculata*
70	Shisham	*Dalbergia sissoo*
71	Tittri	*Rhus punjabensis*
72	Toon	*Cedrela toona*
73	Trimal	*Zanthoxylum alatum*

B – SHRUBS AND HERBS

S No	Local Name	Botanical Name
1	Aak	*Calotropis procera*
2	Alai	*Caesalpinia decapetala*
3	Arand	*Ricinus communis*
4	Heer	*Rubus ellipticus*
5	Bhang	*Cannabis sativa*
6	Ban nimbu	*Glycosmis pentaphylla*
7	Ban gulab	*Rosa moschata*
8	Ban chameli	*Jasminum humile*
9	Ban tambaku, Bhut kataia	*Solanum indicum*
10	Bans	*Dendrocalamus strictus*
11	Bana	*Vitex nigandu*
12	Banwan	*Myrsine Africana*
13	Basmol	*Viburnum coriaceum*
14	Basuti, Arusa	*Adhatoda vasica*
15	Bathu	*Chenopodium album*
16	Bekhal	*Prinsepia utilis*
17	Beri	*Zizyphus jujuba*
18	Bhang	*Cannabis sativa*
19	Binda	*Colebrookia oppositifolia*
20	Bichhu buti	*Gerardiana heterophylla*
21	Bichhu buti	*Urtica dioca*

22	Charmar	*Artemisia vulgaris*
23	Chilla	*Casearia tomentosa*
24	Dhak,Kari	*Clerodendron phlomidis*
25	Dhatura	*Datura stramonium*
26	Dhau	*Woodfordia fruticosa*
27	Duranta	*Duranta plumieri*
28	Gandhela	*Murraya koenigii*
29	Harshingar	*Nyctanthes arbortristis*
30	Kali kathi	*Indigofera hirsuta*
31	Jamalghota	*Jatropha curcus*
32	Jangali Palak	*Rumex nepalensis*
33	Kanta bans	*Bambusa arundinacea*
34	Karaunda	*Carissa spinarum*
35	Kashmal	*Berberis lyceum*
36	Kathi	*Indigofera pulchella*
37	Keor	*Holarrhena antidysenterica*
38	Kingora	*Berberis asiatica*
39	Lantana, Phulnu	*Lantana camara*
40	Magar Bans	*Dendrocalamus hamiltonii*
41	Makhiar	*Salvia glutinosa*
42	Mithiari	*Hedera helix*
43	Mehndar	*Dodonaea viscose*
44	Nachhar	*Coriaria nepalensis,*
45	Nagphani	*Opuntia dillenii*
46	Nar,Piuli	*Arundinaria falcata*
47	Nil, Kali kathi	*Indigofera pulchella*
48	Nila Phulanu	*Ageratum conyzoides*
49	Panibel	*Vitis parviflora*
50	Panwar	*Cassia tora*
51	Phul Lakri	*Lantana camara*
52	Ram Ban	*Agave americana*
53	Ruinsh	*Cotoneaster bacillaris*
54	Safed kathi	*Desmodium tiliaefolium*

55	Sataron,Sansarmul	*Asparagus racemosus*
56	Saun	*Crotalaria albida*
57	Siharu	*Debregeasia hypoleuca*
58	Thor	*Euphorbia royleana*
59	Trimal	*Zanthoxylum alatum*
60	White Jasmine	*Jasminum offcinale*

C – GRASSES

S No	Local Name	Botanical Name
1	Bans	*Dendrocalamus strictus*
2	Bhabhar	*Eulaliopsis binata*
3	Dhaulu	*Chrysopogon fulvus*
4	Dhaulu	*Chrysopogon montanus*
5	Dub	*Cynodon dactylon*
6	Kans	*Sachharum spontneum*
7	Lamb	*Heteropogon contortus*
8	Makora	*Cymbopogon martini*
9	Magar bans	*Dendrocalamus hamiltonii*
		Dichanthium annulatum
		Themeda anathera.
10	Munj	*Saccharum munja*

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.
Bawri	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	Laborer.
Charand	Grazing land.
Chhang	Lopping.
Chhatan	Thinning.
Dhar	A Ridge.
Devta	A local deity.
Dochi or dogri	Temporary field residence.
Darat	Sickle used for lopping purpose.
Dehat	Village.
Dhulan	Manual carriage.
Dhulanee	Labor 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	Labor 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 labor	Labor 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 Mahfouz	Reserved forest.
Jughti	Torch wood.
Jungle	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 tannin 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	Laborer.
Mohal	Revenue estate.

Muawza	Compensation.
Manu	Current years shoot of bamboo.
Nalla	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 included all 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.

KUNIHAR FOREST DIVISION

STATISTICS AT A GLANCE

1.	Total geographical area of the Division	546.572 Km^2	
2.	Division is bound between		
	a) Longitudes	70°40'35"	76°55'10"
	b) Latitudes	30°53'15"	31°14'25"
3.	Land Use Classification		
	Forest area	178.62	
4.	Per capita Forest area of div.		
5.	Categorywise area of Forest Demarcated Protected Forest Un-Demarcated Forest	 6042.20 11820.40	 17862.60 ha.
6.	Area By Working Circle i) Chil working circle ii) Bamboo Working circle iii) Soil cum Biodiversity conservation Working circle	 3565.0 1434.0 12663.6	 17862.60 ha.
7.	Total Volume (M3) of growing stock specieswise Chil Misc. B/L	 192091.52 82525.41	
8	Yield Prescription Chil WC	 1050 PB-I 920 PB-IV 980 - Inter	

CHAPTER – I

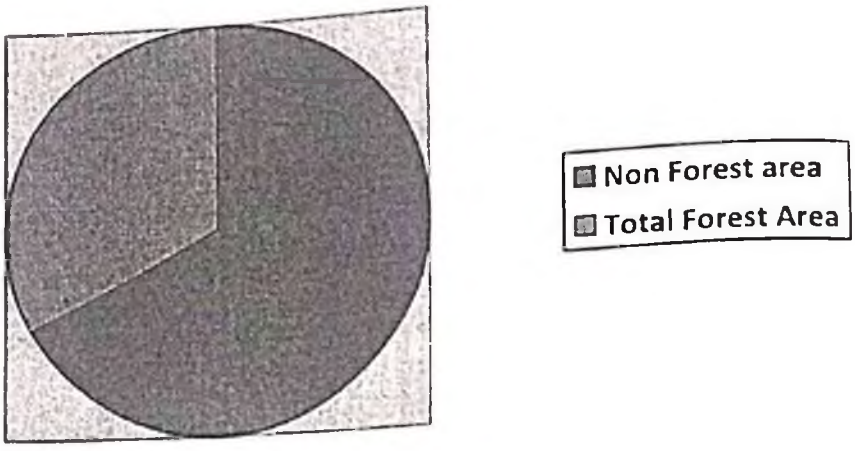
THE TREACT DEALT WITH

1.1 Name and Situation:-

This Working Plan covers the forests of Kunihar Forest Division. It is a revision of Revised Working Plan of Kunihar Forest Division (1991-92 to 2005-06) by Shri V K Singh. In 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. Reorganization took place again in April 1993 when Kunihar Social Forestry Division was abolished and status quo of erstwhile Kunihar and Nalagarh divisions was maintained. During the Sh D D Shagotra Working Plan period, there were many changes in the areas and boundaries of old Kunihar Forest Division, because of transfer of the areas of Dhami Rang to Shimla Forest Division; creating of Wild Life Range, Piplughat under the jurisdiction of Wild Life Division, Shimla; and transfer of three forests of Kunihar Rang to Solan Forest Division. This working plan deals with current Kunihar Forest Division.

1.1.1 Kunihar Forest Division extends over whole of the Arki Sub-Division (former Baghal, Mangal and Kunihar States); and parts of Kasuali Tehsil (former Kunihar, Mahlog and Baja States) of Solan District. The Division is situated between 76°40′35″ to 76°55′10″ East longitude and 30°53′15″ to 31°14′25″ North latitude.

1.1.2 The geographical area and forest area of Kunihar Forest Division is 546.572sq. Kms and 178.627sq. Kms respectively. The percentage of forest area is 32.6% in Kunihar Forest Division. The forests do not form a continuous and compact belt but are scattered throughout the division occupying mostly steep hillsides generally not fit for cultivation.



Area Statement

1.1.3 The Division is divided into Four Ranges, Kunihar, Kuthar, Arki and Darlaghat. The headquarters of the Division is located at Kunihar which lies on the Solan-Bilaspur state highway. All weather roads connect this with Shimla, Bilaspur, Solan and Chandigarh.

1.1.4 Kunihar Forest Division is bounded on the North by Bilaspur and Suket Forest Divisions, on the east by Solan Forest Division, on the South by Panchkulla District of Haryana State and on the West Nalagarh Forest Division

1.2 Configuration of Ground:-

The altitude of the tract varies from 300 meters to 2100 meters above mean sea level. However, major portions are below 1500 meters. Slopes vary from gentle to sleep. At lower elevation the terrain is flat to undulating whereas it is sleep to precipitous in the catchments of Ghamber Khad along the Sutlej river.

The general direction of main hill range is North West to South East whereas many side spurs run in all directions.

1.3 Geology, Rock and Soil:-

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

Formations	Age
Terraces Alluvium	Quaternary
Sabathu	Middle Eocene to Upper Oligocene
Karol	Triassic
Infra Karol	Permian
Blaini	Upper Carboniferous
Shimla slates	Lower Paleozoic
Shali and Jutog	Precambrian.

1.3.1.1 Terraces and Alluvial deposits:-

These are encountered in Doon portion in the south in Kunihar region and on a limited scale all over the tract as flood –plain terraces. The alluvial deposits in Kunihar actually starts somewhere in the north of Arki town and occur in the lesser Himalayan zone.

1.3.1.2 Subathu Formation:-

Rocks of this information are exposed in the neighborhood of Sabathu and the area toward North East of it as linear outcrops, trending NW-SSE. It consist of olive green splintery sales with gray inter bands of limestone. The main crop on this formation consists of Chil.

1.3.1.3 Karol Formation:-

This formation consists of sandstones, lime stones and shale's. Soft slicken sided and crumpled, red and green shales are found above Baren on the Karol hills .Soft white sandstone and shale occur in nallas on the road from Chandi to Badhalag. Chil is the main vegetation on this formation.

1.3.1.4 Infra Karol Formation:-

This formation presents in a small part of the area SE of Delgi. It comprises grayish black carbonaceous shale and siltstone. The Infra Karol has been intricately faulted and shows great variation in the grade variation in the grade of metamorphism. Admixture of Chil and a few broad leaved species occur in these formation.

1.3.1.5 Blaini Formation:-

This formation is one of the most important formations of the Shimla Himalayas because of its significance in fixing the age of the other formations below and above it. This formation was deposited during upper carboniferous period when there was wide spread glaciations in this part of the globe. Glacial boulder beds, shale and lime stone constitute the different litho units of this formation.

1.3.1.6 Shimla Group of rocks:-

The Shimla slates occur around Domehar, Shangi, Padher and Kamlog. The Shimla slates are dark colored, with gray blue tints and are made up to miceous shales, slates, occasional phyllite sandstone with predominant graywakes. A number of limestone bands occur in the lower horizons of the Shimla slates series. These are called Kakkarhatti limes stones and are blue and pink in color. Another band of massive limestone occurs on the ridge at Arki while yet another formations of this group, found in the divisions, are:

(a) *Kunihar Formation:-*

This formation is developed near Subathu through Kakkarhatti and Kunihar up to Bamol. It consists of shale and siltstone with alternating bands of limestone. It is characterized by general lack of carbonaceous beds and by the occurrence of lime stone inter beds with shale and silt stones ripple arks. Some lime stone bands show algal structures showing shallow water, near shore condition of deposition.

(b) Chhaosa Formation :-

This formation is well exposed between Danoghat and Thalog. Its development can also be seen from near Sabathu. The Chhaosa Formation is characterized by a thick rhythmic sequence of well-bedded shale, silt stone and greywacke. The shale's are grey olive green and purple in color. Bands of quartzite are also present.

1.3.1.7 Jutog Formation:-

This formation consist soft rocks rest on younger formation of the Shimla Group. The Jutog formation comprises of highly metamorphosed sediments. The original marine sediments have now been altered into compact quartzite schist and gneisses. Black carbonaceous schist constitute a significant part of this formation. Instructions of granite are present in the extension of these rocks toward the east.

1.3.1.8 Shali Formation:-

These occur as a narrow NNW-SSE trending belt bounded on both the western and eastern sides by faults. This formation consists mainly of calcareous rocks, lime stones and dolomite with a minor amount of quartzite, shale and siltstone.

1.3.2 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.

1.4 Climate:

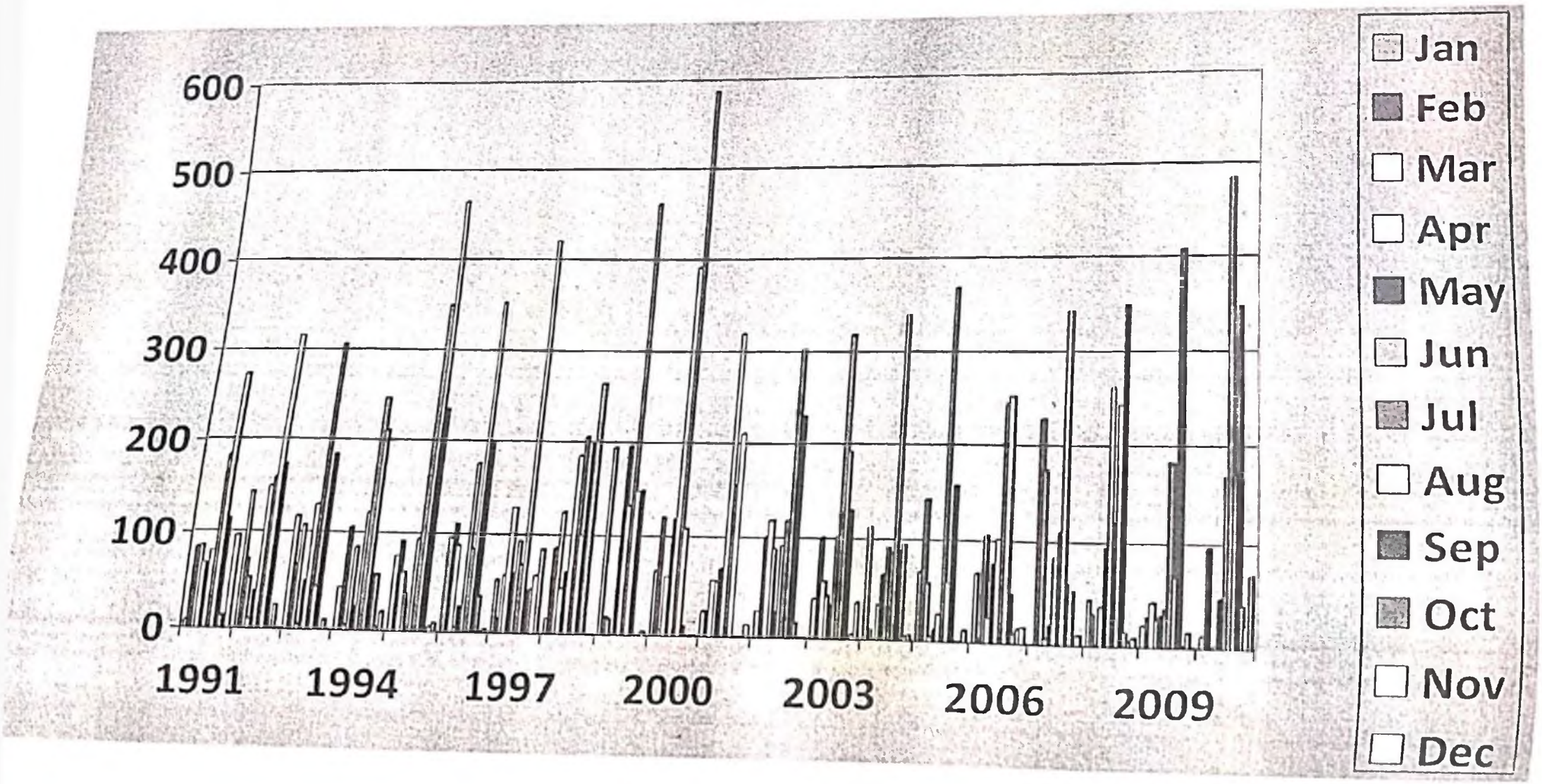
The climate is mainly subtropical in the lower reaches and temperate in the upper reaches. Winter, summer, rain and autumn season are well marked. Average rainfalls and temperature data has been collected from Dr. Y S Parmar University of Horticulture and Forestry Nauni,which is shown in **table 1.1 to 1.4** as under?

Table-1.1

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

Source: Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan, HP

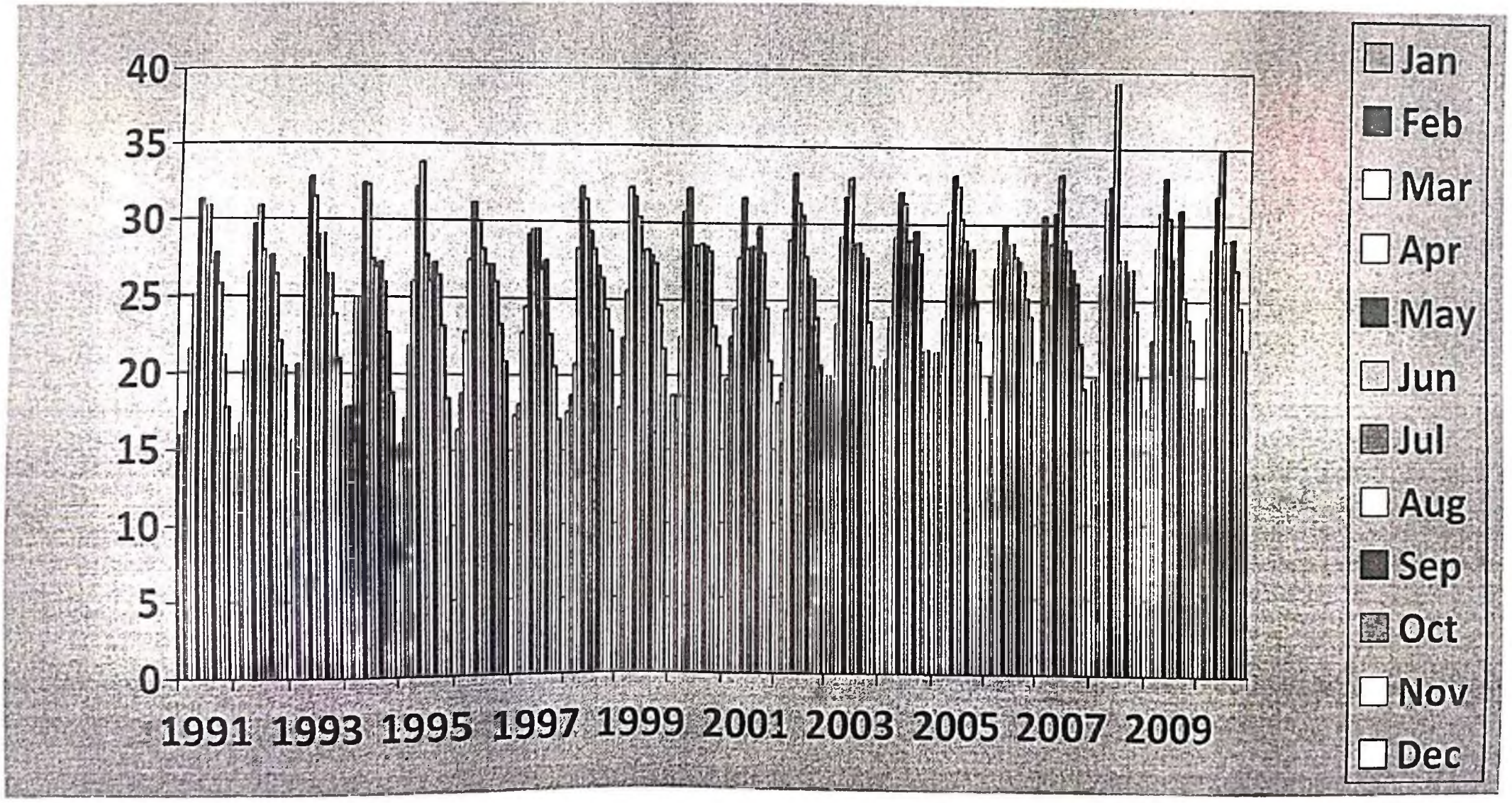


Average Rain Fall

Table 1.2

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



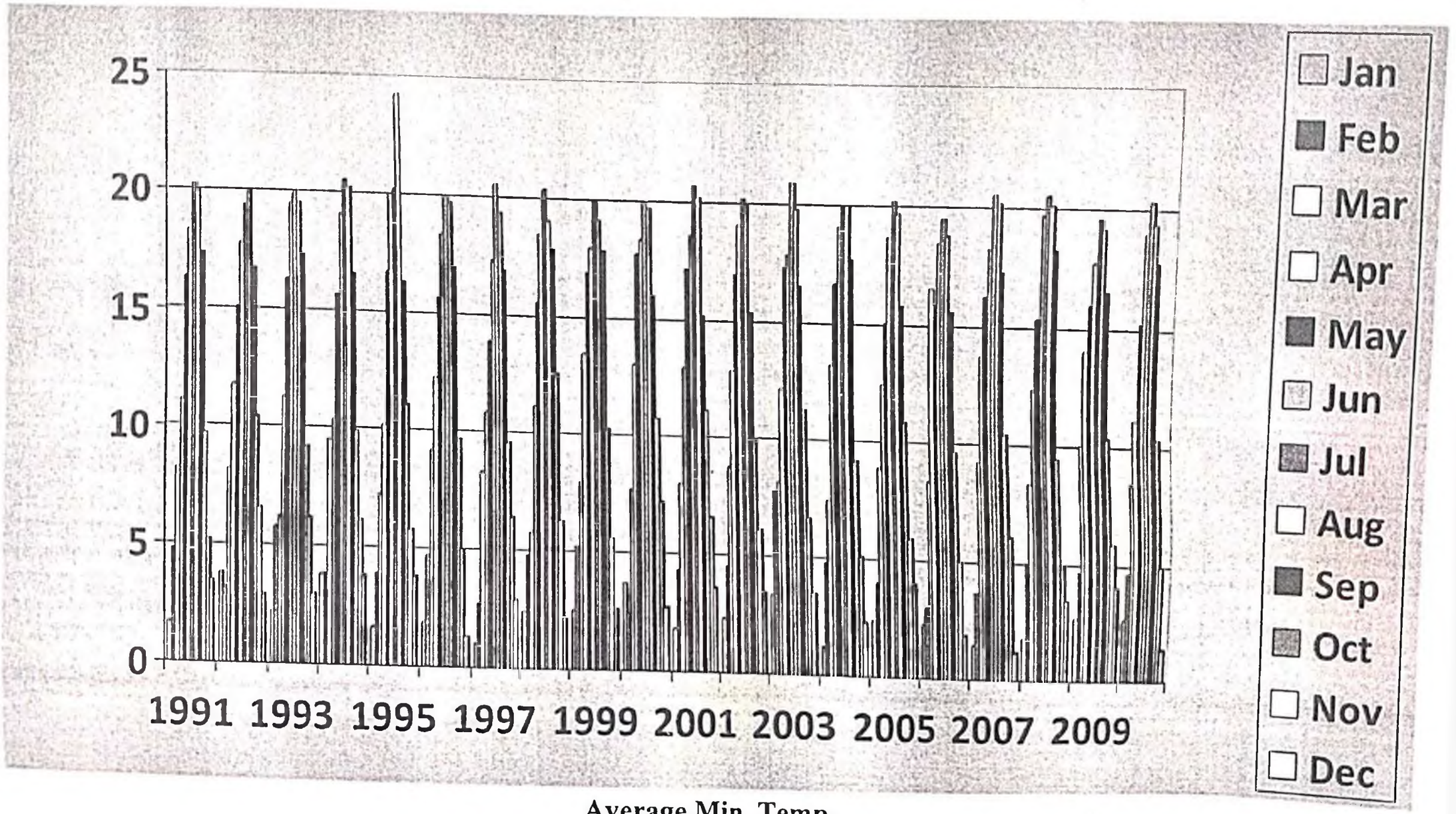
Average Max Temp

Table 1.3

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	19.1	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

Source: Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan, HP

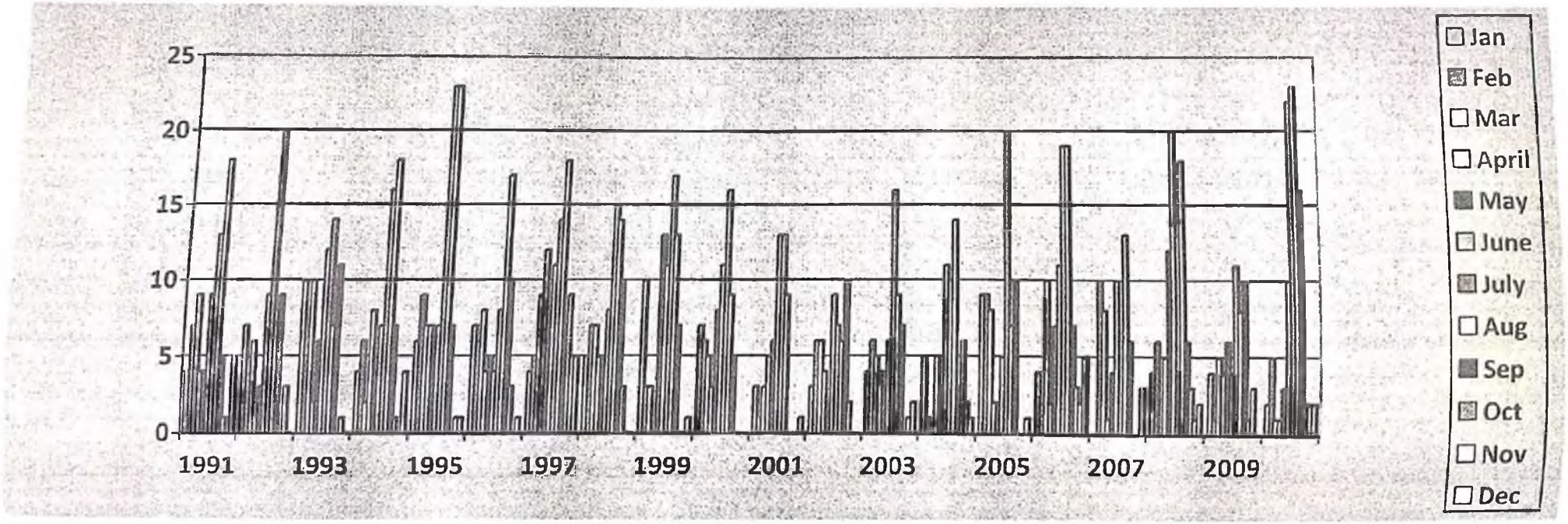


Average Min. Temp.

Table 1.4
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

Source: Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan, HP



Average Rainy Days

The tables and figures above shows droughts are frequent in the months of April, October, November and December. 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.

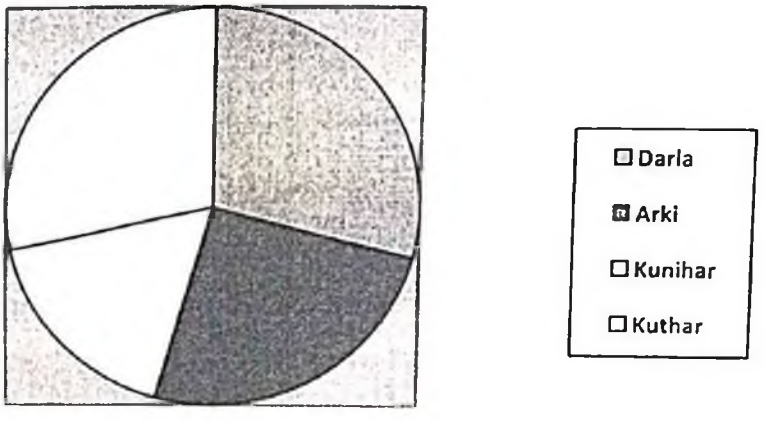
1.5 Water Supply:- Kuni Khads , Cheol khad, Jol Khad, Kuthar naddi and Ghambrola Khud are the main feeding drainage lines to Gambhar Khad whereas Tredha and Bhalag nallah in Kandhar and Ali Khad in Dhundan area drain into Sutlej river . All of these are perennial. The volume of the flow and its duration depends upon intensity of the rain.

1.6 Distribution of area:-

1.6.1 Kunihar Forest Division comprises of four ranges namely Darla, Arki, Kunihar & Kuthar having Demarcated Protected Forests and Un-demarcated Protected Forests. The forest areas generally scattered and do not form continuous belt. The range-wise distribution of area is as under:-

Table 1.5

Darla	1836.00	3325.20	5161.20
Arki	2257.80	2307.20	4565.00
Kunihar	1097.90	1993.60	3091.50
Kuthar	850.80	4194.40	5045.20
G. Total	**6042.50**	**11820.40**	**17862.90**



Forest Area of Ranges

1.6.2 Change of Land Use in the Tract Due to Extensive Industrialization and its Impact:

1. Land use pattern has undergone a big change in Barotiwala area due to extensive industrialization.

a) Large scale 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 there Jhuggi wherever vacant space is available. For fuel, labour depends on 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 also.

2) In Barotiwala areas the demand for LPG has increased many fold.

3) As per information received from PCB, there are 2087 industries established in BBN (Barotiwala Included in this) area in small, LM and Medium sector. The main Sector is 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) In Darla range two cement plants have come up at Darlaghat and Bagga.

5) 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.

6) Agriculture itself has undergone a change, with many farmers shifting from raising wheat and Maize to raising off season vegetables, raising of orchards and construction of poly houses for off-season vegetables and floriculture in big way.

1.6.3 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 are threatened.

The FCA diversion cases for the Division are tabulated below:

Table 1.6

SNo	Name of Project	Date of final approval	Area in Ha.	No of trees as per Proposal	
				Trees	Saplings
1.	2	3	4	5	6
2.	Mining Lease GACL Darla	30.10.02	19.38	585	1995
3.	Kasuli Goan- Gunai Road.	24.01.03	0.726	28	0
4.	Chandi Gain Road	24.01.03	1.437	62	0
5.	Rampur-Bhat-Ki-Hatti Road	05.04.05	0.438	11	0
6.	Dhanu Ghat Ser Galotia Road	23.03.05	1.33	23	0
7.	Kandhar -Beral Road	14.06.05	3.85	827	0
8.	Hindustan Petrolium Darla(Road)	16.03.05	0.12	0	0
9.	Patta-Joharji-Sua Road.	23.11.05	2.28	233	0
10	OLBC-GACL Darlaghat	14.11.05	0.956	0	0
11	Alternate Road GACL Darla	12.05.05	4.06	135	72
12	Jabbal-Maan-Biwassi Road	02.06.06	1.15	133	0
13	Bhud-Gularwala Batoli Kalan Ghred Ratta Road.	30.06.06	5.28	196	0
14	For Mining Plant JHCP Bagga	19.05.06	104.685	5874	1116

15	For Mining Lease JHCP Bagga	02.06.06	239.51	0	0
16	Gagal-Kashyalu Road	24.08.06	0.84	56	0
17	C/o Road by Kundlas Loh-Udyog Buranwala	24.10.06	0.019	0	0
18	Widning of ShalluGhat Temple to Bagga Road	23.08.06	2.2651	163	0
19	Rehabilitation Coloney for Resettlement of Kol Dam Ousties	19.09.08	4.36	355	1745
20	Ravan -Ki-Johari -Dhakariyana-sua Road	10.08.07	2.56	485	15
21	Transmission Line from Ko Dam to Redu by Power Grid Corporation	22.04.08	1.058	40	38
22	M/s Sharma Stone Crusher Bhumati	28.08.07	0.33	0	0
23	220 KV Transmission Line Kangu to Rauri	6.10.09	1.26	54	58
24	Chheod Khad to Jaghoon Road	15.02.10	3.95	83	0
25	Ghagar to Manju School Road	16.03.10	1.967	254	0
26	132 KV Transmission Line Kharsi to Bagga	23.10.09	1.3716	68	0
27	C/o School Building at Kot beja by Education Deptt.	16.03.10	0.668	0	0
28	For Mining of lime stone at Arki(Approval in Principle)	15.12.11	84.36	986	1535
29	For Stone Crusher(Already Running) at Sainsiwala	21.4.11	0.2819	0	0
30	For CHC Building at Darlaghat (Approval in Principle)	19.8.11	0.38	0	0
	Total		**494.8726**	**10656**	**6580**

Government Waste Land: The Government Waste Lands (ex Shamlat) are out of the scope of this working plan.

1.7 State of Boundaries:

The Demarcated Protected Forests stand properly demarcated and mapped. The Un-demarcated Protected Forest are only roughly

demarcated and mapped. The condition of boundary pillars here also is not very satisfactory and these require proper and regular maintenance.

1.8 Maps:

Maps on the scale of 1:15000 are available for entire area covered under this division. Maps on 1:50000 are also available in this division. The area of Kunihar Forest Division has been covered in the following survey sheets:

Table 1.7

53 E/13 NE
53 E/15 SE
53 E/16 SE
53 E/16 NE

1.9 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 notifications which are reproduced in Appendix.

1. *Notification No.Ft.29-241-BC/49 dated 25.2.52* making 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-E/49-3 dated 25.2.52* prohibiting the breaking up of land for cultivation, for building, for herding cattle for any purpose.

4. *Notification No Ft.43-241-A/49-4 dated 25.2.52* framing rules under section 32 of the Indian forest Act, to regulate various matters in Protected Forests in the old Dhami, Mangal, Baghal Kuthar, Mahlog and Beja states now compressive Solan Forest Division.

5. *Notification No Ft.43-241-A/49-4 dated 18.6.60,* giving Schedule I of the Notification No Ft.43-241-A/49-4 dated 25.2.52.

Special forest settlements were carried out only in respect of Baghal (1907-08) State. In the respect of other areas the provisions of *wajub-ul-arj* as per land revenue settlement are being followed.

1.10 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.

1.10.1 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.

1.10.2 Timber for Construction and repair of house:

Timber Distribution (T.D.) is a unique policy in the colonial history of forest management. It is a policy that provides every landowner with the right to harvest timber for the construction and repair of their houses. This policy while providing for a basic need of the local population is also the single largest reason for timber harvest in the western Himalayan region. It results in the harvest of 100,000 cubic meters of prime timber till recently. Hon'ble High Court while disposing a PIL directed the State Govt. to rationalize the process, as rates for T.D.

were fixed at 20% of the market rates at the time of the initial forest settlements, for all species that had a market value at that time. Thus practically while the market rates had increased over 15,000 to even 88,000 times (in case of Fir), state used to charge the original rates till 2005. Since the timer was available at such dead cheap rates, most of it was also misused and was sold further at commercial rates.

The state has recently notified **H.P. Forest (Timber Distribution to Right Holders) Rules, 2010** for the rationalization of grant of timber. The Facts and Figures thereof are given below:

(i) Introduction These rules cover the Timber Distribution (T.D.) Rights for construction and maintenance of residential house, cowshed that too for bonafide domestic use without affecting the other rights contained in the Forest Settlements in operation. Some doubts and misconceptions are uncalled for and are clarified as under.

- Forest centered based on the principle that if the forests will remain there only people will be able to exercise rights namely of Timber distribution (TD). Further these rights are people centered, more so rural poor centered.

- The rights recorded in settlement other than Timber distribution (TD) like free grant for last rites of the dead, collection of medicinal herbs, grazing etc. have not been touched upon and would remain to be exercised as they were in the past.

- To have transparency involvement of people in Timber Distribution through their Gram Sabha has been ensured.

(ii) Rationalization Process:

Hon'ble High Court before deliberating and deciding the issue under consideration of PIL with them directed the State Govt. to rationalize the timber distribution process which took into account the following aspects

- As the TD is concerned with Land holding in rural areas that too for construction of house/cowshed for domestic purpose the TD in Urban areas has been done away with.

- If the Right Holders have land holding at more than one place then TD will be granted at only one place of the choice of land holder.

- TD will only be enjoyed by original Right Holder and not by those who have purchased land after taking permission under Section 118 of the HP Tenancy and Land Reforms Act, 1972 from now onwards.

- The ratio of TD rates of Chil, Deodar and Kail at the time of Forest Settlement when their rates of TD were initially fixed was 1:5 to 1:8, which has now gone to 1:8,8700 in case of Deodar, 1:30,000 in Kail, and 1:15,000 in Chil, thus requiring rationalization, which has been affected after about more than 100 years.

- The people would be given converted timber near to their place of residence at rate of 30% and 10% of average commercial rates at which timber is sold by HP Forest Development Corporation.

(iii) Legal position:

The various settlement reports mention that '*if the exercise of rights as admitted in any forest, would endanger the existence of forest, the extent to which the rights will be exercisable can be re-determined and should the exercise of rights become detrimental to the exercise of the forests over which these are exercised, the extent to which the rights will be exercisable can be re-determined.*

Yet this option has seldom been exercised in the past for conservation of forests. H.P. Forest Settlement Rules, 1965 have been framed under Section 76 of IFA, 1927. The guiding principle laid down for determining the rights and concessions under these rules are as under:

"*All these rights and concessions are meant for the satisfaction of personal bonafide requirements and subject to condition that forests are to be maintained in perpetuity. The right of user of easement is always a limited one; it can never extend so as to destroy the servient estate. The right exists so long as the (servient) property is safe or continues to exist, because if the (servient) estate cases to exist, the right ceases with it. So while dealing with the claims, the Forest Settlement Officer should see that the forests are not unduly burdened.*

Keeping into consideration the powers delegated to the state Govt. under Section 32 of IFA, 1927, based on the guiding principles under HP Forest (Settlement) Rules, 1965 and the orders passed by Hon'ble HP High Court the HP Forest (Timber Distribution of Right Holders)Rules, 2010 have been formulated and notified.

These rules in brief contain the following:

(iv) Quantity:-

(1) Timber Distribution shall be granted in converted form from the depots to be specified separately as per scale fixed below:-

For construction of new house = 3 cubic meters; and

For maintenance = 1 cubic meter.

(2) Timber Distribution shall be given from salvage (fallen, dry standing), silviculturally available green trees in the order of preference.

(v) Periodicity:-

The periodicity for grant of Timber Distribution to the Right Holders will be as under:-

(i) For new construction once in life time or 30 years whichever is later;

(ii) For additions/alterations – once in 15 years; and

(iii) sufferers of natural calamities/fire sufferers: as per actual requirement as recommended by the Sub Divisional Officer (Civil) and after personal verification by the ACF/DFO concerned subject to the grant not exceeding the maximum limit prescribed under rule-4.

(6) Rates:-

The rates to be charged from the different types of Right Holders for grant of Timber Distribution will be as under:-

(i) Right Holders above poverty line- 30% of the rates at which timber is sold by the Himachal Pradesh State Forest Development Corporation Ltd commercially;

(ii) Right Holders below poverty line- 10% of the rates at which timber is sold by the Himachal Pradesh State Forest Development Corporation Ltd. Commercially; and

(iii) Right Holders suffering from natural calamities- Free of cost.

(vii) Priority for grant of Timber Distribution:-

Priority for grant of Timber Distribution shall be given to the Right Holders belonging to Below Poverty Line. Then Right Holders above poverty line shall be granted Timber Distribution on first come first served basis.

(viii) Procedure for grant of Timber Distribution:-

i) Application for grant of Timber Distribution, on the form appended to these rules as 'Annexure-I' shall be submitted by Right Holder(s) to the Panchayat concerned after getting necessary remarks from the Patwari concerned.

ii) The Panchayat after ascertaining genuineness of the requirement of the Right Holders shall pass resolution in the Gram Sabha of the Panchayat indicating actual quantity of requirement of Timber Distribution of the individual(s) concerned.

iii) After resolution recommending grant of Timber Distribution is passed by the Gram Sabha of the concerned Panchayat, right holders shall submit his Timber Distribution application to the Forest Guard (FG) of the area.

iv) FG shall enter the same in the register maintained for the purpose and issue receipt of the application to the Right Holder.

v) He shall send his recommendations to the Block Officer after ascertaining the genuineness of demand, who in turn shall submit his recommendations to the Range Officer.

vi) After receipt of Timber Distribution application from the Range Officer, the Divisional Forest Officer shall take action for sanction of the Timber Distribution after satisfying himself about the genuineness of the requirement and silvicultural availability of trees/timber in the concerned forest and intimate his decision/ Timber Distribution grant to the Right Holder concerned on the performa appended to these rules as 'Annexure II'.

vi) A schedule for grant of Timber Distribution shall be framed and notified for publicity to all panchayats and other functionaries in the Forest Division by the Divisional Forest Officer.

(ix) Time schedule for grant of Timber Distribution:-

The right holders shall apply for grant of Timber Distribution through concerned Panchayat to the concerned forest guard by 31st March each year which has been extended to 30th April this year. The application shall be processed and Timber Distribution shall be given to eligible right holders between September to December of the year as per procedure under rule 8 and no Timber Distribution shall be granted thereafter for that year.

(x) Depot:-

The depots will be notified by Divisional Forest Officer every year from where TD in converted form is to be supplied to Right Holder. Any change during the next year in the place of these depots shall also be notified. These notifications shall be widely circulated up to the Panchayat level by the Divisional Forest Officer. The rates in this respect for various species has been notified by H.P. govt vide notification No. FFE-B-E(3)-43/2006-Vol-II-Loose Dated 6-2-2012 for the year 2011-12.rate of the spps relevant to this division are given as under:

Table 1.8

Rates of Timber under H.P. Forest (Timber Distribution to Right Holders) Rules, 2010 for the year 2011-12

Species	*Average weighted sale (commercial) rate of HPSFC Ltd.*	*Rate per Cum at 30%*	*Rate per Cum at 10%*	*Estimated cost per*	
				For Right Holders APL	*For Right Holders BPL*
Deodar	23889	7167	2389	717	239
Chil	6674	2002	667	200	67
Tuni	6479	1944	648	194	65

(xi) Merit of these rules over previous provisions of T.D. in various settlements:-

The advantage these rules have provision for grant of TD under various settlements are as under:-

1. These Rules of TD have been integrated and unified for whole of the state.

2. Timber will be available in converted form and near to the place of residence of the people helping them in saving precious time and money during this schedule.

3. The rules are forest centered as well as right holder centered based on the guiding principles of HP Forest Settlement Rules, 1965 as indicated in point 3 which will help in conservation of forests and so also catering to the demand of TD to the present and future generations.

4. The periodicity and quantity has been made based on optional requirement so that forest remains and TD continues to be given in perpetuity.

5. Priority has been given to poor and needy (BPL) followed by other people who need wood in TD.

6. A detailed procedure for grant is enshrined in the Rules itself which is time scheduled for the year.

7. People have been empowered, as the application for needy will start from the Gram Sabha.

8. The right holder now has to simply give application duly authenticated by the Gram Sabha of the Panchyat to the FG which will pass through the various chanels of the Forest Deptt. and the applicants would get their converted TD at the earmarked depots between September to December.

1.10.3 Wood for cremation, obsequious 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.

1.10.4 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.

1.10.5 Grazing and Grass Cutting by local people:

In Kunihar Division, the local people have the right to graze their own cattle free of charge in all forests expect which are free of rights or have been specifically closed to grazing on silivicultural grounds. Grazing by local goats and sheep is also free in the entire Division. Under the rules, the rights of grazing is allowed only in favour of cattle required for Bonaire domestic and agricultural requirements and legally the number may not exceed 30% of that possessed at the time of Forest Settlement. The restriction has not been enforced in practice and the grazing pressure is very heavy.

1.11 The Grazing Policy:

In view of the importance of the forests in providing adequate grazing to the cattle wealth of the state, the Himachal Pradesh Government vide notification No.ft.784-13/66(M), dated 29.2.1968,appointed a high level Grazing Advisory Committee to review the entire Grazing Policy of the state. The excerpts of the Report of the Grazing Advisory Committee on the Grazing Policy of Himachal Pradesh have been given in Appendix.

1.12 Migratory Graziers:

They are mostly Gaddies and there are no Gujjar graziers in this division.

Following statement shows the number of migratory cattle in the Kunihar Forest Divisions during the year 1991-92 to 2010-11:

Table 1.9

Year	Goat/ Sheep	Other	Kids/ Lambs	Total Animal
1991-92	12632	71	2744	15447
1992-93	Kunihar Forest Division was Social Forest Division.			
1993-94	11739	91	2129	13959
1994-95	11942	102	2214	14258
1995-96	11940	46	2204	14190
1996-97	15815	57	0	15872
1997-98	15815	57	0	15872
1998-99	15815	62	0	15877
1999-2000	15815	63	0	15878
2000-01	15733	52	0	15785
2001-02	14767	52	0	14819
2002-03	15929	50	0	15979
2003-04	15367	53	0	15420
2004-05	16398	56	0	16464
2005-06	15734	56	0	15790
2006-07	14700	59	0	14759
2007-08	14930	69	0	14999
2008-09	15506	69	0	15575
2009-10	17855	56	0	17991
2010-11	12369	36	745	13150

Source: DFO Kunihar

1.13 Powers of Collector to DFOs under the H.P. Public Premises Land (Eviction and Rent Recovery) Act, 1971:-

Vide Government of Himachal Pradesh notification No 1-21/71 LSG dated 8th June 1994, the divisional forest officers in Himachal Pradesh have been given the powers of Collector under the H.P. Public Premises Land (Eviction and Rent Recovery) Act, 1971.Under this act, the DFO (Territorial) has been empowered to initiate summary trial and order eviction of encroachment on forest lands. After the act came into effect, in Kunihar Forest Division a total of 47 cases (9.362 ha) have been detected. Out of these 47, eviction order have been passed in 42 cases

(8.637 ha.) till November 2011 and 5 cases (0.725 ha.) are under trial in the court of DFO cum Collector, Kunihar. Out of 42 cases, where eviction orders were passed; possession in 33 cases (5.9523 ha) has been taken back by the department with the good efforts of staff. Government of HP with the direction of Hon'ble High Court has added removal of encroachment on Govt. Forest Lands as a priority programme which is being monitored by Chief Secretary of HP on regular interval of time.

CHAPTER – IIA
FLORA

2.1 Occurrence and Distribution of Species:

The altitudinal difference as well as aspect and biotic influences have caused diversity in vegetation type in Kunihar 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, namely (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 these 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-DS1-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.

(v) Type 9/C/1b Upper or Himalayan Chirpine Forests.

(vi) Type 9/CI/DS2-Sub-Tropical Euphoria Scrub Forests.

Group 12 Himalayan Moist Temperate Forests.

Sub group C1-Lower western Himalayan Temperate Forest

(vii) Type 12/CI Lower Western Himalayan Temperate Forests.

(vii) Type 12/C1a – Lower western Himalayan Ban oak (*Quercus incana*) Forests.

2.2.1 Type 5 B/C2 – Northern Dry Mixed Deciduous Forests:

Forests of this type occur at lower altitude (between 300 meters and 1300 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 Dhau Ki Dhar (Kunihar Range) and U-511 Mandhala, U-512 Dhar-ka- Chamba & U-513 Guradaspur (Kuthar 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) simbal (Bombax ceiba), pula (Kydia calycina), Amaltas (Cassia fistula), Chamror (Ehretia laevis), Sandan (Ougenia oojeinensis, Kaimb (Mitragyna Parviflora), Kangu (Flacourtia indica), Khair (Acacia catechu), Jamun (Syzygium cumini), chilla (Casearia tomentosa), Amla (Emblica officinalis), Kachnar (Bauhinia variegata), Kambel (Mallotus philippinensis), Dhak (Butea monospermous).

Under growth consists of:

Harshingar,(Nyctanthes arbortristis), Karaunda (Carissa spinarum), (Woodfordia fruticosa), Kathi (Indigofera pulchella), Gandhela (Murraya koenigii), Basuti (Adhatoda vasica), Keor (Holarrhena antidysenterica).

The importance grasses of:

Makora (Heteropogon contortus), dub (Cynodon dactylon), Dhaulu (Chrysopogon montanus), lab (Cymbopogon spp), Munj (Saccharum munja),.

The importance climbers are:

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

2.2.2 Type 5b/C3-DS 1 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 confided to lower reaches, mainly of Surajpur 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, Euphorbia royleana, Aegle marmelos, Carissa spinarum, Holarrhena antidysenterica, Acacia catechu, Lannea grandis, 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 is moderate in Awar, Praghu, Bhowan, and Nalki of Kuthar Range. 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 grandis), Bel (Aegle marmelos), Dhai (Woodfordia fruticosa), Gandhela (Murraya koenigii), Basuti (Adhatoda vasica), 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 Kunihar Forest Divisions. 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) and 2000 meters (on southern aspects). 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. Chanol and Bohli Katli of Kuthar Range.

The main floristic are as under:

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 spinarum), Heer (Rubus ellipticus),Chhota hunjra (Myrsine Africana), Adhavi, Kathi (Indigofera pulchella), and Gandhela (Murraya koenigii).

Grasses:

Chrysopogon fulvus, Cymbopogon spp. Dichanthium annulatum, Heteropogon contortus and Themeda anathera.

Climbers:

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

2.2.5 Type 9/C/1b Upper of Himalayan Chirpine Forests:

The *Pinus roxburghii* (Chil) forest of some areas of Darla, Kunihar, Arki and Kuthar Range fall in this type. In these forests also the top canopy is Pinus roxburghii only, and there are very few scattered trees forming second canopy. The middle canopy is in stunted form, is that of *Ficus, Lynoia ovalifolia, Mallotus philippinensis, Pyrus pashia, Syzygium cumini, Coriaria nepalensis*, etc.

The undergrowth consists of *Myrsine Africana, Rubus ellipticus, Carissa opaca, Woodfordia floribunda, Berberis lyceum, Viburnum coriaceum*, etc.

Ground flora consists of *Heteropogon contortus, Themeda anathera, Desmodium parvifolium, Swertia* spp., etc.

Climbers – *Rosa moschata.*

2.2.6 Type 9/C/DS 2 Sub Tropical Euphorbia scrub Forests:

The degraded chirpine forests fall under this type. These are the result of adverse biotic influence which is much beyond the endurance of forests. Their distribution is related to edaphic factors, notably dry rocky ridges. These are mainly confined to Kunihar Block and some parts of Arki Block. At places only a part of the forests compartment is of this type. Thor (Euphorbia royleana) is the only main

2.2.7 Type-12/C1a Lower Western Himalayan Ban-Oak (Quercus incana) Forests

There is no well developed ban oak (Quercus incana) forests in the division. However, this forest type is located along Baridhar ridge (Bari and Silnu Forests). Mostly the Quercus incana trees have short boles and low branching. The Ban trees have been affected very adversely due to heavy biotic pressure, being situated near the

habitations. Chil have been planted in some gaps in this ban forests successfully.

2.3 Natural Regeneration:-

2.3.1 Chir Pine Forests:

This species covers about 3565.0 Ha forest area of the division. No felling has been carried out during period of working plan under revision. However the status of regeneration is satisfactory where ever gaps have been created by salvage removal. In Chil forests of this division, natural regeneration is not a problem except for the forests located close to habitations.

2.3.2 Bamboo Forests:

In this division 1640 ha area comes under bamboo working circle. Some of the forests were gregariously flowered during period of working plan under revision these forests have been regenerated fully.

2.4 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:-

2.4.1 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 are liable to damage due to fires. Lantana invading underneath has also become a hazard due to which at time controlling/ combating fire becomes difficult.

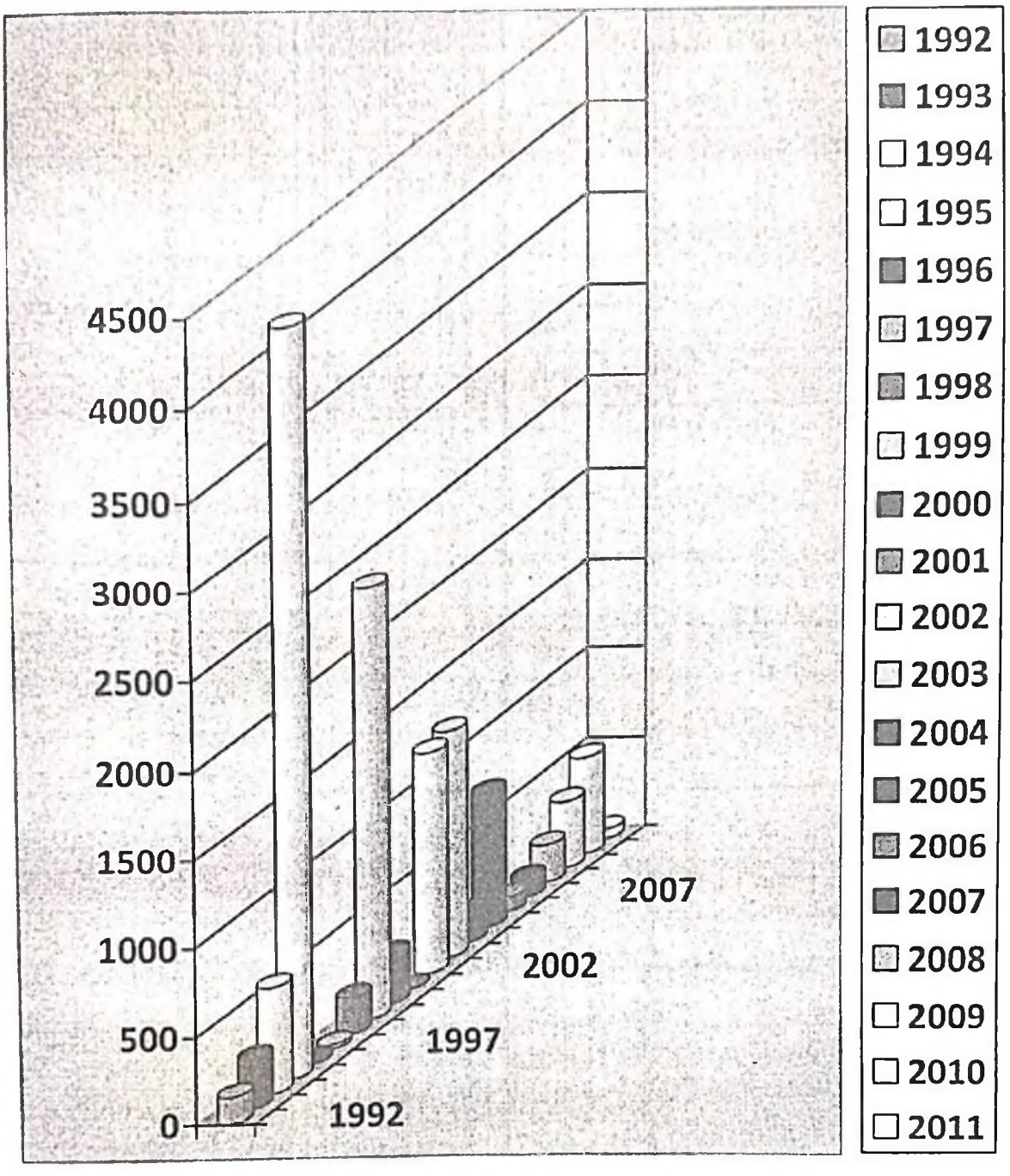
Fires kill young poles and wipe out seedling and saplings. They destroy the micro flora and fauna and thus impede soil forming processes. In Chil forests considerable number of trees dry every year on this account, consequently such fire lead to the spread of weeds like Lantana.

Detailed of forests affected by fire during the period 1992 to 2011 is given in appendix. Table 2.1 shows area (Ha) burnt during 1992 to 2011, in different ranges of Kunihar Forest Division with estimated loss (in ₹):

Table 2.1

Year	Kunihar Range	Arki Range	Darla Range	Kuthar Range	Total Division	Estimated Loss (in ₹)
1992	2.50	0.00	0.00	152.60	155.10	58,650
1993	17.00	74.00	193.5	4.00	288.5	3,61,200
1994	251.80	143.40	138.45	74.00	607.65	9,67,900
1995	925.70	144.70	2314.50	816.70	4201.60	22,94,887
1996	0.00	0.00	15.00	0.00	15.00	0.00
1997	0.00	0.00	0.50	23.00	23.50	4,000
1998	0.00	0.00	209.20	0.00	209.20	24,500
1999	611.70	244.00	853.06	732.20	2440.96	4,00,838
2000	59.25	4.00	210.60	1.50	275.35	5,11,520
2001	0.00	0.00	0.00	0.00	0.00	0.00
2002	159.60	21.50	940.82	137.80	1259.72	9,26,426
2003	390.00	133.55	447.10	322.50	1293.15	9,79,486
2004	41.25	2.00	122.00	0.00	165.25	2,83,618
2005	68.90	149.60	549.40	8.00	775.90	5,51,995
2006	77.90	2.00	0.00	0.00	79.90	80,035
2007	13.00	10.00	12.00	75.20	110.20	1,52,000
2008	99.00	8.00	100.00	13.00	220.00	3,37,800
2009	24.75	105.00	122.50	134.50	386.75	4,16,000
2010	269.00	81.50	37.00	162.00	549.50	4,23,000
2011	55	0	0	0	55.00	0.00

Source: - DFO Kunihar



Year wise No of Forest Fires

Fire impacts not only Chil areas but as shown below all the areas. Fire has been noticed in all Working Circles.

Table 2.2
Fire Incidences in various Working Circles

Number of fire incidences 2005-2011	
Chil Working Circle	
No. of fire incidences	Area burnt (Ha.)
66	771.85
Rehabilitation Working Circle	
No. of fire incidences	Area burnt (Ha.)
22	564.5
Plantation Working Circle	
No. of fire incidences	Area burnt (Ha.)
81	675.9
Bamboo Working Circle	
No. of fire incidences	Area burnt (Ha.)
6	163

Source: - DFO Kunihar

2.4.2 Grazing :-

Unrestricted grazing by an excessive number of cattle has changed the very complexion of natural vegetation in most of the area. The damage has caused the elimination of useful species and their replacement by weeds like *Euphorbia royaleana* 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 available in the division.

2.4.3 Encroachment :-

This is a serious and contagious issue. The forest land is encroached most commonly adjoining private land holding as depicted in **Table 2.3**

Table2.3
Statement Showing Encroachments in Kunihar Forest Division (2011)

Year	Cases of encroachment on Forest land during the year		Encroachment cleared by the department		Encroachment cases pending	
	No.	Area (Ha)	No.	Area (ha)	No.	Area (Ha)
1997-98	2	0.084	0	0	2	0.084
1998-99	0	0	1	0.004	1	0.080
99-2000	0	0	0	0	1	0.080
2000-01	0	0	0	0	1	0.080
2001-02	1	0.860	0	0	2	0.940
2002-03	4	1.89	0	0	6	2.830
2003-04	18	2.602	1	0.145	23	5.287
2004-05	9	0.620	6	1.838	26	4.069
2005-06	13	3.306	3	0.439	36	6.936
2006-07	0	0	0	0	36	6.936
2007-08	0	0	0	0	36	6.936
2008-09	0	0	14	2.136	22	4.800
2009-10	0	0	0	0	22	4.800
2010-11	0	0	0	0	22	4.800
2011-12	0	0	8	1.3903	14	3.4097

*Out of this 14 cases with area 3.4097 ha 6 are under trial and in 8 cases eviction is pending. (Source: DFO Kunihar)

2.4.4 Illicit felling:-

The damage by illicit felling is common throughout the tract, but generally it is for domestic uses. The gist of number of cases detected in the past is given in **Table2.4**

Table2.4

Incidence of Illicit Fellings in Kunihar since 2004-05

Year	No. of cases detected	Estimated value of timber involved (in ₹)
2004-05	55	61984
2005-06	57	114483
2006-07	56	60647
2007-08	35	34856
2008-09	37	146445
2009-10	21	71498
2010-11	42	138442

(Source: Office record DFO Kunihar)

2.4.5 Mining: -

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 that how does mining affect the environment. Some of the effects of Mining are given as under

- Mining destroys landscapes, forests and wildlife habitats at the site of the mine when trees, plants, and topsoil are cleared from the mining area. This in turn leads to soil erosion and destruction of agricultural land.
- When rain washes the loosened top soil into streams, sediments pollute waterways. This can hurt fish and smother plant life downstream, and cause disfiguration of river channels and streams, which leads to flooding.
- There is an increased risk of chemical contamination of ground water when minerals in upturned earth seep into the water table, and watersheds are destroyed when disfigured land loses the water it once held.
- Mining causes dust and noise pollution when top soil is disrupted with heavy machinery.
- In Kunihar Forest Division 447.935 ha forest land has been diverted for mining. Detail is given in **Table 1.5 Chapter I (Part I).**

2.4.6 Road Construction:-

On 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.
- Road construction alters water routing, downstream peak flows, and groundwater conditions which results change of hydrology of entire area.
- It damages natural beauty of forests. Forests lose their compactness.
- Hydrology of that area is changed
- Ecological impact of road is difficult to assess.

The impacts of roads in natural places can and do go far beyond the physical area directly affected by each road. The impacts caused by roads can alter ecosystems at a great many levels

2.4.7 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 dear 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.

2.4.8 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.*

2.4.9 Fungi:

By and large forests are comparatively free from fungal damage. However, the fungus *Peridermum* species has caused considerable damage to the chil of plantations in U.233 Gururang, U.235, Buila, and U. 236 Deothal.

2.4.10 Climber and Weeds:

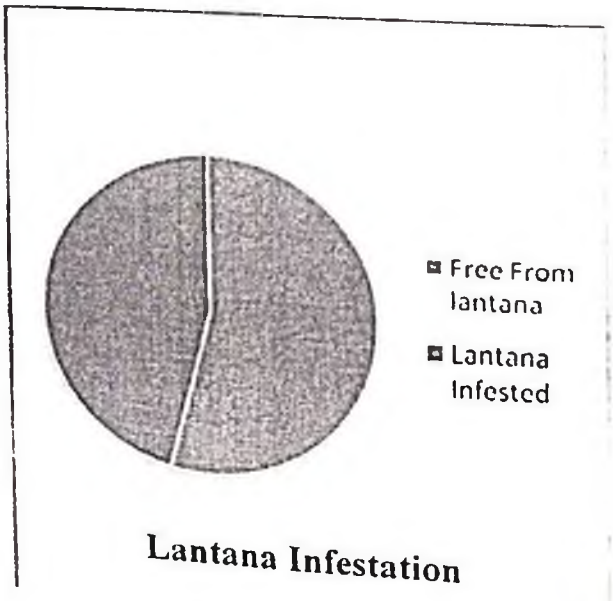
Bauhinia vahlii (taur) is most dangerous in mixed deciduous forest as it often completely covers trees crowns, constricts the boles, retards their overall growth and leads to their ultimate death. *Lantana*

camara is the most dangerous weed which is constantly eliminating all other vegetation. *Euphorbia royaleana* is another weed which has occupied some areas. Invasive alien species, particularly Lantana, has invaded vast tract of forest areas. It has covered areas in all working circles. Range wise figures of forests infested with Lantana are given below in the **Table 2.5**

Table 2.5

Range	Legal Status of Forests	Lantana density(In Ha)				Total Infested Area
		0-25%	26%-50%	51%-75%	75%-100%	
Darla	DPF	17	67	130	0	214.0
	UPF	81.2	142	38	0	261.2
Arki	DPF	478	558.8	215	230	1481.8
	UPF	741.2	301.6	94	57.2	1194
Kunihar	DPF	157.25	291.2	302.2	362.5	1113.15
	UPF	297.8	520.8	596.2	465.6	1880.4
Kuthar	DPF	101	177	105	0	383.0
	UPF	571.5	806	265.6	32	1675.1
	Total	**2444.95**	**2864.4**	**1746**	**1147.3**	**8202.65**

Source: WP Study



Lantana Infestation

Out of total 17862.9 Ha area , 8202.65 Ha is infested by lantana. It means that lantana has covered 45.92% of total forest area. Above table shows that about 65% of total infested area has = or< 50% density.

2.5 Natural Agencies causing damages:

2.5.1 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 if it is a poor monsoon. Drought also leads to forest fires.

2.5.2 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 forest hardy.

2.5.3 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 division.

2.5.4 Erosion:

Adverse biotic influences have caused denudation of various intensity. 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.

CHAPTER II B

FAUNA

2.6 General Description:

The altitudinal variation in the tract provides variety of vegetation and due to this there occur a variety of fauna in this division. These occur mostly in Piplughat and Mangal areas. U.48 Kashlog, U.55-Barial, U.186 Lamo, areas are considered suitable for their habitat. Apart from these, Sutlez 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 wife 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:

2.6.1 Animals (Mammals):

(A) ***Game Animals***

(i) Carnivores:

1. The Himalayan black bear (Bhalu) – Salenarctos thibetanus:(Herbiborus) It is found in high hills in Gaggal, Bagga in Mangal area in Darla Range. During maize season, it comes down to lower elevations in adjoining localities. It mainly thrives on the roots, nuts, and bark of trees, honey and other wild fruits. It comes out at dusk to seek its food and after sunrise.

2. Panther (Tendua, Bagh) – *Panthera pardus*: It is occasionally met with. 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.

(ii) Herbivores:

Goat-Antelope group:

1. The Goral (Goral) – Nemorhaedus goral: It is a stockly goat like animal. Hair coarse, forming a small crest on the neck. It is generally found in rugged grassy hill sides or rocky ground in the forests. The goral

is a much sought after animal by the hunters and falls easy prey to the poachers because of its well known habitat.

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. It occurs around Piplughat.

Pigs:

1. The Indian wild bore (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 grayish 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 division.

2. The Indian Porcupine (Sayal orSsahi) – 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 grantling 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. Cubing time is 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 (JangliBbilli or Ban billi) – Felis chaus: It found in the drier and open scrub areas of the tract. It preys on small animals and birds. It. 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 hedgerows 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 seeds and agricultural cropes.

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.

2.6.2 Birds:-

(I) Game Birds

Land Birds

(A)Pheasants and Fowl group

1. The Red jungle fowl (Jungle Murga) – Gallus gallus: It is found everywhere in the tract, particularly on the periphery of the forests. It is by far 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 is also our national bird having religious sentiments attached to it. 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.

3. The White Crested Kaleej Pheasant (Kolsa) – Lophura leucomelana: It is found generally in the higher reaches of division and inhabits thick bushy areas.

(B)Partridges and Quails group

1. The Grey Partridge (Teetar) – Francolinus pondicerianus: It is commonly found in scrubby and bushy area of Arki and Darla Ranges. 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 (bter) – 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.

(3)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.

(4)Aquatic Birds:-

1. Indian Moorhen (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 (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. Male and female are alike. They are found singly or in pairs, near reeds and thickets on marshy ground.

(II) 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.

2.6.3 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. 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 – Varnus 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.

2.7 Injuries to which Fauna is liable:

2.7.1 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. Local people use Karaki to trap wild animals.

2.7.2 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.

2.7.3 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.

2.7.4 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.

2.7.5 Conflict Between Man and Animals:

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. There has been a steady rise in the population of monkeys which are a menace to agricultural crops.

Data pertaining to, counting data of monkeys (2010) , data pertaining to compensation cases and data pertaining to death or injury to animals in Kunihar Forest Division are given in **Table 2.4, 2.5 &2.6** respectively.

Table 2.6

Data of Monkey in Kunihar Forest Division						
Name of Range	**Name of Block**	**Name of Beat**	**Troups**			
			Troup No.	**Adult**	**infant**	**Total**
Darla	Danoghat	Danoghat	1	70	18	88
		Chandi	1	143	61	204
		Mangu	1	136	70	206
	Kandhar	Labrath	1	71	51	122
		Kandhar	1	66	27	93
		Baga	1	68	24	92
	Darla	Ghanagughat	1	44	8	52
		Kraraghat	1	28	9	37
		Manlog	1	145	66	211
		Dhundan	1	122	40	162
Kuthar	Kuthar	Kuthar	3	94	56	150

		Darwa	4	129	55	184
		Bandh	2	43	24	67
		Shaktighat	2	46	18	64
	Patta	Patta	2	83	5	88
		Beja	2	115	30	145
		Joharji	2	105	25	130
		Awar	2	96	26	122
	Surajpur	Surajpur	2	29	13	42
		Chadyar	2	89	26	115
		Kharota	1	12	6	18
		Gurdaspura	1	8	3	11
Kunihar	Kunihar	Devdhar	1	59	30	89
		Maan	1	50	64	114
		Domehar	0	26	37	63
		Manjyaat	0	55	81	136
		Bani	6	95	113	208
	Chandi	Gharshi	1	12	7	19
		Goela	2	19	36	55
Arki	Arki	Arki	1	144	51	195
		Manjoo	1	83	34	117
		Shalalaghat	1	170	38	208
		Sharon	1	151	45	196
	Jai Nagar	Bhumati	1	160	45	205
		Jai Nagar	1	78	33	111
		Materani	1	66	41	107
		Sai	1	94	34	128
		Bainj hatti	1	87	27	114
			55	**3091**	**1377**	**4468**

Source: DFO Kunihar

Table 2.7

Year	Human Only injuries	Total No. of animals killed	Compensation
2003-04	2	21	65300
2004-05	-	8	7950
2005-06	8	25	105065
2006-07	2	35	124008
2007-08	3	36	29542
2008-09	1	9	15275
2009-10	6	2	88500
2010-11	1	33	39125

Source: DFO Kunihar

Table 2.8

Incidents of wild animals found dead or injured in Kunihar Forest Division w.e.f2003-04 to 2010-11

Sr. No.	Division	Range	Location	Species	Sex	Approx age	Alive or dead.	Remarks
1	Kunihar	Kunihar	On road,Arki-Kunihar road near vill. Biran	Cub	Female	2 months	Dead.	-
2	-do-	Kunihar	Near vill. Thouna	Dear	Male	4-5 Months	Dead	-
3	-do-	Kunihar	Near vill. Kokhari	Samber	Male	Below one month	Dead	-
4	-do-	Darla	Near vill.Kotla	Leopard	Male	1 Year	Dead	-
5	-do-	Arki	Near vill bathalang Jyawara in Ghasni	Leopard	Female	2 Years	Dead	-
6	-do-	Darla	Karaghat Jungle	Leopard	Female	1 Year	Dead	-
7	-do-	Darla	Dati Nala	Leopard	Not Known	Not Known	Injured	-
8	-do-	Kunihar	Near Vill Nanat	Samber	Male	1 Year	Dead	
9	-do-	Kunihar	Anji Nala	Leopard	Female	3Years	Dead	
10	-do-	Kunihar	Maneshi nala	Samber	Male	4 Years	Dead	

Abstract				
Animals found dead				
W.L. Boar	Sambhar	Leopard	Deer	Total
Nil	3	5	1	9
Animals found Injured				
0	0	1		1

Source: DFO Kunihar

2.8 Protection and Management of Fauna:

Kunihar division is surrounded by Majathal and Darlaghat Wild Life Sanctuaries which are part of Protected Area Network of the state.

2.8.1Majhathal Wildlife Sanctuary:-

Majathal Wildlife Sanctuary (40 sq.km.) is bordering south bank of river Sutlej partly falling in Solan and partly in Shimla districts of Himachal Pradesh in the Western Himalayan region within 575 m to 1985 m above msl. The area has a subtropical Monsoon climate. Himalayan Chir pine (*Pinus roxburghii*), ban oak (*Quercus leucotrichophora))* forests and sub tropical *Euphorbia* scrub are the major vegetation types (Champion and Seth 1968).Major habitat in the sanctuary comprises steep south eastern slopes covered with large patches of tall grass sparsely forested with scattered Chil , Ban oak and mixed broadleaved forests in ravines and low lying areas.

2.8.2 Darlaghat Wildlife Sanctuary:-

The Darlaghat WLS has an area of 6 sq Kms with one village is situated within the WLS and 6 situated just outside the WLS. It is burdened by the rights of local population and almost all the WLS barring two DPFs and some UPFs is under agriculture/human habitation and is therefore not fit from wildlife management point of view. Thus, this WLS is proposed to be denotified.

CHAPTER – III

UTILIZATION OF THE PRODUCE

3.1 Agricultural customs and wants of the Population:

According to 2001 census the human population of the Kunihar Forest Division is 128432. It comprises 2877 urban and 125555 rural populations. Agriculture is the main occupation of the people. Agricultural practices are still primitive in most of the villages. Horticulture and Animal Husbandry supplement the agriculture. People are also growing vegetables as cash crop. The cattle population as per latest census is 98,067. The geographical area of the tract being 546.572 sq. kms, the human population density per sq. km. is 223 and cattle population density per sq. km. is 176.

3.2 Demand and Supply of Forest Produce and Pressure on Forests:-

Local people are greatly dependent on the forests for meeting their requirements of the timber for house construction, agricultural implements, packing baskets for fruits and vegetables and other miscellaneous requirements such as firewood, grass and raw material for cottage industries. With the increase of population the requirement of timber has increased whereas the capacity of the forests to meet these requirements has decreased. Similarly, the grazing pressure has also increased. Timber distribution to right holders to meet their demands for constructions of house for agricultural implements. From the year 2007 onwards, there was stay on grant of T.D., imposed by the H.P. High Court, till H.P. Govt. notified new T.D. Rules. These new T.D. Rules have been notified from 2010. However, after these came into effect, not a single case of request of grant of T.D. has been received.

Table – 3.1

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	369.53

2002-03	162	223.946
2003-04	217	207.352
2004-05	291	257.362
2005-06	242	269.287
2006-07	47	35.918
2007-08	0	0
2008-09	0	0
2009-10	0	0
2010-11	0	0
2011-12	0	0

(Source: DFO Kunihar)

Many small and medium scale industries have come up at Barotiwala and Mandhala. Two big cement factories in private sector have come up at Darlaghat and Bagga in Darlaghat Range. These industrial units have opened new occupational avenues for the local people.

3.3 Market and Marketable Products:

Main markets for timber fuel wood and bamboo are Parwanoo, Kalka and Baddi; which are well connected with divisional headquarter, Kunihar with all weather roads. The main marketable products of the divisions are resin, katha, bamboo, timber, fuel wood. Chil timber is also utilized for paper pulp.

Since the entire tract is connected with motor able 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 – 3.2

Produce	Market
Chil timber and pulpwood	Baddi Depot
Resin	Nahan and Bilaspur
Bamboos	Baddi and Kalka
Fuelwood and charcoal	Shimla, Solan and Chandigarh
Katha	Delhi

(Source: DFO Kunihar)

3.4 Lines of Export:

There is a network of all weather, metaled and unmetaled 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 – 3.3

Sr.No.	Name of road	Length	Condition
1	Kunihar-Shimla	45 kms	All weather
2	Barotiwala-Patta-Kuthar-Subathu-Kunihar-Arki-Shalaghat	80 kms	-do-
3.	Kasauli-Chandi-Saddal Patta	46 kms	-do-
4.	Chandi-Badhalag-Kunihar	20 kms	-do-
5.	Arki-Banjhatii-Jainagar	46 kms	-do-
6.	Arki-Dhundhan-Bhararighat	30 kms.	-do-
7.	Galog-Shimla	38 kms	-do-
8.	Kararaghat-Kashlog	9 kms	-do-
9.	Darlaghat-Nagaon- Sundernagar	63 kms	-do-
10.	Shimla-Bilaspur(With in the Division)	46 kms	All weather
11	Jainagar-Loharghat	8 kms	-do-
12	Domehar-Gambhar bridge	8 kms	-do-

(Source: VK Singh's WP)

3.5 Distances

Distance from Kunihar to other important places as under:

Table – 3.4

Places	From Kunihar (Kms)
Arki	16
Darlaghat	37
Piplughat	29
Domehar	6
Kunihar	0
Kuthar	16
Kasauli	30
Solan	35
Dharampur	28
Kalka	58
Baddi	57
Nalagarh	62
Ramshehar	42
Kohu	77
Sowarghat	87
Shimla	41
Ropar	84
Chandigarh	85
Delhi	335

(Source: VK Singh's WP)

3.6 Methods of Exploitation and their Costs:

3.6.1 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 swan into scantlings by using frame saws. The timber is carried manually to road side depots or to suitable points in the

forests. Thereafter it is carried in trucks to the depots of the Corporations. Logs for packing cases (geltus) and 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 Development Corporation. Approximate cost of extraction per cum of sawn wood and per quintal of pulpwood excluding royalty are as under (as per the record of H.P. State Forest Development Corporation) cost has been calculated as per 2011-12 rates of HPSFDC

Table – 3.5

Exploitation cost of Timber and pulpwood

Sr. No.	Item of work	Timber	Pulpwood
		(Cost per cum-(₹)	(Cost per quintal- (₹)
1	Lopping and felling	60.25	-
2	Sawing and conversion	924.93	110.83
3	Carriage by Manual and Tractor	1966.2	687.52
	Total	**2951.38**	**798.35**

(Source: DM HPSFDC Solan)

3.6.2 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 in Chadi/Goyla area of this division from where transportationof resin to out of HP is become easy, had attracted attention to improve resin extraction in Govt. Forests. Therefore, extraction is required to be done as per the instructions contained in H.P. Forest Manual Volume IV : and the procedure laid down in standing order No.2 (Appendix-) dated _____ of CF Bilaspur Circle. Cost of extraction per quintal of resin delivered at Rosin and Turpentine Factories; excluding royalty is as under

Table – 3.6

Resin extraction cost statement

Sr. No.	Item of work	Cost per quintal (₹)
1	Crop setting and extraction charges	855.15
2	Carriage from forest to road side depot.	50.6
3	Carriage from roadside depot to the factories.	72.2
4	Repair and maintenance of tools, roads, paths etc.	12.64
5	Rent of store, depot etc.	10
6	Loading and unloading charges	35.5
7	Mate commission	20
8	Miscellaneous charges. (Tins, Plots, etc.)	190
	Total	**1246.09**

(Source: DM HPSFDC Solan)

3.6.3 Bamboo:

The exploitation of bamboo is carried by H.P. State Forest Corporation. Some bamboos are also made available to Banjaras, for use in basket making. 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 – 3.7

Bamboo exploitation cost statement

Sr. No.	Item of work	Cost per Bundle bamboos (₹)
1	Exploitation charges	22.5
2	Carriage from forest to roadside depot	3
3	Carriage by Tractor	1
4	Loading and unloading charges	1.61
	Total	**28.11**

(Source: DM HPSFDC Solan)

3.6.4. 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 – 3.8

Katha Manufacturing Cost Statement

Sr. No.	Item of work	Cost per quintal (₹)
1	Felling and conversion of khair trees	1350
2	Carriage of cut material to Boiler.	1200
3	Chipping at Boiler site	1850
4	Manufacture of katha	3200
5	Carriage of katha to market	400
	Total	**8000**

(Source: Katha manufacturers)

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.

3.6.5 Bamboo for local craftsman:-

The local craftsmen engaged in trade of bamboo basket making, known as Banjaras get bamboos from the government forest on concessional rate. They make baskets for packing of vegetables and fruits. In Kunihar Forest Division they are confined to Kuthar Range only, the banjaras have to pay only Rs. 5.00 for 100 bamboos. This rate is quite low and requires to be enhanced the quantity of bamboos given to the banjaras during 1991-92 to 2007-08 is as under:

Table – 3.9

Quantity of bamboo given to banjaras

Year	Quantity (Culms)
1991-92 to 2010-11	92400 each year

CHAPTER IV

ACTIVITIES OF HP STATE FOREST DEVELOPMENT CORPORATION

The exploitation works of the forests are executed through state owned H.P. State Forest Development Corporation .In respect of Kunihar Forest Division, the exploitation of timber and extraction of resin are assigned to the forest corporation.

4.1 Harvesting/Exploitation of Timber:-

4.1.1 Salvage Felling:-

Only dry and fallen (Salvage) trees are marked to HPSFDC. These are handed over to Divisional Manager, HPSFDC L Solan who has jurisdiction over this division. The position of last 5 years is given in **Table 4.1**

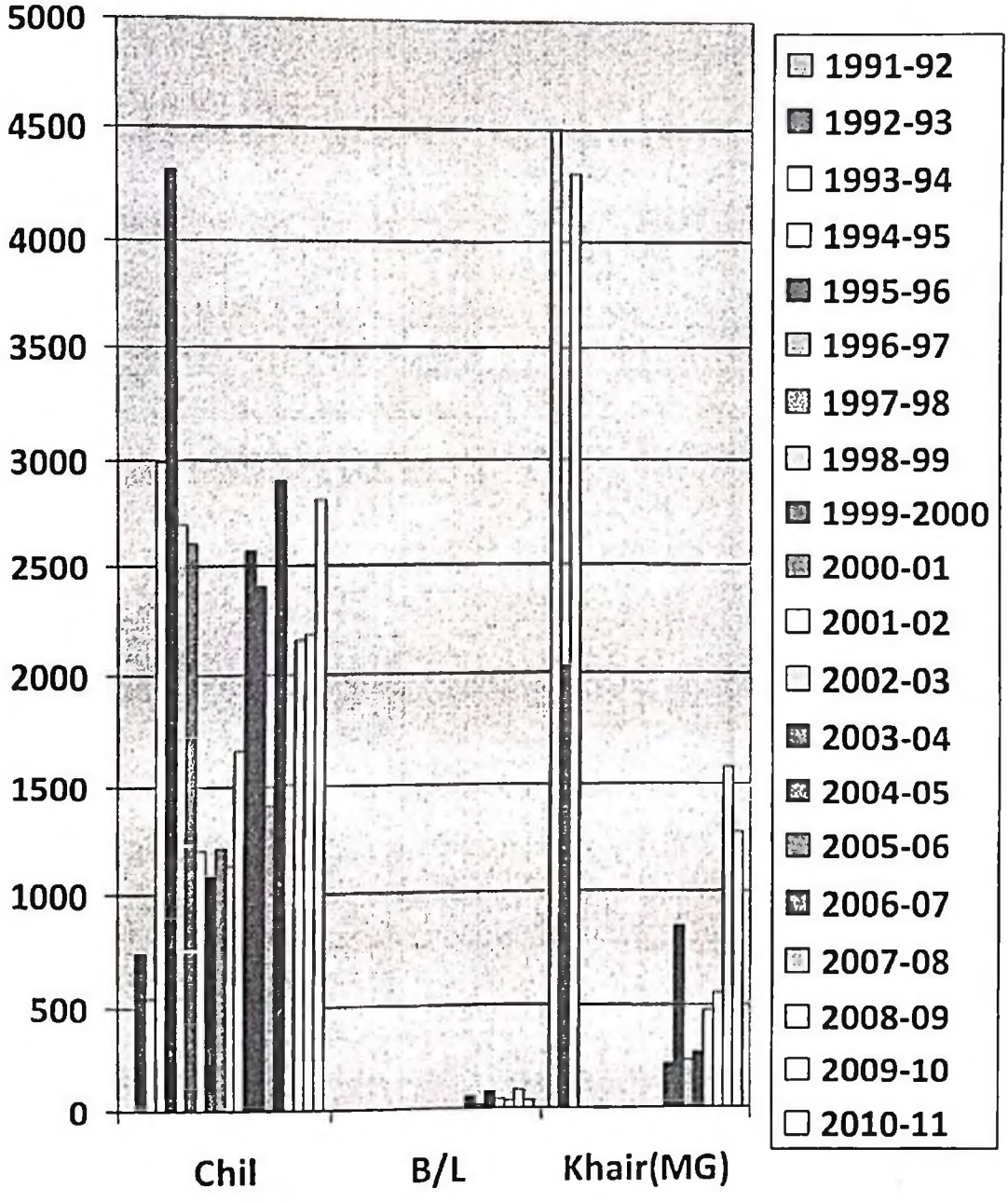
Table – 4.1

Record of salvage lots handed over to HPSFDC

	Chil		B/L		MG	
Year	*No.*	*Vol.(M^3)*	*No.*	*Vol(M^3)*	*No*	*MG*
1991-92	0	0	0	0	6000	4505.9
1992-93	567	740.6	0	0	4097	2030.54
1993-94	409	543.75	0	0	5962	4308.54
1994-95	2286	2988.56	0	0	0	0
1995-96	Not available	4318.9	0	0	0	0
1996-97	2579	2695.41	0	0	0	0
1997-98	2439	2603.84	0	0	0	0
1998-99	756	1196.688	0	0	0	0
1999-00	806	1085.27	0	0	0	0
2000-01	1683	1202.466	0	0	0	0
2001-02	1683	1124.07	0	0	0	0
2002-03	1562	1671.096	0	0	0	0
2003-04	2402	2566.888	0	0	390	209.37
2004-05	3169	2398.946	279	56.784	1431	849.29

2005-06	1219	1407.282	82	18.809	392	228.89
2006-07	3146	2900.556	235	83.663	444	269.73
2007-08	1736	1505.394	230	42.585	755	468.66
2008-09	2052	2155.966	72	33.173	945	552.65
2009-10	2269	2181.93	726	86.5	2624	1582.18
2010-11	3494	2810.044	175	39.857	2243	1267.794

(Source: DFO Kunihar)



Salvage

The HPSFC in turn gets the exploitation work executed through contactors called Labour Supply Mates (LSMs). The employment to skilled, semi-skilled and general is provided almost throughout the year except in winter months.

4.1.2 Green Felling:-

HPSFDC also carry out the felling of green tree (Nationalized Species) over private land as per ten year felling programme and on forest land is diverted to non forestry works under FCA.

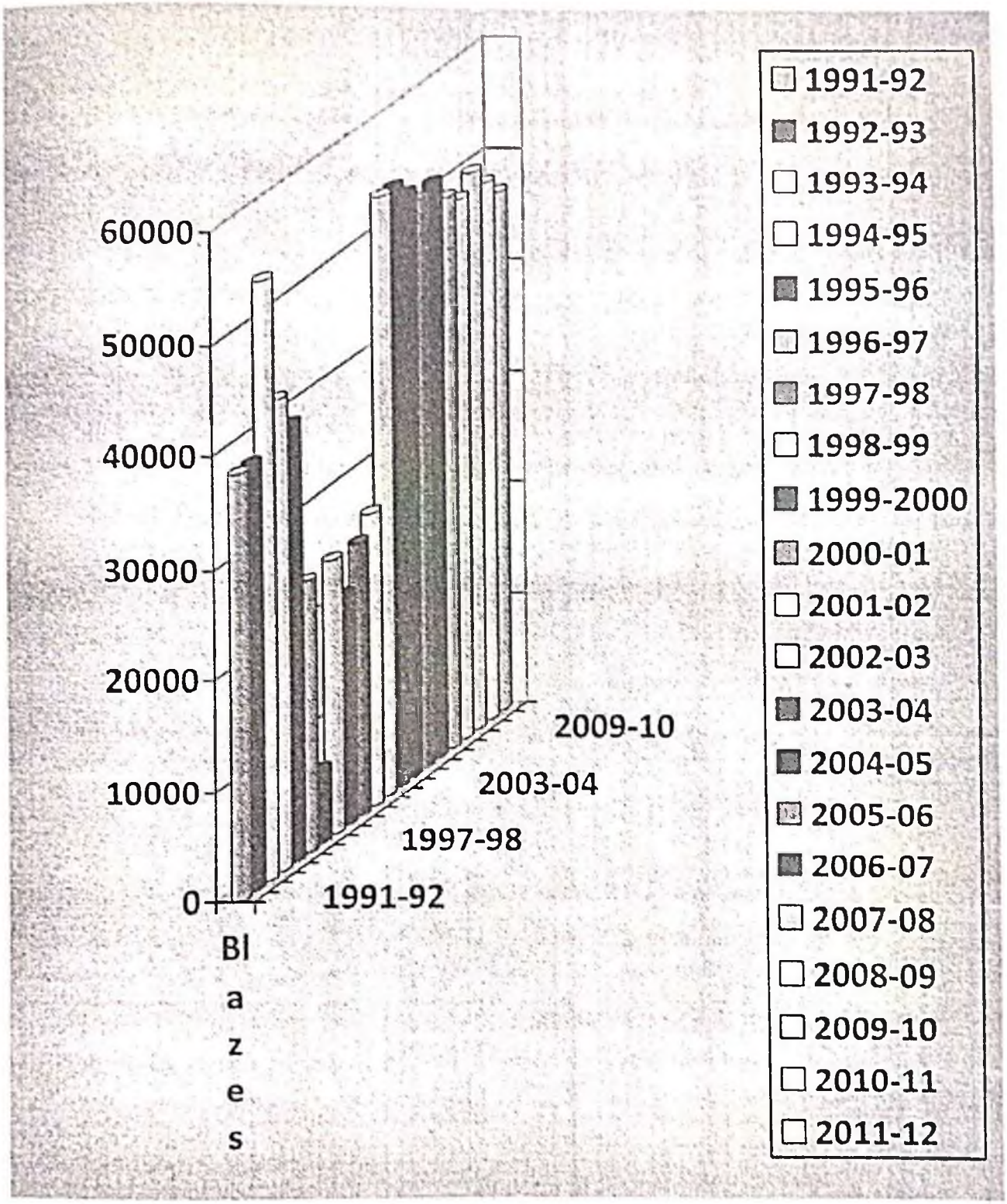
4.2 Extraction of Resin:-

Kunihar Division is one of the main resin extraction divisions. The resin yield w.e.f. from 1991-92 to 2011-12 in Kunihar Division is given in Table 4.3

Table – 4.3

Year	No. of blazes	Rate(in ₹)	Amount(in ₹)
1991-92	38401	15.20	5,83,710
1992-93	38401	19.10	7,33,378
1993-94	54104	27	10,54,807
1994-95	42501	24	9,44,511
1995-96	39377	27	10,51,920
1996-97	24732	31	7,66,692
1997-98	6742	32	2,15,744
1998-99	24942	26.5	6,60,963
1999-2000	20882	24.50	5,11,609
2000-01	24714	25.50	6,30,207
2001-02	26472	27	7,14,744
2002-03	53829	25	13,45,725
2003-04	53829	23	12,38,067
2004-05	52423	23.50	12,31,941
2005-06	51064	24	12,25,536
2006-07	51711	24	12,41,064
2007-08	49502	23	11,38,546
2008-09	48502	27.70	13,43,505
2009-10	50177	33.70	16,19,965
2010-11	48339	35	16,91,865
2011-12	46597	65(T)	30,28,805

(Source: DFO Kunihar)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2009-10
2010-11
2011-12

4.3 Bamboo Exploitation:-

Table 4.4

Year	Bamboo	
	Ha.	*Bundles*
1991-92	301	38303
1992-93	308.2	17878
1993-94	194.8	4807
1994-95	301.6	18026
1995-96	315.2	17699
1996-97	1190.6	21955
1997-98	229.4	4113
1998-99	162.4	3729
1999-00	432	11712
2000-01	0	0
2001-02	279	3591
2002-03	423.8	5002
2003-04	0	0
2004-05	385.6	7488
2005-06	580.2	5334
2006-07	316.8	8197
2007-08	0	0
2008-09	0	0
2009-10	0	0
2010-11	190	0
2011-12	104.4	

(Source: DFO Kunihar)

4.4 Marketing of Forest Produce:-

Timber extracted from this division is marketed through sale depot Baddi. The resin is processed and further sold through Nahan and Bilaspur factories.

4.5 Royalty Rates:-

Royalty rates for Chil, Misc B/L and Khair w.e.f. 2001-02 to 2010-11 are tabulated as below:

Table 4.5

Royalty Rates (in ₹)			
Year	**Chil per Cum**	**Misc .B/L Per Cum**	**Khair MG**
2001-02	400	300	-
2002-03	400	300	490
2003-04	380	300	440
2004-05	450	300	500
2005-06	568	147	547
2006-07	484	174	766
2007-08	437	297	779
2008-09	437	297	779
2009-10	626	481	1078
2010-11	572	326	952

Source: DM Solan

CHAPTER V

FIVE YEAR PLANS

5.1 General

The forests of the division have been managed for getting sustainable yield. The silvicultural fellings were aimed at making the forest uniform and the regeneration achieved through natural means. Till the early seventies, the emphasis was on planting commercially important species such as chil, khair, bamboo etc. Growing demand of forest produce, in the state especially that of timber has resulted in focus on large scale plantations of commercially important species. Although the plantation programme started from I Five Year Plan but it gained momentum from III Plan onwards. The Plan wise management of forests is depicted as under:

5.2 1st Five Year Plan (1951-56):-

After the merger of states in 1949, the Chil forests in Kunihar tract were of pole stage. Felling carried out in accessible areas only. In other chil forests, trees were removed by right holders only. Chil and Scrub working circles were constituted and worked. After partition exploitation of bamboo has been suspended because the *Bora* muslims, who had a monopoly of bamboo trade, migrated *enmass* to Pakistan. The felling resumed in 1957-58.In1953-56 gregarious flowering took place in bamboo areas. There is nothing on record to show the silvicultural system which was adopted. The year-wise revenue and expenditure of the erstwhile Kunihar Forest Division is tabulated as under:

Table 5.1

Expenditure and Revenue of Kunihar 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

(Source: WP G.S. Mathauda)

5.3 2nd Five Year Plan (1956-61):-

The felling of bamboo resumed in 1957-58 and exploited for revenue with emphasis on regeneration by mainly natural means. In chil forest removal was mainly done by right holders to meet their demand. The year-wise revenue and expenditure of the erstwhile Kunihar Forest Division is tabulated as under:

Table 5.2

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

Year	Revenue(in ₹)	Expenditure(in ₹)	Difference (in ₹)
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

(Source: WP G.S. Mathauda)

5.4 3rd Five Year Plan (1961-66):-

The areas were not worked out as per prescription in Chil Working Circle. Only accessible areas were worked out. Out of 8200M3 yield prescribed from PB I areas only 5780M3 was removed in PB inter 2201 M3 has been removed. Resin tapping was carried out in all accessible as well as difficult areas. In bamboo working circle felling rules were not properly observed which resulted in congestion.

Table 5.3

Yield (in M3) 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: WP D.D. Shagotar)

5.5 4th Five Year Plan (1969-74):-

The areas were not worked out as per prescription in Chil working circle. Only accessible areas were worked out. 8200M3 yield was prescribed from PB I areas and 8505M3 was removed. In PB inter 1750 M3 has been removed Resin tapping was carried out in all accessible as well as difficult areas. In bamboo working circle felling rules were not properly observed which resulted in congestion. Paper mill over exploited in bamboo areas

Table 5.4

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

Year	Revenue(in ₹)	Expenditure(in ₹)	Difference (in ₹)
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

(Source: WP D.D. Shagotar)

5.6 5th Five Year Plan (1974-79):-

During this period felling in chil areas was reduced drastically in first three years, whereas in 1977-78 and 1978-79 about10738 M3 excess volume has been removed against prescribed volume. During this period resin tapping has been done regularly. Rill method of tapping has been adopted now. Bamboo working was not carried out properly during this period also. The emphasis had already shifted to raise plantations on blank degraded forests.

Table 5.5

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

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

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

5.7 6th 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. During this period heavy removals had taken place due to heavy salvage felling and excess demand of right holders. Year wise removal for this period in respect of Kunihar Division is given in **Table 5.6** below:

Table 5.6
Yield (in M3) of Chil during IIIrd Five Year Plan

Year	Prescription (m^3)	Removal (m^3)	Deviation (m^3)
1980-81	1000	15847.25	14847.25
1981-82	1000	15847.24	14847.24
1982-83	1000	2119.06	1119.06
1983-84	1000	5252.48	4252.48
1984-85	1000	6820.60	5820.60
Total	**5000**	**45887.13**	**40887.13**

(Source: WP V.K Singh)

5.8 7th Five Year Plan (1985-90)

The social forestry works were in full swing, main emphasis was 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
Expenditure and Revenue of Kunihar Forest Division during VIIth Five Year Plan

Year	Revenue(in ₹)	Expenditure(in ₹)	Difference (in ₹)
1981-82	5455076	5094779	360297
1982-83	3644136	5960484	-2316348
1983-84	3060894	8675041	-5614147
1984-85	810953	5129351	-4318398

(Source: DFO Kunihar)

5.9 8th 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 Kunihar Division

YEAR	TOTAL AREA IN HA.
1992-93	453.72
1993-94	771.33
1994-95	597.00
1995-96	352.00
1996-97	642.50

(Source: DFO Kunihar)

5.10 9th 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 Kunihar Division

YEAR	TOTAL AREA IN HA.
1997-98	510.10
1998-99	548.00
1999-2K	344.00
2000-01	257.16
2001-02	122.80

(Source: DFO Kunihar)

5.11 10th 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. CAT Plan of Kol Dam was also implemented with emphasis on afforestration & soil, water conservation. Detail of works carried out in this CAT Plan is given in **Appendix-XXXVI & XXXVII**

Table 5.10
Plantations Raised during 2002-07 in Kunihar Division

YEAR	TOTAL AREA IN HA.
2002-03	279.36
2003-04	263.40
2004-05	329.50
2005-06	434.50
2006-07	667.40

(Source: DFO Kunihar)

5.12 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.CAT Plan of Kol Dam was also implemented with emphasis on afforestration & soil, water conservation. Some forestry activities were also done in MNREGA. From 2009-10 Rehabilitation of areas infested by invasive alien 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** and **5.12** as under;

Table 5.11
Plantations Raised during 2007-12 in Kunihar Division

YEAR	TOTAL AREA IN HA.
2007-08	439.91
2008-09	405.00
2009-10	352.25
2010-11	318.00
2011-12	
TOTAL	**8277.28**

(Source: DFO Kunihar)

Table 5.12
Rehabilitation of Areas Infested by Lantana in Kunihar Division

YEAR	TOTAL AREA IN HA.
2009-10	83.0
2010-11	75.0
2011-12	190.0
TOTAL	**348.0**

CHAPTER-VI
STAFF AND LABOUR SUPPLY

6.1 Staff:

The following statement shows the present sanctioned strength of various category of staff (permanent, plan and non-plan)

Table 6.1

S NO.	RANK	SANCTIONED STRENGTH	EXISTING STRENGTH
EXECUTIVE STAFF:			
1.	DFO	1	1
2.	ACF	1	1
3.	FOREST RRANGER	5	4
4.	DY. RANGER	16	12
5.	FOREST GUARDS	53	41
MINISTRIAL STAFF:			
6.	SUPDT GR.II	1	1
7.	SR. ASSISTANTS	2	2
8.	JR. ASSTT/CLERKS	6	4
OTHARS:			
9.	KANUNGO	1	1
10.	PATWARI	1	0
11	PEON	10	7
12	CHOWKIDAR	11	8
13	MALI	5	3
14.	CLEANER	1	1
15.	SWEEPER	1	-
16	SYCE	1	-
17	FOREST WORKER	69	69

The strength of staff is quite inadequate. Staff as per sanction strength is required to be posted. The devotion of staff to their duty is found satisfactory and their performance is also good. The In view of the

changing trends (JFF, PRA techniques, MNREGA etc) there is urgent need for imparting specialized skill to both ministerial and field staff.

6.2 Executive Charges:

Kunihar Forest Division is divided into 4 ranges, 10 blocks and 41 beats. A detailed list of territorial units is given below:

Table 6.2

Sr No.	Division	Range	Block	Beat
1	Kunihar	1. Darla	1. Danoghat	1. Chandi
				2. Mangu
				3. Danoghat
			2. Kandhar	1. Bagga
				2. Labrath
				3. Kandhar
			3. Darlaghat	1. Manlog
				2. Kararaghat
				3. Dhundan
				4. Ghanagughat
		2. Arki	1. Arki	1. Arki
				2. Shalaghat
				3. Manju
				4. Sharon.
			2. Jainagar	1. Jainagar
				2. Bainjhatti
				3. Bhumati
				4. Sai
				5. Materni
		3. Kunihar	1. Kunihar	1. Manjyat
				2. Maan
				3. Devidhar
				4. Bani
				5. Domehar
			2. Chandi	1. Chandi
				2. Geola
				3. Gharshi
		4. Kuthar	1. Kuthar	1. Kuthar
				2. Shaktighat
				3. Darwa

				4. Bandh
			2. Patta	1. Beja
				2. Joharji
				3. Patta
				4. Awar
			3. Surajpur	1. Surajpur
				2. Gurdaspura
				3. Kharota
				4. Chadiyar

6.3 Labour Supply:-

With the developmental activities going on in all departments and upcoming industrial growth, labour supply is becoming acute. For execution of various forestry activities under this division scarcity of labour sometimes becomes a limiting factor due to the difference in wages paid by the department and those offered by private employer. For execution of resin and exploitation of timber, the HPSFDC is relying on labour from Mandi, Kangra and Jammu.

6.4 Divisional Forest Officers:-

Detail of DFOs posted in Kunihar Forest Division is in **Table 6.3**

Table 6.3

List of Divisional Forest Officer			
S No	Name	From	To
1	Sh.D D Sharma,P.F.S.II	Oct-48	Jan-49
2	Sh.Pritam Dass,P.F.S.II	Feb-49	Aug-49
3	Sh.Chuni Lal,P.F.S.II	Sep-49	Nov-49
4	Sh. R C Kaushik,P.F.S.I	Dec-49	Feb-50
5	Sh.Sant Ram,P.F.S.I	Mar-50	Apr-50
6	Sh.Arjun Singh,P.F.S.I	May-50	Apr-51
7	Sh.V Raina,P.F.S.I	May-51	Mar-53
8	Sh.Devki Nandan,P.F.S.I	Apr-53	Jul-56
9	Sh.H.P.Sharma,P.F.S.II	Aug-56	Apr-63
10	Sh.S C Sharma	May-63	Sep-64
11	Sh.P N Tikku,I,F.S.	Sep-64	Aug-67
12	Sh.R C Sharma,I.F.S.	Aug-67	Jun-68

13	Sh.R D Rawal,I.F.S	Jun-68	May-72
14	Sh.G C Chaudhary,I.F.S.	May-72	Jun-75
15	Sh.R C Sharma,I.F.S.	Jun-75	Nov-76
16	Sh.Gurcharan Singh,H.P.F.S	Nov-76	Aug-77
17	Sh.S C Sharma	Oct-77	Nov-78
18	Sh.Bahadur Singh	Nov-78	May-79
19	Sh.Baldev Singh	Jun-79	Jul-83
20	Sh.K K Gupta,I.F.S.	Jul-83	May-84
21	Sh D R Awasthy,H.P.F.S.	May-84	May-90
22	Sh.U K Sharma,H.P.F.S.	Jun-90	May-93
23	Sh.N K Bansal,H.P.F.S.	May-93	Jul-95
24	Sh.S M Sharma,H.P.F.S.	Jul-95	Nov-96
25	Sh Rajesh J.Ekka,I.F.S.	Dec-96	Apr-99
26	Sh.U K Banerjee,I.F.S.	Apr-99	Mar-01
27	Sh.Sanjay Sood,I.F.S	Apr-01	Jul-05
28	Sh.S C Thakur,H.P.F.S.	Jul-05	Jun-06
29	Sh.D R Kashyap,H.P.F.S	Jun-06	Nov-09
30	Sh P R Mahajan,H.P.F.S	Nov-09	Onwards

Source: DFO Kunihar

CHAPTER – VII

PAST SYSTEMS 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, Mahlog, 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 chiefs usually used to reserve 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 state 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 Arki Tehsils and parts of Kasuali Tehsil of Solan District.

7.2 Past Management:

For the convenience of review, the past management of forest of Kunihar Forest 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 Sh D D Shagotra Working Plan, i.e. from 1977-78 to 1990-91.

(e) Period of management under Sh V K Singh Working Plan under revision, i.e. from 1991-92 to 2005-06.

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

A brief resume of the progress made in each State during this period is being given in the following paragraphs.

7.3.1 Baghal:

Demarcation was done in 1908, when 32 Demarcated Protected Forests over 6,445 ha. were constituted and a record of rights was prepared. Up to 1936, the forests were worked according to the annual plan of operations. In that year, Print drew up a 5-year programme which provided for coppice felling in DPF Sharon over 8 ha annually. In 1943, a regular Working Schemes was prepared by H.C. Khanna for the period 1943 to 1952.

7.3.2 Kunihar:

At the time of Revenue Settlement in 1924 demarcation of 4 forests was done. No systematic management was attempted at any stage in this State.

7.3.3 Mangal:

Only 9 forests were declared as Demarcated Protected Forests during 1948-51 and Land Revenue Settlement operation. No other conservation work was even done.

7.3.4 Dhami:

In 1890 Mc Intire demarcated 7 forests covering 371 ha and 4 forests covering 59 ha were added in 1906 by W.Mayes. By the year 1948, the State had 27 Demarcated Protected Forests and 8 demarcated ghasnies. Ban forests of the state were worked under Mc Intire Working Plan (1890 to 1906), Mayes Plan (1906 to 1916) and Gibson Plan (1916-17 to 1947-48). The system prescribed was coppice with standards, with a rotation of 26 to 32 years. The number of standards to be retained per hectare was fixed at 62. After that, Puran Singh's Plan followed which was prepared for the period 1948-49 to 1979-80.

7.3.5 Bhajji:

The forests in this State were demarcated in 1904-1905 and record of right was prepared in 1906 to 1917, Gibson Working Plan from 1918 to 1926 and through annual plan of operations from 1927 to 1939. Hari Singh's Working Plan came into force for the period 1940-41 to

1954-55. The forests of this State have been transferred to Shimla Forest Division during reorganization of division in 1984.

7.3.6 Baghat:

35 forests were demarcated and surveyed between 1888 to 1897. Then EM Conventry prepared a working plan which remained in force from 1898 to 1923. The forests of this State have now been transferred to Solan Forest Division.

7.3.7 Kuthar:

10 forests were demarcated by 1893 and 2 more were added in 1904. Mayes Working Plan which was prepared for 20 years in 1904 remained in force till 1933. It contained two working circles, viz. (a) the Chil Working Circle, which covered the chil forests and prescribed thinning and improvement felling on 5 years cycle, and (b) the Scrub Working Circle in which the forests were to be worked under the coppice with standard system on 20 years rotation with the retention of 75 standards per ha. The bamboo areas were to be worked in 3 years felling cycle. Later, the works were carried under a Regular Working Scheme prepared by Pring and Sant Ram, in which rotation for Coppice Working Circle was increased to 30 years and number of standards fixed at 75 to 87 per ha.

7.3.8 Mahlog:

7 forests were demarcated in 1891 and 4 more were added in 1913. A.J. Gibson prepared the first Working plan for the State I 1903 which remained in force for 20 years. He prescribed coppice with standards system for the scrub forests fixing a rotation of 20 years and 2 years felling cycle for the bamboo forest. From 1923 to 1932, work was carried out under annual plan of operations. A fresh working plan/scheme was prepared by Prem Nath and Sant Ram in 1932 for the period 1932 to 1961. They added 25 well stocked Un demarcated Protected Forests in the scheme. They created Chil Working Circle where improvement felling and thinking on 10 years worked under coppice with standard system for fuel wood. The rotation in this case was fixed at 30 years and the number of standard to be retained per ha was fixed at 85 to 100. Bamboo fellings were to be carried out on 3 years cycle.

7.3.9 Beja:

One forest was demarcated in 1911 and 3 more forests were demarcated in 1925. A working scheme was prepared by A.P.F. Hamilton in 1938. It prescribed improvement fellings and thinning on 10 years cycle in Chil forests and coppice with standard fellings on a 30- year

rotation in scrub forest. This was followed by V.Raina's scheme which expired on 31st March, 1961.

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

Before merger, the forests were managed under the guidance of the Punjab Forest Department who arranged for the preparation of the Working Schemes, and Annual Plan of Operations, as necessary. 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 to work the accessible forest for benefits of the States concerned. Under the conditions prevailing at that time, the accessible oak and, mixed deciduous forests were worked for fuel and bamboos. Only thinning and improvement fellings 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 Division. 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 forests 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 by loss of soil through erosion.

7.5 Systems of Management and their results:

7.5.1 Oak forests:

The Oak forests worked under the coppice with standard system since 1890. A rotation of 26 to 32 years with retention of 50-62 standards per ha was prescribed. Progress of coppice regeneration was satisfactory in areas like DF Bareli and DF Salanu, where protection against grazing was adequate. As special closures were nowhere effective, the crops, especially in localities subject to heavy rights, gradually deteriorated.

7.5.2 Chil Forests:

In Kunihar Division, since all the chil crops were in the pole stage, the various schemes prescribed thinning cum improvement felling, generally on a 10 years cycle. Fellings were carried out in accessible areas and some selected old trees were recommended for use by the right

holders. No closures or regeneration with the result that the stocking became open.

7.5.3 Mixed deciduous forests:

In Kunihar Division, the accessible Demarcated Protected Forests were worked under the coppice with standards system on a rotation of 26-30 years. This system worked well in Maihlog, Kuthar and Beja States and the protection was quite effective. But in Baghal and Bhajji States, where the forests were too far from the market, progress was not satisfactory. Thus majority of the mixed deciduous forests were not worked. However, they progressively deteriorated due to continued excessive grazing and unrestricted lopping and cutting of trees for fire wood by the villages.

7.5.4 Mixed Deciduous Forests with Bamboos:

In Kunihar tract bamboos were worked regularly in the premerger period in Maihlog and Kuthar States. In Mahlog both Demarcated Protected and Un-demarcated Protected Forests were exploited. Two years felling cycle was tried in the beginning but was dropped in favor of three years cycle later on. Cleaning of clumps was neglected. The bamboo forests in Mahlog region flowered gregariously during 1953-56. The seedling regeneration made satisfactory progress in the Demarcated Protected Forests which were free from right but it suffered seriously in the Un-demarcated Protected Forests, because grazing had continued in these areas all along. Detail of bamboo flowerings are given in **Table 7.1, 7.2** and **7.3**

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

Source: WP by Sh. V.K.Singh

Table 7.2

Detail of Bamboo Flowering forests in 1996-97				
Range	No of Forest	Name of Forest	Comptt.	Area
Kuthar	D-89	Awar	C.1	18.8
			C.2	20.4
			C.3	18
	D-98	Johar-ka-hara	C.1	20
			C.2	20.8
	D-99	Bragji	C.1	18
			C.2	25.6
			C.3	22
	D-101	Dhanion	C.4	22
	U.379	Chandi	C.2	22.4
	U-425	Duni	C.1	20.4
			C.2	14.4
	U-426	Phophalda	C.1	100.4
			C.2	15.6
	U-431	Ghatiwala	C.1	40
			C.2	36
			C.3	40
	U.433	Lehru		29.6
	U-434	Khalag Joharji	C.1	42
	U-437	Thapal		17.6
	U-463	Chaneog		22
	U-466	Kasal	C.1	35.2
			C.2	40.8
	U-468	Madfal		78
		Bhutiala Charand		20
			Total	**702.8**

Source:- DFO Kunihar

Table 7.3

Detail of Bamboo Flowering forests in 2005-06				
Range	**No of Forest**	**Name of Forest**	**Comptt.**	**Area**
Kuthar	D-105	Nalki		113.2
	U.483	Kaintha	C.1	30
	U.505	Chadyar		42
	U.507	Jumlapur	C1	24
			C2	37.2
	U.508	Kharota		33.2
	U.509	Tibbi		16
	U.510	Khata Pani		83.6
	U.513	Gurdaspur	C.1	14.8
			C.2	20
				414

Source: - DFO Kunihar

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

7.5.6 Protection Works:

In Kunihar tract the un-demarcated forests were not worked and were set apart to meet the requirements of local people but due to excessive grazing and absence of adequate protection, the forests deteriorated on account of loss of soil.

7.6 Post merger period:

The forests of Kunihar tract were managed from 1961-62 to 1970-71 under the prescriptions of Mathauda's Plan and from 1971-72 to 1977-78 under Annual Plan of Operations approved from year to year. 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.

7.6.1 The Chil Working Circle:

All The Chil forests were included in this working circle to be managed under the Punjab Shelter wood system. The so far unmanaged and open Chil forests were to be gradually converted into more or less

even aged fully stocked crops. Enumerations were carried out down to 20 cm d.b.h. in standard 10 cm diameter classes. Exploitation size was fixed at 60 cm d.b.h., with a rotation of 120 years and conversions period of 96 years. Out of the total gross area in this circle, one fourth was allotted to PBI, one fourth to PB II and the balance half was allotted to PB Inter. These areas were clearly defined. After the expiry of this Working Plan, the forests were continued to be worked under Annual Plan of Operations mainly of the prescriptions of the expired working plan.

Three kinds of fellings viz. seeding, secondary and final fellings were prescribed in PBI areas. Detailed guidelines were given for carrying out these fellings particularly for the selection and distribution of seed bearers. Regeneration by way of direct sowing was prescribed in certain areas where adequate numbers of seed bearers were not available. The technique was to be followed as given in the Punjab Forest Leaflet No.4. Regeneration that came up in PB I areas during this period consists of advance growth retained at the time of seeding fellings. Direct sowing of Chil continued up to 1968 and thereafter planning were undertaken.

7.6.2 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 the tract. 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 PBs other 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.

7.6.3 Resin Tapping:

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

7.6.4 The Coppice Working Circle:

All better stocked Ban and deciduous broad leaved species forests of old Kunihar Division, which could be worked economically for fuel, were allotted to this working circle in Mathauda's working plan. Special objects of management were to ensure supply of fuel to the markets at Shimla, Solan and Kalka and to met the demand of right holders. Total area of this circle was 3,640 ha. out of which 2,900 ha was Demarcated Protected Forests, and 740 ha was Un-demarcated Protected Forests. Four felling series, viz. (i) Shimla, (ii) Solan, (iii) Kasuali, (iv)

Kalka were constituted. Silvicultural system prescribed was coppice with standard. Rotation was fixed at 35 years for coppice and 70 years for standards. Yield was prescribed by areas and defined rules for executing fellings were prescribed. Annual felling program for all the series was laid down from 1961-62 to 1995-96. Sowing and planting, weeding, clearing, and thinning were prescribed under subsidiary silvicultural operations.

7.6.5 Result of working:

Regeneration from coppice in oak forests was good. Lack of tending operations in early stage has resulted in congestion of coppice shoots and poor department. Planting of blank patches with oak, Eucalyptus and *Robinia* etc. has been a failure. But Chil has done well. DF Kahl-Ka-Pash and DF Bareli oak forests can be cited as example. Deodar had come upon cooler sites in some of the oak forests. Wherever cleaning in coppice shoots had been done, growth was stimulated and it was vigorous. Annual felling program was more or less carried out according to scheduled, but the scrub forests (mixed deciduous) were not properly protected. Early sowing of Khair, Neem, Zizyphus and Shisham planting could not succeed due to poor protection, drought and at place even wrong selection of species. DF Sharon and DF Kangu forests of Arki Range had been severally affected. 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 are 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.

7.6.6 The Bamboo Working Circle:

Kunihar Tract: under Mathauda's Working Plan, the gross area of the working circle consisted of 1550 ha. in Kunihar Range. This working circle comprised of mixed deciduous board leaved species in which bamboo occurred to a substantial extant of justifying regular exploitation. The sivlicultural system adopted was selection fellings and thinning in each clump as an independent unit of the working. The forests were prescribed to be worked on a 3- years cycle and the yield was regulated by area. Clear cut rules were laid down for executing fellings and definite annual felling program was laid out. Subsidiary silvicultural operations comprised of sowing, plaiting and clearing, removal of dry malformed culms and climbers from clumps.

7.6.7 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. Unrestricted felling by right holders especially by the Banjaras in Kunihar tract aggravated the situation. However, clear felling of scrub forest had been beneficial for bamboo also came up DF Braghu and DF Bijiwala in Kunihar tract can be cited as examples.

7.6.8 The Plantation Working Circle:

Kunihar Tract: In Mathauda's Working Plan the areas proposed to be planted were mostly grassy blank or occupied by low quality mixed deciduous broad leaved species. In addition, some better quality Ban areas suitable for deodar were also identified. The circle partially overlapped the Coppice Working Circle and covered 2170 ha area out of which 1400 ha were considered suitable for plantation work. Definite plantation program for areas in the Coppice Working Circle was prescribed year wise. Species suggested to be raised were Chil, Deodar, Ash, Walnut, Khair and Eucalyptus.

7.6.9 Result of Working:

The annual program of raising of plantations was not strictly adhered to, because of reported difficulties in securing closure with the consent of panchayats and right holders. However, as per records, some areas other than those prescribed were taken-up for plantations. Eucalyptus plantations became a failure in both the tracts except where in Rakh Hatra and partly in Bir Plassi. Khair and Chil were successful in areas where protection was ensured. There were reports of damage by porcupine in newly raised plantations in Dhami Range and fungs attack on young Chil seedlings in Arki Range.

7.6.10 The Protection Working Circle:

Kunihar Tract: this working circle with gross area of 13,720 ha comprised of forests which were (i) inaccessible for raising plantation; (ii) situated on too steep or geologically unstable ground; (iii) in need of protection due to ruthless exploitation in the past; and (iv) old ghasnies of Ex-Dhami State. The special objects of the management of this working circle were to protect the areas against denudation and erosion and to give rest to over exploited areas. No commercial fellings of green trees were to be made expect those marked on conservative selection principles, or under thinning for meeting the right holdersrequirements. Forests were proposed to be closed in toto or in portions for period of 15 years. These

closures were to be followed by sowing and planting and by soil conservation works, wherever necessary.

7.6.11 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. Chil planting in DF Nalag and UF Chaiyan forests shows 50% success. In both the tracts, half-hearted attempts were made to plant some of the accessible areas.

7.7 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, expect 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. However, some parts of this range remained under the jurisdiction of Arki Range. Three forests of Kuthar Range, viz. D.239, Serdhar, D.240 Dochi and D.246 Kasauli were transferred to Solan Forest Division.

Following working circle were constituted by sh. D.D. Shagotar in his working plan:

1. The Chil Working Circle.
2. The Coppice Working circle.
3. The Bamboo Working Circle.
4. The Plantation Working Circle.
5. The Protection Working Circle.

7.7.1 The Chil Working Circle:

All forests bearing a predominantly chil crop and established chil plantation areas were included in this working circle. The system of management was irregular shelter wood system with the floating Periodic Blocks. The unmanaged, uneven aged and openly stocked chil crops were to be converted into more or less even aged fully stocked crops with a normal distribution of age gradations. The total enumeration of all the areas allotted to PB I and partial enumeration of other PBs were carried out. 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.

Out of the total gross area in this circle, one fourth was allotted to PBI. The P.B.I comprised of area having maximum number of

exploitable trees and with almost no regeneration; area which were worked during the previous plan period and where regeneration had been established, the remaining PBI areas of the working plan under revision where Chil regeneration had not been established and new Chil planted areas.

The yield was to be controlled by volume and the deviation of 20% was permitted with ceiling that accumulated yield would not be more than 20% of year's yield at any stage. No thinning was prescribed. Main yield was to come from P.B.I. and was prescribed as 1000 M3 annually for the period of plan. All trees 20 cm and over in diameter were to count towards yield. The yield from PB Inter was to count against the total yield prescribed for this working circle. The yield prescribed was on lower side. The B type areas which were worked during the previous plan period and where regeneration had been established should have been transferred to P.B.IV, instead of allotting these areas to PBI.

Out of the prescribed yield of 14000 M3, up to 31.3.91, 91809.13 M3 had been removed.

The excess demands by right holders and excessive salvage removal have been reported to be the reasons for the excess markings. Only two kinds of felling were prescribed, i.e. seeding felling and final felling. Detailed guidelines had been suggested for carrying out these felling, especially for the selection and distribution of seed bearers. Regeneration was generally expected by natural means. But, it of account of some unfavorable factors adequate natural regeneration of chil would not come within two years of seeding felling artificial regeneration, by monsoon planting of chil, raised in polythene bags, had been suggested. No felling was prescribed for PBII. In PB Inter, dead, dying, top broken and suppressed trees were to be marked.

7.7.2 Results of Working:

The prescription of the working plan has not been adhered to. After 1980-81 no green felling was carried out in the areas where seeding felling was done during the period. However, as far as yield is concerned its removal has been much higher than prescribed due to heavy salvage removals. In B Type areas where final felling was to be carried out it has not been done and the mother trees are standing over the young crop. Regeneration is established and most of such areas are being transferred to PB.IV. Regeneration felling has not been done in some of the forests. Due to this some PB I areas remained un-felled and therefore un-regenerated. On the other hand trees to right holders were marked without giving consideration to silvicultural aspect. The tending operations have

seldom been done in the forests which have resulted in thick growth of deformed poles.

7.7.3 Resin taping:

During this period, resin tapping has been done regularly in all chil bearing areas. The Rill Method of resin tapping has now, been adopted in these forests.

7.7.4 Coppice Working Circle:

This working circle comprised of Ban oak areas of Arki and Dhami ranges. Total area of this working circle was 957.20 ha. Special objects of management were to meet the firewood and charcoal requirements of Shimla and Solan towns; to meet the demands of right holders and to improve the stocking of these forests near to normal as possible. Silvicultural system prescribed was coppice with standard. Rotation was fixed of 35 years for coppice and 70 years of standards. The yield was to be regulated by area. General rules for executing felling were prescribed. Sowing and planting, wedding, cleaning and thinning were prescribed under subsidiary silvicultural operations and definite guidelines were suggested for grass cutting, lopping and notification of the closures.

7.7.4.1 Result of Working:

Prescriptions of the working plan were followed only upto 1983-84. After that almost all the area of this working circle falling under Dhami Range was transferred to Shimla Forest Division. Again during 1992-93, 43.2 ha area of this working circle was transferred to Wild Life Division, Shimla. At present only 102.40 ha area, comprising of five forests, namely, Shilnu (D.56), Gater (D.57), Koil (D.58), Sharma (D.59) and Jhaltu (U.131) are left in this working circle. These forests have been deteriorated due to heavy biotic pressure. In these forests lopping is very heavy.

The experiments with coppice carried out earlier have been a failure. The main reasons for failure were: (a) availability of low moisture during peak period; (b) existence of mature to over mature trees incapable of producing coppice shoots; (c.) existence of mainly non commercial trees in the areas.

7.7.5 The Bamboo Working Circle:

The working circle comprised of mixed deciduous forests with a preponderance of bamboos. 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. Three felling series

namely (i) Commercial felling series, (ii) Thakurdwara felling series and (iii) Local 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 bamboos were prescribed.

7.7.6 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. The prescriptions regarding manu and chals remained only paper prescriptions.

7.7.7 The Plantation Working Circle:

The following types of areas constituted the Plantation Working Circle in Shagotar's Working Plan: (A) mixed deciduous forests without bamboos and ban oak which were included in the Coppice Working Circle under Mathouda's Plan; (B) Dry scrub forests and blank areas except those allotted to Protection Working Circle; and (C) areas which had been worked under modified clear felling system and in which plantations were raised.

The special object of the management was to meet the demands of local people and also to rehabilitate the scrub and blank areas. The forests were stock mapped. The gross area of this circle was 15072.98 ha, out which 1498.15 ha. was under chil, 188.90 ha under oak, 4686.12 ha under broad leaved species and 8708.12 has was blank or scrub area. Partial enumeration was carried out and the average standing volume per ha. was determined as 8.52 M3. 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, biul and shisham. No rotation was prescribed.

For A-type areas, i.e. areas suitable for clear felling and planting, clear cut felling rules were prescribed. The total area under A-type was 3793.11 ha. Out of which 1482.40 ha. to be felled during the plan period. The yield was to be controlled by area.

For B-type, area i.e. the scrub and bank areas, planting programs had been prescribed. The total area of this type was 8379.35 ha.

Out of which 2959.86 ha. was to be taken up for plantation during the plan period.

In C-type areas i.e. the areas in which regeneration had been established, cleaning, thinning and improvement felling were to be carried out as per the prescribed

7.7.8 Result of Working:

The broad leaved miscellaneous forests which mainly constitute the plantation working circle has been deteriorated due to heavy biotic interference. The prescriptions of the working plan have not been followed. The A-type 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. The condition is worst in Kunihar Division where the areas have become scrubby and infested with unwanted species like Thor and Lantana. In B-type areas, the prescriptions of working plan have not been followed. The plantation program 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.

7.7.9. The Protection Working Circle:

This working circle comprised of (i) Demarcated and Un-demarcated Protected Forests of Kunihar tract which are too remote to be worked or which are very open and lie on very steep ground and (ii) eroding areas such as Khols of Nalagarh Tract. The special objects of management were: (a) to protect the areas against further denudation and erosion; (b) to provide rest to the over exploited areas and to improve their condition by planting economic species; and (c) to meet the demand of the right holders for timber and grass.

The gross area of working circle was 757412 ha. Out of which 1596 ha was under chil; 412 ha under bamboo; 2957.4 ha under miscellaneous broad leaved species and 2608.72 ha was blank or scrub area.

From management point of view the areas were divided into two categories (i) A-Type areas were only planting was to be done (2495.34 ha) and (ii) B-type areas which were to be protected (5083.78 ha). For A-type areas, planting program from 1981-82 to 1990-91, was prescribed. The areas for planting were mostly in Dhami Range and Khol Dharampur (D.200) and Khol Nalagarh (D.201) in Nalagarh Range. The species suggested for snowing and planting were chil, khair and bhabber grass. Soil conservation works for some A-type areas of Kunihar tract

were required to be done to save them from erosion and these areas were enlisted. All the areas, taken up for planting were to be closed for at least 10-15 years.

7.7.10 Result of Working:

In the working circle the closure has not been made effective and it has resulted into failure of plantations. However, in Mangal areas some of the remote and difficult terrain has been successfully planted. In the Khols of Nalagarh tract, reclamation work was required with very effective closure and correct choice of species. Khair and shisham have come up well in nallas.

7.8 Period of Working Plan under revision (V K Singh's Plan) i.e. from 1991-92 to 2005-06:

During this period i.e. from April 1992 to March 1993 Social Forestry Division Kunihar was created after transferring the area of Kunihar Forest Division. After this two territorial divisions namely, Kunihar and Nalagarh, came into existence independently.

Following working circle were constituted by Sh.V K Singh in his working plan:

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

7.8.1 The Chil Working Circle:

All forests bearing a predominantly Chil crop and established Chil plantation areas were included in this working circle. The forests allotted to this working circle were managed under Punjab Irregular Shelter wood System which provides retention of advance growth and also selection marking in rugged terrain. The sole objective was to induce natural regeneration by effective closure immediately after seeding felling and resorting to artificial regeneration only where natural regeneration failed, deficient or problematic. The unmanaged, uneven aged and openly stocked Chil crops were to be converted into more or less even aged fully stocked crops with a normal distribution of age gradations. The total enumeration of all the areas allotted to PB I & PB IV and partial enumeration to the extent of 20% in PB Inter were carried out. 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.

Out of the total gross area in this circle, 768.80 ha were allotted to PBI. The P.B.I comprised of - area having maximum number of

exploitable trees and with almost no regeneration; areas which had remained un-generated during the last plan and areas with poor density (below 0.3) of Chil trees.

The yield was to be controlled by volume and the deviation of ±10% was permitted with the condition that it was to be adjusted at the end of 5 years. Main yield was to come from P.B.I. and was prescribed as 1450 M3 annually for the period of plan. All the removals down to 20 cm (class V) d. b. h were counted towards yield. The yield prescribed from PB IV was 850 M3 and from PB Inter 1300 M3.

Out of the prescribed yield of 72000 M3, up to 2010-11, **34618.215** M3 had been removed. The removal and deviation for the period 1991-92 to 2011-12 is given below:

Table 7.4

Year	Annual Prescription in M3	Annual removal In M3	Deviation In M3
1991-92	3600	300.89	-3299.11
1992-93	3600	753.54	-2846.46
1993-94	3600	664.98	-2935.02
1994-95	3600	3137.17	-462.83
1995-96	3600	4340.712	740.712
1996-97	3600	1322.994	-2277.006
1997-98	3600	2468.866	-1131.134
1998-99	3600	1558.244	-2041.756
1999-2000	3600	435.52	-3164.48
2000-01	3600	1482.918	-2117.082
2001-02	3600	1056.29	-2543.71
2002-03	3600	1457.644	-2142.356
2003-04	3600	2430.62	-1169.38
2004-05	3600	1375.494	-2224.506
2005-06	3600	242.525	-3357.475
2006-07	3600	2936.474	-663.526
2007-08	3600	1505.394	-2094.606
2008-09	3600	2155.966	-1444.034
2009-10	3600	2181.93	-1418.07
2010-11	3600	2810.044	-789.956
Total	**72000**	**34618.215**	**37381.785**

Source:- DFO Kunihar

The prescriptions of the working plan have not been adhered after 1980-81 due to blanket ban on green felling in H.P and as such no green felling was carried out in the forests where seeding felling was prescribed during the period of working plan, thus resulted in less yield removal in comparison to the prescribed yield. The removal includes - dead, dry, wind fallen/ uprooted trees which were marked under salvage marking and handed over to HPSFC for commercial exploitation or trees marked under TD in order to meet the bonafied requirement of right holders in respect of timber, fuel wood, crimination etc. Due to this factor yield removal was less as compare to the yield prescribed under the expired working plan.

7.8.2 Results of Working:

The prescriptions of the working plan have not been adhered to. After 1980-81 no green felling was carried out in the areas where seeding felling was to be done during the period. However, as far as yield is concerned its removal has been much lower than prescribed due to ban on green felling. Only the areas where regeneration established and most of such areas transferred to PB.IV. Regeneration felling has not been done in some of the forests. Due to this some PB I areas remained un-felled and therefore un-regenerated. On the other hand trees to right holders were marked without giving consideration to silvicultural aspect. The tending operations have seldom been done in the forests which have resulted in thick growth of deformed poles.

7.8.3 Resin taping:

During this period, resin tapping has been done regularly in all Chil bearing areas. Resin tapping operation is being carried out by the HP State Forest Corporation Ltd.; the responsibility of territorial staff is to enforce the instructions issued from time to time. For resin tapping Rill Method has been adopted in these forests. The Chil forests of Kunihar Forest Division have been under resin tapping for quite a long time and as a result of which some of the areas started showing adverse effects.

7.8.4 The Bamboo Working Circle:

The working circle comprised of mixed deciduous forests (DPFs & UPFs) or part thereof, with a preponderance of bamboos justifying their regular exploitation and independent management. It also includes bamboo growing degraded areas which are suitable for raising this species. The silvicultural system adopted was selection system with thinning. Each clump treated as an independent unit of the working. Three years felling cycle was prescribed. Two felling series namely (i) Kunihar Commercial felling series and (ii) 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 bamboos were prescribed. Gregarious flowering in the forests of Patta and Surajpur Blocks took place in 1996-97 and 2004-05 respectively during this working plan period.

7.8.5 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 through the H.P. State Forest Corporation in Kunihar Felling series and through Bhanjaras in Local Demand Felling Series. 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. The prescriptions regarding manu and chals remained only as paper prescriptions.

7.8.6 The Plantation Working Circle:

The Plantation Working Circle of the plans was constituted by the areas - (A) mixed deciduous forests without bamboos which have not been included under Bamboo working circle, (B) Scrub and blank areas suitable for planting except those allotted to Rehabilitation Working Circle, (C) Established and young plantation areas of broad leaved species; and (D) Un established Chil plantation areas.

The special object of the management was to restock the existing blank degraded areas and areas under useless scrub growth, with species of higher utility & economic value, to maintain the existing young plantation and natural young growth under a systematic regime of cleaning & thinning, to meet the demands of local people and also to protect the hill side against soil erosion. The gross area of this circle was 10247.60ha. Enumeration to the extent of 20% was carried out to assess the growing stock of miscellaneous broad leaved species including Khair. Since no felling was to be done, hence no silvicultural system was prescribed.

Type A: areas, which were open to very open crop of miscellaneous broad leaved species (average growing stock 4 cum/ha), such areas were to be managed to improve the growing stock by protection and planting.

Type B: Scrub or bank areas where afforestation had been prescribed. Out of 5017.00 ha area allotted to this type, 2971.20 ha area was to be taken up for plantation during the plan period.

In C-type areas i.e. the areas in which regeneration had been established, cleaning, thinning and improvement felling were to be carried out as prescribed.

7.8.7 Result of Working:

The broad leaved miscellaneous forests which mainly constitute the plantation working circle has been deteriorated due to heavy biotic interference. The prescriptions of the working plan have not been followed. The A-type area could not be improved due to heavy biotic interference. In B-type areas, the prescriptions of working plan have not been followed. The plantation program was ignored and more and more areas had been taken under plantation without effective protection. The plantations done are not satisfactory. In the established plantations tending operation could not be done due to scarcity of funds. The condition of forests allotted to this circle has become worst due to infestation with unwanted species like Thor and Lantana.

7.8.8 The Rehabilitation Working Circle:

This working circle comprised of (i) Open and steep areas of Demarcated and Un-demarcated Protected Forests which were allotted to protection working circle in Shagotra's working plan and (ii) all other areas which were not allotted to any other working circle.

The gross area of working circle was 2407.20 ha. Out of which 276.00 ha was under Chil; 88.60 ha under Ban oak; 794.40 ha under miscellaneous broad leaved species, 15.00ha was young plantation of BL and 1233.20 ha was blank or scrub area.

No silvicultural system was prescribed. Forests under this working circle were to be protected and rehabilitated. No felling except dead, dry fallen etc. trees were allowed. The culturable blanks and other poorly stocked areas were to be restocked with suitable species. Hardy species such as Khair, Kikar, Shisham etc were to be preferred. Soil conservation works for some areas were required to be done to save them from erosion and these areas were to be identified by some trained officer and detailed scheme was to be prepared before actual execution.

7.8.9 Result of Working:

The prescriptions of the working plan have not been followed in total. In the working circle the closure has not been made effective and it has resulted into failure of plantations. However, in Mangal areas some of the remote and difficult terrain has been successfully planted

7.9 Special Works of Improvement:

7.9.1 Forest Roads and Paths:

A list of forest roads and paths with the year of construction has been given in **Appendix-XXXI.** 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.

7.9.2 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. The repair of the old buildings, particularly of those situated in remote areas continued to suffer for want of sufficient funds.

7.9.3 Boundaries:

The condition on boundary pillars is far from satisfactory. The repair and maintenance have not been systematically as per the repair program prescribed in previous plan. In Kunihar division most of the boundary pillars are in dilapidated condition and some were found all together missing.

7.9.4 Boundary Registers:

Boundary registers have not been properly maintained in Kunihar Forest Division.

7.10 Position of Past Revenue and Expenditure-1991-92 to 2011-12:-The position of past revenue and expenditure is as under:

Table 7.5

Year	Revenue	Expenditure		G. Total	Deficit (in ₹)
		Plan	Non Plan		
1991-92	387646	2584910	7033862	9618772	9231126
1992-93	3064632	19385	15690236	15709621	12644989
1993-94	2115663	4993946	6357880	11351826	9236163
1994-95	475663	5498601	5699318	11197919	10722256
1995-96	298183	5507305	5183600	10690905	10392722
1996-97	445721	6976635	6399247	13375882	12930161
1997-98	660444	7257900	5984195	13242095	12581651
1998-99	215838	9214699	9531900	18746599	18530761

1999-2K	222330	10974500	8939900	19914400	19692070
2000-01	971384	8792800	8816100	17608900	16637516
2001-02	727017	10073456	7588200	17661656	16934639
2002-03	3512557	10959980	7344485	18304465	14791908
2003-04	12636046	3989382	16907100	20896482	8260436
2004-05	7246769	5367680	18095660	23463340	16216571
2005-06	1499907	20394490	7393380	27787870	26287963
2006-07	7871249	21494700	2465600	23960300	16089051
2007-08	18595771	31093535	7674505	38768040	20172269
2008-09	12713142	35945480	9839226	45784706	33071564
2009-10	948049	35160772	7879850	43040622	42092573
2010-11	1621353	51841749	6930950	58772699	57151346
Total:-	**76229364**	**288141905**	**171755194**	**459897099**	**383667735**

Source: - DFO Kunihar

CHAPTER-VIII

STATISTICS OF GROWTH AND YIELD

8.1 General:

Chil and Bamboo are the main species of commercial importance found in this division. Hence sufficient field work was done to study its growth and yield and same is incorporated in this Working Plan. However ,other Broad leaved species are also found in this tract therefore growth and yield data of these species are also adopted from various sources.

8.2 References:

The following records were consulted for compilation of statistics of growth and yield for various species.

1. The Working Plan under revision (V K Singh's Plan)
2. The Working Plan Code.
3. The Working Plan of Solan Forest Division (Archana Sharma's Plan)
4. Forest Mensuration
   BY Chaturvedi, A.N. & Khanna, L.S.

8.3 Chil (*Pinus roxburghii*):-

8.3.1 Volume Factor:

A study relating to calculation of Volume factor and elaborating relationship between age, height. Diameter, volume recruitment period was conducted in Rajgarh, division during the revision of plan by Sh. O.P. Sharma. Various measurements were recorded by felling 219 trees of various height and diameter classes selected randomly all over the entire chil Zone. The data so obtained was computed by Pre- investment Survey of Forest Resources organization Dehradun. The growth and increments were studies by Pressler borer method. The present annual growth percentage have been calculated and co-ordination with P.I.S.. The C.I.A. and M.A.I. have been compiled from FRI yield tables bases on total stem timber for use and comparison. The results are tabulated below.

Table 8.1

Volume Table for Chil

Dia Class in Cm	Vol (M^3)
10-20 V	0.0504
20-30 IV	0.2499
30-40 III	0.6846
40-50 IIA	1.3544
50-60 IIB	2.2593
60-70 IA	3.3994
70-80 IB	4.7746
80-90 IC	6.3849
> 90 ID	8.2303

These volume factors will be used in current plan also.

8.3.2 Growth:

The chil forests of Kunihar Division are almost similar to chil Forests of Solan Division. Hence the data in this regard, has been adopted from Ms Archana Sharma's Solan Working Plan and is reproduced as under:

Table 8.2

Age, Diameter, growth and Recruitment Period for Chil

Diameter classes in cms	Breast height dia(O.B.) in cms	No. of years to reach the data	Passage time from lower to higher dia classes
10-20	15	27	8
20-30	25	44	17
30-40	35	63	19
40-50	45	82	19
50-60	55	102	20
60-70	65	130	28

Source: Solan Working Plan (2002-03 to 2016-17)

Table8.3

Age, Height and Diameter Relationship

Sl. No.	Age in Years	Height in meters	Dia in cms
1.	10	5.8	6.0
2.	20	8.3	11.5
3.	30	10.8	17.2
4	40	13.8	22.8
5.	50	16.9	28.3
6.	60	18.3	33.6
7.	70	20.6	39.0
8.	80	22.7	44.3
9.	90	24.5	49.6
10.	100	25.4	54.4
11.	110	26.2	58.7
12.	120	26.8	62.3
13.	130	27.1	65.0

Source: Solan Working Plan (2002-03 to 2016-17)

8.3.3 Increment %:

The current annual growth percentage for each diameter class was calculated during preparation of O.P. Sharma's Plan for Rajgarh Forest

Division, by increment boring and by collection of felled trees data In co-ordnance with Pre-investment Survey of Forests Resources Organization. The data was complied by Data Processing Officer, PIS Centre, Dehradun. This has been used in Archana Sharma's Solan WP, which are reproduced below:

Table:-8.4
Current annual growth (CAI) percent

Diameter Classes (cms)	Current annual increment	
	Last 10 years	Previous 10 years
10-20(15)	4.56	4.66
20-30(25)	3.75	4.60
30-40(35)	2.69	3.24
40-50 (45)	2.26	2.35
50-60(55)	1.99	2.13
60-70(65)	1.56	1.88
70-80(75)	1.14	1.14
80-90(85)	0.92	0.92
90 & above(95)	0.66	0.66

Source: Solan Working Plan (2002-03 to 2016-17)

Table 8.5
Table C.A.I. and M.A.I. of Chil (FRI yield Table)

Age /age class in years	Quality III			Quality II/III		
	CAI M3 /ha	CAI %	MAI M3 /ha	CAI M3 /ha	CAI %	MAI M3 /ha
10-20 20	0	0	0	0	0	0
20-30 30	4.688	20	1.539	10.636	20	3.534
30-40 40	13.015	11.64	4.408	13.33	7.71	5.983
40-50 50	7.977	3.68	5.108	1.356	3.556	6.858
50-60 60	8.467	2.836	5.668	9.412	2.413	7.277
60-70 70	7.837	2.063	6.018	8.607	1.793	7.487
70-80 80	6.367	1.412	6.018	8.082	1.435	7.557
80-90 90	7.137	1.377	6.158	8.222	1.275	7.627
90-100 100	7.137	1.211	6.228	7.732	1.068	7.627
100-110 110	5.388	0.826	6.158	6.123	0.772	7.627
110-120 120	3.849	0.551	5.948	4.234	0.501	7.208

Source: Solan Working Plan (2002-03 to 2016-17)

8.3.4 Value of 't' & 'z':-

The value of 't' (time taken by IIB class tree to pass to IA class) and 'Z' (the mortality i.e. decrease in number from IIA to IA) is taken as adopted in Solan Forest Division Plan (2002-03 to 2016-17) by Dr. Archana Sharma. The value of 't' is 30 years and 'z' is 23%.

8.4 Ban Oak and Kokat:

As the quality of Kokat in Kunihar Forest Division does not differ much from those of the adjoining Solan Division, hence the volume factor/ Conversion factors used in Solan Forest Division in Ms Archana Sharma's Working Plan is being adopted in this plan. The diameter class wise volume and weight of firewood and charcoal of Ban oak and Kokat are given in the **Table 8.6** below:

Table: 8.6
Diameter classes and firewood/ charcoal production.

Diameter class in cms	Ban oak			Kokat		
	Volume in m^3	Firewood (Qtl)	Charcoal(Qtl) 16.5% of F/wood	Volume in m^3	Firewood (Qtl)	Charcoal(Qtl) 10.25% of F/wood
10-20(V)	0.054	0.65	0.107	0.06	0.40	0.041
20-30(IV)	0.25	3.00	0.495	0.112	0.75	0.077
30-40(III)	0.558	6.70	1.105	0.336	2.25	0.231
40-50 (IIA)	0.958	11.50	1.897	0.672	4.50	0.461
50-60(IIB)	1.5	18.00	2.970	1.00	6.70	0.687
60-70(IA)	1.867	22.40	3.696	1.284	8.60	0.881

Source: Solan Working Plan (2002-03 to 2016-17)

Table 8.7
Conversion factor between volume, weight of firewood and charcoal

Species	Firewood		Charcoal	
	Weight(Qtls)	Volume(m^3)	Weight(Qtls)	Conversion
Oaks	12	1	1.98	16.5
Kokat	6.7	1	0.687	10.25

Source: Solan Working Plan (2002-03 to 2016-17)

8.5 Broad Leaved Species:

8.5.1 Volume factors:

Table 8.8

Volume factors of Miscellaneous B/L/ Species

Species	Class					
	10-20(V)	20-30(IV)	30-40(III)	40-50(IIA)	50-60(IIB)	60-70(IA)
Terminalia tomentosa	0.127	0.368	0.825	1.770	3.030	4.557
Dalbergia sissoo	0.064	0.176	0.467	0.977	1.523	2.265
Juglans regia	--	0.2	0.8	1.5	2.5	3.8
Robinia pseudoacacia	--	0.3	0.6	1.0	1.4	1.7
Eucalyptus	0.114	0.312	0.500	0.600	0.600	0.600
Poplar	--	0.3	0.7	1.4	2.8	4.9
Celtis australis	0.3	0.7	1.3	2.2	3.3	4.6

Source: Solan Working Plan (2002-03 to 2016-17)

8.6 Khair:-

In this also Solan Working Plan is adopted. The Solan Working Plan has used the data originally from Nurpur Working Plan prepared by Sh. Nank Chand, 10 trees of each diameter were sampled and data in respect of standing volume, heartwood volume, weight of chips & quantity of Katha was collected. The results so obtained are reproduced as below:

Table 8.9

Standing volume and out turn of other products from Khair

Diameter Class(cm)	Height (m)	Standing Volume (M3)	Heartwood volume (M3)	Weight of Chips (Kg)	Weight of air dried Katha (Kg)
10-15	8.30	0.0257	0.0122	11.2	--
15-20	10.10	0.0686	0.031	31.6	2.5
20-25	11.80	0.1181	0.0576	50.6	5.0
25-30	12.40	0.1697	0.1096	78.7	8.0
30-35	13.40	0.2528	0.1757	128.3	14.0
35-40	13.40	0.331	0.2406	167.7	18.0
40-45	13.40	0.4337	0.3016	197.4	23.0
45-50	13.40	0.5468	0.3898	280.1	29.0

Source: Solan Working Plan (2002-03 to 2016-17)

8.7 Bamboo:

Since bamboo is an important species of the division, efforts were made to collect data on growth and yield to bamboo (*Dendrocalamus*

strictus) in great detail. Collection of data was done in depth to arrive at the following:

a. Number of clumps per hectare; i.e. density.
b. Size and composition of clumps; i.e. category wise number of culms per clump.
c. Out tern from each clump: i.e. yield studies in terms of culms per ha and bundles per ha.

The detail of the study is given in chapter III of Part II (Bamboo working Circle) but the conclusions based on the studies are given here. The average number of clumps per ha for the natural bamboo forests and in the plantation areas is given in the **Table 8.10**. It is observed that density is highly variable in natural and plantation areas. Even in the natural bamboo areas of the division, density of clumps per ha varies greatly. The results are tabulated below:

Table 8.10
Area Wise density of Bamboo Clumps

Type of area	Total area enumerated	Total clumps enumerated	Average No. of clumps per ha.
Plantation area	1.5	893	595
Natural Area	1.5	280	187

Similarly the composition of the clumps in different categories of areas was also studies involving 1173 clumps and the results are tabulated as under in **table 8.11**

Table 8.11
Area wise Average composition and number of culms per clump

Type of rea	Total No. of clumps numerated	Total Manus	Average Manus per clump	Total Chals	Average Chals per clump	Total older culms	Average older culms per clump	Total culms per clump	Average no. of culms per clump
Plantation	893	1518	1.70	1250	1.39	27415	30.70	30183	33.79
Natural	280	1708	6.1	1456	5.2	3584	12.8	6748	24.1

The bamboo is extracted and sold in bundles. The commercial classification of bamboo that is normally followed in this area along with the specifications is given as under:

Table 8.12
Commercial classification of bamboos:

Class	Specification		No. of sticks per bundle
	Length	Girth	
Chawar	14'	Over 6"	5
Bahi I	6 ½'	5"-6"	10
Bahi II	6 ½'	4"-5"	15
Manjhola	6 ½'	3"-4"	20
Lathi	6 ½'	2 ½" -3"	30
Chatti	6 ½'	2 ½"	40
Porel	14'	Over 3"	10
Pore II	12'	2"-3"	15
Char	9'	2"	30

8.8 Quality Class

The quality class in respect of Chil was assessed ocularly and cross checked by height and diameter measurement of at least 2-3 trees in each Comptt /Sub- compartment with those of standard quality classes. The quality classes determined have been recorded in respective compartment history files.

8.9 Density:

Density of all the Compartment/ Sub- compartments has been calculated either by basal area method or ocularly and mentioned in respective compartment history files.

8.10 Enumeration:

10% forests of PB I & PB IV and 5% of PB Inter areas have been randomly selected online after giving due weightage to area of forests. Then complete enumerations in these selected forests were carried out in 10 cms diameter class down to 10 cms d.b.h. while In Bamboo Working Circle and Soil cum Biodiversity Conservation WC 5% compartments have been selected and completely enumerated.

In bamboo areas studies for density of Bamboo clumps over 5% of the total area were carried out in the bamboo forests of Kuthar Range and number of culms in each clump in bamboo area to assess the yield/ outturn of bamboo was done over 3 ha area in which 1173 number of clumps were studied.

8.11 Stock Mapping:-

The stock maps of all forests have been taken from Survey sheets 1:15,000 scale and have been placed in their respective compartment history files.

Chapter IX
Estimate of Capital Value of the Forest

9.1 Capital value of the land under forest:

The estimated capital value of the forest lands bases on the average annual values for the year 2000, provided by the revenue department pertaining to Arki, Kasauli Tehsils comes to approximately Rupees 1107.50 crores. The **Table 7.1** below gives this detail bases on the category of forest land. This abstract has been worked out on the basis of the compilation done for each forest of the division.

Table 9.1
Capital value of Forest Land

S.No.	*Type of Forest Land*	*Area(Ha)*	*Average cost of Land(Rs/ha)*	*Total Cost of Land (Rs)*
1.	*Demarcated Protected Forest*	6042.50	6200000	37463500000
2.	*Un-demarcated protected Forest*	11820.40	6200000	73286480000
	Total:	17862.90		110749980000

Source: NIC site

9.2 Capital Value of the Growing Stock:

The estimated value of the growing stock present in the forests of Kunihar Forest Division is as given in **table 7.2.** The estimation has been done on the basis of rates fixed by Pricing Committee for the year 2000-2001 and conveyed by DFO Kunihar.

Table 9.2
Capital Value of Growing Stock

S. No	*Species*	*Growing Stock(M3)*	*Market Rate (₹ /M3)*	*Total value (in ₹)*
1	*Chil*	192091.52	18630	357,86,65,018
2	*Misc. broad leaved species*	82525.41	6888	56,84,35,024
		174616.93		414,71,00,042

9.3 Capital Value of Minor or Non-wood Forest Produce:

The annual income from minor forest produce in this division is given in table 7.3 . Value accrued from the NTFP has been based on the figures of 2010-11 as received from the HPSFC division Solan and Ranges of Solan Forest Division.

Table 9.3
Value of Minor / Non Timber Forest Produce

S. No	*Produce*	*Amount* (in ₹)
1.	*Resin*	16,91,864

9.4 Total Estimate Value

The total estimated capital value of the forest of this division, including value of land, growing stock, work out to the tune of Rs. 1522.209 Crore millions. In addition NTFPs worth Rs. 17.00 lacs would be available for extraction annually.

PART –II

FUTURE MANAGEMENT DISCUSSED AND PRESCRIBED

CHAPTER I

BASIS OF PROPOSAL

1.1 General:-

A very large section of our rural and remote area population depends on forests for their sustenance needs. The urban populations which may not be in the proximity of forests also indirectly depend on forests and derive innumerable benefits from them. Forests provide environmental and productive services. Forests of Himachal Pradesh are very important, being integral part of Himalayan Eco-System. They have been instrumental in the economic development of vast Indo-Gangetic plains in particular the Sutlej-Ganga basin. The forests of HP have undergone a sea change in the past few decades and are presently under a great stress. They have been venerated as an entity but over-used as a resource. Forestry in the present times has undergone striking changes. The focus of management has shifted from production to conservation. Non-timber forest produce has come to the forefront of forestry management. The role of local people in protection and management of forests has grown from strength to strength. Joint Forest Management has taken a formal shape. The decentralized planning process for area specific forest management approach has resulted in formulation of micro plans. 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 a back seat and the needs of local population while managing the forests have assumed priority. The emphasis is also on shifting to involve people in the protection and development of forests. Himachal Pradesh Forest Policy 1980 envisages meeting the requirements of local right-holders while giving importance to watershed management. Similarly National Forest Policy 1988 emphasizes on efficient utilization of forest produce and maintaining substitution of wood and to meet the requirements of fuel wood, fodder, minor forest produce and small timber of the rural and tribal population. It further emphasizes on creating a massive peoples' movement with the involvement of women for achieving these objectives and to minimize pressure on existing forests. The salient features of the National Forest Policy1988 are as follows:

1.1.1 National Forest Policy of 1988:-

The forest Policy of 1952 was revised in 1988. The principal aim of the new Policy is maintenance of environmental stability and ecological balance through preserving the natural forests. Derivation of direct economic benefit has been subordinated to this principal aim. The policy , for the first time, has given emphasis to the involvement of people , including women, in the protection and development of forests. The salient features of the Forest Policy of 988 are:-

i) Setting of a national goal to have a minimum of one third of the total land area of the country under forest or tree cover

ii) Initiating need-based and time bound programme for afforestation on participatory forestry and common property management.

iii) Increasing productivity of forests through scientific management, based on management plans to be approved by the Government.

iv) Right and concession of the rural people including that of grazing, to be in accordance with the carrying capacity of the forests; the rights and concessions enjoyed by the tribal and other poor people living within and around forest to be fully protected; minor forest produce and construction timber to be the first charge on forest produce.

v) Greater emphasis on forest protection and wildlife conservation in all management plans.

vi) Strengthening of forest extension, forestry education and research.

vii) Supply of forests produce to industries on concessional prices to cease; no forest based enterprise, except at the cottage level, to be permitted in future unless it has been first cleared with regard to assured availability of forest produces; forest based enterprises to raise their own material requirement by establishing direct relationship with individual farmers;

viii) Creating a massive people's movement with the involvement of women for achieving objectives of the policy.

1.1.2 Himachal Forest Policy:-

Himachal Pradesh Government has formulated a Forest Policy for the Pradesh vide No. Fts (8) 17-5/10 dated 3rd September, 1980. Important features of this Policy is as under:-

i) To have 50% of the geographical area of the state under forest by 2000 AD and to raise this percentage to 60% ultimately.

ii) Felling to be carried strictly in accordance with the prescriptions of sanctioned Working Plans and all kinds of removals from the forests to be counted against the prescribed yield.

iii) Felling to be followed by regeneration.

iv) No felling upto 30m on either side of the roads.

v) All forest area to be properly demarcated.

vi) Forests and Revenue Settlements to be taken up simultaneously and the right to be defined and regulated by an Act of Legislation.

vii) The requirement of local right- holders to be met with judiciously keeping in view the conditions of forests.

viii) There being hardly any scope for further extension of agriculture, the people should be encouraged to adopt some alternative professions.

ix) Transfer of areas under reserved, demarcated protected forests and plantations for non- forestry purposes to be totally banned.

x) Management of water sheds to be given due importance.

xi) The methodology of planting and standards of protection to be improved to reduce mortality percentage.

xii) The vast blank stretches in the productive waste lands to be afforested under Social Forestry Programme with appropriate involvement and cooperation of people especially youth and school children.

xiii) Planting of fast growing fuel and fodder species to be preferred near habitations to meet the requirements of the local people.

xiv) Steps to be taken to reduce cattle population rationally, fixing norms of grazing under comprehensive legislation.

xv) To promote tourism along with improvement of forest vegetation.

xvi) Shooting big and small game should be banned in the Pradesh for the development of Wildlife. Game sanctuaries should be established and properly managed all over the State.

xvii) No leas for the extraction of minerals to be granted without the prior consent of Forest Department.

Research facilities to be created in the Forest Department to solve problems of applied nature.

1.2 Essential of Forest Management:-

(i) Existing forest and forest lands should be fully protected and their productivity improved. Forests and vegetal cover should be

increased rapidly on hill slopes, in catchment areas of rivers and reservoirs on Mid Himalayan Region.

(ii) Diversion of good and productive agricultural lands to forestry is discouraged in view of the need for food production.

(iii) For the conservation of total biological diversity, biospheres reserves and other protected areas should be strengthened and extended adequately.

(iv) Provision of sufficient fodder, fuel and pasture, especially in areas adjoining forest, is necessary in order to prevent depletion of forests beyond the sustainable limit. Since fuel wood continues to be the predominant source of energy in rural areas, the programme of forestation should be intensified with special emphasis on augmenting fuel wood production to meet the requirement of the rural people.

(v) Minor forest produce provides sustenance to tribal population and to other communities residing in and around the forests. Such produce should be protected, improved and their production enhanced with due regards to generation of employment and income.

(vi) To regulate and control both local and migratory grazing as far as possible.

1.3 Objectives of Management: -

General objectives of management of forests of Kunihar forest division are as under:-

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

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

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

(iv) To produce the optimum yield of resin subject to the maintenance of the chil crops in the healthy and thrifty conditions.

(v) To regulate and control both local and migratory grazing as far as possible.

(vi) To improve the status of growing stock in the Bamboo forests both in quantitatively and qualitatively.

1.4 Method of treatment:-

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

- It is emphasized that all fellings prescribed in the Working Plan for the purpose of regeneration should commensurate with the budget provisions for regeneration.
- Chil forests will be managed for preservation under Indian irregular Shelter wood system.
- The broad leaved species form pure patches in the shady areas in the chil forests. They shall not be felled unless they are found suppressing the regeneration of these species.
- All areas situated on steep to precipitous or degraded areas which are subject to heavy erosion and grazing pressures are essentially the protection forests. The efforts will be made to improve the growing stock and protective cover on the soil to prevent further depletion of forests.
- Lantana infested forests of all WCs will be rehabilitated by cut root stock method supplemented by planting mainly bamboo and other valuable local species.
- Bamboo areas will be managed under Selection-cum- Improvement System in order to create hygienic conditions and improve the productivity.

1.5 Constitution of Working Plan:-

In conformity with the objective of management discussed above the following Working Circles are constituted:-

i) Chil Working Circle — 3565.00 ha
ii) Bamboo Working Circle — 1634.00 ha
iii) The Soil cum Bio-Diversity Conservation Working Circle — 12663.60 ha.
iv) Wildlife Working Circle(Overlapping)
v) Joint Forest management Working Circle (Overlapping)
vi) Plantation Working Circle(Overlapping)

In addition chapters dealing with the following topics have been incorporated owing to their importance in present day Forest Management.

i) Forest Protection
ii) Resin
iii) Diversion of forest land under Forest Conservation Act, 1980

iv) Non Timber forest Produce
v) Miscellaneous Regulations
vi) Establishment and Labour
vii) Control of Record
viii) Financial Forecast and cost of the Plan
ix) Summary of Prescriptions

The breakup of area Range wise and legal classification wise under different Working Circles:-

Table 1.1
Showing Areas covered under different working Circle

Sr. No.	*Name of Range*	*Legal Classification*	*Chil WC*	*Bamboo WC*	*Soil cum Biodiversity Conservation WC*	*Total*
1.	Darlaghat	DPF	474.4	-	1361.6	1836.0
		UPF	571.2	-	2754.0	3325.2
2.	Arki	DPF	693.0	-	1564.8	2257.8
		UPF	342.0	-	1965.2	2307.2
3.	Kunihar	DPF	192.4	-	905.2	1097.6
		UPF	599.2	-	1394.4	1993.6
4.	Kuthar	DPF	116.0	572.40	162.4	850.8
		UPF	576.8	1061.60	2556.0	4194.4
	Total	**DPF**	**1475.8**	**572.40**	**3994.0**	**6042.2**
	Total	**UPF**	**2089.2**	**1061.60**	**8669.6**	**11820.4**

Out of 12663.6 Ha total area of soil and Biodiversity Conservation, 382.0609 Ha area has been diverted for mining purpose for JP Cement and Ambuja Cement. Detail is tabulated in **Table 1.2**

Table 1.2

Name of forest	Company	Area (Ha)	Extent
D.1 Bagga	**JP Cement**	30.973	Partly
D.2 Samtiari		31.8199	Partly
U.3Samtiari		108	Partly
U.4Dhauta		72	Partly
U.5 BagaMangal		28	Total
U.14Sehnali		46	Partly
	Total	**316.7929**	
U.42Sanghoi	**Ambuja Cement**	12.4	Total
U.44Chaura		14.8	Total
U.45 Rouri		8	Total
U.46 Patti		7.2	Total

U.32Badog		4.012	Partly
U.48 Kashlog		2.166	Partly
U.50Fagwana		1.08	Partly
U.51Chakhru		15.6	Total
U.159BagaBhagal		0.01	Partly
	Total	**65.268**	
	G Total	**382.0609**	

1.5.1 The Chil Working Circle:-

This Working Circle is composed of all such forests where chil is found either in pure or in fair proportion and are considered suitable for application of the system of concentrated regeneration felling. Indian Irregular shelter wood system is prescribed with rotation at 120 years corresponding to 50 cm dbh. In general forests correspond to the F.R.I. quality III with some exceptions which are quality –II/III. Exploitable diameter is kept at 50 cm with a felling cycle of 15 years, corresponding to plan period.

1.5.2 Bamboo Working Circle:-

All the scrub forests, which were part of bamboo working circle in VK Singh's Plan have been placed under this Working Circle. The felling cycle is kept at 3 years.

1.5.3 Soil and Bio Diversity Working Circle:-

This Working Circle includes mainly the miscellaneous Broad leaved areas, scrub areas, Chhal, Khair Jhingan, Simbal, Sain, Siris and Bamboo etc. are the main species found in these forests and also Chil, Deodar, Khair areas which are very small, along the road sides or adjoining habitation or forests at steep slopes prone to high erosion.

The objects are to identify critically eroded areas and suggested suitable prescriptions for treatment in order to ensure restoration of productive potential and conservation of biodiversity.

This working circle includes forest allotted to erstwhile Plantation and Protection-cum- Rehabilitation Working Circle in previous plan. Almost all area of this WC is *Lantana* infested. It also includes those areas which are seriously eroded and denuded and needs immediate soil and moisture conservation measures. The detailed description of each forest is given in concerned Compartment History file.

1.5.4 Plantation Working Circle (Overlapping):-

This working circle comprises all the Demarcated and Undemarcated forests of Kunihar Forest Division. The prime object of management is to manage degraded, poorly or sparsely stocked, blank forests on scientific basis so as to increase the area under forest cover, thereby, reducing the pressure on other forests.

1.5.5 Wild Life Management Working Circle (Overlapping):-

In this chapter the importance of wildlife conservation, its management has been discussed in detail. The problems especially relating to man-animal conflict in the area and suitable preventive measures to manage the wildlife has been discussed.

1.5.5 Joint Forest Management Working Circle (Overlapping):-

In this chapter the experience gained from social forestry, ODA, DFID, SVY projects have been incorporated to enlist the potential *panchayats* /villages where JFPM approach can be successfully implemented.

1.5.6 Reasons for Constitution of Working Circles:-

The forests have been allotted to various working circles on the basis of the physiography, growing stock, managerial requirements to meet specific objectives as enlisted in detail in chapters ahead.

1.5.7 Blocks and Compartments:-

Numbers of Forests in this plan are same as that of old Plan. All the blocks, compartments and sub compartments have been maintained as such. Invariably the natural features like ridges, nallas, and paths form the boundaries. The order in which numbering was done Range wise is Darlaghat, Arki, Kunihar, Kuthar, separately for DPFs and UPFs.

1.5.8 Enumerations:-

Complete enumeration has been carried out in 10 % of total compartments in PB I, PB IV and 5% of PB Inter after giving weightage to area in Chil Working circles. In Bamboo Working Circle and Soil cum Biodiversity conservation WC 5% compartments have been completely enumerated.

1.5.9 Stock Mapping:-

The stock maps of all forests have been taken from Survey sheets 1:15,000 scale and have been placed in their respective compartment history files.

1.5.10 Period of Plan:-

The revised Working Plan has been prepared for the period of 15 years, commencing from 01.04.2012 to 31.03.2027. The working Plan under revision was expired on 31.03.2006. Period from 01.04.2006 to 31.03.12 shall be treated as gone over period.There were no Silivicultural felling/green fellings. The other operations like salvage felling, plantations, control burning repair of boundary pillars etc. were done on the basis of Annual Plan Operations. The Bamboo felling however has been done in a sequential manner based on the previous felling programme after getting the approval from competent authorities.

A mid-term review of the Working Plan to assess and monitor the implementation of the prescriptions of plan should be carried out during the eighth year of the plan period i.e. around the year 2020.

CHAPTER-II

THE CHIL WORKIN CIRCLE

2.1 General Constitution of the Working Circle:-

This Working Circle is comprised of all Demarcated protected forests and Undemarcated protected forests of the division where chil is found either in pure or in fair proportion and are considered suitable for application of the system of concentrated regeneration felling. Indian Irregular shelter wood system is prescribed with rotation at 120 years corresponding to 50 cm dbh. In general forests correspond to the F.R.I. quality II with some exceptions which are quality –II/III. Exploitable diameter is kept at 50 cm with a felling cycle of 15 years, corresponding to plan period. Two new forests have been added to the area of previous WP.The area of these forests is 27.20 Ha. The Total area of this working circle is 3565.0 ha. The detail of the forests allotted to this working circle is given in **Appendix-II.**

Area of Chil Working Circle of V.K. Singh's Plan	3537.80 ha
Add areas transferred from Plantation WC (VK Singh's Plan)	27.20 ha
Total area of present Chil Working Circle:	**3565.00 ha**

2.2 General Character of the Vegetation:-

The forests in this circle have pure crop of Chil and mostly conform to the Champion and Seth's Forest type 9 Class- Lower Shivalik Chir pine forests. They lie between 980-1440 meters to 1760-1940 meters elevation. The forests are heterogeneous as far as age class distribution is concerned. Normal distribution of age gradation is absent, except in the PB IV areas which generally contain fairly dense even aged young crop of chil. The stocking of older trees is generally poor while there is predominance of younger age classes. Barring the PB IV areas the crop in the other periodic blocks is irregular and stocking is poor to moderate. The crop is pure with few associates like *Pistacea integerrima, Sapium insigne, Pyrus pashia* etc. Lantana has been invaded in most of the compartments of this working circle **(Detail in Table 11.1)**The general character of vegetation has been dealt in detail in **Chapter II of Pat-I** of this Plan.

2.3 Special Object of Management:-

The special objects of management of forest under this working circle will be as under:-

1. To continue the conversion of generally irregular chil forests to more or less regular and uniform crop.
2. To provide for efficient ecological services to people through watershed development.
3. To provide for the requirements of the right holders for constructional timber, firewood and grazing etc.
4. To restock areas with deficient regeneration either naturally or artificially.
5. To produce resin without damage to the trees.

2.4 Area Statement:-

The range-wise distribution of the area in this Working Circle is as under:-

Table 2.2
Range wise area distribution in Chil Working Circle.

Range	Class of Forest	PBI	PB IV	PB Inter	Total
Darla	DPF	126.8	144.4	203.2	495.2
	UPF	0	422.8	148.4	596.0
	Total	**126.8**	**567.2**	**351.6**	**1091.2**
Arki	DPF	203.6	223.6	265.8	672.2
	UPF	39.2	122.8	180	290.0
	Total	**242.8**	**346.4**	**445.8**	**962.2**
Kunihar	DPF	62.4	96.8	33.2	192.4
	UPF	115.2	71.2	412.8	599.2
	Total	**177.6**	**168**	**446**	**791.6**
Kuthar	DPF	80.8	32.4	2.8	116.0
	UPF	98.8	58.4	419.6	576.8
	Total	**179.6**	**90.8**	**422.4**	**692.8**
	G Total	**726.8**	**1172.4**	**1665.8**	**3565**

2.5 Blocks and Compartments:-

The boundaries of the compartments and Sub- compartments have been retained as per the previous working plan. Two new forests are added to previous working plan. list of forests allotted to this working circle is given in **Appendix-II**

2.6 Felling Series: Only one felling series has been constituted.

2.7 Analysis and Valuation of the crop:

2.7.1 Stock Map: -

The entire area has been stock mapped afresh on 1:15,000 scale survey sheet and copies of the map have been placed in the concerned Compartment History Files.

2.7.2 Density of the Crop:-

Density is variable and has been assessed occularly. The density varies from 0.2 to 0.8 with the average being 0.5. The forests away from habitations and the PB IV areas are better stocked than those in the lower reaches and in the vicinity of villages. The density of each forest has been recorded in the list of forest in **Appendix –II.**

2.7.3 Site Quality:-

The site quality of each compartment and sub compartment has been assessed and noted in compartment history file. The quality varies from locality to locality. In general forests correspond to the F.R.I. quality III with some exceptions which are quality –II/III.

2.7.4 Enumerations:-

10% forests of PB I & PB IV and 5% of PB Inter areas have been randomly selected online after giving due weightage to area of forests. Then Complete enumerations in these selected forests were carried out in 10 cms diameter class down to 10 cms d.b.h. The PB wise result of enumerations, abstract /summary of enumeration is given in **Table 2.3** The average growing stock is 47.106 M3 which is 38.12% of normal growing stock (123.56 M3 /ha) The tabular statement showing the comparison of stocking during the past and present plan is given in **Table 2.6.**The enumeration results of the Working Circle are annexed as **Appendix-VI,VII and VIII.**

Table 2.3

	Chil			Other B/L		
	No.	*Estimated No of Trees*	*Estimated standing Vol M3*	*No.*	*Estimated No of Trees*	*Estimated StandingVol M3*
PB I (14.81%)						
10-20 V	10818	73045	3681.480	1608	10858	586.307
20-30 IV	2632	17772	4441.167	407	2748	687.036
30-40 III	2728	18420	12610.323	153	1033	576.462
40-50 IIA	494	3336	4517.715	94	635	608.049
50-60 IIB	335	2262	5110.503	18	122	182.309
60-70 IA	145	979	3328.244	4	27	50.409
70-80 IB	48	324	1547.473	0	0	0.000
80-90 IC	12	81	517.345	0	0	0.000
>90 ID	4	27	222.290	0	0	0.000
Total	**17216**	**116246**	**35976.541**	**2284**	**15422**	**2690.571**
PB IV (12.45%)						
10-20 V	10793	86691	4369.214	5388	43277	2336.964
20-30 IV	14609	117341	29323.607	7953	63880	15969.880
30-40 III	3517	28249	19339.263	2469	19831	11065.880
40-50 IIA	287	2305	3122.191	332	2667	2554.667
50-60 IIB	46	369	834.761	80	643	963.855
60-70 IA	19	153	518.784	23	185	345.395
70-80 IB	10	80	383.502	0	0	0.000
80-90 IC	5	40	256.422	0	0	0.000
>90 ID	0	0	0.000	0	0	0.000
Total	**29286**	**235229**	**58147.745**	**16245**	**130482**	**33236.640**
PB Inter (5.40%)						
10-20 V	6027	111611	5625.200	474	8778	474.000
20-30 IV	5743	106352	26577.328	96	1778	444.444
30-40 III	1254	23222	15897.933	47	870	485.667
40-50 IIA	361	6685	9054.415	17	315	301.593
50-60 IIB	219	4056	9162.717	6	111	166.667
60-70 IA	74	1370	4658.437	3	56	103.722
70-80 IB	25	463	2210.463	7	130	0.000
80-90 IC	4	74	472.956	0	0	0.000
>90 ID	1	19	152.413	0	0	0.000
Total	**13708**	**253852**	**73811.861**	**650**	**12037**	**1976.093**
G Total	**60210**	**605327**	**167936.1465**	**19179**	**157941**	**37903.30363**

Table 2.4
Stocking (No. and Vol. M3) of chil Working Circle in past and present plan

Past (Area Chil 3537.8_ ha)										
Parameter	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	>90	Total
Number	365646	143049	89508	58568	29693	16147	6747	2124	580	712062
Vol(M3)	20476.17	20026.86	62655.6	74381.36	62949.16	51993.34	28674.75	9027	2465	332649.246
No/ ha	103	40	25	17	8	5	2	0.60	0.16	201
Vol./ ha	5.787	40.434	17.710	21.025	17.793	14.696	8.105	2.551	0.696	94.027
Present (Area Chil3565.0 ha)										
Number	271347	241465	69891	12326	6687	2502	867	195	46	605327
Vol(M3)	13675.89	60342.10	47847.52	16694.32	15107.98	8505.47	4141.44	1246.72	374.70	167936.15
No/ ha	76	68	20	3.5	1.9	0.70	0.25	0.05-	-	169.79
Vol./ ha	3.836	16.926	13.421	4.682	4.237	2.386	1.162	0.350	0.107	47.106

2.8 Silvicultural System:-

The silvicultural system adopted shall be the Punjab Shelter wood system or Indian Irregular shelter wood system which is modification of the Uniform system. Chil is a strong light demanding species and hence most suited to be managed under the Uniform system or modifications of the Uniform system. The Punjab Shelter Wood System allows the retention of compact groups of well grown poles as part of the future crop and selection making on steep slopes, nallas, banks etc. It is well recognized under this system that a certain amount of irregularity in the young crop is inevitable. This system has been adopted ever in previous plan of this division.

2.9 Rotation and Conversion period:-

The main annual increment for quality III Chil crop stem timber culminated at 120 years as per the standard FRI yield table. The rotation adopted here is 120 years and the exploitable diameter is being fixed at 50 cms. The chil forests of this division have been worked on a rotation of 120 years in the past also.

2.10 Regeneration Period:-

A period of 30 years has been fixed as the regeneration period and accordingly the rotation has been divided into four periodic blocks. Considering the periodicity of the seed years, the danger of incendiary fires and the time required for establishment of chil regeneration, this regeneration period of 30 years is sufficient to obtain adequate regeneration.

2.11 Division into Periods and Allotment to Periodic Blocks:-

The forests have been divided into fixed periodic blocks. Owing to the general moratorium on green felling in Himachal Pradesh since the early1980s, the process of conversion of irregular chil forests to regular ones came to a halt. The seeding and final felling as prescribed in the plan under revision were not implemented. There is general preponderance of class V and IV trees which is due to opening of canopy because of salvage and TD removals, thereby creating condition conducive for establishment of regeneration. The converted area having young regular even aged crop have been allotted to Periodic Block IV (P.B.IV) and approximately one fourth of the area of the Working Circle has been assigned to Periodic block I (P.B. I). The chil forests of the division, except PB IV areas, are in such a condition that it is virtually impossible to find truly representative Periodic Block areas especially PB II & PB III. Hence reversion of the concept of PB inter, as was done in V K Singh's plan has been adopted to include all the compartments that have neither been allotted to PB I nor PB IV .

The allotment of various compartments to periodic blocks is given in **Table 2.5, 2.6, & 2.7**

Generally, the areas allotted to different Periodic Blocks move in a specific and predetermined sequence from one PB to another but the present nature of crop (due to non-adherence to the prescriptions of the working plan/moratorium of green felling during the previous working plans), has rendered regression instead of progression in some forests while still others have been allotted to an altogether different PB. This has been necessitated because of no felling done in the PB-I and PB-IV areas and also partly because of disturbance to the forest ecology in the form of fires, development works like roads, salvage removal etc. The allotment to the respective periodic Blocks has been made on the following considerations;

2.11.1 Periodic Block I:- Total area under this PB is 726.80 Ha. This PB includes following types areas:

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

(b) Areas which remained unregenerated during previous plan.

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

Table 2.5

Areas under PB I

Range	Block	Beat	No & Name of Forest	Compt./sub Compt	Area in ha
Darla	Danoghat	Danoghat	D.49 Gharakru	C-2	26
		Danoghat	D.51 Sergharaku	C-3	56.8
		Danoghat		C-7	44
				Total DPF Darla	**126.8**
Arki	Jai Nagar	Jai Nagar	D.61 Baraghat	C.4	25.2
	Jai Nagar	Jai Nagar	D.62 Majhatu	C.4	20.8
	Jai Nagar	Jai Nagar		C.8	20.8
	Jai Nagar	Bhumati	D.63 Paniharu	C.3	14.8
	Jai Nagar	Sai	D.64 Ghend	C.2	12
	Jai Nagar	Sai	D.65 Ghanidhal	C.1	22.8
	Jai Nagar	Sai	D.66 Baila	C.1	19.6
	Jai Nagar	Sai	D.67 Tira	C.1	13.2
	Jai Nagar	Sai	D.68 Kurmala	C.1	23.2
	Jai Nagar	Sai		C.2	31.2
				Total DPF Arki	**203.6**
Arki	Jai Nagar	Materani	U.219 Basni	C.1	17.2
	Jai Nagar	Jain Nagar	U.229 Jaghun	C.1	22
				Total UPF Arki	**39.2**
Kunihar	Chandi	Chandi	D.86 Dharkwag	C.1	21.2
	Chandi	Chandi		C.2	20.4
	Chandi	Goela	D.87Baragwon	C2	20.8
				Total DPF Kunihar	**62.4**
Kunihar	Chandi	Gharshi	U.355 Malu ka ban	C.2	17.2
	Chandi	Goela	U.362 Bangoa	C.2	14.4
	Chandi	Goela	U.363 Bassi		10
	Chandi	Goela	U.365 Dhakrayana	C3	12.4
	Chandi	Goela	U.367 Bagh Dhakruyana		16.4
	Chandi	Goela	U.369 Sua	C.4	20.4
	Chandi	Goela	U.372 Gharsi Brahmana	C.2	17.6

	Chandi	Goela	U.376 Dharkwag		6.8
				Total UPF Kunihar	**115.2**
Kuthar	Kuthar	Kuthar	D.92 Majha	C.1	8
		Kuthar		C.2	8
		Shaktighat	D.93 Chanol	C.1	7.2
		Shaktighat	D.94 Sill Badyar		14
		Shaktighat	D.95 Bohli Katli	C.2	9.6
	Patta	Patta	D.101Dhanion	C.2	17.6
		Beja	D.107 Thandu		16.4
				Total DPF Kuthar	**80.8**
Kuthar	Kuthar	Darwa	U.389 Kufta	C.2	18
	Kuthar	Kuthar	U.391 Khanger		19.2
	Kuthar	Kuthar	U.398 Jagton		6.8
	Patta	Joharji	U.412 Jatwan	C.2	24.8
	Patta	Joharji	U.435 Kashlag Baderi	C.1	13.2
	Kuthar	Shaktighat	U.451 Badoh Uprala		16.8
			Total UPF Kuthar		**98.8**
			Total DPF		**473.6**
			Total UPF		**253.2**
			G Total PB I		**726.8**

2.11.2 Periodic Block IV: The total extent of this PB is **1172.40** ha. All the Chil forests containing pole to young chil crop of moderate to dense stocking have been allotted to this PB. The areas seeded felled during the earlier plans that have established regeneration and also successful areas planted up with chil have been included here.

Table 2.6

Areas under PB IV

Range	Block	Beat	No & Name of Forest	Compt./sub Compt	Area in ha
Darla	Danoghat	Danoghat	D.49 Gharakru	C-3	13.2
		Danoghat	D.50 Daran	C-1	16.4
	Danoghat	Danoghat	D 51 Sergharaku	C-1	29.6
		Danoghat		C-4	43.2
		Danoghat		C-6	42
				Total DPF Darla	**144.4**

Darla	Darla	Manlog	U.25 Kanswala	C.2	16
		Manlog		C.3	18
	Danoghat	Chandi	U.31 Banli	C.1	9.2
		Mangu	U. 41 Malaun		18
		Chandi	U.47 Newri	C.2	7.2
		Chandi	U.48 Kashlog	C.1	16
		Chandi		C.2	22
		Chandi	U.49Sera		11.2
	Darla	Kraraghat	U.52GagalGiana	C.2	16
	Danoghat	Mangu	U.53Mangu (Bagrouri)	C.1	18
		Mangu		C.4	18
		Danoghat	U150 Kolka	C.1	12
		Kraraghat	U.152Krara Sukhan		9.6
		Kraraghat	U153Pathragal		3.6
		Kraraghat	U.154Krara		12
		Kraraghat	U.155 Chalayaun		12
		Kraraghat	U.156Barialy	C.1	11.6
		Dhundan	U.170Kund		8
		Dhundan	U.171Syari		8.8
		Dhundan	U.172Tuiru		17.2
		Manlog	U.180Shameli		7.2
		Ghanagu	U.181Datti Bramna		6.4
		Ghanagu	U.183Datti Bramna		8.8
		Ghanagu	U.186Lamo	C.1	20
		Ghanagu		C.2	20
		Ghanagu	U.191 GhanaguKaug		13.6

		Dhundan	U.206 Dharth		28.8
		Dhundan	U.207 Muknata		20.8
Darla	Darla	Dhundan	U.209Pambar	C.1	12.8
		Dhundan		C.2	20
				Total UPF Darla	**422.8**
Arki	Arki	Shalaghat	D.48 Chiayan		20.8
	Jai Nagar	Jai Nagar	D.61 Baraghat	C.3	20.8
	Jai Nagar	Jai Nagar	D.62 Majhatu	C.2	21.6
	Jai Nagar	Jai Nagar		C.6	20.4
	Jai Nagar	Bhumati	D.63 Paniharu	C.1	14.8
	Jai Nagar	Sai	D.65 Ghanidhal	C.2	24.4
	Jai Nagar	Sai	D.66 Baila	C.2	8
	Jai Nagar	Sai	D.67 Tira	C.2	8
	Jai Nagar	Bainj hatti	D.69 Jeauli Karoli	C.1	24
	Jai Nagar	Bainj hatti		C.2	16
	Jai Nagar	Bainj hatti		C.3	20
	Jai Nagar	Bainj hatti		C.4	24.8
				Total DPF Arki	**223.6**
Arki	Arki	Shalaghat	U.133 Galag East		12
			U.137 Kothi Kunal		9.2
	Arki	Shalaghat	U.138 Por Nichli		6.4
	Arki	Shalaghat	U.143 Bathalang		24.4
	Jai Nagar	Jain Nagar	U.232 Jaghun Kuhlag		26.4
	Jai Nagar	Bhumati	U.234 Surech	C.1	17.2
	Jai Nagar	Bhumati	U.238 Pehl	C.1	12
	Jai Nagar	Bhumati	U.240 Bagi Ladoh		15.2
				Total UPF Arki	**122.8**

Kunihar	Kunihar	Mnajyaat	D.83Dhau-ki-Dhar	C.1	20
	Kunihar	Mnajyaat		C.2	18
	Chandi	Chandi	D.85 Chandi		8.8
	Chandi	Goela	D.88 Jharabal	C.2	31.2
			D.87 Baragaon	C.3	18.8
				Total DPF Kunihar	**96.8**
Kunihar	Chandi	Gharshi	U.358 Dhaila		8
	Chandi	Goela	U.362 Bangoa	C.3	12
	Chandi	Goela	U.365 Dhakrayana	C.2	16
	Chandi	Goela	U.366 Dhar Kanatan		8.8
	Chandi	Goela	U.369 Sua	C.1	26.4
				Total UPF Kunihar	**71.2**
Kuthar	Patta	Shaktighat	D.93 Chanol	C.2	8
		Shaktighat	D.95 Bohli Katli	C.1	10
	Patta	Patta	D.101Dhanion	C.1	14.4
				Total DPF Kuthar	**32.4**
Kuthar	Patta	Joharji	U.412 Jatwan	C.1	16
	Patta	Joharji	U.435 Kashlag Baderi	C.2	12.8
	Patta	Beja	U.499 Jamli		29.6
				Total UPF Kuthar	**58.4**
				Total PB IV	**1172.4**

2.11.3 Periodic Block Inter: All other forests, compartments that have neither been allotted to PB I nor PB IV have been clubbed together as PB Inter. Since the forests are still in process of conversion, it is a provisional allotment as there are no areas which can be correctly allotted to PB II and III according to age classes. The extent of this PB is 1665.8 ha. Maximum resin tapping can be done in this Periodic Block.

Table 2.7
Areas under PB Inter

Range	Block	Beat	No & Name of Forest	Compt./sub Compt	Area in ha
Darla	Kandhar	Bagga	D.1 Bagga	C.2	37.6
	Danoghat	Danoghat	D.49 Gharakru	C-1	20.4
		Danoghat		C-4	10
		Danoghat	D.50 Daran	C-3	20.4
		Danoghat	D.51 Shergharakru	C-2	40.4
		Danoghat		C-4	42
		Danoghat		C-8	32.4
				Total DPF Darla	**203.2**
Darla	Danoghat	Danoghat	U.48 Kashlog	C.3	11.2
	Darla	Kraraghat	U.52GagalGiana	C.1	17.6
		Kraraghat		C.3	24
		Kraraghat	U.56 Bambira		7.6
		Kraraghat		C.2	11.6
		Kraraghat		C.3	18
		Kraraghat	U.174Dhundan		8.8
		Ghanagu	U.182Deeb		5.2
		Ghanagu		C.3	8.4
		Ghanagu	U.204 KotlaSaryanj		36
				Total UPF Darla	**148.4**
Arki	Jai Nagar	Materani	D.60 Malen	C.1	20
	Jai Nagar	Materani		C.2	24.4
	Jai Nagar	Jai Nagar	D.61 Baraghat	C.2	24.8
	Jai Nagar	Jai Nagar		C.5	24.4

	Jai Nagar	Jai Nagar	D.62 Majhatu	C.1	14.8
	Jai Nagar	Jai Nagar		C.3	20
	Jai Nagar	Jai Nagar		C.5	22.8
	Jai Nagar	Jai Nagar		C.9	35.6
	Jai Nagar	Bhumati	D.63 Paniharu	C.2	12.2
	Jai Nagar	Bhumati		C.4	16.8
	Jai Nagar	Sai	D.64 Ghend	C.1	12.8
	Jai Nagar	Sai	D.68 Kurmala	C.3	17.2
	Arki	Arki	D.76 Lade-ki-Bain	C.2b	20
				Total DPF Arki	**265.8**
Arki	Jai Nagar	Materani	U.219 Basni	C.2	24
	Jai Nagar	Jai Nagar	U.222 Patta		4.4
	Jai Nagar	Jai Nagar	U.223 Kathlana		18.8
	Jai Nagar	Jain Nagar	U.227 Matog		20
	Jai Nagar	Jain Nagar	U.228 Jaghun Ghati	C.1	28
	Jai Nagar	Jain Nagar		C.2	14.4
	Jai Nagar	Bhumati	U.237 Kunhar		7.6
	Jia Nagar	Bhumati	U.269 Ghariach West	C.1	49.6
	Jia Nagar	Sai	U.272 Jhundla	C.1	3.2
	Jia Nagar	Sai		C.2	10
				Total UPF Arki	**180**
Kunihar	Chandi	Goela	D.87 Baragaon	C.1	16.4
	Chandi	Goela	D.88 Jharabal	C.1	16.8
				Total DPF Kunihar	**33.2**

	Chandi	Gharshi	U.355 Malu ka ban	C.1	24
	Chandi	Gharshi	U.357 Cheori Mahalwans		10.4
	Chandi	Gharshi	U.360 Bajthana	C.1	16
	Chandi	Gharshi		C.2	12.8
	Chandi	Gharshi		C.3	12.8
	Chandi	Gharshi		C.4	14
	Chandi	Gharshi		C.5	16
	Chandi	Gharshi		C.6	18
	Chandi	Gharshi		C.7	14
	Chandi	Gharshi		C.8	14.8
	Chandi	Gharshi		C.9	16
	Chandi	Gharshi		C.10	18.4
	Chandi	Gharshi	U.361 Jubbar		8
	Chandi	Goela	U.362 Bangoa	C.1	14.4
	Chandi	Goela	U.364 Baddu		5.2
	Chandi	Goela	U.365 Dhakrayana	C.1	12
	Chandi	Goela	U.368 Kiartu		8.8
	Chandi	Goela	U.369 Sua	C.2	20
	Chandi	Goela		C.3	16.8
	Chandi	Goela	U.372 Gharsi Brahmana	C.1	16
	Chandi	Goela		C.3	18.4
	Chandi	Goela	U.373 Badal Goela		6.8
	Chandi	Goela	U.375 Goela	C.1	24
	Chandi	Goela		C.2	14
	Chandi	Goela	U.413 Bhogpur	C.1	14

	Chandi	Goela		C.2	22
	Chandi	Goela	U.415 Fagla Goela		14
	Chandi	Goela	U.416 Fagla Sua		4.8
	Chandi	Goela	U.418 Kiartu		6.4
				Total UPF Kunihar	**412.8**
Kuthar	Patta	Beja	D.109 Bhanet		2.8
				Total DPF Kuthar	**2.8**
Kuthar	Kuthar	Darwa	U.384 Kiartu ka pash		4.8
	Kuthar	Darwa	U.389 Kufta	C.1	14.4
	Kuthar	Kuthar	U.392 Mandhesar		23.2
	Kuthar	Kuthar	U.393 Bisampur		6.4
	Kuthar	Kuthar	U.394 Bunga Ghehar		4.4
	Kuthar	Kuthar	U.395 Rupar		12.4
	Kuthar	Kuthar	U.397 Rampur		10.4
	Patta	Awar	U.420 Serla Dhar (Hara Mehta)		24.4
	Patta	Awar	U.421 Serla		6.4
	Patta	Awar	U.430 Jamanwala	C.1	24
	Patta	Awar		C.2	26
	Patta	Awar		C.3	16
	Patta	Joharji	U.434 Khalag (Joharji)	C.2	8
	Patta	Joharji	U.435 Kashlag Baderi	C.3	62.4
	Kuthar	Kuthar	U.441 Dhardari		10.4
	Kuthar	Shaktighat	U.444 Shilli Pash		10

	Kuthar	Shaktighat	U.445 Khajret	C.1	8.8
	Kuthar	Shaktighat	U.446 Shayamaghat		17.6
	Kuthar	Shaktighat	U.447 Janjoa		18.4
	Kuthar	Shaktighat	U.449 Tamlog		3.6
	Kuthar	Kuthar	U.450 Chyawani ki hara		4.4
	Patta	Patta	U.472 Selga		39.2
	Surajpur	Chadyar	U.481 Badhonighat	C.2	28
	Patta	Beja	U.494 Nihari		3.2
	Patta	Beja	U.495 Chatyan		5.6
	Patta	Beja	U.497 Bhanet		10.4
	Patta	Beja	U.501 Bire ki khil		3.6
	Patta	Beja	U.503 Jhangar		9.6
	Patta	Beja	U.506 Ossi		3.6
				Total UPF Kuthar	**419.6**
				Total PB Inter	**1665.8**

Total area of chil Working Circle ***=3565.0 ha***
Total Growing stock ***=167936.15Cum***

2.12 Calculation of Yield:-

The yield is of two types: -

(1) Main yield: All felling from P.B.I and felling of II A and above from P.B.IV constituted the main yield.

(2) Intermediate Yield: It was from marking of dead dying, wind fallen or otherwise, and seriously damaged trees. This was kept reserved to meet the demand of right holders.

2.12.1 Total Yield:-

The yield is calculated on the basis of Simmon's modification of Von Mentel's Formula as below:-

$$\text{Annual Yield } Y = \frac{2R^* V}{(R)\,2-(X)\,2}$$

Where, V = Volume of growing stock measured
R = Rotation i.e. 120 Years
X = Age corresponding to diameter down to which the growing stock is measured

Here V = m^3

R = 120 Years

X =27 Years(age corresponding to 10 cm(dbh)

Therefore, $Y = \frac{2*120 * 167936.1465}{(120)^2 - (27)^2}$

$= \frac{240 * 167936.1465}{13671}$

= 2948.18 m^3 or say 2950 m^3

2.12.2 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 class trees and 30% removal in lower (III & IV) classes of this periodic block.

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

$$Y = \frac{CI\ VI + C2\ V2}{P}$$

Where Y = Annual yield in M3
C1 = Constant representing proportion of volume of IIA and above class trees.
C1 = Constant representing proportion of volume of III & IV and above class trees
VI = 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 = 15243.571 m^3
V2 = 17051.490 m^3
P = 15 years(Plan Period)

Therefore, $Y = \frac{(15243.571 * 0.7) + (17051.490 * 0.3)}{15}$

= 1052.39 or say 1050 m^3

2.12.3 Yield from P.B.IV:-

1172.40 ha area of this working circle is under the PB-IV(PB regenerated) and has good stocking of pole crop . In most cases the mother trees have not been removed and are still standing over the young crop. As a safeguard over felling, increment is being ignored and only chil trees are taken into consideration while calculating yield. Trees of other species, may only be removed under salvage markings. Thus yield from this Periodic Block will be available from two sources:-

a) **From final felling i.e. trees 40 cms and above in dbh standing over young crop:**

The shelter wood system prescribes the need for retention of older trees standing on steep, rocky areas, water bodies and other outer boundaries blank etc. and also as a safety factor against fire(insurance reserve). Therefore 20% of the total standing volume of chil trees of 40 cms & over dbh, available in PB-IV shall be retained to accommodate the above requirements. The remaining 80% of the volume of trees above 40 cms dbh will be available for felling.

b) **From thinning / cleaning i.e. trees of lower diameter classes (i.e. 20 cms to 40 cms dbh):**

The average annual yield in the form of thinning/ cleanings available from PB-IV area, is estimated to be around 20% of standing volume of chil crop of class III and IV i.e. 20cm to 40 cms dbh and retaining all of the V class trees with the aim to increase the stocking / density of the forests.

Thus the annual yield is calculated as per *Hufnagle;s formula* as under:-

$$Y = \frac{C1\ V1 + C2\ V2}{P}$$

Where $C1 = 0.8$

$C2 = 0.2$

$V1 = 5115.66\ m^3$

$V2 = 48662.87\ m^3$

Therefore, $$Y = \frac{(0.8*5115.66)+(0.2*48662.87)}{15}$$

$= 921.67\ m^3$ or say $920 m^3$

2.12.4 Yield from P.B.INTER:-

No felling was 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.

2.12.5 Total Yield Prescribed from the Chil Working Circle:-

As described in para 2.11.1 the total annual yield comes to be $2950m^3$. The yield available from PB I and PB IV is 1970 m^3 i.e. $1050m^3$ from PB I and $920m^3$ from PB IV. Thus the remaining m^3(2950-1970) will be adjusted by way of salvage removals from PB Inter; therefore total annual prescribed yield is as under:

Yield from PB I	=1050 m^3
Yield from PB IV	=920 m^3

Hence there remains as margin of about $980m^3$, and this would be adjusted against the salvage removals to be made from the PB Inter annually, without affecting the removals from the PB-I and PB-IV areas.The green felling would be subject to the out come of the cases pending in Hon'ble Apex court and petty fellings would done after taking approval from competent authority.

2.13 Control of Yield:

All removals down to V class will count towards the yield of the working circle. This yield should not exceed 10% of the prescribed yield and will be checked after every three years. No efforts should be made to obtain the prescribed yield, if the yield is not available silviculturally. If as forest / compartment has been taken for marking , it should be marked purely on silvicultural considerations, and any excess yield available should be adjusted in future fellings.

2.14 Felling Programme:-

Table 2.8
Felling Programme for Chil Working Circle:

Year	No and Name of Forest	Comtt.No	Area (Ha)	Estimated Yield

2012-13	D-49 Gharakru	C.2	26	1050
	D-50 Daran	C.1	16.4	920
2013-14	D51.Sergharaku	C.7	44	1050
	D51.Sergharaku	C.4	43.2	920
2014-15	D.61 Baraghat	C.4	25.2	650
	D.62 Majhatu	C.8	20.8	400
	D51.Sergharaku	C-6	42	920
2015-16	D.63 Paniharu	C.3	14.8	550
	D.64 Ghend	C.2	12	500
	U.25 Kanswala	C.2	16	450
		C.3	18	470
2016-17	D.65 Ghanidhal	C.1	22.8	650
	D.66 Baila	C.1	19.6	400
	U.47 Newri	C.2	7.2	350
	U.48 Kashlog	C.1	16	570
2017-18	D.67 Tira	C.1	13.2	450
	D.68 Kurmala	C.1	23.2	600
	U.48 Kashlog	C.2	22	920
2018-19	U.219 Basni	C.1	17.2	600
	U.229 Jaghun	C.1	22	450
	U.49Sera		11.2	650
	U153Pathragal		3.6	270
2020-21	D.87Baragwon	C2	20.8	600
	U.362 Bangoa	C.2	14.4	450
	U.52GagalGiana	C.2	16	920

2021-22	U.365 Dhakrayana	C3	12.4	600
	D.92 Majha	C.1	8	450
	U.53Mangu (Bagrouri)	C.1	18	920
2022-23	U.369 Sua	C.4	20.4	650
	D.92 Majha	C.2	8	400
	U.53Mangu (Bagrouri)	C.4	18	920
2023-24	D.93 Chanol	C.1	7.2	400
	D.107 Thandu		16.4	650
	U.154Krara		12	600
	U.180Shameli		7.2	320
2024-25	D.101Dhanion	C.2	17.6	650
	U.398 Jagton		6.8	400
	U.152Krara Sukhan		9.6	500
	U.156Barialy	C.1	11.6	420
2025-26	U.389 Kufta	C.2	18	450
	U.412 Jatwan	C.2	24.8	600
	U.155 Chalayaun		12	500
	U.171Syari		8.8	420
2026-27	U.451 Badoh Uprala		16.8	650
	D.95 Bohli Katli	C.2	9.6	400
	U.191 GhanaguKaug		13.6	480
	U.209Pambar	C.1	12.8	440

2.15 Method of Executing Felling:-

Only two kinds of felling namely seeding felling and final felling are suggested:

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

ii) The seed bearers should preferably be IIA class, but trees of IA and IIB class also be retained where IIA trees are not available. The seed bearers should have well developed crowns, long, clear cylindrical boles and be free from diseases.

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

iv) Compact groups of young crop upto 30 cms d.b.h. occurring over an area of not less than 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 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 nallas 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 particulars, will be submitted by the marking officer along with the map and marking list and filed in the concerned compartment history file.

2.15.2 Method of Executing Felling in PB-IV:

The following guidances are laid down for the 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 measures and increment trees.

iii) Advance growth retained at 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 damage to the young crop.

2.15.3 Method of executing felling in P.B. Inter:

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

2.16 Subsidiary Silvicultural Operations in PB –I Area:

2.16.1 Disposal of Felling Debris:

Immediately after the felling is over, all felling refuse should be collected in open and nallas away from mother trees and advance growth, and thoroughly burnt so as to provide a clean and respective bed for the germination of seed. Local people should be encouraged to take away the debris for use as fuel. Collection and burning of the debris should commence from top of the forests and progress downhill. 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.

2.16.2 Subsidiary Felling:

All marked and damage trees left unfelled, along with malformed and ill developed stems in the advance growth should be felled before burning the debris and disposed off as per the existing practices. The left over should be burnt along with the felling refuse. The climbers, and other unwanted growth, should be removed.

2.16.3 Shrub-Cutting:

In some forests shrubs like Lantana, Mysrine, Carissa, Dadonea, Rosa etc. do not allow young regeneration to establish. All such shrub and bush growth in regeneration areas should be cut as per prescribed technique till the young plants become free from suppression.

2.16.4 Pruning:

Pruning should be carried out with the pruning scissor with a cut from below upwards in order to obtain quality timber.

2.16.5 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 vigor and quality of the crop should be given more consideration than the spacing. When the crop is two meter in height, the second cleaning should be carried out so that the saplings are spaced 3 meters apart. Cleaning and thinning should be planned with clinical precision and executed with surgical firmness. Cut material, unless required by local people, should be utilized for paper, pulp and activated carbon. The requirement and technique of thinning /cleaning is given below:

a) Thinning consists of lessening the congestion in the crowns of the best trees in a canopy so as to favour their development. Thinning in crop below 4 cm in diameters are called 'cleanings' while thinning in crop of 10 cm upto 20 cm in diameter (usually done semi-automatically with a stick of appropriate length to give the desired average spacement) are designated "early thinning". The principles underlying all thinning operations however remain the same.

b) The necessity of thinning has long been recognized, the importance of thinning among the dominant and dominated and diseased trees having been especially realized, for a while, the removal of suppressed and dead or moribund trees may have an appreciable effect on root competition. Such removal is distinctly undesirable when the cut material cannot be removed from below the crop without unjustifiable expenditure, since not only is money wasted in felling such material, but the fire hazard is greatly increased by the mass of dry wood lying under the standing crop.

c) Thinning is done not only to increase increment but also as a measure of fire protection. Crops which are well thinned at an early date and which are free from an excess of suppressed and inflammable material, are much less subject to fire damage than un-thinned crops.

d) Thinning should commence early and be repeated as often as necessary, subject only to the condition that inflammable material is not to be left lying on the forests floor. 'Cleaning' and "Early thinning" must be considered essential in over dense crops for the establishment of vigorous sturdy crop and for the encouragement of increment from the earliest age but in older crops where material cannot be disposed of without expenditure, true thinning should ordinarily be postponed till cut material can be disposed of either free or at a price. However, in areas under concentrated regeneration (e.g. PB I and the youngest P.B. under the Shelter wood system) early and repeated thinning are also important for

the optimum development of the crop. The periodical thinning must be carried out even through the disposal of the cut material involves expenditure. It will undoubtedly be repaired in course of time by accelerated maturity of the crops. However thinning in young woods must not be so heavy as to prevent the production of long clean boles when timber production is an object of management.

2.16.6 Sowing and Planting:-

If adequate protection against fire and grazing is ensured, sufficient natural regeneration of chil is 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 resorted to immediately. Chil areas which are lantana infested **(Appendix-XXIV)** will be rehabilitated as per the strategy discussed in **Chapter VIII para no 8.5 part II.**

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

2.17 Other Regulations:-

2.17.1 Closures:

All P.BI areas shall be closed to grazing be proper fencing immediately after the felling is over and shall continue throughout the period of this plan. Through the regeneration period is 30 years, chil seedling attains good growth and are beyond damage within a period of 15 years, therefore, it will not be always necessary to enforce closures for full regeneration period. In case of undemarcated protected forests, steps to complete the necessary codal formalities must be done well in advance so that closures are duly notified before commencement of regeneration.

2.17.2 Grazing and Grass cutting:

Grass cutting will be prohibited in all the P.B. I areas after the commencement of regeneration operation till the young crop is beyond the stage of damage, i.e. 50 cm and above. Grass cutting shall be allowed to be carried out under 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.

2.17.3 Fire Protection and Control burning:

More details have been discussed in **Chapter VIII**of this Plan. The chil forests of this tract are highly susceptible to fire of accidental and intentional types. Large areas of chil get burnt every year.

2.17.4 Fire Lines:

Detailed programme regarding fire lines having discussed under **para 8.1.6.7 of Chapter VII** of this plan.

2.17.5 Resin Tapping:

As per latest instructions of 24 Sep.2001, appended at **Annexure – XXVII**, the minimum tappable dia is 35cm. The tapping is to be done by Rill method only. The enumerations are to be carried out every 5 years as per prevailing instructions. In case drying up of trees due to resin tapping is observed in some forests it should be immediately closed for tapping. Retapping in such forests should be taken up after a minimum period of three years only after the reasons for drying up of trees are analyzed and effective steps to prevent recurrence taken. Complete record in this respect will be maintained at divisional level. There is no check on the concentration of acid-mixture used. The trees above 35c.m d.b.h, which were capable of being tapped for 20 years at a stretch are being tapped for 13-15 years at the most. This is leading to wastage of valuable tappable space and consequently loss of revenue to the H.P. Forest Department. Permanent inventory of tappable trees will be maintained as per Standing Order No 2/2011of CF Bilaspur **(Appendix-XXVIII).**Following points require special attention:-

i) Rider should not be allowed to be removed/ adjusted so that freshening knife is not able to make rills deeper than 2mm.
ii) Width of rills should remain within prescribed limit of 6-7 mm so that inter rill bark does not become fragile and consequently break.
iii) The total size of blaze should remain within prescribed limits of 36-38x20 cm and no of rills in a season should not be exceed 32.
iv) New channel should be started only after the previous one has been tapped for 5 years and intervening space between two adjoining channels should be less than 7.5cms.

v) Strict supervision should be exercised over the concentration of acids in the stimulant since higher concentration can irreparably damage the tissues thereby adversely affecting the process of healing.

2.17.6 Grant of Timber:

T.D. should be marked preferably from final felling (PB-I) and PB-IV (removal of over wood) areas. Silviculturally available trees from such areas should be marked for T.D. irrespective of their year of felling. No T.D. grant should be marked for T.D. irrespective of their year of felling. No T.D. grant should be made from P.B. Inter areas expect for dead, dying and diseased trees. The state has recently notified **H.P. Forest (Timber Distribution to Right Holders) Rules, 2010** for the rationalization of grant of timber. T.D. will be provided as per this rule.

2.17.7 Salvage Removal:

The qualitative and quantitative norms for salvage marking fixed vide Pr. CCF memo No. Ft.116-84/71 (S) Part Add.Mob. dated 10.05.1997 is appended. There be followed in letter and spirit. The fire burnt chil trees should not be taken dry or dead until there is no sign of revival till end of September of the year of fire.

2.18 Regeneration Assessment Surveys:

The regeneration assessment survey of the felled P.B.I areas will be done every alternate year for at least 10 years. The report should be placed before the review committee of the Govt. of India at the time of periodic reviews.

2.19

All felling should commensurate with the regeneration and no felling should be carried out unless funds for regenerating the felled areas are made available.

CHAPTER-III

BAMBOO WORKING CIRCLE

3.1 General Constitution of the Working Circle:-

This working circle contains 572.40 ha of DPF's and1061.60 ha UPF's with predominance of bamboo justifying their regular exploitation and independent management. It also includes bamboo growing degraded areas which are suitable for raising the species. These areas are mainly confined to the Surajpur and Patta blocks of the Kuthar Range. It involves all commercially exploitable bamboo areas of the division and the main objective of this working circle is to rehabilitate the old bamboo areas and to promote the growth of bamboos in existing bamboo forests in addition to introducing bamboos in areas suitable for their growth. The bamboo species found in the tract is of *Dendrocalamus strictus*. The distribution of bamboo areas is as under in **table 12.1**

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 forests allotted to this Working Circle have more than 250 clumps per hectare but the quality of the clumps is poor. The detailed descriptions of the individual forests are available in the concerned compartment history file.

3.3 Distribution of Areas:-

All the forest allotted to this working circle in previous Plan have been retained. The gross area of this working circle is 1634.0 ha.The area allotted to local demand series in working plan under revision has been kept as it is. The area distribution is tabulated as under:

Table 3.1

Area Distribution of Bamboo Forests in Kunihar Forest Division

Range	DPF (ha)	UPF (ha)	Total (Ha)
Kuthar	572.40	1061.60	1634.0

Bamboo is found either pure or mixed with scrub or miscellaneous broad-leaved species. The FSI study states that any bamboo area and most of these area are densely stocked with bamboo clumps (350 or more; in some cases even upto 1200 clumps per ha) However, the size of

the clumps is small and in most cases the circumference does not exceed 2m. the standard set by the FSI to assess **site quality** cannot be applied here as almost all areas have more than 200 clumps per hectare, but the quality of bamboo is in no case akin to **'Site Quality I'.** In the present case an area having 250clumps per ha or more has been considered as completely stocked with bamboo. The quality of bamboo, however, is not very good and most of the clumps suffer from severe congestion, being full of half cut, broken, twisted and malformed green and dry culms. The present state of the clumps is governed by many factors like the moisture regime, quality, characteristics and drainage of soil, slope of the ground, extent to shade, age of clump, and degree of injury from grazing, lopping and frequency of cleaning and regular cutting of the clumps. The general character of vegetation in these forests has been described in detail in para **2.2.3 of Chapter II(Part-I).**

3.4 Special Objects of management:-

These are mainly related to sustainable production, preservation and expansion of the bamboo cover.
The special objects of management of this working circle are:

1. To provide for the bonafide requirement of the right holders and local cottage industries.
2. To improve the productive capacity of the bamboo forests through appropriate interventions.
3. To manage these forests in such a manners so as to get maximum sustained yield.

3.5 Distribution of Bamboo Areas in Forests:-

Table 3.1 gives the list of forests along with area under bamboo that are included under this working circle.

Table 3.2
Bamboo Forests in Kunihar Forest Division

Range	No & Name of Forest	Compt./sub Compt	Area in Ha	Bamboo area in ha.
Kunihar Commercial Felling Series				
Kuthar	D.89 Awar	C.1	18.8	8
		C.2	20.4	12
		C.3	18	12

	D.90 Bir-ki-dhar		22.8	19.8
	D.98 Johar Ka Hara	C.1	20	11
		C.2	20.8	12.8
	D.99 Bhargu	C.1	18	12
		C.2	25.6	16.6
		C.3	22	9
	D.100 Bijliwala	C.1	36	21
		C.2	51.2	26
	D.101Dhanion	C.4	22	14
	D.104 Bowan	C.1	38	18
		C.2	49.2	26.2
		C.3	26	16
	D.105 Nalki		113.2	83
	D.106 Gugranthari		50.4	15
	Total DPF		**572.4**	**332.4**
	U.406 Ghori ka pash		13.2	5
	U.425 Duni	C.1	20.4	11
		C.2	14.4	7.4
	U.426 Phophalada	C.1	100.4	59.4
		C.2	15.6	10.6
	U.431 Ghatiwala	C.1	40	12
		C.2	36	10
		C.3	40	13
	U.433 Lehru		29.6	12.6
	U.434 Khalag (Joharji)	C.1	42	10
	U.437 Thapal		17.6	12.6
	U.463 Chaneog		22	17
	U.464 Sukhal		26	18
	U.466 Kasal	C.1	35.2	20.2
		C.2	40.8	25.8
	U.467 Bragju		29.2	18.2
	U.468 Madfal		78	48
	U.474 Piplata		55.2	20
	U.476 Dhamrot		10	4
	U.482 Naseri		35.2	15.2
	U.500 Dohal	C.1	20	12
		C.2	26.4	16.4
	U.512 Dhar Chamba	C.1	44.8	13
		C.2	44	15

	U.515 Tipra		49.2	15.2
Total			**885.2**	**421.6**
Kunihar Local Demand Felling Series				
	U.380 Khair ka Toda		10.8	3.8
	U.469 Tejhar		29.2	11
	U.505 Chadyar		42	15
	U.507 Jumalapur	C.1	24	12
		C.2	37.2	20
	U.508 Kharota		33.2	5
Total			**176.4**	**66.8**
G Total Bamboo WC			**1634**	**820.8**

A few forests have recorded a reduction in the area under bamboo as fires in the past have destroyed some portions of bamboo crop. The forests where flowering took place in 2005-06 are regenerated very well, but at present they are not commercially workable. As and when these forests will be fully established, the working should be started immediately after assessment and certification by some responsible officer not below the rank of Range officer.

3.6 Felling Series: -Following felling series have been constituted:

(i) ***Kunihar Commercial Felling Series***:-It includes the bamboo forest of Kuthar Range of this division to meet the market demand.

(ii) ***Kunihar Local Demand Felling Series***:-This felling series is constituted to meet the demands of local Banjaras, for cottage industries.

3.7 Blocks and Compartments:-

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

3.8 Analysis and Valuation of the Crop:-

The entire area of this working circle has been stock mapped on 1: 15,000 scale copies of the survey sheet and area under bamboo depicted therein. These maps have been posted in the respective Compartment History Files. The net bamboo area is 820.81 ha or 50.23% of the area in this circle.

3.8.1 Enumeration:

5% of areas have been randomly selected online after giving due weightage to area of forests. Then Complete enumerations in these selected forests were carried out..Enumeration results are appended in **Appendix-IX**. On an average the density of clumps per ha comes to 195 in natural areas and 595 in plantation areas clumps per ha. Culm composition is 22 and 33 culms per clumps in natural and plantation areas respectively.

Most (almost 70%) of the clumps have a circumference ranging from 1-3 meters through a few clumps have attained a circumference of more than 5 meters. The dead culms choking the clumps in natural bamboo areas are common and these have not been counted while determining the clump composition. It can be inferred that higher the number of clumps per unit areas smaller is the size of the clump in terms of the no. of culms. The average clump composition area wise is given in **table 8.10 and 8.11 in para 8.8 of chapter VI in part I** of this Working Plan.

The bamboo areas have generally degraded and deteriorated in the past. It is an established fact that congestion in clumps is caused by maltreatment and over –cutting of the early accessible peripheral culms. Non- regular felling and poor control over execution of felling and non adherence to the felling rules have left the clumps in a sorry state and most of the clumps are extremely congested ,choked with the dead, dry and malformed culms and also with remains of the broken culms. The old and dry bamboos restrict the proper development of new shoots (manus) and the expansion of the clumps. Most of the new shoots are crooked and whippy, their by being of low commercial value.

An area of about 3.0 ha involving 1173clumps was investigated in detail to ascertain the average composition of the clumps and proportion of culms of different age per clump. Observations were made in two categories i.e. natural Bamboo Areas, and Plantation areas The consolidated results are as followed in **table 3.3**

Table 3.3
Category Wise Density and Composition of Clumps

Type of area	Avg. no. of clumps per ha	Avg. No. of culms per clump	Avg. No. Manus per clump	Avg. No. of Chals per clump	Avg. no. of old culms per clump
Plantation area	595	33.79	1.70	1.39	30.70
Natural Area	187	24.1	6.1	5.2	12.8

3.9 Silviculture System:-

The silviculture system prescribed for bamboo working is "Culm Selection-cum-Clump improvement" i.e. selection felling and thinning in individual clumps. This will be preceded by cleanings wherever necessary. Any salvage removal of other associated species in this working circle will be adjusted towards total yield of working plan.

3.10 Silviculture and Management of Bamboos:-

India Forest Records, volume II no. 4 by P.N. Deogan gives full information about the silviculture and management of bamboos. The following are broad conclusions which may be kept in view in the working of bamboos in this division:-

1. Congestion in clumps retards the production of new culms and makes them inferior and hence should not be allowed to develop.
2. Adequate foliage for food supply to the rhizomes and sufficient support for the mew culms are necessary for better production and quality hence the necessary number of old culms must always be kept in each clump.
3. Culms less than three years old are somewhat immature and less than two years are unacceptable in the market therefore they should not be cut for sale as far possible.
4. Clouse for three months annually during the rainy season to protect the new shoots and for ten year after a gregarious flowering to regenerate the forest are essential.
5. Lopping of Bamboos for fodder is the most destructive practice and it should not be allowed at any cost.

Although it is realized that under present conditions it is somewhat difficult to enforce the working on these lines, yet it is emphasized that

every effort should be made to introduce correct methods of working. It will not only increase new culm production and avoid considerable depletion in capital, but will also save large sums of money and labour on cultural operations which in advance stage of congestion become impracticable and fruitless.

3.11 Calculation of Rotation:-

Rotation of bamboo is of academic interest only and has no bearing on the management. Earlier studies have established that 4-5 years old culms show signs of deterioration and accordingly 6 years may be taken as the maximum age of an individual culm and this can be the theoretical rotation. Culms below three years do not fetch a good price in the marked as they are prone to appreciable shrinkage and are light weight, so only culms over three years in age will be felled. A few culms of over three years age may have to be retained for giving support to the young 'manus' and also where felling rules restrict minimum number of culms to be retained as six. The culms so retained should be evenly distributed.

Since the felling rules prescribe that a minimum of 6 clumps are to left in a clump, even if the first and second years shoot are not present , the older culms should be retained to maintain this number. In practice only half the total clumps present in the forest are worked, resulting in loss to the State exchequers on the one hand and leading to further deterioration of the clumps due to further congestion, malformation of culms etc. on the other.

3.12 Felling Cycle:-

Keeping the yield, market demand and commercial value in consideration, a felling cycle of three years is adopted. Studies conducted on the frequency of felling have indicated that a three or four year felling cycle is the most suitable. The previous working plan had felling cycle of 3 years and this has been observed that a longer felling cycle aids congestion.

3.13 Method of Executing Felling:-

As mentioned earlier. Bamboo culms over 5^{th} year below sign of deterioration and those of 2 year or so , are raw and do not fetch a good market, the proper time of exploitation is in the third to fifth year. A clump is unit of management and yield should be bases on net increment (i.e. Annual production of Manus-loss through malformation / decay/

deterioration). Another aspect to be kept in mind is the very short span of suitable period of exploitation during the life of the culm. A clump can remain healthy and vigorous only if all old clumps removed equal the new culms produced. But this is rarely the case and due to improper working in the past many clumps have become congested and unworkable, as only good culms were extracted leaving the malformed, dead, decayed culms left should not be less than the number of healthy culms of the two preceding seasons, i.e. manus and chals.

3.14 Standard Bamboo Cutting Prescriptions (Felling Rules):-

Bamboo cutting prescriptions have been more or less standardized which are as follows:

1. The felling should commence in the middle of October and should be completed by the end of February. Any felling done before mid October is liable to injure the new culms whereas those done after February may cause borer attack.

2. Themaximum number of culms (individual bamboos) to be cut in a clump (entire cluster), except in case of congested /dry or flowered clumps, should not exceed the number of culms which have come up in the last three years. This should approximately be the number of manus (current shoots) plus twice of number of chals (last year's shoots). This is the maximum number which can be cut however the actual number to be cut will be determined after retaining the culms as prescribed below from (a) to (f).

a) All the manus and chals are to be retained. These are not only an important source of rhizome growth but are also raw and unfit for sale. Sometimes, manus are cut for binding the bundles. This practice should be stopped.

b) In addition to manus and chals, old healthy culms not less than the number of manus should also be retained as support. But the minimum number of old culms to be retained should be four. These should be distributed uniformly all over the clump. There is a general tendency not to leave the supports as these old healthy culms give good quality bamboo. But their non retention increases the chances of young tender shoots being toppled / broken by winds. The retention also helps in food supply to rhizome.

c) The total number of manus, chals and old culms retained should not be less than six. If there are less manus/chals, more number of old culms should be retained. If the number of culms in a clump is less than six, all culms are to be retained.

d) The culms present on the periphery of the clump are to be retained, as they are conductive to the main(outer) growth of the rhizome.

e) All the culms (except dry / dead ones) in the open clumps are to be retained.

f) Single /some flowering culms in a clump will be retained till seeds are shed.

3. Any cutting of the culms meant for retention (a) to (f) above in para (2) should be considered as illicit cutting.

4. The cut should be as low as possible, preferably within 30 cms of ground level and should be just above a node (preferably the first one) so as to avoid accumulation of water in the internode, which id generally hollow. However, if support is required for some adjoining 'manu' the cut may be higher.

5. The cut should be clean and made with sharp instrument in one stroke, so as to avoid splitting / tearing of culms. It should be in slanting position.

6. There is a general tendency to leave congested clumps unworked. The congested clumps are those in which the culms are either packed together firmly or are overcrowded and are also held together either by side branches or by some of the culms interlacing each other indifferent ways. Their working is difficult and expensive. In many case the quality of bamboo obtained may be poor. But the clumps once worked properly, would definitely give higher yield and good quality bamboo and will satisfactorily compensate the initial higher expenditure and poor return. For working congested clumps, a horse shoes cut will be given from downhill side in the middle of the clump and culms are retained on the periphery (particularly on the uphill side) of the clump. Other culms should be cut, however, efforts be made to follow rule 2 above as far as possible.

7. The totally dry clumps will be clear felled. Any clump which is two third or more dried will be considered totally dry.

8. Clumps which have flowered will be cut (clear felled) only after seed fall.

9. In case there are some partially flowered and partially dry clumps (less than 2/3rd dry), only those culms which have flowered and dried up during previous season will be cut. The culms flowering during the current season shall not be cut. These will be cut after the seed fall. The rest of the clump will be worked as per usual rules.

10. Cleaning, comprising of the removal of dead and dry culms should invariably be done.

11. No cut portion of bamboos should be left in the clumps.

12. No area of the clump should be left un worked, rather each clump should be treated as a unit of working.
13. Digging of rhizomes should be prohibited.
14. Climbers infesting the clumps should be cut.
15. All the worked clumps should be cleared of lops and tops of cut bamboos which shall be heaped into nallas and rivers and burnt or used.
16. Main felling as well as cleaning will be constantly supervised by a forest official capable of deciding the silvicultural limit of exploitation.
17. In case of gregarious flowering, all clumps which have flowered will be clear felled after they have shed their seeds and the area protected against grazing and fires.
18. Felling must be cautious on hot aspect, near the ridges or where the growth of bamboo is poor.

3.15 Fellings Programme:-

Felling will be carried out in the sequence indicated below:-

Table 3.4 Bamboo felling Programme

2012-13, 2015-16, 2018-19, 2021-22, 2024-25			2013-14, 2016-17, 2019-20, 2022-23, 2025-26			2014-15, 2017-18, 2020-21, 2023-24, 2026-27		
Forest/ Comptt	**Total area (ha)**	**Area under Bamboo (ha)**	**Forest/ Comptt**	**Total area (ha)**	**Area under Bamboo (ha)**	**Forest/ Comptt**	**Total area (ha)**	**Area under Bamboo (ha)**
Kunihar Commercial Felling Series								
D.89 Awar C1toC3	57.2	32.0	D.90 Bir-ki-dhar	22.80	19.8	D.104 Bowan C1 to C3	113.2	60.2
D.98 Johar ka Hara C1 &C2	40.8	23.0	D.100 Bijliwala C1 & C2	87.20	47.0	D.106 Gugranthari	50.4	15.0
D.99 Braghu C1 to C3	34.6	28.6	D.101Dhanion	22.0	14.0	U.406 Ghori ka pash	13.2	5.0
U.425 Duni C1 &C2	34.8	11.8	D.105 Nalki	113.2	83.0	U.464 Sukhal	26.0	18.0
U.426 Phophalada C1 & C3	116.0	70.0	U.433 Lehru	29.6	12.6	U.474 Piplata	55.2	20.0
U.431 Ghatiwala C1 & C3	116.0	35.0	U.434 Khalag (Joharji)	42.0	10.0	U.476 Dhamrot	10.0	4.0
U.468 Madfal	78.0	48.0	U.437 Thapal	17.6	12.6	U.482 Naseri	35.2	15.2
			U.463 Chaneog	22.0	17.0	U.500 Dohal C1 & C2	46.40	18.4
			U.466 Kasal	76.0	46.0	U.512 Dhar Chamba C1 & C2	88.8	18
			U.467 Braghu	29.2	18.2			
			U.515 Tipra	49.2	15.2			
Kunihar Local Demand Felling Series								
U.507 Jumalapur C1	24	20.0	U.380 Khair ka Toda	10.8	3.8	U.469 Tejhar	29.2	11.0
U.508 Kharota	33.2	5.0	U.505 Chadyar	42.0	15.0	U.507 Jumalapur	37.2	20.0

3.16 Calculation of Yield:

Yield is prescribed by area. In Kunihar Forest Division the gregarious flowering has taken place recently and covered almost entire division, at present the regeneration is coming .So it is not possible to fix yield at this point of time .So it is prescribed that DFO and DM will visit the areas in advance and both of them will fix the yield every year. However any salvage removal of other associated species in this working circle will be adjusted towards total yield of Kunihar Division.

3.17 Subsidiary Silvicultural Operations:-

3.17.1 Cleanings:

Cleanings are an essential aspect of Bamboo management and must not be lost sight of in executing felling and thinning. They are required to be done regularly in the Bamboo clumps as they are beneficial for the health and hygiene of the clumps.

a. Cleaning make the clumps workable by relieving congestion, thereby saving a lot of labour , time money and loss of marketable material.
b. They improve the growing, stock. Ensuring better production and quality of new culms.
c. They facilitate the correct enforcement of felling rules.

Cleaning should be done immediately after fellings, in the same year. Since most of clumps are congested the forest cleaning carried out will be labour and money intensive. Subsequently the clumps will be less congested and cleaning will be less costly. Proper control also need to be exercised over loping of bamboo for fodder as the cleaned clumps become liable to greater damage. Care should be taken to execute the cleaning operations on the following principles:

a) Very large old and very badly congested clumps which are apparently past recovery will not be worked. Only young, good quality clumps that are likely to respond to the treatment will be chosen.
b) Clumps that are raised above the ground or consisting of thin switches will not be touched as the whole clump may collapse.
c) All felling rules mentioned in para 3.14 and 12.10 will be strictly observed.
d) Cleaning should be done in all clumps in need of treatment and not confined only to the congested clumps.
e) Dry bamboo if required for support will not be removed.

3.17.2 Sowing and planting:

Natural regeneration of bamboo is not satisfactory in this tract and the scant sporadic flowering of the clumps cannot be relied upon for seed production. Therefore in order to increase the percentage of bamboo in the working circle and also to bring, it is necessary to introduce bamboos artificially. Of the various methods of raising bamboos transplanting of nursery grown plants has been found to be most successful and economical and needs to be followed in future too.Seed should be collected from certified sources and plants raised in the well established Jumlapur Nursery.

3.17.3 Weeding:

Weeding is an essential operation but care should be taken to ensure retention of sufficient bush and shrub growth over young bamboo plant to afford production from insulation and frost.

3.17.4 Closure:

In general, the manu production, the bamboo areas should be closed to grazing and other interference for three months during the rain. In order to get successful plantation of bamboo, closure is a must. In plantations an initial closure for 10 years should be done and all efforts should be make to restock the areas as quickly as possible, so that the closure is not extended beyond ten years.

3.18 Gregarious Flowering:

Gregarious flowering of bamboo took place in the year 1996-97 and 2005-06 in this division. Detail of the area flowered is as follows:-

Table 3.5

Detail of Bamboo Flowering Forests in 1996-97				
Range	No of Forest	Name of Forest	Comptt.	Area
Kuthar	D-89	Awar	C.1	18.8
			C.2	20.4
			C.3	18
	D-98	Johar-ka-hara	C.1	20
			C.2	20.8
	D-99	Bragji	C.1	18
			C.2	25.6
			C.3	22
	D-101	Dhanion	C.4	22
	U.379	Chandi	C.2	22.4
	U-425	Duni	C.1	20.4
			C.2	14.4

	U-426	Phophalda	C.1	100.4
			C.2	15.6
	U-431	Ghatiwala	C.1	40
			C.2	36
			C.3	40
	U.433	Lehru		29.6
	U-434	Khalag Joharji	C.1	42
	U-437	Thapal		17.6
	U-463	Chaneog		22
	U-466	Kasal	C.1	35.2
			C.2	40.8
	U-468	Madfal		78
		Bhutiala Charand		20
			Total	**702.8**

Table 3.6

Detail of Bamboo Flowering Forests in 2005-06				
Range	No of Forest	Name of Forest	Comptt.	Area
	D-105	Nalki		113.2
	U.483	Kaintha	C.1	30.0
	U.505	Chadyar		42.0
	U.507	Jumlapur	C1	24.0
			C2	37.2
	U.508	Kharota		33.2
	U.509	Tibbi		16.0
	U.510	Khata Pani		83.6
	U.513	Gurdaspur	C.1	14.8
			C.2	20.0
				414.0

3.18.1 Treatment of Gregariously Flowered Areas:

1. Bamboo seedling at an espacement of about 5mX5m is to be adopted and retained, while the rest are to be thinned out.
2. Cleaning, Soil working and seedling is to be done around the adopted bamboo seedling up to a radius of 50 cm.
3. To maintain the continuity, planting up of bamboo seedling/ rhizomes is also to be resorted to especially in big gaps.
4. All the flowered clumps are to be worked up following the prescriptions of the working plan.
5. The areas should be closed for grazing.
6. Elaborate fire protection measures are also be taken up.
7. It may mention that the intensity of gregarious / sporadic flowering varies as on a selection forest, the age of the clump varies. Flowering is

also depend on the site quality, and is related with the growth and storage of starch, sugar and other substances in the clump which aid flowering. In well managed forests, intensity of flowering is less in comparison to unworked forest comprising congested and malformed clumps. Intensity of flowering is also greater in areas having greater biotic interference in the form of grazing and fire when compared to protected forests.

3.19 Bhanjaras:-

"Bhanjaras" is a term given to the traditional basket making community, that is depend on the bamboo forests for their livelihood and sustenance. Through the bamboo areas were being managed in accordance with the prescriptions of the various working plans, it was only in 1943 that the rights of Bhanjaras for obtaining bamboos from the forest areas was duly recognized and provisions made there in Minniken's statement of 1903 didn't recognize their right to harvest bamboo and the first step in this direction was when the Revenue Minister of Patiala State passed order to this effect in 1943. The Patiala State permitted the Bhanjaras to harvest 100 Bamboos per house hold annually for a period of six months from October to March, on the payment of a nominal fee that was Rs. 3.12 in 1943. Later on this right holder rate as fixed at Rs. 6.25 per hundred sticks of bamboo and still continue as such. The reserved forests kept free from such rights and this right could only be exercised in the Demarcated Protected Forests of the Division, subject to the condition that the bamboo so extracted could only be used for manufacture of bamboo articles locally. No resale or barter of bamboos was allowed. Stringent felling rules were framed and felling was to be restricted to bigger and dense clumps and that too under the supervision of forest officials. There are 137 such families whose right has been admitted in specific forests. The experience over past 15 years has shown the Bhanjaras presently do not wholly depend on basket making activity for their livelihood and the forests set aside for them, have not been exploited to great extent and as a result the clumps have become congested and choked due to under exploitation. The quality of Bamboo clumps also has suffered due to this. Due to this fact, no forest/ compartment is now being worked by them so the forests should be handed over to the Forest Corporation for exploitation.

3.20 Natural Regeneration:-

Profuse natural regeneration of bamboos occurs after a gregarious flowering. Under natural conditions, the seed germinates at the commencement of the rainy season, and the ground in the neighborhood of the flowered clumps becomes carpeted with green, grass like seedling. These spring up and survive in large numbers on bare ground, and particularly on newly exposed soils. Some

of the seedlings only develop into clumps after 6-12 years while others die out. After flowering the bamboo clumps dry up and die and become inflammable in the hot season, when accidental fires may take a heavy toll if the crop is not harvested well in time. This period is very critical for the tree species in the over wood.

The young seedling do not relish heavy shade and are liable to be killed by a heavy growth of weeds but, light shade is helpful in protecting them from drought and frost, and in pulling them to grow up and form into culms. Fire and grazing are most harmful in the seedling stage, both in natural, as well as in artificial reproduction, hence protection from fire and grazing is of primary importance for ensuring the reproduction of bamboos. The natural seedlings in flowered bamboo areas take the place of flowered crop in about 8-10 years.

3.21 Nursery and Planting Techniques for Bamboo (Dendrocalamus *strictus*):-

Natural regeneration of Bamboo is poor due to the long and erratic flowering and seeding cycle and poor seed viability. The situation is further aggravated by the threat posed by grazing and forest fires. Therefore, artificial regeneration methods are more often resorted to raise bamboo plantation. Bamboos are propagated through seed, by offsets and clump divisions or by stem or rhizome cuttings.

3.21.1 Raising Bamboo Stock through Seed:

Bamboos are manocarpic and die after production seeds. *Dendrocalamus strictus* also flowers gregariously (sometimes sporadically too) on cycle of 30-40 years and the seeds ripen in April-May as a result of the gregarious/ sporadic flowering. Seed collection is done by cutting flowered branches and seed can be stored after beating and winnowing. The seed loses its viability within 6-8 months. Sowing of seeds in the nursery is done in August –September and it has been observed that if they are dipped in cold water or cow-dung slurry for 24 hours, germination is quick and uniform. 1.5 to 2Kg seeds are broadcast in raised nursery beds of size 10m x 1m. Seeds should be covered with light covering of sand and watered with a fine rose can. Germination stars within 10-15 days and is completed within a month. 3-4 leaved seedlings (5cms tall) are pricked out in polybags or transplant nursery bed 10 x 10cm apart. Seedlings are fit for planting out in following July.

3.21.2 Macro Proliferation Technique:

This is a technique by which bamboo stock can not only be maintained perpetually in the nursery, but can also be multiplied around 3 times each year

to meet the increasing planting demands. Seeds are either sown in July and are available for transplanting within one and half month or are obtained from the forest floor and these are then planted in polybags filled with a mixture of sieved soil, sand and farmyard manure in 1:1:1 ratio, along with localised placement of first dose of NPK (Urea 0.05g+ Superphosphate 0.59g+ Muriate of Potash 0.04g mixed in 30ml water per polybag) around the root zone. One young seedling having 3-5 leaves is planted in each polybag and kept in shade for one week, after which they are shifted in the open under direct sunlight. The second dose of fertilizer (Urea 0.05g +Muriate of Potash 0.12g in 30ml of water per polybag) is applied in the soil of each seedling at an interval of one month from the day of transplanting the seedling at an interval of one month from the day of transplanting the seedlings in polybags. The seedlings are watered and weeded upto February –March when the tillers from 3-8 in number are proliferated in each polybag. Each proliferated tiller along with some rhizome and roots is separated which acts as a propagule and is planted in a separate polybag of the usual soil mixture and the first dose of NPK as done earlier. Utmost car must be exercised to prevent injury while separating the tillers. The seedlings are ready for field planting on the onset of rains in July.

3.21.3 Raising Bamboo through Culm Cutting:

Vegetative propagation by means of culm cutting is another viable alternative which has some advantages. Generally 1-2 nodes cutting of 1-3 years old culms are planted obliquely or horizontally, through horizontal planting gives better result. Cuttings from the basal portion of the culms are to be preferred as the results are more positive. April is generally the best month for planting.

3.22 Characters to Identify Culms of Various Ages:-

The following characters serve as a rough guide to identify the different culms according to their appearance in the winter month:

a) New or one season old culms produced in the last rains have fresh looking bracts still adhering to the nodes and a coating of white waxy bloom on the internodes which comes off with the slightest touch; there are usually few or no braches.
b) Two season old culms may still retain the bracts in some localities but if so they are with red and darkish in colour, either erect or sometimes hanging on to the nodes. The inter node are greenish in colour, with a thin bloom spread fairly uniformly and comes off when a finger is lightly rubbed over it. Freshly formed side branches are present on the nodes.
c) Three season old culms generally have no bracts, but if present they are discoloured and weather-worn and prevented from falling by some

obstruction. The bloom on the internodes is no longer uniform but is variegated with darker blotches and is not readily removal by rubbing.

d) Four season old culms are green with little or no bloom. On cooler sites these are dark blotches on the surface of the internodes which can be rubbed off easily.

e) Still older culms show yellow patches in the green and this is a sure sign of maturity.

The identification of culms more than two seasons old is rather difficult and can only be estimated after careful observation and experience.

3.23 National Bamboo Mission:

Areas of this working circle as well as of Soil and Biodiversity conservation WC are been taken up for plantation and improvement of existing stock in National bamboo Mission. Private areas are also being taken up in this. Detail of such areas is given in **Appendix-XIII.**

3.24

All felling should commensurate with regeneration and no fellings should be carried out unless funds for regenerating the felled areas are made available.

CHAPTER IV

SOIL CUM BIODIVERSITY CONSEVATION WORKING CIRCLE

4.1 General Constitution:-

This working circle includes forest allotted to Plantation and Protection-cum- Rehabilitation Working Circles of previous plan.

4.2 General Character of Vegetation:

The vegetation met within this working circle is mostly of dry mixed deciduous type, chhal, Khair Jhingan, Simbal, Sain, Siris and Bamboo etc. are the main species found in these forests. Scrub areas are mostly occupied by *Lantana, Euphorbia,* Karounda, etc. It also includes those areas which are seriously eroded and denuded and needs immediate soil and moisture conservation measures. Chil is also available in some areas. Besides these the plantation areas consists of Khair, Shisham, Eucalyptus, siris, chil etc. The detailed description of each forest is t given in concerned Compartment History file.

4.3 Special Objects of Management:

The special objects of management will be as under:-

1. To manage the forests, grasslands, nallas, streams and rivers as part of the overall landscape for purposes of improved hydrology and to reduce soil erosion.
2. To improve the stocking of forest for climate moderation.
3. To improve and conserve the forest for meeting the genuine demands of the populace of fodder, fuel, timber and non-timber forest produce.
4. To improve the biodiversity of the area through suitable managerial interventions like rehabilitating areas infested with invasive alien species and emphasizing on plantations of native species and species of medicinal value.
5. To prevent land degradation by adopting multidisciplinary integrated approach the catchment.
6. To improve the land capability and moisture regime in the watershed by vegetative and mechanical means.
7. To involve the local people in the management of the watershed.
8. To improve the ecology of the area.

4.4 Block and Compartments:-

Existing blocks and compartments of the earlier WCs, which now constitute this WC, are continued. The boundaries of the compartments and Sub- compartments have been retained as per the previous working plan. The list of forests allotted to this working circle is given in **Appendix-IV**

4.5 Area and Allotment:-

The range-wise distribution of the area in this Working Circle is as under:-

Table 4.1
Range wise Area Distribution in Soil cum Biodiversity Conservation Working Circle.

Range	Classification of Forest	Soil cum Biodiversity Conservation Working Circle
Darla	DPF	1361.6
	UPF	2754.0
	Total	**4115.6**
Arki	DPF	1564.8
	UPF	1965.2
	Total	**3530.0**
Kunihar	DPF	916.8
	UPF	1382.8
	Total	**2299.6**
Kuthar	DPF	162.4
	UPF	2556.0
	Total	**2718.4**
	G Total	**12663.6**

The distribution of area is tabulated by range and class of forests.

4.6 Biodiversity:-

4.6.1 Analysis and Evaluation of the Crop:-

4.6.1.1 Stock Maps:

The entire area has been stock mapped afresh on 1:15,000 scale survey sheet and copies of the map have been placed in the concerned Compartment History Files.

4.6.1.2 Density:

Density is variable and has been assessed occularly. The density varies from 0.2 to 0.8 with the average being 0.5. The forests away from habitations are better stocked than those in the in the vicinity of villages. The density of each forest has been recorded in the list of forest in **Appendix –III.**

4.6.1.3 Site Quality and Age Classes:

The forests are quite variable. It is not possible to indicate site quality.

4.6.1.4 Enumeration:-

5% of compartments have been randomly selected online after giving due weightage to area of forests. Then Complete enumerations in these selected compartments were carried out..Enumeration results are appended in **Appendix-X.**

4.6.1.5 Silvicultural System:

Since no commercial felling is required to be done, no silvicultural system is prescribed; however salvage removal in this working circle will be adjusted towards total yield. Forests will be managed to improve the growing stock purely by rehabilitation in some forest where plantation is not required and rehabilitation supplemented by plantation in other forests. However, felling of trees for meeting the bonafide requirements of the people and felling in bamboo areas which require working is permitted. There are few areas in some forests of this working circle where bamboo plantations or natural bamboo has been established and in these areas working is commercially viable. These areas need immediate working. In these areas working should be started immediately through HPSDFC Ltd. Detail of such areas is tabulated as under:

Table 4.1
Detail of Established Bamboo Plantation in Kunihar Forest Division

S.No.	Range	Name of Forest	Area of Forest (Ha)	Area under Bamboo (ha)	Expected yield in bundles(No)
1.	Kunihar	D-84 Bani	234.00	12.00	3400
2.	Kunihar	U-336 Jalang	92.00	1.50	450
3.	Kuthar	U-489 Timali Ka Nala	19.60	8.00	500
4.	Kuthar	U-457 Jahu Ka Dharda	84.40	6.00	475
5.	Kuthar	U-380 Khair Ka Toda	10.80	5.00	500
6.	Kuthar	U-408 Daung	20.80	3.00	300
7.	Kuthar	Chandi Charand		5.00	800
8.	Kuthar	U-459 Amb Pani ki Khol	22.80	4.00	400
9.	Kuthar	U-454 Pamboo Ki Dhar	46.80	3.00	300
10.	Kuthar	U-462 Bakhrog	20.80	6.00	500
11.	Kuthar	Panjali Charand		3.00	400
12.	Kuthar	U-460 Kaunta	50.40	5.00	500

13.	Kuthar	Bagi Charand		3.00	300

4.6.1.6 Management System:

Most of the areas of this WC fall under scrub forests. These forests are devoid of vegetative cover. The forests/ grasslands and other patches of vegetation along with sources of water shall be managed on the principle of watershed.

Each site-specific management plan shall necessarily indicate the following management interventions:

(i) Plantation activity in this WC if required would be of enrichment planting and choice of species including species of medicinal value would be of native species to these areas. Areas where local bamboo can come should be planted by bamboo.
(ii) Invasive alien species infested areas would be taken up for rehabilitation. Detail of which is given in **Chapter VIII of Part II**
(ii) Moisture retention works would be carried out through out.
(iii) Some of the locations for silting water harvesting structures and silt detention dams have been identified and given in CH file.
(iv) Drainage line for treatment works have been identified and nature of works to be undertaken like gully plugging, dry stone check dams, vegetative barriers and underrating bio-engineering works. Participatory management approach should be followed particularly areas near habitations for development of forests or grasslands or other culturable areas.

4.6.1.7 Lantana Infestation:-Most of the areas in this WC are infested by lantana. Detail is given in **Appendix-XXIV.** These areas will be rehabilitated by the approach discussed in **Chapter VII.** In this rehabilitation programme participation of local should be taken.

4.6.1.8 Sowing and Planting:-

Areas which are available for planting in this WC are given in **Appendix-XI.** In this WC only native species and bamboo *(Dendrocalamus strictus)* will be planted. The areas will be inspected/ identified every year before making an APO. In APO all details such as latitude,longitude or Geo. reference spps to be planted, nursery from where plants are to be carried etc. will be given.

4.7 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. The lower reaches of the division are particularly liable to gullying and erosion an account of their weak geology. Besides this construction of large number of roads and buildings have aggravated the problem. These activities have created serious imbalance in the eco-system. The works of soil and water conservation in this division was also done under RVP and other schemes. No commercial fellings shall be carried only salvage removals and removal for local demand of the people will be carried out in this WC. Comprehensive Catchment Area Treatment Plan has been made for Satluj basin which will guide the soil moisture conservation measures to be adopted in the areas of Kunihar Division which fall in this basin.

The grazing in these forests is required to be regulated. The rotational closures supplemented with some soil conservation measures in the eroded areas would improve protective vegetative cover. 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.

4.7.1 Strategy:-

To achieve the above objectives, the strategy should comprise of the following actions:

a. Effective administrative arrangements for direction, control and co-ordination of the programme.
b. Institutional linkage between farmers and field functionaries be established for promotion of skills of farmers.
c. To retard velocity of runoff and to impound water in the watershed along drainage lines through higher thrust for construction of strategically located structures (Light check dams etc.).
d. Adoption of a project approach to the treatment of catchment.
e. Consolidation of treatment through project approach and proper choice of work areas.
f. Sustainability of treatment measures.
g. Comprehensive watershed development and maintenance by integration of sectoral measures.

4.7.2 Definition of Erosion:-

The soil loss by wind and water or gravitational creep is known as erosion. Normal erosion and Accelerated erosion are the two categories commonly recognized. Accelerated erosion is erosion in excess of the normal and is chiefly due to change in nature and density of native vegetation by human activities. Hence the discussion that follows is **mainly concerned with accelerated erosion.**

4.7.3 Type of Erosion:-

The natural agencies chiefly responsible for accelerated erosion are wind and water. Since wind erosion is generally restricted to arid and semi-arid regions we are here mainly concerned with the later. Erosion by water involves hydraulic action, abrasion, solution and transportation with the velocity of flow having an important bearing on its erosion power. The following categories are recognized.

i) Sheet erosion:

The term applies to the removal of a more or less uniform layer of surface soil. The general contour of the land surface remains unaltered and so the insidious effects go un-noticed until most of the top soil has been lost. Sheet erosion is most active on cultivated lands but in unimportant in forest areas, where unincorporated organic matter covers up the soil.

ii) Rill erosion:

This implies the formation of small channels in the land surface. It represents an intermediate stage between sheet and gully erosion. in forest area this type of erosion is generally seen along the extraction paths and on fire burnt areas.

iii) Gully Erosion:

This type refers to formation of large channels or gullies which are not obliterated by ordinary tillage. It develops in situation where concentrated run off attains sufficient volume and velocity to cut deep into the soil body. Gullies have their origin in rills, skid roads, trails, cattle treads or natural depressions.

4.7.4 Control Measures:

4.7.4.1 Vegetation in Erosion Control:

A vigorous plant cover is the best protection against erosion, mechanical measures are extremely valuable but they should not be regarded as a substitute for adequate vegetation. The most effective plant cover is provided by tree growth. The trees best adapted for planting on eroded sides usually are native which are intolerant of shade and have low moisture and nutrient requirement of fuel and fodder should be fully borne in mind.

4.7.4.1.2 In the pasture lands, over grazing must be avoided. If the native plant cover is not depleted, proper regulation of grazing will usually be sufficient to prevent erosion. Additional restorative measures are only possible on critical area where community

demands immediate control of erosion and run-off and soil condition are favorable for forage plant gro9wth. In such area sowing and planting of selected tree species and even engineering works, such as contour furrows, absorption terraces and check damming of gullies are justified.

4.7.4.1.3 Gullies require the use of vegetation for their control. More commonly, however, mechanical measures are necessary to facilitate re vegetation. Native species especially those characteristic of the pioneer communities, such as Acacias, Bamboos, Ficus species, Mulberry, Pines, Poplars, Robinia and Siris are usually better adapted for severe conditions on gullied lands. Of scrub the most useful are Adhatoda, Berberis, Desmodium, Indigofera, Prinsepia, and Vitex.

4.7.4.1.4 Before planting is attempted, diversion of runoff water before it enters the gullies is generally necessary. Feasible dams of various types have to be constructed so as to check further cutting and are must be closed to all grazing to avoid damage to the developing vegetation. In drier localities rooted stumps give better results.

4.7.4.1.5 An effective method to break the velocity of run off on steep slopes where contour trenching is out of place is to create vegetal brakes. Some of most common plants, met with wildings are Adhatoda, Agave, Euphorbia, Indigofera, Punica, Prinsepia spp.

4.7.4.2 **Mechanical measures in erosion control**:

These measures are often necessary to supplement vegetation in erosion control and to aid the establishment of a plant cover. Simple and inexpensive techniques will materially reduce the velocity of runoff and provide for the safe removal or such water are to be preferred.

4.7.4.2.1 Contour Trenches:

They afford a simple means of retaining and distributing water on slopes upto 20 degree gradient. The work must be started from the top and the dugout earth heaped on the lower berm of the trenches. The trenches vary in size and spacing depending on the slope, the amount of water to be impounded and the nature of the soil generally a checkered formation of 1x1 foot and 8 feet long trenches spaced 10 to 20 feet apart will be found to be most effective.

4.7.4.2.2 Diversion Ditches:

They are commonly employed on relatively steep or un-usually long slopes where there is large amount of runoff water to be handled. The diverted water is conducted at non-erosive velocity and emptied into the adjoining forest or grasslands or natural drainage channels free from erosion. When no such suitable place is available the best thing to do is to spread the flow over a considerable area so as to increase infiltration and avoid erosion.

4.7.4.2.3 Check Dams:

When runoff water can't be kept out of gullies, the construction of check dams, so as to halt further cutting until vegetation is established, becomes necessary. The chief value of check dams, therefore, has in their breaking velocity of runoff water and accumulation of soil material. Low dams with an overall height of about 2-3 feet are to be preferred. Firm anchorage to the gully bottom and sides is essential so as to prevent under cutting or cutting of the sides. In order to avoid undue concentration of water at the over fall, spillways should be made as broad as possible. Under cutting at the over fall is to be prevented by providing an apron built of rocks, logs or brush wood.

4.7.4.3.4 Control of Erosion along Roads:

The erosion hazard along the hill roads can be materially lessened by more rational alignment, greater use of retaining wall and cribbing on cuts and fills, careful disposal of excess material, improved drainage practices, a cover of vegetation on all cut and fill slopes and avenue tree planting along the road sides.

4.8 Selection of Area for treatment:

The areas for treatment under soil and moisture conservation should be selected in accordance with the following criteria.

1. Very high and high priority watershed must be taken first for treatment.
2. Watershed to be treated should be in contiguity for consolidating the measures of treatment.
3. Annual programme must cover whole micro watershed.

4.9 Preparation of Micro Plan:

Prior to starting the soil and biodiversity conservation works in identified micro-watershed, an elaborate micro plan should be prepared with the help of local people. These work plans serve as a guide lines for proper planning, monitoring and execution of soil conservation works. This work plan should contain:-

i) Basic information regarding aims and objectives, watershed characteristics, locality factors, land use etc.
ii) Watershed problems and needs i.e. magnitude of soil erosion problem and conservation needs.
iii) Method of management i.e. through Engineering and Biological measures.
iv) Schedule of operation i.e. phasing of the programme.
v) Maintenance and repair.
vi) Cost.
vii) Source of finance.

viii) Benefits.
ix) Supplementary information as appendices like soil survey report Design, Drawings and details of major structures, rates analysis of works etc.
x) Maps index, soil survey and capability and watershed management map.
xi) Organization.

Works in micro watershed should be done as per Micro Plans and funds for this can be pooled from various agencies/heads.

4.10 Water Sources:-There are 251 **Bawaris** in the forests of Kunihar Forests Division, out of which 196 are functional and rest 55 are non-functional. There are 174 functional and 113 non functional **Johars** in this division. In the forests of this division there are 165 **Springs** in the forests.4710 Rmt Kuhal is passing through forest area to feed the agricultural fields of local people. Detail of these water sources is given in **Appendix IV.**

4.11 Suitable Species:-The list of suitable spps. for soil conservation is given in Table 4.2 as under:

Table 4.2

Plant Species Suitable for Bioengineering Practices in Indian Himalayan Region

Species	Elevation (m)	Site Condition	Functions	Method of propagation
Species suitable for entire IHR				
Anus nepalensis	900-2700	Moist to Wet	Achor, catch, armour, reinforce, support, drainage	Seed
Amomum subulatum	Upto 1700	Swamp	-do-	Rhizome
Camelia sinensis	Upto 2000	Varied and moist	Armour, catch, reinforce	Seed/cuttings
Crotalaria tetragona	Upto 1600	Dry	-do-	Seed
Dalbergia sissoo	Upto 150	Dry	-do-	Seed
Dendrocalamus hamiltonii	Upto 1300	Moist to Wet	Armour, catch, reinforce, support	Nodal segment
Ficus semicordata	Upto 2000	Hot and dry, varied	Armour, catch, reinforce	Seeds/ polypots
Flemingia macrophylla	300-2000	Varied	-do-	Seeds
Lagerstroemia parviflora	Upto 1200	Varied to dry	Anchor, catch, mour, support	Seeds/ polypots

Musa paradisiace	Upto 1300	Varied to dry	-do-	Root suckers
Thysanolaena maxima	Upto 2000	Moist	-do-	Rhizome
Toona ciliate	Upto 1700	Moist, good soil	-do-	
Species Suitable for Central and Western Himalaya				
Adhatoda vasica	Upto 1000	Varied	Support, catch, reinforce	Hard wood cuttings
Arundinaria fulcata	Above 1600	Moist	Catch, armour, reinforce, support	Rhizome
Bauhinia variegata	Upto 1200	Moist	-do-	Seed
Boehmeria rugulosa	300 -1200	Varied	-do-	Seed/ cuttings
Buddleja asiatica	600-1800	Dry, harsh	Catch, armour, reinforce	Seeds/ hard wood cutting
Dodonia viscosa	Upto 1700	Varied, dry	-do-	Seeds
Duranta ripens	Upto 1500	Varied, dry	-do-	Seeds/ cuttings
Erythrina suberosa	900-3000	Varied	-do-	Seeds/ cuttings
Tulaliopsis binata	Upto 1500	Dry	Armour, catch, reinforcement	Slips
Grewia oppositizolia	Upto 2100	Dry to moist	Anchor, catch, armour,drainage	Seed
Heteropogon contortus	Upto 2100	Dry	-do-	Slips/ seeds
Juglans regia	1000-3300	Dry to moist	-do-	Seed
Melia azedarach	Upto 1800	-do-	-do-	Seed
Morus alba	Upto 3300	-do-	-do-	Cutting, seed
Pennisetum purpureum	Upto 1700	Dry	-do-	Rhizome/ cutting
Pyrus pashia	1500-2500	Varied	-do-	Seeds
Quercus glauca	600-2000	Moist	-do-	Seed
Saccharum spontoneum	Upto 2000	Hot, dry and moist	Armour, catch, reinforce	Slip cutting/ seeds
Salix tetrasperma	Upto 1800	Moist	Support, catch, reinforce	Cutting
Spium insigne	Upto 1800	Dry	-do-	Cutting
Vitex negundo	Upto 1500	Moist to dry	Support, catch, reinforce	Cutting
Woodfordia fruticosa	Upto 1500	Dry	-do-	Seed

Plant Species Recommended for Bioengineering Works

Woody Perennials	Dry Open Areas	Boerhavia regulosa Boerhavia platyphylla Debregeasia salicifolia Berberis sp. Adhatoda zeylanica Vitex negundo Zanthoxylum armatum Asparagus adscendens Indigofera heterantha Colebrookia oppositifolia Agave sp. Woodfordia fruticosa Jasmine humile Murraya koenigii Cotinus cogygera Spiraea canescens Rosa moschata Tinospora cordifolia, Ficus semicordata Ficus palmata Wendlandia exserta Ailanthus excels
Woody Perennials (Trees Shrubs)	Moist Areas	Arundinaria falcata Salix elegens Murraya paniculata Rubus elliptieus Alnus nitida Populus ciliata Salix tetrasperma
Grasses, Perennial Creeping, stout root stock		Arundo donax (Nal) Thysanolaena maxima (Broom grass) Saccharum munja (Munj) Saccharum spontaneum (Kana) Eulalipsis binata (Bhabar) Cynodon dacylon (Dub) Vetiveria lawsonii (Khas) Cymbopogon citratus (lemon grass)
Live Hedges Woody perennials Fast growing extensive root system, Thorny Non palatable, Bush forming, Local native, of local use.		Berberis Adhatoda Vitex Zanthoxylum Wickstroemia Asparagus Indigofera Plant at close spacing – 0.50 m apart. 2 rows

CHAPTER-V

THE PLANTATION (OVERLAPPING) WORKING CIRCLE

5.1 General Constitution:-

This working circle comprises such areas which are devoid of tree growth/vegetation, carry open crop or have young plantations or crop which still need protection. Only such areas will be included which have site factor favourable for raising plantations, closure is possible, in view of the fact that not more than one third area of a forest can be closed at a time and where the resultant plantations will be economically viable. The areas adjacent to village habitations where the species of local requirement of fodder and fuel can be raised are also included in this working circle. The depleted scrub forests and the plantations raised in the plan period but not fully established are also included in this working circle. Focus will be on restoring the species composition from timber centric to other useful species for fuel, fodder, NTFPs.

5.1.1 Genaral Character of the Vegetation:-

The forests of this working circle are located in different altitudinal zones, therefore, the vegetation varies. The following types of forests are included in this working circle:-

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-DS1-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.

(v) Type 9/CI/DS2-Sub-Tropical Euphoria Scrub Forests.

5.2 Blocks and Compartments:-

The forests have been divided into compartments and sub-compartments wherever felt necessary to separate the area suitable for plantation. The maps depicting the stock have been prepared on 1:15000 scales and placed in individual Compartment History files.

5.3 Special Objects of Management:-

The special objects of management are:-

1. To manage degraded, poorly or sparsely stocked, blank forests on scientific basis so as to increase the area under forest cover, thereby, reducing the pressure on other forests.
2. To develop and augment forest resources of area in order to meet the demand of the locals for firewood, fodder and timber & NTFPs.
3. To check denudation and soil erosion and to conserve moisture.

5.4 Plantation Series There will be only one plantation series, the division being the unit of control.

5.5 Analysis and Valuation of Crop:-

The stock maps of all areas have been prepared on 1:15000 scale and placed in respective compartment history files. In order to cover the entire planatable area of the division during the plan period, about 140-150 ha on an average area annually is to be taken up for planting for another 10 years. The emphasis however, should be on proper selection of species, combination of species, reduction of mortality, post planting scenario and in this the JFM committees, PRIs and communities can play a very important role. The provision of PFM Rules can be made best use of by educating and sensitizing the communities. Actual planting from 1991-92 to 2011-12 is given in Table 5.1.

Table 5.1

Year Wise Area Planted in Kunihar Division (1991-92 to 2011-12)

YEAR	TOTAL AREA IN HA.
1991-92	507.35
1992-93	453.72
1993-94	771.33
1994-95	597.00
1995-96	352.00
1996-97	642.50
1997-98	510.10
1998-99	548.00
1999-2K	344.00
2000-01	257.16
2001-02	122.80
2002-03	279.36
2003-04	263.40

2004-05	329.50
2005-06	434.50
2006-07	667.40
2007-08	439.91
2008-09	405.00
2009-10	352.25
2010-11	318.00
2011-12	342.00
TOTAL	**8937.28**

5.6 Strategy:-

Table 3.2 above, shows that about 9000 ha area has been planted in last two decade in Kunihar Division. However, when we look at their survival percentage, it is miserably low. Thus, it is time to seriously relook at our plantation strategy.

5.6.1 The Concept of User groups:

This has been demonstrated elsewhere in HP and is working well. Essentially a user group comprises 10-15 local women or a SHG who are organized to protect the plantations and keep it free of grass cutting in initial stage and grazing later on when plantation is established. This User group is allowed to cut grass from the plantation area (which they divide amongst themselves) for self use or for sale. The user group is further incentivized by making them take care of the plantation for five years and funds earmarked for Maintenance are transferred to them. The practice of organizing User groups needs to become necessary for any area taken up for plantation by the department. The User group will be allowed to take grass from the area as long as feasible and thereafter be allowed to take firewood and fodder once the trees are bigger. An active user group would be invaluable in keeping exotic weeds away and in preventing fires.

5.6.2 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. 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. 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 suppy, 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 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: vermicompost)

There are 7 nurseries in Kunihar (as on 30th Nov'11).Nursery Technique of some important species is given in **Appendix- XV**

5.6.3 Tall Planting:

One of the main reasons for failure of plantations is grazing / trampling by cattle. Also drought, fire hazards contribute to failure. Thus, to overcome pressure of grazing and drought, planting of tall plants (above grazing height) with well developed root system and good collar girth is desirable. Such plants will be able to cope with droughts owing to their well developed spread out root system, will be above grazing height and thus will survive grazing pressure and their good collar girth will help them withstand trampling. Such plants can be raised in nurseries.

For deciduous tall plants, root-shoot cuttings will be raised in production nurseries while sowing will be done in mother nurseries..

Nurseries larger than 0.25 ha but smaller than 0.5 ha, that have been closed can be used as **Mother Nursery** for production of root-shoot cuttings of deciduous broadleaved species. Thus, all deciduous broadleaved species like Amla, Bahera, Walnut, Horse Chest Nut, Daru, Darek, Ritha etc will not be grown from seed in production nurseries but their root- shoot cuttings will be made in Mother Nurseries. Month wise activity chart for such nurseries is given in **table 5.2**

Table 5.2

Mother Nurseries for Production of Deciduous Broadleaved Species

Month	Activities
Nov-Dec	1. Plough the field, add compost and broadcast seeds, level to cover the seeds 2. Flood irrigation to the field
March to June	1. Flood irrigation 2-3 times depending on

(Next Year)	rainfall and temperature 2. Weeding twice- once before and once during monsoon (these plants will not be shown in nursery return)
Nov' (Next Year)	1. Uproot plants that are >2, transport to production nurseries 2. Make root-shoot cutting retaining 4" of root and 4" of shoot 3. Plant in polybags of size 15"x7" (Now they will be shown in the Nursery Return of May'13 under age group 1.5 years)
Nov-Dec' (2nd Year)	1. Plant 90% of the quality plants 2. Retain10% best plants from among the quality plants for production of 'Tall Plants' 3. Make root shoot cutting of these 10% retained plants by cutting the shoot at 2' height (retaining only one shoot) and shift alongwith the soil to bags of size 20"x12"
Dec'(3rd Year)	1. Plant out these plants in pits of size 45x45x45cm

5.6.4 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.

Table: 5.3
Suggested list of Species to be Planted

Altitude	Species suggested for plantation
Up to 1000 meters	Shisham, Bamboo, Khair, Ritha, Toon, Bihul, Siris, Khirk, Kachnar,Daru, Harar, Bahera

1000 to 1500 meters	Robinia, Bihul, Toon, Ritha, Kachnar, Willow, Bamboo, Khair, Khirak, Kikker, Daru, Hill Poplar
1500 to 2500 meters	Deodar, Walnut, Hill Poplar, Willow, Robinia, Ban Oak, Horse Chestnut
2500 to 3000 metres	Silver Fir, Maple, Walnut, Moru Oak, Bird Cherry, Ash, Hill Poplar

5.7 Plantation Programme:-

In Kunihar Forest division 1402 Ha area is available for planting. Out of this, 450 Ha is in DPF and rest 952 Ha is in UPF. The available areas for the plantations are given in **Appendix-XI**

5.8 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. It is also prescribed that wherever deodar is being planted the plants should be at least 2 and half years old. Similarly broad leaved species should be at least 1 year old. Deciduous broad leaved species are to be planted during winter while conifers are to be planted during the rainy season.

5.8.1 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 out crops, existing patches of trees etc. It is important that GPS coordinates of at least 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 should record their visits and 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 properly in record there.

5.8.2 Fencing:

Fencing needs to be done around plantation sites only where it is necessary. Fencing along their 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.

5.8.2 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/ alien species like lantana, Partheni um etc. then these are to be removed when the area is fenced.

CHAPTER- VI

WILD LIFE MANAGEMENT (OVERLAPPING) WORKING CIRCLE

6.1 General Constitution:-

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. There are the Majhathal and Darlaghat Wildlife Sanctuaries in the Kunihar Forest Division which is administered by the Divisional Forest Officer Wildlife at Shimla.

6.2 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 humankind 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, especial 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.

6.3 Wildlife Sanctuaries:-

6.3.1 Majhathal Wildlife Sanctuary:-

Majathal Wildlife Sanctuary (40 sq.km.) is bordering south bank of river Sutlej partly falling in Solan and partly in Shimla districts of Himachal Pradesh in the Western Himalayan region within 575 m to 1985 m above msl. The area has a subtropical Monsoon climate. Himalayan Chir pine (*Pinus roxburghii*), ban oak (*Quercus leucotrichophora)*) forests and sub tropical *Euphorbia* scrub are the major vegetation types (Champion and Seth 1968).Major habitat in the sanctuary comprises steep south eastern slopes covered with large patches of tall grass sparsely forested with scattered Chil , ban oak and mixed broadleaved forests in ravines and low lying areas.

This Sanctuary provides the world's most important refuges to the IUCN Red Data Listed 'vulnerable' Cheer Pheasant. The pilot survey conducted in April, 1983 reported highest density of 24 pairs per sq km. of this species

(Garson ,P.J 1983). Other pheasant species include Indian Red Jungle Fowl, Indian Pea Fowl and White Crested Kaleej. Leopard (*Panthera pardus*) is the main mammalian predator. Besides Leopard other predators include Himalayan Black bear (*Selenorctos thibetanus*), Himalayan Yellow-throated marten (*Martes flavigula*), Jungle cat (*Felis chaus*). Lammergeier (*Gypaetus barbatus.*) , a potential avian predator are also reported to be found in the Sanctuary. The potential prey base found is the Goral (*Nemorhaedus goral*). Goral is the most abundant followed by Barking deer *(Muntiacus muntjac*).More than 300 sightings of Goral have been recorded in a study of six months(Mishra,1993, Mishra and Johnsingh,1996). Sambar (*Cervus unicolor*), Wild pig (*Sus scrofa)*, common langur (*Presbytis entellus),* Porcupine (*Hystrix indica),* Rhesus macaque (*Macaca mulatto)* and Rufous- tailed hare are also found in the Sanctuary. One hundred and six species of birds were also identified in this Sanctuary (Misra, 1997).Few roosting sites and a breeding colony of Himalayan Griffon Vulture (*Gyps himalayensis*) has also been noticed in the recent past.

The Sanctuary has 20 villages inside with the human population of around 2400.Nearly same number of the villages are located in the surrounding with a population of around 4000. Live stock rearing is one of the main occupations besides cultivation. More than a decade before Gujarat Ambuja Cements plant came up nearby at Darlaghat which provided more livelihood opportunities to the people of the area mainly in transport. Live stock population figures around 1000 inside and around 2000 in the surroundings. Apart from this there are 14 recorded permit holder migratory graziers having permission to graze around 2700 animals mainly goat and sheep. Presently around 10 graziers still come to graze their herds from October to March and are largely dependent on the sanctuary resources. Similarly most of the local populace inside the Sanctuary including some from the surrounding villages are marginal farmers and meet their daily grass, fodder, fuel wood, grazing requirements from the Sanctuary. Although there are no development projects inside and access to the Sanctuary by road but still there are significant movements of the people as some shortest pedestrian routes pass through the sanctuary to connect the famous Tattapani pilgrimage and other areas of Shimla district which are otherwise more than 100 kms. by road.

Due to the evident human pressure there is obviously man-wildlife conflict. Some cases of killings of mainly cows, ox, horses by Leopard has been recorded here. Also the local people complain of their significant crop damages mainly by Rhesus monkeys, Himalayan Black bear and wild pigs, which is one of the major man-wildlife conflict issues but regrettably there are no records of crop damages. There are 40 recorded gun holders in and around the sanctuary and incidences of poaching also occur. There is one case of poaching presently under trial.

Forest fires are one of the major threats in this Sanctuary. There have been recorded 11 cases of forest fires in the last five years in which more than 1500 ha. area was burnt.

Management interventions hitherto were mainly restricted to block plantations of fodder and fruit species, creation of water holes, maintenance of fire lines, providing salt licks, soil conservation, and maintenance of paths and carrying out census. Fires, biotic pressures and environmental variations claim most of the plantations and there seem to be negligible impact on improving the food base. Census estimates do not seem to be reliable as have been worked out without following any standard species specific techniques.

This sanctuary still has some homogenous and contiguous habitat towards the north west of Surg-Dwari (Western boundary limit) i.e.Banola and Kutpol forests presently under Kunihar Forest Division which support population of Cheer pheasant and Gorals.

In Majathal WLS some of the area is densely populated with human population. Such areas need to be excluded from this WLS. Further, some of the WLS area has also to be deleted because of its likely submergence in proposed Kol Dam.Thus,10 sq Km area is proposed to be deleted after considering the fresh representation regarding difficulties faced by the people,11 villages having human population(2264) and cattle population(690) are also proposed to be deleted.

6.3.2 Darlaghat Wildlife Sanctuary:-

The Darlaghat WLS has an area of 6 sq Kms with one village is situated within the WLS and 6 situated just outside the WLS. It is burdened by the rights of local population and almost all the WLS barring two DPFs and some UPFs is under agriculture/human habitation and is therefore not fit from wildlife management point of view. Thus, this WLS is proposed to be denotified and Baridhar Forest is proposed to be declared as conservation reserve.

6.4 Distribution of wildlife:-

The distribution of wild life has been described in detail in Chapter II of Part-I of the plan.

6.5 Special Object of Management:-

The primary goal of management of wildlife in the Kunihar 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.

A. Working with the local communities to reduce their dependencies on the forests to minimize human-wildlife conflict and
B. Interventions to manage, monitor and protect wildlife.

A. **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 Kunihar 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.

B. **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

iii. Protect (with the consent of the local community) the cultural, historic sites such as Sacred Groves for research purposes as elements of the cultural heritage of the region.

6.6 Problems Faced by Wildlife Outside Sanctuaries:-

Wildlife does not get the same priority and significance in areas outside sanctuaries and national parks as it does in the notified wildlife areas. As a result they remain an invisible part of forest ecosystem and whenever forests are subjected to any activity the impact of each activity on them is either undermined or ignored altogether. Habitat loss, due to diversion of forest land for other purposes. frequent forest fires. excessive lopping and hacking etc. is one of the prime impacts and as a result the animals are either pushed deep into the forests or left with no option to venture out into villages. In the latter cases, the carnivores resort to cattle lifting and at times pose a threat to human life too. In this process they render themselves also vulnerable to being poached and killed. This interface has led to a genesis of man-animal conflict and has not served the cause of wildlife protection. Poaching animals for meat and sometimes as trophy in the division are not very common if the number of cases registered is the criteria to go by.

6.7 Wild life Management Problems of the Division:

The Kunihar Forest Division also faced the problem of animal depredation. Such incidents are consistently increasing and pose a great challenge in wildlife management. The following two problems are the most pressing and demand immediate tackling:

a) **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.

b) **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.

c) **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.

6.8 Management Strategy:-

The strategic approach of wildlife protection/conservation in the Kunihar 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 a more informed understanding of the different stakeholder groups and the major influences that shape them.

Accordingly, management prescriptions for the objectives mentioned above are given as following:

6.8.1 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 Kunihar Forest Division.

ii) The officials of Kunihar Forest Division should provide for resolving the man-animal conflict with emphasis on social and environmental backdrop of the people living close to the forests. , and development of a competence based training programme for the Kunihar Forest Division staff and the local community.

6.8.1.1 Crop Depredation Historically, the villagers have been hunting the large bodied animals for meat and trophy (meat and horns of Ghoral, Sambhar) in the area which is now Majathal and Darlaghat WL Sanctuaries and forests of Kunihar Forest Division. This was also a strategy to check the wild animals' populations from killing the livestock or damaging the crops.

About fifteen years back, the state govt. imposed ban on the hunting of wild animals (1986). As a result of this ban the number of wild animals has been increasing in the area. Most of the villagers try to save their crops by putting up snares, traps, etc. This being an illegal activity, the resource-deficient villagers need to resort to labour intensive measures of crop protection, which include burning fire at night, beating drums, or putting up scarecrows in the

fields. Such actions mostly result in disproportionate cost of raising crops by the poor and marginal villagers.

The villagers in Kunihar Forest Division raise wheat, maize, barley, tomato, peas, ginger and garlic. The time of growing these crops mostly depends on the altitude of the area. The wheat harvested in March/April. The wild animals such as Ghoral, monkey, wild bore and paraqueets do the maximum damage to these crops. Porcupine is known to dig out the ginger, while monkeys' raids the maize crop. The paraqueets feed mostly on fruits, while monkey and rats go for any crop. There are legal provisions to annihilate the small-bodied animals such as rats and many insects; the big-bodied animals are protected under the various Schedules of the Wildlife Protection Act. In this scenario the poor farmer living on the edge of the forest is faced with the problems of the crop depredation as well as the legal action in the event of his killing a wild animal.

The villagers often use retaliatory measures of harming/killing the wild animals of which there is hardly any record or report. The depredation enhances dramatically when there is an increase in the number of livestock as well as the area under cultivation close to the forests; when there is a decline in the availability of the natural food; when there is an increase in the number of large wild herbivores. In all these circumstances, the crop depredation or killings of livestock gets escalated exponentially.

6.8.1.2 Livestock Depredation:

Due to increasing population pressures and consequent degradation of forest habitat, the wild animals such as leopards have become "refugees" in their own habitats. At the same time the rhesus macaque and langurs are able to adapt themselves to the human presence. It is a well-known fact that the wild animals avoid areas with disturbances. This means that when their habitat gets further restricted as a result, they venture into the human habitations. The wild animals also intrude into agriculture fields as the crops raised are more palatable, and they are located in easy locations. In addition to this the poor and marginal farmers in the villages keep livestock such as sheep and goats, which usually survive on grazing on the forest and pasture land. For wild animals, such domestic livestock are very easy prey.

6.8.1.3 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.

6.8.1.4 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 **(Appendix-XVI)**

Some of the suggested measures for the reduction in the conflict between man and animals:

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 "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 defense 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 Kunihar Forest Division. Possibility of paying a portion of the insurance premium by the Forests department for poor villagers should be explored.

REACTIVE

However, once the damage is done, the provisions of compensation should be an easy and straightforward process so that the poor villagers are able to receive the compensation easily and without delay. It is also important that the forest department functionaries ensure that the poor people not only attend Panchayat or Gram Sabha meetings in good number but also participate actively so that their voice is heard. Proper checks and balances can be evolved 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 behavior; at the same time recognition of the fact that these are the poor villagers showing tolerance to the existence to the crop damaging bear or livestock lifting Leopard. This enhances the limits of human existence with the large carnivores. The future of man-animal conflict resolution lies as much in the involvement of the local communities in the wildlife habitat management, as in the measure that are taken to leave the wild habitats to the wild herbivores.

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 an incase of injury to human being, medical certificate is necessary for claiming the compensation.teh 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. The revised rates (in Rs.) for different categories are given in **Table 6.1**

Table 6.1

1.	In case of death of Human Beings	1,00,000/-
2.	In case of Killing of horses/ mules(all breeds) by snow leopards in shed	4,000/-
3.	In case of Killing of horses/ mules(all breeds) by snow leopards in jungle	2,500/-
4.	In case of permanent disability/ incapacitation to human being	1,00,000/-
5.	In case of grievous injury to human being	33,000/-
6.	Loss of buff7lo, cow(jersey cross), ox and mule(adult-special breed) in cow shed	2,500/-
7.	Loss of buffalo, cow(jersey cross0, ox and mule(adult-special breed) in jungle	1,500/-
8.	Loss of cow(local breed) in cow shed	625/-
9.	Loss of cow(local breed) in jungle	375/-
10	Loss of ox (local breed) in cow shed	1,250/-
11	Loss of ox (local breed) in jungle	625/-
12	Loss of young ones of buffalo, cow(jersey), ox and mule(special breed) in shed	250/-
13	Loss of young ones of buffalo, cow(jersey), ox and mule(special breed) in jungle	188/-
14	Loss of goat and sheep in shed	375/-
15	Loss of young ones of buffalo, cow(jersey) ,ox and mule(special breed) in shed as well as in jungle	125/-
16	Loss of young ones of sheep and goat in shed	125/-
17	Loss of goat and sheep in jungle	400/-
18	Loss of young ones of sheep and goat in jungle	188/-
19	Loss of yak, horse/ mule and camel in shed	2,500/-
20	Loss of yak, horse/ mule and camel in jungle	1,500/-
21	Loss of Churu/ Churi in shed	1,250/-
22	Loss of Churu/ Churi in jungle	625/-
23	Loss of Donkey in shed	875/-
24	Loss of Donkey in jungle	500/-
25	Loss of Pashmina goat in shed	625/-
26	Loss of Pashmina goat in jungle	375/-
27	Loss of young ones of yak, horse, camel, Churu/ Churi, donkey and Pashmina goat in shed	250/-
28	Loss of young ones of yak, horse, camel, Churu/ Churi, donkey and Pashmina goat in shed	125/-
29	Pigs in shed	312.50/-
30	Pigs in Jungle	188/-

6.8.2 Dealing with Leopard in Kunihar Forest Division:-

The Divisional Forest Officer shall follow following criteria to deal with capture of naturally free ranging leopards and eliminating man eaters.

a) Mere sighting of leopards in the vicinity of a village or in inhabited area and ensuing political pressure, media attention does not qualify for its capture/elimination.

b) When first human killing is reported, the concerned Wildlife Warden must study the reasons on these lines: Whether it was a chance encounter? Whether outright aggressiveness? Was it a female leopard merely protective of her cubs? Was the leopard injured and unable to hunt? Whether the victim entered the forest to cut grass or collect firewood or otherwise and got killed when mistaken by leopard for its prey? How many times the leopard had mauled a man or killed a livestock in the past?

c) The Wildlife Warden should remember the underlying principle before declaring a leopard man-eater unless they actually consume the body of human killed. Jim Corbett, a renowned naturalist who had been dealing with man-eaters *pointed out that every human-killer is not a man-eater in the making.*

d) Shooting of leopards through identified shooters shall be considered only as a last resort once it is confirmed to be a man-eater after due observations and studies. Distinction between purposeful and accidental attack be made carefully. Purposeful attacks should always be dealt with immediately and the animal should be removed from the wild as soon as possible. In case of accidental attacks, the situation should be monitored.

e) No leopard captured as man-eater shall be released back into the wild and also should not be placed on display in a zoo. However, it can be kept in off-display facility in a zoo or rescue centre.

I. Facilitate organizing the 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.

Community organization in small user groups is key to stakeholder participation in the wildlife protection/conservation. The poor people in the interior villages of Kunihar Forest Division may be organized in micro financing groups; herb collectors may form their own groups and likewise. Such organized groups may be involved in asset building and their marketing. The process of group formation and asset building is recommended as future strategy. Vermicomposting, apricot oil production, hemp produce, ecotourism, street theatre and wage labour are some of the options that have been tried successfully elsewhere in HPFD.

6.8.3 Interventions to Manage, Monitor and Protect the Natural Habitat and Resources:-

1. Maintain and protect the natural vegetation communities (remove exotics and Invasive Alien Species), populations of large ungulates (with emphasis on Sambhar, Ghoral) and pheasants. One of the important indicators of the success of management practices for wildlife protection is the abundance of animals (pheasants, large mammals). The inventories of mammals, birds, reptiles, amphibians, annelids, and insects (mostly butterflies and moths) may be prepared with the help of experts in HPFD or reputed institutions. Similarly the angiosperms, Gymnosperms, ferns, bryophytes, mosses and lichens need to be documented.

- Services of institutions such as Wildlife Institute of India or NGOs of repute may be hired to train frontline staff including the Forest Guards, Forest Workers and wildlife watchers to measures abundance of species: absent, rare, occasional, common and abundant (first level).
- Conduct proper field trainings for the Forest Guards, Forest Workers and wildlife watchers for the next/second level of information collection on evidence of the animal's presence, such as tracks, droppings, calls, nests, feeding signs, etc.
- The advanced or third level of information collection is by determining the **trends** or **indices** of population growth and the **actual** population numbers (such as the density of Ghoral or Sambhar

Control of Poaching and Illegal Trade in Wild animal and plant species is needed with the help of enforcement measures. Intelligence gathering needs to be undertaken by the forest officials in this regard.

2. Provide facilities and opportunities in natural areas for purposes of formal and informal education, research and the study

The training need analysis should clearly bring out all that is required (elements of competence) to help the target group to perform competently in the given area of the job/role. For agreed elements of competence it will be required that necessary performance criteria are generated which necessarily means that unless distinct performance criteria are developed for agreed elements of competences, there would always be an ambiguity with respect to what training be imparted to trainees. Once the performance criteria have been laid out, the mode of assessment becomes important. The assessment is about generating and collecting evidences that tell whether or not the trainee is able to perform as per the laid out standards.

3. Protect (with the consent of the local community) the cultural, historic sites such as Sacred Groves for research purposes as elements of the cultural heritage of the region.

The Western Himalayas are home for some of the globe's most intact and colourful indigenous and traditional cultures. The people of Kunihar Forest Division are manifesting their traditional lifestyle in form of Sacred Groves (*Devban* or forests of Gods). These areas show how local villagers combine their beliefs and religion with natural resource management. The sacred groves have been instrumental in biodiversity conservation. They have a religious connotation and mostly located away from each other. Each Sacred Grove has its own devta (deity) mostly related to Hindu pantheon. A very distinct characteristic of these devtas are that they are treated as a corporal entity by the villagers. The Devtas own property in form of a forest which is locally known as Devban. Most of the Devbans are treated as sacred. Enumeration of such sacred groves must be given top priority in this Division. Communities must be encouraged to maintain these forests in perpetuity.

Listing of such sacred groves in this Division has been done **Appendix-XVII**. Communities must be encouraged to maintain these species in perpetuity.

6.9 Human Resource Development and Personal Planning:-

The challenging wildlife conservation requires committed wildlife managers who possess scientific competence and social awareness aided by communication.

6.10 Scientific Study, Research and Data Collection:-

In order to avoid or reduce man-animal conflicts, the scientific study, data collection and possible local or expert aided solutions are required.
The wildlife damage related problems must be addressed on priority. The focus issues are:

6.10.1 Monkey Menace:-

The menace is increasing day by day all over the country and State of Himachal Pradesh is facing it since last many years. Wildlife Wing is sensitive to the monkey menace destroying agriculture crops, undertook population abundance estimation exercise in 2003/2004 for the first time in the entire state. The monkeys and langoors were estimated in Urban locations, rural areas, forest areas and around temples. This estimation showed 3, 19,168 monkeys in the entire State and 4468 in Kunihar Forest Division

To curb monkey menace all the Range Officers have been authorized by Chief Wildlife Warden to issue permits for the killing of the monkeys during 2000. Thereafter, an attempt to set up an exclusive monkey sanctuary was tried and Primate Protection Park at Taradevi was established in March 2008. Some

The State Govt. had also proposed in the year 1992 to GoI to declare monkeys as vermin and in response the Govt. of India informed that the problem can be mitigated effectively under the provisions of section 11 (1) (b) of the Wildlife (Protection) Act 1972. This would allow the WL authorities to ensure that only such animals which are posing threat to life and property are hunted. The State Govt. also proposed to relax the ban on export of monkeys but Central Government has turned down the proposal.

The GoI have been promising to provide funds to further control monkey menace and mitigate the hardships of the farmers whose crops are being destroyed year after by heard of monkey troupes.

- To overcome the monkey menace and check their population growth, sterilization of monkeys was started at Rescue & Rehabilitation Centre Tutikandi Shimla in February 2007.Two more Monkey Sterilization Centers one at Saster, (Hamirpur) and another at Gopalpur (Kangra) have been set up and are functioning w.e.f. March and June 2009 respectively. To speed up monkey sterilization, fourth Monkey Sterilization Centre at Boul in Una District has been made operational on 31.3.2012. Till 21.3.12, 51329 monkeys have been sterilized in Himachal.

HP Cabinet Decision dated 18.10.2011 to address Monkey Menace in the State

HP Cabinet in its meeting on dated 18/10/2011 took following decisions to address monkey menace in the State.

i) The per monkey capturing rate was enhanced to Rs. 500/- .It was also decided that the Forest Guards shall also be paid Rs. 500/per monkey if they are involved in capturing.

ii) 25 monkey sterilization centres including 4 existing MSCs shall be set-up by up-grading the existing Veterinary facilities in the State.

6.10.1.1 Monkey Surveys:-

In Kunihar forest division monkey count has been done during the year 2010 , Feb 2011 and latest in Feb 2012 **Table No 2.4 Chapter II B Part I** under the guidelines and directions of PCCF Wild Life Shimla. **(Appendix XVIII)**

6.11 Field Craft-How to Observe and Understanding 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 snort, 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-wracking encounter. We should not think that we can easily outrun 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.

FOREST RULES

- 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.
- 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.
- A leopard carrying its fresh kill may cause the fresh blood trail. Approaching a leopard on its fresh kill could be dangerous.
- 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.
- 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? We 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.
- Do not stumble through the forest without carefully looking at the path.
- 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.
- 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.
- 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.

- 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.

CHPTER VII

JOINT FORST MANAGEMENT WORKING CIRCLE (OVERLAPPING)

7.1 Joint Forest Management in Himachal Pradesh:-

In 1985, social forestry was given impetus by the National Social Forestry (Umbrella) Project. The project achieved its objective of planting more than 100,000 hectares of plantations, but physical targets took precedence over participatory objectives, and social and equity issues could not be addressed.

In the 1980s the World Bank-supported Social Forestry project (1984-92) and the Indo-German Integrated Dhauladhar project (1982-92) were taken up in HP. Both were more participatory than previous FD projects. In the 1990s both donors switched their focus to the Shivalik hills with the Indo-German Changer Project that went on till 2005-06, as did the WB IWDP Kandi project.

The framework for JFM in HP is provided by the Government of HP Order of 12 May 1993, which followed the June 1990 Government of India (JFM) Circular enabling the spread of JFM. The HP Order was compiled following study of JFM resolutions issued by other states.

The JFM Order coincided with the development of a donor-led (DFID) project for Mandi and Kullu districts, in which JFM was a key element. This Himachal Pradesh Forestry Project (HPFP) may be seen to have facilitated the introduction of JFM statewide.

Until 1998, JFM in HP was confined to donor-supported pilot activities (DFID, GTZ, World Bank). Then, as in earlier years (see above with illegal timber) the arrival of a new PCCF in 1998 meant the search for a new programme to make a positive public relations impact. Participation was the buzzword from Delhi, and a small group of three or four FD staff was tasked with developing plans for the new scheme. The Chief Minister was persuaded to launch *Sanjhi Van Yojna* (SVY). 'Entry point activities' – such as making pots, water taps, mending temples, small infrastructure developments; all designed to attract people to the project – were given a budget so that DFOs could be seen to be dispensing something worthwhile.

As in other parts of Himachal Pradesh, most of the rural populace in Kunihar forest Division uses significant quantities of forest goods and benefits from the services provided by the forest areas. Solan district is the foremost vegetable producing area of the state and a lot of pressure on the forests apart from the usual demand from the fuel, fodder and timber, is the extracting stakes for the vegetable plants. For this use i.e. stakes for support, there is no other cheap and locally available substitute. The other rights enjoyed by the right holders as per the provision of the settlements, also are the major stakes in the forests beside the livelihood issues.

To address the long standing problems of deforestation and land degradation, the approach of involving local communities in an effective and meaningful manner, is gaining acceptance significantly. Even the present National Forest Policy, 1988 emphasizes on participatory management and common property management. It also specifically mentions that to achieve the objectives of the Policy, a massive people's movement should be created, especially involving women. Consistent with the NFP of 1988, the Government of India, on 1st June 1990, issued policy instruction to all state governments supporting greater participation of village communities and NGOs in regeneration, management and protection of the forests. In keeping with the above notification, the Govt. of H.P. has formulated a policy vide no. Forest (c) 3-4/80-v dated 125-05-1993, supporting joint management arrangements. Ever since village communities are being involved by the forest department to further the aim of protection and management of Forest and continuation of forest cover. The recognition of the link between the socio economic incentives and forest development has been singularly responsible in eliciting community participation. A new resolution of the Ministry of Environment and Forest dated February 21, 2000 has further strengthened the JFM programme and this circular interalia contemplates.

a. Legal back up to the JFM committees.
b. 50% members of the general body should be women;
c. Extension of JFM in good forest areas, with sharper focus on activities concentrating on NTFP/NWFP management.

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

There are various schemes and projects, initiated by the H.P. Government, GOI and some financed through External agencies e.g. externally aided projects that lay emphasis on people's involvement in forestry. The Sanjhi Van Yojna is a H.P. Government backed initiative. Works through FDA is funded by GOI.

Though, no separate and exclusive working circle has been proposed in this plan, under which JFM activities are to be confined, it is suggested that all activities, as far a possible, should be carried out after involving local people. However, the general prescriptions of the working plan be adhered to. The protection-cum-rehabilitation working circle is most suitable for carrying out works under the participatory management mode. It is also suggested that species of local importance be preferred in afforestation activities. Such species should have economic value and should be fast growing, high yielding and of multiple use. Species that provide raw material for local industry, craftsmanship should be encouraged. Quick growing and high yielding grasses and legumes e.g. Hybrid Napier, provide immediate alternatives to fodder demand and should be introduced along with tree species to sustain people's interest in the

close area. Bamboo should be planted in gullies, nallas and moist pockets as these would serve the dual purpose of soil conservation and fuel and fodder replenishment as these are relatively quick growing. An all out efforts should be made to evolve a "community-State Partnership"

7.2 Steps to be taken to Initiate People' Participation in Forest Area:-

Community participation is an important aspect of any joint management plan. The process of community involvement starts from identification of village to problem analysis and in monitoring and evolution of the programme. The sustainability of any such practice or activity depends on the level of participation .Participation forests ownership of the people over the resources being managed by such joint activity and ensures better results.

Participatory planning helps in:

- Building the "we" feeling;
- Involve and ensure the community's participation
- Transparency
- Brings clarity; and
- Sustainability.

7.2.1 Approach to be adopted in implementing JFM schemes:

- Educate people on the aim and objectives of the programme/ scheme before launching progamme /scheme;
- Make extensive and intensive use of PRA techniques to formulate the plan and share the derived information with the people;
- Draw up a working scheme/ Microplan with the active involvement of the local people, ensuring representation of the heterogeneity of the group;
- Execute works and use PRA techniques for monitoring as well;
- Exemplify spirit of participation by well defined, lucid usufruct sharing mechanisms and transparency in accounting the expenditure on the works.

7.3 Constraints to Participatory Management:-

There is a general lack of enthusiasm in embracing the idea of shared management in the forestry sector by the people and though some inroads have been made with the communities, a lot more thrust needs to be given to popularize the concept among the masses. The main causes for this lack of encouraging response among people are:

a) There is a general apathy of the youth to participatory programmes related to rural sector because with acquiring college education all youth strive for white collared jobs and anything that keeps them back in villages does not enthuse them.
b) Lack of proper education of government programmes and insufficient extension activities of the department.
c) Long gestation period of the forestry activities.

d) Too much dependence of the public on government and subsidy, cost sharing in such activities is generally not accepted.
e) Reluctance of government functionaries to hand over control of resources to people or even partially share their "power" with the people.
f) Lack of proper legislation on participatory management and usufruct sharing.
g) Need to promote income generating activities under JFM programmes.
h) Frequent changes in schemes and discontinuation of old schemes which leads to mistrust of people in government.

7.4 Past Experiences in Participatory Approaches:-

The social Forestry Umbrella Project was a pioneering effort in which, perhaps, for the first time people were associated with forestry works and forestry was taken outside forest area to village lands. This project ended in 1993. A new scheme "Van Lagao, Rozi Kamao" was launched in 1992 in which plantation over 2 ha land was awarded to a person belonging to Antodaya category and in lieu of protection and care of this area, the beneficiary was to be given remuneration depending upon the survival percentage of the plantation. This scheme was also discontinued on 31.03.1993.

7.4.1 Sanjhi Van Yojna:-

Sanjhi Van Yojna, a community based afforestation scheme was launched in Himachal Pradesh on 25th December 1998. Under this scheme the communities as well as the NGOs are to be involved in the protection of the existing forest wealth as also to participate in holistic rural development. The main objectives of this scheme are:

a.) Involvement of grass-root level institutions e.g. Gram Panchayats, Mahila Mandals, Yuvak Mandals, schools, VFDCs, NGOs etc. in eco-restoration.
b.) Regeneration of degraded forests areas through community involvement.
c.) Creation of social assets for the benefits of the communities.
d.) Increasing the productivity of the forest area by improvement of nursery stock through adoption of modern nursery techniques.
e.) Re-orientation of forest staff for facilitating community participation.
f.) Generation of employment opportunities in rural areas,
g.) To bring more area under tree cover by encouraging rehabilitations/ plantations of private waste lands on cost/ benefit sharing basis.

No specific duration for the scheme has been proposed and depending upon its success in the initial years the scheme would be adopted as a model for natural resources management by the State Forest Department.

In order to execute the scheme, the Village Forest Development Society (VFDS) is to be constituted in the village situated on the periphery of the forests. The VFDS will be registered; non-political bodies representing almost all families who are depend on forests for their livelihood. The level society will be registered by the DFO(T) under the Societies Act and the process of formation of VFDS will be assisted by the DFO or his representative, not below the rank of rank of Range Forest Officer. The executive committee will have 10-15 members and the local Forest Guard will be the member Secretary till such time the VFDS is enable to handle its own affairs. For this the forest guard will pick up a co-secretary from amongst the literate person in the village to acquaint him with the process and facilitate taking over soon.

7.4.1.1 Responsibilities and Duties of the VFDS:-

a. Assist the Forest department in planning, protection, afforestation etc. As per the approved Microplan;
b. Judicious use of all existing rights and their equitable distribution;
c. Inform the department about forest offenders;
d. Help the forest department in extinguishing forest fires;
e. Persuade villagers to give available area for plantations
f. Fair and just distribution if usufructs;
g. Settlement of disputes between VFDS members;
h. Protect the assets created by the VFDS;
i. Honour all the commitments made with the department and the members of the VFDS.

7.4.1.2 Responsibilities and Duties of the Forest Departments:-

a. To recognize the VFDS and give full weightage to its recommendations;
b. To explain the contents of the Microplan to the VFDS members.
c. To provide technical know-how to the executive body to carry out its responsibilities.
d. To honour the commitments made with the VFDS.

The area taken up under the SVY scheme would primarily be degraded forests, government lands, existing poorly stocked plantations and private lands. These would be notified under section 38 of IFA. The area should not overlap with any other scheme and those with minimum conflicts would be given priority. The microplan would cover a period of 5-7 years and would contain 60% of the total activities for afforestation component and NTFPS. To ensure participation through creation of stakes of the communities to encourage their owning up the assets created by them, the VFDS will contribute 1% of the total cost of the microplan in cash and 4% as "Shramdaan"(Voluntary labour) for the various works to be executed under the microplan. Owners of private lands will contribute 4% in cash and 6%in "Sharmdaan"or its equivalent in cash.

To support the state JFM Order, Participatory Forest Management (PFM) Rules were developed for HP, and notified on 23 August 2001. These Rules make provision for increasing the institutional autonomy of Village Forest Development Committees (VFDCs) by registering them as Village Forest Development Societies (VFDSs) under the Societies Registration Act. Importantly, the PFM Rules encourage VFDS formation panchayat wardwise thereby attempting to link these bodies directly with the panchayat structure with each elected panch being on the executive committee of the VFDS, *ex officio*. However, the role of the VFDSs continues to be viewed narrowly, focusing mainly on helping the HPFD to police forests and on wage-based micro-plan activities.

This resulted in the 'New SVY' rules and guidelines being announced by the GoHP in August 2001. They contain provisions for VFDSs to become, in legal terms 'the forest officer' (not notified as on July 2011) for levying fines etc, and for 100 per cent share in intermediate usufructs while on final harvest 75 per cent would go to the VFDS and 25 per cent to the panchayat. The GoHP agreed to completely forgo any share from JFM areas.

Under 'New SVY': entry point activities are abandoned but "income-generating activities" introduced; forest guards will not be the member secretary of the Executive Committee; but local organisers – usually led by a literate woman linked to a local community-based organisation, helps mobilise towards a properly representative VFDS based on a Panchayat ward. Several meetings are held before a microplan is initiated – this shows VFDS maturity. The FD sends a cheque to a local bank account. The VFDS agrees with the FD to furnish a 'utilisation certificate' which can be monitored and checked.

Since January 2001 the Government of India agreed to bring "better" forests under JFM but how many have actually been included under micro plans is not known. Even under FDAs, JFM continues to be restricted to degraded forests.

At the policy level the PFM Rules and SVY Rules and Guidelines of August 2001 are seen as a major step forward, laying the basis for uniformity in approach to community based forest management. It also makes JFM poverty focused and is targeted to the resource dependent.

In 2003, MoEF started the Forest Development Agencies (FDAs) at district level – with DFOs getting direct access to central funding – for forest and plantation work for employment generation objectives. This is an 100 per cent central sector scheme, created to reduce the multiplicity of schemes with similar objectives (it merges four existing central schemes), ensure uniformity in funding pattern and implementation mechanism, avoid delays in availability of funds to the field level and institutionalize peoples' participation in project formulation and implementation. FDAs will be constituted at the territorial/ wildlife forest division level, and JFM committees will be the implementing

agencies at grassroots level. FDAs are to work through forest guards / deputy rangers- and thus appear to conflict with SVY rules which allow for the member secretary to be elected by the JFMC / VFDS.

The growth of FDAs and therefore of JFMCs since 2003 appears to be fluctuating as figures culled out from various departmental reports indicate. In March, 2003, 678 JFMCs were reported covering a forest area of about 1640 km^2 distributed in RFs, DPFs & UPFs. In March, 2005, 1690 JFMCs are reported covering a forest area of over 4200 km^2. As of December, 2008, 1381 JFMCs stand listed. However, as per field reports only 986 of these are said to be active & area covered is not mentioned. In March, 2010, a total of 1109 JFMCs have been reported covering an area of about 4200 km^2. In July, 2010, the total number of JFMCs has been pegged at 1270 but how much forest area they cover is not indicated.

7.4.1.3 Progress of Works Under the Sanjhi Van Yojna:-

It is observed that activities pertaining to afforestation, soil conservation, assisted natural regeneration along with some entry point activities (EPAs) were carried out after formulation of a microplan which is prepared using participatory methodologies. The entry point activities generally include construction or repair of village paths, construction of small rooms in Panchayat building and School buildings, augmentation of drinking water supply and irrigation channel etc. Under the soil conservation component check dams and spurs were constructed.

7.5 The Lessons Learnt:-

The last three decades of dabbling with JFM / PFM under various EAPs and the homegrown SVY and now the Centrally administered FDA do hold some valuable lessons and insights for the future of participatory natural resource management in the state.

1. PFM should focus in and around pockets of poverty i.e. remote, forested areas (better forests) and where livelihood dependence on forests is high. This would entail several genuine joint management activities (other than plantation) like collective protection against illicit felling, fires, poaching and so forth. Issues of Rights, equity and benefit sharing are better addressed and conflicts resolved.

2. In participatory approaches, the ***process*** is more important than achieving targets. Choosing and regularly training the right persons for the job is therefore critical.

3. Sharing of removals, including resin, intermediate and salvage felling with VFDSs are necessary to establish long term stake of local communities in PFM.

4. Continual policy and rules adjustment and calibration to promote better market returns for wood and non-wood based enterprises. Example, the recent decontrol of bamboo trade and transit. Next: efficient markets for value added products.

5. Local Leadership – this is a critical role. Successful examples of JFM or CFM show that local leadership roles have been crucial in making the change. It could be an enlightened, accepted local person, an elected representative, a dedicated NGO/ CBO or even a committed forest officer. This is also important for sustainability of groups.

Why consolidate forest committees?

- Allow economies of scale to be applied, reducing the number of micro-plans to be established by one-quarter,
- More economical to produce field maps at a scale smaller than 1:20,000 and identifying all present land uses
- Development issues common to all villages could be addressed in a more efficient, coordinated and economic manner, including road upgrading, health and education, service delivery of agriculture and forestry extension, and minor irrigation,
- Facilitate dealing with common forestry problems
- Promote development of marketing cooperatives or federations, based on economies of scale for product sales, and improve market positions,
- Facilitate training for the communities by covering a larger, yet similar group,
- Support landscape-level forest planning that address conservation and economic goals,
- Allow scope for zoning community forests into areas conducive for timber and pole production, NTFPs, grazing and biodiversity conservation (with limited access).

Source: **Unlocking Opportunities for Forest Dependent People,**

7.6 Concept of Participatory Forest Management:-

The concept of Joint or Participatory Forest Management is an intervention to evolve organized and collective thinking on the issues of forest management keeping in view the fact that the forest resources are limited and the claim over these are varied, no single solution can satisfy the needs of all. The philosophy aims at involving all the stakeholders in resource generation activities through motivation, active involvement in the process of management and sharing of benefits through adequate institutional arrangements.

Joint management of forest lands is sharing of responsibilities, control, decision making authority and products over forest lands between Govt. and local user groups. The primary purpose of PFM is to create conditions at the local level which enable improvements in forest conditions and productivity. It

is a movement towards a more democratic management of natural resources founded on the principle of equity, transparency and social justice.

It is widely acknowledged that the govt. and development agencies alone can not solve the growing problem of degradation of forests and natural resource depletion. The traditional approach to management worked satisfactorily in the past when the population was less but depleting natural resources have led to the concept and practice of participatory management.

7.7 Special Object of Management:-

The basic objects of Joint or Participatory Forest Management are:-

i) To evolve consensus on the basic issues for the conservation of forest resources including soil and water.
ii) To provide an effective treatment for wastelands, degraded forests and forest lands situated near villages through protection, afforestation, pasture development, soil conservation by active participation of local people.
iii) To maintain the environmental stability through preservation of natural resources through involvement of local people in management.
iv) To augment fuel wood, fodder and small timber production for use by local people. The Govt. of HP has notified Himachal Pradesh Participatory Forest Management Regulations, 2001 and rules regulating payment of Grant-in Aid to the Village Forest Development Societies under the Participatory Forest Management (PFM) schemes operative in Himachal Pradesh.These regulations are reproduced in **Appendix-XII &Appendix-XII A**

7.8 Implementation of JFM in Kunihar Division:-

The JFM approach has been implemented in the division through projects like Sanjhi Van Yojna, FDA, NBM etc. The micro plans were prepared in accordance with project philosophy and works executed by VFDC/VFDS, the list of which is given in Table 6.1.

Activities like soil conservation, afforestation, village development activities, fire protection, grazing have been undertaken in the past but almost in all cases, the participation of locals remained upto fund flow only. Most of the committees are totally inactive now. There is a need to revive, activate and involve these rural committees in forest management activities.

Table 7.1
JFM Committees in Kunihar Forest Division

S.No	Name of JFMC/VFDC	Name of Revenue Village
1	Rugi Bhogpur	Rugi Bhogpur
2	Khanger Jatrog	Khanger Jatrog
3	Badoh	Badoh
4	Rampur/Bishanpur	Rampur/Bishanpur
5	Hara Mehta	Hara Mehta
6	Braghu	Braghu
7	Badehari	Badehari
8	Dhaula	Dhaula
9	Soria Bahra	Soria Bahra
10	Jalana	Jalana
11	Rahoo	Rahoo
12	Bassibangoa	Bassibangoa
13	Mangiat	Mangiat
14	Tukari	Tukari
15	Durgapur	Durgapur
16	Banoh	Banoh
17	Manla	Manla
18	Bawan Katal	Bawan Katal
19	Nagar Sawain	Nagar Sawain
20	Jeowala	Jeowala
21	Maan	Maan
22	Larech	Larech
23	Ladi	Ladi
24	Paplota	Paplota
25	Seri	Seri
26	Dadal(Non functional)	Dadal(Non functional)
27	Surajpur	Surajpur
28	Haripur	Haripur
29	Bater	Bater
30	Gurdaspur	Gurdaspur
31	Kharota	Kharota
32	Kathlog	Kathlog
33	Ekhu	Ekhu
34	Johar Ka Hara	Johar Ka Hara
35	Kot Beja	Kot Beja
36	Thundu/Bhangar	Thundu/Bhangar
37	Bhogari	Bhogari
38	Bandh	Bandh
39	Dangri Ser	Dangri Ser
40	Rilli	Rilli
41	Manan	Manan
42	Khanalag	Khanalag

(Source: DFO Kunihar)

7.9 Future Scope:-

7.9.1 There is tremendous scope for the JFM activities in the division. All the forests allotted to the plantation and protection working circles are suitable/ potential sites for afforestation, soil conservation, grassland improvement, NTFP development besides other forests.

7.9.2 Identification of JFM Areas:-

The degraded forest areas as well as common village land located in the vicinity of the villages are potential sites for JFM implementation. The deficiencies and strengths of these areas with regard to soil condition, water availability, grazing pressure, fuel wood production and requirements need to be understood. While touring the division, the following Panchayats, beats have been identified and are recommended for adopting JFM approach in future. The list is indicative only and the DFO is at liberty to include or exclude any area while implementing the JFM approach.

7.9.3 Non Timber Produce:-

JFM can play an important role in collection, marketing and propagation of NTFPs. Many villagers are dependent on the collection of NTFP to sustain their livelihood. They usually collect various medicinal herbs and sell it to the middleman who further sells in the market.

7.10 Potential activities of JFM Committees:-

The JFM/PFM committees are the future agencies of forest development, conservation and expansion. The potential activities to be executed through JFMCs can be:-

- Afforestation activity (both departmental and MNREGS)
- Soil & water conservation through treatment of macro and micro watersheds in a catchment.
- Recharging of water bodies like boulies, ponds and underground water.
- Minor construction works of road, paths, and buildings.
- Awareness programme for forest protection, fire protection ,propagation of medicinal herbs on a larger scale
- Livelihood options like bee keeping mushroom cultivation, vermicomposting, cutting & pruning etc. through effective training.
- Collection, value addition and marketing of NTFP.
- Fire protection

7.11 Mode of Working:-

Traditionally forest department has been involved in protection of forests and the concept of involving people in forest management is relatively recent in forest department. Forest Department especially forest guards who have more regular and direct interaction with people have to adopt 'carrot and stick policy'

which is not always easy. Thus it is desirable to involve local CBOs, NGOs etc. in implementation of programmes involving 'people'. Forest staff is not imparted specialized training on participatory management of natural resources, which is vital for success of any people centric programme. To start with the mode of working could be as follows which will further evolve with time:

i) **'User groups'** whenever a plantation is raised or a water harvesting structure is constructed; it must be in consultation with local people, essentially with their end user. Such people should be constituted into User groups, who will maintain assets, use them and if need be extend them. Thus Forest Department will be not only relieved of its function of monitoring each and every small plantation/ structure but will also be in a better position to connect with people. Such user groups will be registered and will have an account. Thus the budget received for plantation/ WHS etc can be directly transferred to their account. However, FD will monitor the quality of work and give technical guidance. Plants will be provided from departmental nurseries

ii) **Vermicomposting :** In departmental nurseries a large amount of vermicompost is required (approximately to the extent of 500 tons for 0.5 ha nursery) and this demand is difficult to meet with departmentally. Thus training may be imparted to local people preferably to women on vermicomposting (without construction of cemented structures as discussed in Chapter II, Part II) and the department can give them buy back assurance. This will give a livelihood option to local people.

CHAPTER-VIII

FOREST PROTECTION

8.1 Fire:

Fire is major factor that causes considerable damage to the forests of this division. The fire both accidental and incendiary are very common in this tract due to the reason that majority of forests are easily approachable by roads/ Paths another reason is that most of the forests lie in dry/ hot areas. As most of the forests are either chil or scrub forests, any incident of server fire has a considerable adverse effect not only on the vegetation but it also deteriorates the habitat of wild animals.

Fire has an adverse effect on soil, water and ecological balance of the affected area. Soil becomes vulnerable to soil erosion and its structure gets affected, thereby retarding plant growth. The soil building micro-organisms are destroyed and the area is ultimately rendered susceptible to erosion and decreasing productivity. The young regeneration is wiped out, growth of surviving vegetation is adversely affected, the yield of forests produce is immediately reduced and the vegetation damaged by fire becomes venerable to insect and fungal attack. The high salvage removals are attributed to this. In the fire burnt forest change in crop pattern takes place, resulting in mixing crop in the forests.

The chil forests and other forests which are infested with Lantana in this division are highly susceptible and are subjected to frequent fires in the month of April to June. If fires are not controlled in time, these cause serious damage. Fire incidents occurred every year, except in the year 2011. Maximum annual forest areas recorded as burnt has been 4201.60 ha in the year1995.In 1999, 2002 and 2003 lots of fire incidences took place.After observations it is also apparent that some fire incidents are not reflected in the records of this division. In reality wild fire do occur frequently in at least some of the areas, in the division.

Because of all these reasons prevention and control of forest fire assumes great importance in Kunihar Forest Division and there is an urgent need to take effective steps to counter the menace of forest fires, with the aim of:

a) Protecting forests from damaging fire by taking up all preventive measures like administrative, technical, social, legal ect.
b) Preparing adequately and taking appropriate action for controlling, suppressing and extinguishing forests fires, in order to minimize the loss caused by them.
c) Educating local people about fire damage and eliciting their cooperation in preventing, controlling and extinguishing fires.

8.1.1 Cause of Forest Fires:-

The main causes attributable for the outbreak of fires are various and can be summarized as under:-

8.1.1.1 Natural: -This is caused due to lighting, friction between quartzite stones and dry bamboo culms. Such fires are rare.

8.1.1.2 Accidental: -Such fire are more common and are caused due to

i) Charcoal burning and control burning the forests
ii) Gross carelessness of the passersby, smokers, grazers, hikers, campers, hunters, wood collectors, honey collectors, labourers working in the forest, etc.
iii) Burning of refuse in the cultivated fields by the people without suitable precautions or supervision.

8.1.1.3 Incendiarism:-

i) Peoples set fire to forest under the false belief, that the resultant grass growth will be better and more abundant.
ii) Fires are started for scaring away wild animals for poaching.
iii) Fires are caused to destroy the evidence of crimes committed or damage caused to forest property.

8.1.2 The detail of fire incidents in this division during previous plan period has been discussed under para **2.3.1 of chapter II (part I).**

8.1.3 Factors Contributing to Fire Damage:-

Fire is the product of the fire environment, which has mainly following components:

i. High Temperature.
ii. Low humidity.
iii. Inflammable material.

i) High Temperature:- With the increase in temperature during summer season, the possibility of fire increases. In this area 37^0 is considered the critical temperature, above which the cases of fire keep on increasing with increas in temperature. The detection of fire danger day can be assessed with the help of thermometer.

ii) Low humidity:- This factor also contribute towards spread of fire. The areas which are more humid are less prone to fire, than the areas, which have low humidity in summers. This is the reason that the casual rain fall reduces the risk for a few days.

iii) Inflammable material:- In most of the forests, grasses, chil needles, resin, fallen trees, bushes etc., make ample inflammable material. The possibility & magnitude of fire depends upon the quantity of inflammable material on forest floor. To reduce the inflammable material in forest, control burning is done.

8.1.4 Fire season:-The greater danger of fire occurrence is during summer months from April to early July, upto the commencement of monsoon rains. During autumn, normally, the danger of forest fire is less but occasionally the fires do occurs in this period. Fire sensitive forests and Private Ghasanis adjoining forests have been identified and detail is given in **Table No 8.1**. Fire fighting calendar is also made every year. Calendar for 2012-13 is given in **Appendix-XIX**

8.1.5 Management of Fire Protection:-

The following steps will prove effective in fire management.

a) Fire prevention measures.
b) Timely detection of forest fire and information to concerned staff.
c) Process of fire control and fire fighting.
d) Penal provisions and a system of rewards.

8.1.5.1 Fire Prevention Measures:-

"Prevention is better than cure" and this holds good in case of forest fires too. Prevention of fire is more beneficial and cost effective than fighting the fire. For this effective steps should be taken well in time, such as summarized below:-

8.1.5.2 Earning Good will of Local People:-

The forests cannot be protected against fire without winning the good will and co-operation of the local people. This can be done by making regular contact with local villagers and meeting the reasonable bonafied demands of right holders, well in time. Also, the closures made should be affected for the minimum required period.

8.1.5.3 Education and Publicity:-

Wide publicity especially in villages nearby forests, should be given against the harms caused by forest fires. For this, timely action should be taken for distribution of pamphlets and other educative material during the fire season, well in advance, so as to acquaint the villagers/ local people through panchayats. The staff should hold regular meeting with local villagers in their areas to create awareness. Also, hoardings, notice broad and banners should be displaced at prominent points to make tourists and local public regarding the damage caused by fires.

8.1.5.4 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/vermicompost/briquettes.

8.1.5.5 Needle Collection:-

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:

a) **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 incentive for protecting 100 ha forest may be fixed as follows:

i) No fire: Rs 10,000
ii) 1 fire: Rs 5000
iii) 2 fires: Rs 2000
iv) More than 2 fires: No incentive

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.

b) **Deployment of Fire Watcher:**

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.

c) Use **of Pine Needles:**

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.

Presently in H.P. handicrafts of chil needles are being made by Kangra Mahila Sabha, Dharamsala and they have imparted such training to SHGs formed by MHWDP in Salooni, Chamba. After making a study of the economics of the enterprise, the same may be adopted in Kunihar. However, as the exercise would involve identification of marketing channel etc, it is better to get it done through an NGO or any local Community based organization that are already into marketing of handicrafts.

Pine briquetting 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. After making a study of the economics of the enterprise, the same may be adopted in Kunihar.

Similarly pine needle check dams, *Pirule* have been made in Uttarakhand Forest Department and have also been tried in Kalatop Khajjiar Wildlfe Sanctuary. 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, HPFDC resin workers or resin agents should get such compartments cleared of fallen pine needles at leaast 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

8.1.5.6 Fire Protection Equipments:-

The field staff (near the fire prone forests) should be provided with sufficient fire fighting equipments, such as brooms, shovels, slashers, axes, hatches , forks, buckets, gunny bags ect. so as to meet any emergency and for facilitating the speedy extinguishing of fire. Fire staff should be imparted training for effective controlling forest fires.

8.1.5.7 Fire Lines:-

The existing fire lines be properly maintained and kept clear of all bushes, needles etc. to avoid any chance of fire. This division has very good network of National/ State Highway, link road, bridle/ inspection paths, hence no new fire lines are proposed. It is laid down that all such roads/ paths should be kept clear of all inflammable material specially during the fire season, so as to act as fire lines. The details of fire lines existing are given in **Appendix XX.**

8.1.5.8 Control Burning:

The chil forms a thick bark at an early age, by virtue of which it can resist the effects of slow fire and this property is of great advantage and development of control burning. The burning should be thoroughly planned and organized and should be carried out under the supervision of competent officials.

All the forest must be isolated by clearing a strip of 1 meter width, of all inflammable material, leaves, bushes etc. to ct as fire barrier during the fire season. Grazing by cattle, should be permitted, in order to reduce inflammable material in the forests.

It is most essential that forests, allotted to, Chil Working Circle are adequately protected against fire. The control burning is the most important operation and should never be neglected. The triennial programme for control burning is the most important operation and should not be neglected. The

triennial programme for control burning is chalked out and is given in **Appendix-XXI**

The forest area have been prescribed in full, however it is laid done that all the forest areas planted there in should not be controlled burnt, until the plants attains a height of 1.5 meter.

The detailed instructions on control burning are contained in the H.P. Forest manual Vol. IV and are as below:-

1) The control burning should always be done during winters in January-February.
2) Burning should progress from uphill to down kill in calm weather and special care should be taken, to keep the line of fire as straight as possible and under control.
3) The fire should start along the ridge, a cleared path or specially-cleared lines.
4) Chil needles and other inflammable material should be fully raked to ensure thorough burning.
5) In the forests under resin tapping, it must be ensured that all chips, fallen resin, needles, etc. are cleared about 1.5meter away from the base of the tree by the resin labourers.
6) Cleaning and early thinning in young regeneration areas must be completed before the control burning.
7) Burning shall be done always under strict supervision and control of the executive staff and shall never be left to engaged labrouer.
8) The existing fire lines should be properly maintained and kept clear. The roads, bridle and inspection paths etc. must be kept clear of all inflammable material, so as to act as fire lines.
9) Sufficient number of trained fire watchers should be employed during the fire season to help the field staff and provided with necessary equipments. No felling operations, even to the right holders, should be allowed during the fire season.

It is, however to be noted that areas under regeneration should not be control burnt, until the regeneration reaches a height of 2.5 meters. In each area, however, the grass cutting / needle collection by right holders be encouraged.

The control burning will also be a part of control forms and deviation reflected therein should be explained very clearly giving valid reasons.

In order to protect the forests, against fire risk, in case of other forests allotted to other working circles, which are not included under chil working circle and are not prescribed for control burning ,and to maintain the sanitation of the forests, the following guidelines/steps are laid down:-

1. The inflammable/fire hazard material, from the forest should be collected and disposed off during the winters.
2. The job should be got done preferably, through the regular forest workers of concerned range.
3. Collection of humus and other inflammable material should be by racking from top of the forests and working downhill.
4. Stack in moderate heaps in open places and suitable nallas.
5. Burn the heaps downhill so that the smoke does not interfere with men working below and reduce the risk of fire.
6. Burn the heaps in rotation to reduce the heat.
7. Burning operation should be carried out under the supervision of forests guard concerned.
8. Steps should be taken to make it mandatory to right holders and Forest Corporation, to collect the felling refuse after felling trees into heaps or its removal from the forest should be specified.

8.1.5.9 Fire Fighting:-

When a fire is observed, forest guard or the fire watcher should at once inform the block officer (Dy.Ranger) and the Range Forest Officer. He should also inform the president of the local panchayat immediately, as well as, the staff of the government officers or institution situated in the vicinity and seek their help in fire fighting operation. In case of alarming situation, immediate help or services of organization,like fire brigade, N.C.C., N.S.S., SITUATED NEAR THE VICINITY OF EACH RANGE, the service of such institutions can be availed. District Administration may be requested for immediate help, as and when, required. The fire is normally controlled by beating with the broom of green bushes.

Fire fighting methods have been given in the Punjab leaflet No-8 and practical forest management by Trevor and Smithies. For guidance of field staff, the method is given in brief here. The Senior Officer present will immediately, take command of the operations. He should know the local geography and have some idea of local force. The labour force should be organized in section of suitable strength, each under the order of one man and given definite task. A couple of men should be kept in waiting to take messages and instruction to the various sections. In case the fire goes beyond control, it is necessary to localize it by counter firing. Counter firing should only be done under order of a senior officer in charge of operation and attempted from a defined line such as road or bridge or fire line. A line is formed along the ridge by clearing the forest floor and cutting bushes after that these fire line is started, so as to consume the fuel in advance of the on coming fire. Wind direction and gradient should always be kept in mind during counter fire. Roads/paths are useful, provided enough man power is present. After the fire has been brought under control, the shouldering stumps should be extinguished by putting the dug earth on them and strict

vigilance be kept till al dangers of fire spreading are taken care of. Arrangement for the transport of food and adequate fire fighting tools are essential. The rolls of right holders, who helped to fight the fire, should be kept in record, so that the rights of defaulting right holders can be suspended.

8.1.6 Administrative Measures:-

i. Administrative aspects are also very important in connection with fire protection efforts. Encouragement should be given to good staff, while negligent staff be punished appropriately so that the officials remain vigilant and cautious in their work. The concerned Conservator of Forests can give suitable reward, in case of exemplary work done by any official or any other person so that temptation is more towards the fire fighting operation.

ii. Regarding government common land and other forests, which are not under the direct control of the forest department the D.F.O.should write to the revenue department authorities or concerned authorities to take fire protection measures during fire season, as the fire gets spread into government owned forests, from these areas.

iii. The D.F.O. should also make it to know to the district revenue authorities that the staff and vehicles of the forests department should not be deployed for any work other than forest protection during fire season.Guidelines issued By GOI is given in Appendix-

8.1.7 Legal Action/Punitive Measures:-

All cases of incendiarism should be properly investigated and punitive measures should be taken against the culprits. H.P. Govt. has framed rules regarding fire protection known as Himachal Pradesh Forests (Protection from fires) Rules, 1999 vide H.P. Govt. Notification No. FFE-A(C) 7-1/96-11 DATED 17-11-99, which are being appended in **Appendix-XXII** .The Depty Commissioner also invoke the Thikary Para in exercise of the power vested with him under section 3 of the Himachal Pradesh village and small town Patrol Act, 1964.

8.1.8 Assessment of Loses Caused by Fire:-

Fire causes tangible and intangible damages to the forest and wild life. Loss of timber, resin, etc. are tangible, where as loss of soil fertility and soil constituent are intangible. Fire damage leads to increase in rate of soil erosion and causes drying up of water sources. Fire causes adverse effect on regeneration and destroys under growth leading to invasion by weeds. Natural succession goes into retrogression. Wild animals are killed. Being afraid of disciplinary action the loss caused by forests fire is often not actually recorded

by field staff and is also under estimated because of which calculation of exact magnitude of loss is hardly possible. The offenders responsible for causing fire are also rarely caught and punished for which concrete and sincere efforts are required.

8.1.9 Fire Records:-

All cases of fires are to be registered to police for investigation and bringing the culprits to book soon after the outbreak of fire. The fire reports on prescribed performa are prepared, immediately after controlling the fire, highlighting cause of fire, extent of area burnt and damage done, suggestions for the treatment of area and safe guards for future incidences. The fire reports should contain a map of area burnt. All the fire reports are sent to higher authorities and follow up action taken accordingly.

A complete record of fires will be maintained, both in range, as well as divisional offices. Maps of the forest showing the area burnt by fire will be filled in the compartment, history files along with other relevant details regarding fire.

8.1.10 : Fire Sensitive Areas:

The detail of fire sensitive Forests, Fire Line and Private Ghashanies adjoining to forests is tabulated as under:

Table 8.1

Fire Sensitive Forests, Fire lines, Private Ghasanies in Kunihar Forest Division						
Area of Fire Sensitive Forests/ Plantations		Fire Lines		No. of Fire Sensitive Beats	Private Ghasnis adjoining the Forest Fire Sensitive Forests	
Chil Forests (Ha)	Other Forest (Ha)	Nos	Length (Km)		No.	Area (Ha)
1828.00	4811.00	23	67.00	19	348	198.93

8.1.11 Khosla Committee Report:-

Govt. of India, vide No.A-34011/6/95-FF, dated 11th July 1995, from Shri Sarveshwar Jha, Jt. Secy., Mnistry of Environment and Forest, constituted a team consisting of Sh. R.P.Kkosla, IAS (Retd.) former chief secy., U.P and former secy., Ministry of steel, G.O.I., and Sh. S. Parmeswarappa, IFS (Retd.), former Pr.CCF., Karnataka to enquire into causes of forest fires, the extent of damage to forest wealth and to formulate the strategy to prevent the occurrence of such large scale fires in future and suggest measures for there control. The

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copy of the summary of conclusion of there report is appended as **Appendix XXIII** for favour of information and guidance.

8.2 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. Detail of encroachment is given in **Chapter II of part I (Table No 2.3)**

8.2.1 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.
- The old stone masonry pillars should be replaced with cement mortar after proper demarcation. The new boundary pillars of only cement mortar should be constructed in future.
- 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.
- 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.
- 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.

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.

II) 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 a permanent record.

III) As a deterrent, FIRs should be registered as soon as an encroachment is detected. Court proceedings will then follow.

III) 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

8.3 Illicit Felling:-

With development of good network of roads, there has been an increase in incidences of illicit felling. The detail of illicit felling has been given in **Chapter II of part I (Table No 2.4)**

8.3.1 Smuggling of Timber/Resin:

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 hear 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 cases admitted and decided in the court of Authorized Officer Kunihar under 52A is given below:

Table 8.2
Vehicles Seized during Smuggling of Forest Produce

Vehicles seized	Vehicles confiscated	Under appeal	Under trial	Vehicles auctioned
4	1	1	3	0

(Source: DFO Kunihar)

Strategy:

Rapid Action Team: Number of beats in Kunihar Division has now been reduced to 45 from 55 beats.

i) Stringent action against offender will act as a deterrent.

ii) Whenever any vehicle is apprehended or timber is seized, they should be disposed off immediately (after seeking permission from court) before

there is any depreciation in their value. This will save space and time wasted in keeping them in custody.

8.4 Resin Tapping:-

Resin tapping is a major commercial activity in the division. The quality of resin tapping works being undertaken by HPSFDCL needs to be improved. CF Bilaspur has introduced Permanent Inventory System in Bilaspur Circle which in turns improves the resin tapping working. The detail is discussed in **Chapter IX of part II.**

8.5 Invasive Alien Species:-

Introduction:-

Biological invasions – one of the anthropogenically mediated ecological perturbations – are threatening native biodiversity, preventing natural ecological succession and changing the community structure and composition, besides impacting ecosystem services. *Lantana camara* is perhaps one of the most important invasive alien plant species (exotic weed) in forest ecosystems of India as also in Kunihar Division. Other alien invasive plant species with very little impact on the forests of Kunihar Forest Division include *Parthenium hysterophorus* 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, *Ageratum* is also seen in some forest occupying small areas.

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 invasive alien species was negligible in this division.

INVASIVE ALIEN SPECIES: STRATEGY FOR CONTROL AND REHABILITATION OF AFFECTED AREAS

Table 4.3
Distribution if Invasive Alien Species in Kunihar

Range	Legal Status of Forests	Lantana density(In Ha)				Total Infested Area
		0-25%	26%-50%	51%-75%	75%-100%	
Darla	DPF	17	67	130	0	214
	UPF	81.2	142	38	0	261.2
Arki	DPF	478	558.8	215	230	1481.8
	UPF	741.2	301.6	94	57.2	1194

Kunihar	DPF	157.25	291.2	302.2	362.5	1113.15
	UPF	297.8	520.8	596.2	465.6	1880.4
Kuthar	DPF	101	177	105	0	383
	UPF	571.5	806	265.6	32	1675.1
	Total	**2444.95**	**2864.4**	**1746**	**1147.3**	**8202.65**

Analysis of the table above reveals that in Kunihar Division, approximately 8202.65 ha area is under invasion of *Lantana*. It also comes out that once the lands become degraded and infested with invasive species, these attract apathy of all the stakeholders, further strengthening the invasion process.

In the absence of any record of infestations of forests in the Division by exotic weeds prior to January, 2011, the data presented here will be taken as baseline for the proposed management purposes .Compartment wise detail of lantana infestation is given in **Appendix-XXIV**

Strategy for rehabilitation of forests infested with lantana is dealt in detail as under:

Core Principles of the Strategy:-

- **Contain Future Spread:**
  A close watch over the spread of exotic weeds will be kept through biennial monitoring mechanism and necessary corrections in the program will be made to remove the recent infestations on priority basis.
- **Complete Rehabilitation of Infested Areas:**
  It will involve shift from 'one time removal of weeds' to 'complete rehabilitation' of the treated areas by competing/ shading out exotic weeds. All noxious exotic weeds on any given area will be tackled simultaneously.
- **Reliance on Only Mechanical/Manual Methods:**
  In view of their environmental/ ecological concerns, the rehabilitation measures will NOT employ any Chemicals/ Biological methods of exotic weed control.
- **Natural Resilience of Native Flora to be the basis of Rehabilitation Action:**
  The natural regeneration of indigenous plant species on treated sites will be encouraged and facilitated to establish towards better environmental and ecological services, including fodder, fuel, water recharge, etc.

- **No exotic Species to be used to Rehabilitate Treated Sites:**
  No potentially invasive exotic species – (viz. Leucaena leucocephala, Prosopis juliflora, Jatropha curcus, Tecoma stans, Tectona grandis, etc.) -

will be used for plantation in the areas under rehabilitation, because of their deleterious effect on the native flora.

- **Rehabilitation to start from Low intensity Infestation and to move towards Heavy infestation:-**
  Rehabilitation activities will start from the fringes of infestation zone with lower intensity infestation and will progress towards the heavily infestation areas. This approach will (i) allow tackling larger areas with the given financial resources and result in creating quick visible impact, and (ii) help in containing further spread of exotic weeds.
- **Selective priority Rehabilitation of Heavily infested Critical Habitats:-**
  Rehabilitation of heavily infested areas as starting point will be taken up only in limited number of carefully selected ***critical habitats*** *like grazing grounds near habitations. Such sites will then act as nucleus from where rehabilitation activity will radiate to adjoining areas of high infestation.*

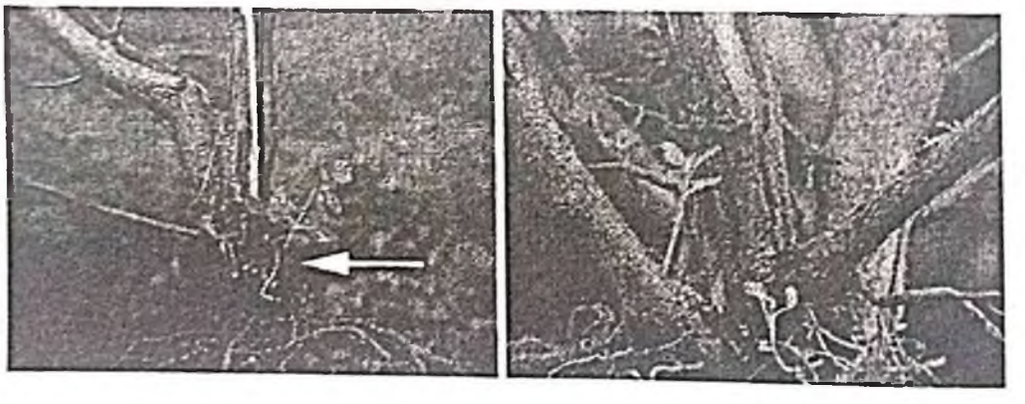
With the above mentioned core principles of the strategy, the approach/ plan to implement the strategy will be as under:

(a) MANAGEMENT OF *LANTANA* With the major focus of the management strategy on 'containing further spread', a two pronged approach, as described below, will be followed in tackling *Lantana* menace on forest lands. **Table 4.2** gives spread of Lantana and the intensity of infestation.

- **Approach-I (For areas with Low infestation Intensity)**
  About 65% of total infested area has = or< 50% density. Under this approach, these areas will be tackled on priority basis for the reasons that (i) with the given financial resources, it would be possible to rehabilitate larger areas for creating significant impact, and (ii) further spread of this exotic weed would be contained.
  The rehabilitation activities will be started from the fringes of infestation zone with low intensity infestation and will progress towards the high infestation areas. Major activities under this approach will be removing *Lantana* with cut root stock method, spreading of local grass seeds and encouraging establishment of local species, including grasses or augmenting populations of native species through plantation.
- **Approach-II (For areas with Heavy Infestation)**
  Under this approach, critical areas under heavy infestation, especially the grazing grounds near habitations, will be identified and treated.
  The rehabilitation activities will start from the selected critical area that will act as nucleus, and will radiate from this nucleus to cover adjoining areas of high infestation. Major activities under this approach will be manual cutting of *Lantana* bushes, encouraging establishment of local species, including grasses and planting the areas with tall plants of fast growing species to quickly shade out *Lantana*.

The methodology to implement the above two approaches 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. **(See box below for details).**
- **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(**Appendix-XXV**)
- A three year active maintenance of the treated areas and triennial follow up thereafter will form integral part of the rehabilitation programme 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 400-500 hectares of *Lantana* infested areas will be taken up for rehabilitation per year.



METHOD FOR REMOVAL OF LANTANA *(FIG-1)*

Removal of adult clumps using 'Cut Root Stock' (CRS) method: This method involves cutting the main tap root of *Lantana* plant beneath the 'coppicing zone' (transition zone between stem base and rootstock) (Figure 1). This method of removal involves engagement of 2–3 individuals to work in a group for the removal of *Lantana* if the clumps are too large to be handled by one individual after the rootstock is cut. The steps involved in the cut rootstock method are:

(i) The person, who engages in removal of *Lantana*, is positioned in a way that he stands near centre of the *Lantana* clump with his back facing the clump and holding the handle of digger (kudal)

(ii) Using the specially designed digger, the person cuts the main rootstock of *Lantana* 3–5 cm below the soil surface by hitting the rootstock 3 or 4 times; while hitting the rootstock the blade of the digger gets lodged into the main tap root, and at this point it is useful to move the handle of the digger in the forward direction away from the body of the person so as to severe the connection of the clump with the main tap root. In case the clumps of *Lantana* form impenetrable thickets, it is advantageous to cut the rootstocks of 3–4 contiguous clumps to make the removal operation convenient. It may be noted that the branches of *Lantana* clumps should not be slashed/cut to gain access to the centre of the clump for its removal by cut rootstock method. The branches of *Lantana* thicket formed by more than one clump should be lifted and tipped over from one end by using a wooden or bamboo pole of about 1.5–2.5 m long and diameter 5–6 cm which is inserted just below the branches from one side and rolled over easily by two workers holding the pole at either end and pressing it so as to reach the centre of the clump Such manual handling of impenetrable thicket is possible because of the umbrella type of canopy which makes it difficult to reach the centre of clump easily. Such physical maneuvers minimize or prevent regeneration from rooted cut branches when they fall on the ground.

(iii) Lift the clump/s and place the clump/s upside down. If the clump is not placed upside down, the prostrate rooted branches and the aerial old branches having aerial roots at nodes may develop into adult plants when they come in contact with the soil. Therefore, the upside–down orientation of cut clumps is critical in the prevention of regeneration of *Lantana* from cut clumps. It may be noted that *Lantana* does not produce root suckers.

(iv) After drying the clumps, the clumps may be used as fuel or burnt at the same site or all the dried clumps may be collected at one place and then burnt. The best time for removal of *Lantana* is winter season in Himachal Pradesh,

iteps Involved in the Eradication of *Lantana*

- Chop the main tap root just 3 – 5 cm below the ground surface by standing close to the clump, with a few hits using a kudaal having a long handle (cut rootstock method).Lift the clump and place it upside down for drying.
- Burn the dried clumps of *Lantana.*
- Uproot seedlings of *Lantana if any, by hand, after removing the clump.*
- Locate perching trees and remove the saplings under the canopy of perching trees and along the surface run off originating from the perching trees.

- Continuous surveillance for *Lantana in the area from where Lantana has been* eradicated
- The best season for eradication of *Lantana is summer, but in condition of Himachal Pradesh winter season is the best because in winter it is almost leafless (Quite easy to locate the main stem which is to be cut)*

(Fig-2)

(b) Management of Other Invasive Alien Species (Parthanium,Ageratum):

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 the 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.

8.6 Boundaries:-

The state of existing boundaries and boundary pillars is very bad .The latest position of boundary pillars has been given in **Appendix-XXVI**. The repair of boundary pillar is to be taken on priority. The priority of repair is to be given in the forests which are situated near the habitation.

CHAPTER IX

RESIN PRODUCTION

9.1 General:-

Resin is economically the most important produce of this division and is one of the principal sources of revenue to the department. The price of resin in recent years has gone very high, hence, every efforts should be made to extend correct resin tapping operations to all suitable chil areas.

Resin tapping was started in this division in early twentieth century, resin tapping upto 1975 was used to be done departmentally, but with the creation of H.P.Forest Corporation Ltd in 1974 this work is being executed by the Corporation now.

The tapping was used to be done by conventional French "Cup and Lip" method. This method involved deep and rather uncontrolled depth of the blaze which coupled with frequent fires and high velocity winds was responsible for salvage removals. Besides, quantitative and qualitative output of timber was also affected adversely, as the lowest portion of tree rendered to useless due to deep gullies and subsequent destruction by fire.

The conventional method was gradually replaced by improved method "Rill Method" of resin tapping and the all tapping since 1988, is being carried out by this method. This technique of tapping was evolved at Forest Research Institute, Dehradun and its important features were brought out in a publication "Field Guide to Modern Methods of Resin Tapping" by Shri V.P.Verma,IFS, Forest Research Institute and Colleges, Dehradun in 1978.Subcequentally a manual of "Rill Method of Resin Tapping from Pines" by Shri D.C. Choudhary, Scientist, Non Wood Products Division, Forest Research Institute,(I.C.F.R.&E),Dehradun has been published. The salient features of resin tapping by rill method are described here under.

9.2 Salient Features of Rill Method:-

9.2.1 The improve method has shown the increase in yield by about 22 to 50% per blaze per season and has faster healing quality. it does not reduce resistance to storms and help in reducing fire incidences of fire in pure forests

9.2.2. Some other parameters are as

(a) The width of blaze is 20 cms and vertical sides are 38 cms.This is delineated on the tree with the help of a blaze made out of tin sheet. A handle is fixed in the centre of frame and to enable the labourer to hold it against the tree. The angle between the vertical and slanting sides of frame is 40°.

(b) Loose and rough bark over a surface area of about 45x30 cm leaving a space of about 15 cm from the ground level is removed with the help of bark shaver.

(c) The blaze frame is put on the stem in vertical position so that the lowest point of the frame is 15 cm above the ground level and the position of the blaze is marked with the marking gauge. The position of the central groove is also marked with the help of wooden board and marking gauge.

(d) The central groove, 4 mm deep and 7-9 mm wide, is then cut with the help of groove cutter.

(e) The lip measuring 7 cm long, 6.5 cm wide, bent at 1.5 cm from one side made out of used tin sheet is fixed to the tree with two bullock shoe nails. A 5 cm long wire nail is driven into the tree about 2 cm below the mid point of the lip for hanging the collection pot on it, the nail is driven at a slight angle so that the pot hangs smugly against the tree. The pot of conical shape with the diameter of 11.5 cm and length of 16.5 cm is made out of tin sheets. A hole is made about 1 cm from the top so that the pot can be hung on the wire nail stuck in the tree.

(f) The plastic spray bottle is 13.5 cm long and .5 cm in dia with a 9.0 long cap which has a pin hole at the end. A 22.5 cm long capillary tube is fitted in the bottle to ensure a fine spray of liquid. The diameter of the capillary tube should not be more than 1.0mm otherwise the liquid comes out of the bottle in the form of a jet, instead of a spray

(g) The freshening knife consists of a wooden handle, the steel blades, guides, side washer wooden piece and the nut and bolt with washer. The guides fixed with each blade enable the worker to move the knife in the right direction, thus leaving the bark of the requisite thickness between the rills. It has to be ensured that the rills neither extend beyond the limits of the blaze mark nor fall short of it. The average width of the rills is 5 to 6 mm (fig1(a) &1(b) The depth of the rill is 2 mm in the wood. The total numbers of rill are 323 in the eight months (One season)

(h) Freshly blazed rills are treated with the acid mixture, by squeezing the plastic bottle, sprayer keeping at an angle of 45° and 3-5 cm away from it and moving its nozzle in a steady motion along the rill.

(i) The preparation of setting of crop for the subsequent years should be started from the first week of February. The bark shaving should be done above the top the first year's blaze and the position of the blaze is marked just above the previous year.

9.2.3 Salient Measurements of the Blaze:-

- **Marking the size of blaze**
  - Bark shaving area= 45x30 cm
  - Bark to be left in the shaved area= 2mm
- **Size of blaze**
  - Length= 38 cm
  - Width= 20 cm
  - Width of bark between rills = 5 mm
- **Size of rill**
  - Average width of rills= 6-7mm
  - Depth of rill= 2 mm
  - Number of rills in a season= 32
  - Distance between two channels= 7.5 cm
- **Angle of rill**
  - Angle of rill with central groove= 40^0

9.2.4 Stimulant for one section:-

Water	875 ml
Sulphuric acid	70 ml
Nitric acid	55 ml

9.2.5 Yield:-

The average yield from 30 cm dia trees at New Forest, Dehradun by this rill method is 3.211 Kg/tree/season against 2.523 Kg by old Cup-Lip method. The detail of the blazes tapped during previous working plan has given in **Table No 4.3** Of **Chapter IV of part I.**

9.2.6 Tappable Diameter:-

As per the instruction communicated by the PrCCF,H.P. vide his memo No dated ,The tappble diameter for the rill method is fixed 35 cm.**Appendix-XXVII**

9.3 Areas Available for Resin Tapping:-

Resin tapping will be carried out in all the chil forests of the division subject to availability of adequate number of blazes. The trees due for final felling may be tapped heavily. The Division Forest Officer may stop resin tapping in any (As per the latest pricing committee decisions in this regard) forest where it is felt that the resin extraction work is likely to interfere with the growth of the tree or may be a potential fire hazard.

9.4 Suspending Resin Tapping Operations:-

In case drying up of trees due to resin tapping is observed in some forests, it should be immediately closed for tapping for a period minimum 3 years after making joint inspection as per pricing committee decisions

9.5 Data Collection and Recording:-

It is observed that HPSFDC ltd dose not maintain data of resin extraction compartment wise. It is therefore, prescribed that the data of resin extraction be maintained compartment wise and entered in the respective compartment history file.

9.6 Fire Protection:-

Pine needles and other refuse within one meter of tree tapped for resin should be removed and other instruction laid down in the H.P.Forest Manual IV and other latest instruction must be observed carefully. Areas being tapped for resin are very fire sensitive and needs extensive fire protection. Some fire fighting equipments should be provided in resin depots whether in forests or road side. All staff should be trained to handle such equipments.

9.7 Collection of Resin:-

The pot should be removed from the tree and the resin should be poured into can (container).the resin still adhering to the pot should be removed with the help of scrapper; the central groove should be cleaned after each collection with groove cleaner. For improving labour output, the collection from the pot should be done with alternate freshening in March, April and August to October. If necessary, from May to July, collection may be done with each freshening.

9.8 Tapping Season:-

Crop setting must be started by 15th February and completed by 15th March. Tapping season extends from 15th March to 15th November freshenings are not done from 16th November to 30th November and during this period only resin should be scrapped.

9.9 Continuous Tapping for 20 Years:-

After two years tapping, the blaze reaches a height at which it is not possible to pull the freshening knife upwards. Therefore, third year the freshening is done by pushing the freshening knife upward from the central groove towards the outer edge of the blaze mark.

In this way, the blaze can be extended upto 4 years. During fifth year, the height will be beyond the reach of tapper. Hence it is necessary to use a ladder. Reseach has shown that much higher yields can be obtained if tapping is done at a height of 2-4 m from the ground

Mechanics of Rill method:

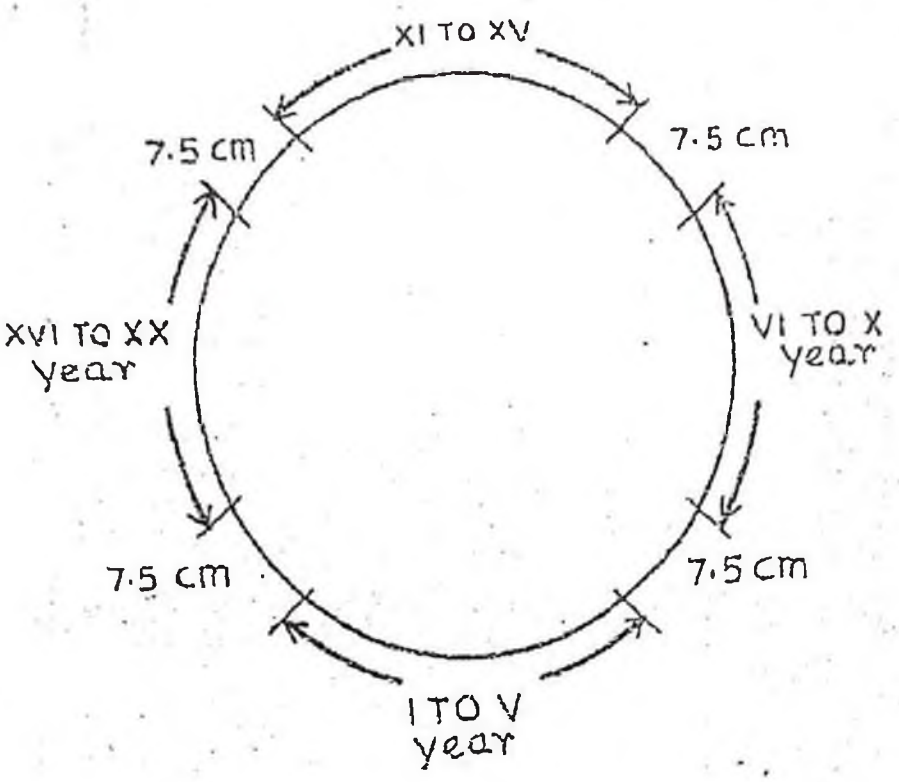


Fig.1

35 cm d.b.h tree is capable of being tapped for 20 continuous years

During the sixth year of tapping, a new blaze is made at the bottom of the tree in the same manner as in the first year, leaving 7.5 cm wide space along the girth of the tree from the edge of the first blaze as shown in the Fig 1

Thus the tapping trees of 35 cm diameter can be continued for 20 years if tapping is done as per scientifically correct method.

9.10 Permanent Inventory System:-

This system has been evolved and introduced in Bilaspur Circle by Shri Rajeev Kumar, CF Bilaspur in 2011.In this method all the trees which are being tapped are given permanent unique numbers and each and every information of every single tree is gathered/maintained in register.Same number is not used again. He has issued a standing order No 2/2011 **Appendix-XXVIII** in which full detail of this system is given. In Kunihar Division this permanent inventory is under implementation since 2011season and by this, working of tapping has improved a lot.

9.11 Current Penalties Approved by Pricing Committee:-

- Rills from 33-40 — Rs. 3/- per rill
- Rills from 41-50 — Rs. 50/- per rill
- Rills 51 & above — Rs. 100/- per rill
- Width above 23 cm — Rs. 10/- per blaze
- Illicit blaze — Rs. 100/- per blaze
- Guide not used — Rs. 10/- per offence
- Acid higher conc. — Rs. 500/- per offence

It is difficult to check use of guide, acid of higher strength

No penalties in place for not maintaining safe distance between two blazes

No penalties in place for wastage of valuable tappable area, improper crop setting, wasting space between two blazes (linearly)

No penalties for non-linear tapping in successive years

9.12 Advantages of Rill method:-

- Guide used in freshening control depth of blaze at 2 mm-eliminates damage to heartwood and consequent revenue
- Fast healing of shallow blaze makes second tapping cycle possible & conserves forests
- Does not reduce resistance to wind storm
- Loss due to fire to tree and incident of fire is reduced
- Loss of stem timber is minimized
- Yield of resin per tree per season increases
- Use of acid stimulant facilitates
- Additional revenue from the sale of tapped log as timber at the end of felling cycle.

9.12 Defects Frequently Noticed:-

- Broadly classifiable into two categories
- Over-utilization of inviolate space
    - Distance between two blazes not maintained at 7.5 cm min
        - Girdling of trees, no live bark/ cambium left
    - Improper crop setting after fire
    - Blaze frame not used to demarcate tapping area
    - Excess bark shaving
- **Under-utilization of Premium Tappable Space/Area**
    - Distance between two successive blazes exceeds 5 cm
    - Blazes are placed non-linearly
    - Fire affected blazes are not restarted in next year

9.13 Consideration to Augment Resin Production:-

In addition to the above details discussed a wise resin tapper should also know the following apothegms:

a. The yield of resin is largest in the region of the root column, less in the clear part of the bole, and least in the vicinity of the branches
b. More resin is secreted:
   i) On the south than on the north side of the sun
   ii) In a warm than in a cold climate aspect
   iii) In a warm than on a cool aspect
   iv) On dry and warm soils than in moist places
   v) In open than in crowded forest
   vi) On loose, sandy than on stiff and cold soil
   vii) On hilly or sloping than on level ground
c. Moderate tapping: Promotes diametric increment of the stem and spread of crown, thereby increasing secretion of resin.

References: 1. Manual of Rill Method of Resin Tapping from pines by D C Chaudhari

2. New Methods of Tapping: A Research report; Forest Chemicals Review, May-June 1998

CHAPTER X

NON TIMBER FOREST PRODUCE

10.1 General:-

With the thrust of forest management shifting from being 'tree centered' to 'people centered' forests are now being viewed as a source of not only commercial timber but of valuable. Interest in non-timber forest products (NTFPs) is increasing rapidly. At present there are numerous efforts to increase awareness of these products, their management and market potential. However, there is a shortage of information available and there are few means effective in disseminating the information necessary for the sustainable management and marketing of these resources and products. There is a need to emphasis on the study, exploitation and marking of valuable medicinal plants found in the division.

10.2 Special Objects Management:-

1. To document important NTFP species found in the division.
2. To preserve and improve the quaintly and quality of NTFPs in the division and manage them on a sustainable basis.
3. To preserve &develop the resource base for food security of wildlife.
4. To decide and adopt strategies for the above purpose in the changing context like climate change.

There is not much information available on the occurrence of medicinal herbs and species and there are still fewer records on the yield estimates of such species. A lot needs to be done in the field of conservation, development and management of NTFPs. This would be in accordance with the National Forest Policy of 1988, where in conservation and propagation of NTFPs and their contribution towards the local economy have been given due recognition and emphasis. In Kunihar Forest Division, resin, medicinal plants, bamboo. tannins, katha and grass are the important NTFPs contributing to the local economy. Resin and bamboo are being exploited on commercial basis already and grass is being locally exploited.

10.3 Contribution to Income and Quality of Life in Rural Areas:-

In the rural setup, NTFPs form an integral part of the daily lives of the villagers, varying from personal hygiene, cosmetics, nutrition, household items for use of livestock medicine and even at times are a source of additional income of rural households. It has estimated that a family consumes NTFPs worth ₹ 3200/- per annual and if the value of fuelwod and fodder are added to it, then the figure comes to around ₹ 40,000/- year.

Table 10.1
Important NTFPs found in Kunihar Forest Division:

S. No	Common / Local name	Botanical name	Type	Part used	Uses
1	Rati	*Abrus precatorius*	Climber	Seed/ Root	Bruised seeds are poisonous seeds are used as purgative emetic, aphrodisiac and used in nervous disorder. Root is known as Indian liquorices
2	Khair	*Acacia catechu*	Tree	Heart wood	Yield 'Katha' used as astringent, digestive, useful in cough & diarrhea, Externally applied to boils & eruptions on skin.
3	Babul, Kikar	*Acacia nilotica*	Tree	Bark	Used for its demulcent effect. An ingredient of bases is used for pastilles & lozenges.
4	Puthkanda	*Achyranthes aspera Linn*		Entire plant	Used in cough & its decoction in given in renal dropsy & bronchial infection.
5	Bansa, Basuti	*Adhatoda vasica*	Herb	Leaves, flowers	Used in treatment of cough , Asthama, Opthalmia.
6	Bel	*Aegle marmelos*	Tree	Fruit	Fruit is chiefly used in chronic diarrhea & dysentery, sweet drinks soothing for intestines. Half ripe fruit is stringent, digestive & stomachic. Leave are useful in diabetics.
7	Ramban	*Agave Americana*	Shrub	Leaves and stem	Fiber for rope making
8	Kikki, Siris	*Albizzia lebbeck*	Tree	Root, Bark, Flower	Used in hemicranias, cooling. Alexiteric, anthelmintic. For asthma & snake bite.
9	Bhondir, Kurmura	*Albizzia julibrissin*	Tree	Timber	For furniture
10	Kali Siris	*Albizzia Odoratssima*	Tree	Timber	Used for wheels, Oil mills & furniture.
11	Barbadis akie, Ghikawar	*Aloe barbedensis*	Shrub	Leaves	Source of resinous drug which is used as purgative.

12	Janmani, Jonkmari	*Anagalis arvensis*		Entire plant
13	Kateli, Shialkanta, Mexican prickly, poppy	*Argemone Mexicana*		Roots, Seeds, Juice of plant
14	Barna, Jau	*Artenisia scoparia waldst. & kit*		Fruits and leaves
15	Kakatudi, Kauradoodi	*Asclepias curassavica Linn*		Roots/Juice of leave
16	Safed musli	*Asparagus adcendens/ Roxb*		Root
17	Dante	*Baliaspermum montanum Muell*	Shurb	Roots/Seed
18	Tadrelu	*Barleria cristata*	Shurb	Roots & leaves
19	Kaliar, Lal Kachnar	*Bauhinia purpurea Linn*	Tree	Root. Bark, Folwer
20	Maljhan. Tour	*Bauhinia vahlii*	Tree	Seed
21	Kachnar	*Bauhinia variegata*	Tree	Bark
22	Kashmal	*Berberis lyceum*	Shrub	Roots
23	Phutium	*Bidens pilosa*		Flower
24	Bimol, Ciar, Khaksha	*Boehmeria platyphylla*	Shrub	Bark
25	Simal	*Bombax ceiba*	Tree	Wood/ Root
26	Dhak, Palas	*Butea monosperma*	Tree	Wood/ Bark of roots/ flower
27	Ak	*Calotropis procera*	Shrub	Roots/ leaves
28	Bhang	*Cannabis sativa*	Shrub	Leaves/ flowers
29	Amaltas	*Cassia fistula*	Tree	Pods, Root, bark
30	Kandiari	*Caesalpinia sepiaria*	Climber	Seed/ bark
31	Daia	*Callicarpa macrophylla*	Shrub	Leaves
32	Heart pea, kanphuti	*Cardiaspermum halicacabum*		Root/ Leaves
33	Chilla	*Casearia tomentosa*	Tree	Wood/ Fruit
34	Chaksu	*Cassia absus*		Leaves
35	Chakunda, Kasonda	*Cassia occidentalis*	Weed	Roots

36	Panwar Chakunda	*Cassia tora*	Weed	Leaves
37	Malkangi	*Celastrus paniculata Wild*	Climber	Seed/ Leave
38	Somraj	*Centratherum anthelminticum*	Herb	Seeds
39	American worm seed	*Chenopodium ambrosiodes*	Herb	Entire plant
40	Mush kapoor	*Cinnamomum camphora*	Tree	Tree
41	Akanadi Harjori	*Cissampelos pareira*	Climber	Tree
42	Lanjai	*Clerodendron inerme(L) Gaerth*	Shurb	Leaves and roots
43	Dughi, Karanta	*Cryptolepis buchanani*	Climber	Milk
44	Akas-bel, Sarag bali	*Cuscuta reflexa*	Climber	Leaves
45	Mirchagandh	*Cymbopogon martini*	Grass	Roots/ Leaves
46	Kaladhatura	*Daturametel Linn*	Shrub	Leaves, Flowering tops and seeds
47	Thorn apple,Safed Dhatura	*D.stramonium Linn*	Shrub	Leaves, Flowering tops and seeds
48	Nirbisi	*Delphinium denudatum wall*	Shrub	Roots
49	Potatoyam , gaithi, Ratalu	*Dioscorea bulbifera Linn*		Tubers
50	Bhangra Mochkand	*Eclipta alba Hassk*		Entire plant
51	Amla, Aonla	*Emblica officinalis*	Tree	Fruit
52	Dhaul ,Dhak, Madar, padyara	*Erythrina suberosa*	Tree	Wood
53	Laldudhi	*Euphorhbis hirta*	Shrub	Entire plant
54	Pipal	*Ficus religiosa*	Tree	Bark
55	Kangu	*Flacourtia indica*	Shurb	Seed
56	Pit- papra	*Fumaria parviflora Lam*		Entire plant
57	Goose grass	*Galium aparine*		Entire plant
58	Glory, Lilly, kalihari	*Gloriosa superb*	Herb	Tubers leaf juice
59	Marorphali	*Helictris isora*	Shurb	Fruit/ Bark/ Root
60	Kura	*Holarrhena antidysentrica*	Tree	Seed/ bark
61	Kathi, Hakna, Nil.	*Indigofera pulchella*	Shrub	Root
62	Rungru	*Kalnchoe spathulata*		Leaves

63	Goma. Matapati	*Leucas cephalotes*		Flowers	Used in form of syrup for cough & cold.
64	Barnasi	*Limonia crenulata*	Shrub	Leave/Root	Tonic, appetiser & useful in fever.
65	Jalapapili	*Lippia nudiflora Rich.*		Leaves	Alcoholic extract shows antibacterial activity.
66	Aam	*Mangifera indica*	Tree	Fruit/ bark	Acrid, cooling, astringent to the bowels.
67	Drek	*Melia azaderach*	Tree	Leaves/ Seeds	Anthelmintic, Used in rheumatism
68	Jangli pudina	*Mentha longifolia Huds*	Shrub	Leaves	Carminative and stimulant
69	Indian wild thyme	*Micromeria biflora Benth*	Shrub	Entire plant	Used as an application for worm infested wounds of cattle.
70	Kambel, Rohni, Kamala	*Mallotus Philippinensis*	Tree	Bark. Fruit	Drug Kamela used for destroying tapeworms used externally in treatment of shin diseases.
71	Maruabel	*Marsdenia tenacissima*	Shrub	Bark/ Juice	Bark yields a silky white fiber used for fishing lines, bow string by mountaineers, coagulated milky juice used as Indian rubber
72	Sahjan	*Moringa pterigosperma*	Tree	Fruit/ Bark/ Leaves	Used in gout and acute rheumatism
73	Ganghela	*Murraya koenigii*	Shrub	Leaves	Used for flavor to curries
74	Kaiphal, Kaphal	*Myrica esculanta Buch-Ham*	Tree	Bark	Decoction used for asthma, diarrhea, lung affection, chronic bronchitis.
75	Banwan	*Myrsine Africana*	Shrub	Fruit	Used as anthelmintic
76	Kaner	*Nerium indicum Mill*	Shrub	Leave	Anthelmintic especially for tapeworm.
77	Tamakhu	*Nicotiana tabacum*	Shrub	Leave	
78	Harsinga	*Nyctanthes arbor-tristis*	Tree	Leave/ Flowers	Leaves are used for polishing wood, in medicine as a febrifuge and flower used as orange dye.

79	Sandan	*Ougenis oojeinensis*	Tree	Bark	Used as febrifuge and also as fish poison.
80	Chil	*Pinus roxburghii*	Tree	Pine needles/ Oil	As liniment in rheumatic pains as stimulant, expectorant & in chronic bronchitis.
81	Khajur/ Palm	*Phoenix sylvestris*	Tree	Fruit / Leaves	Fruits are edible . cooling , tonic, useful in diarrhea and urinary problems.
82	Kakkar	*Pistacia integerrima*	Tree	Galls	Kakarsinghi used in native medicines
83	Chicha, Chita	*Plumbago zeylanica linn*	Shrub	Roots	As an appetizer, used in skin diseases, diarrhea, piles, used as application in scabies and unhealthy ulcers.
84	Raniphul	*Polugonum plebejum R.Br*	Shrub	Entire plant	For bowel complaints and in pneumonia
85	Bhekhal. Bekkra	*Prinsepia utilis*	Shrub	Entire plant	Yield oil used as a rubefacient & in rheumatism
86	Siali, Sural	*Pueraria tuberosa*	Shrub	Flowers Roots	Cooling , aphrodisiac, Demulcent & rheumatism
87	Anardana	*Punica granatum*	Tree	Fruit	Used in diarrhea and dysentery
88	Rara	*Randia dumetorum*	Tree	Fruit	Fruit are edible & pulp of fruit is also given in dysentery
89	Chandra-bhaga	*Rauvolfia serpentine*	Shrub	Entire plant	Used as anti-hypertensive & as sedative. Also employed for relief of various central nervous system disorders, for intestinal disorder.
90	Basabthi	*Reinwardtia indica*	Shrub	Stempa & Leaves	Applied to wounds infected with maggots, used for treatment of paralysis.
91	Brass	*Rhododendron arboretum*	Tree	Flower	Flowers used for making drinks & jams also used in diarrhea & in preparation of snuff. Tender leaves are edible & applied on forehead, wood used for making tool handles.
92	Arandi	*Ricinus communis*	Shrub	Seeds	Made into paste & are applied to sores, bils7 rheumatic swelling.

93	Locus tree, Robinia	*Roninia pseudoacacia*	Tree	Leaves & Flowers	Antispasmodic, laxative & emollient
94	Kunjo, Kuja	*Rosa moschata*	Shrub		
95	Guma	*Roylea elegans well*	Shrub	Roots & Leaves	Used as febrifuge
96	Majith, Satavar	*Rubia cordifolia linn*	Climbe r	Entire plant	Used in rheumatism & several Ayurvedic preparations
97	Jangali palak	*Rumex nepalensis*	Shrub	Roots	Purgative , also used for venereal diseases.
98	Gurgumma	*Salvia moorcroftiana*		Roots/ Seeds/ Leaves	Used in cough As emetic, For guinea- worm and itching
99	Ritha	*Saptndus mukorossi*	Tree	Fruit	Used in salivation, epilepsy , chlorosis.
100	Sahdevi	*Sida rhombifolia*	Shrub	Roots & Leaves	Aphrodisiac, tonic useful in fever, heart diseases, burning sensational , piles.
101	Barikatai	*Solanum indicum*	Shrub	Roots	For Treating cough, catarrhal affection, colic & nasal ulcers
102	Kateli	*Solanum Khasianum Clarke*		Berries	Steroidal drugs
103	Makoi	*S.nigrum*	Climbe r	Entire plant	In treating cirrhosis of liver & for patients suffering from dropsy
104	Jangali gainda	*Targets minuta*	Shrub	Flowers	Flowers source of essential oil which shows hypotensive, spasmolytic and anti-inflammatory properties. Also as stomachic, diuretic & diaphoretic.
105	Dulal	*Taraxacum officinalis weber*	Climbe r	Entire plant	Used as diuretic, stomachic , hepatic, stimulant & tonic
106	Sarpokha	*Tephrosia purpurea(l) pers*		Roots	Alexipharmac good for ulcers and wounds, useful in enlargement of the spleen
107	Arjun	*Terminalia arjuna*	Tree	Bark	Cooling, Alexiteric, styptic, tonic, antidysenteric, diseases of heart, anemia, excessive , perspiration, asthma.
108	Bahera	*Terminalia*	Tree	Bark	Mild diuretic , useful in

		belerica			anaemia & leucoderma
109	Harad	*T. Chebula*	Tree	Fruit	Astringent, useful in dysentery & diarrhea, good in ophthalmia, disease of the spleen, piles. Cold in the head.
110	Andhahuli	*Trichrodesma indicum linn*		Entire plant	Beneficial in diseases of eyes. It helps in the expulsion of the dead foetus.
111	Common Nettle	*Urtica dioica*		Roots	Diuretic
112	Gidartamaku	*Verbascum Thapsus linn*		Entire plant	Demulcent, astringent & pectoral. Used in pulmonary diseases
113	Sododi, Sadori	*Vernonia cinerea less*		Entire plant	Tonic, stomachic, astringent. Cures asthma , bronchitis.
114	Banafsha	*V. Serpens*	Herb	Roots	Purgative , good febrifuge , tonic, expectorant, diuretic, removes inflammation.
115	Ban, Banda	*Viscum album*		Berry	Laxative, tonic, aphrodisiac , diuretic, cardio-tonic, used in inflammations
116	Nirgundi, Bana, Sahalu	*Vitex negundo*	Shrub	Leaves	Considered tonic, smoked for headaches and applied to rheumatic swelling of joints
117	Akri, Ashwagandha	*Withania somnifera(L) Dunal*		Fruits	Used for liver complaints, asthma & biliousness.
118	Dawi, Dhai	*Woodfordia fruticosa Kurz*	Shrub	Flowers	Used in dysentery , astringents tonic & in disorders of the mucous membrane.
119	Banokara	*Xanthium stramonium linn*	Shrub	Fruits	Rich is vitamin C used against chronic malaria and urinary troubles.
120	Tejphal. Tirmira	*Zanthoxylum armatum DC*	Shrub	Bark fruit & seed fruits	Carminative, stomachic & anthelmintic.
121	Jhaeber, Jhaeberi	*Z.nummularia (burn.f.) wt & A rn*		Fruits	Appetizer , stomachic
122	Ber	*Zizyphus mauritiana*	Shrub	Leaves/ Fruit	Laxative, given in throat trouble, source of vitamin 'C' & Sugars

The NTFPs should be given the due thrust and species yielding them should be included in the plantation programme. Nurseries should raise sufficient stock of medicinal and other plants of economic importance and make them available to the population desirous of planting them. With many JFM schemes being under operation in the division, the stakeholders should be encouraged to include such species in JFM micro plans.

As in other parts on India and in the state, the rural people use plant bases traditional medicines for health case. Since they are still produced using old method, their quality, efficacy, and shelf life gets adversely affected. Hence there is a need to introduce low cost, appropriate and simple technologies to encourage this dwindling practice and bring in additional income to rural households. Collection processing , value addition and marketing aspects of NTFPs need to be studied and the administration should provide all necessary help in this regard the training programmes on various aspects of NTFPs i.e. collection, refinement, value addition, storage and marketing should make growing and trading of NTFPs more remunerative.

10.4 Rehabilitation Plan:-

As far as the medicinal plants are concerned, this area has not received much attention resulting in neglect and improper realization of the potential of this resource. Hence there is a need for initiation of more action- orientated plans, bearing in mind the conservation issue such that the rural household incomes could be augmented. There should be facilities for pilot scale production and replication of positive results; development of low-cost, appropriate technologies, assurance of quality of raw materials and final products, marketing and marketability analyses, training in all aspects of medicinal plant production, management and marketing research and development i.e. development of superior propagation materials, improvement in quality and yield, agro technology, efficient processing technologies etc. and knowledge of procedures for registration and property rights.

CHAPTER XI

DIVERSION OF FOREST LAND UNDER FOREST CONSERVATION ACT, 1980

11.1 General:-

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. Due to this enactment distinction amongst the protected forests(Demarcated or Undemarcated), Unclassed Forest ,Government common land regarding breaking up for non forestry purpose has been disappeared.

11.2

In Kunihar Division 494.8726 ha has been diverted for non forestry purpose till now. In this division forest land has been diverted mainly for road mining & construction. Out of 494.8726 ha, 447.935ha has been diverted for mining (Lime stone) and rest of the area for road construction mainly.

11.3 Government has to carry developmental works for the local people as well as for state as a whole. For such works some time forest land is also required. In Himachal Pradesh larger area is either covered by forest or is forest land so it becomes inevitable to avoid use of forest land for developmental works. Developmental works are also being carried out in Kunihar Forest division. There are two cement plants in this division and many roads have been constructed in Kunihar division with prior approval of Government of India. In some cases principle approval has been granted subject to fulfillment of some conditions. Detail is given in **Table 1.5 Chapter I (Para 1.6.3) of part I.**

11.4 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 that how does mining affect the environment.

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.

1.4.1 Effect on Land:

***Deforestation*:** Mining requires large areas of land to be cleared so that the earth could be dug into by the miners. For this reason, large-scale deforestation is required to be carried out in the areas where mining has to be done. Besides clearing the mining area, vegetation in the adjoining areas also needs to be cut in order to construct roads and residential facilities for the mine workers. The human population brings along with it other activities that harm the environment.

***Loss of Biodiversity*:** The forests that are cleared for mining purposes are home to a large number of organisms. Indiscriminate clearing of the forests lead to loss of habitat of a large number of animals. This puts the survival of a large number of animal species at stake. The cutting down of trees in itself is a big threat to a number of plants and trees growing in the forests.

***Pollution*:** Despite measures being taken to release the chemical waste into the nearby rivers through pipes, a large amount of chemicals still leak out onto the land. This changes the chemical composition of the land. Besides this, since the chemicals are poisonous, they make the soil unsuitable for plants to grow. Also, the organisms that live in the soil find the polluted environment hostile for their survival.

11.4.2 Effect on Water:

Pollution: Many Chemicals are used in various stages of mining. Most of the chemicals are released into nearby water bodies that lead to water

pollution. In spite of tailings (pipes) being used to dispose these chemicals into the water bodies, possibilities of leakage are always there. When the leaked chemicals slowly percolate through the layers of the earth, they reach the groundwater and pollute it. Surface run-off of just soil and rock debris, although non-toxic, can be harmful for vegetation of the surrounding areas.

Loss of Aquatic Life: Release of toxic chemicals into the water is obviously harmful for the flora and fauna of the water bodies. Besides the pollution, mining processes use water from nearby water sources. The result is that the water content of the river or lake from which water is being used gets reduced. Organisms in these water bodies do not have enough water for their survival.

11.4.3 Spread of Diseases:

Sometimes the liquid waste that is generated after the minerals have been extracted is disposed in a mining pit. As the pit gets filled up by the mine tailings, they become a stagnant pool of water. This becomes the breeding ground for water-borne diseases causing insects and organisms like mosquitoes to flourish.

Although the developed countries have tight norms regarding mining, such rules can be easily flouted in countries which lack strict monitoring of the procedures being followed for mining. The effects in such cases can be devastating for the environment.

11.4.4 Remedies:-

(a) The mining 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) Conditions laid by the mining department/experts should be followed.

(d) Field staff should monitor the situation time and again in the field.

(e) Areas where mining is completed should be rehabilitate/restocked immediately as and when mining is completed.

(f) Muck generated should be used for other works as far as possible; post user agency should be involved for muck utilization.

(g) Rest of the muck should be dumped in scientific manner and should be stabilized immediately.

There is one stipulation regarding closing of diverted area of mining by boundary pillars.CF Bilaspur has issued instructions in this regard vide his Standing Order No 1/2010 dated 4th Dec, 2010 . **Appendix-XXIX**

11.5 Impact of Road Construction:-

Roads are widespread throughout forested ecosystems and landscapes across Himachal Pradesh. In Kunihar division many roads are passing through the forests. Some were constructed prior to 1980 and in some cases prior permission has been taken from GOI. Detail is given in **Table 1.5 Chapter I (Para 1.6.3) of part I.**

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.
- Road construction alters water routing, downstream peak flows, and groundwater conditions which results change of hydrology of entire area.
- It damages natural beauty of forests. Forests lose their compactness.

11.5.1 Hydrology: A study shows that twenty percent of annual precipitation is lost to interception by vegetation. Interception is valuable because it greatly reduces the impact to the soil by precipitation. This effect maintains an open pore structure at the soil surface, promoting infiltration, and inhibiting runoff and erosion. Infiltration is the flow of water from the ground surface down into the soil. Soil is an unconsolidated aggregate of mineral and rock fragments ranging from clay and silt particles to sand pebbles, and boulders. Infiltration supplies

most of the water to plants and many animals. Without infiltration, streams would stop flowing soon after a rain, soil would erode, and floods would devastate river valleys

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. In forested mountainous areas, roads can constrain, divert, and transform subsurface flow to surface flow, and this may concentrate and accelerate erosive hill slope surface runoff increasing the amount of water flowing into stream channels causing higher peak flows. As a result, this increase will accelerate soil erosion and nutrient loss. Finally, roads fundamentally disrupt natural drainage patterns by diverting water and by preventing water infiltration into soil.

11.5.2 Conclusion:

Assessing all the impacts of roads is difficult. In addition to having ecological impacts they can change physical processes through increasing erosion, sedimentation, and run-off. Many of the far-reaching influences of road impacts are still to be observed, studied, or considered. The impacts of roads in natural places can and do go far beyond the physical area directly affected by each road. The impacts caused by roads can alter ecosystems at a great many levels.

11.5.3 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.

(e) 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.

(f) The more natural qualities of the landscape should be reflected in careful planning of the general route, in design of the alignment and in detailed design and management of cuttings and embankments. The intention is not to disguise the road and other structures completely but to reflect both the scale and forms of the landscape in their design by following landform in road alignment and re-establishing vegetation on large areas of excavation and fill.

(g) Care in working practice at road construction times is needed to avoid undue disturbance to animals and humans e.g. bird nesting periods and popular times for recreation

(h) Care is also needed to avoid spillage of petrol, oil and lubricants near streams, ditches or culverts.

(i) Excessive use of explosives during construction should be avoided. Because it triggers a high rate of mass wasting and sedimentation, especially in the geologically unstable locations found so often in Himachal Pradesh.

(j) The implementation approach should strictly adhere to the green road concept. Construction should be done with the limited use of small machines. The construction adopts a transverse cut to fill method to achieve mass balance and progressively extend the road cross-section width allowing the new construction to stabilize better in the fragile hill environment, reducing any bad environmental impacts and taking a longer time to complete. This engineering approach aims to avoid the difficulties and negative outcomes observed in other road projects, especially the ones affecting adjacent land by erosion and sedimentation.

(i) In road construction muck should not be allowed to dump all along the road.

11.6 Muck Disposal:-

Suggested Guidelines for Scientific Disposal of muck, Consumative Use as well as Disposal and Restoration of the Dumping Sites

It is extremely necessary to protect the environment, through stabilising and conserving the displaced topsoil, and other non-renewable resources used in construction activities, through proper management utilization of muck generated from Mining and Cement Plants, tunnelling, road constructions and such developmental site activities.

11.6.1 Site Selection:

It is important to note that mere site selection will not suffice. Such a site has to be prepared and made ready to receive the muck. Once the site is filled to its capacity, it has to be treated through biological measures and engineering measures to ensure that the muck does not further role down downhill to degrade other areas. The muck disposal sites are invariably to be finished with top soil and plantation of local species.

11.6.2. Need for Strict Compliance at Site:

Under Article 4 of the Forest Conservation Act 1980, Wild Life Protection Act, 1972 and the Environment Protection Act, 1986 and the Rules made there-under authorizes the department of forest through its Officers to issue Notifications from time to time. However, there is need to ensure strict compliance at site by all central government, state government and private agencies carrying out any work in Himachal Pradesh which may generate muck of any description due to the project activities undertaken by these Agencies.

11.6.3. Definition of Muck:

The word "muck" shall mean all inert material, excavated, tunnelled, dislodged or caused to be dislodged as a collateral effect of primary human interference from its natural position to its new location either in a stable area or in an unstable manner. Every project proponent shall invariably submit a muck disposal plan to the Principal Chief Conservator of Forests and the Conservator of Forests responsible for the area under whose jurisdiction the project falls. This Plan is to be submitted in addition to the Plan submitted in the Environment Management Plan (EMP) for the Environmental Clearance to MOEF and/or any case put up for diversion of forest land for non-forest use under the Forest Conservation Act. It is reiterated that within the state of Himachal Pradesh, EIA clearance and FCA clearance will not be a substitute for specific submission and approval of muck disposal plan which has to be obtained from the Principal Chief Conservator of Forests through his officers.

In addition to the projects needing EIA clearance or FCA clearance, there may be other measures of maintenance or maintenance modification, re-construction or new construction related works which may generate muck, the Project Proponent/Contractor/Agency carrying out the works is charged with the responsibility of obtaining muck disposal approval. The proposal to obtain muck disposal approval shall contain the following details:

a) Nature of work to be carried out;
b) Is the work site specific or can it be carried out at an alternate site, if so, site specific drawings for the same;
c) Volume of muck to be generated; add 5 % more to allow for unforeseen muck generation;
d) Machinery and Labour proposed to be employed with the total duration of work;
e) Specifications of muck disposal site including the location giving longitude latitude, distance from worksite and arrangements of transportation;
f) Proposed preparation of muck disposal site with location, drawings etc;
g) Proposed plan for rehabilitating the disposal site with specific details of source and quantity of top soil and proposed vegetation with plantation (bioengineering) and maintenance plan.
h) The total quantity of muck to be dumped at the dumping site shall be calculated by multiplying the quantity of muck to be generated from the project with muck's swelling factor (to be considered between 1.45 to 1.5)

11.6.4. Consumptive Use of Muck:

- The generated muck to some extent should be used for strengthening of bunds, construction of roads, filling up of low-lying areas, aggregate for concrete work etc; so that cutting and filling will be equalized.
- Some small roads may be locally required to be constructed on various sites connecting work areas with labour colonies, workshops, stores etc. So some part of muck should be consumed in these roads for soling as well as protection work.
- Some construction work of schools, dispensary, monuments, gardens, play grounds etc. should also be taken up in the adjoining areas using the muck.

- The muck in excess of above activities should be transported and disposed off at predetermined places, if so required.
- All disposal sites should be properly landscaped when the disposal gets completed so as to merge it in the natural surroundings.

11.6.5. Monitoring the Utilization of Muck:

- Local people or private agencies should be allowed to lift and use the muck for their requirements. This muck should be supplied to them free of cost. Action plan for this should be made which would describe, thirty per cent of the muck utilization should be done, within three years, with further increase in utilization by at least ten per cent points every year progressively for the next six years to enable utilization of the entire muck generated from the various excavating activities at least by the end of ninth year.

11.7 Land Bank:-Land bank for compensatory plantations has been identified and detail is tabulated as below:

Table11.1

Proposed Land Bank for raising CA in Kunihar Forest Division

SNo.	Name of Range	No. and Name of Forest	Area (ha)
1.	Kuthar	U-481 Badhonighat	10.0
		U-510 Khatapani	10.0
		U-508 Khareta	10.0
		U-477 Katla	30.0
		U-511Madhala	15.0
		U-429 Karoli	30.0
		U-500 Dhoal	10.0
2.	Kunihar	UPF-Bajthana	20.0
		U-269 C1 Gharyach	10.0
		DPF Devidhar	10.0
3.	Arki	D-75 Shron	10.0
		U-131 Jhallu	20.0
		U-249 Piotha	15.0
		U-146 Thalog	20.0
		U-233 Garudnag	25.0
		D-70 C3 Aulti	25.0
		D-73 C2 Bheuli	25.0
		D-78 Manjhu	20.0
4.	Darla	D-50 Daran	10.0
		UPF-Chamrol	5.0
		U-10 Banola	60.0
		D-53 Manlog	70.0
Total			540.0

CHAPTER-XII

MISCELLANEOUS REGULATIONS

12.1 Petty fellings:-

The felling of petty nature as detailed below may be treated as per prescriptions of this working plan:-

1. Dry or green trees required to meet bonafide requirement of local people including the right holders and others.
2. Dry or green trees for ordinary departmental use or for other Govt. departments.
3. Dry or green trees to meet special free grant for construction of houses damaged/destroyed by natural calamities like fires, lightening etc. as per settlement provisions or as per Govt. orders.
4. The felling of dry or green trees after getting felling permission of competent authority under Forest Conservation Act, 1980.

All the trees and poles marked for such purpose shall be recorded in the respective compartment history files and such fellings will appear in the control forms. The silvicultural principles shall be strictly adhered to while carrying out such marking.

12.2 Deviations:-

Any large or unusual felling operation not prescribed in the Working plan will be a deviation requiring prior sanction of the competent authority. The deviations may be due to:-

1. Large scale damage by heavy rains, fire and wind storms.
2. Special fellings to meet the sudden unexpected heavy demand of particular industries or for security/defence purposes.
3. Large scale felling of trees coming in the alignment of major roads or transmission lines or hydro-electric projects.

12.3 Roads/Paths and Buildings:-

12.3.1Roads & Paths:

Kunihar Forest Division has a very good net work of all weather roads, which includes national and state highways and other Kacha roads, which are maintained by P.W.D. and Forest Department. Majority of the

forest can be visited by motorable roads. Also there exist sufficient bridle/ inspection paths passing through majority of forests. Their existence is also well marked on the survey sheets, hence no new bridle / inspection path is being proposed. The list of old roads and paths which exist in this division has been given in **Appendix-XXXI.** The condition of most of these is very poor and required extensive repair. The priority for the repair works may be decided by the Divisional Forest Officer, depending upon the availability of funds;

Table 12.1
Road Construction Programme

S.No.	Name of Range	Name of approach roads	Approximate length(in Kms)
1.	Darla	Barel-Boi	4 KM

12.3.2 Buildings:

The detail of buildings existing as on 01.04.2011 is given in *Appendix-XXX*. The condition of the residential building for field staff is poor and required special attention for their repair. The buildings which are in bad condition and can be made livable by carrying out special repairs are prescribed to be taken up at priority after the personal inspection of the D.F.O. Efforts should be made to produce the funds for the repairs, so that the field staff is comfortable at their headquarters.

12.3.3 Forest Rest House:

To facilitate touring of Govt. officials and also to cater to the needs of tourists, this division have Seven Forest Houses as listed below:-

Table 12.2
Rest House Location

S No	Name of Range	Name of FRH	Capacity
1	Darla	Darlaghat	4 Sets
2		Tunbadhyar	3 Sets
3	Arki	Arki	3 Sets
4	Kunihar	Kunihar	3 Sets
5	Kuthar	Kuthar	2 Sets
6		Jagjit Nagar	2 Sets
7		Chandi	2 Sets

Two new Rest Houses are under construction at Bag ka Jubbar and Jainagar both in Arki Range.

12.4 Demarcation and Survey:-

All the demarcated and un-demarcated protected forests are well demarcated and brought on 1:15000 scale survey sheets by the Survey of India. The area is also covered by 1:50000 scale maps. The boundary registers are not properly maintained. The position of boundary pillars is not shown properly. The forward and backward bearings of the boundary pillars have not been shown. Although settlement works have been completed in the tract, but the position of boundary pillars of demarcated protected forests is far from satisfactory especially along the cultivated lands. Some of the boundary pillars are missing also. So proper demarcation, identification of the DPFs on ground, proper recording of the forward and backward bearings of boundary pillars is required. The use of Geographical Positioning System (GPS) is strongly recommended for recording the forest boundaries accurately.

12.5 Forest Boundaries:-

The state of boundaries of forests is not satisfactory. The boundary registers are not maintained properly. The boundary pillars are not maintained on desired lines. As already recommended, the use of Geographical Positioning System (GPS) is the need of the hour for correct positioning of boundary pillars. The field staff must check the forest boundaries frequently. It is recommended that the forest guard will conduct complete annual checking of the boundaries of all forests and make a report to the block officer who in turn shall check at least 20% forests of his block complete in all respects at least once a year and make report to the range officer. Similarly the range officer will conduct complete checking of 20% forests in his range in a year and shall make a report to the DFO. Following points should be kept in mind while maintaining boundary pillars.

(i) Distance between consecutive boundary pillars, forward and backward bearing should tally with boundary register/ beat manual.

(ii) Visibility of successive boundary pillar be made by clearing the boundary line carefully.

iii) Number and both bearing be engraved on to the boundary pillars while executing fresh construction or repair.

iv) Boundary distinction between compartment /Sub- compartment be made clear by putting white belt on trees.

The boundary registers are not maintained in most of the beats, but at the same time some valuable old record is available in few of the beats, which is in poor condition. Direction should be issued to re-construct the old available information / record afresh, without further delay.

It is suggested that boundary pillars should be erected after demarcation, adhering to the standing orders issued by the Pr. CCF/ H.P.,

vide order No. 1/2000 dated 4-3-2000 regarding "Demarcation and Settlement operations in Himachal Pradesh- specifications for boundary Pillars", which contains complete details regarding specifications, procedures for construction of boundary pillars, analysis for construction of Boundary pillars, designs etc. **(Appendix XXXII & XXIII).** The standard designs/ plan of standard and chak boundary pillars are given in figure (i) & (ii) along with Appendix.

A quiquennial programme for the repair and checking of boundary pillars and chak pillars have been prepared and is tabulated as under:

Table 12.3

Quinquennial Programme of Boundary Pillars			
Block Of Years	**Range**	**Legal status of Forests**	**No of Forests whose Boundaries will be checked and BPs will be repaired**
2013-14	Darla	D.P.F.	D.1 to D.6
2017-18		U.P.F.	U.1 to U.19
2021-22			
2025-2026	Arki	D.P.F.	D.58 to D.62
		U.P.F.	U.193, U.233 to U.240
			U.263 to U.269
	Kunihar	D.P.F.	D.77
		U.P.F.	U.305, U.307 to 309
			U.313 to U.327
	Kuthar	D.P.F.	D.89 to D.95
		U.P.F.	U.405 to U.410, U.412, U.414,
			U.477 to U.490
2014-15	Darla	D.P.F.	D.7 to D.10
2018-19		U.P.F.	U.21 to 25, 27, 28
2022-23			U.31, 32, 36
2026-27			U.181 to U.190
	Arki	D.P.F.	D.63 to D.69
		U.P.F.	U.212 to U.232, 242, 243
	Kunihar	D.P.F.	D.79 to D.83
		U.P.F.	U.33 to U.358
	Kuthar	D.P.F.	D.96 to D.100
		U.P.F.	U.419 to U.430
2015-16	Darla	D.P.F.	D.49 to D.53

			U.41 to U.60, 62, 63
2019-20		U.P.F.	U.191 to U.197, U.200 to U.211
2023-24			D.70 to D.76
	Arki	D.P.F.	U.248, 262, U.270, 289
		U.P.F.	D.84
	Kunihar	D.P.F.	U.359 to U.370
		U.P.F.	D.101 to D.104
		D.P.F.	U.431 to U.452
		U.P.F.	
2016-17	Darla	D.P.F.	D.56, D.57
2020-21		U.P.F.	U.131 to U.146, 147
2024-2025			U.244 to 247
	Arki	D.P.F.	D.78
		U.P.F.	U.290, 304, 306, U.310 to 312
			328 to 332
	Kunihar	D.P.F.	D.85 to D.88
		U.P.F.	U.371 to U.378
			U.385 to 387, U.415 to 418
			U.411, 413
	Kuthar	D.P.F.	D.105 to D.109
		U.P.F.	U.453 to U.476
			U.513 to U.516

Persent condition of boundary pillars is given in **Appendix-XXXVI.**

12.6 Maps

The demarcated and un-demarcated protected forests have been stock mapped on 1:15000 scales. The stock maps have been filed in compartment history files. Regeneration maps of all felled PB I areas have been prepared on 1:3750 scale and placed in compartment history files. The management map on 1:50000 scale has been prepared by making use of survey sheets.

12.7 Meteorological Data :-

No rain gauge has been installed in this division. It is recommended to install rain and snow gauges at following stations:-

Table 12.5
Proposed Stations for Rain Gauges and Snow Gauges

S.No	Proposed Rain Gauge Stations
1	Arki
2	Kuthar
3	Kunihar
4	Darla
	Chhatri

12.8 Preserved and Monumental Trees:-

Such historical, large sized/giant trees of important conifer and broad leaved species if found should be declared preserved and recorded, photographed, provided with a sign board giving its basic information.

12.9 Temple Groves:-

All the temple grooves should be preserved irrespective of the species. No trees shall be felled from the temple groove. Detail of these is given in **Appendix-XVII.**

12.10 Timber for Right Holders:-

The genuine demand of right holders should be met as per provisions of settlement report, Govt. orders/instructions.

12.11 Saw Mills and Timber Sale Depots:-

There are 36 saw mills and 14 timber sale depots owned by private individuals are in operation in Kunihar Division. List is given in **Appendix-XXXIV & XXXV.**

12.12 Voluntary Closures:-

Now with the adoption of Participatory Forest Management and with adequate persuasion and motivation by the staff, people will come forward with more voluntary closures and more area will be available for carrying out the prescriptions of Working Plan. The particulars of closed areas should be available in suitable registers in the division and range offices. The closure cases should be prepared regularly every year and got notified to avoid legal complications at a later stage.

12.13 Rehabilitation of Degraded Areas:-

There are many seasonal nallas which were not tackled for reducing erosion in the past under state and central funded schemes. The territorial staff may prepare plan for carrying out soil and water conservation works from top to bottom for better retention of rain water. Besides this, there are accidental damages to forest property due to natural calamities very often. One must tackle such problems immediately and on priority.

A short term rehabilitation plan is to be prepared by the territorial staff for tackling such areas consisting of soil conservation measures and

planting of soil conservation species. District Collector may be approached for funding such areas in the public interest.

12.14 Fixing of Compartment boards and Plates:

It was observed during field visit that the knowledge of the field staff about various forests/compartments and allotments thereof is poor. It is therefore laid down that small tin plates (approximately 20X15 cm size) should be fixed on the tree along the boundary of the forests/ compartments, depicting the name, number, area, compartment, sub-compartment and allotment. In case of PB-I areas, felled copies areas, as well as the plantations raised as per prescription of the plan. The sign boards of bigger size(approximately 60X90 cm)should be fixed. Few of boards which were fixed in some cases, v.i.z. RF's/ DPF's/ Plantation, a few year back have become illegible , which should be repainted and rewritten in addition to the new ones at suitable location.

12.15 CAT Plan (KOL DAM)

The Kol Dam Hydroelectric Project (4×200 MW) is located on Sutlej river upstream of Dehar Power Station of B.S.L.Project in Billaspur District of Himachal Pradesh. The project envisages utilization of a drop of about 140 mtrs. By constructing a 163 m high rock fill dam and a dam for power station with an installed capacity of 800 MW. Besides providing an annual energy generation of 3054 GWh, the Kol dam Project would enhance the life of the Bhakra reservoir by about 18 years.

12.15.1 Activities under Kol Dam CAT Plan:

The various activities carried out in the CAT Plan in respect of Kunihar Division are in **(Appendix-XXXVI & Appendix-XXXVII).**

12.16 Retrieval of Barbed Wire:-

A large quantity of barbed wire is lying in the forests and around old (established) and failed plantations areas. It is suggested that such barbed wire be retrieved and reused. The retrieving expenditure will be far less as compared to the cost of the new barbed wire.

12.17 Ecological Assessment:-

The plant communities are basically indicators of the total environment. These communities respond not only to one environmental factor but also to interacting group of factors. The plant communities integrate these influences and react sensitively to change in balance of the environmental stresses being primary producers in the ecosystem. Efforts are therefore required to conserve biodiversity at all levels.

CHAPTER XIII

ESTABLISHMENT AND LABOUR

13.1 Establishment:-

The list of existing ranges, blocks and beats is given in ***Table No 6.2 of Chapter-VI, Part-I*** . The position of sanctioned staff vis-à-vis the existing one has been given in ***Table No 6.1 of Chapter-VI, Part-I.*** In view of the increased work load on account of developmental activities, more special duty staff shall be needed for smooth working of division. Even protection work has become more difficult because with the construction of roads, increase in population, tremendous increase in prices of timber, even remote forests have become prone to illicit fellings and encroachments.

13.1.1 The quantum of office work at range level has increased considerably. The range officers are forced to devote more time in the office at the cost of field works. Therefore, it is suggested that all the range officers should be provided range clerks. Similarly, additional ministerial staff is required to cope with the increasing work load in the division office.

13.2 Labour:-

The position of labour supply has been discussed in ***Chapter VI; Part I.*** Except during agricultural/horticultural harvesting season, sufficient local labour is available to carry out normal forestry works. However, the labour supply mates of Forest Corporation have to import labour from outside the division for carrying out exploitation work of forests.

13.3 Training:-

Functioning of Forest Department now has more role of people's participation. Executions of various schemes are now being done through locally constituted VDCs. Therefore, a skill is required to convince the people and to get scheme implemented in a successful way. For which short term training courses are being run at different forest training schools and Dr. Y.S. Parmar University of Horticulture and Forestry. Therefore it is proposed that different category level staff be rendered training from these institution time to time.

CHAPTER XIV
CONTROL AND RECORD

To ensure the proper implementation of the prescriptions of the plan, the following record will be maintained in the division:-

14.1 Compartment History Files:-

Two copies of the compartment history files(one each for the Division and range) , have been prepared for all the Demarcated and un demarcated protected forests of the division. Efforts has been made to tag the old record, with the new compartment history files. Stock map on 1:15,000 scale , forest wise(for the whole forest) have been appended in all compartment history files along with the management prescription and enumeration results. The stock maps have been prepared on copies of the 1:15,000 survey sheets in order to incorporate additional useful information like the location, the physical features e.g. contours, aspect, elevation etc, as well.

The past record of maintenance and posting of compartment history files has not been satisfactory . It is therefore , emphasized that the compartment history files be posted regularly and accurately, under the supervision of the DFO/ ACF. The inspection notes of the DFO, CF and other Superior Officers be tagged properly in the concerned compartment history file. The works being done in the forest area under various schemes and projects, even by agencies other than Kunihar Forest Division should also be included in the compartment history files. The DFO is required to submit a certificate to CF, along with the control form, that all compartment history files have been maintained upto date. The DFO is advised to make a special mention regarding the updating of this record during the Range Inspections.

14.2 Control Forms:-

To exercise proper check and control on the prescriptions of the working plan, the Divisional Forest Officer will submit the control forms 2a, 2b, 4 and C annually to the Conservator of Forests in accordance with the instructions laid down in Punjab Forest Leaflet No. 11. The control forms must be completed and submitted in the first quarter of the following year.

14.3 Register of Roads, Paths and Building:-

These should be maintained Range wise, mentioning the year of construction, cost incurred, plinth area, length of road, path. All works under capital expenditure should be incorporated in this register and this should be updated yearly.

14.4 Forest Guard Mannual/Beat Book:-

Very few Beat Guards in the division have the old beat books. The reorganization of range and division in the past have results in the beat

books not being traceable or if in case, some are available, these have not been updated since long. The importance of this manual to the concerned forest guard for proper control and efficiency cannot be over emphasized. These required to be standardized for the whole division and these should be got printed. Information on the following aspects must mandatorily be available in a beat book.

(a) List of forests in the beat along with their area and allotment in the Working Plan. It should have sufficient space for further allotments in the event of revision of the Working Plan.
(b) Maps of the Beat, showing the various forests, maps of the different forests in the beat traced from the respective compartment history file, showing the boundaries of the compartment, sub-compartment, boundary pillars, roads, paths etc.
(c) Copy of the boundary register of each forest in the beat.
(d) Extracts of important Acts and notifications relevant to a Forest Guard.
(e) Duties of the beat guard.
(f) Range officer's standing instructions.
(g) Details of PB-I areas, if any, in his beat.
(h) List of plantations raised with space for updating.
(i) Class-wise volume and market rate of important timber species.
(j) Names address and telephone numbers of important/ resourceful person/ institutions in the beat.
(k) Record of habitual offenders.

This will update the knowledge of the beat guard and help him discharge his duties effectively and efficiently. Handing over the charge of the beat, in the event of transfer, will be smooth and orderly and important information will not be lost. The Range Officer should insist on checking the beat book once every month. The range officers shall see that all the beat guards keep and carry copies of maps of forests of their beats.

14.5 Research Journal:-

The research journals should be maintained in each division and relevant research activities conducted/undertaken should be entered.

14.6 Plantation/Soil Conservation Journal:-

In order to have complete information on plantation/soil conservation works done in any area other than those covered by a compartment history file i.e. outside DPF and UF's separate plantation journals incorporating details regarding year and month of planting, species planted, cost of different operations, survival beating up, maintenance activities, shall be maintained and posted regularly till the

plantation is beyond danger. A map of the plantation, along with boundaries and legal status of the area and its physiography should also be appended. In the event of failure of many plantations, specific reasons for the same be recorded therein. The field officers should also make note of their observations during their tour/ visit to the plantation. These journals should be maintained at the range level.

14.7 Nursery Journal:-

Nursery Journal should be maintained at Range level that show the complete record about the origin of seed , date of showing , germination, cost of various operations and stock position. The cost of raising the plants be entered at the end of each season in this journal. Reasons and observations for good/ bad results be incorporated for further reference and record.

14.8 Fire Records:-

A record of fires be maintained according to the standing orders in force from time to time.

14.9 Record of Capital Expenditure:-

A record of capital expenditure on roads, buildings and other works shall be maintained in the prescribed form.

14.10 Rainfall Record:-

This record shall be maintained in a consolidated form at the divisional level for various stations where rain gauges will be installed.

14.11 Forest Settlement Files:-

All the forest settlement files should be well preserved and kept under the safe custody of ACF/Superintendent of the division.

14.12 Record of Machinery:-

These registers should be maintained to keep a record of all vehicles, machinery etc. incorporating the year of purchase/ receipt, initial cost, repairs done and its cost, other relevant details etc.

14.13 Register of Regeneration Assessment Surveys:-

The details of various regeneration survey carried out as per the prescription of Working Plan should appear in this register which should be maintained on the prescribed proforma. The compiled annual report of such survey conducted will be conveyed to DFO by every concerned R.O.

14.14 Divisional Note Book:-

The divisional note book properly maintained is of great assistance to the DFO as its helps him/ her by providing information on a variety of subjects of day to day working e.g. experiments, methods of estimating out turn, trends of prices of various forest products, prices/ auction of timber/ tree, etc.

CHPATER-XV

FINANCIAL FORECAST AND COST OF THE PLAN

15.1 General:-

Due to all round development of the region, rise in the living standards of the people and improvement in the means of communications, the prices of the forest commodities have registered a steep rise during the past years. This trend is likely to continue in future also. Therefore, the usual fluctuations make it very difficult to prepare a financial forecast that is likely to be accurate for the whole period of the plan. Similarly, it is equally difficult to correctly assess the expenditure likely to be incurred in carrying out the prescription of the Working Plan. An attempt price of the forest produce and the present cost of carrying out various operations prescribed in the Working Plan.

15.2 Past Yield:

The detail of yield from various working circles realized in the past is given in **Chapter IV & VII of Part-I.**

15.3 Past Revenue and Expenditure:

The detail of Past Revenue and Expenditure is given in table 7.6 of **Chapter VII of part-I** of this Working Plan.

15.4 Future Yield:

The annual expected yield of different species in each working circle is given in **Table 15.1**

Table 15.1
Showing Annual Prescribed Yield

S.No	Working Circle	PB	Prescribed Average Annual yield(M3)
1	Chil Working Circle	PB I	1050 M3
2		P B IV	920 M3
		PB Inter	980 M3

15.5 Future Revenue and expenditure:

15.5.1 Revenue:

Based on current market prices, the anticipated annual revenue is provided in **table 15.2 below:**

Table 15.2

Anticipated Annual Revenue of Kunihar Forest Division

S.No	Produce	Expected annual yield M3	Rate (in ₹)	Amount (in ₹)
1	Royality of chil trees	2950	572	1687400
2	Royality from resin blazes	46000	65	3028805
3	Revenue from grass and grazing fees			32000
4	Receipt from rent of Building			154000
5	Recipt from Registration fee			35000
6	Receipt from export permit fee			550000
7	Other misc. receipt			40000
8	Receipt from penality and damage bills etc. from HPSFC and others			200000
Total				5727205

15.5.2 Expenditure:

The estimates of annual expenditure are given in **Table 15.3 below:**

Table 15.3

Estimate future annual expenditure

S.No	Particulars	Estimated expenditure (in ₹)
Establishment		
1.	Salary	4002918
2.	TA	400000

3.	Uniform/Liveries	400000
4	O/E	550000
5	Motor Veh	340000
Conservancy Works		
	Marking and Demarcation	120000
	Repair Of Boundary Pillars	100000
	Const.of building	1000000
Repair/maintenance of		
1	Building	800000
2	Road	200000
3	Compound	150000
4	Fire Protection	800000
5	Plantation and Nursery (Raising)	2500000
6	Maint of Plantation	1000000
7	M&S	800000
	Total	49,189,108

Abstract of annual future revenue and expenditure:

Revenue	₹	57,27,205
Expenditure	₹	4,91,89,108
Deficit	₹	4,34,61,903

15.6 Cost of Plan:

The expenditure incurred on the preparation of this plan is shown in **table 15.4 below:**

Table 15.4

Cost of Preparation of the plan

S No	Particulars	Amount (in ₹)
1	Enumeration	30000
2	Motor vehicle	100000
3	M&E	33000
4	M&S	33000
	Total:-	**466000**

A sum of ₹ 5727205/- was earned in the revision period as revenue from the house rent of govt. accommodation and miscellaneous recoveries.

Enumeration Abstract:

The total area covered under the plan	= 546.572sq.km
No. of trees enumerated	= 182801
Cost of enumeration (Rs)	= 300000/-

CHAPTER –XVI

SUMMERY OF PRESCRIPTIONS AND SUGGESTIONS

16.1 Important Prescriptions:-

The important prescriptions and Suggestions of the working plan are as under:

S. No	Heading	Prescription/ Suggestion	Para	Page
The Chil Working Circle				
1	Feling Series	Only one felling series adopted	2.6	114
2	Silviculture System	Punjab Shelter wood System	2.8	117
3	Rotation and Conversion Period	120 Year	2.9	118
4	Regeneration Period	30 years	2.10	118
5	Periodic Block	PB-I, PB Inter, PB-IV	2.11	129
6	Calculation of Yield a. Yield from PB-I b. Yield from PB-IV c. Yield from PB –inter	 1050 M3 920 M3 980 M3	 2.12.2 2.12.3 2.12.4	 129 130 131
7	Control of Yield		2.13	131
8	Felling Programme		2.14	131
9	Method of Executing Felling PB-I PB-IV PB-Inter	 Guidance Final Felling No felling except salvage	2.15 2.15.1 2.15.2 2.15.3	133 133 134 135
10	Subsidiary Silviculture Operation in PB-I a. Disposal of felling debris. b. Subsidiary felling.	 Clean bed recommended as per Technical order No. 6 of Punjab Forest manual Vol. III. Left over trees, damaged, malformed trees be cut.	 2.16.1 2.16.2	 135 135

	c. Shrub cutting. d. Pruning e. Clearing f. Sowing and planting	All shrubs be cut To be done. Specification of cleaning and utilization of material prescribed Protection measures are suggested in addition to regeneration. Also closure/ planting programme prepared for plan period.	2.16.3 2.16.4 2.16.5 2.16.6	135 135 135 137
11	Other Regulations a) Closure b) Grazing and grass cutting. c) Fire protection and Control burning. d) Fire lines e) Resin Tapping f) Right holder demand for TD. g) Salvage Removals h) Regeneration assessment survey	 All PB-I areas to be closed. No grass cutting allowed till seedling attain a height beyond 50cm Dealt in Chapter-VIII Dealt in Chapter –VIII Time schedule and specific points to be kept in mind while doing tapping by rill method.ore details have been discussed in Chapter-XIV, Resin Production. Dealt in Chapter-I(Part-I) In felled areas in every alternative year at least for 10 years	2.17 2.17.1 2.17.2 2.17.3 2.17.4 2.17.5 2.17.6 2.17.7 2.17.8	137 137 137 138 138 138 139 139 139
Bamboo Working Circle:				
1	Distribution of Bamboo area	Bamboo areas listed	3.3	140
2	Felling series	a) Kunihar Commercial Felling Series b) Kunihar Local Demand Series	3.6	143
3	Blocks and compartments	Same as that of VK Singh's Plan	3.7	143

3	Analysis and Valuation of crop	Position of stock maps , status of enumeration done in different modes highlighted	3.8	143
4	Silviculture System	Culm Selection cum-Clump improvement suggested	3.9	145
5	Silviculture Management of Bamboo	Important prescriptions have been made for working of bamboo forests	3.10	145
6	Calculation of Rotation	Time schedule prescriptions for felling of culms have been suggested	3.11	146
7	Felling Cycle	Three year felling cycle prescribed	3.12	146
8	Method of Executing Felling	Number of culms left should not be less than the number of healthy culms of the two preceding seasons. Also felling programme highlighted	3.13	146
9	Standard Bamboo cutting Prescriptions	General felling rules prescribed	3.14	147
10	Fellings Programme:-	Detail of felling Programme	3.15	150
11	Calculation of yield		3.16	151
12	Subsidiary Silviculture Operations		3.17	151
	a)Cleaning	General cleaning rules for health and hygiene of culms suggested	3.17.1	151
	b)Showing and planting	Suggestion for artificial planting prescribed	3.17.2	151
	c)Weeding	Weeding suggested	3.17.3	152
	d)Closure	Closure prescribed in deficient areas	3.17.4	152
12	Gregarious Flowering	Different treatment/ closure prescribed for such areas	3.18	152
13	Bhanjaras	Suggestions made regarding allotment of areas for felling by Bhanjaras	3.19	154

14	Natural Regeneration	Discussed and given	3.20	154
15	Nursery and Planting techniques of Bamboo a)Raising Bamboo stocks through seeds b) Macro-proliferation Technique c)Raising Bamboo through Culm cutting	Seed collection. Sowing schedule prescribed along with planting time Technique for maintenance and multiplication of Bamboo stock discussed The technique prescribed	3.21 3.21.1 3.21.2 3.21.3	155 155 155 155 156
16	Character to identify culms of various ages	Distinguishing features of culms of different age classes discussed	3.22	156
17	National Bamboo Mission	NBM discussed	3.23	157
The Soil cum Biodiversity Conservation Working Circle:				
1	Area and allotment	Range wise detail is given	4.5	159
2	Biodiversity Analysis and Evaluation of the Crop Silvicultural System Management System Lantana Infestation		4.6 4.6.1 4.6.1.5 4.6.1.6 4.6.1.7	159 159 160 161 161
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--sd—
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No.13-7 (18)/1997-ROC/5827

Dated. 19th July, 2012

To

The Principal Secretary (Forests)
Government of Himachal Pradesh,
Forest Department,
Talland Shimla, Hiamachal Pradesh,

Sub. **Approval of Working Plan for the forests of Kunihar Forest Division (2012-2013 to 2026-2027).**

Ref.: Pr. Chief Conservator of Forests, Govt. of Himachal Pradesh letter No. 798 dated 13/07/2012.

Sir,

The Working Plan for the forests of **Kunihar Forest Division** (2012-2013 to 2026-2027) has been examined in accordance with the provisions of Forest (Conservation) Act, 1980 as amended till date, National Working Plan Code, guidelines issued by Government of India, Ministry of Environment and Forests, New Delhi from time to time, National Forest Policy 1988 as well as orders dated 12th December 1996 of Hon'ble Supreme Court of India in PIL WP(202 of 1995 read with WP(C) 171 of 1996.

After careful consideration of the proposed Working Plan, approval of the Competent Authority is hereby conveyed under Section 2 of the Forest (Conservation) Act, 1980 subject to observance of the following conditions :-

1. The approval shall be effective from the date of issuance of this communication till 31.03.2027.
2. All the provisions of the Forest (Conservation) Act, 1980 and various Rules & Guidelines issued under the Act shall be strictly enforced.
3. Yield obtained from dead dry & salvaged timber will form part of prescribed yield and in case prescribed yield has been achieved from dead & dry volume, no further felling will be carried out. Yield from dead, dry & salvaged timber must not exceed the prescribed yield in the working plan.
4. All the felling must commensurate with regeneration and no felling would be permitted unless funds for regeneration are available. In this regards, orders of Hon'ble Supreme Court of India will be strictly compiled with

Contd....2/-.....

5. Working Plan is technically approved. However, felling forests will be undertaken only as per orders dated 12.12.1996 of Hon'ble Supreme Court of India in CWP No. 202 of 1995 with CWP No. 171/1996 and / or other order of Hon'ble Supreme Court of India or any other Courts as applicable.
6. Intensive protection measures against fire, biotic interference and encroachment in forests shall be taken up.
7. All the prescriptions prescribed in the working plantation, protection and development of the forest area will be strictly followed and any change in the prescriptions will be treated as deviation for which prior approval of competent authority will be obtained.
8. Sufficient budgetary allocations be ensured for timely implementation of various prescriptions regarding protection regeneration and development of the forests.
9. Mid term review of the Working Plan will be taken up each between in 2019-2020.
10. The work on review of the working plan shall be taken well in advance so that the revised plan is ready before expiry of the current Working Plan.

The Central Government reserves the right to review/modify or withdraw this approval at any point of time depending upon the management needs any other guidelines of the Ministry of Environment and Forests, Government of India or Hon'ble Supreme Court of India.

Yours faithfully,

(S.K. Sehrawat)
Addl. Principal Chief Coservator of Forests (Central)

Copy to :

1. The Addl. Director General of Forests (FC), Ministry of Environment & Forests, Paryavaran Bhawan, CGO Complex, New Delhi.
2. The Pr. Chief Conservator of Forests, Govt. of Himachal Pradesh, Forest Department, Talland, Shimla, Himachal Pradesh.
3. The Additional Pr. Chief Conservator of Forests, Working Plan & Settlement Mandi, Himachal Pradesh.
4. The Divisional Forest Office-cum-Working Plna Officer, Forest Division and District Kunihar, Himachal Pradesh.
5. Guard File.

H. P. Forest Department Printing Press, Kalaghat, Solan