

**GOVERNMENT OF HIMACHAL PRADESH
FOREST DEPARTMENT**



**WORKING PLAN FOR THE
FORESTS**

OF

DHARAMSHALA FOREST DIVISION

(2024 TO 2034)

VOLUME-I

BY

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W.P.O - CUM -D.F.O. DHARAMSHALA**

Under the guidance of

***Addl. Pr. CCF Working Plan &
Settlement, Mandi
Himachal Pradesh***

***Principle Chief Conservator of
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PREFACE

This Working Plan is revision of Sh. Shushil Kumar Singla's Plan (1912-1913 to 2021-22) as per the Revised National Working Plan Code, GOI, year 2014. We were assigned additional work of working plan of Dharamshala Forest Division. However, field work was started during 2022-23 and completed in July, 2024. Sh. Sanjeev Sharma, IFS had also started the field work and writing of PWPR during their tenure as DFO-cum-WPO, Dharamshala and submitted the PWPR Report which was approved in year 2022. Sh. Dinesh Sharma had written the complete Draft Working Plan including Chapter on Wildlife Management (Overlapping) Working Circle during 2024, which was duly approved by the Pr.CCF, Wildlife, HP and also submitted the chapter on Ecotourism and Human Resource Development on Dharamshala forest division which is a part Draft Working plan.

The preparation of the revised working plan for Dharamshala Forest Division has been a great learning experience for all WPOs. It has been a great team effort, laborious and difficult nature, which were impossible to be completed without sincere efforts made by the staff in the field as well as in the office as mandate given by the Pr. CCF H.P., Shimla. We, owe my indebtedness to my field staff, who extended a whole hearted co-operation and help during field works, valuable suggestions for the preparation & final completion of this working plan.

Special thanks to the Pr. CCF(HoFF), H.P., Dr. Pawnesh Kumar, IFS, Sh. Lalnun Sanga, IFS, A.P.C.C.F., Working Plan and Settlements, Sh. Amitabh Gautam, IFS, P.C.C.F. Wildlife for their constant guidance, encouragement and help during the preparation of this working plan.

The revised working plan has been prepared for a period of 10 years, commencing from 2024-25 to 2033-34. The working plan under revision expired in 2022-23. As, there was practically, no silviculture fellings during the last plan period in terms of the Hon'ble Supreme Court order dated 12-12-1996, there is no problem in making the plan operative prospectively.

The working plan had the benefit of being supervised by many superior officers of the rank of CCF and Addl. Pr. CCF, owing to the frequent changes at these levels in the working plan set up. I am highly indebted to Sh. Dev Raj Kaushal, IFS A.P.C.C.F., Sh. E. Vikram, IFS, CCF who were instrumental in providing the necessary guidance to the undersigned. The plan

owes its present form, due to the generous technical support provided by Sh. H.V. Kathuria, IFS and Smt. Upasna Patial IFS, A.P.C.C.F.

We would like to acknowledge the valuable contribution rendered by all the staff of the Dharamshala Forest Division. Thanks are due to all the field staff and ministerial staff of Dharamshala Forest Division for their sincere support in the preparation of the working plan.

Finally, we are thankful to Sh. Daulat Ram Dhiman H.P.F.S., Sh. Sanjay Sen HPFS(Retd.), Sh. Sumit Sharma, R.F.O. Dharamshala, Rakesh Kumar JOA(IT) and Sh. Sunil Kumar JOA(IT) for his arduous effort and who have co-operated in typing and collection of data of this working plan in a nice manner in the shortest possible time.

Place: - Dharamshala

Dated: 18th Nov, 2024

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EXECUTIVE SUMMARY

Statistics of Dharamshala Forest Division at a Glance

Total Geographical area of the tract	1140.94 Km ²
Forest area (RF, DPF & Listed UPF)	61063.18 Ha.
Percentage of forest area to the total Geographical area	53.52 %

Legal status of Forest area: -

a)	Reserved Forests	138.77 Ha.
b)	Demarcated Protected Forests	27674.38 Ha.
c)	Listed Un-demarcated Protected Forests	22882.17Ha.
d)	CFS	9939.46Ha.
e)	Road strips	215.72Ha.
f)	Railways Side strips	212.68 Ha.

Before the tract ceded to the British on 9th March in 1846, the forests were the property of the local rulers where definite rules for forest management existed. On the advent of British rule, the forests were placed under the control of Deputy Commissioner, who managed them according to the rules embodied in the village administration papers of the Land Revenue Settlement by Barnes (1849-52). These rules, a mere re-iteration of ancient practice, were modified by Bailey in 1853 which in 1859 were replaced by local rules applied under the authority of the "Rules for the Conservancy of Forests in the Hill tract of Punjab" promulgated by Govt. of India in 1857. In 1870, as a preliminary to the constitution of reserved forests on the principles followed in Hoshiarpur district, Dehra tehsil forests were placed under the control of the Forest Department. Reserves in Dehra tehsil were notified in 1879 vide Notification No. 111-F dated 6th March, 1879. 6 blocks of forests in Dada-sibajagir were demarcated during Barnes Settlement (1848) and the draft notification was prepared. Simultaneously, the provisions of Chapter-IV of the IFA, 1878 to all wastelands, demarcated and un-demarcated were also proposed to be applied. The notification, however, could not be issued till Sheep Shank was deputed as Forest Settlement Officer, who submitted his report in 1913 and notification No 2839-A to 2839-E all of 31st August 1915 were finally issued.

The first Working scheme for the reserved forest, (Reserved Banal) was prepared for five years from 1915 to 1920. The second working scheme was prepared by Budhi Singh (1922 to 1933). A revised working Scheme from 1933 to 1938 was prepared by David followed by the revised working scheme of Aggarwal (1942 to 1951). The last revised working scheme was

prepared by Romesh (1952-53 to 1961-62) where after the forests were incorporated in the main revised working plan of Kangra Forest Division by Malhotra (1966-67 to 1980-81). Then M.P. Singh prepared the Working Plan for the period 1981-82 to 1995-96 followed by Working Plan of Sushil Kumar Singla.

The Present working Plan covers all the Reserved, Demarcated Protected Forests, Undemarcated Protected Forests, Cooperative Society Forests, PWD road side strips, Railway side strips, of the Dharamshala Forest Division. It is revision of working Plan (2012-13 to 2021-22) by Sh. Sushil Singla. The boundaries of Dharamshala Forest Division coincide with that of Dharamshala, Shahpur, Kangra and Baroh Tehsils and Harchakian Sub Tehsil of Kangra district. The headquarters of the Forest Division is at Dharamshala. It has five territorial Ranges, viz Dharamshala, Kangra, Shahpur, Mallan and Lapiana.

The tract lies between longitudes 76°4" E to 76°28" E and Latitudes 31°57" to 32°24" N. It is bound on the North by the Dhauladhar mountain range, on the east by Palampur Forest Division, on the south by Dehra Forest Division and in the West by Nurpur Forest Division.

The total geographical area of this Division is 1140.94 sq. km. The forests do not form a continuous and compact belt but are scattered throughout the Division and cover 610.6365 Sq. Km (61063.65 ha.) i.e. 53.52 % of the total geographical area.

The terrain is mostly hilly with altitude varying from 430 m near Lapiana to 2496 m on the Dhauladhar Range. On the whole, the tract presents a panorama of high, rocky, granitic peaks of the Dhauladhar with rolling hills below, gradually settling into undulating plains of the Kangra valley. The upper reaches are very steep and there is an abrupt fall of 900 to 1225 m and then it breaks up into a series of spurs which run into the main valley at a moderate gradient for some distance, then finally fall sharply into the valley. There is succession of parallel intermediate ranges of gradually decreasing heights and thus, the tract abruptly divides itself into high and low hills. At the foot hills of Dhauladhar lies the main Kangra valley bounded on the South East by rugged hills of sand stone called Changer and on the North East by Ambuari-Gaggal ridge which enters Palampur forest Division near Mallan. Generally speaking, the Southern, South Eastern and eastern slopes are very steep precipitous while the descent on the Northern slopes is moderate to steep. The Range wise distribution of the forests is as under: -

Range wise Distribution of the Forest Area (in hac.)

Range	RF		DPF		UPF		CFS		Road Strips	Railway Side Strips	Total Forest	Area (Ha.)
Dharamshala	1	138.77	14	10720.51	10	2998.96	8	6790.73	56.12	0	33	20705.09
Kangra	0	0	6	1875.86	79	7034.45	2	206.38	70.49	127.68	87	9314.86
Lapiana	0	0	13	2887.2	95	4242.35	0	0	35.25	0	108	7164.8
Malan	0	0	6	3813.74	32	4812.46	5	1511.96	27.26	85	43	10250.42
Shahpur	0	0	15	8377.07	43	3793.95	6	1430.39	26.6	0	64	13628.01
Grand Total		138.77		27674.38		22882.17		9939.46	215.72	212.68	335	61063.18

The present working plan is the revision of Sushil Kumar Singlas's Working Plan from 2012-13 to 2021-22 and included extension 2022 to 24 for regularization. This working plan has been prepared, strictly, on the basis of National Working Plan Code, 2014. In order to, achieve the objects of management outlined in Chapter-I, Part-II, the Chil Working Circle, the oak Working Circle, the Coppice Working Circle, the Plantation Working Circle, and the protection working circle have been constituted as per composition of the crop. A separate mandatory working circle i.e. Plantation, NTFP, Forest Protection (Fire, illicit felling, encroachment, illegal mining, poaching etc.) and Joint Forest Management & Wild Life Management overlapping working circles have also been constituted and discussed in length with prescriptions of legal control mechanism, which would be very useful as reference. The chapter on NTFP gives an exhaustive list of the useful medicinal plants along with their uses, which would be very useful as reference. Similarly, the new chapter on Five Year Plans is included. The circle wise statement of Forest area is given as under:

Range	Forest Working Circle(In Ha.)					Grand Total (Ha.)
	Chil	Oak	Coppice	Plantation	Protection	
Dharamshala	2031.78	2081	0	1814.42	14721.77	20648.97
Kangra	1515.18	0	653.15	2670.26	4278.1	9116.69
Lapiana	1861.94	0	210.43	1409.68	3647.5	7129.55
Malan	1289.78	0	63.53	1147.21	7637.64	10138.16
Shahpur	3553.37	21.85	95.49	1079.12	8851.58	13601.41
Grand Total	10252.05	2102.85	1022.6	8120.69	39136.59	60634.78

As per working plan code 2014, the enumeration was carried out on the grid system bases in the Sample IDs (Plots) of size 0.1 Ha each. The enumerations were carried out, accordingly, in all the PBs down to 10 cms dbh in all the working circles. All the coniferous and important broad-leaved species have been included in the enumeration list. The results have been analyzed and growing stock has been assessed accordingly.

Species wise Growing Stock (volume in m³)

Class	Chil	Deodar	Khair	Ban	Rai	Tosh	BL	G. Total
V	9754.35	0.00	14138.33	10095.60	0.00	0.00	43108.74	77097.02
IV	104671.39	1370.46	45451.66	82218.57	335.86	267.26	154815.18	389130.38
III	327552.55	11165.70	44739.45	255677.25	7519.68	0.00	333134.58	979789.21
IIA	529552.72	11341.26	43874.37	315794.22	39427.92	940.80	387849.24	1328780.53
IIB	514206.24	12790.12	31213.79	167794.38	51457.56	5180.56	169349.46	951992.11
IA	519784.94	2936.50	25879.33	99900.28	0.00	0.00	139845.87	788346.91
IB	586419.60	0.00	3812.28	72535.58	0.00	0.00	106596.20	769363.65
IC	335992.80	15164.38	1040.41	54289.32	0.00	0.00	52650.74	459137.64
ID	1492327.20	105798.00	1731.47	149524.90	18841.20	0.00	138825.65	1907048.42
G. Taotal	4420261.79	160566.42	211881.06	1207830.10	117582.22	6388.62	1526175.65	7650685.87

The present working plan has been revised thoroughly, notwithstanding, the present moratorium on green felling. The revised working plan includes all regular working circles, prescribing yield and felling cycle/felling series depending on the condition of Forests in each working circles. Thus, green felling

in any Forest or in public Forest will be allowed / carried out strictly in accordance with the approved prescriptions of working plan subject to the decision of the Hon'ble Supreme Court.

The Forests allotted to different working circles viz Oak, Coppice, Plantation, Protection & Chil are prescribed to be managed under the Punjab Shelter Wood System. The rotation period is fixed at 120 Years for Deodar/Kail, Fir/Spruce and Chil. Beside this, the felling cycle of 10 years corresponding to the period of plan has been adopted. The regeneration period of 30 years has been adopted and area of the all working circles has been divided into four periodic blocks i.e. PB-I to PB-IV.

The yield has been calculated by volume and separately for PB-I and IV on the basis of enumeration result in the viz Chil, Oak, Coppice, Plantation & Protection working circles. The total Annual prescribed yield from the Forests of the different working circles has been worked out by Simon's modification of Von Mantel's formula and is given in the Table below:

Abstract of Annual Yield Working Circle Wise Dharamshala Forest Division					
Sr No	Working Circle	Felling series	PB (If Any)	Prescribed Annual Yield	Remarks
1	Chil SW WC	I	I	5000 m ³	Seeding felling
			II	Nil	Salvage removal only

			III	3000 m ³	Only thinning and salvage removal
			IV	3000 m ³	Final felling
		II	I	4000 m ³	Seeding felling
			II	Nil	
			III	Nil	
			IV	1300 m ³	Final Felling
		III	I	250 m ³	Seeding felling
			II	Nil	
			III	110 m ³	Only thinning and salvage removal
			IV	250 m ³	Final Felling
		Total WC		16910 m³	
2	Oak WC			Nil	No felling prescribed
3	Coppice WC	All		34 hac	

4	Khair (O) WC	All		35000 Trees	In all WC including protection & Plantation
5	Plantation WC	All		7000 m³	Salvage & right Holders
6	Protection WC	All		No Prescription	Salvage & right Holder's removals

The methods of executing fellings/thinning have also been described along with the detailed felling and planting programme. An exhaustive artificial regeneration and miscellaneous regulations are also prescribed under respective working circles. However, all the working circles are described in detail from Chapter II to Chapter XIII of Part-II of the working plan. Similarly, miscellaneous regulations in Chapter-XI+2 are also described in detail, which would be useful as reference.

SUMMARY OF PRESCRIPTIONS

Important Prescriptions: The important prescriptions and suggestions of the working plan are as under:

Sr. No	Headings	Prescriptions
Basis Of Proposal		
1	National Forest Policy and Legislation	The National Forest Policy and Legislation, Himachal Forest Policy described.
2	Supreme Court on Green Felling and Regeneration	Felling of trees from forest area shall be allowed only as per approved working plan by the Government of India.
3	Objectives of management	The objectives of management prescribed.
Chil Shelterwood Working Circle		
1	Felling Series	There will be three felling series.
2	Comparative Statement	The Comparative Statement of growing stock of Singla's and current plan given
3	Silvicultural System	The Punjab Shelter Wood System
4	Choice of species	Laid down
5	Regeneration Period	30 years
6	Rotation & Exploitable diameter	120 years rotation and exploitable diameter of 60 cm d.b.h.
7	Felling Cycle	30 years
8	Division into Periodic Blocks	Four Periodic Blocks have been formed
9	Calculation of Yield	The yield has been calculated by volume for PB-I and PB-IV
10	Total Prescribed annual Yield	16910 m ³
11	Control of Yield	The control of yield and the deviation for a year, a period of five year and a plan period shall not exceed +- 25%,+10% and +-05% respectively.
12	Method of executing felling in PB-I areas	The general principles laid down
13	Treatment of PB-II areas	No commercial felling prescribed
14	Treatment of PB-III areas	Only Thinning and Salvage Removal
15	Thinning	The general principles laid down
16	Method of executing felling in PB-IV areas	The general principles laid down
17	Table of felling	The felling programme has been laid down
18	Subsidiary Silviculture operations in PB-I	Works to be carried out and general principle discussed
19	Artificial regeneration in PB-I area	To be carried out to supplement natural regeneration discussed and prescribed.
20	Planting Programme	Prescribed
21	Tending operations	Discussed and prescribed
22	Weeding	Discussed
23	Cleaning	Discussed
24	Fire protection	The areas will be protected from fire discussed and prescribed.

25	Grazing and grass cutting	The grass cutting will be prohibited in all the PB-I areas, till the young crop is beyond the damage i.e. 75 cms and above.
26	Right holder's Demand	The requirements of right holder for timber will be met from the depot as per H.P. Govt. notification dated 26 December, 2013 and 26 February, 2016 rest of the demand of right holders will be met as per the provision of Forest Settlement Report.
27	Closures	Effective closure of all the PB-I areas prescribed
28	Lopping	Lopping may be allowed to the right holders as per settlement reports.
29	Regeneration survey	Discussed and prescribed.
Oak Shelterwood Working Circle		
1	Felling Series	Only One Felling Series, no felling prescribed only Salvage Removal prescribed
2	Silvicultural System	Protection
3	Choice of species	Laid down
4	Regeneration Period	30 years
5	Rotation & Exploitable diameter	120 years rotation and exploitable diameter of 35 cm d.b.h.
6	Division into Periodic Blocks	Four Periodic Blocks have been formed
7	Prescribed Annual Yield	Nil
8	Calculation of Yield	No Yield Prescribed
9	Method of executing felling in PB-I areas	The general principles laid down
10	Treatment of PB-II areas	No commercial felling prescribed
11	Thinning	Thinning prescribed in accordance with the principles discussed
12	Method of executing felling in PB-IV areas	The general principles laid down
13	Subsidiary Silviculture operations in PB-I	Works to be carried out and general principle discussed
14	Artificial regeneration in PB-I area	This is to be carried out to supplement the natural regeneration
15	Planting programme	Blank areas in the preservation felling series are to be artificially restocked mainly with Ban Oak
16	Closure and fencing	Discussed and detailed prescribed.
17	Weeding	Discussed and prescribed.
18	Fire protection	The areas will be protected from fire discussed
19	Grazing and grass cutting	Detailed prescribed.
The Coppice Working Circle		
1	Felling Series	Only One Felling Series
2	Comparative Statement	The Comparative Statement of growing stock of Singla's and current plan given
3	Silvicultural System	Coppice with standard system
4	Choice of species	Laid down
5	Regeneration Period	30 years
6	Rotation & Exploitable diameter	30 years for coppice and 60 years for standards

7	Felling Cycle	30 years
8	Calculation of Yield	The yield has been calculated by area
9	Total Prescribed annual Yield	34Ha.
10	Method of executing felling	The general principles laid down
11	Thinning	The general principles laid down
12	Sequence of felling	The felling programme has been laid down
13	Subsidiary Silviculture operations, Cleaning and Thinning in PB-I	Works to be carried out and general principle discussed
14	Planting Programme	General Principle Discussed
15	Lantana Treatment	Works to be carried out and general principle discussed
16	Fire protection	The areas will be protected from fire-discussed
17	Right holder's Demand	The requirements of right holder for timber will be met as per prescribed Norms
18	Closures	Effective closure of all the PB-I areas prescribed
19	Grazing and grass cutting	Detail prescribed.
20	Regeneration survey	Discussed and prescribed.
Khair Overlapping Working Circle		
1	Felling Series	Three Felling Series
2	Silvicultural System	Selection System
3	Choice of species	Laid down
4	Exploitable D.B.H.	25cm
5	Felling Cycle	10 years Duration
6	Felling Unit	Mauza or Group of Mauzas
7	Prescribed annual yield	35000 trees
8	Methods of Executing Felling	Discussed in Detail
9	Sequence of Felling	Discussed and prescribed
10	Subsidiary silviculture operations	Discussed and prescribed.
The Plantation Working Circle		
1	Felling Series	No felling series prescribed
2	Silvicultural System	No silvicultural system prescribed as no commercial fellings are proposed.
3	Choice of species	Discussed, no rotation prescribed.
4	Rotation period	No rotation prescribed
5	Felling Cycle	No felling cycle is prescribed.
6	Calculation of yield	7000m ³ , Only Salvage Removal
7	Method of executing Felling	No sequence of fellings is prescribed
8	Subsidiary Silvicultural Operations, Cleaning and Thinning	Discussed.
9	Artificial regeneration	Discussed.
10	Plantation Programme	The planting program laid down and is given in the plantation Working Circle. Plantation of 170 Ha. Area per year prescribed.
11	Bush cutting/weeding	Laid down
12	Monitoring of plantations	Discussed and laid down
13	Fire protection	Laid down

14	Closure	Detail discussed
Protection Working Circle		
1	Silvicultural System	No silvicultural system prescribed as no commercial fellings are proposed and only plantation will be raised by planting and sowing.
2	Rotation & Exploitable diameter	No rotation and exploitable diameter are prescribed.
3	Calculation of Yield	No yield prescribed as no commercial fellings are proposed
4	Choice of Species	Discussed
5	Sequence of Plantation	Discussed
6	Fire Prevention	Discussed and prescribed
7	Improving Moisture Regime	Discussed and prescribed
8	Countering Invasive Alien Species	Discussed and prescribed
Alpine Pasture Improvement (Overlapping) working Circle		
1	Area Allotted	6512.47 Ha.
2	Analysis and valuation of the Crop	Discussed in Detail
3	Methods of treatment	Discussed and prescribed
4	Sequence of Treatment	Discussed and prescribed
Water Resource Management Working Circle		
1	Spring shed Area	Discussed in details
2	Identification of spring shed	31 spring sheds Listed
3	Proposed Treatment	Discussed in detail
Non -Timber Forest Produce (Overlapping) Working Circle		
1	Silvicultural System	No silvicultural system prescribed as no commercial fellings are proposed
2	Calculation of yield	No yield prescribed as the most NTFPs are extracted through right holders and however, maintaining proper record suggested.
3	Method of treatment & Rotational Extraction	Only rotational extraction is prescribed
4	Artificial propagation and conservation	Measures are suggested for the conservation, protection and propagation of medicinal plants.
5	Community versus Official efforts in Conservation of Medicinal Plants	Discussed
6	Propagation Techniques	The technique of propagation and harvesting of some important plants species prescribed.
7	Other Non-Timber Forest Produce	Brief description of other NTFP like Morchela deliciosa, Dioscorea deltoides etc. discussed.
8	Campaign for conservation and preservation of endangered species	Discussed and prescribed.
	Other Regulations	Legal Measures for extraction/collection and export of NTFP's prescribed under the provision Indian Forest Act, 1927.
9	Fire Protection	The areas will be protected from fire described.
10	Right Holders Requirements / Demand	The requirements of the Right holders will be met as per settlement provision.
11	Issues and Challenges	Discussed
12	Assessment of major NTFP species	Discussed

13	Strategy	Discussed
Wildlife Management (Overlapping) Working Circle		
1	Importance of wild life	The importance of protection and preservation of wild life is discussed and prescribed.
2	Wildlife Conservation measures	Discussed and prescribed.
3	Habitat Improvement measures	Discussed and prescribed.
4	Management Initiatives required to Address Human-Wild Life Conflicts	Discussed and prescribed.
5	Compensation for damages caused by wild animals	The rates for grant of relief for damages prescribed.
6	Mitigating Man Animal Conflicts	Discussed and prescribed.
7	Census of Wild Life	Prescribed
Joint Forest Planning and Management (Overlapping) Working Circle		
1	Emergence of Joint Forest Management	The evolution of joint forest management is discussed and prescribed.
2	Concept of participatory forest management	Concept of participatory forest management is discussed and prescribed.
3	Joint Forest Management in H.P.	Discussed and prescribed
4	Special Objective of JFM	Discussed and prescribed.
5	The World Bank aided Mid-Himalayan Watershed Development Project	Discussed and prescribed.
6	Sanjhi Van Yojna	Procedure Discussed
7	Identification of J.F.M. Areas	Discussed in Detail
8	J.F.M.C.'s in Dharamshala Division	Discussed in detail
9	Preparation of Micro Plan	Discussed in detail
10	Formation of JFMCs	Procedure discussed and prescribed
11	Monitoring and Evaluation	Procedure discussed and prescribed
Bio-Diversity Conservation (Overlapping) Working Circle		
1	Status of Biodiversity	Discussed in detail
2	IVI of different species	Laid Down
3	Management Proposed	Discussed in Detail and prescribed
4	Treatment Proposed	Discussed in Detail and prescribed
5	Permanent Preservation Plot	Discussed in Detail and prescribed

I. INTRODUCTION

This Working Plan deals with all the Reserved, Demarcated Protected Forests, Undemarcated Protected Forests, Cooperative Society Forests, PWD road side strips, Railway side strips, of the Dharamshala Forest Division of Dharamshala, Kangra, Lapiana, Mallan and Shahpur ranges of Dharamshala Forest Division. The forests of Dharamshala Forest Division are situated in the terrain, which in general is mountainous with moderately steep slopes. The main forests lie between the elevations of 430 meters near Lapiana to 2496 meters above mean sea level on Dhauladhar range. The boundaries of Dharamshala forest Division coincide with that of Dharamshala, Shahpur, Kangra and Baroh Tehsils and Harchakian Sub- Tehsil of Kangra district. The headquarter of division is at Dharamshala. It has five territorial Ranges, viz Dharamshala, Kangra, Shahpur, Mallan and Lapiana. The tract lies between longitudes 76°4" to 76°28" E and Latitudes 31°57" to 32°24" N. The total geographical area of this division is 1082.07 Sq. Km. Dharamshala Range is having high altitudes forests, whereas other ranges are of lower altitudes. Varied configuration of this resulted in varied climate and vegetation. The forests do not form a continuous and compact belt but are scattered throughout the division and cover 610.6318 Sq. KM (61063.18 ha) (adding 2.07 ha. Non-forest land mutated in favour of Forest Department during the year 2017 for Compensatory Afforestation area against diversion of forest land for construction of Dharamshala- Mcleodganj Ropeway) i.e. 53.52% of the total geographical area. The current Working Plan of Dharamshala Forest Division by Sushil Singla Working Plan (2012-13 to 2021-22), which deals with the forest area of 61061.18 Ha.

Keeping in view the National / State Forest Policy and National Working Plan Code - 2014, the forest resources of Dharamshala Forest Division are proposed to be managed incorporating holistic management of forest resources keeping in view the need for conservations as well as utilization of forest produce. Reliance shall be made to scientific working parameters that confirm to the set criteria indicators of sustainable forest management.

The holistic assessment of forest resources with regard to biodiversity, climate change, carbon sequestration and timber production will be made on the basis of methodology stipulated in the National Working Plan Code -2014 with the help of Forest Survey of India (FSI), Dehradun. Keeping in view the broad objectives of the management, socio-economic needs and biodiversity conservation, different working circles for sustainable management of forests have been suggested to be incorporated in revised working plan.

Vision statement:

Sustainable management of forests and its biodiversity as enshrined in the National Forest Policy, encompassing the ecological (environmental), economic (production) and social (including cultural) dimensions as per National Working Plan code 2014 (Code-2014).

Goals and objectives of management:

The main objectives of management are as under:

- I. Conservation of forests and abating the forest degradation.
- II. Maintenance and enhancement of ecosystem services including ecotourism.
- III. Enhancement of forest productivity together with establishment of regeneration to improve forest health and vitality as per ecological and silvicultural requirements of the species.
- IV. Progressively increasing the growing stock and carbon sequestration potential.
- V. Maintenance of biological diversity.
- VI. Sustainable yield of forest produce.
- VII. Prevention of soil erosion and stabilization of the terrain; improvement and regulation of hydrological regime.
- VIII. People's involvement in planning and management of forests for fulfilling socio-economic and livelihood needs of the people.

SWOT analysis for prescription of strategies for achieving the goal and objectives:

The detailed SWOT analysis for prescription of strategies for achieving the goals and objectives of working plan will be carried out. Further projection of expected outcome and an abstract of plan prescription in the format as prescribed in National Working Plan Code-2014 will also be provided in the revised working plan.

This Working Plan contains detailed and close analysis of the results of the past management for each working circle, necessary details of the working plan area, details of management prescription and practices to be adopted in New working plan period along with aspects of forest management which have been considered important for assessing the sustainability, accompanied by a set of related quantitative, qualitative or descriptive attributes in consonance with working plan period which have been proposed for 10 years as per guidance enshrined in code-2014. The Working Plan will ensure sustainable management of the forest resources.

Expected Outcome

- i) Forest cover as envisaged by the National Forest Policy will be increased to the expected level
- ii) Wildlife habitat will be restored and improved
- iii) Ecology will be restored and balanced.
- iv) Creation of awareness and strengthening the people participation.
- v) Meeting the timber needs of the people from trees outside forests

Statistics of Dharamshala Forest Division at a Glance

Total Geographical area of the tract	1140.94 Km ²
Forest area (RF, DPF & Listed UPF)	61063.18 Ha.
Percentage of forest area to the total Geographical area	53.52 %

Legal status of Forest area: -

a) Reserved Forests (Notification No. 455 Dated 21/9/1914)	138.77 Ha.
b) Demarcated Protected Forests	27674.38 Ha.
c) Listed Un-demarcated Protected Forests	22882.17Ha.
d) CFS	9939.46Ha.
e) Road Strips (Notification No. 1122-Ft-58/1195 Dt. 3/5/1915)	215.72Ha.
f) Railways Side strips (Notification No. 1122-Ft-58/1195 Dt. 3/5/1915)	212.68 Ha.

Range Wise Distribution of Forest area by legal classification

Range	RF		DPF		UPF		CFS		Road Strips	Railway Side Strips	Total Forest	Area (Ha.)
Dharamshala	1	138.77	14	10720.51	10	2998.96	8	6790.73	56.12	0	33	20705.09
Kangra	0	0	6	1875.86	79	7034.45	2	206.38	70.49	127.68	87	9314.86
Lapiana	0	0	13	2887.2	95	4242.35	0	0	35.25	0	108	7164.8
Malan	0	0	6	3813.74	32	4812.46	5	1511.96	27.26	85	43	10250.42
Shahpur	0	0	15	8377.07	43	3793.95	6	1430.39	26.6	0	64	13628.01
Grand Total		138.77		27674.38		22882.17		9939.46	215.72	212.68	335	61063.18

Percentage of Forest area under Reserved, Demarcated Protected Forests and Un-demarcated protected Forests: -

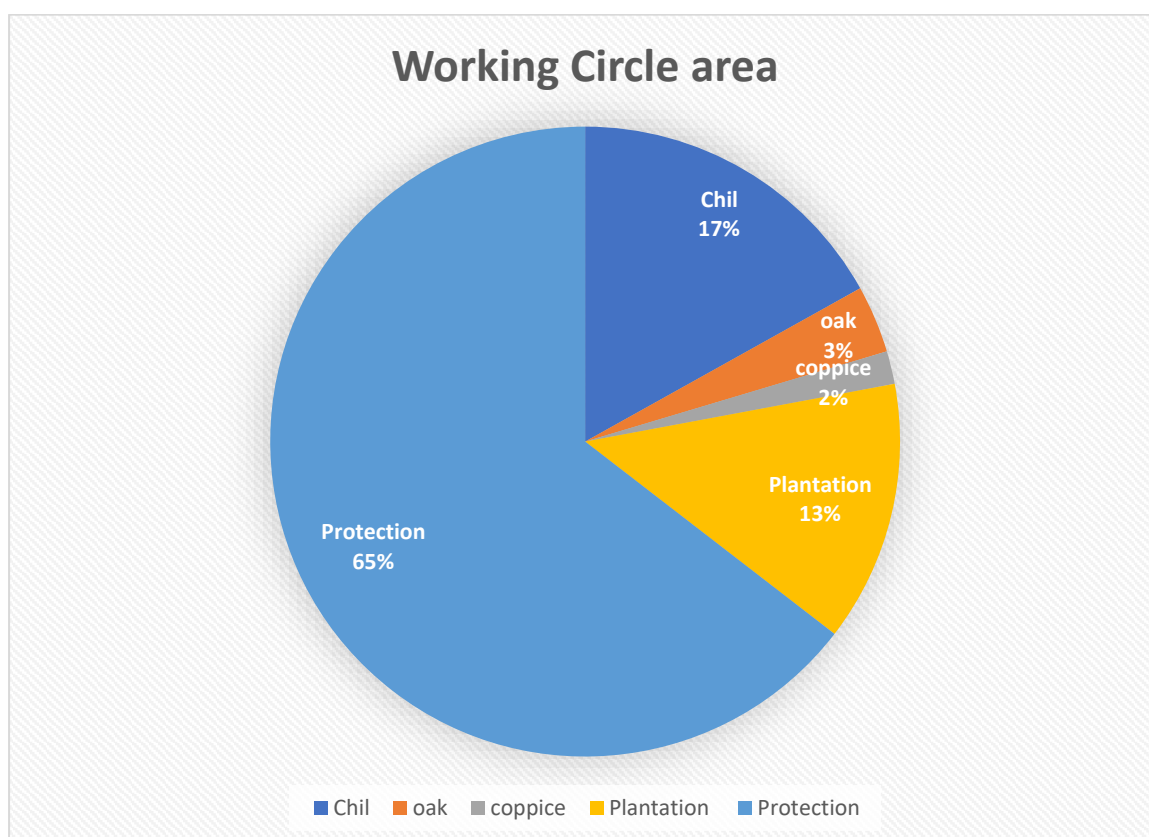
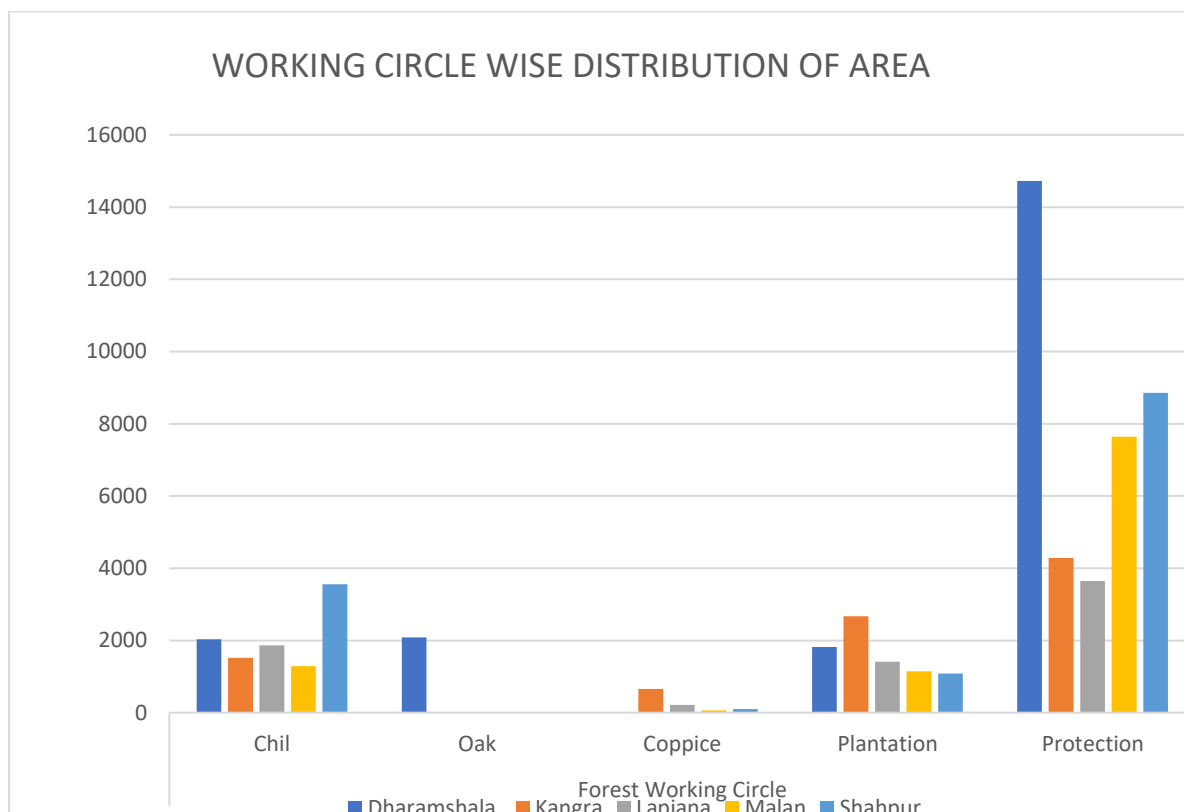
Category of Forests	% age to Forest area	% age to Geographical area
Reserved Forests	0.227	0.121
Demarcated Protected Forests	45.32	24.25
Un-Demarcated Protected Forests	37.47	20.05
CFS	16.27	8.71

Range Wise Forest Area :-

Sr. No.	Name of Range	Geographical Area (ha.)	Forest Area (ha.)	%age of GA
1.	Dharamshala	38560.89	20705.09	53.84
2.	Kangra	20900.63	9314.86	44.53
3.	Lapiana	11660.12	7164.80	61.01
4.	Mallan	21419.07	10250.42	48.00
5.	Shahpur	21553.40	13628.01	63.07
Total (ha.)		114094.11	61063.18	53.52

Graphical Representation of category of Forests (On the Basis of current enumeration(In Ha.))

Range	Forest Working Circle					Grand Total(Ha.)
	Chil	Oak	Coppice	Plantation	Protection	
Dharamshala	2031.78	2081	0	1814.42	14721.77	20648.97
Kangra	1515.18	0	653.15	2670.26	4278.1	9116.69
Lapiana	1861.94	0	210.43	1409.68	3647.5	7129.55
Malan	1289.78	0	63.53	1147.21	7637.64	10138.16
Shahpur	3553.37	21.85	95.49	1079.12	8851.58	13601.41
Grand Total	10252.05	2102.85	1022.6	8120.69	39136.59	60634.78



Species wise and Working Circle Wise Growing Stock (volume in m³)

Class	Chil	Deodar	Khair	Ban	Rai	Tosh	Broad Leave	G. Total
V	9754.35	0.00	14138.33	10095.60	0.00	0.00	43108.74	77097.02
IV	104671.39	1370.46	45451.66	82218.57	335.86	267.26	154815.18	389130.38
III	327552.55	11165.70	44739.45	255677.25	7519.68	0.00	333134.58	979789.21
IIA	529552.72	11341.26	43874.37	315794.22	39427.92	940.80	387849.24	1328780.53
IIB	514206.24	12790.12	31213.79	167794.38	51457.56	5180.56	169349.46	951992.11
IA	519784.94	2936.50	25879.33	99900.28	0.00	0.00	139845.87	788346.91
IB	586419.60	0.00	3812.28	72535.58	0.00	0.00	106596.20	769363.65
IC	335992.80	15164.38	1040.41	54289.32	0.00	0.00	52650.74	459137.64
ID	1492327.20	105798.00	1731.47	149524.90	18841.20	0.00	138825.65	1907048.42
G. Total	4420261.79	160566.42	211881.06	1207830.10	117582.22	6388.62	1526175.65	7650685.87

Working Circle Wise Prescribed Annual yield: -

On the Basis of detailed analysis carried out for growing stock and forming Felling Series and PBs yield prescribed is as follow: -

Abstract of Annual Yield Working Circle Wise					
Dharamshala Forest Division					
Sr No	Working Circle	Felling series	PB (If Any)	Prescribed Annual Yield	Remarks
1	Chil SW WC	I	I	5000 m3	Seeding felling
			II	Nil	Salvage removal only
			III	3000 m3	Only thinning and salvage removal
			IV	3000 m3	Final felling
		II	I	4000 m3	Seeding felling
			II	Nil	
			III	Nil	
			IV	1300 m3	Final Felling
		III	I	250 m3	Seeding felling
			II	Nil	
			III	110 m3	Only thinning and salvage removal
			IV	250 m3	Final Felling

		Total WC		16910 m3	
2	Oak WC			Nil	No felling prescribed
3	Coppice WC	All		34 hac	
4	Khair (O) WC	All		35000 Trees	In all WC including protection & Plantation
5	Plantation WC	All		7000 m3	Salvage & right Holders
6	Protection WC	All		No Prescription	Salvage & right Holder's removals

Chart for comparison of present prescription with that given for working circle in Previous Working plan and its analysis

Heading	Prescriptions- Area statement												
	Sushil Singla’s Working Plan										Current Working Plan		
	Range	RF		DPF		UPF		CFS		Road Strips	Railway Side Strips	Total Forest	Area(Ha.)
	Dharamshala	1	138.77	14	10720.51	10	2998.96	8	6790.73	56.12	0	33	20705.09
	Kangra	0	0	6	1875.86	79	7034.45	2	206.38	70.49	127.68	87	9314.86
	Lapiana	0	0	13	2887.2	95	4242.35	0	0	35.25	0	108	7164.8
	Malan	0	0	6	3813.74	32	4812.46	5	1511.96	27.26	85	43	10250.42
	Shahpur	0	0	15	8377.07	43	3793.95	6	1430.39	26.6	0	64	13628.01
	Grand Total		138.77		27674.38		22882.17		9939.46	215.72	212.68	335	61063.18

Rights and Concessions	➤ Requirement of right holders as per settlement provisions	➤ The demand of right holders will be met as per provision of settlement report and as per revised timber distribution policy Notified by HP Govt. in the year 2013 amended 2016.
Fuel wood Depot	➤ The right holders are entitled to collect fuel wood free of charges from the forests as per recorded rights in settlement.	➤ The right holders are entitled to collect fuel wood free of charges from the forests as per recorded rights in settlement.
Recent development	➤ Nil	➤ New activities like MGNREGA ➤ Green India Mission ➤ Scheduled Tribes & other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 ➤ Ek Buta Beti Ke Naam ➤ Vidyarthi Van Mitra Yojna ➤ Van Samridhi – Jan Samridhi ➤ Samudayik Van Samvardhan Yojana
New Chapters	➤ Nil	➤ Five-year plan ➤ Ecotourism and Human resource Development ➤ Water resource Management Working Circle
Enumeration	• The total enumeration carried out in PB-I and PB-IV area. • Partial enumeration carried in other PBs	• As per National Working Plan Code, 2014 the enumeration was carried out on the grid system basis in the Sample IDs (Plots) of size 0.1 Ha each.
Constitution of	➤ Chil Shelterwood Working Circle ➤ Oak Shelterwood Working Circle ➤ Coppice Shelterwood Working Circle ➤ Khair (Overlapping) Working Circle ➤ Plantation Working Circle	➤ Chil Shelterwood Working Circle ➤ Oak Shelterwood Working Circle ➤ Coppice Shelterwood Working Circle ➤ Plantation Working Circle ➤ Protection Working Circle

Working circles	➤ NTFP (Overlapping) Working circle ➤ Protection Working circle ➤ Joint Forest Planning and Management (Overlapping) Working circle ➤ Wildlife Overlapping Working circle ➤ Alpine Pasture Improvement Working circle						➤ Khair (Overlapping) Working Circle ➤ Alpine Pasture Improvement Working circle ➤ Wildlife Overlapping Working circle ➤ Joint Forest Planning and Management (Overlapping) Working circle ➤ Water Resource Management Working Circle ➤ NTFP (Overlapping) Working circle ➤ Bio-Diversity Conservation Overlapping Working Circle																													
Working circle, their area and distribution	<table><tr><td>Working Circle</td><td>CSWC</td><td>Oak WC</td><td>Coppice WC</td><td>Plantation WC</td><td>Protection WC</td></tr><tr><td>Area (Ha)</td><td>10217.29</td><td>2110.16</td><td>1059.02</td><td>8010.18</td><td>3926.53</td></tr></table>						Working Circle	CSWC	Oak WC	Coppice WC	Plantation WC	Protection WC	Area (Ha)	10217.29	2110.16	1059.02	8010.18	3926.53	<table><tr><td>Working Circle</td><td>CSWC</td><td>Oak WC</td><td>Coppice WC</td><td>Plantation WC</td><td>Protection WC</td></tr><tr><td>Area (Ha)</td><td>10252.05</td><td>2102.85</td><td>1022.60</td><td>8120.69</td><td>39136.59</td></tr></table>						Working Circle	CSWC	Oak WC	Coppice WC	Plantation WC	Protection WC	Area (Ha)	10252.05	2102.85	1022.60	8120.69	39136.59
Working Circle	CSWC	Oak WC	Coppice WC	Plantation WC	Protection WC																															
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Period of Working Plan	• 10 years						• 10 years																													
Forest Block	• 18 Blocks						• 18 Blocks																													
Prescribe Annual yield	Sr No	Working Circle	Felling series	PB (If Any)	Prescribed Annual Yield	Remarks	Sr No	Working Circle	Felling series	PB (If Any)	Prescribed Annual Yield	Remarks																								
	1	Chil SW WC	I	I	4000 m3	Seeding felling	1	Chil SW WC	I	I	5000 m3	Seeding felling																								
				II	Nil	Salvage removal only				II	Nil	Salvage removal only																								
				III	700 m3	Only thinning and salvage removal				III	3000 m3	Only thinning and salvage removal																								
				IV	1700 m3	Final felling				IV	3000 m3	Final felling																								

Planting Program me	Yield prescribed from the forest areas is directly proportional to area planted.	Planting programme as per Availability and after assessment of plantable area
Resin Tapping	Prescribed as cup and lip method/rill method	Prescribed as per rill method
THE FOREST AND CLIMATE CHANG E	Nil	Detail discussed
Carbon stock and carbon sequestra tion and mitigatio n	Nil	Detail discussed

II GLOSSARY OF TERMS

The WPO shall discuss the glossary of terms used in working plan in detail. List of glossary of terms is as under:

GLOSSARY OF LOCAL TERMS USED IN THE WORKING PLAN

S. No.	Local Term	English equivalent
1.	Bahan	Floating
2.	Baili	Round unsawn timber used in the houses as rafter or posts
3.	Bartan	Rights of user
4.	Bartandar	An individual who enjoys rights of user in the forest
5.	Begar	Free labour
6.	Chak	Included cultivations with in a forest.
7.	Chuwkidar	Watchman
8.	Dandassa	Trade name of bark of walnut roots used for cleaning teeth
9.	Deota	The local God.
10.	Dhar	A ridge or spurs
11.	Dhangris	Professional labour who undertake charcoal burning.
12.	Dhulan	Land carriage
13.	Dhulani	Labour engaged for land carriage
14.	Dimdima	Any old size of wood roughly dressed by axe and of cross section ranging from 25cm X 25cm to 30cm x 30cms with less than 1.82 metres.
15.	Doghri	A small farm house on the land usually away from the main village.
16.	Gad	A small stream with perennial water.
17.	Garhwali	Inhabitants of Garhwal (U.P.)
18.	Geltu	Wood of spruce, Fir, Kail and Chil roughly dressed by axe and of size.
19.	Ghall	Timber floating in stream or river.
20.	Ghalu	Labour engaged on floating of timber
21.	Gharat	Flour mill run by water
22.	Ghasni	Grass land where from the grass is cut.
23.	Gujjar.	Nomadic buffalo grazier.
24.	Gurkhas	A native of Nepal
25.	Hakries	Small triangular split up pieces of wood usually less than 1.5 mt. in length
26.	Illaqua	Area
27.	Karies	Scantlings
28.	Khad	A water stream
29.	Khan	A slate or stone quarry.
30.	Kharif	Raining season crop.
31.	Khatis	Small pits carved out near water sources in hill sides to store water.
32.	Lambardar	The village head man or man deputed to collect land revenue by revenue authorities.
33.	Mali	The man employed on raising and maintenance of nurseries

34.	Mohal	A Revenue unit comprising of one or several villages
35.	Nala	A ravine or depressing with or without water.
36.	Nautor	Land granted for fresh cultivation.
37.	Panchayat	Village Council.
38.	Pargna	A unit comprising of several village.
39.	Patwari	Revenue official in charge of Patwar Circle (Smallest revenue unit)
40.	Phat	Grass land where from the grass is cut.
41.	Rabi	Winter crop.
42.	Rakha	Rasaot Watcher.
43.	Ruta	Grass land preserved from growing grass for fodder.
44.	Tehsil	Sub-Division of District.
45.	Tehsildar	Revenue officer incharge of a Tehsil
46.	Thach.	Small grassy blank in alpine forests used as a halting place by graziers.
47.	Tibba	Peak
48.	Zamindar	Cultivator or Farmers

III LIST OF FLORA

The WPO shall discuss names of trees shrubs herbs, and climbers with English names, if any, in alphabetical order, followed by their botanical names making it as exhaustive as possible with a separate list of rare, endangered and threatened species. The WPO may take help of subject matter experts for updating the list.

List of local flora is as:

A-TREES

S. No.	Scientific Name	Family	Local Name	English Name
1.	<i>Abies pindrow</i>	Coniferae	Tosh	Silver
2.	<i>Acacia nilotica</i>	Leguminosal (Mimosaceae)	Kikar	-
3.	<i>Acacia catechu</i>	Leguminosal (Mimosaceae)	Khair	-
4.	<i>Acer caesium</i>	Sapindaceal	Mandlu	Mandar Maple
5.	<i>Acer obolongum</i>	Sapindaceal	Parange	-
6.	<i>Acer villosum</i>	Sapindaceal	Chirandru	Maple
7.	<i>Adina cordifolia</i>	Rubiaceae	Haldu	-
8.	<i>Aegle marmelos</i>	Rutaceal	Bel	-
9.	<i>Aesculus indica</i>	Sapindaceal	Khanor	Horse chestnut
10.	<i>Ailanthus glandulosa</i>		Ailanthus	Ailanthus
11.	<i>Albizzia procera</i>	Leguminosal (Mimosaceae)	Safed (White) Siris	-
12.	<i>Albizzia stipulata</i>	-do-	Oie	-
13.	<i>Albizzia lebbec</i>	-do-	Kala (Black) Siris	-
14.	<i>Albizzia odoratissima</i>	Albizzia	Siris	-
15.	<i>Alnus nitida</i>	Cupliferae	Kosh, Kunish	Alder
16.	<i>Alnus nepalensis</i>	-do-	Kosh	Alder
17.	<i>Anogeissus latifolia</i>	Combretaceae	Dhou, Chhal	-
18.	<i>Bauhinia perpura</i>	Leguminosal	Karal	-
19.	<i>Bauhinia variegata</i>	-do-	Kachnar, Karale	-
20.	<i>Betula alnoides</i>	Cupliferae	Shagra	Birch
21.	<i>Bombax ceiba</i>	Bombaceae	Semal	Red Cotton tree
22.	<i>Buxux wallichiana</i>	Euphorbaceae	Shamshad	Box wood
23.	<i>Broussonetia papyrifera</i>	Niraceak	-	Paper mulberry
24.	<i>Careva arborea</i>	Myrtaceae	-	-
25.	<i>Carpinus viminea</i>	Cupuliferae	Khirki, Chevs	Himalayan Hornbean
26.	<i>Cassia fistula</i>	Caesalpiniaceal	Amaltas	India Laburnum
27.	<i>Cassia siamea</i>	-do-	-	-
28.	<i>Cassia frondosa</i>	-do-	-	-
29.	<i>Callistemon viminalis</i>	Myrtaceal	-	Bottle Brush
30.	<i>Casearia tomentosa</i>	Samydaceal	Pimpla, goela, pula	-
31.	<i>Cedrela Serrata</i>	Meliaceae	Darke	Hill Toon
32.	<i>Cedrela toona</i>	-do-	Tooni, Tun	Toon
33.	<i>Cedrus deodara</i>	Coniferae	Kelo, Diar	Deodar

34.	<i>Celtis australis</i>	Urticaceae	Khirak	Nettle Tree
35.	<i>Citrus mediaca</i>	Rutaceae	Jhamirdi	-
36.	<i>Cordia myxa</i>	Boraginaceae	Lasura	-
37.	<i>Cordia vestita</i>	-do-	Lasura	
38.	<i>Cornus capitata</i>	Cornaceae	Kreeva	Dog wood
39.	<i>Cornus macrophylla</i>	-do-	-do-	-do-
40.	<i>Corylus colurna</i>	Cupuliferae	Sharol	Hazlenut
41.	<i>Cupressus sempervirens</i>	Coniferare	Saru	Himalayan cyprus
42.	<i>Cupressus torulosa</i>	-do-	Davidiar	Himalayan Cyprus
43.	<i>Dalbergia sissoo</i>	Papilionaceae	Shisham, Tali	Sissoo
44.	<i>Ehretia acuminata</i>	Boraginaceae	Bakli	-
45.	<i>Ehretia laevis</i>	-do-	Chamror	-
46.	<i>Embllica officinalis</i>	Euphorbaceae	Ambla	-
47.	<i>Engelhardtia colebrookiana</i>	Euglandaceae	Samma	-
48.	<i>Erythrina subarosa</i>	Papilionaceae	Pariara	Coral tree
49.	<i>Eucalyptus camaldunensis</i>	Myrtaceae	Safeda	River Red gun
50.	<i>Eucalyptus citriodora</i>	-do-	-do-	Lemon scened gun
51.	<i>Eucalyptus globulus</i>	-do-	-do-	Blue gun
52.	<i>Eucalyptus grandis</i>	-do-	-do-	Rose gun
53.	<i>Eucalyptus hybrid</i>	-do-	-do-	-
54.	<i>Euonymus lacerus</i>	Celastraceae	Kala chindwara	Indian spindle tree
55.	<i>Euonymus tingens</i>	-do-	-do-	-
56.	<i>Ficus palmata</i>	Urticaceae	Fegura, Fegra	Wild Fig
57.	<i>Ficus hispida</i>	-do-	Debre	-
58.	<i>Ficus religiosa</i>	-do-	Pipal	-
59.	<i>Ficus roxburghii</i>	-do-	Tremal, Traimbal	-
60.	<i>Ficus bengelensis</i>	-do-	Bar	Banyan
61.	<i>Floccurtia ramentchii</i>	Bixaceal	Kaodei, Kangu	-
62.	<i>Fraxinus micranthus</i>		Ash	Ash
63.	<i>Fraxinus floribunda</i>		Ash	Ash
64.	<i>Grevillea robusta</i>	Proteaceae	-	Silver Oak
65.	<i>Grewia oppositifolia</i>	Tiliaceae	Bihul, Beul	-
66.	<i>Gewia elastica</i>	-do-	-do-	-
67.	<i>Holarrhena antidysenterica</i>	Apocynaceae	-	-
68.	<i>Ilex dipyrena</i>	Illicineae	Jacranda	-
69.	<i>Jacaranda ovalifolia</i>	Bignoniceae	-	-
70.	<i>Juglan regia</i>		Khor Akhrot	Walnut
71.	<i>Kydia calycina</i>	Micxww	Pula	-
72.	<i>Lagerstroemia indica.</i>	Lythraceae	Har Singar	-
73.	<i>Lannea grandis</i>	Anacardiaceae	Salambra	-
74.	<i>Litsea umbrisa</i>	Lauraceae	Paror	Laurel
75.	<i>Litsea Chinensis</i>	do	do	do
76.	<i>Litsea Polyantha</i>	do	do	do
77.	<i>Leucaena leucocephala</i>	Leguminosal	Subabool	-

78.	<i>Lyonia ovalifolia</i>	-	Airean, Ebran	-
79.	<i>Machilus odoratissima</i>	do	do	-
80.	<i>Mallotus philippineusis</i>	Euphorbiaceae	kambal	Kamila tree
81.	<i>Mangifera indica</i>	Anacardiaceae	Am	Mango
82.	<i>Melia azedarach</i>	Meliaceae	Drek	Persian lialac
83.	<i>Moringa pterogospema.</i>	Moringaceae	Saunjana	-
84.	<i>Morus alba</i>	Urticaceae	Chimmu	Mulberry
85.	<i>Morus serrata</i>	do	Paharitut	Hill Mulberry
86.	<i>Myrica Nagi</i>	Myrtaceae	Kaphal	-
87.	<i>Olea cuspiata</i>	Obaceae	Kahu	Olive Tree
88.	<i>Oroxylum Indicum</i>	bignoniaceae	Arlu	-
89.	<i>Ougeinia dalbergiodes.</i>	Leguminosal	Sandan	-
90.	<i>Phoenix sylvestris</i>	Palma	Khajur, Khajri.	Wild date palm
91.	<i>Phoenix humilis</i>	Palma	Khajri	Wild date palm
92.	<i>Pinus roxburghii</i>	Coniferal	Rai	Spruce.
93.	<i>Ougeinia dalbergiodes.</i>	Leguminosal	Sandan	-
94.	<i>Phoenix sylvestris</i>	Palma	Khajur, Khajri.	Wild date palm
95.	<i>Phoenix humilis</i>	Palma	Khajri	Wild date palm
96.	<i>Pinus roxburghii</i>	Coniferal	Rai	Spruce.
97.	<i>Pinus wallchiana</i>	Coniferal	Chil	Chirp pine
98.	<i>Pistacia integerrima</i>	Coniferal	kail	Blue pin
99.	<i>Pistacia integerrima</i>	Auacardiaceae	Kakare	-
100.	<i>Populus deltoids G.3</i>	Salicaceae	Chiluna. Pahari	Poplar
101.	<i>Populus ciliate</i>	Salicaceae	Pipal	Poplar
102.	<i>Populus deltoids G.48</i>	Salicaceae	-	Poplar
103.	<i>Populus deltoids G.121</i>	Salicaceae	-	Poplar
104.	<i>Populus nigra</i>	Salicaceae	-	Poplar
105.	<i>Pongamia pinnata</i>	Papilionaceae	Karanj	Indian Beech
106.	<i>Prunus armenica</i>	Rosaceae	Chuli	Wild aprioot
107.	<i>Prunus cerasoides</i>	Rosaceae	paja	Wild cherry.
108.	<i>Prunus cernua</i>	Rosaceae	jammu	Bird Cherry.
109.	<i>Prunus grantum</i>	lythraceae	Auar, Daru	pomegranate
110.	<i>Pyrus lanata</i>	Rosaceae	Bumfal	-
111.	<i>Pyrus Pashia</i>	Rasaceae	Segal, Kainth	-
112.	<i>Quercus dilatata</i>	Cupliferae	Mohru	Green oak.
113.	<i>Quercus glanca</i>	Cupliferae	Banni	-
114.	<i>Quercus incana</i>	Cupliferae	Ban	White oak
115.	<i>Quercus semicarpitolia</i>	Cupliferae	Kharsu	Braown Oak
116.	<i>Rhododendron orboreum</i>	Ericaceae	Burah	-
117.	<i>Rhus Punjabensis</i>	-	Titri	-
118.	<i>Robina pseudo acacia</i>	-	Robina	-
119.	<i>Salix babylonica</i>	Salicaceae	Majnu	Weeping willow
120.	<i>Salix elegans</i>	Salicaceae	Beunes	Willow
121.	<i>Saix tetrasperuna</i>	Salicaceae	Beunes	Willow
122.	<i>Sapinfud mukurossi</i>	Sapindaceae	Ritha	Soap nut tree

123.	<i>Sapium sebiferum</i>	Euphorbiaceal	Dudhla	Chinese Tallow Tree. Symplocos crataegoides
124.	<i>Taxus baccata</i>	Coniferal	Barmi, Rakhale	Yew
125.	<i>Terminalia belerica</i>	Combretaceal	Bahera	-
126.	<i>Terminalia chebula</i>	Combretaceal	Harad	-
127.	<i>Terminalia tomentosa</i>	Combretaceal	Alasan	-
128.	<i>Ulmus wallichiana</i>	Urticaceal	Marinu	-
129.	<i>Ulmus laevigata</i>	Urticaceal	Marinu	Small leaf elm
130.	<i>Urighia tinctoria</i>	Apocynaceal	Summa	-
131.	<i>Wrightia tomentosa</i>	Apocynaceal	Summa	-
132.	<i>Xylosmalongifolium</i>	Bixaceae	Draindu	-
133.	<i>Zizyphus jujuba</i>	Rhamnaceas	Beri	-

B-SHRUBS/HERBS

S. No.	Scientific Name	Family	Local Name	English Name
1.	<i>Adhatoda vasica</i>	Acanthaceae	Basuti	-
2.	<i>Agave Americana</i>	-	Ramban	-
3.	<i>Andrachna cordifolia</i>	Euporbiaceae	Durlu	-
4.	<i>Artemesia vulgaris</i>	Composita	Drubsha	-
5.	<i>Artemesia vulgaris</i>	Composita	Drubsha	-
6.	<i>Artemesia Vestata</i>	Composita	-	-
7.	<i>Balikospermum axillare</i>	Euphorbiaceae	-	-
8.	<i>Berberis aristata</i>	Berberidaceae	Kasmal	-
9.	<i>BerberisChitriaaristata</i>	Berberidaceae	Kasmal	-
10.	<i>Berberis lyceum</i>	Berberidaceae	Kasmal	-
11.	<i>Boehmeria pletyphyla</i>	Urticaceas	Sisar	-
12.	<i>Calatropis procera</i>	Asclepiadaceas	Akh	-
13.	<i>Caragana brevispina</i>	Leguminosae	Shameh	-
14.	<i>Carissa Opaca</i>	Leguminosae	Garna	-
15.	<i>Carissa spinarium</i>	Legumionsae	Garna,Kharn	-
16.	<i>Caryopteris wallichiana</i>	Verbenaceae	Chingari.	-
17.	<i>Caryopteris grata</i>	Verbenaceae	Rumri	-
18.	<i>Cassia occidentalis</i>	Legumionsae	Chakunda	-
19.	<i>Cassia tora</i>	Legumionsal	-	-
20.	<i>Cleroden drom serratum</i>	Verbenaceae	Banbakri	-
21.	<i>Collebrookea oppositifolia</i>	Labiatae	Bansa	-
22.	<i>Cotoneaster acuminate</i>	Rosaceae	Riunsh	-
23.	<i>Cotoneaster bacillaris</i>	Rosaceae	Riunsh	-
24.	<i>Cotoneaster microphylla</i>	Rosaceae	Riunsh	-
25.	<i>Crotalaria prostate</i>	leguminoesa	-	-
26.	<i>Debregeasia hypolenca</i>	Urticaceae	Siaru	-
27.	<i>Daphne cannabina</i>	thymelaeaceae	kaola	-
28.	<i>Desmodium sabuense</i>	Legumiosae	Safed Kathi	-
29.	<i>Desmodium tiliaefolium</i>	legumiosae	Safed Kathi	-
30.	<i>Deutzia cormbosa</i>	Saxifragaceae	Chururu	-
31.	<i>Deutzia staminea</i>	Saxifragaceae	Chururu	-
32.	<i>Dentzia viscosa</i>	Sapindaceae	Mendru	-

33.	<i>Duranta plumier</i>	Verbenaceae	-	-
34.	<i>Elaeagnus umbellate</i>	Elaeagaceae	Geai	-
35.	<i>Elsholtzia polystachya</i>	labiatae	Pothi, Jaunkra	-
36.	<i>Euphorbia royleana</i>	Euphorbiaceae	Thor	-
37.	<i>Euphorbia prolifera</i>	Euphorbiaceae	-	-
38.	<i>Enonymus lacerus</i>	Cdastreaceae	-	-
39.	<i>Flemingia prostrate</i>	Leguminosae	-	-
40.	<i>Hamilttonia suaveolens</i>	Rubiaceae	Bari podari	-
41.	<i>Hypericum vermuum</i>	Hypericaceae	Bani wakra	-
42.	<i>Indigofera gerardiana</i>	Leguminosae	Kathi	-
43.	<i>Indigofera habepetala</i>	leguminosae	-	-
44.	<i>Indigofera heterantha</i>	leguminosae	-	-
45.	<i>Indigofera pulchella</i>	do	-	-
46.	<i>Inula cappa</i>	Compositae	-	-
47.	<i>Inula grandiflora</i>	do	-	-
48.	<i>Impomaea spp</i>	convolvulaceae	Japlota	-
49.	<i>Japlota curcas</i>	Euphorbiaceae	Panch-Phuli	-
50.	<i>Lantana camara</i>	Verbenaceae	Choti podari	-
51.	<i>Laptodermis lanceolata</i>	Rubiaceae	Bilan	-
52.	<i>Limenia crenulata</i>	Rubiaceae	Reeni parasite	-
53.	<i>Leranthus ligustrinus</i>	Loranthaceae	Changari	-
54.	<i>Lonicera angustifolia</i>	Caprifoliaceae	-	-
55.	<i>Lonicera parviflora</i>	Caprifoliaceae	-	-
56.	<i>Lonicera quinguelcukarus</i>	Coarctifoliaceae	Jannu	-
57.	<i>Murraya exotica</i>	Rutaceae	Gandelu	-
58.	<i>Murraya Keenigii</i>	Rutaceae	-	-
59.	<i>Myrsine Africana</i>	Myrsinaceae	Kanaru, Bandaru	-
60.	<i>Nerium odoratum</i>	Apocynaceae	-	oleander
61.	<i>Nyctanthes arbor-tristis</i>	Oleaceae	Dlatchi	-
62.	<i>Opuntia monacantha</i>	Cactaceae	-	-
63.	<i>Phoenix acaulis</i>	Palmae	kajre	-
64.	<i>Plectranthus rugosus</i>	Labiatae	Chichri	-
65.	<i>Plectranthus coeata</i>	Labiatae	Bangra	-
66.	<i>Potentilla fruticosa</i> Rosaceae	-	-	
67.	<i>Potentilla rigida</i>	Rosaceae	-	-
68.	<i>Priosepia utilis</i>	Rosaceae	Bekhal	-
69.	<i>Rhus continus</i>	Anacardiaceae	Rikhal	-
70.	<i>Rhus punjabensis</i>	Anacardiaceae	Rikhal	-
71.	<i>Rhus semialata</i>	Anacardiaceae	Rikhal	-
72.	<i>Rhododendron complanata</i>	Ericaceae	kashmiri Patha	-
73.	<i>Ricinus communis</i>	Euphorbiaceae	Arand	-
74.	<i>Roylea celycina</i>	Labiatae	Karnoi Titpati	-
75.	<i>Rubus biflorus</i>	Rosaceae	Kala Akha	-
76.	<i>Rubus ellipticus</i>	Rosaceae	Kala Akha	-
77.	<i>Rubus lasiocarpus</i>	Rosaceae	Kala Akha	-
78.	<i>Rubus paniculatus</i>	Rosaceae	Kala Akha	-
79.	<i>Salix Hastata</i>	Salicaceae	Buinbs	-

80.	<i>Salixa denitculata</i>	Salicaceae	Buinbs	-
81.	<i>Salixa dephnoides</i>	Salicaceae	Buinbs	-
82.	<i>Sarcococca saligna</i>	Euphorbiaceae	Charabri	-
83.	<i>Skimmia laureola</i>	Rutaceae	Nayr	-
84.	<i>Spiraea canescens</i>	Resaceae	Chakh, Khosti	-
85.	<i>Spirae Bella</i>	Resaceae	-	-
86.	<i>Spiraea lindleyana</i>	Resaceae	Katbri	-
87.	<i>Solanum verbascifolium</i>	Solanaceae	Ban Temaku	-
88.	<i>Rhododendron companula</i>	Ericaceae	kashmiri Patha	-
89.	<i>Ricinus communis</i>	Enphorbiaceae	Arand	-
90.	<i>Roylea celycina</i>	Labaiatae	Karnoi Titpati	-
91.	<i>Rubus biflorus</i>	Rosaceae	Kala Akha	-
92.	<i>Rubus ellipticus</i>	Rosaceae	Kala Akha	-
93.	<i>Rubus lasiocarpus</i>	Rosaceae	Kala Akha	-
94.	<i>Rubus paniculatus</i>	Rosaceae	Kala Akha	-
95.	<i>Salix Hastata</i>	Salicaceae	Buinbs	-
96.	<i>Salixa denitculata</i>	Salicaceae	Buinbs	-
97.	<i>Salixa dephnoides</i>	Salicaceae	Buinbs	-
98.	<i>Sarcococca saligna</i>	Euphorbiaceae	Charabri	-
99.	<i>Skimmia laureola</i>	Rutaceae	Nayr	-
100.	<i>Spiraea canescens</i>	Resaceae	Chakh, Khosti	-
101.	<i>Spirae Bella</i>	Resaceae	-	-
102.	<i>Spiraea lindleyana</i>	Resaceae	Katbri	-
103.	<i>Solanum verbascifolium</i>	Solanaceae	Ban Temaku	-
104.	<i>Staphylea emodii</i>	Sapindaceae	Nadaun snahe	-
105.	<i>Tamarix gallica</i>	Tamaricaceae	Jhao	-
106.	<i>Viburnum coriaceaum</i>	Caprifoliaceae	Diha	-
107.	<i>Viburnum cotinifolium</i>	-do-	Dab	-
108.	<i>Viburnum stallulatum</i>	-do-		-
109.	<i>Viburnum nervesum</i>	-do-	Tilenal	-
110.	<i>Visum album</i>	Loranthaceae	Bhangra	-
111.	<i>Vitex negundo</i>	Verbenaceae	Banha	-
112.	<i>Wikstroemia canescens</i>	Thymelaeaceae	Tilak	-
113.	<i>Woodfordia floribunda</i>	Lythraceae	Dawe	-
114.	<i>Zanthoxylum alatum</i>	Rutaceae	Tirmira	-

C- HERBS

S. No.	Scientific Name	Family	Local Name	English Name
1.	<i>Achilles millefolium</i>	Compositae	Foa	-
2.	<i>Achyranthes bidentata</i>	Amarataceae	Putkanda	-
3.	<i>Achyranthes aspera</i>	-do-	-do-	-
4.	<i>Aconitum heterophyllum</i>	Ranunculaceae	Padish, Mohra	-
5.	<i>Acorus calamus</i>	Avacae	Barin	Sweat flag
6.	<i>Adiantum capillus</i>	-	-	Maiden hair fern
7.	<i>Agrimonia enpaterium</i>	Rosaceae	Kanaula	-
8.	<i>Ainsliaca aptera</i>	Compositae	Durwa	-
9.	<i>Ajuga parviflora</i>	Labiatae	Darpatre	-

10.	<i>Allium loratum</i>	Liliaceae	-	-
11.	<i>Anaphalis cinnamomea</i>	Compositae	-	Pimperial
12.	<i>Anaphalis contorta</i>	-do-	-	-
13.	<i>Anaphalis triplinervis</i>	-do-	-	-
14.	<i>Anemone obtusiloba</i>	Ranunculaceae	-	-
15.	<i>Anemone rivularis</i>	-do-	Carbini mamiri	-
16.	<i>Aralia cachemirica</i>	Araliaceae	-	-
17.	<i>Argemone mexicana</i>	Papaveraceae	-	-
18.	<i>Arisaema hellebarfolium</i>	Araceae	-	-
19.	<i>Arisaema intermedium</i>	Araceae	-	-
20.	<i>Arisaema wallichianum</i>	Araceae	-	Cobra Plant
21.	<i>Asparagus adscendens</i>	Liliaceae	Shasi mulu	-
22.	<i>Asplenium polypotoides</i>	-	Linger	-
23.	<i>Aster molliusculus</i>	Compositae	-	-
24.	<i>Aster asperulus</i>	-do-	-	-
25.	<i>Atropa belladonna</i>	Solanaceae	Saanggur	-
26.	<i>Boenninghausenia albiflora</i>	Rutaceae	Pessumar	-
27.	<i>Brunella vulgaris</i>	Labiatae	Potindu	-
28.	<i>Bupleurum lanceolatum</i>	Umbelliferae	Banjwain	-
29.	<i>Bupleurum tenue</i>	Umbelliferae	Banjwain	-
30.	<i>Companula tatifolia</i>	Companulaceae	-	-
31.	<i>Companula colorata</i>	Companulaceae	-	-
32.	<i>Cannabis sativa</i>	Urticaceae	Bhang	Hemp
33.	<i>Capsella bursapastroris</i>	Cruciferae	-	Shepheerds purse
34.	<i>Carum copticum</i>	Umbelliferae	Ajwain, Jawain	-
35.	<i>Cassia tora</i>	Leguminosae	-	-
36.	<i>Chaerophyllum villosum</i>	Umbelliferae	Khelti	-
37.	<i>Chenopodium album</i>	Chenopodiaceae	-	-
38.	<i>Colons aromaticus</i>	Labiatae	Pathan beg	-
39.	<i>Datura stramonium</i>	Salanaceae	Datura	-
40.	<i>Delpinium spp.</i>	Ranunculaceae	-	-
41.	<i>Delpinium elatum</i>	Ranunculaceae	-	-
42.	<i>Delpinium vestitum</i>	Ranunculaceae	Kalulu	-
43.	<i>Echinops niveus</i>	Compositae	-	-
44.	<i>Elsholtzia incisa</i>	Labiatae	Banjwana	-
45.	<i>Erigeron multiradiatus</i>	Compositae	-	-
46.	<i>Foeniculum vulgare</i>	Umbelliferae	Saunf	Fenuel
47.	<i>Fragaria indica</i>	Rosasceae	Bhumpa	Straw berry
48.	<i>Fragaria vesca</i>	Rosasceae	-	-
49.	<i>Fumaria parviflora</i>	Fumariaceae	Pitpapra	-
50.	<i>Galium spp.</i>	Rubiaceae	-	-
51.	<i>Gentiana kurroo</i>	Gentianaceae	Karu	-
52.	<i>Geranium nepalense</i>	Geraniaceae	-	-
53.	<i>Geranium ocellum</i>	Geraniaceae	-	-
54.	<i>Geranium rebertianum</i>	Geraniaceae	-	-
55.	<i>Geranium wallichianum</i>	Geraniaceae	Chowhri	-
56.	<i>Girardiana heterophylla</i>	Urticaceae	Bichhubuti	-
57.	<i>Habenaria dense</i>	Orchidaceae	Kharwar	-
58.	<i>Habenaria goeondra</i>	Orchidaceae	Sirab	-
59.	<i>Halenia elliptica</i>	Gentianaceae	Pitpapra	-

60.	<i>Hyrocotyle aristica</i>	Umbelliferae	Brahmi	-
61.	<i>Impatiens amphorata</i>	Geraniaceae	-	-
62.	<i>Impatiens roylei</i>	Geraniaceae	-	Balsam
63.	<i>Iris nepalensis</i>	Iridaceae	Brechra, Kharera	
64.	<i>Justicia simplex</i>	Acathaceae	-	-
65.	<i>Lathyrus pratensis</i>	Leguminosae	-	-
66.	<i>Lilium giganteum</i>	Liliaceae	-	-
67.	<i>Malava rotundifolia</i>	Malvaceae	Dodu	-
68.	<i>Mentha sylvestris</i>	Labiatae	Podina	-
69.	<i>Nardostachys jatamansi</i>	Valerianeae	Jatamansi	-
70.	<i>Nepta ciliaris</i>	Labiatae	Brun	-
71.	<i>Nepta elliptica</i>	Labiatae	-	-
72.	<i>Nepaver dubium</i>	Papaveraceae	-	Poppy
73.	<i>Picrohiza kurroa</i>	Scrophularineae	Karu	-
74.	<i>Pilea umbrosa</i>	Urticaceae	Charmali	-
75.	<i>Pipinella acuminata</i>	Umbelliferae	-	-
76.	<i>Pimpinella diversifolia</i>	Umbelliferae	-	-
77.	<i>Podophyllum hexandrum</i>	Berberidaceae	Bankakri, Papri	-
78.	<i>Polygonatum cirrhifolium</i>	Liliaceae	-	-
79.	<i>Polygonatum verticillatum</i>	Liliaceae	Salang mishri	-
80.	<i>Polygonatum alatum</i>	Polygonaceae	Malora	-
81.	<i>Polygonum capitatum</i>	Polygonaceae	-	-
82.	<i>Potertilla argyrophylla</i>	Rosasceae	-	-
83.	<i>Potertilla fulgens</i>	Rosasceae	-	-
84.	<i>Potertilla nepalensis</i>	Rosasceae	Dora	-
85.	<i>Prenanthes brunoniana</i>	Compositae	Dudhli	-
86.	<i>Primula denticulata</i>	Primulaceae	Kauri	-
87.	<i>Renunculus orvensis</i>	Ranunculaceae	-	Butter cup
88.	<i>Rumex hastatus</i>	Polygonaceae	Malori	-
89.	<i>Rumex nepalensis</i>	Polygonaceae	Malori	-
90.	<i>Salvia glutinesa</i>	Labiatae	-	-
91.	<i>Salvia lanata</i>	Labiatae	-	-
92.	<i>Saussurha spp.</i>	Compositae	-	-
93.	<i>Saxifraga diversifolia</i>	Saxifragaceae	-	-
94.	<i>Scutellaria linearis</i>	Labiatae	-	-
95.	<i>Sida rhombifolia</i>	Malvaceae	-	-
96.	<i>Sisymbrium thalianum</i>	Cruciferae	Jangli Sarson	-
97.	<i>Sisymbrium iris</i>	Cruciferae	Jangli Sarson	-
98.	<i>Strobilanthes atropupuren</i>	Acathaceae	Mashna	-
99.	<i>Strobilanthes angustiflora</i>	Acathaceae	-	-
100.	<i>Strobilanthes glutinosa</i>	Acathaceae	-	-
101.	<i>Strobilanthes dalhosianus</i>	Acathaceae	-	-
102.	<i>Swertia chirata</i>	Centianaceae	Charaita	-
103.	<i>Swertia paniculata</i>	Centianaceae	Charaita	-
104.	<i>Thalictrum foliolosum</i>	Ranunculaceae	-	-

105.	<i>Thymus serpyllum</i>	Labiatae	Ban ajwayan	-
106.	<i>Tragopogon gracile</i>	Compositae	-	-
107.	<i>Tripolium protense</i>	Leguminosae	-	-
108.	<i>Urtica dioca</i>	Uricaceae	Kugas	-
109.	<i>Valeriana parviflora</i>	Valerineae	Kugas	-
110.	<i>Valeriana hardwichii</i>	Valerineae	Nihani, Nakh	-
111.	<i>Valeriana wallichii</i>	Valerineae	Mushkbala	-
112.	<i>Verbascum thapsus</i>	Scrophularineae	Gaddi Tamaku	-
113.	<i>Veronica serpyllifolia</i>	Scrophularineae	-	-
114.	<i>Vicia rigidula</i>	Leguminosae	-	-
115.	<i>Vicia tetrasperma</i>	Leguminosae	-	-
116.	<i>Viola canascens</i>	Violaceae	Banafsha	-
117.	<i>Viola serpens</i>	Violaceae	Banafsha	-

D-CLIMBERS

S. No.	Scientific Name	Family	Local Name	English Name
1.	<i>Bauhinia vahlii</i>	Leguminasae	Taur	-
2.	<i>Caesalpinia bonducella</i>	Leguminasae	Kanderi	-
3.	<i>Caesalpinia sepiaria</i>	Leguminasae	Kanderi	-
4.	<i>Clematis conneta</i>	Renunculaceae	-	-
5.	<i>Clematis grata</i>	Renunculaceae	-	-
6.	<i>Clematis gouriana</i>	Renunculaceae	Bel Kangu, Chabru	-
7.	<i>Clematis montana</i>	Renunculaceae		-
8.	<i>Cryptalepis buechanani</i>	Asclepiadaceae	Khurnmble	-
9.	<i>Cuscuta reflexa</i>	Convolvulaceae	Akash Bel	-
10.	<i>Dioscoria bulbifera</i>	Dioscoreaceae	-	-
11.	<i>Dioscoria belophylla</i>	Dioscoreaceae	Tardi	-
12.	<i>Dioscoria deltoidea</i>	Dioscoreaceae	-	-
13.	<i>Hedera helix</i>	Araliaceae	Grumru	-
14.	<i>Ichnocarpus frutiscens</i>	Apocynaceae	-	-
15.	<i>Jasminum officinal</i>	Oleaceae	Banmalti	-
16.	<i>Jasminum humile</i>	Oleaceae	-	-
17.	<i>Jasminum pubescens</i>	Oleaceae	Dure	-
18.	<i>Mellettia auriculata</i>	Leguminesae	Salanghe	-
19.	<i>Rosa macrophylla</i>	Rosaceae	Kujas	-
20.	<i>Rosa moschata</i>	Rosaceae	Kujas	-
21.	<i>Rubia cordifolia</i>	Rubiaceae	-	-
22.	<i>Smilex ashdra</i>	Liliaceae	-	-
23.	<i>Smilex parviflora</i>	Liliaceae	-	-
24.	<i>Vitis paraviflora</i>	Vitaceae	-	-
25.	<i>Vitis semicordata</i>	Vitaceae	Mizao	-
26.	<i>Vitis trigolia</i>	Vitaceae	Pola	-
27.	<i>Zehemeria umbellata</i>	Cucurbitaceae	-	-

E- GRASSES AND BAMBOOS

1.	<i>Andropogon halepensis</i>	Graminae	Phulna	-
2.	<i>Arstida dspressa</i>	-do-	Lambaru	-

3.	<i>Arundinaria falcata</i>	-do-	Nirgal	-
4.	<i>Arundinaria spathiflora</i>	-do-	Gari, Ringal	-
5.	<i>Arundinaria brasiliensis</i>	-do-	-	-
6.	<i>Avena aspera</i>	-do-	-	-
7.	<i>Bambusa arundinaceae</i>	-do-	Maggar	-
8.	<i>Bambusa nutans</i>	-do-	Daraog	-
9.	<i>Bothriochloa intermedia</i>	-do-	Palwan	-
10.	<i>Chrysopogon martinii</i>	-do-	Khawi	-
11.	<i>Cynodon dactylon</i>	-do-	Dub	-
12.	<i>Cyperus niveos</i>	Cyperaceae	-	-
13.	<i>Dendrocalamus strictus</i>	Gramineae	Bans	-
14.	<i>Erianthus hamiltonii</i>	-do-	Mohr Bans	-
15.	<i>Erianthus fulmi</i>	-do-	Kaki	-
16.	<i>Eriophorum comesum</i>	-do-	Chor bager	-
17.	<i>Heteropogon montanus</i>	-do-	Sariala syu	Tanli
18.	<i>Ischaemum angustifolium</i>	-do-	Baggar	-
19.	<i>Panicum pitcatum</i>	-do-	-	-
20.	<i>Panicum floccidum</i>	-do-	-	-
21.	<i>Phicum asperum</i>	-do-	-	-
22.	<i>Poa annua</i>	-do-	-	-
23.	<i>Setaria glanca</i>	-do-	Siun	-
24.	<i>Setaria viridis</i>	-do-	-	-

F-MEDICINAL PLANTS

<i>Abrus precatorius</i>	--	Gunjratt
<i>Aconitum heterophyllum</i>	--	Patis
<i>Aconitum chefmanthum</i>	--	Mohri
<i>Aconitum violaceum</i>	--	Tilla
<i>Acorus calamus</i>	--	Barian
<i>Angelica glauca</i>	--	Chora
<i>Aquilegia pubiflora</i>	--	--
<i>Arisaema flavum</i>	--	Sampki makki
<i>Arisaema helleberifolium</i>	Cobra plant	Samp-ki-kukri
<i>Arisaema wallichianum</i>	--	--
<i>Asparagus racemosus</i>	--	Satawar
<i>Atropa acuminata</i>	--	--
<i>Berberis spp</i>	--	Rasaunt
<i>Carum carvi</i>	--	Kalazira
<i>Cimmamomum tamala</i>	--	Tejpat
<i>Delphinium denudatum</i>	--	--
<i>Digitalis purpurea</i>	--	--
<i>Dioscorea bulbifera</i>	--	Khildri
<i>Dioscorea deltoidea</i>	--	-do-
<i>Ephedra gerardiana</i>	--	Somlata
<i>Gentiana kurroo</i>	--	Karu
<i>Geranium napalensis</i>	--	--
<i>Gymnea sylvestra</i>	--	Gurmar
<i>Herculum candicus</i>	--	Patlain
<i>Jurinea dulomiaca</i>	--	Dhup

<i>Mentha aquatica</i>	Mint	Pudina
<i>Mentha piperata</i>	-do-	-do-
<i>Morchella esculenta</i>	Mushroom	Guchhi
<i>Ocimum spp</i>	--	--
<i>Onosma bracteatum</i>	--	Ratta/Ratanjot
<i>Dactylorhiza hatagirea</i>	--	Salam pnja
<i>Picrorhiza kurroo</i>	--	Kaur
<i>Phytolacca acinosa</i>	--	--
<i>Podophyllum hexandrum</i>	--	Bankakru
<i>Polygonatum multiflorum</i>	--	--
<i>Polygonatum verticillatum</i>	--	--
<i>Pteris aquilina</i>	--	Lingar
<i>Rumex hastatus</i>	-	Mlora
<i>Rumex nepalensis</i>	--	-do-
<i>Salvia nubicola</i>	Dog flower	Makhlar
<i>Salvia officinalis</i>	--	--
<i>Salvia moorcroftiana</i>	--	Thuth
<i>Saussurea lappa</i>	--	Kuth
<i>Bergenia ciliate</i>	--	Pathar tor
<i>Senecio spp</i>	--	--
<i>Solanum indicum</i>	--	Ban tobacco
<i>Solanum erianthum</i>	--	--
<i>Swertia angustifolia</i>	--	Pahari Chirayata
<i>Swertia chirata</i>	--	Chirayata
<i>Taraxacum officinale</i>	--	Dudhali
<i>Eriopodum</i>	--	--
<i>Thalictrum foliolosum</i>	--	Machhar Mar
<i>Thymus serpyllum</i>	--	Banajwain
<i>Valeriana jatamansi</i>	--	Smak
<i>Viola odorata</i>	--	Banafasha
<i>Viola canescens</i>	--	-do-
<i>Withania somnifera</i>	--	Ashbgandha

IV LIST OF FAUNA

Some of the important mammals, birds, reptiles, fishes are given below:

A-REPTILES

Important reptiles found in the tract are given below:

LOCAL NAME	ENGLISH NAME	SCIENTIFIC NAME
Girgit	The Common Indian monitor lizard	<i>Varanus griseus Daudin</i>
Gobilda	Chameleon lizard	<i>Chameleon ealcaratus</i>
Kharpa	The Indian Cobra	<i>Naja naja</i>
Sapp	The Himalayan pit viper	<i>Vipera ruselli</i>

B- MAMMALS

The common carnivores found in the tract are Leopard, Jungle cat, Leopard cat, Jackal, Fox, etc and the list of herbivores and Omnivores includes Ghoral, Barking Deer, Sambar, Wild Boar, Indian porcupine, The Indian Hare, Flying squirrel, Black Bear, Yellow throated Martens etc

LOCAL NAME	ENGLISH NAME	SCIENTIFIC NAME
Baghera	Leopard	<i>Panthera pardus</i>
Kakar	Barking deer	<i>Muntiacus muntjak</i>
Lomri	Red Fox	<i>Vulpes bengalensis</i>
Shail	Procupine	<i>Hystrix indica</i>
Bandar	Monkey	<i>Macaca mulatta</i>
Chuha	Himalayan marmot	<i>Marmota bobak</i>
Common house rat	Rat	<i>Rattus rattus</i>
Gidar	Jackal	<i>Canis aureus</i>
Gilhari	Five stripped Palm squirrel	<i>Funambulus pennanti</i>
Jungle Billi	Jungle Cat	<i>Felis chaus</i>
Langoor	Common Langoor	<i>Presbytis entellus</i>
Newla	Common Mongoose	<i>Herpestes adwardsi</i>

C- BIRDS

S. No.	English Name	Scientific Name
1.	Black Francolin	<i>Francolinus francolinus</i>
2.	Red Junglefowl	<i>Gallus gallus</i>
3.	Kalij Pheasant	<i>Lophura leucomelanos</i>
4.	Indian Peafowl	<i>Pavo cristatus</i>
5.	Grey-headed Woodpecker	<i>Picus canus</i>
6.	Grey-capped Pygmy Woodpecker	<i>Dendrocopos canicapillus</i>
7.	Lesser Yellownape	<i>Picus chlorolophus</i>
8.	Great Barbet	<i>Megalaima virens</i>
9.	Brown-headed Barbet	<i>Megalaima zeylanica</i>
10.	Blue-throated Barbet	<i>Megalaima asiatica</i>
11.	Common Hoopoe	<i>Upupa epops</i>
12.	Asian Koel	<i>Eudynamis scolopacea</i>
13.	Alexandrine Parakeet	<i>Psittacula eupatria</i>
14.	Rose-ringed Parakeet	<i>Psittacula krameri</i>
15.	Plum-headed Parakeet	<i>Psittacula cyanocephala</i>
16.	Rock Pigeon	<i>Columba livia</i>
17.	Wedge-tailed Green Pigeon	<i>Treron sphenurus</i>
18.	Spotted Dove	<i>Streptopelia chinensis</i>
19.	Eurasian Dove	<i>Streptopelia decaocto</i>
20.	Red Collared Dove	<i>Streptopelia tranquebarica</i>
21.	Black Kite	<i>Milvus migrans</i>
22.	Shikra	<i>Accipiter badius</i>
23.	Long-tailed Shrike	<i>Lanius schach</i>
24.	Rufous Treepie	<i>Dendrocitta vagabunda</i>
25.	Grey Treepie	<i>Dendrocitta formosae</i>
26.	Yellow-billed Blue Magpie	<i>Urocissa flavirostris</i>
27.	Large-billed Crow	<i>Corvus macrorhynchos</i>
28.	White-throated Fantail	<i>Rhipidura albicollis</i>
29.	Black Drongo	<i>Dicrurus macrocercus</i>
30.	Ashy Drongo	<i>Dicrurus leucopaeus</i>
31.	Asian Paradise-Flycatcher	<i>Terpsiphone paradise</i>
32.	Blue-capped Rock Thrush	<i>Monticola cinclorhynchus</i>
33.	Blue Whistling Thrush	<i>Myophonus caeruleus</i>
34.	Indian Robin	<i>Saxicoloides fulicatus</i>
35.	Oriental Magpie Robin	<i>Copsychus saularis</i>
36.	Indian Robin	<i>Saxicoloides fulicata</i>
37.	Pied Bushchat	<i>Saxicola caprata</i>
38.	Brahminy Starling	<i>Sturnus pagodarum</i>
39.	Jungle Myna	<i>Acridotheres fuscus</i>
40.	Common Myna	<i>Acridotheres tristis</i>
41.	Great Tit	<i>Parus major</i>
42.	Green-backed Tit	<i>Parus monticolus</i>
43.	Black-lored Tit	<i>Parus xanthogenys</i>
44.	Black-throated Tit	<i>Aegithalos concinnus</i>
45.	Red-rumped Swallow	<i>Hirundo daurica</i>
46.	Himalayan Bulbul	<i>Pycnonotus leucogenys</i>
47.	Red-vented Bulbul	<i>Pycnonotus cafer</i>
48.	Black Bulbul	<i>Hypsipetes leucocephalus</i>

49.	Ashy Prinia	<i>Prinia socialis</i>
50.	Grey-breasted Prinia	<i>Prinia hodgsonii</i>
51.	Oriental White-eye	<i>Zosterops palpebrosus</i>
52.	Streaked Laughing Thrush	<i>Garrulax lineatus</i>
53.	Rusty-cheeked Scimitar Babbler	<i>Pomatorhinus erythrogenys</i>
54.	Black-chinned Babbler	<i>Stachyris pyrrhops</i>
55.	Jungle Babbler	<i>Turdoides striatus</i>
56.	Crimson Sunbird	<i>Aethopyga siparaja</i>
57.	House Sparrow	<i>Passer domesticus</i>
58.	Scaly-breasted Munia	<i>Lonchura punctulata</i>
59.	Crested Bunting	<i>Melophus lathami</i>
60.	Grey-hooded Warbler	<i>Seicercus xanthoschistos</i>
61.	Eurasian Golden Oriole	<i>Oriolus oriolus</i>
62.	Blue-throated Blue Flycatcher	<i>Cyornis rubeculoides</i>

ABBREVIATION	
ACF	Assistant Conservator of Forests
APO	Annual Plan of Operations
AIR	All India Reporter
AR/ANR	Artificial Regeneration/ Aided Natural Regeneration
AWPO	Assistant Working Plan Officer
Addl. Pr. CCF	Additional Principle Chief Conservator of Forests
BCD	Biodiversity Conservation and Development
BPs	Boundary Pillars
CCF	Chief Conservator of Forests
CF	Conservator of Forests
CAMPA	Compensatory Afforestation Fund Management and Planning Authority
CASFoS	Central Academy for State Forest Services.
CAT Plan	Catchment Area Treatment Plan
CWP	Civil Writ Petition
CAI	Current Annual Increment
DBH	Diameter at Breast Height
DCF	Deputy Conservator of Forests
DFO	Divisional Forest Officer
DGF & SS	Director General of Forests and Special Secretary
DSMs	Defence Series Maps
DPF	Demarcated Protected Forest
DKWC	Deodar Kail Working Circle
DM	Divisional Manager
EC	Environmental Clearance
EPA	Environment Protection Act
FCA	Forest (Conservation) Act
FDA	Forest Development Agency
Fgd	Forest Guard
FSWC	Fir Spruce Working Circle
FSI	Forest Survey of India

FRA	Forest Rights Act, 2006 {Scheduled Tribes & other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006}
FRI	Forest Research Institute
GCS	Geographic Co-ordination System
GHGs	Green House Gases
GIM	Green India Mission
GPS	Global Positioning System
GoHP	Government of Himachal Pradesh
GoI	Government of India
GDP	Gross Domestic Product
GIS	Geographic Information Systems
GSDP	Gross State Domestic Product
HoD	Head of Department
HoFF	Head of Forest Force
HPSFDC Ltd	Himachal Pradesh State Forest Development Corporation Limited
ICFRE	Indian Council of Forestry Research & Education
IGNFA	Indira Gandhi National Forest Acedemy
IFA	Indian Forest Act
IIFM	Indian Institue of Forest Management
ITRF	Internation Terrestrial Reference Frame
IUCN	Internation Union for Conservation of Nature
IVI	Importance Value Index
IWDP	Integrated Watershed Development Project
JFPM	Joint Forest Participatory Management
JFM	Joint Forest Management
MAI	Mean Annual Increment
MFP	Minor Forest Produce
MAPs	Mediicinal and Aromatic Plants
MAR	Monitoring Assessment and Reporting
MEF	Miniser of Environment and Forests
MIS	Management Information System
MODIS	Moderate-resolution Imaging Spectroradiometer
MoEF	Miniser of Environment and Forests

MoU	Memorandum of Understanding
MRV	Measuring Reporting and Verification
MNREGA	Mahatma Gandhi National Rural Employment Generation Agency
NFI	National Forest Inventory of Indi
NTFP	Non-timber Forest Produce
NGO	Non-Governmental Organization
NREGA	National Rural Employment Generation Agency
NRSC	National Remote Sensing Centre
NPCC	National Plan in Climate Change.
NTCA	National Tiger Conservation Authority
NWFP's	Non- Wood Forest Products
OWC	Oak Working Circle
Pr. CCF	Principal Chief Conservator of Forests
PB	Periodic Block
PES	Payment for Environment Services
PFM	Participatory Forest Management
PWC	Protection Working Circle
Pl.WC	Plantation Working Circle
PWPR	Preliminary Working Plan Report
RAPCCF	Regional Additional Principal Chief Conservator of Forests
RBA	Relative Basal Area
RBAFs	Relative Basal Area Frequencies
RD	Relative Density
REDD	Reducing Emission from DeForestation and Forest Degradation
RET	Rare, Endangered and Threatened
RF	Reserve Forests
RFO	Range Forest Officer
RSD	Road Side Depot
SFM	SustainableForest Management
SFR	State of Forest Report
SOI	Survey of India
SLUB	State Land Use & Waste Land Development Board
SPCB	State Pollution Control Board

SCC	Supreme Court Cases
SLP	Special Leave Petition
TD	Timber Distribution
TOF	Trees Outside Forest
UF	Unclassified Forest
UNFCCC	United Nations Framework Conservation on Climate Change
UPF's	Un-demarcated Protected Forests
VFDCS	Village Forest Development Committees
WC	Working Circle
WLPA	Wild Life (Protection) Act
WP	Working Plan
WPO	Working Plan Officer

Draft
Working Plan
Of
Dharamshala Forest Division

Part I
Summary of Facts on which
Proposals are made

CHAPTER – 1

1. THE TRACT DEALT WITH

1.1: Name and Situation:

This working Plan covers all the Reserved, Demarcated Protected Forests, Un-demarcated Protected Forests, Cooperative Society Forests, PWD road side strips, Railway side strips, of the Dharamshala Forest Division. It is revision of working Plan (2012-13 to 2021-22) by Sh. Sushil Singla. The boundaries of Dharamshala Forest Division coincide with that of Dharamshala, Shahpur, Kangra and Baroh Tehsils and Harchakian Sub Tehsil of Kangra district. The headquarters of the Forest Division is at Dharamshala. It has five territorial Ranges, viz Dharamshala, Kangra, Shahpur, Mallan and Lapiana.

The tract lies between longitudes 76°4" E to 76°28" E and Latitudes 31°57" to 32°24" N. It is bound on the North by the Dhauladhar mountain range, on the east by Palampur Forest Division, on the south by Dehra Forest Division and in the West by Nurpur Forest Division.

The total geographical area of this Division is 1140.94 sq. km. The forests do not form a continuous and compact belt but are scattered throughout the Division and cover 610.6365 Sq. Km (61063.65 ha.) i.e. 53.52 % of the total geographical area.

1.2: Configuration of the ground:

The terrain is mostly hilly with altitude varying from 430 m near Lapiana to 2496 m on the Dhauladhar Range. On the whole, the tract presents a panorama of high, rocky, granitic peaks of the Dhauladhar with rolling hills below, gradually settling into undulating plains of the Kangra valley. The upper reaches are very steep and there is an abrupt fall of 900 to 1225 m and then it breaks up into a series of spurs which run into the main valley at a moderate gradient for some distance, then finally fall sharply into the valley. There is succession of parallel intermediate ranges of gradually decreasing heights and thus, the tract abruptly divides itself into high and low hills. At the foot hills of Dhauladhar lies the main Kangra valley bounded on the South East by rugged hills of sand stone called Changer and on the North East by Ambuari-Gaggal ridge which enters Palampur forest Division near Mallan. Generally speaking, the Southern, South Eastern and eastern slopes are very steep precipitous while the descent on the Northern slopes is moderate to steep.

1.3: Geology, rock and soil

The great mass of Dhauladhar is composed of gneissose granite, practically uniform in character throughout. Below this, from elevations 1950 to 2400 meters

are two groups of Himalayan series out-crops. The lower metamorphic series belongs to the Cambrian period and form a narrow band along the main range upto Sansal in Palampur Division, then expanding further enters Chhota Bhangal area of that Division. The higher un-metamorphic series called Krol series is found as band of lime stones and slates of Precambrian era and is about one to two hundred meters broad.

1.3.1: Structure:

There are two conspicuous structural features of the Himalayas:

- (i) The main boundary fault.
- (ii) The Jutog thrust

1.3.1.1: Main boundary fault

The main boundary fault is considered to delimit the area of deposition of Shiwaliks. This fault therefore, lies between the pre-Shiwalik and Shiwalik formations and runs for nearly 2300 km throughout the length of Himalayas between Kashmir and Mishmi hills of Arunachal Pradesh. This fault in Dharamshala Forest Division runs from Chamba to South of Khanyara slate quarries through Drini, Devi-da- Gallu, Bhagsunath. It brings rocks of various ages to rest over the Shiwaliks. Besides, the main boundary fault, there are various minor reverse faults within the Shiwalik formations to rest over younger rocks, In Bara Bhangal syncline noticed. Here, the Jutogs along with over lying maniries and saloonies form a regional synclinal structure. The rocks which show north easterly dip in the area south east of Jalta (Confluence of Shahinal with Ravi River) become westerly dipping in the east and north east of Jalta. The axis of this syncline runs in the north- north west to south-south east direction and is traced from north of Numi Jot in the North to the south of Makori Jot in the south. The core of the syncline is occupied by carbonaceous rocks of Salooni formation. Both the limbs of the syncline are over folded several times giving rise to synclinal structure.

1.3.1.2: The Jutog thrust

This is the oldest group of rocks consisting of inter bedded greenish grey brown and black carbonaceous slates, phyllites, schists, quartzite and gneisses. The rocks of Jutog formation have moved over the younger rocks of Sundernagar formation and here occupies the highest structural position in the area. The development of Jutog rocks is best seen about 2 km north of Bandla in Palampur Division, seen trending in North West to south east direction, dipping at low angles towards north east. Carbonaceous phyllite in association with limestone is seen as

their lenticular bands and lenses throughout between Dewal Khas and Bir, Awa Khad and Neogal Khad; in Baner Khad and Manuni Khad.

The quartzite gneisses are further physically overlain by a thick sequence of slate, phyllites and schist etc. The rocks of Jutog formation too have been traced from Bir to Dharamkot.

1.3.2: Sundernagar formation

These form the base of Shali formations and consist mainly of phyllites, Gray and maroon slates, red and dark Gray slates, pink and dirty white quartzite and slaty phyllites, Slates and slaty phyllite are well exposed between Luni & Sansal Khads.

1.3.3: Darla-Mandi Volcanics (Panjal Traps)

Mandi-Daria volcanoes consist of number of basic volcanic flows, light to dark green Massive to foliated basalt. Between Beas and Ravi Rivers, the basic rock constitutes one major rock unit overlying the detached-out crops of Shali-lime stones and quartzites. The outcrops of this formation are noticed on entire Gogar Dhar, between pat and Neogal Khad and at a place in Bir, SansalLuni, Nain, Awa Khads and Bag Nallah.

1.3.4: Shali formation

Shali group mainly comprises of massive dolomite, purple coloured bedded limestone, shale, phyllite & quartzite rocks. The limestone of this group is of cement grade. The salt grits are generally confined to the tertiary shall contact and are overlapped by the basic rocks. The development of grits is well seen between Sansal and Dewalkhad and between Awa and Pun khads and also at Bag nallah, Dharamkot and Lunikhad. The salt grits run approximately north west-south east between Dharamkot and Mandi. The most important member of shall formation Sarghaward member is found exposed at Dharmkot and occupies the core of syncline. It comprises of pink limestone which can yield good quality cement.

1.3.5: Tertiaries: these consist of:

(a)Subathus: These are khaki to olive green splintery shales with fossiliferous limestone and exposed between Manjhl and Manuni Khads. These occupy thin and squeezed bands,

(b) Lower and upper Dharamshala: Dharamshala formation comprises of greenish grey sandstone, purple siltstone, shale and nodular clay. The upper portion of Dharamshala is predominantly sandstone which is tough and compact. These rocks are traced from Harabag to Sihunta and from Oranala to Ravi River.

The rock of this group between Kholi and Leond Khads contain thin bands of conglomerates which marks the gradual passage of upper Dharamshala to lower Shiwaliks.

1.3.6. Shiwaliks:

These are made of sandstone, grit, conglomerate to clay and silt, The Shiwalik belt of hills, several kilometers wide is made up of parallel ridges, most of them with steep scrap facing a gentle dip slope on the north side. The Shiwaliks have evolved in the later phases of Himalayan oreogenesis and hence are folded, faulted over thrust and lie at steep angles against other formations. The main over thrust in which the Shiwaliks are involved is called the main boundary fault. The Shiwaliks are divided into three major Divisions, namely

(i) Lower Shiwaliks: The sandstone is grey, massive and hard. Bands of grey and pink colour concretionary clays occur within the sandstone.

(ii) Middle Shiwalik: The rocks of middle shiwalik are grey sandstone with bands of variegated clays. Thin bands of conglomerate also occur within the middle shiwalik. Rocks of this shiwalik are friable, grey, dirty, red sandstone with interbands of grey, pink, yellow and dirty red clay and conglomerates.

(iii) Upper Shiwalik: These occupy the areas at Sunkanal, Borusarna, Ramgarh ridge and the "Changer" The rocks of Shiwalik system occupy a thick belt and are seen around Kangra, Dehra Gopipur and Jawalamukhi areas.

1.3.7: Soil and Forest Distribution:

The gneiss and schist etc, of Jatog formation gives rise to fairly deep fertile loam to clay loam which supports the fir/spruce and oak forests. The boulders of these formation have been carried lower into the villages downhill by glacial action and the same type of soil is found in pockets in the lower valley at P 59 K Dhalun (near Yol camp), few compartments of CFS Shahpur where Oak forests are noticed at such low elevations. It is worth noting that Deodar does not occur indigenously on the main ridge of the Dhauladhar where the stratum is composed mainly of slates and sales. However, Oaks and Misc BL spp. are found in profusion in this area. It is of interest to note that in Bara and Chhota Bhangal area of Palampur Division where quartzite rocks of Salooni formations replaced slates, deodar comes up locally Kangra Valley Deodar is absent because metamorphic strata is composed of slates and shales etc, where oak and miscellaneous broad leaved species thrive. It is felt that absence of Deodar in Dharamshala Division on the main range is essentially due to very high rainfall coupled with geological formation.

The Shiwallk system of rocks yields soils of sandy to loamy structure and support low quality Chil and scrub forests. These soils are generally dry and deficient in organic matter. Development of soil profiles, over most of the tract is not clearly discernible. The North West slopes have clays which alternate with sandstones. Alluvial deposits along streams have deep and fertile sandy loam to clayey loam soil where pioneer species like Khair, Dalbergia and Salmalia flourish. The hard sand ones of lower and upper Dharamshala formation yield deep fertile sandy loam on which Chil mixed, Chil and Oak forests thrive.

1.4: Climate Parameters

Due to wide variation in altitude and configuration, the tract experiences a highly diverse climate ranging from sub-tropical at lower elevations to temperate higher up. Semi-arctic conditions prevail along the main Dhauladhar range during winter months. March-April and October-November ARE COOL AND BRIGHT AND OCCASIONAL SNOW FALL OCCURS IN THE INNER VALLEYS. May and June are hot when dust laden winds from plains are a common feature. The rainy season or monsoon is active from June end till the middle of September. Snowfall on the upper reaches of Dhauladhar occurs between December and March. Rainfall over most part of the tract is heavy and the weather is moist from July to September when bulk of rainfall is received in the form of torrential downpours. Severe drought is common in Changer and part of Mallan, Kangra, Shahpur and Lapiana ranges. Snowfall is fairly heavy above an elevation of 2100 m but extends below 1200 m owing to precipitous nature of the main range.

1.4.1: Climate Change: According to Dr. RC Kang IFS, who was born in Hamirpur and has worked in Kangra district for over 11 years, the Climate of Kangra is now much warmer and there has been a decrease in the rainfall and its intensity in the area. Indicators of this change are reflected in the observations of local "khuls" now with less or no water during the lean season, the Dhauladhar range which was snow clad for at least 9 months in the year now has snow barely for a couple of months, and, that Dharamshala and Palampur towns which had 24-hour water supply till the 1990s now get water for a few hours only. Fans came to be used in houses around 1995 in Palampur.

1.5 Distribution of area

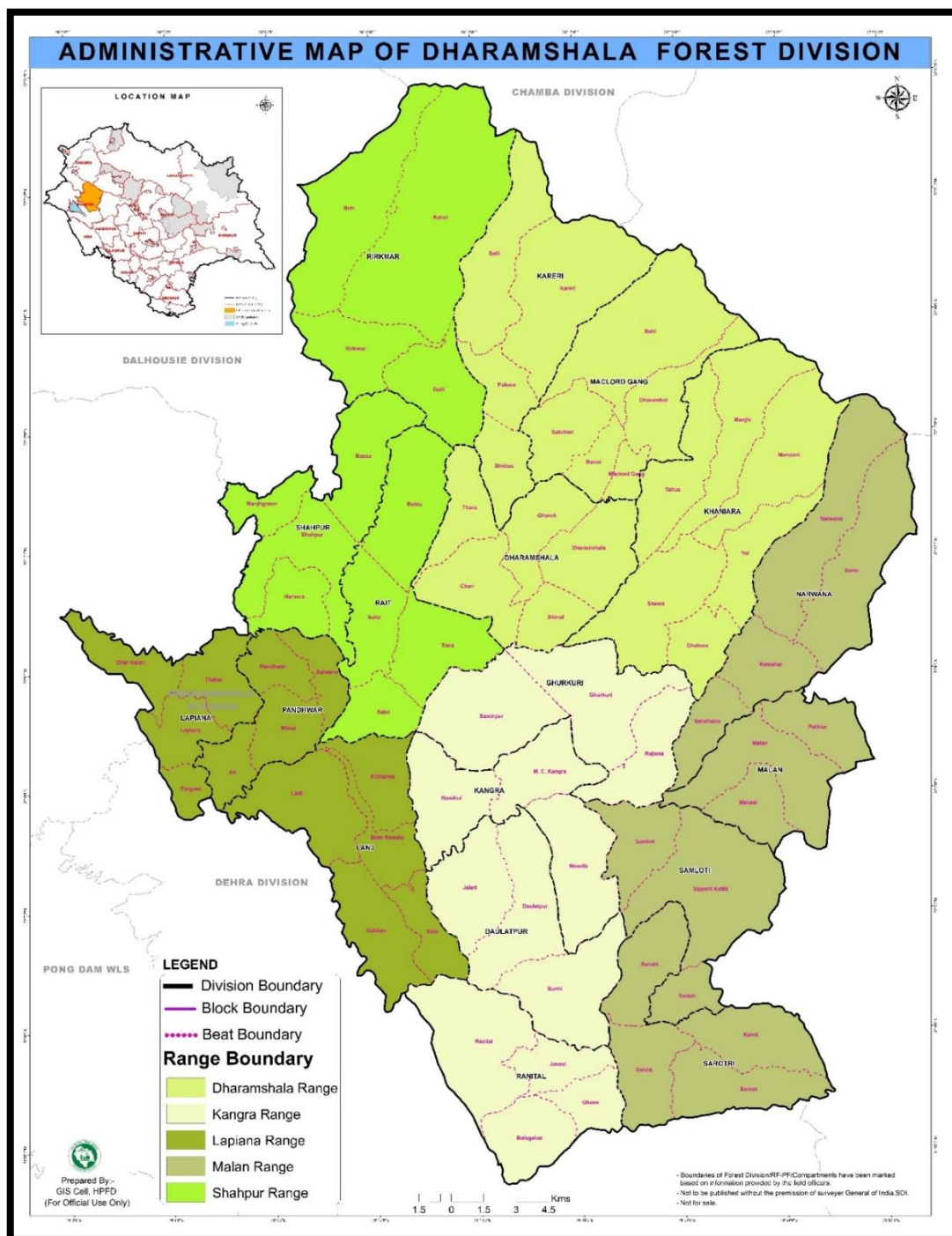
Table No. – 1.1

Name of Division	Name of Forest Range	Area in ha.	No of blocks	No of beats
Dharamshala	Dharamshala	20765.03	4	20
	Kangra	9307.38	4	13
	Lapiana	7114.27	3	13
	Mallan	10282.68	4	14

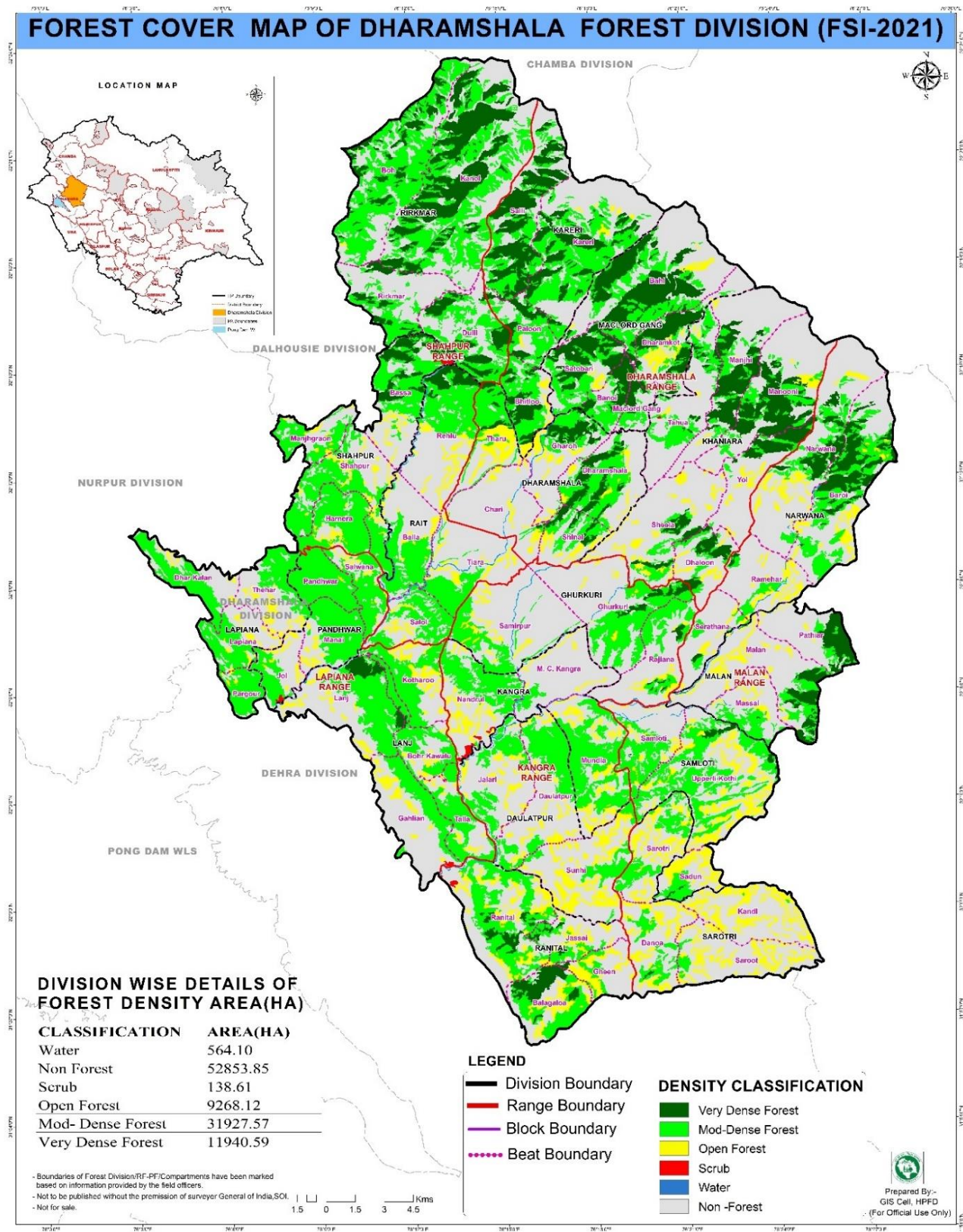
	Shahpur	13594.29	3	12
Total Area of Dharamshala Forest Division		61063.65	18	72

MAPS: The area of the present working plan of Dharamshala Forest Division is covered by following maps.

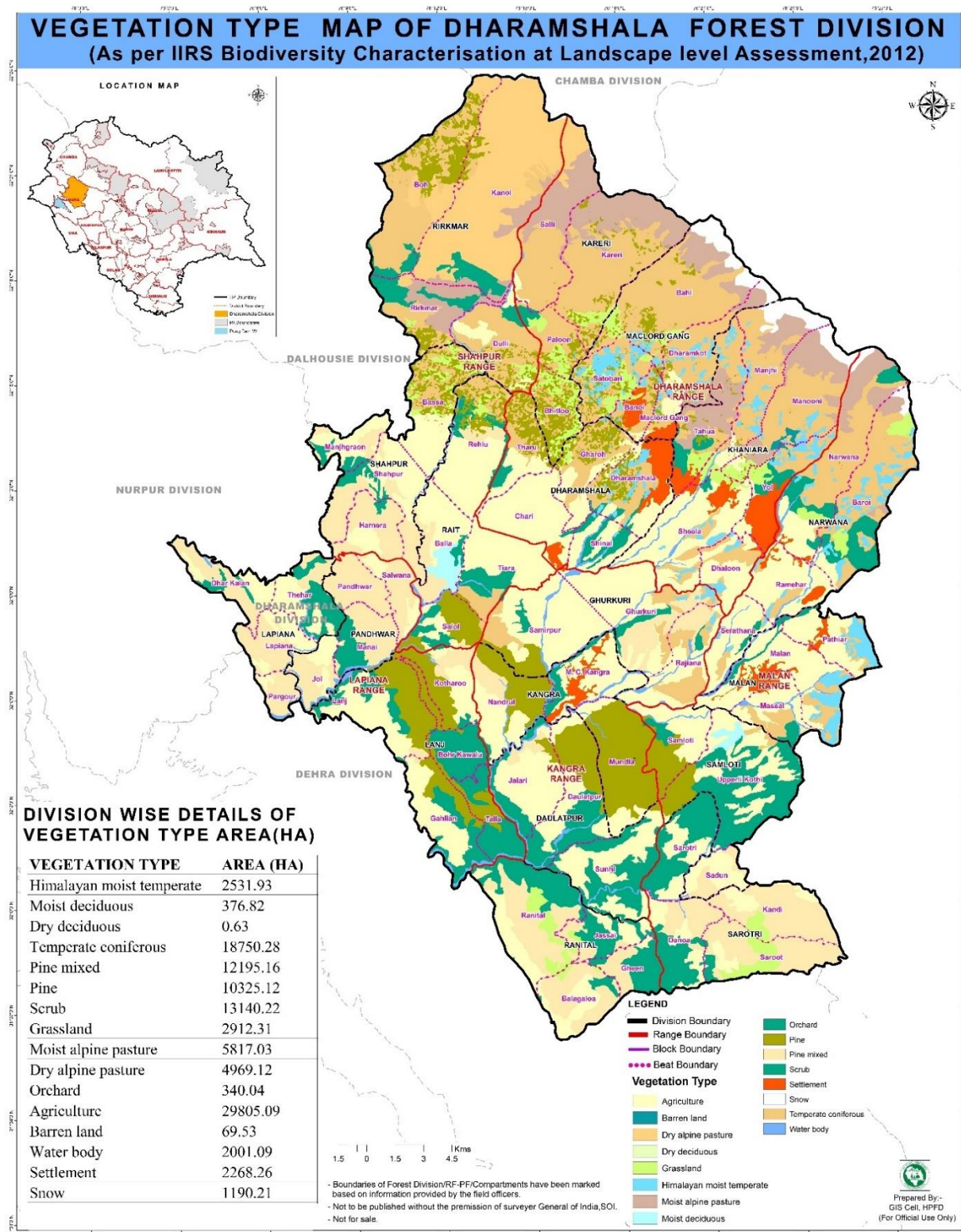
Map No. 1.1



Map No. – 1.2



Map No. 1.3



Chapter- 2

Maintenance/ Increase in the extent of forest and tree cover

2.1: Area of forests under different legal classes

This working Plan covers all the Reserved, Demarcated Protected Forests, Un-demarcated Protected Forests, Cooperative Society Forests, PWD road side strips, Railway side strips, of the Dharamshala Forest Division. Dharamshala Forest Division comprises five territorial ranges namely Dharamshala, Kangra, Lapiana, Mallan and Shahpur designated by their respective headquarters. Range wise area statement is as below:

2.1.1 Range-wise Forest area

Table No. – 2.1

Sr. No.	Name of Range	Geographical Area (ha.)	Forest Area (ha.)	%age of GA
1.	Dharamshala	38560.89	20705.09	53.84
2.	Kangra	20900.63	9314.86	44.53
3.	Lapiana	11660.12	7164.80	61.01
4.	Mallan	21419.07	10250.42	48.00
5.	Shahpur	21553.40	13628.01	63.07
Total (ha.)		114094.11	61063.18	53.52

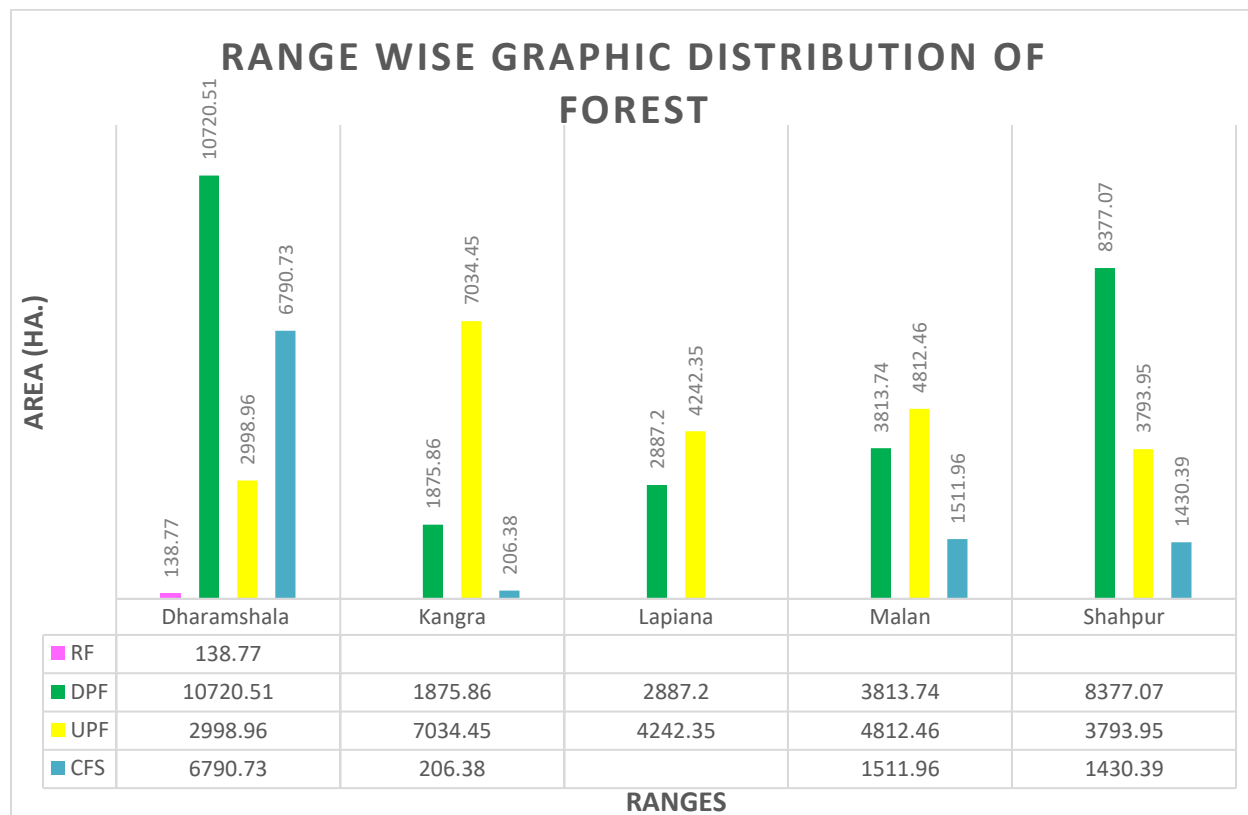
2.1.2: Distribution of Forest area by legal classification

Table No. – 2.2

Range	RF		DPF		UPF		CFS		Road Strips	Railway Side Strips	Total Forest	Area (Ha.)
Dharamshala	1	138.77	14	10720.51	10	2998.96	8	6790.73	56.12	0	33	20705.09
Kangra	0	0	6	1875.86	79	7034.45	2	206.38	70.49	127.68	87	9314.86
Lapiana	0	0	13	2887.2	95	4242.35	0	0	35.25	0	108	7164.8
Malan	0	0	6	3813.74	32	4812.46	5	1511.96	27.26	85	43	10250.42
Shahpur	0	0	15	8377.07	43	3793.95	6	1430.39	26.6	0	64	13628.01
Grand Total		138.77		27674.38		22882.17		9939.46	215.72	212.68	335	61063.18

The Govt. orders and notifications issued from time to time, on the subject has been taken into account in order to bring out the present legal position of these forests. The details of areas brought under the control of the government through land reforms and other vesting enactment are incorporated in the Plan. Variation in area as per revenue record and working plan with respect to all categories of forests, has been taken care of.

Figure No. 2.1



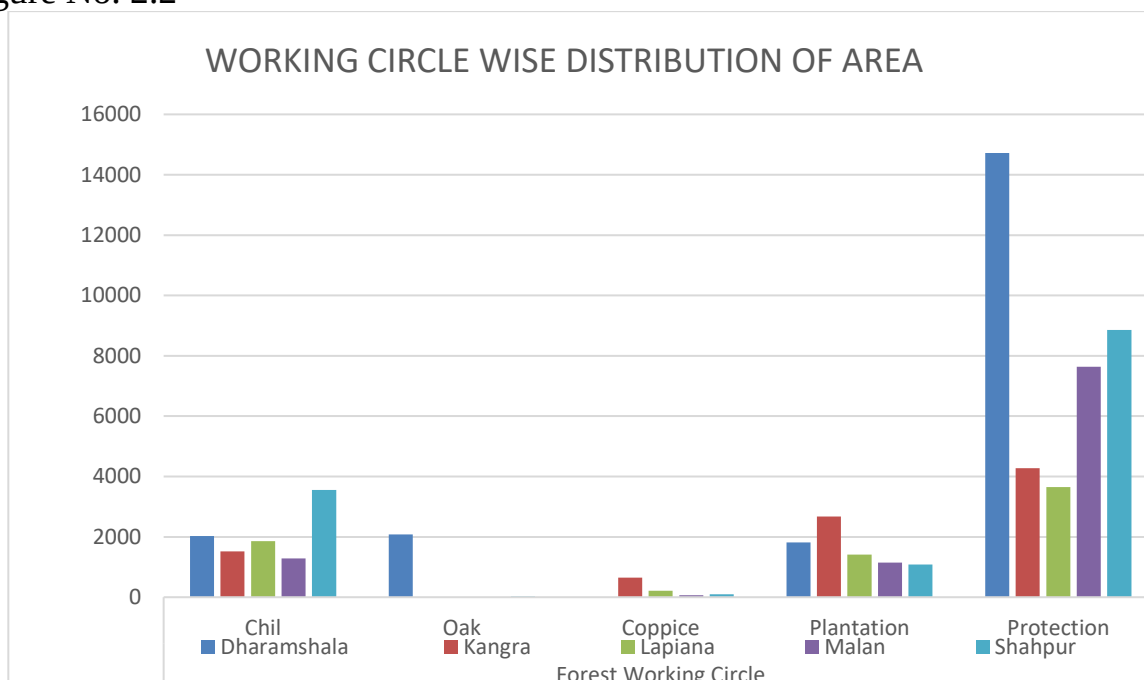
2.2: Forest area under different working circle/ management plan

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

Table No. – 2.3

Range	Forest Working Circle					Grand Total
	Chil	Oak	Coppice	Plantation	Protection	
Dharamshala	2031.78	2081	0	1814.42	14721.77	20648.97
Kangra	1515.18	0	653.15	2670.26	4278.1	9116.69
Lapiana	1861.94	0	210.43	1409.68	3647.5	7129.55
Malan	1289.78	0	63.53	1147.21	7637.64	10138.16
Shahpur	3553.37	21.85	95.49	1079.12	8851.58	13601.41
Grand Total	10252.05	2102.85	1022.6	8120.69	39136.59	60634.78

Figure No. 2.2



2.3: Percentage of forest with secured boundaries

All the demarcated protected forests stand mapped on 1:15840 (4 INCHES TO ONE MILE) scales in 1901 -02 and demarcated with numbered pillars of dry rubble masonry. All the demarcated protected forests have again been surveyed on 1:15840 scales.

The boundaries of Un- demarcated protected forests are not so demarcated. The boundary has not been checked since long and no attention is given for the maintenance of boundary pillars. This results that the boundary pillars are either missing or wrongly numbered in many forests. As a result of indeterminate nature boundary of such forests in the past, these are honeycombed with cultivation and conquest chances of encroachments cannot ruled out. The boundary registers showing the distances and bearings are also not properly maintained. The utility of these in detecting the encroachments is therefore limited.

2.3.1: Range-wise Boundary Pillars in Dharamshala Forest Division:

Table No. – 2.4

Range	Number of Forests	Number of Boundary Pillars		Total
		Big	Small	
Dharamshala	15	900	588	1488
Kangra	6	330	740	1070
Lapiana	6	192	121	313
Mallan	15	462	341	803
Shahpur	12	548	547	1135
Total	54	2472	2337	4809

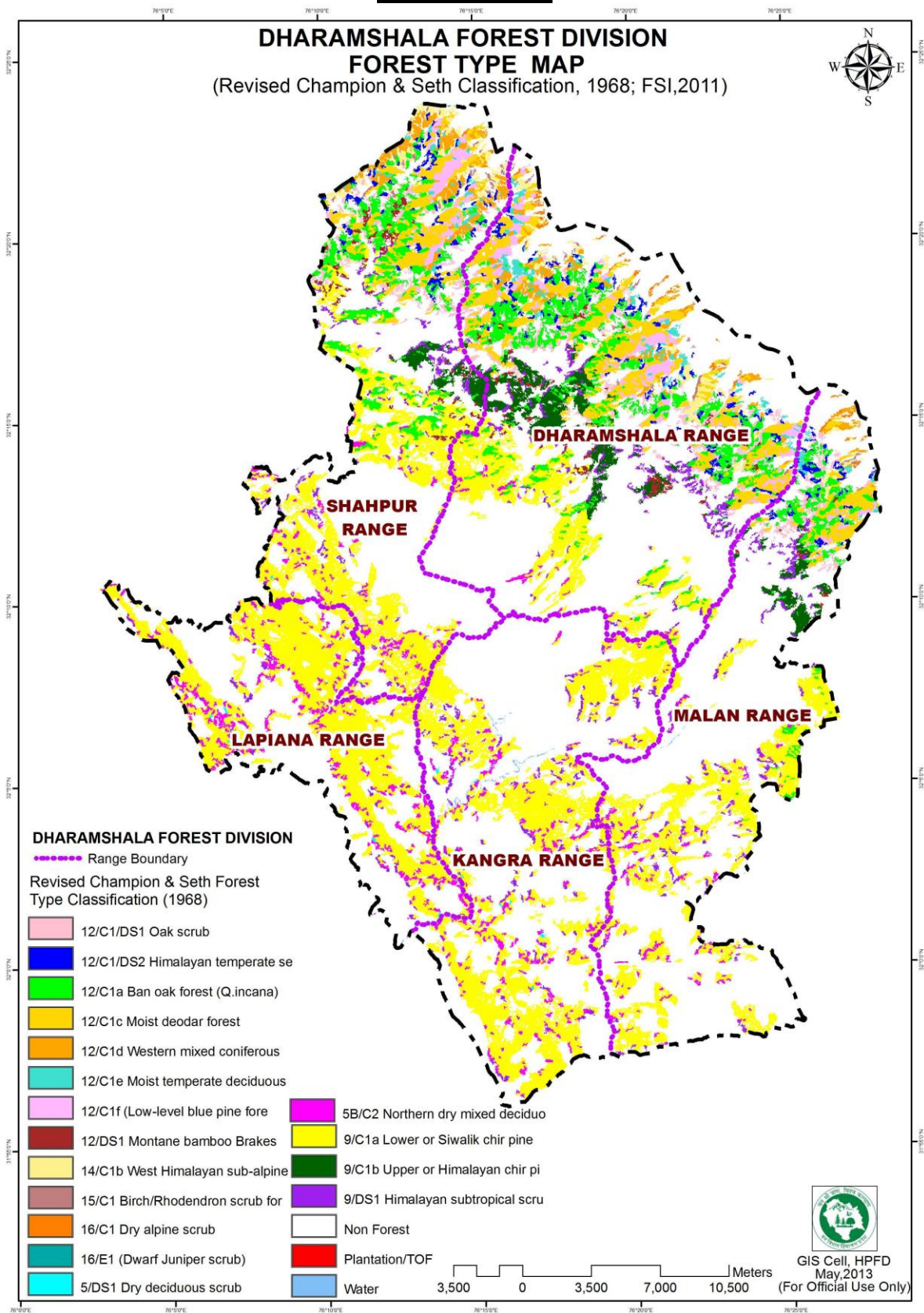
The un-demarcated protect Forests as the name implies are neither delimited nor mapped. The outer boundary of most of the un- demarcated protected forests are formed by prominent ridges, spurs and nallas and where such natural feature did not exist, and the boundary have been laid by coal tar or by double blazed rings on the boundary trees at suitable interval. The UPFs have been affected by nautores and encroachments. Further, 433 newly formed DFSs are proposed for final notification U/S 29(1) and 30 of the Indian Forest Act, 1927.

The boundary pillar registers are maintained at Division/Range level. The condition of boundary pillars by and large is dismal due to lack of repairs. The WPO shall discuss the existing boundary pillar status in detail. There are several areas that need to be addressed w.r.t. BPs here. (1) The forest wise BPs need to be checked for number, whether they exist or not and the state of repair needs to be recorded along with its coordinates; (2) The BPs around “chaks” or enclosed cultivations are a priority; (3) Similarly, BPs of DPFs, which are prone to encroachment need to be identified. Thereafter, once we know the fore mentioned information / data, a year wise plan for proper repair or replacement of the BPs esp. in the vulnerable DPFs has to be incorporated in the working plan. The location of all BPs should be shown on the map with its latitude and longitude to be used in working plan and in maps in CH files.

Table No. – 2.5

Forest Classification	Area
Reserve Forest	138.77
DPF	27674.38
UPF	22882.17
Cfs	9939.46
Other (Road & Railway side)	215.72
Total	61063.18

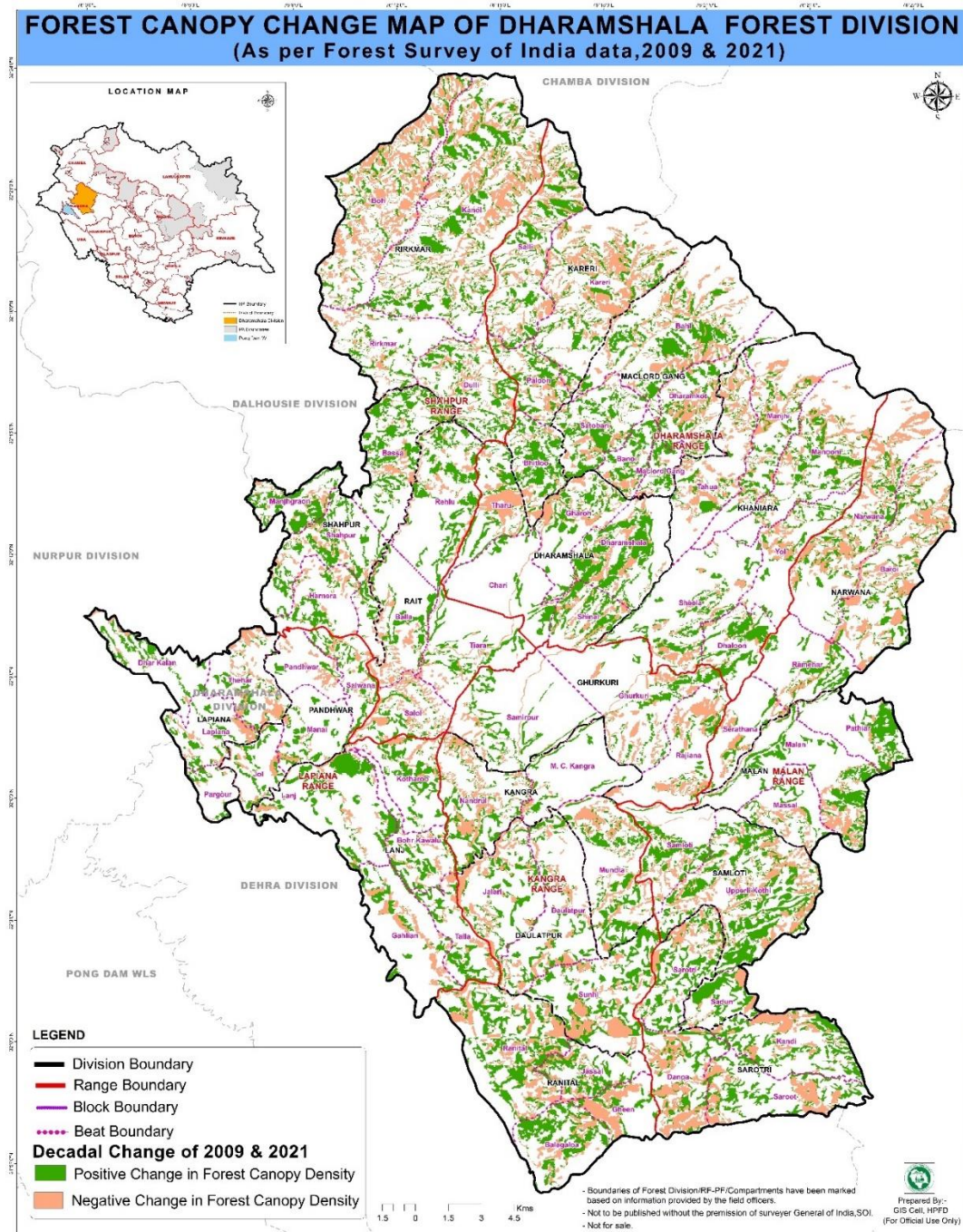
Map No. – 2.1



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

There is a land use change since the last working plan due to the reason that some of the forest land has been diverted for non- Forestry purpose and some encroachments on the forest land has been detected and recorded by divisional forest officer, however over the years there is a perceptible change in the forest density classes due to tremendous increase in biotic and a biotic pressure.

Map 2.2



2.5 Threats to the forest

The crop of forests under this working plan is liable to threats from the following

2.5.1 Forest fires

Forest fires are dangerous both for the forest and wildlife during the dry and hot season fire breaks in block forest where bhabbar and other grasses, dry leaves and twigs of lantana and other weeds are abundant. The problem of forest fire becomes Grave when pre monsoon showers are either delayed or absent. Fire prevention is undertaken by clearance of fire lines on the ridges along the inter-state boundaries and control burning during winter. Most of forest fires occur when ever some unscrupulous passerby throws butts of cigarettes Biddies un- intentionally or putting fire in the forest intentionally forgetting sprouting of new flesh of grasses babbar, for collecting honey. Whenever fire breaks out in the forest it is controlled by traditional way of fire beating and counter fire, modern firefighting techniques with the help of modern tools are employed to control forest fires, it is felt that maximum public awareness may be created regarding the the destructions caused as a result of forest fire and consequential environmental loses. Training of field staff and others engaged in fire prevention and control in modern forest fire techniques with improved tools is required. Maintenance of the fire lines is of utmost importance besides creation of new fire lines in one vulnerable area, clearing of all possible routes inspection path, compartment boundaries before the fire season may be especially helpful in prevention of spreading of fire. Joint forest Management Committees may also be given necessary inputs regarding fire control. could be reduced by control burning forest in the winter season, cleaning of clumps as per procedure laid down and maintenance of fire lines. In the fire season involvement of JFM committees is also vital in this respect to forge security for the forests

AREAS AFFECTED BY FOREST FIRES IN LAST 10 YEARS

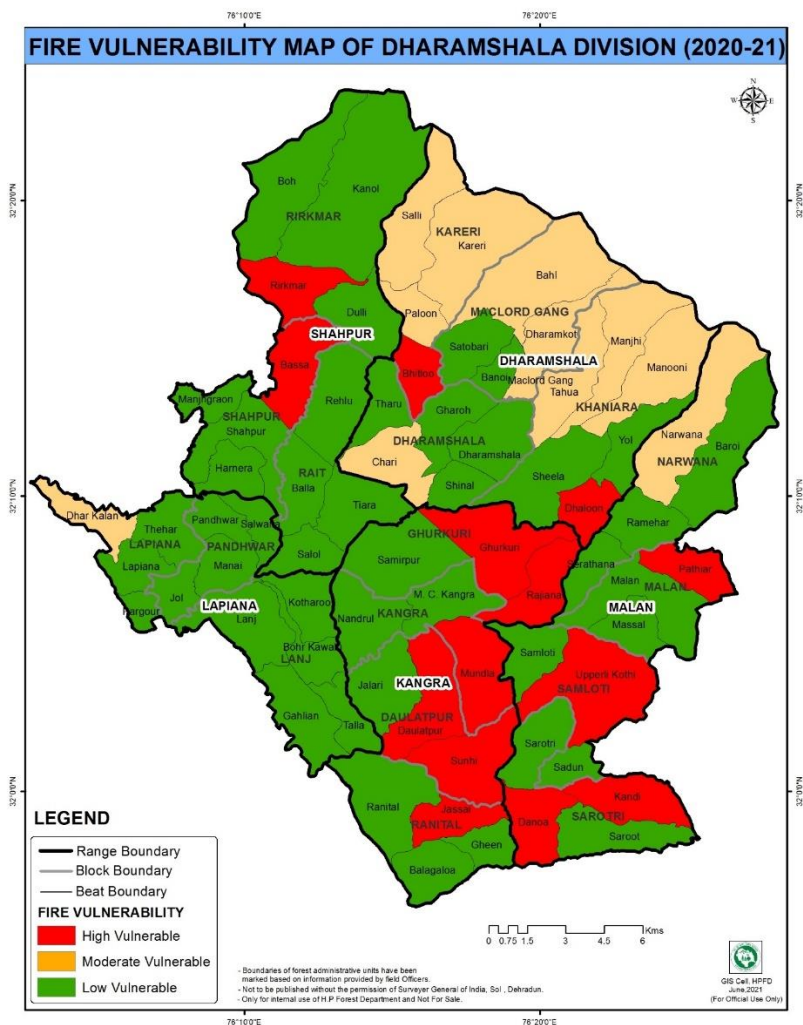
Fires: - With the onset of summers, fires are quite common in the region. They are accidental as well as deliberate, As the fires occur, burning of areas lead to a clean flush of grass. This fact motivates local inhabitants to put an area on fires. However, in most of the cases, results are extremely dangerous. There is a tremendous loss to both flora and fauna. The following table shows the areas burnt from 2010-11 onwards:

Fire Incidents

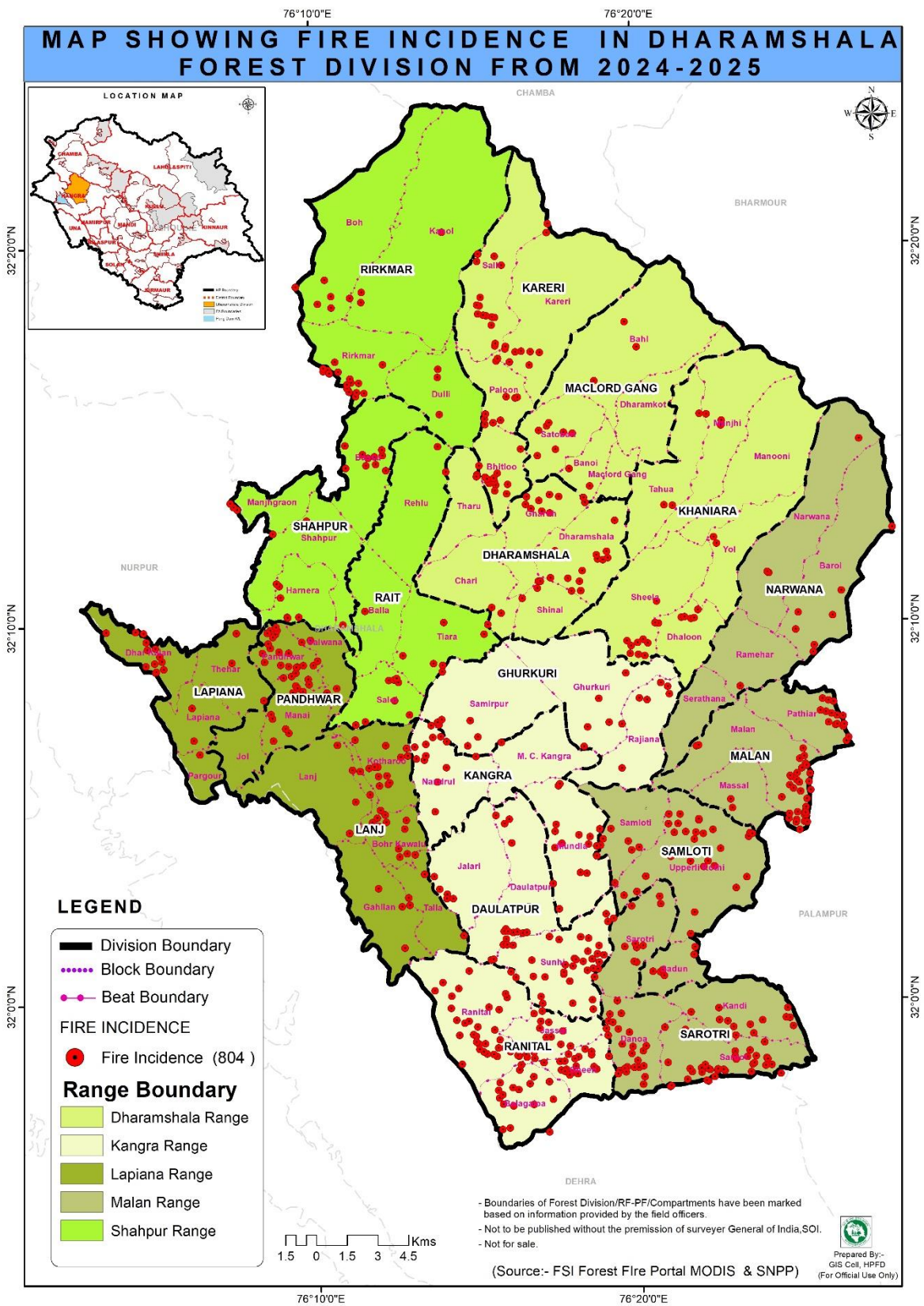
Table No. – 2.6

Sr. No	Year	Total No of case.	Total Area burnt in ha.
1	2012-13	108	657.90
2	2013-14	51	191.80
3	2014-15	40	111.00
4	2015-16	56	171.449
5	2016-17	114	484.28
6	2017-18	107	390.00
7	2018-19	247	971.75
8	2019-20	150	511.25
9	2020-21	32	145.50
10	2021-22	140	545.304

Map 2.3



Map No. 2.4

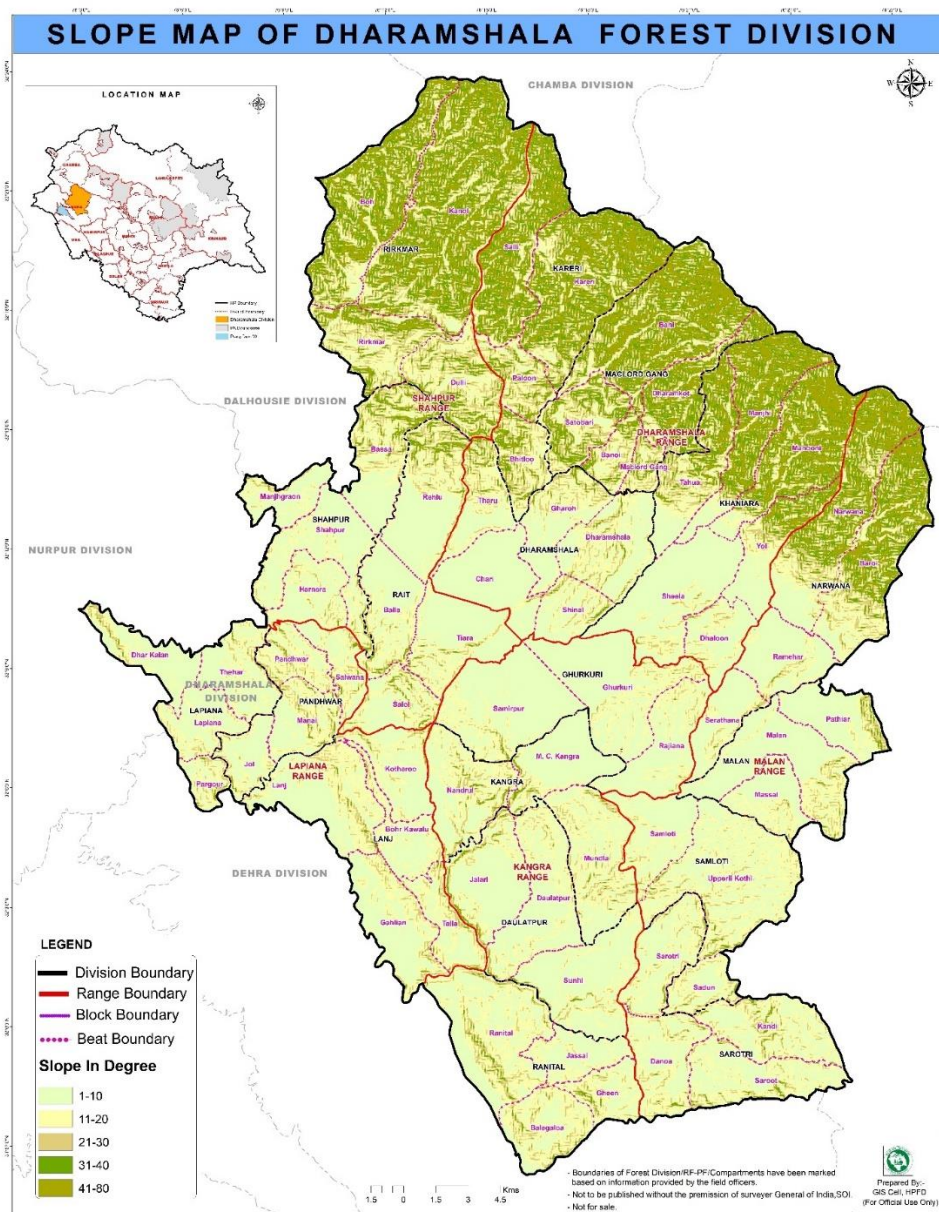


2.5.2 Area damaged by natural calamities No such data recorded however the following factors are responsible for damage to forest crop

2.5.2.1 Soil erosion

Bank and slip erosion is very common in the Forest of Dharamshala forest division due to its typical geological formation. This type of erosion is particularly common in Kangra, Mallan and Shahpur rangers where grazing is prohibited. Sheet erosion is common in many forests especially near habitations, where it is a result of over grazing. The beds of nullahs have been raised due to deposition of stones and pebbles brought down from upper slope.

Map 2.5



2.5.2.2 Drought

The crop of forests under this working plan is liable to threats from the following ag Draught: Absence of rains, scanty rainfall, less number of rainy days etc. result in drought conditions in these forests which some time persist for long periods. As the soil being well drained and having low capacity to retain moisture some spells of drought or late arrival of monsoon affects the growth of young plants badly. The regeneration as well as growth of flora are retarded due to inadequate moisture. Erratic rainfall also affects the growth of plants. Prolonged drought also results in heavy mortality of seedlings and due to heavy accumulation of ground floor litter risk of fire is considerable enhanced

2.5.2.3 Frost

Adjective Frost and pool Frost are common in this area. The survival of Frost tender species in young plantations are affected by frost to a great extent. The effect of Frost during drought conditions become lethal resulting in large scale dying up of aged trees. The survival of young plantation is also affected severely by frost and many casualties are seen in some recent plantations. Frost tender o species covered with locally available grasses helps to protect them against frost

2.5.3 Grazing lopping and cutting

The problem of grazing lopping and cutting is very common in the forests of division. Overgrazing has deteriorated the soil condition by compaction and rendering it unsuitable for proper growth and regeneration of forest, It also promotes soil erosion illicit grazing and cutting of bamboos especially in the rainy season does a great harm, stray cattle grazing during the rainy season being an impending problem causes irreparable damage to the crop, illicit cutting of raw and immature trees for fencing, basket making and other purposes also cause damage to the crop

2.5.4 Non-working of forest

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

2.5.5 Area infested by invasive weed species in forests

The forest has been invaded by invasive weed species like Lantana, Parthenium, Ageratum etc. which has caused negative impact on native biodiversity causing economical lose and harming human health. Lantana has done maximum invasion for which extensive survey for determining the extent of

invasion like upto 25% invasion, 25 to 50%, 50 to 75% and more than 75% categories has been defined and survey reports has been posted in CH files.

2.5.6 Incidence of pests and diseases, Insects and Fungi

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

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

2.5.7 Climbers and weeds

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

2.6 Distribution of different forest types

The configuration of tract, geological formations and altitude has contributed to its biodiversity. The description of forest types as given in the existing working plan under revision is adopted. The relationship of forest types existing in field and locality factors is clearly brought out which will make the prescription more logical and practical for the future scientific management of all these forests. All the maps as listed in the Working Plan Code 2014 have been prepared Range wise. Range wise statement of areas of different forest types is in a tabular form.

The forests of this division area grouped into the following types and sub-types as per Champion and Seth's Classification; *A Revised Survey of the Forest-types of India, 1962.*

Forest Classification

Table No. – 2.8

GROUP 5: DRY TROPICAL FORESTS.	
Sub – group 5B	Northern Tropical Dry Deciduous Forests.
5B/C ₂	Northern Dry Mixed Deciduous Forests.
GROUP 9: SUB- TROPICAL PINE FOREST.	

Type C ₁	Himalayan Sub – Tropical Pine Forests
9/C _{1(b)}	Upper or Himalayan Chir Pine Forests.
9C ₁ /DS ₁	Himalayan Sub – Tropical Scrub.
9C ₁ /DS ₂	Subtropical Euphorbia Scrub.
GROUP 10: SUB- TROPICAL DRY EVERGREEN FORESTS.	
10C ₁ /DS ₁	Dodonea Scrub Forests.
GROUP 12: HIMALAYAN MOIST TEMPERATE FORESTS.	
12/C _{1(a)}	Ban Oak Forests (<i>Quercus leucotrichophora</i>).
12/C _{1(c)}	Moist Deodar Forests (<i>Cedrus deodara</i>).
12/ C _{1(d)}	Western Mixed Coniferous Forests (Spruce, Fir & kail).
12/ C ₂ (a)	Kharsu Oak Forests.
12/DS ₂	Moist Deodar Forest
12/DS ₃	Himalayan temperate Pastures.
GROUP 14: SUB– ALPINE FORESTS.	
14/2S ₁	Sub-Alpine Blue Pine Forests.
14/ DS ₁	Sub Alpine Pasture.
Group 15: Moist Alpine Forest	
Sub –group 15/C ₁	Birch / Rhododendron Scrub Forests
15/C ₃	Alpine Pastures.

2.7 Tree cover outside forest area

The field data has been collected on samples drawn and has been sent for extrapolation and the result is still awaited and the same will be added as and when received

The field data is tabulated below

Tree Outside Forest (T.O.F)

Table No. – 2.9

Plot No	Longitude	Latitude	Stratum	Map sheet No	Grid_ID	Range	Beat	Total trees	Remarks
108	76° 12' 52.48" E	32° 01' 21.74" N	BLOCK	52D04	010295	Lapiana	Gahlian	0	Plot shifted due to Govt. land
115	76° 12' 08.04" E	32° 02' 09.67" N	SCATTER ED	52D04	010295	Lapiana	Gahlian	38	
151	76° 10' 10.24" E	32° 04' 57.22" N	SCATTER ED	52D04	010219	Lapiana	Lunj	10	
156	76° 09' 18.87" E	32° 05' 21.71" N	SCATTER ED	52D04	010219	Lapiana	Lunj	7	
158	76° 08' 29.85" E	32° 05' 38.08" N	SCATTER ED	52D04	010219	Lapiana	Lunj	4	
164	76° 19' 06.40" E	32° 05' 44.33" N	BLOCK	52D08	010222	Kangra	Rajiana	23	
165	76° 23' 27.13" E	32° 05' 50.81" N	SCATTER ED	52D08	010224	Malan	Massal	3	
166	76° 09' 10.17" E	32° 06' 01.18" N	BLOCK	52D04	010219	Lapiana	Lunj	31	
169	76° 17' 23.92" E	32° 06' 21.58" N	SCATTER ED	52D08	010149	Kangra	MC Kangra	18	
174	76° 07' 55.38" E	32° 06' 51.48" N	SCATTER ED	52D04	010146	Lapiana	Jol	40	
181	76° 08' 20.43" E	32° 07' 31.92" N	SCATTER ED	52D04	010146	Lapiana	Jol	169	
183	76° 07' 08.14" E	32° 07' 35.62" N	BLOCK	52D04	010146	Lapiana	Lapiana	79	
184	76° 16' 22.62" E	32° 07' 43.17" N	SCATTER ED	52D08	010148	Kangra	Samirpur	141	
186	76° 23' 53.96" E	32° 07' 52.32" N	SCATTER ED	52D08	010151	Malan	Pathiar	0	
187	76° 07' 46.51" E	32° 08' 03.12" N	SCATTER ED	52D04	010146	Lapiana	Thehar	0	Plot shifted due to Govt. land
191	76° 06' 21.67" E	32° 08' 19.96" N	BLOCK	52D04	010145	Lapiana	Lapiana	4	
196	76° 06' 32.68" E	32° 08' 55.24" N	BLOCK	52D04	010145	Lapiana	Thehar	7	
198	76° 18' 47.17" E	32° 09' 03.01" N	SCATTER ED	52D08	010149	Kangra	Ghurkari	95	
201	76° 15' 38.37" E	32° 09' 11.54" N	SCATTER ED	52D08	010082	Kangra	Samirpur	24	
204	76° 23' 27.21" E	32° 09' 25.36" N	SCATTER ED	52D08	010085	Malan	Ramehar	79	
208	76° 14' 13.56" E	32° 09' 50.97" N	BLOCK	52D04	010082	Shahpur	Tiara	18	

212	76° 13' 34.00" E	32° 10' 23.91" N	SCATTER ED	52D04	010082	Shahpur	Tiara	36	
214	76° 12' 12.32" E	32° 10' 46.77" N	SCATTER ED	52D04	010081	Shahpur	Balla	1	
218	76° 20' 07.95" E	32° 11' 04.60" N	SCATTER ED	52D08	010084	Dharamshal a	Sheela	73	
220	76° 12' 20.75" E	32° 11' 27.84" N	SCATTER ED	52D04	010081	Shahpur	Balla	26	
221	76° 23' 10.29" E	32° 11' 26.23" N	SCATTER ED	52D08	010085	Dharamshal a	Yol		Plot shifted
222	76° 16' 29.26" E	32° 11' 34.05" N	SCATTER ED	52D08	010083	Dharamshal a	Gharoh	14	
223	76° 14' 31.85" E	32° 11' 43.29" N	SCATTER ED	52D04	010082	Dharamshal a	Chari	18	
230	76° 15' 34.88" E	32° 12' 07.01" N	SCATTER ED	52D08	010017	Dharamshal a	Chari	10	
232	76° 10' 48.47" E	32° 12' 17.92" N	BLOCK	52D04	010016	Shahpur	Shahpur	64	
235	76° 20' 07.37" E	32° 12' 23.12" N	SCATTER ED	52D08	010019	Dharamshal a	Tahu	69	
236	76° 12' 28.28" E	32° 12' 40.19" N	SCATTER ED	52D04	010016	Shahpur	Rehlu	6	
237	76° 10' 37.04" E	32° 12' 48.16" N	SCATTER ED	52D04	010016	Shahpur	Shahpur	6	
242	76° 08' 44.30" E	32° 13' 06.36" N	SCATTER ED	52D04	010015	Shahpur	Manjgraon	5	
250	76° 11' 28.35" E	32° 13' 27.58" N	BLOCK	52D04	010016	Shahpur	Bassa	72	
108	76° 21' 52.21" E	32° 02' 33.22" N	BLOCK	52D04	010295	Lapiana	Gahlian	21	
187	76° 13' 01.68" E	32° 13' 56.02" N	SCATTER ED	52D04	010146	Lapiana	Thehar	20	
221	76° 22' 113" E	32° 10' 34.450" N	SCATTER ED	52D08	010085	Dharamshal a	Yol	9	
G.Total								1240	

CHAPTER-3

MAINTENANCE, CONSERVATION AND ENHANCEMENT OF BIODIVERSITY

3.1 FOREST COMPOSITION AND DISTRIBUTION: -

The forests of Dharamshala forest division are scattered as they are, over a vast area, contain Chil, Ban, Deodar, Khair, miscellaneous BL and bamboo forests depending on the altitude, rain fall, aspect and geological formation met with. The forests are essentially the Middle hills or outer Himalayan type. The common scrub species are *Acacia catechu*, *Anogeissus Latifolia*, *Albizzia lebbak*, *Aodoratissima*, *Lannea coromandelica*, *Syzygium cumini*, Jaman, *Kydia calycina*, *Casearia tormentosa*, *Cassia fistula*, but none of these species grows to a size as can yield useful timber. The main produce of these forests is katha and fuel wood. *Acacia catechu* is in great demand for katha manufacture, Bamboos are an important constituent of forest along nullah and river, Chil is next important species both for production of small sizes timber and resin. Chil is the main source of timber for local use and for export.

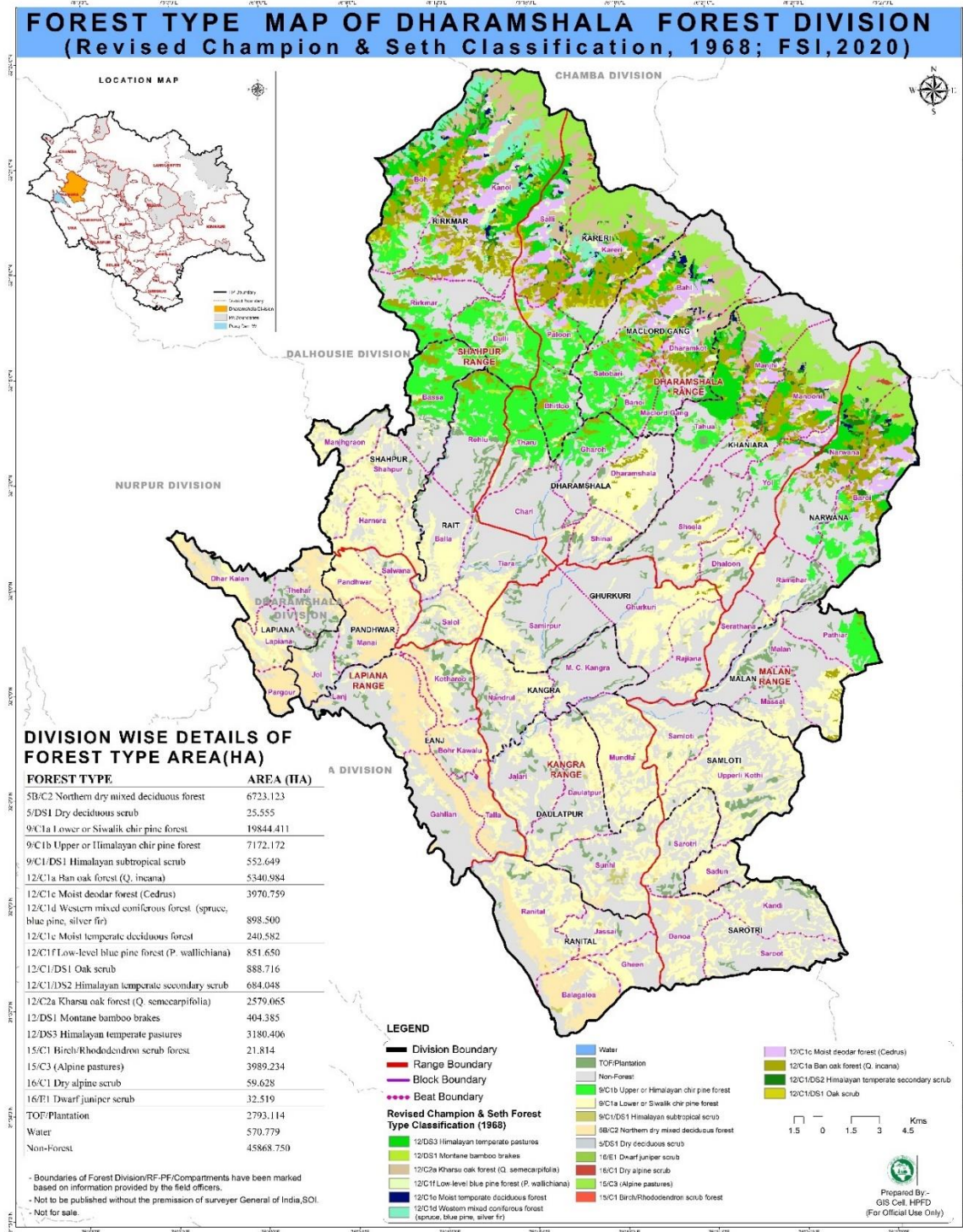
The floristics of individual areas are given in the compartment history files. The main vegetation is classified according to “A” Revised Survey of the Forest Type of India” by Champion and Seth as under

According to the classification of champion and Seth Forest covered by this plan fall under the following types.

Table No. – 3.1

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

Map 3.1



3.2

3.2 Plant species diversity:

The data collected during enumeration such as the number of individuals of each species and the DBH of each tree was utilized to derive secondary attributes

like basal area (BA, m²/ha), density (D, trees per ha) and frequency (F, number of quadrats where trees are present) in relation to total plots observed). Relative values of BA, D and F were then calculated. The important value index (IVI) was calculated by adding up relative dominance (R BAF), relative density (RD) and relative frequency (RF).

Species diversity is an expression of community structure. The number of species in a community is referred to as species richness. The relative abundance of all species is called evenness. A community demonstrates a high species diversity if many equally or nearly equally abundant species are present. Communities with a large number of species that are evenly distributed are the most diverse. Species diversity indices like Shannon–Wiener Index are calculated separately for trees, shrubs and herbs.

The most common species in the forests are given below:

Sr no	Local name	Scientific name
1.	Chil	<i>Pinus roxburghii</i>
2.	Harar	<i>Terminalia chebula</i>
3.	Dhao, or Chal	<i>Anogeissus latifolia</i>
4.	Kakoran	<i>Pistacia integerrima</i>
5.	Khair	<i>Acacia catechu</i>
6	Shisham	<i>Dalbergia sissoo</i>
7.	Kinu	<i>Diospyros tomentosa</i>
8	Tun	<i>Cedrela toona</i>
9	Bamboo	<i>Dendroclamus strictus</i>
10	Rajain	<i>Holopteles integrifolia</i>
11	Behra	<i>Terminalia belerica</i>
12	Sanan	<i>Ougeinia dalbergiodes</i>
13	Mahil Kawil	<i>Mallotus philippinensis</i>
14	Sarin	<i>Albizia lebbek</i>
15	Jaman	<i>Syzygium cumini</i>

16	Simul	<i>Bombax ceiba</i>
17	Bill	<i>Aegle marmelos</i>
18	Kembal	<i>Lannea grandis</i>
19	Arjun	<i>Terminalia Arjuna</i>
20	Ber	<i>Ziziphus Jujuva</i>
21	Asan	<i>Terminalia Arjuna</i>
22	Amla	<i>Emblica officinale</i>
23	Lasora	<i>Cordia myxa</i>
24	Dhaman	<i>Grewia optiva</i>
25	Ohi	<i>Albizzia stipulata</i>
26	Kao	<i>Olea cuspidata</i>
27	Kikar	<i>Acacia arabica</i>
28	Karmaru	<i>Albizzia odoratissima</i>
29	Kuthman	<i>Eugenia jambolana</i>
30	Kachnar	<i>Bauhinia variegata</i>
31	Mulberry	<i>Morus alba</i>
32	Khirk	<i>Celtis australis</i>
33	Jamu	<i>Prunus cerasides</i>
34	Bado	<i>Salix alba</i>
35	Kurumb	<i>Machillus species</i>
36	Dodan	<i>Sapindus detergens</i>

The frequency, density, basal area and IVI of most important trees and shrubs found in forests are given in Table 3.1.

Ecological parameters of Trees

Table 3.1

Working Circle	Species	Relative Density	Relative Frequency	Relative basal Area	IVI=RD+RF+RBA
Bamboo	<i>Acacia catechu</i>	41.86	50.00	28.73	120.59
	<i>Bauhinia variegata</i>	18.60	25.00	1.04	44.64
	<i>Cassia fistula</i>	18.60	25.00	1.04	44.64
	<i>Diospyros cordifolia</i>	37.21	25.00	13.51	75.72
	<i>Ehretia laevis</i>	13.95	50.00	4.24	68.19
	<i>Eugenia jambolana</i>	9.30	25.00	1.04	35.35
	<i>Ficus roxburghii</i>	27.91	25.00	1.81	54.72
	<i>Grewia elaeagnifolia</i>	9.30	25.00	0.59	34.89
	<i>Lannea coromandelica</i>	18.60	25.00	19.59	63.20
	<i>Mallotus philippensis</i>	43.41	75.00	21.14	139.55
	<i>Melia azadirachta</i>	9.30	25.00	0.59	34.89
	<i>Zizyphus Mauritiana</i>	9.30	25.00	6.69	40.99
	Total	100.00	100.00	100.00	300.00
Chil	<i>Acacia catechu</i>	25.76	57.35	9.36	92.47
	<i>Acacia modesta</i>	3.01	0.74	0.03	3.78
	<i>Aegle marmelos</i>	4.22	3.68	0.04	7.94
	<i>Albizia lebbek</i>	4.35	6.62	0.38	11.35
	<i>Albizia odoratissima</i>	6.02	2.94	0.03	9.00
	<i>Anogeissus latifolia</i>	10.88	13.24	1.93	26.05
	<i>Bauhinia vahlii</i>	6.02	2.21	0.05	8.28
	<i>Bauhinia variegata</i>	11.55	4.41	0.31	16.27
	<i>Bombax ceiba</i>	3.01	4.41	0.19	7.61
	<i>Butea monosperma</i>	9.04	9.56	0.64	19.23
	<i>Casaria Tomantosa</i>	6.72	9.56	0.40	16.68
	<i>Cassia fistula</i>	8.13	36.76	0.67	45.57
	<i>Dalbergia sisoo</i>	12.37	13.97	0.86	27.19
	<i>Diospyros cordifolia</i>	4.66	8.09	0.13	12.88
	<i>Diospyrus tomentosa</i>	16.40	6.62	0.85	23.87
	<i>Emblica officinalis</i>	11.25	11.03	0.86	23.13
	<i>Eucalyptus</i>	9.64	3.68	1.45	14.76
	<i>Eugenia jambolana</i>	7.91	11.76	0.61	20.28
	<i>Ficus bangalensis</i>	3.51	4.41	1.33	9.25
	<i>Ficus glomerata</i>	6.02	2.21	0.10	8.33
	<i>Ficus religiosa</i>	3.01	1.47	0.11	4.59
	<i>Ficus roxburghii</i>	6.30	16.18	0.90	23.38
	<i>flacourtia indica</i>	7.03	4.41	0.13	11.57
	<i>Gravia optiva</i>	14.56	13.24	0.97	28.76

	<i>Holoptelea integrifolia</i>	3.01	0.74	0.02	3.77
	<i>Krembal</i>	3.01	0.74	0.09	3.84
	<i>Kydia calycina</i>	16.87	3.68	0.26	20.80
	<i>Lannea coromandelica</i>	7.63	11.03	0.69	19.35
	<i>Lannea grandis</i>	23.85	8.82	1.15	33.82
	<i>Leucaenea leucocephella</i>	6.02	5.15	0.10	11.27
	<i>Litsaea umbrosa</i>	9.54	4.41	0.20	14.15
	<i>Madhuca indica</i>	3.01	0.74	0.02	3.77
	<i>Mallotus phillippensis</i>	40.44	69.12	9.65	119.21
	<i>Mangifera indica</i>	13.34	5.15	2.13	20.62
	<i>Morus alba</i>	6.53	4.41	0.23	11.17
	<i>Nerium oleander</i>	15.61	8.09	0.45	24.14
	<i>Oroxylum indicum</i>	3.01	0.74	0.00	3.75
	<i>Other/BL</i>	13.91	40.44	3.96	58.31
	<i>Ougeinia dalbergioides</i>	7.03	2.21	0.14	9.37
	<i>Persicaria maculosa</i>	3.01	0.74	0.03	3.77
	<i>Phoenix dactylifera</i>	3.01	1.47	0.11	4.60
	<i>Pinus roxburghii</i>	40.31	61.76	55.91	157.98
	<i>Pistacia integerrima</i>	3.01	1.47	0.00	4.48
	<i>Premna Mueronasa</i>	6.02	0.74	0.02	6.78
	<i>Psidium guajava</i>	3.01	0.74	0.01	3.75
	<i>Pyrus pashia</i>	8.13	7.35	0.28	15.77
	<i>Randia dumetorum</i>	3.01	2.21	0.03	5.24
	<i>Sageretia theezans</i>	12.05	0.74	0.02	12.81
	<i>syzgium cumini</i>	6.48	14.71	1.33	22.51
	<i>Terminalia arjuna</i>	4.52	1.47	0.06	6.04
	<i>Terminalia Bellarica</i>	4.02	4.41	0.11	8.54
	<i>Terminalia chebula</i>	6.02	0.74	0.02	6.77
	<i>Tonna cilta</i>	11.04	2.21	0.31	13.56
	<i>Wendlandia heynei</i>	13.55	1.47	0.06	15.08
	<i>Wendlendis exerta</i>	10.24	3.68	0.14	14.06
	<i>Xylosma longifolium</i>	7.03	2.21	0.10	9.34
	<i>Ziizyphus Mauratiana</i>	4.02	4.41	0.07	8.50
	Total	100.00	100.00	100.00	300.00
Coppice	<i>Acacia catechu</i>	22.46	66.15	12.47	101.08
	<i>Acacia Modesta</i>	5.51	3.08	0.06	8.65
	<i>Aegle Marmelos</i>	3.67	1.54	0.01	5.22
	<i>Albozia Lebbeck</i>	6.37	23.08	1.84	31.28
	<i>Albozzia odoratissima</i>	5.51	3.08	0.20	8.78
	<i>Anogeissus latifolia</i>	28.15	18.46	8.47	55.09
	<i>Azadircachta indica</i>	11.02	1.54	0.06	12.62
	<i>Bauhnia verigate</i>	4.59	6.15	0.17	10.91
	<i>Bombaxx Ceiba</i>	4.20	10.77	1.35	16.32
	<i>Butea monosperina</i>	12.85	3.08	0.76	16.69

	<i>Casaeria Tomantosa</i>	5.25	10.77	0.68	16.69
	<i>cassia fistula</i>	9.72	26.15	0.97	36.85
	<i>Dalbergii sisoo</i>	4.72	10.77	0.46	15.95
	<i>Diospyros Cordifolia</i>	5.97	12.31	0.71	18.99
	<i>Diospyrus tomentosa</i>	18.36	3.08	0.62	22.06
	<i>Embllica officinalis</i>	4.72	10.77	0.44	15.93
	<i>Eucalyptus</i>	65.18	6.15	14.50	85.84
	<i>Eugenia Jambolana</i>	7.34	6.15	0.26	13.76
	<i>Ficus Glomerata</i>	13.95	7.69	1.10	22.74
	<i>Ficus palmata</i>	3.67	1.54	0.09	5.30
	<i>Ficus religiosa</i>	3.67	4.62	0.85	9.14
	<i>Ficus roxburghii</i>	6.73	18.46	0.55	25.75
	<i>flacourtia indiaca</i>	12.24	9.23	0.41	21.89
	<i>Gravia optiva</i>	6.61	7.69	0.36	14.66
	<i>Holarrhena Antidysentrcia</i>	3.67	1.54	0.05	5.26
	<i>Holoptellea iontegrifolia</i>	6.61	7.69	1.17	15.48
	<i>Kydia calycina</i>	4.90	4.62	0.26	9.77
	<i>Lannea coromandelica</i>	11.02	23.08	5.52	39.61
	<i>Lannea grandis</i>	15.61	6.15	0.75	22.52
	<i>Leucaenea Leucocephella</i>	6.30	10.77	0.32	17.39
	<i>Litsaea umbrosa</i>	3.67	4.62	0.08	8.37
	<i>Mallotus phillippensis</i>	44.00	78.46	16.49	138.95
	<i>Mangifera indica</i>	17.44	6.15	3.00	26.60
	<i>Melia azadirachta</i>	5.51	6.15	0.14	11.81
	<i>mitragyna parvifolia</i>	9.18	3.08	0.10	12.36
	<i>Morus alba</i>	4.59	6.15	0.22	10.97
	<i>Nerium oleander</i>	24.33	12.31	1.08	37.72
	<i>Oroxylum indicum</i>	3.67	1.54	0.04	5.25
	<i>Other/BL</i>	17.33	49.23	8.58	75.14
	<i>Persicaria maculosa</i>	4.90	4.62	0.23	9.74
	<i>Pinus roxbnrghir</i>	15.15	24.62	10.88	50.65
	<i>Pistacia integerrima</i>	7.34	1.54	0.13	9.02
	<i>Psidium quajava</i>	3.67	1.54	0.02	5.23
	<i>Pyrus pashia</i>	6.61	7.69	0.28	14.58
	<i>Randia dumetorum</i>	9.18	3.08	0.11	12.37
	<i>syzgium cumini</i>	9.18	9.23	0.57	18.98
	<i>Terminalia arjuna</i>	3.67	1.54	0.01	5.22
	<i>Terminalia Bellarica</i>	4.90	4.62	0.28	9.79
	<i>Terminalia chebula</i>	14.69	1.54	0.17	16.40
	<i>Tonna ciliata</i>	7.34	4.62	0.76	12.72
	<i>Wendlandia heynei</i>	22.03	1.54	0.16	23.73
	<i>Wendlendis exerta</i>	12.59	10.77	0.61	23.97
	<i>Xylosma longifolium</i>	4.59	6.15	0.24	10.98
	<i>Ziizyphus Mauratiana</i>	9.79	9.23	0.35	19.37

	Total	100.00	100.00	100.00	300.00
Plantation	<i>Acacia catechu</i>	28.81	71.01	17.10	116.93
	<i>Acacia koa</i>	3.78	0.19	0.00	3.98
	<i>Acacia Modesta</i>	6.80	1.95	0.07	8.82
	<i>Acacia nilotica</i>	3.78	0.58	0.01	4.37
	<i>Aegle Marmelos</i>	11.76	1.75	0.12	13.63
	<i>Albezia Family</i>	11.34	0.19	0.06	11.59
	<i>Albozia Lebbeck</i>	7.18	13.42	0.92	21.53
	<i>Albozzia odoratissima</i>	9.45	3.89	0.19	13.53
	<i>Anogeissus latifolia</i>	18.82	17.51	3.25	39.58
	<i>Azadirachta indica</i>	7.56	0.39	0.01	7.96
	<i>Azadircachta indica</i>	8.51	1.56	0.08	10.14
	<i>Bauhinia vahlii</i>	5.04	0.58	0.01	5.63
	<i>Bauhinia veriegata</i>	7.40	4.67	0.24	12.31
	<i>Bombax ceiba</i>	4.75	8.37	0.76	13.87
	<i>Breidelia Veruucossa</i>	26.46	0.19	0.05	26.70
	<i>Butea monosperina</i>	16.07	3.89	0.54	20.50
	<i>Casaeria Tomantosa</i>	6.75	5.45	0.38	12.58
	<i>cassia fistula</i>	11.19	38.72	7.14	57.05
	<i>Celtis australis</i>	3.78	0.39	0.01	4.18
	<i>Citrus Sedolimon tanaka</i>	11.34	0.19	0.02	11.55
	<i>cordia myxa</i>	4.73	1.56	0.06	6.34
	<i>Dalbergia sisoo</i>	10.09	18.87	2.02	30.99
	<i>Datasal Stramonium</i>	3.78	0.19	0.00	3.98
	<i>Dendro clamus strictus</i>	94.51	0.19	0.14	94.84
	<i>Diosphros Melanoxylon</i>	3.78	0.19	0.00	3.98
	<i>Diospyros Cordifolia</i>	7.10	11.28	0.51	18.90
	<i>Diospyrus tomentosa</i>	17.13	6.23	1.00	24.36
	<i>Ehretia laevis</i>	9.45	0.39	0.06	9.90
	<i>Embllica officinalis</i>	7.56	14.98	0.63	23.17
	<i>Eucalyptus</i>	45.93	3.89	3.93	53.76
	<i>Eugenia Jambolana</i>	8.59	6.42	0.63	15.64
	<i>Ficus Bangalensis</i>	9.07	3.89	3.00	15.96
	<i>Ficus Glomerata</i>	5.59	4.47	0.64	10.71
	<i>Ficus religiosa</i>	4.32	1.36	0.20	5.88
	<i>Ficus roxburghii</i>	7.96	9.14	0.52	17.63
	<i>flacourtia indiaca</i>	9.29	4.67	0.19	14.15
	<i>Gravia optiva</i>	8.32	12.65	0.83	21.79
	<i>Grewia elaeticaver</i>	5.04	0.58	0.01	5.63
	<i>Holoptellea iontegrifolia</i>	9.20	4.47	0.40	14.07
	<i>Jatropha Curcas</i>	30.24	0.19	0.01	30.44
	<i>Krembal</i>	3.78	0.39	0.04	4.21
	<i>Kydia calycina</i>	12.18	1.75	0.11	14.04
	<i>Lannea coromandelica</i>	11.73	15.18	3.75	30.65

	<i>Lannea grandis</i>	14.05	10.31	1.17	25.53
	<i>Leucaenea Leucocephella</i>	16.15	8.56	0.85	25.56
	<i>Litsaea umbrosa</i>	9.38	4.86	0.22	14.46
	<i>Mallotus phillippensis</i>	37.47	77.43	13.68	128.58
	<i>Mangifera indica</i>	6.30	5.84	1.24	13.38
	<i>Melia azadirachta</i>	5.43	3.11	0.10	8.65
	<i>mitragyna parvifolia</i>	6.05	4.86	0.22	11.14
	<i>Morus alba</i>	6.66	4.09	0.47	11.21
	<i>Nerium oleander</i>	15.90	12.26	0.86	29.02
	<i>Oroxylum indicum</i>	9.45	0.39	0.02	9.86
	<i>Other/BL</i>	17.14	37.94	7.31	62.38
	<i>Ougeinia dalbergioides</i>	7.56	2.72	0.22	10.50
	<i>Persicaria maculosa</i>	6.38	3.11	0.11	9.60
	<i>Phoenix dactylifera</i>	3.78	0.19	0.02	4.00
	<i>Pinus roxbnrghir</i>	27.57	27.24	20.31	75.12
	<i>Pistacia integerrima</i>	5.29	1.95	0.10	7.34
	<i>Poplus cylitia</i>	3.78	0.19	0.01	3.98
	<i>Premna Mueronasa</i>	3.78	0.39	0.00	4.17
	<i>Prunus persica</i>	3.78	0.19	0.01	3.99
	<i>Pyrus pashia</i>	10.91	8.56	0.51	19.99
	<i>Randia dumetorum</i>	9.18	1.36	0.02	10.56
	<i>Sageretia theezans</i>	5.04	0.58	0.01	5.64
	<i>Stemtheygyne</i>	3.78	0.19	0.03	4.00
	<i>syzygium cumini</i>	5.40	6.81	0.54	12.75
	<i>Tectona grandis</i>	37.14	3.31	0.32	40.77
	<i>Terminalia arjuna</i>	5.67	2.33	0.25	8.25
	<i>Terminalia Bellarica</i>	4.16	1.95	0.27	6.37
	<i>Terminalia chebula</i>	3.78	0.78	0.02	4.57
	<i>Tonna cilta</i>	9.33	5.84	0.52	15.68
	<i>Wendlandia heynei</i>	8.40	1.75	0.07	10.23
	<i>Wendlendis exerta</i>	12.83	7.39	0.39	20.62
	<i>Wrightia Tomentosa</i>	3.78	0.19	0.00	3.98
	<i>Xylosma longifolium</i>	6.45	6.61	0.23	13.30
	<i>Ziizyphus Mauratiana</i>	5.13	5.45	0.26	10.83
	Total	100.00	100.00	100.00	300.00
Protection	<i>Acacia catechu</i>	25.58	59.46	13.37	98.40
	<i>Acacia Modesta</i>	7.10	4.05	0.10	11.26
	<i>Acacia nilotica</i>	5.68	4.05	0.37	10.10
	<i>Albozia Lebbeck</i>	9.95	4.05	0.19	14.20
	<i>Anogeissus latifolia</i>	10.23	6.76	0.72	17.70
	<i>Azadircachta indica</i>	10.66	5.41	0.59	16.66
	<i>Bauhnia verigate</i>	4.26	2.70	0.07	7.03
	<i>Bombaxx Ceiba</i>	6.87	24.32	2.70	33.89
	<i>Butea monosperina</i>	22.95	17.57	4.10	44.62

	<i>Casaeria Tomantosa</i>	4.26	9.46	0.23	13.95
	<i>cassia fistula</i>	12.23	31.08	1.90	45.21
	<i>cordia vestita</i>	4.26	1.35	0.04	5.66
	<i>Dalbergii sisoo</i>	8.05	12.16	1.41	21.63
	<i>Diospyros Cordifolia</i>	7.99	10.81	0.70	19.50
	<i>Diospyrus tomentosa</i>	19.42	12.16	2.31	33.89
	<i>Emblica officinalis</i>	8.53	4.05	0.28	12.86
	<i>Eucalyptus</i>	27.71	2.70	3.36	33.77
	<i>Ficus Bangalensis</i>	4.26	2.70	1.12	8.08
	<i>Ficus Glomerata</i>	8.53	6.76	1.81	17.09
	<i>Ficus religiosa</i>	4.26	2.70	0.18	7.15
	<i>Ficus roxburghii</i>	12.18	9.46	1.08	22.71
	<i>flacourtia indiaca</i>	4.26	2.70	0.11	7.08
	<i>Gravia optiva</i>	8.53	20.27	0.91	29.70
	<i>Holoptellea iontegrifolia</i>	11.84	12.16	2.12	26.13
	<i>Lannea coromandelica</i>	20.37	12.16	4.57	37.10
	<i>Lannea grandis</i>	13.95	14.86	2.34	31.15
	<i>Leucaenea Leucocephella</i>	34.10	17.57	4.76	56.42
	<i>Mallotus phillippensis</i>	25.21	62.16	9.08	96.44
	<i>Mangifera indica</i>	10.66	2.70	0.43	13.78
	<i>Melia azadirachta</i>	10.66	2.70	0.14	13.50
	<i>mitragyna parvifolia</i>	4.26	4.05	0.20	8.52
	<i>Morus alba</i>	4.26	1.35	0.04	5.66
	<i>Nerium oleander</i>	10.96	18.92	1.00	30.88
	<i>Other/BL</i>	41.31	56.76	23.91	121.98
	<i>Ougeina dalbergiedes</i>	12.79	6.76	1.13	20.67
	<i>Persicaria maculosa</i>	4.26	1.35	0.10	5.71
	<i>Phoenix dactylifera</i>	25.58	2.70	1.19	29.47
	<i>Pinus roxbnrghir</i>	28.93	18.92	9.88	57.73
	<i>Pyrus pashia</i>	9.95	4.05	0.24	14.25
	<i>syzgium cumini</i>	4.26	1.35	0.01	5.63
	<i>Terminalia arjuna</i>	17.05	1.35	0.34	18.74
	<i>Tonna cilta</i>	8.53	1.35	0.10	9.98
	<i>Wendlandia heynei</i>	11.37	4.05	0.12	15.54
	<i>Wendlendis exerta</i>	12.79	6.76	0.40	19.95
	<i>Ziizyphus Mauratiana</i>	5.68	4.05	0.26	9.99
	Total	100.00	100.00	100.00	300.00

Figure No. 3.1

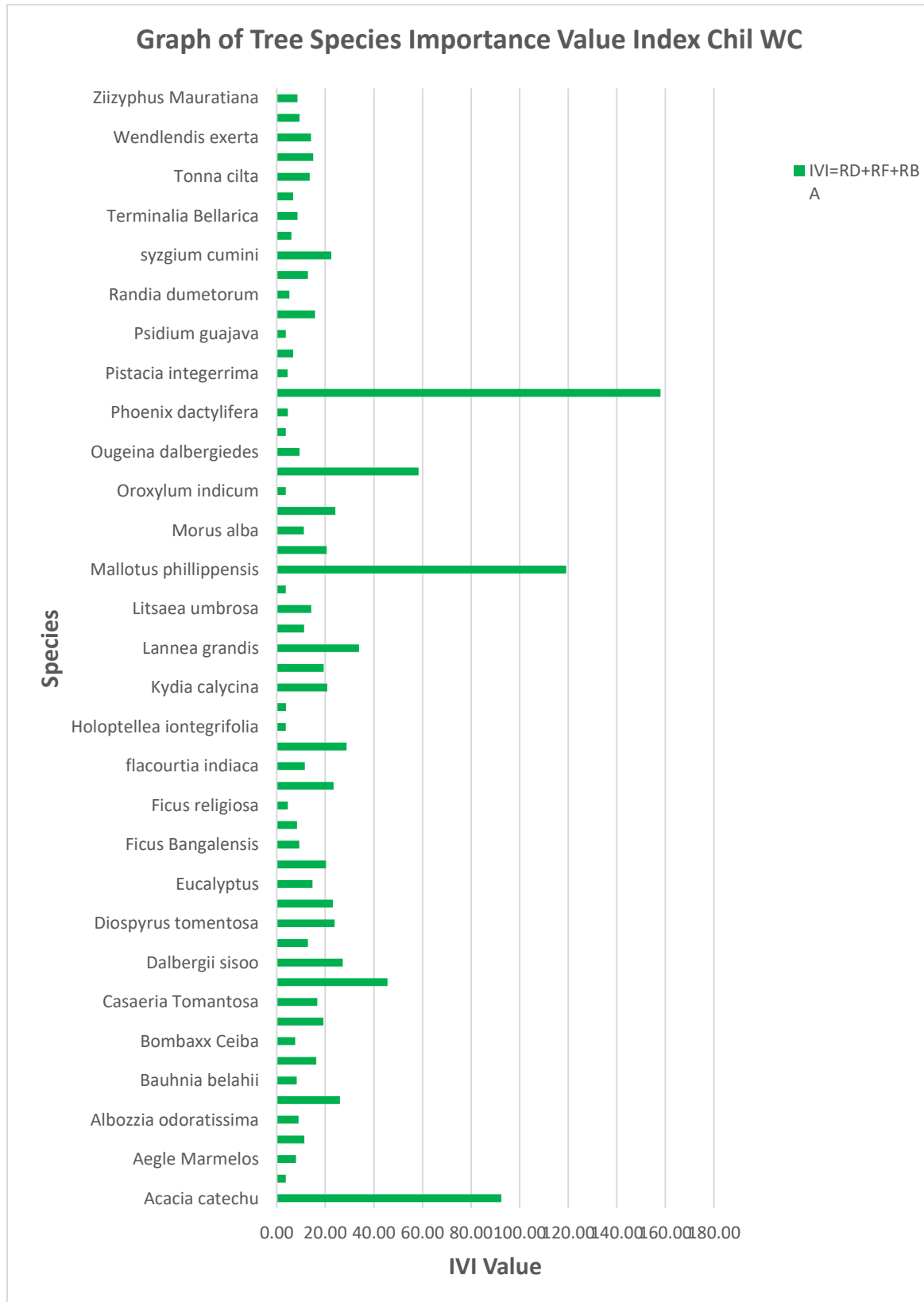


Figure No. 3.2

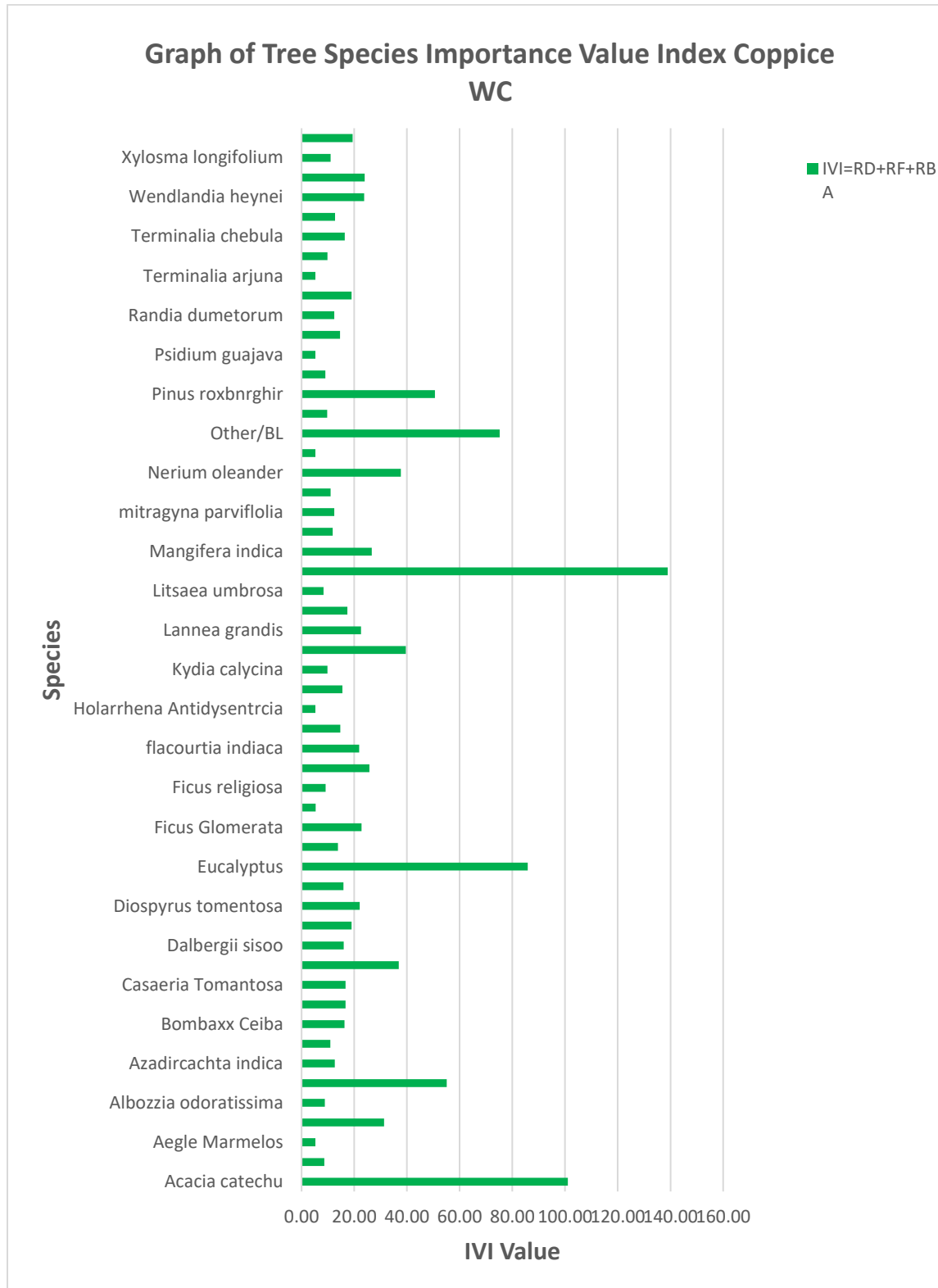


Figure No. 3.3

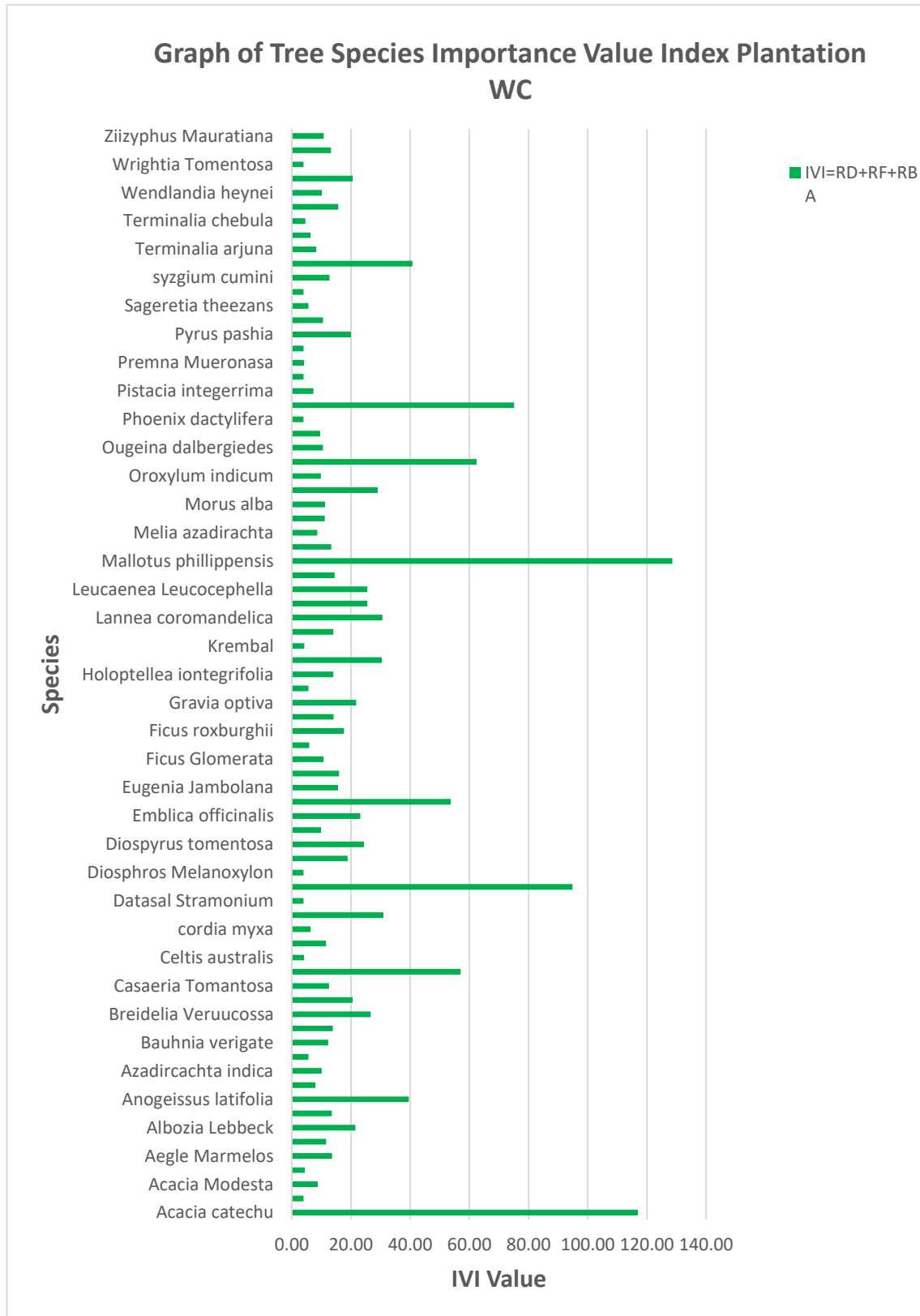
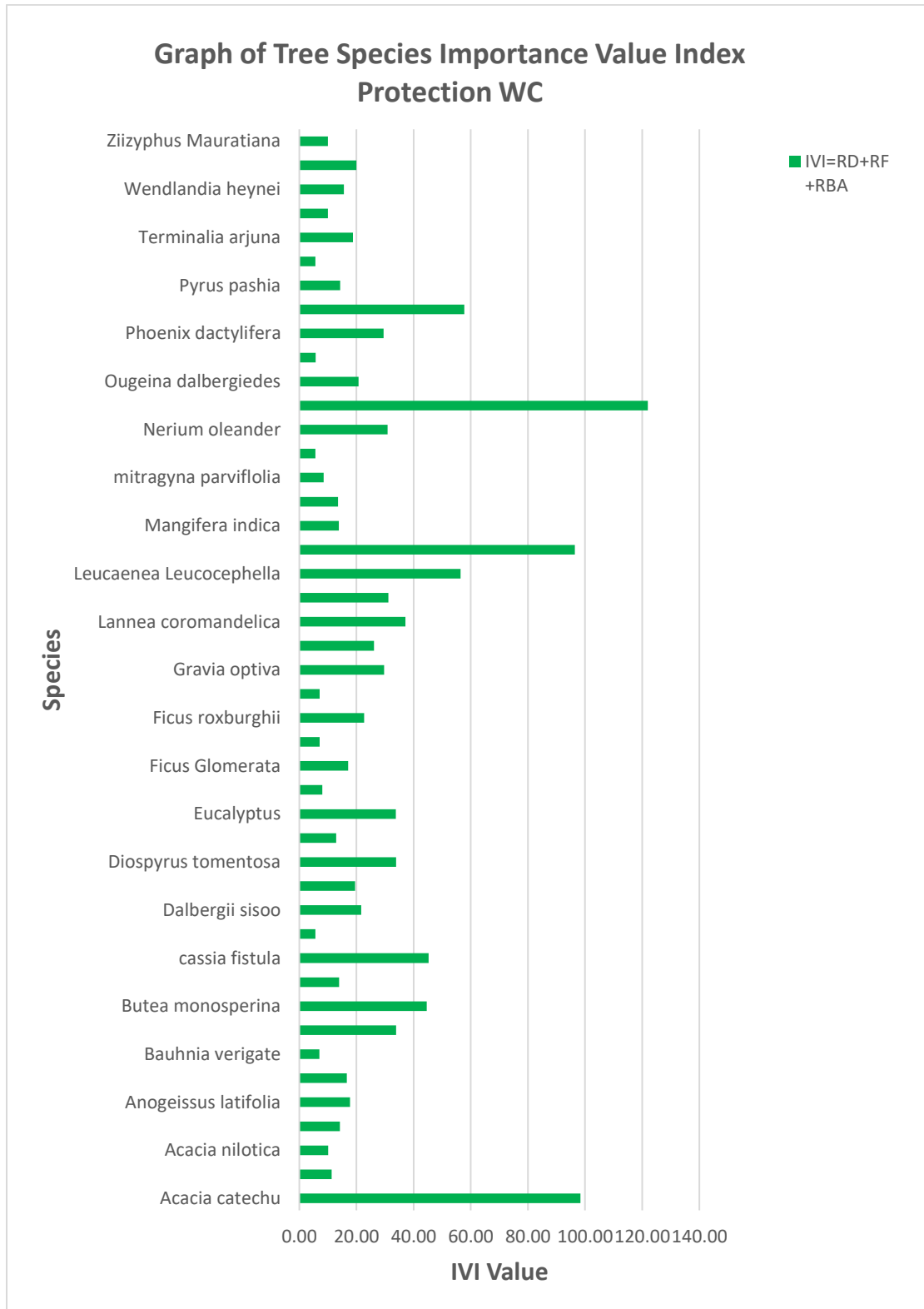


Figure No. 3.4

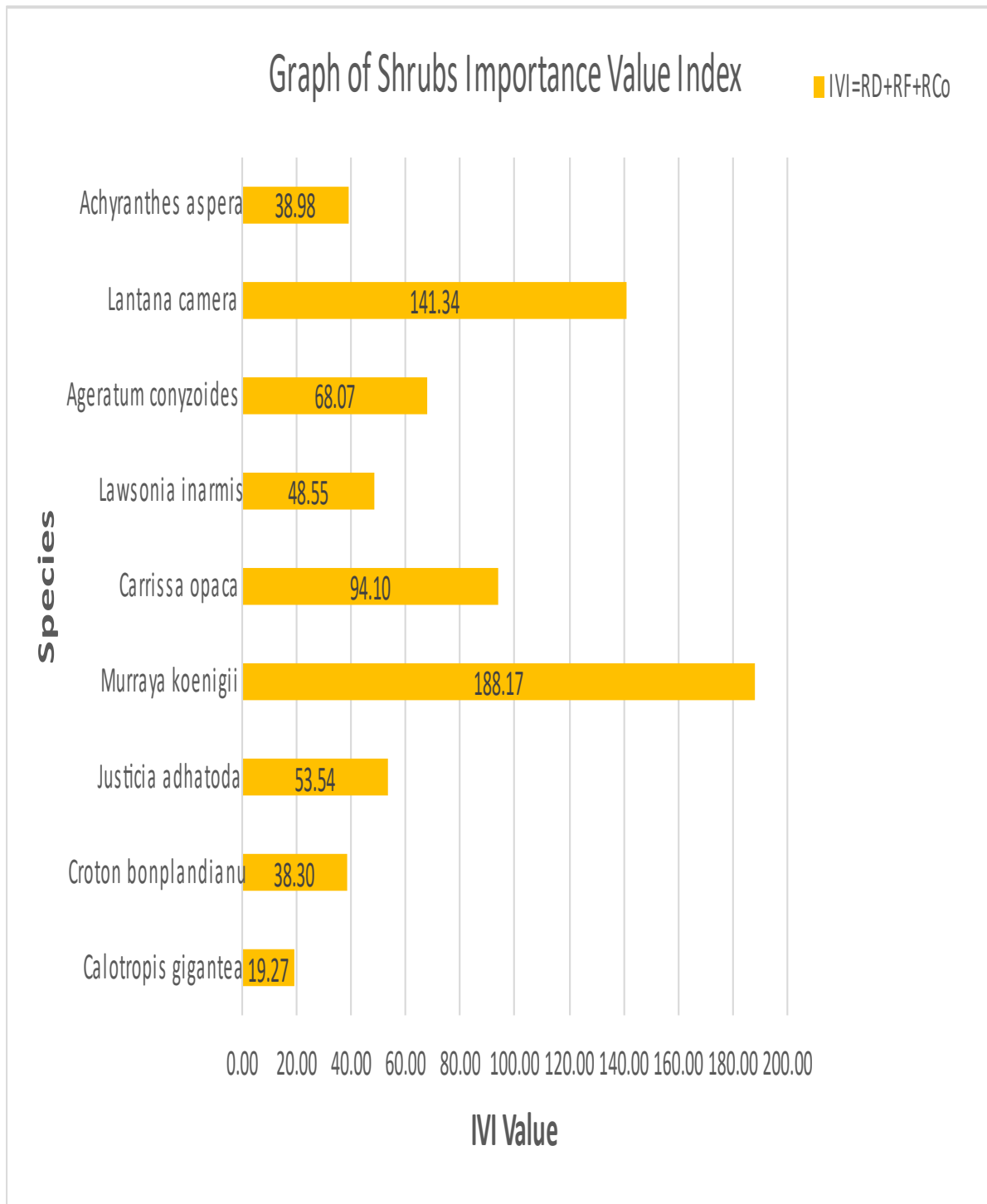


Ecological parameters of Shrub species

Table 3.2

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

Figure No. 3.5

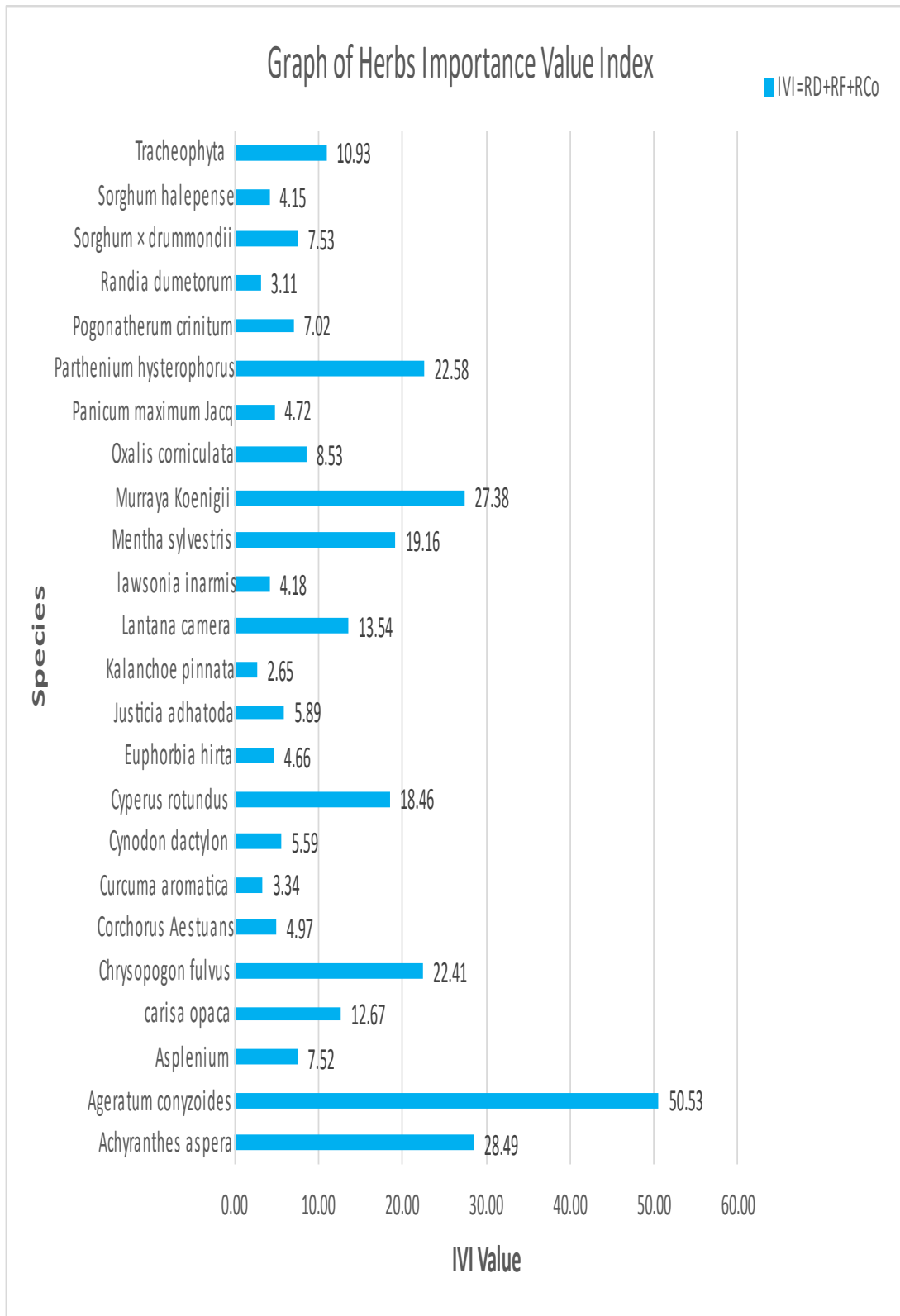


Ecological parameters of Herb species

Table 3.3

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

Figure No. 3.6



3.3 Endemic, rare and threatened species:

Species recorded were screened for their uniqueness with references in the literature. No species under Red Data Book was recorded. All the species recorded were abundant in nature. However, species like *Delphinium danudatum* and *Peristylus constrictus* were found to occur rarely. In a study conducted by Indian Institute of Remote Sensing, the rare plants encountered were: *Cynoglossum wallichii*, *C. glochidiatum*, *Dicliptera roxburghiana*, *Galium asparine*, *Kydia calycina*, *Rubus ellipticus* and *Selaginella subdiaphana*.

3.4 Medicinal Plants

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

3.5 Economically Important Species

There are many species that are considered important for food, fuel, fodder, fiber, timber, medicinal value, oil, gums and others. On these parameters many economically important species present in these forests are: *Acacia catechu*, *Dendrocalamus strictus*, *Moringa oleifera*, *Holoptelia integrifolia*, *Aegle marmelos*, *Emblica officinalis*, *Achryranthes aspera*, *Adhatoda vesica*, *Ageratum conyzoides*, *Azadirachta indica* and *Cannabis sativa*.

3.6 Status of biodiversity Conservation in Forests:

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

3.7 INJURIES TO WHICH THE CROP IS LIABLE:

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

3.7.1 Grazing

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

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

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

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

3.7.3 ILLICIT FELLING: -

Unauthorized felling by local people for private use as well for commercial use, have increased manifold. In the last decade with the increasing demand of timber and khair wood and availability of market thereof in adjoining areas, illicit felling and smuggling of timber/khair wood is not in prevent. They have become instance of organized illicit felling and smuggling; the field staff will have to be extremely cautious and vigilant to check this menace. Recent amendment of sec. 52 of I.F.A. will go a long way in checking illicit smuggling and felling of trees.

3.7.4 Soil Erosion: -

The geological formation of the is loose, unstable and prone to soil erosion. With the loss of vegetation cover, soil erosion has assumed dangerous proportions. The denuded hill sides, with sub soil exposed, is an example of destruction and lose of top soil. Areas in Kotla and Nurpur ranges are a testimony to this. Huge slips along nala and river banks are common. Streams like Dehar and Chakki create a havoc in rains due to floods, Heavy landslides and soil erosion worsen the situation. The silt and boulders carried by the hill torrents not only scour the bed and deepen it, but also cut, and widen the banks. The debris often spread in the adjoining agriculture fields with the loss of top soil, nutrient availability of the plant decreases, which further results in degradation. Suitable Soil conservation and management plans are a must in the region. The catchments of Yamuna, Giri and Bata have already been surveyed to determine the intensity of soil erosion Using the already available data, works should be initiated to stabiles the already eroded areas.

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

Area affected by Forest fires (Last 10 Years)

Table No. 3.4

Sr.No	Year	Total No of Case	Total Area burnt in Ha.	Percentage of Total area burnt
1	2012-13	94	567.75	1.06
2	2013-14	6	58.71	0.11
3	2014-15	11	56.65	0.11

4	2015-16	14	43.55	0.08
5	2016-17	42	208.15	0.39
6	2017-18	21	89.80	0.17
7	2018-19	161	2508.40	4.70
8	2019-20	27	133.08	0.25
9	2020-21	1	3.00	0.01
10	2021-22	68	268.25	0.50
11	2022-23	79	492.90	0.92
12	2023-24	2	14.50	0.03

3.7.6 CLIMBERS: -

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

3.7.7 PARASITES: -

Parasites feed on the sap of the host, weaken the tree prevents its growth and development and gradually cause its death. Banda (*Ioranthus spp.*) is the most common parasites found in Sal forests.

3.7.8 Drought: -

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

3.7.9 FROST: -

Severe frost is not common in this tract. However mild frost do occur every winter Young sal crop is damaged to great a extent by frost as it is frost tender.

3.7.10 STORMS: -

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

3.7.11 WILD ANIMALS: -

The damage caused by the wild animals is very rare. Wild boars, porcupines and monkeys do cause some damage to the crop, especially the young crop and regeneration by nibbling and digging.

3.7.12 INSECT PESTS: -

During 1948 heart wood borer (*Hoplocerambyx spinicornis*) attacked in epidemic form good quality areas of the division. This beetle breeds in the slash and felling refuse and is the most important insect pest of sal trees. In the recent past and currently no appreciable damage by the sal heart wood borer has been noticed. No, a day the fallen debris is removed as fuel wood and the better hygienic conditions are probably responsible for reducing the damage.

(II) Occasionally swarm of locusts may reach these localities and attack the foliage of the trees and cause considerable damage.

(III) Ordinarily a sporadic attack of geometrid leaf defoliator (*Ascotis selenaris*) takes place every year. This affects the growth of individual trees but there is never a large-scale damage.

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

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

3.7.13 THE FUNGI: -

Trees with developed heartwood are susceptible to attacks by the heart rotting fungi, polyporus spp. The spores of this fungus enter through the wounds. In the crop of coppice origin, it spreads from the stumps into the poles. The fungi cause rot in the trees locally termed as "GO". The rot is more common in the forest which are overgrazed, lopped or burnt annually. The mature and over mature trees are invariably affected by this rot. This not only reduced the quality of timber but also useful volume of trees.

Khair is lopped heavily for fodder, throughout the tract, Heavy lopping makes the trees susceptible to attack by a heart rot fungus, it is very difficult to find a sound khair trees. As almost all the khair trees are invariably affected by this heart rot.

3.8 FAUNA

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

3.8.1 ANIMALS

3.8.1.1 Leopard or Panther (*Panthera Pardus*)

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

3.8.1.2 The Himalayan Black Bear (*Selenarctos thibetanus*)

Kala Bhalu is a big animal found in high hills between 1500 to 3000 m and lives solitary in the caves deep in the forests except during mating season. The body is covered with thick coal to black hairs with V shaped mark on the chest. The males may measure slightly over two meters in length and weigh up to 200 kg. Females' area a little smaller and lighter. Bears hibernate during winter. It

descends down to lower elevations after snow fall. Though it prefers oak stands, it inhabits coniferous forests also. Being omnivorous it lives on variety of food such as wild fruits, berries, honey insects, rodents, even birds and small mammals. During spring and early summer black bears damage the saplings and poles of deodar and kail by peeling off the bark to lick the sap or resin exudes. It is very furious when provoked. Females are more dangerous than the males. This animal though categorized as big game and its hunting is only under permit it is killed by poaches for its skin gall bladder and fat.

3.8.1.3 Porcupine (*Hystrix Indica*)

Locally known as Sehl, Sehl or Sail, it is robust heavy and terrestrial. The whole of its back is covered with long and well developed quills which may be nearly 60 to 70 cm long. It feeds on vegetables, principally on roots and damages the young plants in nurseries and plantations, especially of walnut, chil deodar etc, the animal is fond of gnawing bones and when alarmed it utters a gruntling sound, erects its spines and inflicts injuries. It weighs about 10 to 15 kg. and is locally very much valued for its meat.

3.8.1.4 The Goral (*Nemprhaedus goral*)

It is stocky goat like animal, smaller than domestic goat with stout limbs and coarse hair. It is found from 1000 to 3000 m elevations. Gorals are found in groups with off springs of different ages feeding on rugged grassy glades or rocky grounds in the midst of forests. Its ideal habitat is thick undisturbed forests with glades of open grassy lands which it prefers to graze at dawn and dusk. It spends most of the day time in secluded spots in dense forest. The mating season is from October to December and the young ones are dropped in April to June. The animal is often hunted for its meat in winter when forests are under snow and it descends down to the villages.

3.8.1.5 The Barking Deer (*Muntiacus muntjak*)

It is known as kakar found between 800 to 2500 m elevation. Its colour is deep chest nut becoming darker on the back and pale and dull below. Its height shoulder is about 50 to 57 cm. The horns rarely exceed 13 cm. Generally, it utters a subdued chicking noise but when alarmend and in flight; the sound becomes a bark lilke cry from which the same barking deer is derived. The animal lives mostly in forests having very thick understorey and comes out to graze in the out skirt of forests in open clearing during night. It is a solitary animal and is rarely found in herds. The animal is diurnal in habit and its food is mainly grass, tender leaves of trees, shrubs and wild fruits. It is unmatched for flexibility and prowess of creeping through the tangled stands. The mating season is during winter months and youngs are born in spring. During winter it descends down. Being small in height, it cannot

run fast on snow and gets stuck up and gunned down easily. It is a sought-after animal for its meat. The high incidence of poaching has reduced the population an alarming low position. The destruction of the habitat of this animal is also the reason for its reduced population.

3.8.1.6 The sambhar (*Cervus unicolor*)

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

3.8.1.7 Common Indian Hare (*Lepus nigricollis*)

Locally known as Khargosh, Serru, or Kharha it is found everywhere but is more pronounced in lower regions in Sarahin and Narag ranges. It is a small size animal having about 40 to 50 cm length and about 2 kg. of weight. It feeds on grasses, seeds and fruits, it is hunted for its meat. It is harmful to nurseries and plants

3.8.1.8 Wolf (*Canis lupus*)

An animal little larger than domestic dogs and earthy brown in colour, was common in the area but due to its alleged preying on the domestic animals, it has been made nearly extinct.

3.8.1.9 The Jakal (*Canis Aurs*)

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

3.8.1.10 The wild Cat (*Felis benqalenis*)

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

3.8.1.11 The leopard cat (*Felis benqalenis*)

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

3.8.1.12 Mongoose (*Herpestes edwardsii*)

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

3.8.1.13 The Monkey (*Macca mulatta*)

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

3.8.1.14 The Langoor (*Presbytis entellus*)

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

OTHERS

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

3.8.2 BIRDS

TERRESTRIAL BIRDS

PHEASANTS AND FOWL GROUP

3.8.2.1 The Cheer Pheasant (*Catreus wallichii*):

It is a big bird about 90cm with long tail of about 60cm. The head has long narrow pointed crest with bare red skin around the eye in both the sexes. The colour is buffy white, barred with black above. The lower part is buff barred with steely black. It has got a special preference for bushy areas and open forest. In the recent past the bird has been nearly wiped off by the poachers in some of the localities. Its habitat is also heavily disturbed by grass cutting and cattle grazing. It has been declared as endangered species by I.O.C.N. (1979) Red data Book 'Aves'

3.8.2.2 The Red Jungle Fowl (*Fallus gallus*)

It is known as Jungli Murga or Kukar and is common upto 2000m altitude. It prefers lower scrub forests. It is a favorite bird of shikaris. It is believed to be the ancestor of all domestic fowls, found in pairs or parties. It is a very shy and conning bird, scuttles into cover on slightest disturbance or suspicion. The male is black below and red above. The tail has long coverts with dark metallic green, black and chestnut. The hens are plain streaked brown with rufous brown under parts. It roosts on thick crowned trees or bamboo clumps; feeds on grains, vegetable shoots, insects etc. Nesting season is generally from March to May.

PATRIDGE AND AUAILS GROUP

3.8.2.3 THE BLACK PARTRIDGE (*Francolinus francolinus*)

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

3.8.2.4 The Chakor (*Alectoris Graeca*)

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

The lower parts below the breast are buff and the flanks are beautifully banded with grey, buff, and chestnut. It is distinguished at once by the beautiful bearing of

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

3.8.2.5 The Grey Partridge (*Francolinus Pondicerianus*)

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

3.8.2.6 Jungle Bush Quail (*Predicula asiatica*)

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

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

It is almost the tailless partridge like bird called Bater. It is buffish- brown in colour with pale reddish brown and black streaks. It is found in pairs or parties in grass land and cultivations and hides very well in grass and bushes. It flies straight for a short distance. Their population swells during winter when they migrate from Central and Western Asia to this region. It feeds on grain, grass seeds and insects etc. Nesting season is from March to May. Rain Quail (*Contrunx coromandelica*) which migrates locally is also found in the lower regions but rather very rare.

DOVES AND PIGEON GROUP

3.8.2.8 Blue Rock (*Columba livia*)

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

3.8.2.9 Dove (*Streptopelia spp.*)

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

OTHERS

3.8.2.10 The Wood Cock (*Scolopax rusticola*)

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

Aquatic Birds

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

NON-GAME BIRDS

These are of two types viz. Raptors, and non-raptors. Raptors are the birds of prey such Hawks, Kestrels eagles, falcons, vultures and owls. Other birds of common occurrence are house and jungle crowns (*Corvus spp.*) the jungle babbler (*Turdoides spp*) bulbuls (*Chloropsis and Pyon-onotu*) King crow (*Dicrurus spp*) golden oriole (*Oriolus spp*) the common Myna (*Acridotheres spp*) the common baya (*Cloceus spp*) the wood pocker (*Dinopium spp*) parakeets (*Pisttacula spp*) common king fisher (*Atlthene spp*) Indian moorhens (*Gallinula spp*) herons bagula (*Egretta spp*) etc. These birds too are equally important froms aesthetic, forest cleanliness and health, farming, bird watching and balace of nature, point of view, some of the important raptors and non-raptors are described. Below: -

3.8.2.11 The Himalayan Griffon Vulture (*Gyps himalayensis*)

It is the largest bird with long naked neck and unfeathered bald head. A large gathering on an old carease of a domestic animal is the common sight. The other varieties of vultures observed in the tract are the Indian griffon long belled vultures and lammergeyer.

3.8.2.12 The Black Eagle (*Ictinactus malayenges*)

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

3.8.2.13 The Golden Eagle (*Aquila chrysetus*)

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

3.8.2.14 The Shahin Faloons (*Falco peregrinus*)

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

3.8.2.15 The Forest Eagle Owl (*Huhuna nepalensis*)

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

3.8.2.16 Parrot/ Parakeet (*Psittacidae himalayana*)

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

3.8.2.17 The Jungle Crow (*Corvus macrorhyniches*)

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

3.8.2.18 Wood Pecker (*Picus Squanmatus*)

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

3.8.3 SNAKES

3.8.3.1 The common Indian Krait (*Bungarus Caeruleus*)

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

3.8.3.2 The Himalayan Pit Viper (*Ancistrodon Himalayanus*)

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

CHAPTER 4

MAINTENANCE AND ENHANCEMENT OF FOREST HEALTH AND VITALITY

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

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

To supplement natural regeneration, abstract of plantations raised in the past in these forests is given in **Appendix III**

4.2 Area affected by forest fires:

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

It is obvious that there is no serious effort to report the losses and effect of forest fires, as a result fire management is given a low priority. But there is no denial of the fact that besides causing economic loss, loss to biodiversity, soil flora and fauna by forest fires is immense. To prevent forest fires, the following strategy should be followed.

1. Maintenance of fire lines. Fireline's over a length of 10 km have been constructed. The list of these fire lines is provided in Table 4.3. These firelines must be maintained annually removing the lines clear of leaf litter and other obstacles.
2. Working of bamboo forests is essential on a regular basis without which dry and dead culms become firehazard.
3. Watch towers be posted with fire watchers to keep an eye on the outbreak of smoke in the forests and report to the ground teams for quick response. A system needs to be developed for detection, reporting, dispatching and fighting fires within the shortest possible timelag.
4. The right holders and the JFM committees should be educated and trained to take necessary fire control measures in their areas.

Existing fire Lines as per previous working plan

Table 4.1

S No	Division	Fire Line	Length(km)
1	Dharamshala	P39 K Ranital C5a	1.6
2		P 43 Cheli Kareri	8.7
3		P 60 K Kuned	5
4		P 58 K Cheli Narwana	1.1
5		P 28 K Mansu	6.6
6		P 27 K Pathiar	4
7		P 12 K Raltung C14, C2	2.4
8		P3K Parkumal C2a	2
9		P4K Sunkanal C2a	2
10		P4K Sunkanal C2c	2.6
11		P45K Borusarna	1.5
12		P19K Chelli Dhar Thehr C2b,C2a	1
13		P14K Pandhwar C2b, 2d	9.6
14		P19 K Chelli Dhar Thehr C2b	1
15		P14K Pandhwar	2.6

4.3 Area damaged by natural calamities

Forests are affected by droughts, soil erosion and natural phenomena of frost. heavy mortality of trees even Frost is common during the winter months of December and January. Seedling to pole crop of Terminalia, Amaltas and Semal is

affected.

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

The whole forest is however closed to grazing in the rainy season from 1st July to 30th September.

It may be mentioned that there is no pasture land in the villages and the animals are totally dependent on the forest areas for grazing. Over the years the grazing pressure has increased due to increase in the number of cattle. Socio-economic survey done in 14 fringe villages of forests shows that the total livestock is 1835 of which cow represent 60.29 per cent, buffalo 38.24 per cent while goats accounted for 1.47 per cent only. It was noted that livestock rearing was not being used as a means of livelihood. The survey also showed that the cattle of about 40 per cent households grazed in the forest area as well as in the van panchayat areas. The stall feeding though not common was being practiced by people.

Due to incessant grazing and spread of lantana, the growth of palatable grasses has decreased and non-palatable species increased. The maximum representation is made by grass species like *Cenchrus ciliaris*, *Chrysopogon fulvus*, *Cymbopogon martini*, *Cynodon dactylon*, *Sacharum spontaneum*, *Setaria glauca* and *Sorghum halepense*.

4.4 Lopping practices:

Ban, Bamboos, bahera, kachnar, *Khair* and various other species are lopped for fodder. The lopping is usually carried out in the winter season when grasses are weathering. The loppers do not have consideration for the age of the tree when found in Government land, though they have the plan to restrict lopping to the younger trees on the lower half portion of the tree. Usually, trees upto the top leaving a few small growing branches at the top are spared. This heavy lopping leads to drying of trees in the season of severe cold and frost. Before 1903, villages used to lop bamboo for fodder in the rainy season when areas were closed for grazing. This harmful practice was abandoned in the interest of forests, again allowing the opening of forest throughout the year except for three months when culms are produced and established. This proposal was agreed to on behalf of the right holders and sanctioned by the Conservator of Forests in 1903. Under this condition no lopping is permitted but the forests are open to grazing

4.5 Area infested by invasive weed species in forests

Lantana camara, *Parthenium hysterophorus*, *Ageratum conyzoides* and *Cannabis sativa* are the invasive weed species that have overgrown in the area affecting the biodiversity. *Lantana camara* is by far the most obnoxious weeds of the lower and middle hills of Division locally called phulnu or panchphuli. The weed is considered to have been introduced from tropical Central America in 1810 AD. Because of its wide adaptability, prolific seed-bearing capacity and its ability to propagate vegetatively as well, fast growth and a strong light demanding habit, has invaded the forests in a big way. Being an alien species, it has invaded areas so thickly that it has affected the species diversity, productivity of land and thereby changing the ecology of the area. It has also deleterious effects on the health of animals, particularly cows, when browsed accidentally. Studies showed that in the infested areas, it neither favoured palatable nor non-palatable species under its cover. Because of its fast growth, it overtakes the economically important species and negates the effort of afforestation as well. So far, to eradicate *lantana* and utilize it for economic conversion to tradeable products or biomass energy have failed. According to our estimate about 40 per cent of the total forest areas is infested with *lantana*. Areas on moderated slopes where moderately dense crop has come up, *Lantana* has decreased, whereas areas with gaps are thickly infested with this weed. There are compartments where frequency of *Lantana* is 100 per cent and IVI is more than 100. There is a serious depletion of biodiversity in these areas.

Areas where *Lantana* removed

Table 4.2

Year Wise <i>Lantana</i> Cleared Area			
Year	Forest	comp	Area covered (Hac)
2012-13	UP 138 K Kareri	C-20	30
2013-14	-	-	-
2014-15	UP 97 K Kothru	C-7	5
2014-15	UP 26 K Galian		5
2014-15	UP 116 K Har	C-1	5
2014-15	UP 144 K Sakoh	C-7	5
2014-15	CFS Daloon	P-5	5
2015-16	UP 49 K Shiog		15
2015-16	P 14 K Pandwar	C-4b	10
2015-16	UP 236 K Kuthar	C-4b	15
2015-16	UP 144 K Sakoh		10
2015-16	P 48 KCB Chari	C-4b	20
2016-17	UP 249 K Sunhi	C-10	10
2016-17	UP 257 k MC Kangra		10

2016-17	UP 169 K Nandrool	C-1	10
2016-17	UP 169 K Nandrool	C-2	10
2016-17	UP 204 k Sakot	C-1	10
2016-17	P 49 K Sakot	C-1	10
2016-17	UP 254 K Chaklo		6
2016-17	UP 233 K Jheol C-2		5
2016-17	P 49 K Ranital	C-7C	5
2016-17	UP 49 K Sihog	C_1	5
2016-17	UP 72 k Pargod		5
2016-17	UP 36 k Manoh		5
2016-17	UP 145 k Dharnarwana	C-1	15
2016-17	UP 251 K Lunha		10
2016-17	UP 259 k Churar		5
2016-17	UP 29 K Bhoru Sarna		16
2016-17	UP 242 K Bandi	C-2	3
2017-18	P 58 K Chelli Narwana	C-1	5
2017-18	UP 254 K Kandi	C-11	5
2017-18	UP 170 K Maira	C-2	2
2017-18	UP 238 k bhangwar	C-1	5
2017-18	P 39 k Ranital	C-2a & 2b	5
2017-18	UP 204 k sakot	C-4	5
2017-18	UP 249k sunhi	C-2	5
2017-18	UP 190 K Ghatta	C-2	3
2017-18	UP 50 K Seeradak		3
2017-18	UP 140 K Chari	C-5	3
2017-18	CFS Gharoh	U -21	
2018-19	CFS Jhikli Kothi	U-34	3
2018-19	UP 213 K CB U.Kothiyan		5
2018-19	Up 182 K Gatta	C-2	5
2018-19	UP 248 k Balol	C-4	5
2018-19	UP 140 k Chari	C-5	3
2018-19	UP 54K Lapiana Khas		5
2018-19	UP 43 K Bharyal	C-3	5
2091-20	UP 74 K CB Kalroo	C-1	5
2091-20	UP 36 K Badanj	C-9	5
2091-20	P 10 K Sadun	C-2b	10
2091-20	P 53 K Kalfoon	C-1c	5
2091-20	P 48 KCB Chari	C-4	5
2091-20	P 60 K Kaned	C-4	1.5
2091-20	UP 213 KCB U/Kothian		10
2091-20	UP 247 K Chandroot	C-4	5
2091-20	UP 233 K Jheol	C.2	10
2020-21	UP 196 K Bag	C-2	2

2020-21	UP 169 K Nandrool	C-1	3
2020-21	UP 144 K Sakoh	C-5	2
2020-21	UP 140 k Chari	C-3	3
2020-21	P 10 K Sadoon	C-2b	4
2020-21	CFS J/Kothi	U-16	3
2020-21	UP 2013 K CB U/Kothian	C-1	2
2021-22	UP 167 KCB Rajal		5
2021-22	UP 145 K Dharnarwana	C-13	2
2022-23	-	-	-
2023-24	UP 30 k Manoh	5	5
2023-24	UP 54 k Khas		4
2023-24	P 53 K Kalfoon	C-1d	5
2023-24	UP 254 K Kandi C-11	C-9	5

4.6 Incidence of pests and diseases:

Termites though causing negligible damage in standing crops, but when feeding on dying and dead trees they destroy them and also fencing poles. Bamboos are also attacked by culm and shoot borer of the species *Cyrtotrachelus longimanus*. The bamboo leaf roller *Pyraus tabam bucovorais* reported to be a pest and particularly active in nallahs during July-October. The smooth naked pinked larvae feed inside the rolled leaves of the host and eventually they pupate in cocoons. Two to three leaves are sometimes rolled together. The species has four generations in a year.

Apart from that Khair and *Dalbergia sissoo* are attacked by *Ganoderma lucidum*, of which fruit bodies are found on the base of trees. In some situations, mortality of trees is found in patches. Khair is attacked by witches broom in some localities.

4.7 Forest degradation and its drivers:

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

changes are:

4.7.1. Invasion of *Lantana camara*: Due to heavy invasion the regeneration has ceased to occur.

4.7.2. Biotic pressure of the fringe villages: Biotic pressure due to grazing and illicit removal has damaged the crop and its regeneration.

4.8 Pollution Control and protection of environment

The forests near to the townships and habitation are prone to environmental pollution due to dumping of polythene, garbage and biotic pressure like encroachment, right of way, grazing etc. of the order which can affect their growth and quality.

CHAPTER 5

CONSERVATION AND MAINTENANCE OF SOIL AND WATER RESOURCES

5.1 Area treated under soil and water conservation measures:

The Dhauladhars, shivaliks and foot hills being geologically younger, suffer from various forms of land degradation as a result of faulty land management practices in the past and high rainfall zone. The steep slopes and undulating terrain accelerate soil erosion during the monsoon season giving rise to ever deepening gullies and landslides which further degrade productive lands and causes wide spread damage to infrastructure. Due to this reason, attempts have been made in the past under various schemes like Mid-Himalayan Watershed Development Project, Integrated development project (IDP), KFW project, JICA, CAMPA and various other departmental activities to rehabilitate the degraded hills through afforestation and soil conservation measures. The measures included construction of brush wood check dams, dry stone masonry check dams, continuous live hedges, crate wire structures in streams/ nullahs, silt retention dams, cement masonry structures and run-off drainage structures. along with this, landslides and land slips are being rehabilitated with vegetative and concrete structures. To recharge the ground water and to improve percolation, renovation of existing ponds is being done in the villages and new ponds are being constructed. Ponds are also maintained in the forest areas for the benefit of wild animals. to efficiently utilize the water for irrigation purposes in the area, Makkowal type tanks are constructed to improve irrigation facilities for cultivation of off-season crops and cash-crops. The implementation of such a technical package requires proper survey, planning, design of cost-effective structures, judicious integration of vegetative and mechanical measures and people “participation. Many earthen dams, artificial barrages, multipurpose dams with small and big reservoirs have also been constructed recently for augmenting irrigation facilities in this area, the detail of which is given in Table5.1 .

In the past working plan period, areas vulnerable to soil erosion in forests have been treated with soil conservation works of the above description, the details of which are given in Table 5.1.

Soil conservation works carried out in the past working plan period

Table 5.1

Year	Forests	Comptt. No.	Type of works
2012-13		-	-
2013-14		-	-
2014-15	Kangra		Van Sarovar
2015-16	Daultpur Nry.		Water Tank Water Facility
2015-16	Nandrool Nry		Water Tank Water Facility
2015-16	Tarsuh Nry.		Water Tank Water Facility
2015-16	Duki Nry.		Water Tank Water Facility
2015-16	UP 114 Ghar C-1	C-1	Water Pond
2015-16	UP 157 k Samirpur Khas		Water Pond
2015-16	UP 245 K Busal C-6	C-6	Water Pond
2015-16	Ranital		WHS
2015-16	CFS Khaniara U-21	U-21	Van Sarovar
2015-16	Up 204 K Sakot C-3	C-3	Van Sarovar
2015-16	UP 145 K Dharanarwana		Van Sarovar
2016-17	P 21 K Jol		Water Pond
2016-17	P 19 k Chali Dhar Ther		WHS
2016-17	P 9 K Sanantung		Water Pond
2016-17	CFS Sahahpur		Water Pond
2016-17	UP 26 K Narti		WHS
2016-17	P 19 k Chali Dhar Ther C-1d	C-1d	WHS
2016-17	UP 206 K 253 K Khawa C-9	C-9	WHS

2016-17	UP 206 K Amthrar		WHS
2016-17	P 6 K Paid		Water Pond
2016-17	Ehater Nalla in CFS Shahpur		Check Dam
2016-17	UP 18 k Lahari		Check Dam)3 Nos)
2016-17	P 3 K Rirkmar C-2a	C-2a	Check Dam)3 Nos)
2016-17	P 3 K Rirkmar C-1a	C-1a	Check Dam)2 Nos)
2016-17	P 2 k Darinidhar C-2	C-2	Check Dam)3 Nos)
2016-17	P 2 k Darinidhar C-5	C-5	Check Dam)3 Nos)
2016-17	UP 33 K Durgella		Check Dam)3 Nos)
2016-17	U 37 K Salol		Check Dam)4 Nos)
2017-18	P 19 K Chelidhar Ther C-1	C-1	Van Sarovar,Water Pond
2017-18	UP 60 K Harchakiyan		Van Sarovar,Water Pond
2017-18	UP 70 K Khola C-2	C-2	Van Sarovar,Water Pond
2017-18	UP 13 K Khariri		Van Sarovar,Water Pond
2017-18	UP 169 K Nandrool C-2	C2	Van Sarovar,Water Pond
2017-18	Dev. Of pond in P 28 K Manshu C1d	C-1d	Van Sarovar,Water Pond
2017-18	Dev. Of pond VC Tikri		Van Sarovar,Water Pond
2017-18	Dev. Of pond in UP 250 K Sarotari c-5	C-5	Van Sarovar,Water Pond
2017-18	Dev. Of pond in UP 252 K Sadun		Van Sarovar,Water Pond
2017-18	Dev. Of pond CFS Sudher U-13	U-13	Van Sarovar,Water Pond
2017-18	Dev. Of pond in CFS Khaniyara		Van Sarovar,Water Pond
2017-18	UP 242 K Jassai		Van Sarovar,Water Pond
2017-18	UP 175 K Janyankar		Van Sarovar,Water Pond

2017-18	UP 74 K Kalroo		Van Sarovar,Water Pond
2017-18	P 28 K Mansu C-3	C-13	Van Sarovar,Water Pond
2017-18	UP 139 K Dharamshala C-1	C-1	Van Sarovar,Water Pond
2017-18	P 40 KCB Kareri		Van Sarovar,Water Pond
2017-18	UP 146 K Kaned C-2	C-2	WHS
2018-19	P 48 K CB Chari C-2	C-2	Dry Stone Check Dam
2018-19	UP 139 K D/shala C-16a	C-16a	Dry Stone Check Dam
2018-19	P 40 KCN Kareri		Dry Stone Check Dam
2018-19	UP 223 K Gujrehra		Dry Stone Check Dam
2018-19	P 9 K Sanantung Mehar Nala		Dry Stone Check Dam
2018-19	P 2 K Dharnidhar C-7d	C-7d	Dry Stone Check Dam
2018-19	CFS Salol C-12	C-12	Dry Stone Check Dam
2018-19	P 48 KCB Chari C-2	C-2	WHS
2018-19	UP 139 K D/shala C-16 a	C-16a	WHS
2018-19	P 40 KCB Kareri		WHS
2018-19	UP 224 K Gujrerea		WHS
2018-19	P 9 K Sanantung Mehar Nala		WHS
2018-19	P 2 K Darinidhar C7d	C-7d	WHS
2018-19	CFS Salol C-12	C-12	WHS
2018-19	Nandrool Nry		WHS
2018-19	P 21 k Jole		WHS
2018-19	UP 36 K Branj		WHS
2018-19	UP 70 K Khola		WHS
2018-19	UP 255 K Patiyar		WHS
2018-19	UP 149 K Remaher		WHS

2019-20	UP 70 K Khola C-2	C-12	WHS
2019-20	UP 140 K Chari C-3	C-13	WHS
2019-20	CFS Sudhed U-19	U-19	WHS
2019-20	UP 36 K Baranj		WHS
2019-20	UP 12 K Talla		WHS
2019-20	CFS Danoa U-35	U-35	Water Pond
2019-20	UP 253 K Khawa C-15	C-15	Water Pond
2019-20	UP 145 K D/Narwana C-3	C-3	Other Work
2019-20	UP 223 K Honsti U/Kotiyan		Other Work
2019-20	CFS Jhikli Kothi		Other Work
2019-20	UP 24 K Sihuan M/Gran		Other Work
2019-20	P 63 K Civil Forest C-4	C-4	Other Work
2019-20	UP 115 K dadoli Lunj		Other Work
2019-20	UP 74 KB Kalri Pargore		WHS
2019-20	UP 97 K Majakara D/pur		WHS
2019-20	R/wall in UP 204 K Sakot C-4	C-4	R/Wall
2020-21	UP 250 K Sarotari C-5	C-5	Water Harvesting Structure
2020-21	UP 12 k Bandal C-1	C-1	Water Harvesting Structure
2020-21	UP 126 K Check Van Gallian C-2	C-2	Water Harvesting Structure
2020-21	UP 116 KL Har C-1	C-1	Water Harvesting Structure
2020-21	UP 101 K Pathiar C-1	C-1	Water Harvesting Structure
2020-21	UP 70 K Khola C-1	C-1	Water Harvesting Structure
2020-21	UP 74 K Check Van Kalru C-2	C-2	Water Harvesting Structure
2020-21	UP 60 K Harchkian (W)	(W)	Water Harvesting Structure

2020-21	UP 149 K Romehar C-5	C-5	Water Pond
2020-21	P 58 K Cheli Narwana C-4	C-4	Water Pond
2020-21	UP 252 k saddun C-5	C-5	Water Pond
2020-21	UP 254 K Khawa C-14	C-14	Water Pond
2020-21	UP 209 L owch		Water Pond
2020-21	UP 119 K Jhararu		Water Pond
2020-21	UP 73 K Bhareta C-1	C-1	Water Pond
2020-21	UP 69 K Nargeta (W)	(W)	Water Pond
2020-21	UP 74 K Check Van Kalru		Water Pond
2020-21	UP 86 K Gubber		Water Pond
2020-21	UP 91 K Badrella		Water Pond
2020-21	UP 90 K Nera		Water Pond
2020-21	UP 36 K Branj		Water Pond
2020-21	P 14 K Pandwar		Water Pond
2020-21	P 21 K jole		Water Pond
2020-21	UP 149 K Romehar	C-1	Dry Stone Check Dam
2020-21	UP 145 K D/Narwana	C-13	Dry Stone Check Dam
2020-21	CFS J/Kothi	U-78	Dry Stone Check Dam
2020-21	UP 215 K Nehar	C-1	Dry Stone Check Dam
2020-21	UP 252 K saddun	C-5	Dry Stone Check Dam
2020-21	P31 K Saddun	C-1a	Dry Stone Check Dam
2020-21	P 28 K Mansu	C-1a	Dry Stone Check Dam
2020-21	UP 254 K Khawa	C-14C-8	Dry Stone Check Dam
2020-21	UP 251 K Kandi	C-8	Dry Stone Check Dam
2020-21	P 28 K Mansu	C-1c	Dry Stone Check Dam
2020-21	P 27 K Pathiar	C-2	Dry Stone Check Dam
2020-21	UP 34 K bhadiara		Dry Stone Check Dam

2020-21	UP 134 K Darini		Dry Stone Check Dam
2020-21	UP 135 K Bhamnehar		Dry Stone Check Dam
2020-21	UP 100 K Chamni	C-1	Dry Stone Check Dam
2020-21	P 24 K Lunj	C-4d	Dry Stone Check Dam
2020-21	UP 47 K Sirmani		Dry Stone Check Dam
2020-21	Up 92 K Gujrera		Dry Stone Check Dam
2020-21	P 15 K Salwana		Dry Stone Check Dam
2021-22	P 2 K Dharnidhar	C-5	Dry Stone Check Dam
2021-22	UP 1 K Lam	C-2	Dry Stone Check Dam
2021-22	P 12 K Raltung		Dry Stone Check Dam
2021-22	CFS Banala		Dry Stone Check Dam
2021-22	P 3 K Rirkmar	C-1d	Dry Stone Check Dam
2022-23	UP 224 K Gujrera		Dry Stone Check Dam
2022-23	UP 31 K Sadoon	C-1	Dry Stone Check Dam
2022-23	UP 31 K Sadoon	C-5	Dry Stone Check Dam
2022-23	CFS Jalot	U-8	Dry Stone Check Dam
2022-23	UP 18 k Lahari		Dry Stone Check Dam
2022-23	CFS Daloon	U-20	Dry Stone Check Dam
2022-23	CFS Arela	P-31	Loose Stone C/dam
2022-23	CFS Danao	U-45	Loose Stone C/dam
2022-23	UP 253 k Khawa	C-10	Gabin Check Dam
2022-23	UP 254 K Kandi	C-2	Loose Stone C/dam
2022-23	UP 247 k Chandroot	C-5	Gabin Check Dam
2022-23	UP 248 k Balol	C-4	Farm Pond
2022-23	UP 179 K Jather	C-1	Dry Stone Check Dam
2022-23	UP 176 k Paniyarkar	C-1	Dry Stone Check Dam
2022-23	UP 192 k Panjlehar	Whole	Gabin Check Dam

2022-23	UP 195 K Dugail	C-1	Gabin Check Dam
2023-24	UP 9 K Rirkmar		Dry stone check dam
2023-24	P44KCB Dulli	C-2d	Dry stone check dam
2023-24	P2K D/Dhar	C-5	Dry stone check dam
2023-24	UP2k Har		Create Wire Check Dam
2023-24	UP 1K Lam	C-1	Dry stone check dam
2023-24	UP 21KCB Bhaniyar		Dry stone check dam
2023-24	CFS Dohab	S-2	Dry stone check dam
2023-24	P12k Raltung	C-2	Dry stone check dam
2023-24	UP 13k Kharidi	C-3	Dry stone check dam
2023-24	P5K Tal Bhanala	C-1c,C-1d	Dry stone check dam
2023-24	UP32K Rehlu		Dry stone check dam
2023-24	UP 33K Dargella		Dry stone check dam
2023-24	UP 26k Nerti	C-7a	Dry stone check dam
2023-24	UP 26k Nerti	C-7c	Dry stone check dam
2023-24	CFS Salol	U-37	Dry stone check dam
2023-24	UP 27k Rajol		Dry stone check dam
2023-24	UP 62 K Dibber		Dry stone check dam
2023-24	UP 70 K Khola		Dry stone check dam
2023-24	UP 52 k Dibber	C-7	Dry stone check dam
2023-24	UP 114 K Har		Dry stone check dam
2023-24	P 25 k Ghalian	C-3b1	Dry stone check dam
2023-24	UP 117 K Kalari		Dry stone check dam
2023-24	UP 99 K Governand	C-2	Dry stone check dam
2023-24	UP 128 K Badi Bahi	W	Dry stone check dam
2023-24	P 14 k Pandwar	C-2a	Dry stone check dam
2023-24	P 14 k Pandwar	C-1d	Dry stone check dam

2023-24	P 15 k Salwana	C-2d	Dry stone check dam
2023-24	CFS yol	U-2	Dry stone check dam
2023-24	CFS khaniyara	P-13	Dry stone check dam

5.2 Duration of water flow in the selected seasonal streams:

There are records to show that a number of perennial streams were flowing into the forests of Dharamshala Forest Division, not in the distant past, however due to biotic interference and grazing in the forests, the intensity of erosion had increased to such an extent that these streams turned into seasonal streams and instead the loads of silt blocked the paths of streams and turned them into flash flood channels. There are a number of *nullahs* in the forests wherein the flow of water is resumed only during the rains. Even the soil and water conservation measures along with afforestation have so far not been able to resume flow in these streams/nullahs.

5.3 Wetlands in forest areas: There are no wetlands in the forests.

5.4 Water level in the wells in the vicinity (upto 5 km) of forests area

Due to overexploitation of water through hand pumps and tube well specially in changer areas of Mallan, Kangra and Lapiana ranges, the depth of water in most parts of these ranges between 100 to 200metres below groundwater level except in the foot hill zone parts where it is less than 100 m. The decadal fluctuation in water level is between 1m to 4m. On an average the water table is declining at the rate of 10 cm per year.

As per the assessment done in 2020-2021 by the Central Groundwater Commission, out of 128 hydro-geological blocks into which the state is divided, 19 blocks fall in kangra district which has shown rise in water table by 8.88 meters and are not over exploited most of these white or safe blocks are situated in the hilly zone of the state. In the sub-mountainous area of the state, there is a tremendous scope for watershed management. The role of forests in conserving water and recharging the water table is well known. Retaining of forest cover in this area can save the water.

CHAPTER 6

MAINTENANCE AND ENHANCEMENT OF FOREST RESOURCE PRODUCTIVITY

6.1 Growing stock of Wood:

Analysis of growing stock is necessary to know the capacity and potential of the forest to have tree growth and also to calculate harvestable yield in the working plan as also for future management to maintain the forest in the similar condition as a selection forest. As the objective of forest management is gradually shifting towards regular flow of income and ecosystem services to local community keeping conservation and ecological security as the larger objective, the harvestable yield and the increment of the forest has to be considered to arrive at the crucial decision of sustainable management. In Dharamshala forest Division the main crop is Chil, which is being managed under shelter wood working system, Chil forests are also being managed under shelter wood working system and rest of the forests are being managed under selection system.

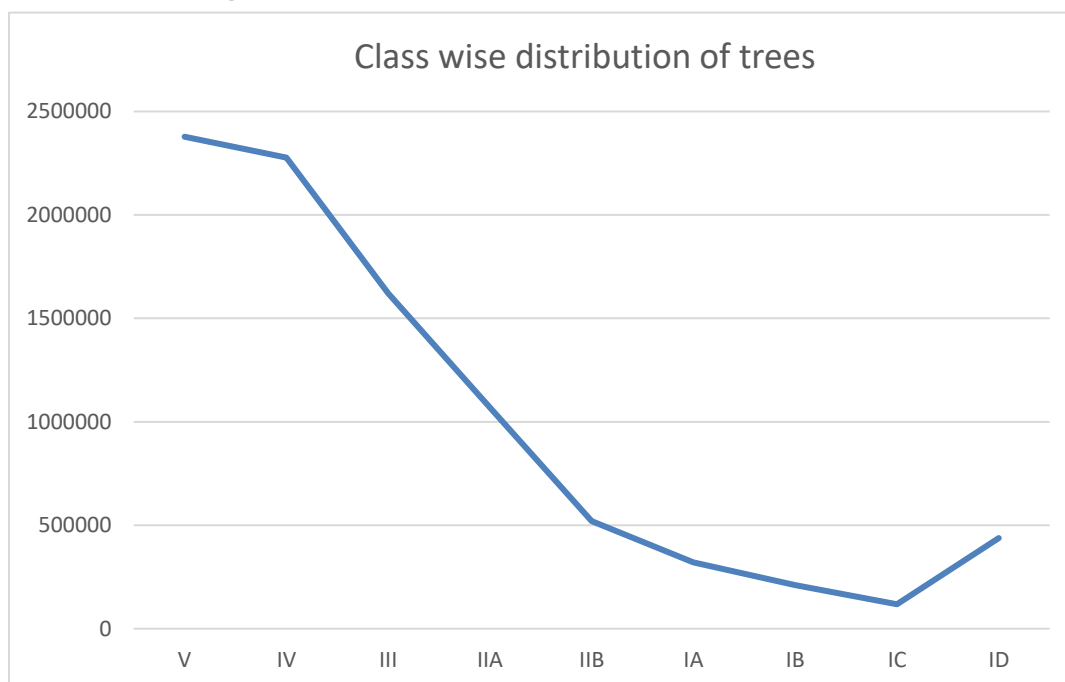
6.2 Estimation of Total Growing Stock: Forest Resource Assessment methodology as prescribed in the “National Working Plan Code-2014” was used to assess the total growing stock of trees and biomass. In each working circle number of sample plots were laid out using systematic sampling tools after reconnaissance of the forest area so that representation of all site qualities, type and structure of forests was ensured. Detail of sample plots, their geographical coordinates and compartments are given in Annexure 1a. The details are also shown in Fig 6.1 to 6.3. While approaching the sample plot observational assessment of site quality, tree species, composition, its health, density and crop age etc. were recorded in the Plot Approach Form I. Presence of special features such as blanks, scattered trees, plantations raised etc. were noted. Information on NTFP yielding species, intensity of invasive species, faunal sights and their traces, special wildlife habitats and drivers of deforestation were recorded.

After reaching the sample plot, a square plot of 0.1 ha was laid out measuring 22.36m horizontal distance i.e. half of the diagonal in all the four directions. After checking the dimensions of the plot, latitude, longitude and altitude coordinates were recorded. The main plot was used for recording the trees and bamboo stocking. The enumeration of trees was done by measuring the diameter/girth of each tree found in the sample plot. In case of bamboos, each clump was enumerated by taking its height, number of first, second and three-year-old culms, dried, congested culms and overall condition of the culms. Information on regeneration and status of crop, injury to crop, grazing incidence, fire incidence, soil type, gradient of slope etc. were gathered and recorded.

The data of shrubs, climbers and regeneration status from all quadrats of 3m×3m laid out at a distance of 30 metres from the centre of the main plot of 0.1ha was collected and recorded in the plot enumeration form. The data of herbs from all nested quadrats of 1m×1m laid within each quadrat of 3m×3m was collected and recorded in the plot enumeration form. The recorded data was analysed compartment wise to find the stocking of trees and other ecological parameters

The results show that growing stock is represented by about 28 tree species in various proportions. The most predominant species include *Pinus roxburghii*, *Acacia catechu*, *Cassia fistula*, *Terminalia tomentosa*, *Syzygium cumini*, *Holoptelia integrifolia*, *Lannea grandis*, *Butea monosperma* and *Bauhinia variegata*. Going by the number of trees, it is apparent that Chil, Deodar, Khair, Ban, Rai tosh and miscellaneous BL species contributed 26.46%, 0.78%, 10.89%, 16.15%, 0.74%, and 44.98% to the total growing stock, respectively. However, going by the volume Chil, Deodar, Khair, Ban, Rai tosh and miscellaneous BL species contributed 57.16%, 20%, 0.30%, 15.78%, 1.62% and 19.94% respectively. This is because the young age class of trees predominate and mature age class was deficient. This was further evident when diameter classes were plotted against number of trees. The trees of 60cm and above diameter class were less. But it must be conceded that the except this deficiency, the forest is fairly balanced. This graph however does not give the picture that how many more trees can be accommodated in the higher diameter classes. From the structure and composition of forest, it will be advisable to develop the forest as a selection forest with fair distribution of trees of all classes and species.

Fig 6.1: Number of Trees in diameter classes

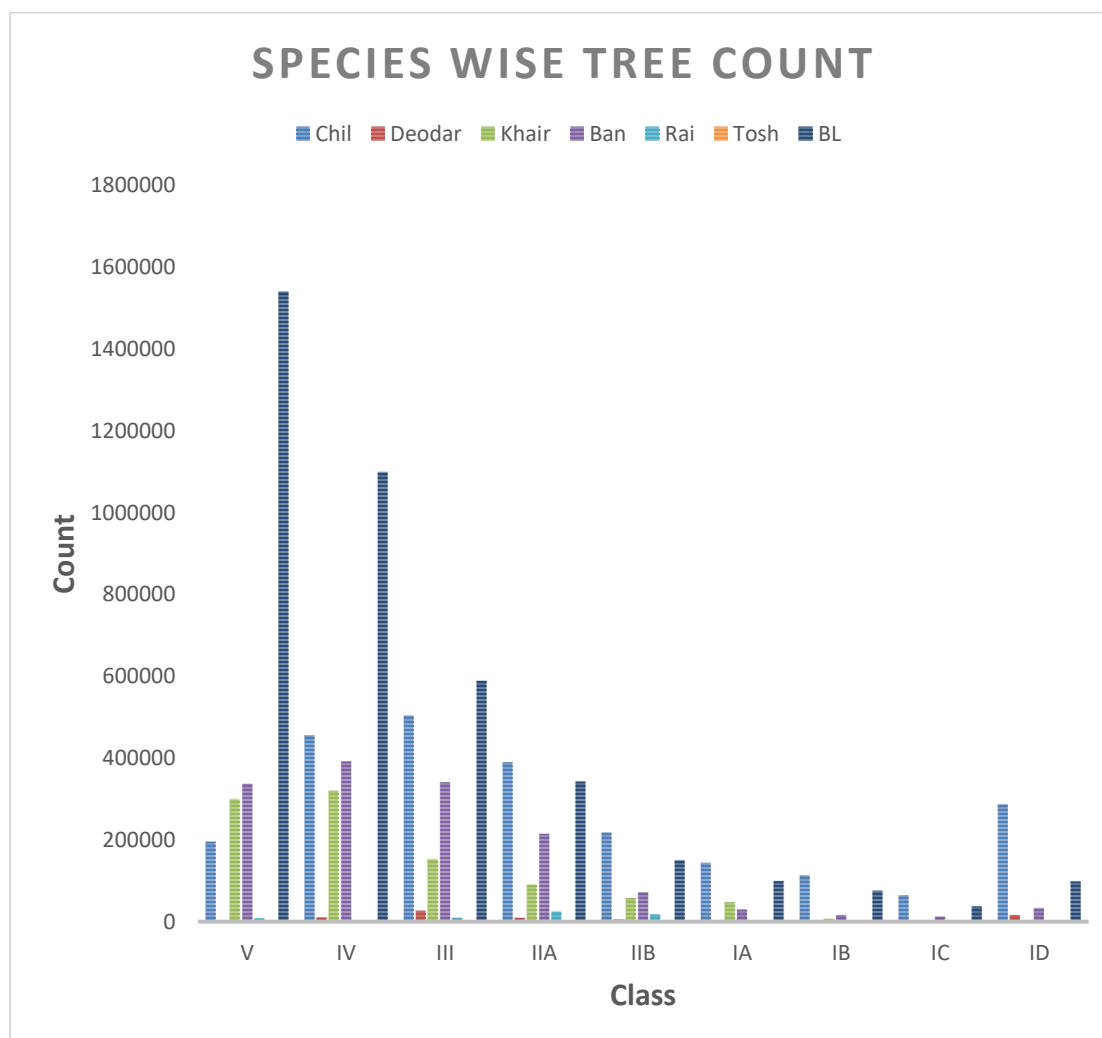


Total Growing Stock (No. of Trees)

Table 6.1

Class	Chil	Deodar	Khair	Ban	Rai	Tosh	BL	G. Total
V	195087	1435	297649	336520	7636	0	1539598	2377925
IV	455093	9789	318959	391517	2399	1909	1097980	2277646
III	503927	26585	152175	340903	8952	0	588577	1621119
IIA	389377	9001	89631	214826	23469	560	342623	1069487
IIB	217884	5374	57273	71707	16707	1682	149602	520229
IA	143587	839	47485	29644	0	0	98831	320386
IB	112773	0	6995	15977	0	0	75333	211078
IC	64614	2519	1909	11958	0	0	37209	118209
ID	286986	15114	3177	32935	2243	0	98110	438565
G. Taotal	2369328	70656	975253	1445987	61406	4151	4027863	8954644

Figure 6.2

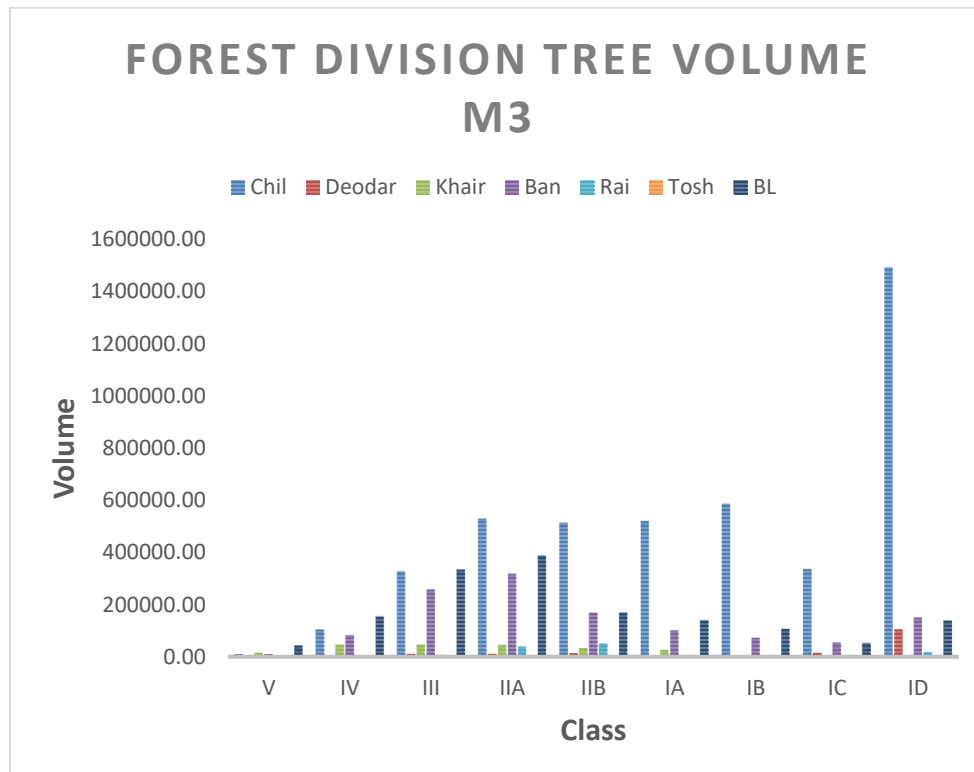


Total Growing Stock (total volume)

Table 6.2

Class	Chil	Deodar	Khair	Ban	Rai	Tosh	BL	G. Total
V	9754.35	0.00	14138.33	10095.60	0.00	0.00	43108.74	77097.02
IV	104671.39	1370.46	45451.66	82218.57	335.86	267.26	154815.18	389130.38
III	327552.55	11165.70	44739.45	255677.25	7519.68	0.00	333134.58	979789.21
IIA	529552.72	11341.26	43874.37	315794.22	39427.92	940.80	387849.24	1328780.53
IIB	514206.24	12790.12	31213.79	167794.38	51457.56	5180.56	169349.46	951992.11
IA	519784.94	2936.50	25879.33	99900.28	0.00	0.00	139845.87	788346.91
IB	586419.60	0.00	3812.28	72535.58	0.00	0.00	106596.20	769363.65
IC	335992.80	15164.38	1040.41	54289.32	0.00	0.00	52650.74	459137.64
ID	1492327.20	105798.00	1731.47	149524.90	18841.20	0.00	138825.65	1907048.42
G. Taotal	4420261.79	160566.42	211881.06	1207830.10	117582.22	6388.62	1526175.65	7650685.87

Figure 6.3



6.3 Increment in volume of identified timber species:

On moderate sites to which these forests subscribe rate of growth of khair in diameter and height is given in Table 6.6

Table 6.3 Rate of growth of diameter and height for Khair

Table 6.3

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

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

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

To enhance the productivity of forests, it is imperative to stock the blank areas by planting with improved planting material. Further well drained soils can be planted with Khair and However, the success of the plantation will depend on the eradication of lantana till the establishment age after which the species will take care to suppress lantana with their shade. In the identified areas, teak and *Diospyros tomentosa* should be planted for better productivity. There is a considerable scope to enhance the productivity of these forests with silvicultural measures and providing protection.

6.5 Carbon stock:

Biomass studies for carbon stock assessment are carried out separately for each working circle of Dharamshala forest division the enumeration of stock is done as per the methodology adopted by the Forest Survey of India for conducting National Forest Inventory. From these observations, the above ground biomass is calculated. For below ground biomass, biomass of litter, rhizomes and the soil is taken separately and added to the above ground biomass to arrive at the total

biomass. The carbon stock is finally calculated using the biomass-carbon relationship applied by the FSI. Thus, total carbon stock of these forests is arrived at. This will be useful as a baseline to find out the carbon sequestration capacity of these forests and their management keeping in view this object in mind.

6.5.1 Carbon Estimation of Forests:

6.5.1.1 Soil Carbon:

Soil organic carbon is next to above-ground biomass in terms of its contribution to the incremental total carbon stock in forests and plantations. There is also a relationship between soil organic C and the site characteristics such as the deciduous or evergreen vegetation, climate and rainfall conditions. During Resource Assessment Survey, soil samples were collected from each compartment as per the standard procedures. These samples were tested for C content in the soil laboratory of the FRI. The results are produced below:

Table 6.4

Working Circle	Total area (ha)	Soil wt. (MT)	Soil C %	Total Soil C (MT)
Chil	10252.05	25783905	1.97	510521
Oak	2102.85	5296212	2.01	106453
Coppice	1022.60	2571839	1.83	47064
Plantation	8120.69	2042800	0.92	18793
Protection	39136.59	98428523	2.01	1978413
Total	60634.78	134123279		2661244

6.5.1.2 Biomass estimation of forests:

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

Biomass estimation of Trees

Table 6.5

Sr no	Working Circle	Total Growing Stock	Biomass of Tree Bole	Biomass of Roots	Biomass of Branches	Total Biomass
		Volume (Cum)	(qtl.)	(qtl.)	(qtl.)	
1	Chil	1205073.26	673635	134659	13466	821760

2	Oak	598800.63	359280	71820	7182	438282
3	Coppice	174925.30	104885	20966	2097	127948
4	Plantation	1325459.42	793949	158710	15871	968530
5	Protection	4346427.24	2429652	485687	48569	2963908
	Total	7650685.85	4361401	871842	87185	5320428

6.5.1.3 Total Carbon Content:

On the basis of estimates given in the previous paras, the total carbon content in the forest (except shrubs and herbs) of the tract has been arrived as under (Table 6.6).

Total Carbon Content (tonnes)

Table 6.6

TOTAL AREA	SOIL CARBON (MT)	TREE CARBON (MT)	TOTAL CARBON (MT)
60634.78	2661244	138331	2799575

The estimates show that total carbon contained in the forests is 46.17 tones/ha. It must be mentioned that the carbon content of shrubs and herbs which make a major part of carbon pool in these forests has not been calculated. Of the total carbon, contribution by soil carbon is the maximum and contribution by tree is significantly low. This show that here is a large potential for enhancing the carbon sequestration of these forests.

6.6 Carbon sequestration and mitigation:

Efforts will be taken to enhance the carbon sequestration of these forests taking the calculated carbon stock as the baseline. It must be recognized that a balanced crop having representation of all diameter and height classes is ideal for maximum carbon sequestration. A growing forest, with healthy and vigorous crop is the signature for the maximum sequestration crop. Forest soil must be kept as healthy and fertile as possible and the forest crops must be kept as vigorous as possible to produce as rapidly as they can till the biomass production attain

CHAPTER 7

OPTIMISATION OF FOREST PRODUCE UTILISATION

7.1 Recorded removal of timber:

The following Annual yield was prescribed in the previous working plan

Table No. 7.1

Sr. no	WC	PB	FS-I	FS-II	FS-LLL
1	Chil	I	4000	900	700
		II	-	-	-
		III	700	-	130
		IV	1700	200	350
		Total	6400	1100	1180
2	Oak		-	-	-
3	Khair (O)		13600 trees per annum all FS		
4	Coppice		34 Hac per annum all FS		
5	Protection		Only salvage removal		

The year wise removals of timber species is as under

Table No. 7.2

Sr. No.	Year	Removals through HPSFDC			
		Species	Trees	MG	Volume
1	2012-13	Deodar	22		25.13
		Kail	3		2.94
		Chil	6779		5541.91
		Shishasm	161		66.729
		B/L	12		13.925
		Khair	617	369.34	
		Total	7594	369.34	5650.634
2	2013-14	Deodar	291		117.67
		Kail	51		36.9
		Rai	1		0.14
		Chil	22835		17846.86
		B/L	339		183.021
		Shishasm	21		10.855
		Khair	1639	765.1	
		Total	25177	765.1	18195.446
3	2014-15	Deodar	1		2.38
		Chil	19375		19320.41
		Shisham	61		31.226

		Tuni	2		0.707
		B/L	105		48.659
		Khair	353	220.19	
		Total	19897	220.19	19403.382
4		Chil	10648		9921.32
		Eucalyptus	1		1.415
	2015-16	Khair	255	162.5	
		B/L	2		2.664
		Shisham	40		10.66
		Total	10946	162.5	9936.059
5		Chil	4750		4660.42
		Shisham	59		24.038
	2016-17	Khair	307	195.66	
		Total	5116	195.66	4684.458
6		Chil	13968		12739.66
		Khair	1045	775.03	
		B/L	1		1.415
	2017-18	Shisham	89		38.518
		Safeda	6		5.376
		Total	15109	775.03	12784.969
7		Khair	1527	944.378	
		Shisham	21		11.595
		Chil	8326		7704.56
		B/L	40		37.688
	2018-19	Deodar	44		37.9
		Kail	6		5.88
		Total	9964	944.378	7797.623
8		Khair	926	620.37	
		Shisham	42		7.694
		Chil	7646		7106.02
		B/L	7		7.533
	2019-20	Kail	30		26.04
		Deodar	147		86.45
		Total	8798	620.37	7233.737
9		Khair	1707	936.2	
		Shisham	15		20.425
		Chil	9749		9026.03
		Deodar	4		10.96
		B/L	42		54.721
	2020-21	Total	11517	936.2	9112.136
10		Khair	265	196.38	
	2021-22	Shisham	5		2.554

		Chil	7224		7658.4
		B/L	80		30.07
		Total	7574	196.38	7691.24

Removals through Right Holders

Table No. 7.3

S. No.	Year	Nos of Sanction TD	Species	Nos of Trees	Volume in CUM
1	2011-12	-	-	-	-
2	2012-13	12	Chil	12	20 Cum
3	2013-14	03	Chil	03	6.35Cum
4	2014-15	65	Chil	65	189.84
		22	Rai	22	72.43
		13	Shisham	13	13.40
		03	Alsan	03	2.654
		01	Tosh	01	2.380
		01	Jamun	01	1.332
		01	Duri	01	1.332
		03	Eucalyptus	03	4.162
Total 2014-15		109	-	109	287.53
5	2015-16	67	Chil	67	198.91
		07	Rai	07	26.52
		03	Shisham	03	2.80
Total 2015-16		77	-	77	228.23
6	2016-17	95	Chil	95	253.95
		07	Shisham	07	7.76
		08	Rai	08	38.08
		01	Safeda	01	1.132
Total 2016-17		111	-	111	300.922
7	2017-18	85	Chil	85	291.212
		01	Kail	01	3.50
		10	Shisham	10	13.196
		12	Rai	12	58.86
		01	Duri	01	2.66
Total 2017-18		109		109	369.428

8	2018-19	60	Chil	60	189.241
		13	Rai	13	56.24
		01	Jamun	01	1.132
		01	Safeda	01	0.566
		21	Shisham	21	20.70
		03	Tuni	03	3.879
Total 2018-19		99		99	271.750
9	2019-20	69	Chil	69	208.872
		30	Shisham	30	31.860
		02	Duri	02	2.309
		01	Tuni	01	1.333
		02	Rai	02	4.760
		01	Safeda	01	1.332
		01	Jamun	01	1.332
Total 2019-20		106	-	106	251.614
10	2020-21	76	Chil	76	214.175
		20	Shisham	20	21.578
		01	Alsan	01	1.332
		08	Rai	08	39.21
		01	Safeda	01	1.132
		01	Tuni	01	1.415
Total 2020-21		107	-	107	278.842
11	2021-22	79	Chil	79	255.263
		27	Shisham	27	22.639
		02	Tuni	02	0.566
		01	Deodar	01	1.260
		05	Rai	05	21.370
		02	Safeda	02	2.830
		01	Alsan	01	1.332
Total 2021-22		116	-	116	305.260

12	2022-23	75	Chil	75	256.431
		22	Shisham	22	23.101
		04	Safeda	04	5.294
		01	Alsan	01	2.35
		03	Tuni	03	3.975
		02	Rai	02	9.144
Total 2022-23		107	-	107	300.295
13	2023-24	62	Chil	62	168.04
		12	Shisham	12	12.306
		01	Safeda	01	1.415
		03	Rai	03	9.830
		03	Tuni	03	3.832
		02	Jamun	02	4.832
Total 2023-24	83	-	-	83	200.255

7.2 Recorded removal of fuelwood:

Forest fringe community uses different types of fuels like fuelwood, crop residues, cow dung cakes, electricity and LPG for cooking. On the basis of socio-economic survey done by the FRI, per capita consumption of fuelwood is 5.50 kg/day/household. The number of households in 287 fringe villages was estimated to be 38270. According to this scale the total consumption in the 220 fringe villages comes to 144320 tonnes per annum. The socio-economic survey showed that fuelwood was the major source of energy for forest fringe households for cooking and heating. Fuelwood provided 89.75 per cent of total energy requirement which clearly reflects very high dependency. The fuelwood uses also depended on state of affluence of household. While the poor people were solely dependent on fuelwood, the affluent class used both fuelwood and LPG for cooking. The major source of fuelwood was forests as 43.7 per cent was extracted from the forest, while 39.8 per cent was obtained from their own land. However, 16.5 per cent of fuelwood consumption was obtained from the market.

Out of this consumption about 50 per cent is extracted from the forests and the rest is met from the agriculture fields or areas closed under Section 4&5 of the Punjab Land Preservation Act, 1900. Even this rate of removal by rightsholders is substantially responsible for degradation of forests areas in the fringes. However, it must be recognized that headload removal of fuelwood by villagers has decreased substantially over the past working plan period due to increasing prosperity and availability of LPG in the villages.

7.3 Recorded removal of locally important NTFPs including MAPs:

There is a wide scope of planting, augmentation, harvest and marketing of NTFPs in these forests. Based on these products, various income generating activities can be promoted in the area. Following are the important produces having potential for value addition and marketing:

1. Amla (*Emblica officinalis*)
2. Desi mango (*Mangifera indica*)
3. Giloe(*Tinospora cordifolia*)
4. Gandla(*Murraya koengii*)
5. Basuti(*Adhaoda vesica*)
6. Arjun (*Terminalia arjuna*)
7. Behera (*Terminalia balerica*)
8. Harer (*Terminalia chebula*)
9. Jamun (*Syzygium cuminii*)
10. Kachnar (*Bauhinia variegata*)
11. Ritha (*Spindus mukorossi*)
12. Bel (*Aegle marmelos*)
13. Brah (*Rhododendron spp.*)
14. Ber (*Zizyphus mauritiana*)
15. Khajoor (*Phoenix sylvestris*)
16. Daru (*Punica granatum*)

17. *Khair (Acacia catechu)*
18. *Atis (Aconitum heterophyllum)*
19. *Basuti (Adhatoda vasica)*
20. *Brahmi (Centelia asiatica)*
21. *Ak (calotropis procera)*
22. *Jung (Dioscorea deltoides)*
23. *Gandla (Murraya koenigii)*
24. *Dhoop (Jurinea macrocephalo)*
25. *Jatamansi (Nardostachys grandiflora)*
26. *Kutaki (Picrobiza kurroa)*
27. *Chirata (Swertia chirayata)*
28. *Mushakbala (Valeriana jatamansi)*
29. *Banafasha (Viola pilosa)*

Grass is however the only NTFP that is given free of cost to the JFMCs for fodder and other uses. There is no other NTFP worth the name that is sold or auctioned. However, there is a large potential of NTFPs such as amla fruits, bael fruits, medicinal plants that can sustain livelihoods of the neighbouring people.

7.4 Demand and supply of timber and important non-timber forest products

Local timber market is very well established. Khair is traded for its heartwood. A *local katha factory* has a demand for Khair wood. It also imports timber from other states.

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

CHAPTER 8

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

8.1 JFM Committees and areas protected by them

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

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

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

This resolution is an attempt to evolve a proactive and people friendly framework for meaningful implementation of the Programme, though the

detailed operational modalities to translate these concerns have not been spelt out.

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

8.2 JOINT FOREST MANAGEMENT IN HIMACHAL PRADESH:

In 1985, social forestry was given impetus by National Social Forestry (Umbrella) Project. The project achieved its objective of planting, 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. These were more participatory than previous Forest Department Projects. 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. The framework for JFM in HP is provided by the Government of HP order of 12 May 1993, which followed the June 1998 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. Donor support of Mandi and Kullu districts continued until March 2001. Until 1998, JFM in HP was confined to donor-supported pilot activities (DFID, GTZ, World Bank). The participation was the buzzword from Delhi, a group of four FD staff were 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. To support the state JFM Order, Participatory Forest Management (PFM) Rules were developed for HP, and notified on 23rd 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 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. The resulted in the 'New SVY,' rules and guidelines being announced by the GoHP in August 2001. They contains provisions for VFDSs to become, in legal terms 'the forest officer'(not notified as on July 2011) for levying fines etc, and for 100 percent share in intermediate usufructs while on final harvest 75 percent would go to the VFDS and 25 percent 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 guard will not be the member secretary of the Executive Committee; but local organizers-usually led by a literate woman linked to a local community-based organization, helps mobilize 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 for furnish a 'utilisation certificate' which can be monitored and checked.

At the policy level the PFM Rules and SVY Rules and SVY Rules and Guidelines of August 2001 are seen as a major step forward, laying the basis of 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 a 100 percent central sachem, 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 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 Km2 distributed in RFS, DPFs & UPFs. In March, 2005, 1690 JFMCs are reported covering a forest area of over 4200 Kms. As of December 2008, 1381 JFMCs

stand listed. However, as per field reports only 986 of these are said to be active. In March,2010, a total of 1109 JFMCs have been reported covering again an area of about 4200 Kms.

Table 8.1

List of functional VFMS under HPFECF, KFW Project					
Sr. No	Range	Name of VFMS	Scheme under made	Area in ha	Present Status
1	Dharamshala	Tahu	HPFECF, KFW Project	25.09	Functional
2	Dharamshala	Sokni da Kot	HPFECF, KFW Project	20.5	Functional
3	Dharamshala	Sarah	HPFECF, KFW Project	29.85	Functional
4	Dharamshala	Lunta	HPFECF, KFW Project	24.95	Functional
5	Dharamshala	Patialkar	HPFECF, KFW Project	34.25	Functional
6	Dharamshala	Karahpura Dhaloon	HPFECF, KFW Project	32.5	Functional
7	Dharamshala	Bhitloo	HPFECF, KFW Project	32.6	Functional
8	Dharamshala	Chari	HPFECF, KFW Project	32.7	Functional
9	Dharamshala	Rin	HPFECF, KFW Project	52.6	Functional
10	Dharamshala	Rakkar	HPFECF, KFW Project	21.5	Functional
11	Dharamshala	Bhatala	HPFECF, KFW Project	20.75	Functional
12	Mallan	Jule	HPFECF, KFW Project	31	Functional
13	Mallan	Mallan	HPFECF, KFW Project	66.2	Functional
14	Mallan	Narwana Khas	HPFECF, KFW Project	51.23	Functional
15	Mallan	Massal	HPFECF, KFW Project	29	Functional
16	Mallan	Sihund	HPFECF, KFW Project	57.15	Functional
17	Mallan	Khawa	HPFECF, KFW Project	27.5	Functional
18	Mallan	Baguleher	HPFECF, KFW Project	94.2	Functional
19	Mallan	Plah Chaklu	HPFECF, KFW Project	73.2	Functional
20	Mallan	Jalot	HPFECF, KFW Project	55.2	Functional
21	Mallan	Sadoon Bargram	HPFECF, KFW Project	76.1	Functional
22	Mallan	Kandi	HPFECF, KFW Project	34.4	Functional
23	Mallan	Baldhar	HPFECF, KFW Project	42.4	Functional
24	Mallan	Danoa	HPFECF, KFW Project	56.9	Functional
25	Mallan	Eirla	HPFECF, KFW Project	35.55	Functional
26	Mallan	Saroot Dholru	HPFECF, KFW Project	42.2	Functional

27	Mallan	Dadkar	HPFECF, KFW Project	63.15	Functional
28	Mallan	Touru	HPFECF, KFW Project	23.5	Functional
29	Mallan	Chaprer	HPFECF, KFW Project	26.8	Functional
30	Mallan	Samara	HPFECF, KFW Project	56.2	Functional
31	Shahpur	Bhanala	HPFECF, KFW Project	93.8	Functional
32	Shahpur	Sadon (Shahpur)	HPFECF, KFW Project	28.15	NonFunctional
33	Shahpur	Salol	HPFECF, KFW Project	63.65	Functional
34	Shahpur	Kiyari	HPFECF, KFW Project	32.8	Functional
35	Shahpur	Shahpur	HPFECF, KFW Project	31.95	Functional
36	Shahpur	Maherna	HPFECF, KFW Project	75.75	Functional
37	Shahpur	Rirkmar	HPFECF, KFW Project	36.1	Functional
38	Shahpur	Tiara	HPFECF, KFW Project	61.85	Functional
39	Shahpur	Harnera	HPFECF, KFW Project	69.2	Functional
40	Shahpur	Har Boh	HPFECF, KFW Project	59.7	Functional
41	Shahpur	Darini	HPFECF, KFW Project	35.2	Functional
42	Shahpur	Tarkhankar	HPFECF, KFW Project	56.1	Functional
43	Kangra	Nandrool	HPFECF, KFW Project	57	Functional
44	Kangra	Rajal	HPFECF, KFW Project	44.3	Functional
45	Kangra	Morth Jassai	HPFECF, KFW Project	35	Functional
46	Kangra	Ratiyar	HPFECF, KFW Project	20.85	Functional
47	Kangra	Lahar	HPFECF, KFW Project	22.75	Functional
48	Kangra	Balu Galoa	HPFECF, KFW Project	31.75	Functional
49	Kangra	Amatrar	HPFECF, KFW Project	21.7	Functional
50	Kangra	Bhatti	HPFECF, KFW Project	24.75	Functional
51	Kangra	Tarsuh	HPFECF, KFW Project	31.9	Functional
52	Kangra	Jheol	HPFECF, KFW Project	58.5	Functional
53	Kangra	Samirpur	HPFECF, KFW Project	31	Functional
54	Kangra	Daulatpur	HPFECF, KFW Project	72.6	Functional
55	Kangra	Janainkar	HPFECF, KFW Project	43	Functional
56	Lapiana	Gahliyan	HPFECF, KFW Project	48.15	Functional
57	Lapiana	Harchakiyan	HPFECF, KFW Project	78.85	Functional

58	Lapiana	Lapiana	HPFECF, KFW Project	58.1	Functional
59	Lapiana	Dharkalan	HPFECF, KFW Project	83.9	Functional
60	Lapiana	Bhrooplaha	HPFECF, KFW Project	60.85	Functional
61	Lapiana	Manai	HPFECF, KFW Project	62.8	Functional
62	Lapiana	Pandhwar	HPFECF, KFW Project	60.25	Functional
63	Lapiana	Kothru	HPFECF, KFW Project	71	Functional
64	Lapiana	Upper Lunj	HPFECF, KFW Project	71	Functional
65	Lapiana	Nagreta	HPFECF, KFW Project	73.4	Functional
66	Lapiana	Pargor	HPFECF, KFW Project	75.3	Functional

VFDS functional Under JICA Project

Table No. 8.2

1	Shahpur	Bankhandi Mata Bhaled	JICA Project	20	Functional
2	Shahpur	Kanol-I	JICA Project	20	Functional
3	Shahpur	Lingru Nag	JICA Project	20	Functional
4	Shahpur	Manoh	JICA Project	20	Functional
5	Dharamshala	Tharu	JICA Project	20	Functional
6	Dharamshala	Balh	JICA Project	20	Functional
7	Dharamshala	Falotha	JICA Project	20	Functional
8	Dharamshala	Kutharna	JICA Project	20	Functional
9	Dharamshala	Khadi Behi	JICA Project	20	Functional
10	Dharamshala	Thathri	JICA Project	20	Functional

Table No. 8.3

Name of JFMC under Sanji Van Yojna in Dharamshala Forest Division				
Sr.No.	Name of Range	Name of Block	Name of JFMC	JFMC wise Afforestation carried out (in hac.)
1	Kangra	Ranital	Thtathal	30
2		Kangra	Rajal	55
3		Kangra	Nandrool	60
4		Kangra	Mundladhar Lilly	30
5		Kangra	Tarsuh Bhatti	40
6		Daulatpur	Saretta Duguail	15
7		Ghurkari	Chakloo Tarengu	25
8	Dharamshala	Kareri	Rawa	30
9		Kareri	Sel	26
10		M/Ganj	Bahl	21
11		D/shala	Gilar Bhera	25
12		Khaniyara	Chowla	26
13	Shahpur	Rait	Manoh	45
14		Rait	Nangla	30
15		Rirkmar	Dibba	60
16		Rirkmar	Rulhed	50
17		Rirkmar	Kanol	45
18		Shahpur	Mahar Chemdera	36
19		Shahpur	Paid Chhatrooh	32
20	Lapiana	Lunj	Jatehar	37
21		Lunj	Prai	38
22		Lunj	Talla	32

23		Lapiana	Nera/Sardwal	32
24		Lapiana	Dhar	30
25		Pandwar	Pandhu	48
26		Pandwar	Bhandrella	39

CHAPTER 9

ADEQUACY OF POLICY, LEGAL AND INSTITUTION FRAMEWORK

9.1 Existing policy and legal framework and their compliance:

The management of forests is guided by the National Forest Policy, 1988. The main principles of this policy are forest conservation and management of forests through the participation of people, for the welfare of the people leaving behind the revenue generation in the colonial past. The policy recognizes that due to relentless pressure arising from ever-increasing demand for fuelwood, fodder and timber, inadequacy of protection measures, diversion of forest lands to non-forest uses and tendency to look upon forests as revenue earning resource was leading to depletion of forests. The policy reiterates that the national goal should be to have a minimum of one-third of total land area of the country under forests or tree cover. On the hills and mountainous region, it aimed to maintain two third of the area under forests. The policy also exhorted a massive need-based and time bound programme of afforestation and tree-planting on all degraded and denuded lands in the country. The policy also admitted that natural forests which serve as a gene pool resource and help to maintain ecological balance should be safeguarded for providing sustained benefits to the entire community. To further strengthen the policy, the Convention on Biological Diversity adopted in 1992 has affirmed that the states have sovereign rights over their biological diversity resources and that they are responsible for conserving their biological diversity and for using them in a sustainable manner.

To achieve the goal of sustainable management of forests, the State Government has prepared Himachal Pradesh Forest sector Policy and Strategy 2005. To augment the forest resources, the state is implemented a Japan Bank for International Cooperation aided Project (JICA) and World Bank funded IDP projects for afforestation, soil and water conservation works and joint forest management initiatives. Besides this state government is also investing through State Plan, centrally sponsored scheme and CAMPA.

Legal protection is provided to the forests through various acts and regulations. The Forest (Conservation) Act, 1980 is being implemented in the State w.e.f. 25th October, 1980. Similarly, Wildlife (Protection) Act, 1972 is being implemented in the state w.e.f. 1976. The Indian Forest Act, 1927 was adopted in the state before independence. The Act provides the procedure for declaration of protected and reserved forests and also control over forests, timber and other forest produce. It also lays down the penalties and procedure for contravention of the Act and gives certain powers to the forest officers to deal with the situations while implementing the Act. The Indian Forest (Punjab Amendment) Act, 2004 has enhanced the punishments under Section 42 and 62 to two years of

imprisonment or fine which may extend to five thousand rupees or both. It also prescribes procedure for confiscation of seized property under Section 52 (A to G). Section 68 of the amended Act empowers the forest officers not below the rank of Divisional Forest Officer to accept as compensation under sub-section (a) up to five thousand rupees and every illicit felling of tree shall be treated as a separate offence. In compliance of the order dated 30.10.2002 passed by the Hon'ble Supreme Court of India, the state has formulated rules called "Regulation of Saw Mills, Veneer and Plywood Industries Rules, 2006 to regulate wood-based industries in the state (Annexure III).

9.2 Status of approved working plan and compliance:

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

Status of prescriptions and their compliance

Table 9.1

S.No	Prescription	Working Circle	Status
1.	Closure for grazing	All circles	Not strictly implemented
2.	Felling / removals	Chil, Coppice	No felling done due to ban on green felling only salvage removals of dry and fallen trees was done and removals by right holders in shape of TD and free grant done
3.	Soil and water conservation measures	All Circles	Carried out under the EAP project Campa and other schemes. Many areas were left.
4.	Plantations	All working circles and specially plantation and protection wc	Plantations done in some areas, but blank area still existing
5.	Active participation of Forest Protection Committees	All circles	No visible impact noticed
6.	Development of Water holes	Wildlife Protection circle	Not done
7.	Construction of new buildings	Misc-regulation	New buildings were constructed
8.	Checking and maintenance of forest boundaries	Misc. regulation	Not done as per programme provided

9.3 Number of forest offences:

The forest offences commonly committed in these forests include illicit felling of Chil, Khair and other B/L trees by right holders and lopping for fodder and, domestic fuelwood consumption, grazing of animals in the closed areas etc. Other than petty offences, no major incidences are reported from the area. The number of cases booked and taken to the court of law are provided in the Table 9.2.

Number of offences and their settlement

Table 9.2

S.No.	Year	No. of damage reports issued	No. of trees involved	No. of damage reports compounded (Current + Previous)	Compensation amount (Rs.)	Court cases/ FIR with Police
1	2011-12	596	150	674	405177	00
2	2012-13	623	140	691	670731	00
3	2013-14	345	162	295	913794	00
4	2014-15	412	136	450	3096633	00
5	2015-16	303	78	294	401313	00
6	2016-17	171	13	205	186769	04
7	2017-18	152	23	166	200982	00
8	2018-19	139	28	113	114642	04
9	2019-20	265	11	209	281192	00
10	2020-21	408	66	414	664680	00
11	2021-22	254	46	224	514876	00
12	2022-23	207	72	315	537227	01

9.4 Status of research and development:

The following research studies pertaining to these forests have been made:

1. Experiments in outer Himalayas have shown that *Lantana camara* suppresses the growth of both palatable grasses and non-palatable herbs under its canopy. Further it reduces biodiversity of the area.
2. Experiments by the University of Horticulture and Forestry, Solan have shown that bamboos can reduce the growth of Lantana under its shade.

9.5 Human resource capacity building efforts:

For human resource development on a sustainable basis, importance of regular training of staff at all levels cannot be overemphasized. The forest training institutions at Sundernagar as H.P.F.A. sunderangar and FTI Chail is equipped with modern training tools and teaching aids to impart training to staff members. In the past years, special trainings have been imparted to the field staff on diverse subjects such as uses of GPS, forest fire protection, root trainers' technology, disease and pest control management,

9.6 Forest Resource Accounting:

A number of tangible benefits are derived by the stakeholders. Forests caters to their livelihoods, food articles, medicinal plants, fuel wood source, source for making handicrafts, cots, sticks, wood for agricultural and household uses and many other reported and unreported uses. The farmers in the area are still using the bushes for fencing agricultural fields and home yards. Forests are still being used as grazing lands and unlimited source for collection of fuel wood. However, the public by and large are not mindful of the intangible benefits of these forests, the reason for antipathy and hostility.

9.7 Budgetary allocations to the forestry sector:

The budgetary allocations to the forestry sector have traditionally been at the low level varying from 0.09 to 0.65 in the 12th Five Year Plan. Himachal being a predominantly a forest dominated state having approximately 66% of land classified as forests, the allocation is low as compared to agriculture, irrigation and rural development departments. Nevertheless, the budget allocation has been sufficient to meet the plan and non-plan expenditure. But the budget allocation is neither projected on the basis of working plan prescription by the Department, nor allocated accordingly, therefore most of the prescriptions given in the working plan remain unfulfilled. Plan and non-plan expenditure details are given in Table No. 9.3.

Plan and non-plan expenditure in Dharamshala Forest Division (Rs)

Table 9.3

Year	Name of Scheme	Allotment	Expenditure
2010-11	2402 soil & Water Conservation	1348200	1348200
	2059 Publiv Work	55000	55000
	Non Plan	51001149	51001149
	Plan Scheme	4326550	4326550
	Capital outlay	200000	200000
2011-12	2402 soil & Water Conservation	917583	917583
	2059 Publiv Work	110000	110000

	Non Plan	56447598	56447571
	Plan Scheme	8143581	8143581
	Capital outlay	200000	199700
	2402 soil & Water Conservation	1041400	1041397
	2059 Publiv Work	210000	210000
	Non Plan	61456537	61398031
	2402 soil & Water Conservation Plan Scheme	652000	652000
	Plan Scheme	16154315	16154314
	Capital outlay	454133	454133
2013-14	2402 soil & Water Conservation	739140	739099
	2059 Publiv Work	250000	250000
	Non Plan	65751494	65751477
	2402 soil & Water Conservation Plan Scheme	2016000	2016000
	Plan Scheme	18053085	18053085
	Capital outlay	525000	525000
2014-15	2402 soil & Water Conservation	968960	968945
	2059 Publiv Work	132500	132500
	Non Plan	70248030	70227809
	2402 soil & Water Conservation Plan Scheme	1525000	1525000
	Plan Scheme	17296300	17296300
	Capital outlay	734000	734000
2015-16	2402 soil & Water Conservation	655400	655333
	2059 Publiv Work	260000	260000
	Non Plan	64104845	64104466
	2402 soil & Water Conservation Plan Scheme	1275000	1275000
	Plan Scheme	14374945	14374010
	Capital outlay		
2016-17	2402 soil & Water Conservation	844700	844608
	2059 Publiv Work	200000	200000
	Non Plan	68595150	68595123
	2402 soil & Water Conservation Plan Scheme	2620000	2620000
	Plan Scheme	9448750	9448750
	Capital outlay	4800000	4800000
2017-18	2402 soil & Water Conservation	755750	755669
	2059 Publiv Work	120000	120000
	Non Plan	76153370	76153007
	2402 soil & Water Conservation Plan Scheme	800000	800000
	Plan Scheme	11775550	11775378
	Capital outlay	5969110	5969110
2018-19	2402 soil & Water Conservation	270000	270000
	2059 Publiv Work	756100	756074
	Non Plan	79400770	76738146
	2402 soil & Water Conservation Plan Scheme	2550000	2550000
	Plan Scheme	15685200	15685062

	Capital outlay	1192000	1192000
2019-20	2402 soil & Water Conservation		
	2059 Publiv Work	100000	96391
	Non Plan	79602160	78380043
	2402 soil & Water Conservation Plan Scheme	1838000	1642024
	Plan Scheme	82618762	79380184
	Capital outlay	4200000	1910330
2020-21	2402 soil & Water Conservation	1035300	797643
	2059 Publiv Work	0	0
	Non Plan	85324570	80548650
	2402 soil & Water Conservation Plan Scheme	1000000	1000000
	Plan Scheme	109516252	108772652
	Capital outlay	8452000	8452000
2021-22	2402 soil & Water Conservation	728529	681379
	2059 Publiv Work		
	Non Plan	500000	500000
	2402 soil & Water Conservation Plan Scheme	225153211	189425008
	Plan Scheme	23523852	22850359
	Capital outlay	4849946	4849113
2022-23	2402 soil & Water Conservation	868800	868800
	2059 Publiv Work	43238	43238
	Non Plan	0	0
	2402 soil & Water Conservation Plan Scheme		
	Plan Scheme	219196443	213290222

9.8 Existence of monitoring, assessment and reporting mechanism:

For monitoring of works under different schemes, the department has a cell under the control of Chief Conservator of Forests, Monitoring and Evaluation, who has support of the Conservator of Forests and Divisional Forest Officer and their officials to perform the field work. The external monitoring of works has been given to the Forest Research Institute, Dehradun who carries out the work as per the guidelines of the Government of India.

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

9.9 Public awareness and education:

Publicity and extension education is an important part of the Forest Department. At present, one division at Shimla is providing extension services to the people. Forest education and awareness is provided through arranging forest exhibitions, nature camps and user-seller meet in different parts of the state. Literature in the form of posters, pamphlets, manuals and handouts on forest laws, need for conservation and the citizen's charter are distributed free of cost to the public. Information is also given during public gatherings at local fairs, and Van Mahotsav and wildlife week celebrations throughout the state.

9.10 Adequate manpower in Forest Division:

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

Sanctioned & Existing strength (AS ON JULY 2022)

Table 9.4

Sr. No.	Name of Post	Sanctioned cadre	Working No.	Vacant post
1.	DFO	1	1	0
2.	ACF	1	1	0
3.	Supdt	1	1	0
4.	Forest Ranger	6	4	2
5.	Senior Assistant	3	0	3
6.	Deputy Ranger	20	18	2
7.	Forest Guard	75	70	5
8.	Driver	1	0	0
9.	Clerk/ Jr. Asstt.	6	6	0
10.	Peon	9	5	4
11.	Multipurpose worker	9	8	1
12.	Chowkidar	8	8	0
13.	Mali	3	2	1
14.	Mali-cum-Plantation worker	1	1	0
15.	Chowkidar-cum-cook	1	1	0
16.	Forest Worker	55	24	31
17.	Mule Man/Syce	2	0	2
	Total	202	151	51

Most of the field staff is deployed for the management of Government Forest, Labour is locally available for carrying out all types of operations in the forest and nurseries. However, shortage of labour is felt in the sowing and harvesting season of *Rabi* and *Kharif* crops.

Wages rates per day in Himachal Pradesh

Table 9.5

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

CHAPTER X

FIVE YEAR PLANS

10.1 Five-year Plans

After independence, India has chosen centralized process of planning for equitable development of Indian states and its people. From original formulation through successive modification to parliamentary presentation, plan making in India has evolved as a responsive democratic political process and the culmination of the same in final document is an impressive manifestation. The planned economic development in India began in 1951 with the inception of First Five Year Plan. Five Year Plans (FYPs) are centralized and integrated national economic programmes. The process began with setting up of Planning Commission in March 1950 in pursuance of declared objectives of the Government to promote a rapid rise in the standard of living of the people by efficient exploitation of the resources of the country, increasing production and offering opportunities to all for employment in the service of the community. The Planning Commission was charged with the responsibility of making assessment of all resources of the country, augmenting deficient resources, formulating plan for the most effective and balanced utilization of resources and determining priorities.

The first FYP was launched in 1951 and two subsequent plans were formulated till 1965, when there was a break because of the Indo Pakistan conflict. Two successive years of drought, devaluation of the currency, a general rise in prices and erosion of resources disrupted the planning process and after three Annual Plans between 1966 and 1969, the fourth five-year plan was started in 1969.

The first plan focused on agriculture as there was a severe food shortage in the country. The power and transport were also priority areas. Forests got a new direction during the Plan period as the New Forest Policy in 1952 was enunciated. The policy emphasized the resurrection of forests but in the same breath stated that agriculture had the first charge on forests. Large forest areas were diverted for agriculture in the first three plans. As the second Five-year plan focused on rapid industrialization, heavy and basic industries, the forests were felled for industrial uses and timber. Bamboo forests especially were given on lease to paper and pulp industries in the subsequent plans. In the third plan, based on the experience of the first two plans, as agricultural production was seen as limiting factor in India's development, agriculture was given top priority to support the exports and

industry. In the fourth plan also, main emphasis was on growth rate of agriculture to enable other sectors to move forward.

After two years of Rolling Plan (1978-80), the Sixth Plan (1980-85) focused on increase in national income, modernization of technology, decrease in poverty and unemployment and controlling population. The period saw the beginning of foreign aided social forestry projects for easing the pressure on forests. The national conservation strategy was launched and also the Project Tiger was implemented. The forestry saw the birth of Forest (Conservation) Act, 1980. During this period, Indian Council for Forestry Research and Education was borne. It was the golden period for the development of forestry.

The Seventh Plan (1985-90) and Eighth Plan (1992-97) aimed at grain production, increasing employment opportunities and raising productivity. The Sixth Plan laid more emphasis on social sector viz. education, health and infrastructure development with share of public participation. The tenth plan further emphasized the social indicators as the targets such as reduction in gender bias, reduction in infant and maternal mortality and access to potable water, and cleaning of major rivers.

The Eleventh Plan (2007-12) emphasized on the inclusive growth reducing poverty, creating employment opportunities and access to essential services of health and education. It also laid emphasis on environmental sustainability. There were calls on conservation of biodiversity and wildlife both at the national and international fora.

The Twelfth Five Year Plan (2012-17) seeks to have broad vision of faster, sustainable and more inclusive growth. Whereas inclusiveness is to be achieved through poverty reduction, reducing inequality, empowering people, the sustainability includes ensuring environmental sustainability, development of human capital through improved health, education, nutrition, and development of institutional capabilities. The plan envisages to increase green cover by 1 million hectare every year during the Twelfth FYP. It also has the target to reduce emission intensity of GDP in line with the target of 20 per cent to 25 per cent reduction over 2005 levels by 2020. Obviously the Twelfth Plan has high aspirations for sustainable management of forests. The outlay for Himachal state during the 12th Plan is given below:

Total outlay (Himachal Pradesh)	=	2280000 lakhs
Project outlay (Forest & Wild Life)	=	69406.00 lakhs
Percentage to total projected outlay	=	3.04

It can be seen that the outlay for Forests and Wildlife Preservation is only

3.04% whereas it covers 66% of total geographical area has increased from 0.09 percent to 0.51 percent of the total outlay of the state, which is a good sign.

The investment and afforestation across different plans in Himachal Pradesh are tabulated as under

Investment and afforestation across different plans

Table 10.1

S NO	Plan Period	Amount invested (Rs in Lakhs)	Area Afforested (Hac)
1	First Five-year plan (1952-56)	18	5294
2	Second Five-year Plan (1956-61)	78	17926
3	Third Five-year Plan (1961-66)	438	40187
4	Annual Plan (1966-69)	310	27321
5	Forth Five-year Plan (1969-74)	929	73349
6	Fifth Five-year Plan (1974-78)	1308	73599
7	Annual Plan (1978-80)	1095	44897
8	Sixth Five-year Plan (1980-85)	4698	120399
9	Seventh Five-year Plan (1985-90)	10883	163826
10	Annual Plan (1990-92)	6475	58945
11	Eighth Five-year plan (1992-97)	23420	142732
12	Ninth Five-year Plan (1997-2002)	39659	131850
13	Tenth Five-year Plan (2002-2007)	38456	86341
14	Eleventh Five Year Plan (2007-2012)	67349	83968
15	Twelfth Five-year Plan (2013-2017)	69406	75212

CHAPTER –11

11. PAST SYSTEM OF MANAGEMENT

11.1 General history of the forests

Before the tract ceded to the British on 9th March in 1846, the forests were the property of the local rulers where definite rules for forest management existed. On the advent of British rule, the forests were placed under the control of Deputy Commissioner, who managed them according to the rules embodied in the village administration papers of the Land Revenue Settlement by Barnes (1849-52). These rules, a mere re-iteration of ancient practice, were modified by Bailey in 1853 which in 1859 were replaced by local rules applied under the authority of the "Rules for the Conservancy of Forests in the Hill track of Punjab" promulgated by Govt. of India in 1857. In 1870, as a preliminary to the constitution of reserved forests on the principles followed in Hoshiarpur district, Dehra tehsil forests were placed under the control of the Forest Department. Reserves in Dehra tehsil were notified in 1879 vide Notification No. 111-F dated 6th March, 1879. 6 blocks of forests in Dada-sibajagir were demarcated during Barnes Settlement (1848) and the draft notification was prepared. Simultaneously, the provisions of Chapter-IV of the IFA, 1878 to all wastelands, demarcated and un-demarcated were also proposed to be applied. The notification, however, could not be issued till Sheep Shank was deputed as Forest Settlement Officer, who submitted his report in 1913 and notification No 2839-A to 2839-E all of 31st August 1915 were finally issued.

11.1.1 IFA of 1878

The year 1878 saw the introduction of Indian Forest Act for the first time where upon regular Forest Settlement commenced in 1883. The forests of the tract were placed under the control of Forests Department in 1894. After promulgation of Anderson's Forest Settlement in 1897, the first working plan was compiled by Hart (1903-04 to 1921-22).

11.1.2 Scheme of Rotational Closure, 1920

In 1909 the Govt. of India drew attention of Punjab Govt. to the unsatisfactory condition of most the protected Forests, the ever-increasing demand of right holders, the excessive sheep and goat grazing etc. and directed for taking remedial measures for preventing forests for permanent damage. This results in the imposition of "Cattle Tax", enhancement in Gaddi grazing fee, a scheme of Rotational Closure of the forests and creation of two forest authorities in the district in the year 1920. The Delimited Protected Forests covered by the scheme of Rotational Closure remained under the charge of Forest Department while the remaining forests were again placed under the control of Deputy Commissioner, who employed separate staff for their protection and management. A revised working plan for the management of Forests under the control of Forest Department was prepared Walters (1920-21 to 1929-30). However, in 1924 the

Punjab Legislative Council refused to provide funds to the establishment, as a result the Forest Department resumed charge of these forests also.

11.1.3 Dharamshala Municipal Forest, 1867

The Dharamshala Municipal were constituted in 1867, when forests of Mauja kareri and Dharamshala were transfer to the charge of Dharamshala municipality as grant-in-aid; with the stipulation that no octroi will be imposed, with the objective of helping the poor. Assisted by a few Rakhas, the Kotwal managed these forests upto 1894. As a sequel to the condemnation of the arrangement in Anderson's Settlement Report, the management of these forests was transfer to work the forests most economically and pay the net revenue to the Municipality. In 1902 Blaschek prepared a scheme of felling for 20 years, which was not acted upon till 1913. These forests were first brought under regular management in the Walter's revised Working Plan from 1920 along with other forests.

11.1.4 Working Schemes for Dharamshala

For saving Dharamshala town from serious landslips and erosion, the area above the town acquired in 1914 and declared as Reserved Forest. The first Working scheme for the reserved forest, (Reserved Banal) was prepared for five years from 1915 to 1920. The second working scheme was prepared by Budhi Singh (1922 to 1933). A revised working Scheme from 1933 to 1938 was prepared by David followed by the revised working scheme of Aggarwal (1942 to 1951). The last revised working scheme was prepared by Romesh (1952-53 to 1961-62) where after the forests were incorporated in the main revised working plan of Kangra Forest Division by Malhotra (1966-67 to 1980-81).

11.1.5 Working Scheme for Kangra Municipal Forests

The working scheme for Kangra Municipal Forest, by Agya Ram (1960-61 to 1974-75) was prepared in pursuance of Punjab Govt. letter No. 1427-ft57/12O3 dated 20.07.1957, transferring an area of 7.15.4.90 on certain conditions.

11.1.6 Railway Strips Working Plan

The Railway Strip's working plan from 1953-54 to 1974-75 was prepared. By Swam Singh which dealt with side strips of the 52-kilometer railway track of Pahthankot-Jogindernagar section falling within the then Kangra Forest division.

11.1.7 Mohan's Revised Working Plan

From 1931-32 to 1950-51 the forests were managed under Mohan's revised working plan for Kangra Forest Division. This working plan dealt with only the Delimited Protected and some more important Un-classed Forests. Mohan's plan was followed by revised working plan (1951-52 to 1980-81) prepared by Romesh

which also dealt with only the Delimited protected and some Un-classed Forests of the main valley. Some forests of the main Valley were transferred to the Cooperative Forests Societies for management during 1941 and Separate working plans were compiled for each society followed by an integrated working plan for the district by the Rawal (1968-69 to 1982-83). An intermediate revision of Romesh plan was carried out by Malhotra (1966-67 to 1980-81) which dealt with all the delimited protected, Un-delimited Protected and Un-classed Forests of the Kangra Forest Division.

11.2 Past systems of management and their results

The period between 1846 and 1980-81 can be divided into three distinct periods from the management stand point:

1. The period of organization (1846-1894): The forests remained under the charge and management of the Deputy Commissioner and forest estates were consolidated and Demarcated.
2. The period of Transition (1894 to 1903): various categories of forests were constituted and notified under the provisions of Indian Forest Act, 1878.
3. The period of scientific management (1903-04 to 1980-81): The forests were managed under regular working plans. The systems of management adopted during each period are described below:

11.2.1 The Period of Organization (1846 to 1894)

This period is very significant from the point of view of consolidation and demarcation of the forest estates. The forests were managed by the Deputy Commissioner on principles of simple Forest Conservancy rules. The Conservancy rules contained in Barne's Land Revenue settlement (1849-52) asserted the exclusive right of the Govt. to sell timber, prohibited cutting of green wood for fuel and made an order of the village head-man necessary, before felling of trees for building purposes. The laxity of the system, however, failed to protect the forests from misuse. These rules were modified by Baily in 1853. Bailey's code of rules provided for more stringent system of forest conservancy; the division of all forest land into three more or less equal parts to be closed in rotation for 3 or more years (i.e. triha, the name still in use for closed are whether 1-3 or not); for better control in the open area; for prohibition of grass-burning in winter and extension of cultivation without permission and for the appointment of Forest Assistants (Ban-Wazirs) in each paragana.

In 1855 the "General rules for Forest Conservancy in Punjab Hill Tracts" were introduced and under its provisions Colonel Lake, the then Commissioner made certain amendments to Bailey's Rules which were sanctioned by TA-Governor in 1859. These rules necessitated for Zamindars to apply to the Tehsildar for all the timber requirements for building or agriculture purposes and to pay nominal fee for the same instead of getting it free by applying to the village head

man. On the other hand, the 1/4 share in the value of the timber sold annually by the Govt. was to be awarded to the village officials and the village community; with the objective of securing their interest and cooperation in the forest conservancy. These two measures laid the foundation of what are now called the grant of trees at Z-rate and the distribution of Z-share.

In 1859 and 1860, the trihais in each mauza were delineated and closed to exercise to rights. Only the first trihai was marked on the ground but not the arrangement was made to close the remaining area in rotation as was the original conception. During Anderson's settlement the original trihais were further notified in 1897 for 20 years closure and thus majority of area closed in 1860 remained closed upto 1917, i.e. for a period of 57 years, the effect of this long closure was extremely beneficial. Adequate chil regeneration was obtained which now forms the mature crop. The rest of the forest being inadequately protected and subjected to increased pressure of rights for longer periods, deteriorated immensely; so much so that many of them reached the level of extinction.

As regards commercial felling, the chil trees were sold to the trades by Deputy Commissioner at a fixed rate of Rs. 8/- per tree. Logically only sound trees of large dimensions and from accessible localities were rapidly removed. In case of Oak and fir also the traders obtained permits at fixed rates irrespective of the size of trees and thus only the best and mature trees from accessible area were removed. However, since the demand was not heavy and young and middle-aged trees were not touched the results were not as injurious as one would expect under the circumstances.

11.2.2 The Period of Transition (1894 to 1903)

The management of Forests was transferred to the Forest Department in 1894. The Forest settlement was completed and various categories of forests were constituted and notified under Indian Forest Act. The old System of management continued more or less unchanged. However, a system of improvement felling bearing on all classes in accordance with the silvi cultural requirements of the crop was introduced in chil and fir forests.

11.2.3 The Period of Scientific Management (1903-04 to 2021-22)

During this period most of the forests were managed under successive Regular Working Plans. These are discussed below:

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

The main object of management was to bring the whole workable area under regular treatment, to provide for realization of sustained annual yield primarily for the satisfaction of the legitimate requirements of right holders under the surplus if any, to be sold. A total area of 46,708 ha. (Including area presently in Una,

Hamirpur and Palampur Forest Divisions) was considered workable and dealt with accordingly. Seven working circles were constituted.

11.3.1 The Pine Working Circle

A System of “Improvement felling of thinning was prescribed on a felling cycle of 20 years. Each Tehsil constituted one felling series. Exploitable girth of 2m corresponding to 90 years of age was fixed. Felling was in arrears till the middle of the plan. The position improved subsequently when traders were allowed to fell large size trees. This resulted in removal of trees of higher classes from all over the area but dense young crop in need of thinning was left untouched. The position somewhat improved when special thinning was made by marking trees of right holders.

11.3.2 The Scrub Working Circle

A system of “Coppice with Standards” with a rotation of 20 years was prescribed, 25 standards per acre were retained. As practically there was no demand, no definite sequence of felling was thus laid down. In 1907 however, some demand arose when some trihais were worked wholly or partly.

11.3.3 The Oak Working Circle

A system of “Coppice with Standards” on a rotation of 25 years was prescribed. 25 standards of oak and 50 of sal were to be retained per acre. DP Dhalun was worked, but DP Andhretta and Kandhari & Trihais of Palampur tehsil were not at all touched.

11.3.4 Other Working Circles:

These were worked on “Selection Systems” in oak high Forest working circle and the Fir Working Circle no felling took place for want of demand. In Deodar Working Circle due to limited demand only 66% of the selection trees were removed.

11.3.5 Results

On the whole the results of Hart’s Working Plan were satisfactory. Many of the prescriptions could not be carried out due to lack of demand. The Chil forest improved by thinning and by the removal of over mature stock, generally of poor quality. Hart’s working plan did not actually expire till 1922-23, but poor progress of Chil regeneration and introduction of scheme of rotational closure made its early revision imperative.

11.4 Scheme of rotational closure by Mitchell and Walter (1919)

The back ground of scheme has been dealt in para 31 above. The details of the scheme are to be found in the special report submitted to the Govt. by Mitchell

and Walters in 1919 (Report on delineation of areas to be subjected to scheme of rotational closure in Kangra proper). The delimited protected forests (subjected to scheme) were divided into a number of closure series. Each closure series in chil, oak and fir forests were divided into 4 parts to be closed in rotation for 30 years while in case of scrub forests each closure series was divided into 3 parts to be closed in rotation upto 10 years. The first closure was marked on the ground and sequence of other closures was shown on the maps and kept in a bound registre called the English register. The internal boundaries of the closures, though subject to slight modification in particular cases are binding. The sequence of closure is at choice only in cases where the Zamindars exercising rights in the closure series in question are unaffected by closure in other series. However, in the case of and forests of chakban tikas of Boh, Drini, Kareri, Dharamshala and Khaniyara, the conditions were to be exceptional. The contained vast areas above tree line are in the form of alpine pastures. Therefore, no general delimitation separating such area from the workable forests was undertaken and also in order to avoid distrust only the first closure delineated on the ground. The Govt. accepted the scheme in 1921 and ordered that in every case where the closure of more than 1/3 of scrub forest was contemplated, the Commissioner should satisfy himself that the areas left open were adequate to the use of the people.

11.4.1 Results

The Rotational Closure scheme provided satisfactory solution to the problem of selection and notification of closures so far as the delimited protected Forests were concerned, but at the same time it increased the risk of destruction of forest not included in the delimitation. In terms of forest management, the scheme in case of high forest resulted in a system of fixed periodic blocks with regeneration period and rotation of 30 and 120 years respectively. In case of scrub forests in fact 10 years closure was considered sufficient, which in fact was not justified.

11.5 Walters Revised Working plan (1920-21 to 1929-30)

It dealt with reserved and delimited protected forest and made general provision for 89.675 ha of Un-delimited protected forests. Hart's Oak working circle and scrub working circles were included under one coppice working circle, the Deodar and Fir, Working Circle were amalgamated into one circle and named Unworkable Scrub Working Circle comprising of unworkable Delimited protected Forests.

The objects of management in all the high forests were replacement of the irregular crop by even aged crops normally spread over 4 age classes, maintenance of trees of all age classes in each block of forest forming a complete closure series for the satisfaction of rights, realization of maximum sustained yield and of

maximum revenue from the surplus yield after meeting the demand of right holders. The results of management were:

11.5.1 The Kangra Pine Working Circle

Uniform system with artificial regeneration was prescribed. The first closure of each closure series was allotted to PBI. Subsidiary felling with the aim of removing over mature trees standing over pole crop along with removal of other trees in accordance with silvicultural principles were prescribed in the other PBs. Only 50% of PBI area was subjected to regeneration felling while only about 25% of the felled area could be regenerated. Most of the regeneration was obtained by natural means.

11.5.2 The Oak Working Circle

Uniform system with artificial regeneration was prescribed while in Kharsu Forests reliance was placed on natural regeneration. For want of demand only 25% of PBI areas could be felled and out of this only 8% could be regenerated.

11.5.3 The Deodar and Fir Working Circle

The system of management was the same as in Kangra Pine Working Circle. Progress of felling and regeneration was very poor. About 50% of the prescribed area was felled.

11.5.4 The Coppice Working Circle

The system adopted was “Coppice with Standard” and showing was prescribed to be carried out irrespective of the area having been felled or not. There being no demand for the produce, a large number of forests could not be worked and the prescribed remained in arrears.

11.5.5 The Unworkable Working Circle

This working circle included the unworkable delimited protected Forests, all Un-delimited Protected Forests for which no system of working could be proposed and the Alpine pastures which could not be closed. Almost the entire area proposed for closure under rotational closure scheme was closed and the results were beneficial. The rest of the areas were opened to exercise of rights as they continued to deteriorate. **The Felling remained in arrears for want of demand and other reasons discussed below:**

- a) The plan was prepared during the trade boom of world war-1 and the boom was expected to continue, but things proved to be wrong and there was a slump in the market hence lack of demand for the forest produce.
- b) The uniform system was applied to all high forest without regard to terrain, crop density and ecological status of the vegetation. The wholesale application of uniform system coupled with the factor that many forests were already so open that regeneration felling was not needed, resulted in prescription of yield which was

beyond the actual capacity of the forests. The data relating to increment was also not sound and therefore a high increment (over 100% in 30 years in case of Kangra Pine Working Circle) was adopted. No deduction for the volume of mother trees was discounted. All these led to fixation of much higher yield.

c) Soon after the plan came into the effect a wide spread conflagration broke out in 1921, which not only adversely affected pace of young regeneration in low hills but also burnt a large number of trees which had been relied upon for much of the increment.

11.6 MOHAN'S REVISED WORKING PLAN (1931-32 to 1950-51)

11.6.1 Chil Shelterwood Working Circle

This Circle was comprised of better stocked chil forests of Walker's Kangra Pine Working Circle excluding some areas on account of poor stocking and precipitous terrain. Two felling series, viz., I and II were created. In felling series I surplus timber was to be sold to the traders while felling series II was kept to meet local demand. The silvi culture system was shelter wood with fixed PBs, natural regeneration to be supplemented where required, by sowings. Regeneration period and rotation were kept at 30 years and 120 years respectively in keeping with the scheme of the plan came into effect regeneration period of 10 years had already expired, hence regeneration of all PBI areas had to completed within the next 20 years without waiting for seeding felling presumably on the erroneous view that chil in the tract did not require heavy opening for including regeneration and that only 25% of the area had been regenerated in Walter's plan. About 80% of PBI area was un-regenerated. Most of the un-regenerated areas were in the unstable sub type and being invaded by scrub. Fires also added to the difficulty of obtaining regeneration.

The yield in PBI was in excess by about 17% at the end of the plan. The excess was essentially due to conservative estimates of yield (two I class trees were prescribed to be left in PSI as fire insurance at the end of regeneration period) and the forest fires which necessitated removal of burnt tree. However, the general condition of PBI areas was fairly satisfactory and the excess yield had not exhausted the growing stock. No felling was prescribed in PB II in PB III and IV thinning and improvement felling on very conservative lines were prescribed, yield was to be controlled by area. In a number of Forests thinning not to be done due to lack of demand and also because of prescribed "tikawar" system of thinning that required thinning of 1/10 of forest in each tika annually which was found to be impracticable. However, due to heavy demand of chil poles in World war-II all the arrear felling was made up. The results were satisfactory on the whole.

11.6.2 The Oak Shelterwood Working Circle

This Working Circle contained the workable Ban Oak Forests and a few Kharsu Oak Forests. Two felling series no. 1 comprising high forests and No. II

comprising coppice forests were distinguished. The silvi culture system was “Shelterwood conversion System” with artificial regeneration in felling series I and “Aubert’s system of conversion from coppice to high forests” in felling series II. Technical rotational of 120 years with 30 years regeneration period in keeping with the requirements of the scheme of rotational closure was adopted. Due to poor demand the felling could not be carried out as contemplated. About 80% of PBI area was regenerated. In felling series II however, the felling was fully carried out which resulted in marked improvement of the crop.

11.6.3 The Coppice Working Circle

The forests allotted to the working circle were mostly scrubbed type. Two felling series Merchantable and Un-Merchantable were created with the provision of transferring areas from the latter to the former in case of subsequent demand. The system prescribed was “Coppice with Standed” about 50-75 standards per ha were to be retained. Rotation of was fairly satisfactory and the excess yield had no exhausted the growing stock. 30 years for coppice and of 90 years for standards, keeping the rotational closure scheme in view, was fixed. The yield was prescribed by area. There was a steady demand for firewood during the period especially due to out break of World war-II and establishment of Yol and other camps in the valley. The felling was thereof carried out as a prescribed except in a few far-flung areas. The felling resulted in vigorous coppice shoots but regeneration by seed was generally lacking. On the whole the prescriptions worked satisfactorily for this Working Circle.

11.6.4 The Selection Working Circle

Forests generally situated on precipitous slopes and those which could not be close due to legal problems were allotted to this working circle. Three felling series viz, (i) Merchantable consisting of workable areas (ii) Un-Merchantable comprised of areas considered Un-workable for want of demand and (iii) Un-classes, consisting of Un-classed forests of the circle where closure could not be enforced without consent of the right holders.

The system prescribed was “Selection System” combined with thinning with felling cycle of 10 years. The yield for the first and third felling series was prescribed by number of trees for the whole plan period instead of annual. About 50% of the I class trees prescribed for felling were removed. The deficit was however, due to lack of demand. In the areas closed to grazing good amount of regeneration was obtained while in others it was completely absent.

11.6.5 The Protection Working Circle

This Circle comprised of heterogeneous mixture of species in all categories of Forests. Four Felling series viz. (i) Reserved felling series comprising of reserved forests (ii) Tricennial (iii) Decennial Closure felling series comprising of

Delimited Protected Forest according to the closure period of 30 and 10 years respectively and (iv) Un-classed felling series consisting of the Un-classed forests constituted. The main object of management was protection against erosion and denudation. The closures were prescribed in accordance with legal status of the forest and the pervision of the settlement. No felling and thinning were prescribed. Extensive chil sowings were prescribe but could be carried out only on a limited scale. Chil regeneration establishment itself in favorable localities while in other areas there was an increase in the proportion of scrub. The object of forming this circle was very well achieved; the blanks were covered with vegetation of one type of the other. The process of erosion was checked and the general condition of soil improved considerably.

11.6.6 Summary of Results of Mohan's Plan

The prescriptions and suggestion of various Working Circles were almost fully implemented. Shelter wood system introduced by Walter in 1921 and continued in this plan for chil and Oak, proved suitable. In all working circles natural regeneration was adequate and fairly good,

Artificial regeneration was also obtained. The demand of right holders was fully met with. Felling except in Chil Shelter wood working circle, were only slightly behind the schedule and proved beneficial to the crop. A large number of buildings, roads and bridle paths were constructed. Deodar was artificially introduced though a limited scale, in comptt 3 of D.P.

11.7 Revised Working Plan by Romesh (1950-51 to 1980)

All the delimited Protected and some important and valuable Un-classed Forests except those transferred to Kangra Cooperative Forest Societies were dealt with in this plan. For kangra forest Cooperative Societies separate working plan, as discussed below was prepared. The different Working Circles are discussed as under:

11.7.1 The Chil Shelter wood Working Plan

This Working Circle contained better stocked and economically more important chil forests. In addition to the forests of Chil Working Circle of Mohan's Plan some chil areas of protection Working Circle considered better stocked were also included. The Silviculture System adopted was "The Punjab Shelter Wood System" with reliance placed on natural regeneration supplemented by artificial means at lower elevations. Rotation of 120 years and regeneration period of 30 years in keeping with the scheme of Rotational Closure was followed. The first period of closure commencing in 1921 had expired on 31 March 1951 and the second period of 3 years, started on 1st April, 1951, the regeneration was to be completed in all PBI areas by 31st March, 1981. Most of the PBI areas were closed in 1951. The control of yield was by volume. Seeding felling was to be completed

within the first 10 years, of the plan. No sequence of felling was, however, laid down. During the period 1951-52 to 1965-66 when this plan revised by Malhotra, an area of 943 ha against a total prescribed area of 1622 ha (for the entire tract dealt with in the plan); that is about 60% was failed, whereas excess yield of 3668 M³ against a total of 54600 M³ (for 15 years) that is about 7% of the total was removed. Out of 2030 ha PB I area only 259 ha could be regenerated fully and 140 ha moderately. In the remaining area regeneration did not keep pace with felling. No felling was to be done in PB II. In PB II only thinning was to be done and in PB IV felling the remaining seed bearers along with cleaning and thinning were to be carried out. Both these operations, however, remained in arrears.

11.7.2 The Oak Shelterwood Working Circle

This Circle contained most of the workable Ban-Oak and a few Kharsu Oak Forests. This was essentially the same as in Mohan's plan except that some areas with poor density were excluded and transferred to protection working circle. But for the areas already regenerated, the forests of the working circle were very much under stocked. The silviculture system followed was "Punjab Shelter Wood System" with emphasis on artificial regeneration. Regeneration period of 30 years was adopted. The second period (as explained in Chil Shelter Wood Working Circle above) started from 1st April, 1951 and therefore all the PB I areas were to be regenerated by 1981.

The yield in PB I was prescribed by volume, about 90% of the areas were felled between the years 1951-52 and 1965-66, whereas the volume (charcoal equivalent in qtls) removed was in deficit by 25%. This arrear is attributed to over estimation of the yield. About 40% of PB I area was completely or moderately regenerated. In PB IV areas the few mother trees standing over the young crop were to be removed for right holder's demand and the excess to be sold. The young crop was to be cleaned and thinned at 10 years interval. About 80% of the prescribed area was felled during the plan period.

11.7.3 The Coppice Working Circle

This working circle comprised of fully stocked, better type scrub forests. This working circle was same as in Mohan's plan except that few better areas protection. Working Circle which had improved were also include the silviculture system continued to be "Coppice with Standard" retaining 50 standards per ha Coppice rotation was 30 years and for standards it was 90 years. Yield was prescribed by area, being 1/10 of each closure series. Each compartment was divided into 10 coupes which caused much difficulty in correct demarcation of annual coupes on the ground resulting in complaints from the purchasers. Closure and regeneration of such small coupes was also a problem. Felling could not take place as contemplated due to coupes not being sold for their size being too small. About 80% of the prescribed area was felled. Eucalyptus introduced in the felled

areas proved initially successful but lagging in height and diameter growth later on, resulting in discontinuation of eucalyptus planting from 1966-67 onwards.

11.7.4 The Selection Working Circle

This Working Circle was comprised of Delimited Protected and Un-classed Forests situated on steep and broken grounds containing an irregular crop of heterogeneous mixture of various species. The silvi culture system adopted was “Selection System” combined with thinning. Exploitable diameter was kept at 60 cm dbh for all species. A felling cycle of 10 years was kept.

Reliance was essentially on natural regeneration. The yield was prescribed by forest for the entire plan period and was 33% of selection trees (I class trees). Felling of trees below 60 cm dbh was controlled by felling rules but no yield was prescribed from such trees. Almost all the areas due for felling up to 1965-66 were gone over and the crop improved markedly. However, the regeneration did not come up as expected for want of closure.

11.7.5 The Protection Working Circle

This Working Circle included those delimited and Un-classed Forests in which the object of management was simple protection for checking their steady deterioration and to improve the condition of growing stock the vegetation included all sorts of species like chil, oak, fir, spruce etc. along with alpine and sub alpine pastures. Density of the crop without doubt was very poor, blanks most common and the ground was precipitous with frequent landslips. Like in Mohan’s Plan 4 felling series were constituted.

No specific silviculture system was followed. No felling consequently was prescribed except for meeting the demand of right holders. The trees of right holders were to be marked on very conservative selection felling and thinning. Artificial regeneration of Chil, Khair, Shisham, Oak etc. was prescribed for suitable sites. The areas were in fact merely closed where little efforts at artificial regeneration were made. From 1962-63 to 1965-66 some suitable areas were planted with eucalyptus after clear felling. The growth and development of eucalyptus having not been found satisfactory, further attempts of eucalyptus planting were abandoned.

11.7.6 The Plantation Working Circle

This working Circle was created in 1965-66. A Felling and plantation programme was drawn up. The forests allotted to this Circle were to be worked on “Clear Felling System” followed by plantation of Chil, Khair, Bamboo, eucalyptus etc depending upon the soil and other factors of the locality. The allotment of areas to this Working Circle was done haphazardly ignoring site conditions. Some areas of protection working circle though unfit for clear felling were also allotted to this

circle. Stress was laid on eucalyptus planting which generally was not suitable for the tract on account of shallow soil and very deep-water table.

11.8 Malhotra's Revised Working Plan (1966-67 to 1980-81)

Even though Romesh Plan was to expire in 1980-81 with the provision for interim revision after 15 years the reorganization of the Division coupled with the desirability of bringing vast Un-delimited Protected and Un-classed Forests under regular management necessitated complete revision of the plan from 1966-67 itself. The revised plan included all the Delimited Protected, Un-delimited Protected and Un-classed Forests of the Divisions, except those under Cooperative Forest Societies. The following WCs were constituted:

1. The Chil Shelter wood Working Circle.
2. The Oak Shelter Wood Working Circle.
3. The Coppice Working Circle.
4. The Khair (Overlapping) Working Circle.
5. The Plantation Working Circle.
6. The Avenue Working Circle.
7. The Protection working Circle.
8. The Grazing (overlapping) Working Circle.

11.8.1 Exception

Excepting oak, khair (Overlapping) and Coppice Working Circle the remaining Working Circles were divided into two felling series. Felling series, I (Legal Closure felling series) covered Reserved and Delimited Protected Forests whereas Felling series II (voluntary closure Felling series) comprised of Un-delimited Protected and Un-classed Forests.

11.8.2 The Chil Shelter Wood Working Circle

An area of 14680.58 ha under all the 4 classes of forests of the Divisions was on the whole under stocked, irregular, poor in growth and burdened with rights of users. The Un-delimited Protected and Un-classed Forests brought under regular management for the first time had been in bad shape in the past. The area under felling series I was 6157.53 ha and 8527.25 ha in felling series II. The main object of management was to convert the irregular chil forests into more or less regular crop. Complete enumeration of chil in PB 1 of felling Series I and Felling Series II was done. The average growing stock per ha was 64.52 M³/ha in felling series and 51 59 M³/ha in felling series II. The forests were to be managed under "Punjab Shelter wood System with natural regeneration to be supplemented by planting where ever needed Compact groups (density not less than 0.5) of well grown poles up to 35 cm dbh of at least 0.2 ha in extent were to be retained as advance growth. Rotation of 120 years and regeneration period of 30 years was adopted. In felling series i. allotment to all the 4 P.Bs. was made while in felling series il only the PBI area were specifically allotted and the rest were grouped together under PB Others.

Only two regeneration felling, viz seeding and final felling was to be carried out when the regeneration was at least 2 m high and the area control-burnt twice. In case of PB II no felling except for the removal of fallen, dead and dry trees was prescribed. In PB III thinning and in PB IV removal of remaining over wood along with thinning in the congested groups was prescribed. The yield was prescribed by volume and calculated separately for PB I and PB IV of each felling series. The control of thinning in PB III and PB IV was by area. PB Others of felling series II was meant only to meet the right holders demand and thus no yield was prescribed. Yield from P.B. was calculated by deduction from the existing growing stock of the trees of 20 cm dbh and up the volume of seed bearers and advance growth to be retained as part of the future crop. Though annual yield was calculated, no annual control was to be exercised at the end of the plan. All trees of IV class and above from PB I and all trees III class and above removed under salvage felling in PB II were to count against the yield of FS-I.

Sequence of seeding felling and final felling (for Felling Series I) were prescribed. Main yield from PB IV was calculated on the basis of percentage of I and II class trees available for felling.

11.8.2.1 Results

A. Position of yield:

In PB-I of Felling Series –I, all the prescribed area of 722.73 ha was felled and similarly final felling prescribed over 164.70 ha was duly carried out within the plan period. In the felling series-II against an area of 1170.20 ha prescribed in PB-I for seeding falling only 102.76 ha was felled and 1067.52 ha remained in areas because of excess felling under salvage removals. 51.87% of the area remained un-felled in PB-I in the felling series-II.

There was excess removal of about 60% of the total prescribed yield in PB-I the both felling series. It is said that this deviation in PB-I is mainly for the reasons of heavy salvage removals carried out year after year of the fire burnt, dry, dead fallen etc. trees. To a fair degree this assumption might be correct but not wholly true. It is felt that yield calculations done by Malhotra were not sound and the yield calculated was much on conservation site.

B. Status of Regeneration:

There has been a marked improvement in regeneration of PB-I area of felling series-I while PB-I areas of felling series-II have not been satisfactory regenerated as was contemplated under Malhotra's plan, essentially on amount of non-felling of about 91.21% of the prescribed area.

11.8.3 The Ban Oak Working Circle

It comprised of workable Ban and Kharsu oak areas in Delimited Protected Forests of Dharamshala Range. The forests were under stocked, badly lopped and overgrazed. The crop was middle aged to mature and deficient in younger age classes. No enumerations were carried out and enumeration figures of Romesh

Plan were made use of. PB-I and PB-IV areas have definitely allotted and the remaining forests were lumped together under PB Un-allotted. In PB-I, two felling series viz. seeding and final felling were to be done. 25 to 40 trees per ha. were to be retained as mother trees. Compact groups of poles of 40 cm dbh and below but not less than 0.2 ha. extents were to be retained as part of the future crop. Final felling was to be carried out when young crop was at least one meter in height.

Status of Regeneration: From the above table it is inferred that only less than 50% of the area has been regenerated when regeneration period of 30 years has ended. The reason is lack of sincere efforts on the part of the staff. Provided due protection is given, ban oak regeneration is not a problem as the locality factors do not pose any silvicultural or ecological difficulties and are in fact favorable. Rotation of 120 years and regeneration period of 30 years was adopted.

11.8.4 The Coppice Working Circle

All the better stocked forest as distinct from scrub areas, were allotted to this Circle. All the areas of this Circle were Reserved and Delimited Protected Forests. The Silviculture System adopted was Coppice with Standard where rotation for Standards was kept at 90 years and 30 years for Coppice.

Felling: The yield was controlled by area, 40-50 as standards per ha were prescribed for retention for seed production and for yielding timber of higher sizes, economically important species like *Dalbergia*, *Anogeissus*, *Aibizzia* etc were suggested for retention as standards. 649.88 ha area was prescribed for felling during the plan period out of which all the prescribed area was felled. The deviation as on 31.3.1981 was (+) 101.91 ha which is not much on the plus side. Sowing and plantation of khair was suggested over 229.82 ha, of which all the area was planted-up.

Satisfactory results: The prescriptions of the Circle have almost been carried out resulting in improvement of crop. The silviculture System adopted has been found suitable and no change therein warranted.

11.8.5 The Khair (overlapping) working Circle

The Circle overlapped khair bearing areas of other Working Circles, in Shahpur, Kangra and Jawalamukhi ranges. The objects were to harvest the mature and over mature stock of khair, to realize maximum revenue and to increase proportion of khair in suitable localities by natural and artificial means. Khair enumerations were done in 5 cm diameter classes. No definite silviculture system was adopted; however, exploitation of khair was prescribed on selection principles. *Exploitable diameter was kept at 25 dbh and felling cycle of 15 years was adopted.*

Yield: For convenience of working, mauza was taken as the annual working unit. Yield was regulated by area and number of khair trees to be removed annually. Annual removal of khair trees was kept at 1000 trees equivalent to 950 m girth, sufficient for running of 4 katha bhatties, 25% variation was permitted provided cumulative excess did not exceed 1000 trees during the plan period.

11.8.6 The Plantation Working Circle

The areas which were under stocked, stocked with inferior brushwood species or with large culturable blanks were allotted to this Working Circle. The legal and voluntary closure felling series were constituted, as discussed in earlier Circles. The objects of management were to clothe the blank areas and replace inferior scrub forests with economically valuable plantations and to nurse and maintain the existing stock.

Yield: The modified clear felling with artificial regeneration was adopted as the silviculture system. About 35-40 standards were to be retained per ha for providing seed, shade and large sized timber etc. no felling of chil unless diseased, dry or wind fallen was to be done. Khair trees below 15 cm dbh were not to be felled. In felling series II, no commercial fallings were prescribed. Here the felling was confined only to meeting the demand of right holders. Bamboo was not prescribed for planting in fertile pockets of the low-lying forests.

Results: In felling series, an area of 1107.95 ha was prescribed for felling and planting and 877 ha. was laid down for closure and planting. Against these prescription except 84.37 Ha. was not be felled, rest was felled and planted up in felling series plantation programme for 2711.99 ha was laid down. All the prescribed areas have been planted up with chil, khair and other miscellaneous broad leaves. Subsidiary silvicultural operations like bush cutting, weeding, cleaning, thinning and other regulations regarding closure and grass cutting were generally carried out as suggested. However, in some chir plantations bush cutting cleaning and pruning were not carried out which resulted in severe damage by forest fires

11.8.7 The Avenue working circle

The P.W.D. roadside strips and the strips of land along railway-tracts were allotted to this Working Circle These strips contained young to mature B.L trees. The crop was patchy, open and irregular with large blanks. There was hardly any restriction on grazing, lopping, debarking and other damage. One felling series for the P.W.D. road side strips and the other for railway strips were constituted. The growing stock in both the felling series was much lower than the normal. Position of regeneration was unsatisfactory. The main objects of management were to restock the blanks with species valuable from aesthetic and economic

considerations. The main species to be planted were *Cassia siamea*, *Jacaranda ovalifolia*, *Grevillea robusta*, *Bauhinia variegata*, Harsingar Mango Gulmohar etc. No definite silvicultural system was prescribed. However, removal of dead, dying, diseased trees causing hindrance smooth flow of traffic were allowed to be removed. Planting programme for the two series was laid down. 307 km road side strips and 162 km railway strips were prescribed for planting. Other operations like fencing weeding, watering etc. were also prescribed. The work on planting of road side strips and of the railway strips has not been done as prescribed for various administrative and management reasons where only a fraction of the prescribed length was planted up.

11.8.8 The protection working circle

This Working Circle includes all types of unworkable forests situated on very difficult and precipitous slopes or at other erosion prone sites like banks of nallas and streams. High level pastures and other blank areas where soil is absent or is negligible and no planting works could be done, besides the forests being inaccessible and burdened with rights of grazing were allotted to this Working Circle. Protection of hill sides from denudation and erosion and improvement of the growing stock were the main objectives of management. Like other Working Circles two felling series were constituted. No definite silviculture system was prescribed. Felling to meet the demand of local population was permitted on silvicultural principles; Sowing/planting programme for each felling series was laid down. It was not mandatory for the staff to stick to the areas prescribed and they could take any other area for planting that was not included in the programme or change the of planting.

Miscellaneous regulations like closure for planting, regulating of grazing, grass cutting, lopping was also laid down which were only partially implemented. Most of the prescribed areas were closed and planted. The planting programme was mainly laid down for the lower areas i.e the scrub and chil forests and no treatment for improvement of the crop or restocking of blanks in higher areas of ban, fir spruce and kharsu oak forests was suggested. Irrespective of the crop density, especially in areas of felling series II, almost entire forest compartments were prescribed for planting. Moreover, planting of vast chunks was not possible in view of difficulties of large-scale closures. However, the prescriptions have generally improved the forests of the circle both in terms of their stabilization in the face of erosion and in bringing green cover to the open sites.

11.8.9 The Grazing working circle

This was an over lapping Working Circle divided into 4 zones; (1) Alpine (2) higher Zone (3) Middle Zone (4) Lower Zone. The object of management was to provide grazing and fodder for the requirement of right holders. Assessment of

the productivity of the grazing lands was done and the detail of cattle population of the local migratory and nomadic graziers was given. In order to evolve a sound grazing policy measure like (i) revision of the settlement (6) Conversion of grazing land into Ghasnies (in) increase in grazing fee (iv) planting of fodder species etc was suggested Against these prescriptions a negligible area was planted with fodder species under the pasture improvement scheme. Besides this, planting of khair and B.L. spp over a small area was also done under plan schemes. The other suggestions could not be implemented.

11.9 Forests of Cooperative Forest Societies (CFS)

The forests now with Cooperative Forest Societies were managed with another Govt. Forest prior to 1941. It was in the year 1941 when the Cooperative Forest Societies were constituted. Before 1967-68 each Cooperative Forest Society had a separate working scheme/ working plan. WPO shall discuss in detail the various working scheme in working under revision. The first integrated Working Plan for the Cooperative Forest Societies of Kangra district was compiled by Rawal for the period 1967-68 to 1982-83. There were 29 Cooperative Forest Societies in Dharamshala and Dehra (Part) Forest Division.

11.10 Rawal's Integrated Working Plan (1967-68 to 1982-83)

The following Working Circles were recognized in this Plan:

- a) The chil Working Circle
- b) The Ban oak Working Circle
- c) The Fuel and Fodder Working Circle
- d) The Coppice with Standard Working Circle
- e) The Bamboo Working Circle
- f) The Plantation Working Circle
- g) The Protection Working Circle

11.10.1 Chil Working Circle

An area of 849.74 ha was covered under this Circle which was allotted to PB-I, PB-II, PB-III and PB-IV periodic blocks. The system and the principles of management were generally the same as in the Romesh plan. Yield was regulated by area in place of volume. The prescriptions resulted in satisfactory generation in PB-I areas and improvement in stocking density and condition of the crop in the remaining periodic blocks.

11.10.2 Ban Oak Working Circle

Some of the compotts of CFS Dhalun, Shahpur, Sudhed, Khaniyara, Yol and Manjgraon were allotted to this circle. The Indian Irregular Shelterwood System with artificial regeneration was adopted. In suitable areas deodar was suggested to be introduced by planting. Rotation of 120 years and regeneration period of 30 years was adopted. As no enumerations were carried out, the yield was controlled by area. In seeding felling of PB I areas, 40-50 seed bearers per ha above 40 cm dbh were to be retained. No programme for sowing/planting was laid down. The area allotted to the Working Circle was 27.15.4.37 ha (212.84 ha in Dharamshala Range and 29.53 ha in Shahpur Range). Definite allotment to PB I and PB IV were made while the forests were grouped together and allotted to P.B. Unallotted.

11.10.3 Bamboo Working Circle

As no areas of Dharamshala and Dehra (Part) Forest Divisions were allotted to this Working Circle in the plan under revision, working of the circle is not discussed.

11.10.4 Coppice Working Circle

All the better type miscellaneous and scrub forests were allotted to this Circle, the system of management was coppice with standards, with Rotation of 90 years for standards and 30 years for coppice. 40-50 vigorously growing trees of valuable species per ha were to be retained as standards. Other valuable species like chil, mango and young growth of economically valuable species were to be retained. As area of 820.99 ha was prescribed for felling in the shape of annual coupes over the plan period of this 747.78 ha was felled and 77.21 ha remained unworked. Definite programme of sowing/planting was not laid down. However, sowing/planting of species like chil, khair, shisham, Eucalyptus and siris was recommended. The prescriptions of the circle have worked well and density of stocking has considerably improved. The rotation age for coppice and standards fixed at 30 and 90 years respectively is suitable and no change therein is required.

11.10.5 Plantation Working Circle

Allotted to this circle were the areas with deep and fertile soil but which were either blank or were largely overgrown with useless scrub such as Mallotus. Carrissa, Dodonaea, Murraya etc. No definite silviculture system was adopted. No sequence of felling was either needed or prescribed. The areas were to be clear felled and sown/planted with chil, khair, mango, shisham, bamboo. In higher areas like Khaniyara, deodar was also suggested to be tried. 1397.70 ha. area (813.90 in Dharamshala, 402.80 in Jwalamukhi and 181.00 ha in Shahpur Range) was prescribed for sowing/planting during the plan period. Out of this more area was

planted up than that prescribed. On the whole the prescriptions have done much good to the areas allotted to this circle and substantial plantations have been raised. The Working Circle needs to be continued.

11.10.6 Fuel and Fodder Working Circle

All the denuded and serni denuded type of scrub forests adjoining habitations and which were mostly used for meeting every day needs of life like fuel, fodder, wood for agriculture system was adopted. Similarly, no rotation age or exploitable diameter was fixed. No yield was prescribed. The areas allotted to this circle were to remain open for meeting every day needs of local population and to be used as grazing grounds. Rotational Closure of half of the available area to grazing was suggested to be implemented on voluntary basis by the concerned society and the remaining half to remain open. Certain guidelines to be enforced strictly for lopping were laid down. The total area of the circle was 3534.19 (Dharamshala 2077.60 ha, Jawalamukhi 1132.19 ha Shahpur 327.68 ha). As no definite prescriptions were laid down, no clear results were to be expected nor were they obtained. There is no justification for continuance of this circle. As these areas are in bits and of small sizes, as also close to habitations and used as grazing grounds for the village cattle, their closure is impossibility with the result they need to be allotted to Protection Working Circle.

11.10.7 Protection Working Circle

This Circle was comprised of all the remaining forests not allotted to any of the above-mentioned Working Circles. No definite silviculture system was prescribed. The areas of the working circle were to remain closed for 15 years from 1.4.1968 for the grass and tree growth to flourish and spread. Programme for sowing and planting of chil and khair was laid down for 1591.60 ha. against this prescription hardly any area has been sown/ planted. Khair felling in Jwalamukhi Dehra and Mallan Ranges over an area of 483.84 ha area were prescribed. Out of which 439.73 ha area was felled. Thus, prescriptions of 15 years closure of all areas from 1968 and sowing/planting over 1591.60 ha have not been followed.

11.10.8 General for CFs

Control and record: Maintenance of CFs CH files is extremely poor. Entries of felling, planting, cultural operations, maintenance of boundary pillars etc are not available and wherever found are far too patchy and incomplete.

State of boundaries: The boundary pillars in most places are in a state of utter disrepair and at some places altogether missing. The programme of repair to boundary pillars has not been properly followed.

Encroachment: Encroachments on some of the society forests are quite common. Sincere efforts at stopping encroachments are wanting. Allotments of land to the landless have aggravated the situation.

Fire Protection: Most of the forests particularly of chill have been saved from fires resulting in good crop of young chill. However, some forests have suffered fire damage. Defective resin tapping is the bane of forest fires and needs to be replaced by the rill method.

11.11 Critical appraisal of the M. P. Singh's working Plan (1980-81 to 1995-1996)

This working plan covered the area of Dharamshala and Dehra Forest Division. General objects of management of this plan were as follow:

11.11.1 General objects of management: The general objectives of management were as under:

i. To ensure primarily, the preservation of the environment and only thereafter, derivation of economic benefits, concessional as well as commercial, from the forests.

ii. To retain as much area as possible under natural cover to fulfil the objectives of recreational values, aesthetic values etc.

iii. To aim at securing co-operations of local inhabitants through imaginative integrated forestry programme of continuing nature, at the same time reorganizing the traditional usufructs in the forest estates, inter-alia, benefiting them through egalitarian distributive justice and recognizing these forests as source of fuel, fodder, food, manure, building material and raw material for indigenous crafts and medicines.

iv. To identify the wild life which is dwindling or getting extinct and to suggest measures aiming at its preservation of their natural habitat and gene pools.

v. To improve the quality and stocking of existing forests and to manage them in a manner such that normal forests are obtained within the shortest period of time.

vi. To raise economic plantations of suitable species in suitable localities like blanks, shamlats, land ceilings, private areas and degraded forests.

vii. To rehabilitate the existing high-level pastures through improved agronomic practices and introduction of suitable high nutritive value local and exotic grasses and clovers.

viii. To preserves the hill slopes against denudation and erosion in order to ensure an equitable flow of water in to the streams and rivers.

ix. To provide necessary raw material of various forest-based industries and thus to generate employment opportunities in rural areas.

x. To aim at the maximum possible sustained yield and to progressively increase the yield of various forest products for meeting I requirements at the local as well as national levels; in consonance with the objectives stated above.

xi. In essence, this working plan dedicates itself to subjugate wood production from the forests to the objectives and ideal of the conservation of flora, fauna, habitat, ecology and watershed values. The discussion here below is confined to forests areas falling in Dharamshala Forests Division and data has accordingly been presented. However, in some cases it was felt appropriate not to submit the figures and to present them in totality as per M.P. Singh's Plan.

11.11.2 Chil Shelterwood Working Circle

This working circle includes an area of 9270.36 ha, of pure or nearly purer Chil forests comprising of delimited protected forests, un-delimited protected forests and Cooperative Society Forests. The forests on the whole were under stocked, irregular and heavily burdened with rights explanation. Un-delimited Protected forests were brought under regular management for the first time under Malhotra's Plan. The forests of this working circle were divided into three felling series in consonance with the legal status and from Management point of view. i) The rotation closure felling series (Felling Series I) comprised on 4543.92 ha, of Reserved and Delimited Protected forests. (ii) Voluntary closure felling series (Felling Series -II) included 39.08.67 ha, of Un-delimited Protected Forests. (iii) The Co-operative Forests Society felling series (Felling series – III) contained 817.77 ha, of Co-operative Society Forests. Special objects of management were to continue the conversion of generally irregular under stocked Chil forests to more or less regular, fully stocked pure crops, to improve the stocking of poor stands through either natural/artificial regeneration, to meet the Bonafide requirement of right holders and to optimize the sustained yield of timber, resin and pulpwood.

Stock mapping was done on 1:15840 scale. General site quality was assessed to be III. Complete enumeration of Chil was carried-out in 10cm diameter classes down to 10cm d.b.h. and Khair in a dia classes. The average growing stock of Chil was 130.2 M³/ha, in felling series I, 104.91 M³/ha. in felling series II and 171.49 M³/ha in felling series III against normal growing stock of 160 M³/ha. The forests were to be managed under the "Punjab Shelter-Wood System" with natural regeneration to be supplemented by planting in refractory and problematic areas. Compact groups of well-grown poles upto 35cm dbh and at least 2 ha, in extent were to retained as advance growth. Marking conformed to selection principles where topographical features do not permit adoption of concentrated felling. Rotation of 120 years with regeneration period of 30 years was adopted.

In felling series, I and III definite allotment to all the four distinct periodic blocks was made, but in case of felling series II the allotment was made to two periodic blocks viz. PB I & P.B. others (II, III and IV). Only two regeneration fellings viz, seeding felling and final felling were to be carried-out in PB I In

seeding felling, 15 to 18 healthy middle aged to mature Chil trees were to be retained per ha. as seed bearers. Numbers of seed bearers can vary up to 25 trees per ha depending upon the topography of the area.

Final fellings were to be carried out only when the regeneration was 2.5 m high and the area control burnt at least twice. Five tall healthy and vigorously growing trees were to be retained as fire insurance. In PB II no commercial fellings of any kind were to be carried-out, except for the removal of dead, dry and fallen trees. Green standing trees were not to be made even in timber distribution and for other requirements of the right holders.

In PB III, no fellings were prescribed, only marking of trees in T.D. for meeting the local demand was prescribed. In PB IV removal of over wood along with cleaning and thinning in congested young crop was prescribed. The yield was prescribed by volume and was comprised of main yield and intermediate yield. The main yield consisted of all fellings from PB I and felling of II A and above trees from PB IV. The intermediate yield consisted of the cleanings and thinning in PB IV and P.B others.

A total of 61.93 ha area was felled under seeding felling in PB I of felling series I. All the area was closed and planted with P/bags raised Chil plants.

Efficacy of Punjab Shelterwood WC: It would be unwise to comment upon the suitability of Punjab Shelter wood System with the present results of this Working circle in view of the fact that none of the major prescription of the silvicultural system viz. seeding felling, final felling, thinning etc, were carried out during the plan period. Removals from PB-II and PC-III areas have also remained uncontrolled due to inefficient management practices. In view of the potential of areas of regenerate naturally, it would be fair to conclude that the Chil forests of this division can be regenerated satisfactorily if due attention is paid. The main inhibiting factor is fire, which must be kept under check especially in areas under regeneration. The rotation of 120 years and the regeneration of 30 years are quite suited to the Chil forests and no change, therein therefore, contemplated.

There are a large number of regenerated Chil areas in PB I and PB IV in the Working Circle which require immediate removal of overhead shade. This silvicultural requirement of crop is not being fulfilled due to ban on green felling. Thus, the regeneration of Chil is suffering due to suppression. Similarly, the mature Chil trees in PB I areas are also not being felled under seeding fellings. Thus, the ban on the felling of green trees will upset the Mitchell and Walter's Rotational Closure Scheme. (1919).

11.11.3 Oak Shelterwood Working Circle

An area of 2206.47 ha comprising delimited protected forests and co-operative society forest of pure or nearly pure Ban Oak forests have been included in this working circle. The forests are generally under stocked and badly lopped. Three felling series viz Depot felling series, Preservation felling series and CFS felling series were constituted. Delimited Protected Forests which were otherwise under regular management since Mohan's Plan (of 1931) were included in Depot felling series (140.83 ha.) of Delimited Protected, Forests which are required to be preserved and protected from soil and water conservation point of view were included in Preservation felling series (1826.26 ha.). CFS Felling Series, included 27.15.4.38 ha, of Co-operative Society Ban Oak Forests. Special objects of management of these forests were to protect these forests from soil and water conservation point of view, to improve their stocking to meet the bonafide requirements of local right holders.

Total enumeration was carried out in the forests allotted to Depot Felling Series while partial enumeration was done in other felling series. The forests of Depot Felling series were to be managed under Indian Irregular Shelter-wood System with artificial regeneration. The coppices were to be tended. Rotation of was kept as 120 years in view of rotational closure scheme and legal status of the forests. The forests under Depot Felling Series were already under the process of conversion to uniform since 1921. The rotation period was divided into four periodic blocks of 30 years each. Definite allotment was made to each P.B. No yield was prescribed in view of non-availability of trees over and above the minimum number to be retained at the time of seeding felling. 58.20 ha area of all the felled PB I areas of old Depot Felling Series and under stocked and blank areas of Preservation Felling Series was prescribed for planting. Out of this 7.20 ha, was not taken up for planting. Similarly, 29.78 ha area of CFS Felling Series was also prescribed for planting but the prescriptions were not followed.

Results: Neither any PB I area was felled nor prescribed during the period. However, 1717.92 M³ volume was removed during the plan period, for meeting the demands of right holders or by way of salvage removals. The condition of Ban Oak forests further deteriorated due to heavy and un-scientific lopping. With protection, ban oak regeneration is not a problem as the locality factors do not pose any silvicultural or ecological difficulty and infact are favourable.

11.11.4 Coppice Working Circle

This working circle encompassed better stocked Dry Deciduous Mixed Scrub Forests. The objects of management were to maintain these forests in their natural form and improve their stocking through planting and also to meet the local demands of right holders for fuel, fodder and small timber. A total of 1074.81 ha

area was allotted to this Working Circle of which 779.83 ha was from Delimited Protected Forests and 294.98 ha from Co-operative Society Forests. Complete enumeration of Khair was carried out in 5 cm diameter classes down to 10cm d.b.h. Silvicultural system prescribed was coppice with Standards. About 40-50, sound, vigorously growing trees with well-developed crowns were to be retained per ha, as standards. Rotation of 30 years for coppice and 90 years for standards was prescribed. The area was to be filled and planted in the following years.

Sequence of fellings was laid down. An area of 331.85 ha of Delimited Protected Forests was prescribed for felling during the plan period, of which all the areas were felled except P.61 K Naina Devi C3a (Area 27.5 ha.) in Kangra Range.

Results:

Bio-diversity of the crop has been a major casualty in the forests worked under this system, especially with respect to fodder species like Dhou, which has diminished greatly. The dry deciduous mixed scrub forests have been converted to more or less pure Khair forests as most of the felled coppice areas have been planted with khair species only. Most of the broad-leaved species throw vigorous coppice shoots. Thinning and singling of coppice shoots was prescribed but seems not to have been carried-out. Natural regeneration was not free from suppression. The closure of the areas was not effective. Some areas were heavily infested with Lantana, for which special treatment was required. Grazing had been another factor responsible for the failures. There is shortage of grazing areas. The situation has further worsened due to large scale plantations carried out during the plan period. The tendency of the staff to plant non palatable species like Chil, Khair and Shisham in preference to fodder species is also attributable to their concern and safeguard against chances of failure due to grazing of the latter. Excessive grazing has also led to qualitative reduction of the forest allotted to this working circle; Cattle prefer tender shoots of coppice origin resulting in gradual wiping out of the fodder species from the forests.

11.11.5 Plantation Working Circle

Blanks and the areas which were under-stocked or stocked with misc. scrub species in need of Afforestation and the young plantations in all categories of forests were allotted to this Working Circle. A total of 9207.10 ha, area was allotted to this Working Circle. The objects of management were to nurse the existing plantations and natural young growth under a systematic procedure of cleanings and thinning and to augment the forest resources by afforestation of blank/degraded forest with commercially important species and also to meet the requirement of local people for fuelwood, fodder and small timber. Four plantation series i.e. Legal Closure Plantation Series (P.S.I.), Voluntary Closure Plantation Series (P.S.II), CFS Plantation Series (P.S.III) and Road and Railway side

Plantation Series (P.S.IV) were created. Khair and Chil were enumerated in Plantation Series I and II. The scrub forests were to be managed under "Modified Clear Felling System" with artificial regeneration, 30-40 trees per ha, were to be retained as standards for seed production, shade and to meet the legal demands. For planting, species suitable for meeting the local requirement were to be preferred. The areas close to habitations were to be planted with Dhaman, Kachnar, Ohi, Mulberry, Robinia, Harar, Ban Oak etc., according to the suitability of site. In plantation series II, three rows of fodder species were to be raised all around the plantations. In plantations series IV, Arjun, Ritha, Jamun, Mango, Jacaranda, Cassia, Acacia were to be planted. Control of yield for scrub areas was given by area. No feelings were prescribed in Plantation series II, III, & IV. In Plantation series -I, closure period was 10 years and annual coupe for feeling was 52 ha., but in view of ban on green fellings, no sequence of felling was laid down. 257.15.4.73 ha. of area was prescribed for plantation from 1988-89 to 1995-96 out of which only 411.75 ha was planted during the period, The sequence of planting laid down in this working were not followed which shows that the Working Plan was not consulted before planting the annual plantation programme.

Results:

The results of working in working circle are of mixed type, as far as success of plantations is concerned. Because of certain limitations, the plantations have not responded, as they should have. A number of plantations are reasonably successful, especially, those where the proportion of Chil and Khair was high. However, failures are also common. The main reasons for failure are suppression of system due to heavy weed growth, infestation by lantana drought, non-co-operation by local people and hence heavy biotic pressures. Fires have also played their role in affecting the plantations adversely. Failures are striking as far as broad-leaved fodder species like Harar, Bahera, Siris and Kachnar, are concerned, which can be attributed to poor nursery stock, Inadequate pit size and palatability of the said species coupled with poor protection.

11.11.6 Protection Working Circle

This includes heterogenous mix of different species and contains Reserved. Delimited Protected, Un-delimited Protected and Co-operative Society & Municipal Forests of Kangra and Dharamshala. The forests are located in difficult and precipitous terrain or situations which are prone to erosion. The objects of management were to protect the hill sides from erosion, to preserve the eco-system of the region, to improve the growing stock per unit area and to meet the demands of the local right holders for timber and other forest produce. A total of 39,304.84 ha area was allotted to this working circle. Complete enumeration of Khair was carried out in 5 cm. d.b.h. classes upto 10 cm. d.b.h. no definite silviculture system was prescribed for Felling of Khair trees. Selection system was allowed in Khair

overlapping working circle. Although no yield was prescribed; still as per deviation statement for the year 1995-96, 12788.372 M³ have been removed. 1933.67 M³ have been removed for meeting the demand of local people and the remaining 10857.005 M³ in salvage marking. Blanks and poorly stocked areas were prescribed for planting. Sequence of planting was laid down but the planting programme was not followed seriously. No tending operations were attended to in case of existing young plantations. Misc. regulations like closure for planting, regulation of grazing, grass cutting, lopping was laid down which were only partially implemented. However, the prescriptions have generally improved the forests of the circle both in terms of their stabilization in the face of erosion and in bringing green cover to the open sites.

11.11.7 Khair (Overlapping) Working Circle

This Working Circle overlapped Khair, leaving areas of Chill and Protection Working Circles. The objects of creating this Working Circle were be harvest mature and over mature stock of Khair and also to augment the proportion of Khair in suitable localities by tending the coppice shoots and planting of khair. Khair enumerations were done in 5 cm diameter classes down to 10 cm dbh. Selection system was prescribed. Exploitation diameter was fixed as 25 cm dbh and felling cycle of 15 years was adopted. All the areas were to be gone over spanning the plan period. For convenience, mauza or group of mauzas was adopted as annual unit for working. However, in case of CFS, the unit of annual working was forest compartment/ sub-compartment of the given societies.

The yield was prescribed by number of trees to be removed annually and calculated by Brandis Method. Annual removal of khair trees was kept at 1500 for felling series I and II. Annual coupe of 7.60 ha was laid down for felling series III. Sequence of felling was laid down 26542 ha area in felling series III was prescribed for felling. As per derivation statement for the 1995-1996, the yield in felling series I and II is deficit by 1032 trees of exploitable diameter.

Critical appraisal: Exploitation diameter of 25 cm dbh has been found to be optimum. Profuse coppicing was observed. However, a number of shoots have appeared on such stumps, tending operations as prescribed has been ignored. It was also revealed during field inspections that Khair exploited during different years has coppiced well except in case of over-mature or rotten trees. It was also observed the some of the coppice could not sustain biotic pressure due to non-closure of such areas. On the while the prescriptions of this circle have worked well.

11.11.8 Alpine Pasture Improvement Working Circle

The forests with large chunks of alpine pasture in the higher reaches of Dharamshala, Mallan and Shahpur Ranges were included in this working circle. These pastures serve as grazing ground for large number migratory sheep, goats and buffaloes during the months of May to October. This working circle included 74902.72 ha delimited protected forests. The special object management of this working circle were mainly to improve the productivity and quality of these pastures to ensure continuous supply of quality grass/fodder to the graziers (right holders). Sequences of treatment have been laid down, but at the same time it was left to the discretion of Divisional Forest Officer to keep in view the financial and administrative constraints. Methods of treatment were prescribed to achieve the special objectives of this working circle. These mainly included removal of weeds, application of fertilizer to grass-lands, rotation closure of short duration and planting of exotic legumes and grasses.

In addition to the method of treatment, some regularity measures were also suggested. These included legislative measures to respect the grazing rights, introduction of improved variety of cattle restriction on number of grazing animals and control on incidences of fire due to negligence.

Critical Appraisal: The methods of treatment, and regulatory measures prescribed were necessary and sufficient. These measures to treat these pastures in accordance with the prescribed method and sequence have not been taken up during the plan period primarily due to financial reasons. Also, the regulatory measures such as improved of cattle stock were not backed by a sound cattle improvement plan, by the Forest Department for want of such provision in the budget. The systematic introduction of legumes and grasses of better variety have not been attempted, leaving these grass lands im-powerished as they were. Short rotation closures to improve the production of bio-mass were also not attempted. In the nut-shell these grass-lands were not given a due attention during the working plan mainly due to administrative financial and technical constraints.

11.11.9 Wildlife (Overlapping) Working circle

This working circle overlapped all the working circles constituted for the tract. Wild animals and birds play not only pay an important role in the maintaining the ecological balance but their importance for scientific, aesthetic and recreational point of view hardly needs emphasis. A detailed description of various wild animal and birds found in the tract has been given. The special objects of management were to to preserve and protect various wild animal or birds and their habitat, to curb poaching of wild life and to provide suitable conditions for an un-hundred reproduction to all forms of wild animals, birds and fishes. Various measures viz,

establishment of wild life barrier to curb poaching, reduction in number of cattle and controlled grazing, protection from fire winter hideouts and shelters for wild animals. Adequate wild life staff etc, were suggest for management point of wild life wing, the lack of finance etc. various sites for installation of watch towers and digging of water holes were suggested but these could not install again due to lack of budgetary support.

11.12 Sushil Singla Working Plan (2012-13 to 2021-22)

The general objectives of management of the forests were as under:

- i. To ensure primarily the preservation of the environment and only thereafter derivation of economic benefits both concessional and commercial.
- ii. To retain as much area as possible under natural cover to fulfill the objectives of conservation of the ecological diversity of species, watershed protection, recreational values etc.
- iii. To aim at securing cooperation of the local inhabitants through imaginative integrated forestry programmers of continuing nature but at the same time reorganizing the traditional usufruct in the forest estates inter-alia benefiting them through egalitarian distributive justice and recognizing these forests as source of fuel, fodder, food, manure, building material and raw material for indigenous crafts and medicines.
- iv. To identify the wild life which is dwindling or getting extinct and suggest measures aiming at its preservation/ rehabilitation and preservation of their natural habitat and gene pools.
- v. To improve the quality and stocking of existing forests and to so manage them those normal forests are obtained within the shortest period of time.
- vi. To raise economic plantations of suitable species in suitable localities of shamlats, land ceiling, private areas and degraded forests;
- vii. To rehabilitate the existing high-level pastures through improved agronomic practices and introduction of suitable high nutritive value local and exotic grasses and clovers.
- viii. To preserve the hill slopes against denudation and erosion in order to ensure an equitable flow of water into streams and rivers;
- ix. To provide for necessary raw material for various forest-based industries and thus to generate employment opportunities in rural area;
- x. Consistence with the above to aim at the maximum possible sustained yield and later progressively increasing yield of various forests products to meeting the national and local requirements.
- xi. In essence the working plan dedicates itself to subjugate wood production of the forests to the objectives and ideals of the conservation of flora, fauna, habitat, ecology and watershed values.

Keeping in view the above objects of management, the following working circles are constructed.

1. The Chil Working Circle.
2. The Oak Working Circle.
3. The Coppice Working Circle.
4. The Plantation Working Circle.
5. The Protection Working Circle.
6. The Khair (Over Lapping) Working Circle.
7. The Alpine Pasture Improvement (Over lapping) Working circle.
8. The Wild Life (Over lapping) Working Circle.

11.12.1 Chil Working Circle (Area: 10217.29 ha.)

This Working Circle comprises of all the pure or nearly pure Chil areas of the Division. The forests are irregular, poor in growth and burdened with excessive rights. The quality is generally III. The forests at high locations are better stocked than those lower down which are being constantly invaded by scrub species. This working circle comprised of 10217.29 ha. of pure Chil forests as well as areas of Chil plantations that lie in the lower parts of the division. In regard to legal status of forests with regard to closure and their control for management, three felling series namely (i) Rotational Closure Felling Series or Felling Series-I, (ii) Voluntary Closure Felling Series or Felling Series-II and, (iii) Co-operative Forest Societies Felling Series or Felling Series-III constituted. Total enumeration of chil and important BL species in 10cm diameter classes down to 10 cm d.b.h. and khair wherever exist in 5 cm diameter classes down to 10 cm d.b.h. was carried out in PB-I, PB-II, PB-III and PB-IV areas. The WPO should discuss the result as tabulated in the WP. The average density was taken as 0.5. The average site quality was taken as III. The forests were managed under “Punjab Shelter wood System” or “Indian Irregular Shelter wood system”. Keeping in view the MAI and CAI & out turn of standard size timber the exploitable diameter was kept 60 cm. Rotation of 120 years, in keeping with the requirement of the scheme of Rotational Closure was prescribed. The regeneration period was 30 years. Four Periodic blocks of 30 years each were constituted. The detail list of forest allotted to these PBs is given in the current WP. WPO should also discuss the same. The allotment of areas to PBs be checked.

The yield was prescribed from PB-I and PB-II areas under Felling Series-I, II and III. There were two types of fellings **1. Seeding felling** **2. Final felling.**

A. Seeding Felling: About 15-20 healthy vigorous growing trees with clear bole and good crown were prescribed to be retained as seed bearer per hac on northern and eastern aspects. The number was increased to 20 to 25 trees on hot southern aspects. The mother trees were prescribed to be kept evenly distributed over the area. But due to ban on green felling during WP period no such activities were

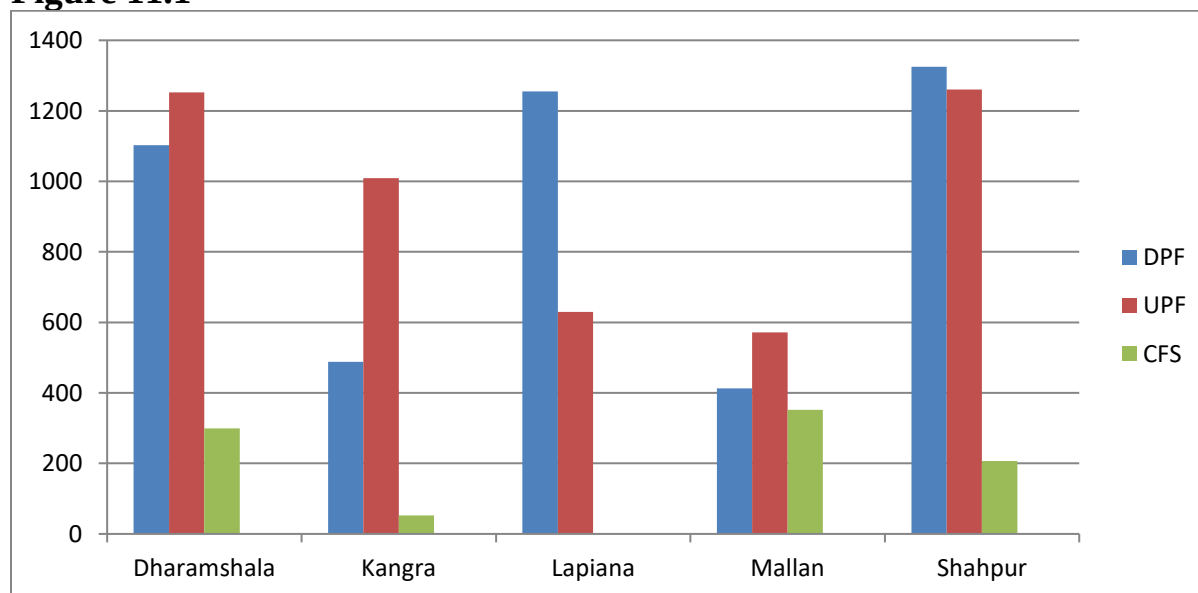
carried out. The WPO should discuss & keep this in mind while finalising the same.

B. Final felling: It applied to fully regenerated areas having height 3 to 4 Meters and had been burnt twice. All the seed bearers were to be removed. But due to ban on green felling during WP period no such activities be carried out. The WPO should discuss & keep this in mind while finalising the same. The sequence of felling programme is prescribed in the current WP. The WPO should discuss the same while finalising the WP.

Annual yields were also prescribed based on the yield regulation under the Punjab Shelter wood System or Indian Irregular Shelter wood system. The control of yield was by volume, felling series- wise. However, following a ban on the green felling in the hills these Chil forests could not be worked in accordance to prescriptions laid down in the working plans. Thus, only salvage extraction of the dead and dry trees were allowed and such extraction was mainly done through the HPSFDC Ltd. As no final felling could be carried out due to the ban, the canopy could not be opened that would have favoured the forest to be fully stocked with well-established regeneration. Hence, generally, there is a lack of natural regeneration in these forests. However, in some Chil forests, one can come across small patches of natural regeneration of Chil.

Range-wise Forest area allotment to Chil Shelterwood working Circle

Figure 11.1



Yield prescription: The annual yield was calculated according to Simon's modification of Von Mantel's Fourmula.

$$\text{Annual Yield (Y)} = 2RXV/R^2 - X^2$$

Where V= Volume of growing stock measured

R= Rotation period

X= Age corresponding to the dia. Down to which the growing stock is measured

Yield from felling series-I: Annual Yield from PB-I was fixed 4000 M³. No yield was prescribed from PB-II as no silvicultural felling area prescribed. Annual yield from PB-III was fixed as 700 M³ PB-IV – 1700 M³ with the regular removal of 4000 M³, 700 M³ and 1700 M³ from PB-I, PB-II and PB-IV areas respectively, there was a leftover of 1100 M³ in felling series-I which is expected to be sufficient to meet the demand of right holders and fee guarantees.

Yield from felling series-II: Annual yield of 900 M³ and 200 M³ was prescribed under the felling series from PB-I and PB-IV areas.

Yield from Felling Series-III: Annual yield of 700 M³, 130 M³ and 350 M³, WPO will discuss sequence of fallings Para 2.19 of the working plan under revision.

11.12.1.2 Subsidiary Silvicultural operation

The detail of subsidiary silvicultural operations like disposal of felling debris, subsidiary fellings, weeding, sowing and planting, tending operations/ cultural operations in PB-IV, closure of PB-I areas and control burning etc. be discussed be discussed by WPO in detail.

11.12.1.3 Other Regulations

The other regulations proposed for this working circle were as under:

Closure: Immediately after felling, all PB-I areas be closed to grazing by proper fencing till the end of the working circle. The WPO should give detail of such PB-I areas which were closed after felling.

Fire protection and control burning: The WPO should give details of forests vulnerable to forest fires for the past 15 years in the form of a table. This can be correlated to number of Fire incidences and hence can show that these steps were useful / not useful in controlling Fire in the Chil forests and hence shall form basis of prescriptions in the new WP with reference to Fire management. All cases of fire should be promptly reported giving the extent of damage. A tracing of all the fire burnt areas 0.4 ha. and above in extent should be prepared. WPO should also discuss the scope of establishment of **Chil needle-based industries**.

Control Burning: The details are tabulated in the current WP. WPO should check the same. Chil forests in the Division are vulnerable to forest Fires during the dry summarise May / June. Measures to check the menace of forest Fires in Chil were prescribed in different working plans. These measures included clearing of Fire lines, controlled burning and removal of inflammable Chil pine needles from the forest floor besides ensuring public awareness and participation in the recent times. Fire lines have been cleared and are being maintained in these Chil forests. WPO should give the triennial programme of control burning.

Resin Tapping: Discussed in detail in the WP. WPO should discuss the same. Prior to 1984, resin tapping was done by conventional *French cup and lip* method. From 1997 onwards, the tappable diameter for Chil trees which would be under tapping for the First time was fixed at 35 cm DBH. The WPO should enclose a table showing the total yield of resin over the past 10-15 years and work out the average resin yield from the records available. This would help in standardizing resin extraction and regulating the same to prevent over exploitation by setting standard yield for resin. WPO should also discuss possibility adoption of Bore Hole methods on experimental basis to minimize the extent of injuries to trees as a result of faulty resin tapping.

11.12.1.4 Results

Following a ban on felling of green trees in the hills these Chil forests could not be worked in accordance with the prescriptions. Only salvage extraction of the dead and dry trees were allowed and such extraction was mainly done through HPSFDC Ltd. As no final felling could be carried out due to ban, the canopy could not open up to favour natural regeneration. Hence there is generally a lack of regeneration in these forests. WPO should present detail analysis of total removal by right holders and salvage tree extraction done through HPSFDC in comparison to prescribed yield in this working circle.

11.12.2 The Oak shelterwood Working Circle (Area: 2110.16 ha.

The Ban Oak forests as are pure or with a high proportion of Ban-Oak have been included in this Working Circle. The forests near the habitations are excessively lopped for fodder particularly during winter. The ban-oak trees are generally gnarled, malformed and crooked due to heavy lopping. Deodar was introduced in some of the Ban-Oak forests with variable success. Total of this working circle is 2110.16 Ha. Three felling series viz. Depot Felling series, Preservation felling Series, and co-operative Forests Society Felling Series have been constituted. The depot felling series include those Ban-Oak forests as are approachable and suitable for convenience of working and a forestation. The areas allocated to preservation felling series are meant to be preserved. The Ban-Oak forests of CFS are kept under Co-operative Forests Society felling series. The Ban-Oak Forests are mostly confined to Dharmashala Range while only a few Co-operative Forest Society forests are there in Shahpur Range Even in the forests allotted to Depot Felling Services. The stands are generally irregular and younger age classes. The density of forests of Depot felling series were generally better (0.7 to 0.8) than those in the preservation felling series where it is much less (0.2 to 0.6). In case of CFS felling series, density is about 0.4 to 0.6. In depot felling series, total enumeration of Ban oak and some other important species was carried out in 10cm diameter classes upto 10 cm dbh. In preservation series and CFS felling series, 5% partial enumeration by stratified random sampling was carried

out taking compartment, sub-compartment as unit of enumeration. WPO shall discuss in detail the result of enumeration for each compartment/ sub-compartment. Depot Felling series and CFS felling series were managed under the “Punjab Shelter wood System” or “Indian Irregular Shelter wood system”.

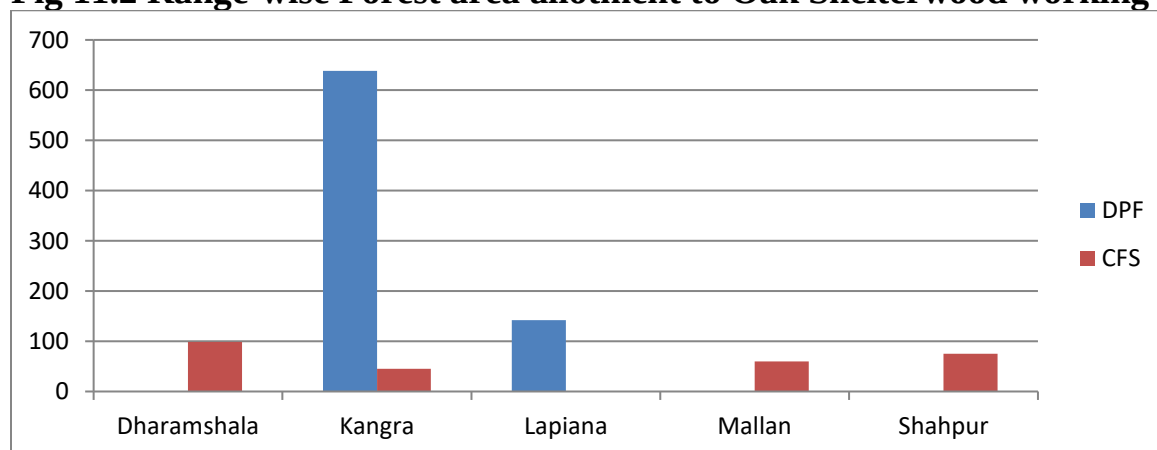
The forests under preservation series were remained under protection. Culturable blanks and under stocked forests were closed and planted with ban oak. Rotation of 120 years, in keeping with the requirement of the rotational closure scheme adopted. The crop diameter at this age is generally 35 cm. The rotation of 120 years was divided into four periods of 30 years each. The main yield was prescribed by way of seeding felling in PB-I. Intermediate yield from other PB's reserved to meet various demands of right holders and other local requirement. No yield from PB-IV was prescribed.

WPO shall discuss in detail the method of executing felling in PB-I and PB-IV prescribed in the working Plan under revision. There is total ban on the felling of oak trees. Therefore, no felling and yield was prescribed. Only salvage trees were to be removed to meet departmental requirements.

11.12.2.1 Subsidiary Silvicultural Operation

The detail of subsidiary silvicultural operations like subsidiary felling, sowing and planting, weeding/cleaning/thinning, grazing and grass cutting, closure of coppice coupe, etc. be discussed by WPO in detail. Further a Lopping Management Plan should be prepared by the WPO to ensure rotational lopping to prevent further degradation of these forests.

Fig 11.2 Range-wise Forest area allotment to Oak Shelterwood working Circle



11.12.2.2 Results

There is almost complete ban on felling of green Ban oak with a few exceptions for meeting the local requirements and for requirement of right holders.

In view of fact, felling could not be executed as per recommendations made. Due to heavy biotic pressure and absence of effective closure the condition of the forests further deteriorated. No specific planting programme was followed.

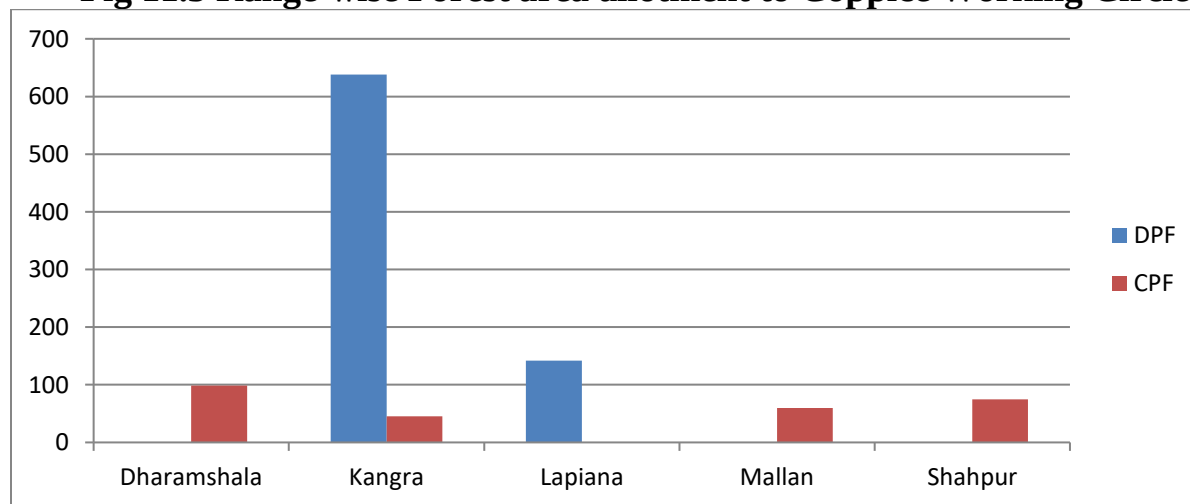
11.12.3 The coppice Working Circle (Area: 1059.02 ha.)

This working circle includes better stocked miscellaneous B.L. forests suitable to be worked under Coppice with Standard System. Natural coppice well be encouraged. Plantation of suitable species is prescribed to supplement natural coppice so that desired proportion of the species mix is maintained. Total area of this working circle is 1059.02 ha. Total enumeration of khair was carried out in 5cm diameter classes down to 10 cm dbh. For other species, 5% partial enumeration was done by stratified random sampling taking compartment/ sub-compartment as unit of enumeration. The site quality determination is neither required nor determine. Silvicultural system adopted for management of forests allotted for this WC was Coppice with Standard system. The standards were kept as they serve the purpose of safeguarding against erosion and frost. The rotation of 30 years for coppice and 60 years for standards was prescribed. Total area for Working circle for Felling Series-I and II was 888.28 ha. and 139.61 ha. respectively. Keeping in view the rotation period of 30 years, an annual target of 34 ha. was prescribed for both the felling series.

11.12.3.1 Subsidiary Silviculture Operation

The detail of subsidiary silviculture operations like clearing of coupes, sowing/planting, strategy to treat lantana infested areas/ tall planting, closure, cleaning of coppice shoats, grazing and grass cutting etc. to be discussed by WPO in detail in revised working plan. Regeneration assessment Survey every year after felling till a period of 5 years was prescribed.

Fig 11.3 Range-wise Forest area allotment to Coppice Working Circle



11.12.4 Plantation Working Circle (Area: 8010.18 ha.)

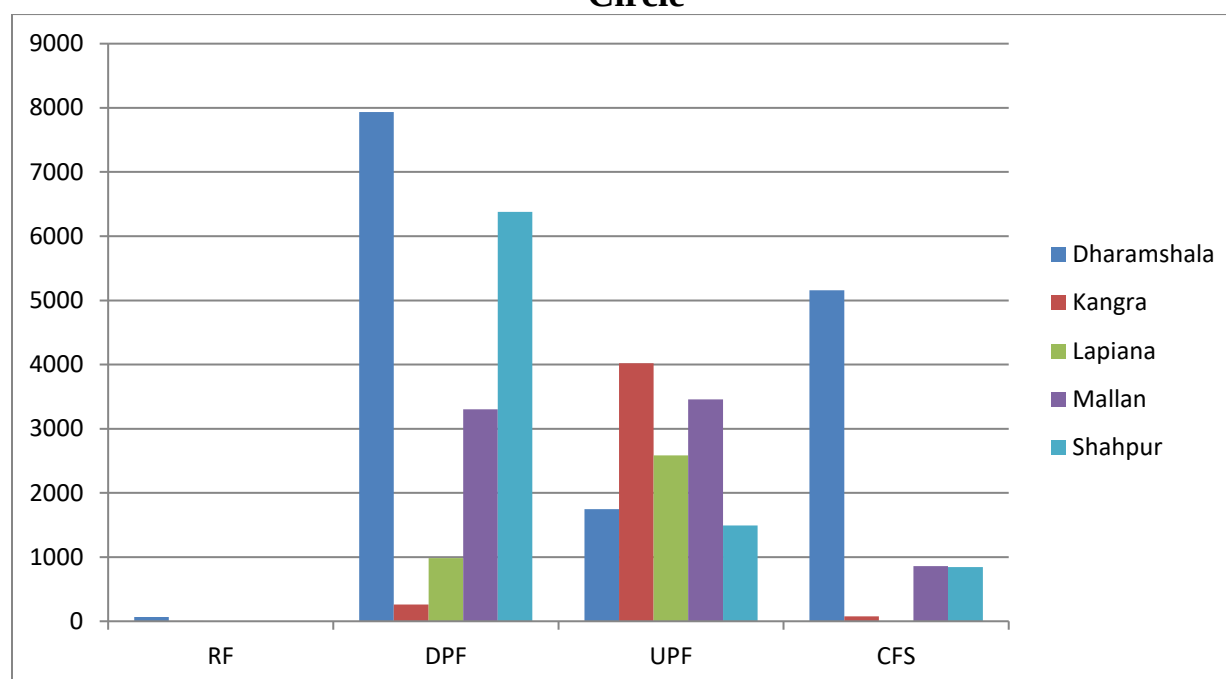
The working Circle has been created with objective to increase the area under Forest cover and thereby reducing the pressure on existing forests. Culturable Blanks (CB) shall be identified in the DPFS, UPFS and CFSs in the five ranges of the division. A year wise plantation target has been fixed for plantation of CBs identified in the DPFs. This Working Circle will include all areas that have been planted in the past and degraded forest areas except grass lands having density less than 0.4. The area of this Working Circle is 8010.18 ha. It includes such areas which carry young crops, and needs further protection, or are devoid of tree growth, or carry very open crop.

No enumeration was considered necessary and hence was not carried out. No silviculture system was prescribed. No yield, exploitable dia, regeneration/rotation was prescribed. The WPO should discuss in detail about plantation programme and site-specific plantation techniques along with closure of the area, site clearance, preparation of site, sowing and planting etc. Miscellaneous regulations like grazing, grass cutting, lopping, and Fire protection etc. w.r.t. plantation areas should also be discussed by WPO.

11.12.5 Protection Working Circle (Area: 39236.53 ha.)

Such forests are generally not to be worked under any system of felling due to their protective sole against denudation and erosion closures combined with planting have been prescribed in suitable area. Felling only to meet the needs of right holders, salvage removals and removals only of khair under khair (Overlapping) Working Circle have been prescribed. In fact, even salvage, removals are to be discouraged in the higher hills and more difficult terrain. Total area of the circle is 39236.53 ha. which includes 138.77 ha of RF, 18861.28 ha of DPF, 22841.10 ha. of UPF and 6940.29 ha of CFs forests. Ocular estimate of site quality was made during field inspections. The average site quality of Deodar is II/III and that of Chil III and below. The average density of the circle was taken as 0.3. Total enumeration of Khair was carried out in 5 Cm diameter classes down to 1 Cm d.b.h. For other species 5% partial enumeration was carried out by stratified random sampling taking compartment/sub- compartment as unit of enumeration.

Fig 11.4 Range-wise Forest area allotment to Protection Shelterwood working Circle



No definite Silviculture system was prescribed. Felling of only Khair trees on selection principles under Khair (Overlapping) Working Circle was allowed. No yield was calculated and prescribed. WPO should discuss the same.

Other regulations were effective closure, grazing, lopping, plantation programme, fire protection, right holder requirement and strategy for control and rehabilitation of Lanata affected areas should be discussed by the WPO in detail.

11.12.5.1 Results

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

11.12.6 Khair (Overlapping) Working Circle

This Working Circle overlaps Chil, Protection and Plantation Working Circle. This Working Circle covers the Delimited protected, Un-delimited Protected and also forests of the co-operative Forests Societies of the Division. The working circle overlaps all Khair bearing forests of all categories in Chil Plantation and protection Working Circles. The objective is to harvest the mature stock of khair on a sustained basis but not to increase the proportion of khair in the forests allotted to Chil Working. The exploitation of khair is to be on selection principles but no thinning is to be done. The enumeration of Khair was done in Chil, Protection and Plantation Working Circles in 5 Cm diameter classes down to 10 cm d.b.h. Silviculture system prescribed for management of forests allotted to this Working Circle was selection system but thinning was prescribed wherever

required. Exploitable d.b.h. retained as 25 cm. Felling cycle was of 10 years duration. The prescribed annual yield under felling series I, II, III (on the basis of number of selection trees and calculated by the Brandis Method) was 123600 trees.

11.12.6.1 Subsidiary Silvicultural operations

The detail of subsidiary silvicultural operation like weeding, cleaning, handling *Lantana*, planting with tall plants and sowing of local grasses etc should be discussed by the WPO in detail.

Results: Following a ban on felling of green trees, removal of green khair trees from the forest area could not be done in accordance with the prescriptions. Only salvage extraction of the dead and dry khair trees were allowed and such extraction was mainly done through HPSFDC Ltd. WPO should present detail analysis of total removal by right holders and salvage tree extraction done through HPSFDC in comparison to prescribed yield in this working circle.

11.12.7 Wildlife management (overlapping) Working Circle

This working circle overlaps all other working circles and is created to check the depletion of wild life and to increase its population. It extends from near the Pong dam lake reservoirs, across the Kangra Valley and up to the snow-clad lofty mountain range of Dhauladhars. The objective is to arrest the rapid decline in the biodiversity especially the number of wild animals by affording due protection, increasing vegetal cover to providing safe habitat and by enforcing the statutory Rules of Wild Life Protection Act, 1972 in a stringent manner. The habitat loss due to diversion of forest lands for other purposes, frequent forest Fires, excessive lopping and hacking of trees has increased the human wildlife conflict manifold. The main animals involved in depredation incidents are Leopard, Monkey, Wild Boars and Black/Brown Bears. The WPO should discuss the Wildlife management plan in detail with main focus on habitat improvement and reduction of human wildlife conflict.

11.12.8 Non-Timber Forest Produce (overlapping) Working Circle

This is an overlapping Working Circle and shall include all the forests of the division under various working circles. The State has formulated Himachal Pradesh Forestry Sector Medicinal Plants Policy, 2006 which is aimed at conserving and strengthening medicinal plant resource base in forest areas as well as outside for use towards enhancing health and livelihood security of the people of the State on sustainable basis. There is much scope to improve upon Non-Timber Forest Product resources found in the Division, which may be helpful for rural

employment. Medicinal plants mostly herbs are found in the tract are in the form of depleted resource due to neglect and improper harvesting techniques and indiscriminate extraction. A four-year extraction cycle of the medicinal plants is already in force. No yield prescribed as the most of NTFPs are extracted through right holders. Efforts should be made to suggest measures for the development and management of this resource. WPO should discuss the NTFP management plan with special focus on resin (from chir pine) and katha (from *Acacia catechu*), other NTFPs include bamboos (now an NTFP under the FRA), medicinal herbs like *Atis* (*Aconitum heterophyllum*), Karu (*Picrorhiza karruoa*) and tree species like Amla, Harar, Behra and so forth. Rotational extraction of medicinal plants forms the backbone of the strategies for sustainable management of this valuable resource. The scope of **Van Smridhi Jan Smridhi Yojna** in sustainable management of NTFPs should be discussed by the WPO.

11.12.9 Alpine Pastures improvement Working Circle

Alpine pastures are found at an elevation of 3200m and extend upto 4800m above mean sea level. The melting snow and monsoon clouds provide sufficient moisture from April to August for luxuriant growth grasses. Vegetation starts drying up from September with fall of temperature. Total area of working circle is 6512.47 ha. These pastures are good sites for grass production and provide grazing grounds from May to September for a large number of migratory flocks of sheeps, goats and buffaloes. It includes all the high –lying pastures locally known as Dhars and all local grazing ground generally UPFs. The main thrust is given to alpine pastures, which require systematic management to check the process of their deterioration due to excessive grazing with every passing year. The WPO should discuss the Garzing land management and livestock management with special focus on grazing potential, herbage/forage requirement and migratory graziers. The scope of Rotational Grazing practices and introduction of improved variety of grasses should be discussed.

11.12.10 Joint Forest Planning and Management (overlapping) Working Circle

This working circle will overlap the other working circles and will include both the degraded as well as good forests (except the protected area Network) which need immediate treatment through protection, afforestation, pasture development, soil conservation etc. Ever increasing population pressure has aggravated depletion of forests. These areas were to be improved through participatory approach on the one hand and silvicultural interventions on the other. Participatory management of forests resources is the theme of 21st century.

The latest JFM/ PFM scheme in progress is being run under FDA. The WPO should discuss the performance of JFM/ PFM in Dharamshala Forest Division and suggest the necessary steps to be taken for making this initiative

successful by critically analysing the past results of forest improvement through participatory approach and lesson learnt. Further WPO should discuss the scope of **Samudayik Van Samvardhan Yojna** and further implementation of **the Himachal Pradesh Forest Ecosystem and Climate Proofing (KfW) Project** in the division.

Chapter 12

STATISTICS OF GROWTH AND YIELD

No fresh studies were carried out to determine local volume tables, diameter growth, mortality rate and relationship of volume and diameter with age in respect of different species while preparing this working plan. Instead, as per the guide lines in the approved preliminary working plan report, all the data regarding statistics of growth and yield has been adopted from working plan by Sh. Sushil Kumar IFS (2012-132 to 2021-22). Since the climate and depict conditions are almost the same for different vegetative zones in the divisions, it was decided to adopt the data for statistics of growth and yield of different species from working plan of Sh. Sushil Kumar IFS (2012-12 to 2021-22). for preparing the current working plan. The same is reproduced here in detail incorporating a few changes in enumerations, stock mapping etc.

12.1 GENERAL:

The main species found in the region are Deodar, Kail, Fir, Spruces, Chil, Khair, Shisham, Eucalyptus etc. Apart from these species several miscellaneous species also exist in the area The statistics of growth, volume and yield of these species are discussed below

i) Deodar, Kail, Fir, Spruce

Generally, the forest of this region supports of quality III. In some portions (dry and exposed ridges), quality recedes to III/IV or even IV. However, in good areas the quality class goes upto II. In genral the standing volume factor for quality class III are applicable and applied and is as under

Table showing standing volume (As applicable)

Table 12.1

Diameter class	DBH in cm	Deodar & Kail Standing Volume (M ³)	Fir & Spruce standing Volume (M ³)
V	10-20	-	-
IV	21-30	0.14	0.14
III	31-40	0.42	0.84
IIA	41-50	1.26	1.68
IIB	51-60	2.38	3.08
IA	61-70	3.50	5.07
IB	71-80	4.76	7.00
IC	81-90	6.02	8.40
ID & above	>91	7.0	8.40

Table showing Diameter class & standing volume Increment Percentage

Table 12.2

Class	DBH	Volume increment percentage			
		Deodar	Kail	Fir	Spruce
V	10-20	-	-	-	-
IV	21-30	3.52	3.81	2.34	3.08
III	31-40	2.82	2.92	2.08	2.56
IIA	41-50	2.27	2.47	1.69	1.97
IIB	51-60	1.82	1.80	1.30	1.54
IA	61-70	1.56	1.67	1.13	1.21
IB	71 -80	1.27	1.24	0.91	0.95
IC	81-90	1.04	1.20	0.71	0.83
ID & above	>90	0.86	0.88	0.49	0.65

ii) Ban Oak

The data is of academic interest only as commercial felling's of ban oak have been stopped as a policy matter and these do not form part of prescriptions of this plan

Table showing standing volume and yield for Ban (As applicable)

Table 12.3

Class	Diameter	Volume (stem & Branch wood)	Fire wood (Qtls) 1 M ³ =9.90 qtl	Charcoal(qtl) 6qtl firewood = 1qtl charcoal
V	10-20	0.03	0.03	0.05
IV	21-30	0.21	2.08	0.35
III	31-40	0.75	7.48	1.24
IIA	41-50	1.47	14.55	2.43
IIB	51-60	2.34	23.17	3.86
IA	61-70	3.37	33.36	5.56
IB	71 -80	4.54	44.954	7.50
IC	81-90	4.54	44.95	7.50
ID & above	>90	4.54	44.95	7.50

iii) Chil (Pinus roxburghii)

The volume table for chil has been adopted from previous working plan and is tabulated below:

Table showing standing volume for Chil (As applicable)

Table 12.4

Diameter class	DBH in cm	Total Standing Volume (M ³)
V	10-20	0.05
aIV	21-30	0.23
III	31-40	0.65
IIA	41-50	1.36

IIB	51-60	2.36
IA	61-70	3.62
IB	71 -80	5.20
IC	81-90	5.20
ID & above	91 & above	5.20

iv) Khair (Acacia catechu)

Due to higher value of khair tree and low exploitable diameter (20 cm) the volume factor is based on 5 cm dia class as was adopted in previous working plan by Sh. Vineet Kumar and reproduced as under

Table showing standing volume for Khair

Table 12.5

Dia	Dia class	Standing Volume M ³	Heartwood M ³
10-15	V-1	0.026	0.012
15-20	V-2	0.069	0.030
20-25	IV-1	0.117	0.056
25-30	IV-2	0.168	0.108
30-35	III-1	0.258	0.176
35-40	III-2	0.330	0.241
40-45	IIA-1	0.434	0.302
45-50	IIA-2	0.545	0.388
50 & above	IIB & above	0.545	0.388

The diameter, total volume, heartwood, Katha as adopted in the Working plan of Hamirpur Forest division by Sh. Anil Joshi (plan of Hamirpur Forest division) is proposed to be adopted and will be made applicable after approval of this working plan which is tabulated as under.

The diameter, total volume, heartwood, Katha.

Table:12.6

Diameter(cm)	Height (m)	Volume (M ³)	Heartwood vol (M ³)	Wt. of heartwood Katha(kg)	Wt. of Katha (kg)
10-15	8.30	0.02570	0.011220	11.2	--
15-20	10.10	0.06860	0.03100	31.6	2.5
20-25	11.80	0.11810	0.05760	50.6	5.0
25-30	12.90	0.216970	0.10960	78.7	8.0
30-35	13.40	0.25280	0.17570	128.3	14.0
35-40	13.40	0.25280	0.17570	128.3	14.0
40-45	13.40	0.33310	0.24060	197.4	23.0
45-50	13.40	0.5680	0.38980	280.1	29.0

v) Miscellaneous BL species

The volume as was applicable in previous plan has been relied upon and will also be applicable in current plan also as reproduced below

Table showing standing volume for Broad leave species

Table 12.7

Dia class	DBH (Over bark)	Standing volume (M ³)
V	10-20	0.028
IV	21-30	0.141
III	31-40	0.566
IIA	41-50	1.132
IIB	51-60	1.132
IA	61-70	1.415
IB	71 -80	1.415
IC	81-90	1.415
ID & above	91 & above	1.415

vi) Shisham The volume factors as were applicable in Paunta working plan will be made applicable after approval of current working plan from Govt. of India and is tabulated as under

Table showing standing volume for shisham

Table 12.8

Diameter class	DBH in cm	Shisham Volume (M ³)
V	10-20	0.064
IV	21-30	0.176
III	31-40	0.467
IIA	41-50	0.977
IIB	51-60	1.523
IA	61-70	2.265
IB & above	71 -80	2.265

12.2 QUALITY CLASS ASSESSMENT:

The quality class of each compartment has been followed and adopted as per expired working plan by Sh Sushil Kumar and has been depicted in compartment history files.

12.3 ENUMERATIONS:

The technique of Survey and Assessment of Forest Resource using Grid and Quadrants method (Sample Plots) has been adopted and complete counting of all tree species class wise has been done as per Working plan code 2014 as under

Sampling Technique adopted

LAYOUT OF SAMPLE PLOTS IN THE FIELD

The digital map of the division was divided into grids of 25''x25'' grids of 1.11 sq Km in size and a sample of minimum one grid in 1.11 sq km of forest area was taken and center point of selected grids was drawn where a quadrant of 0.1 hac (31.62x31.62mts) was laid for enumeration of tree species and 2 quadrants of (3x3mts) diagonally opposite sides 3 meter away from corner was laid for counting of shrub species and 2 plots (1x1 mts) on the corner of main quadrant were laid for counting of shrub species. The enumerated results were captured has been filled in forms number as prescribed in WP code 2014 (A1, A2, B and C) and other forms Plot approach forms and Plot description were filled on spot

A two-stage sampling was followed as under:

- All the compartments of a division after inspection were allocated to one or the other working circle and then the compartments falling in a working circle was arranged in some order.
- Out of 1, 2 and 3, one number was randomly chosen, number 2 was selected randomly.
- The compartment which was numbered 2nd in item 1 is included in the sample of compartments (compartment is first stage sampling units).
- Adding 3 to this number was provide next selected compartment (2+3=5), ie 5th compartment was selected.
- Going this way, compartments numbered was selected.
- At least, eight compartments were selected from each major Working Circle.
- Having selected these compartments, field crew who was responsible for enumeration reached at the location of compartment with sketch of the compartment drawn from the CH file indicating direction of the sides and approximate length of sides.
- Located the South – West corner (S-W corner) of the sketch on the ground.
- From this point, with the help of compass, went 100 meters in East direction. From this point went 50 meters in North direction. This is the location of first sample point (second stage sampling unit).

- From the S-W corner, now went 100 meters in North direction and from there went 50 meters in East direction. This is the location of second sample point in that compartment.
- Now located the North – East (N-E corner) corner of the sketch on the ground.
- From this point, with the help of compass, went 100 meters in west direction. From this point went 50 meters in south direction. This is the location of third sample point.
- From the N-E corner, now went 100 meters in South direction and from there went 50 meters in West direction. This is the location of fourth sample point in that compartment.
- This way four points were selected in every selected compartment.
- These points were plot centers of the plot where enumeration is to be carried out.
- After reaching the plot centers fixed a stout peg of 10 cm diameter and 1.5 m height, and fixed it firmly on the ground. With GPS took the Longitude, Latitude and Altitude of the plot centre. Selected a large tree near the plot centre and took bearing and distance of plot centre from this tree. The bearing and distance of the plot centre from the tree was written with red paint on this tree stem after making a square blaze at the breast height. The GPS coordinates and the measurements from the nearby tree helped in the location of the plot centre at the time of checking by the checking party.
- After reaching the plot centre, from true North, fixed the NE at 45° , SE at 135° , SW at 225° , NW at 315° corners of the plot by measuring 22.36 m. horizontal distance, i.e. half of the diagonal, by steel tape in all four directions.
- Checked the dimensions of the plot i.e. all sides should measure 31.62 metres horizontal distance. Care was taken to adjust the dimensions of the plot according to slopes.
- The data regarding herbs and shrubs (including regeneration) was collected from four square plots of 1m x 1m and 3m x 3m respectively. These plots were laid out 30 meters from the centre of 0.1 ha plot in all four directions along diagonals in non-hilly area and along trails in hilly areas. In case of hilly areas the plot were taken randomly 2-10 meters away either side of the trail as shown in the diagram. Now to lay out 1m x 1m square plots for herbs whose centres are marked at 30 meters from the centre of 0.1 ha plot, marked four points at the distance of 0.71 meter along diagonal in both sides and at right angles. Joined all the four points.

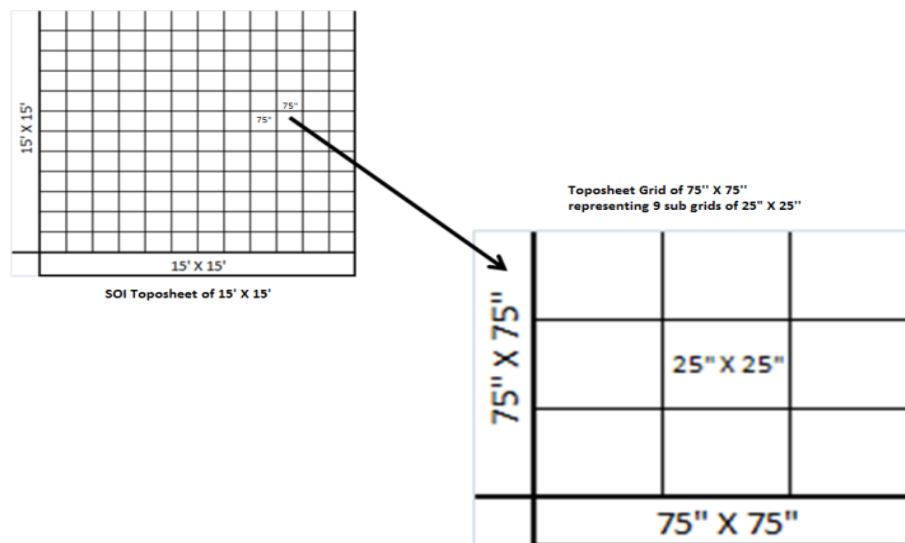
Similarly, for shrubs and regeneration square plots of 3m x 3m were laid out at the same centre by marking and joining four points at 2.12 meters distance along diagonal and at right angles.

From the centre of 0.1 ha plot along the diagonal 50m in each direction, square plot of 3m x 3m for shrubs and regeneration, 1m x 1m plot for herbs were laid out

Square plot: 1m x 1m

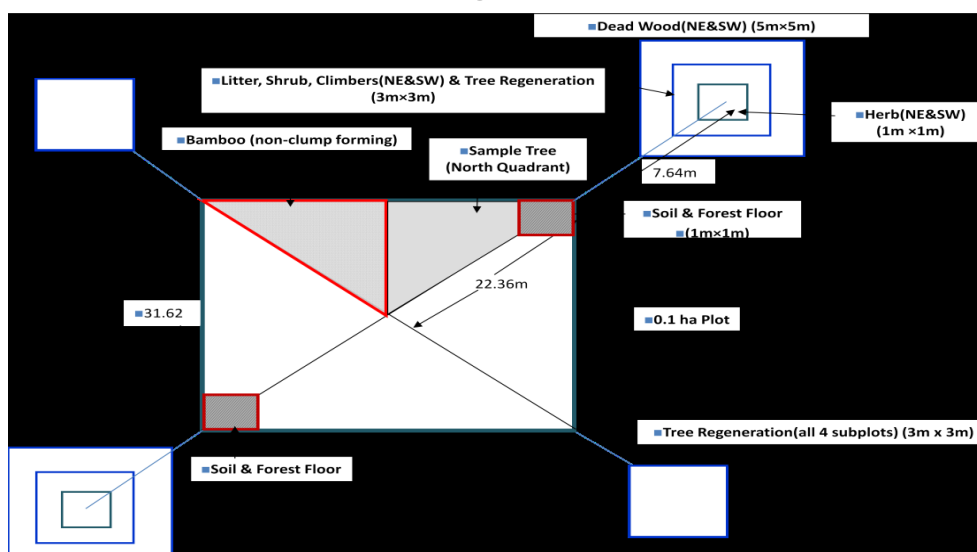
Square plot : 3m x 3m

Figure 12.1



Plot configuration of main plot and attached sub-plots :-

Figure 12.2



Stock Maps:

Stock maps of all compartments have been prepared on GIS platform and soft copy of same in KML format has been kept and hard copy of same has been placed in compartment history files on a scale 1:15000 and in some small compartments at a smaller scale so that same is visible and stock is depicted on it. The help of satellite maps and google maps are used to prepare the stock maps showing various layers and has been assigned legends as prescribed in working plan code 2014

12.4 Forest Resource Assessment

Assessment of natural resources is an essential and integral component of working plan exercise. On the basis of this assessment, past performance is evaluated and future management finalized. In Forest crops multi-dimensional populations with various parameters and attributes. Forest data so collected covers:

- a. Growing stock Inventory- It includes, Individual tree species stand or forest type; form and composition of tree crop-according to age, quality, extent, etc. and its distinction; Statistics of growth and yield through stump and stem analysis as well as from other available records; Biomass carbon stocks; Status of plantations etc.
- b. Vegetation survey- It includes enumeration of species composition such as dominant and co-dominant tree species, bamboos, shrubs, herbs, climbers, lichens, algae, fungi, epiphytes and parasites for their density, frequency, dominance and abundance values. This survey is necessary for study of status of regeneration, geographic distinction and environmental relationships of plant communities, assessment of medicinal and aromatic plants; and other NWFP species (excluding bamboo).
- c. Survey of Forest soils and assessing soil organic carbon stock.
- d. Socio-economic survey to assess the dependence on forests for livelihood needs.

12.4.1 Descriptive work while reaching the sample unit and sample plots.

After deciding the grid and sub-grid numbers to be surveyed, the team leader i.e. find a nearest convenient route so that to reach the sample unit i.e. centre of the sub grid from minimum traverse by vehicle or foot. After reaching at a nearby location of the plot, the next job done is to search a reference point, which is identified on the map as well as located on the ground. The sub-grid centre is reached after covering desired distance and bearing from the reference point with the help of GPS. The location of reference points and its correct description recorded in the form so as to re-visit the sample unit in future.

12.4.2 Stock Mapping

While approaching the sample unit, stock assessment and mapping (earmarking the stocked area on the map) has been done ocularly traversing the forests (compartment/village/any other management unit); so as to cover the entire area making observational assessment of site quality, tree species composition, its health (including injury to the tree-crop), density and crop age, etc.; All locations where any of the parameters change is described in PLOT APPROACH FORM and depicted/delineated on the map. Presence of special features within the compartment/village/other management unit, namely grassy patches, scattered trees, plantations raised, etc., has also been described in PLOT APPROACH FORM, Code-2014 and depicted on the stock map. Regeneration status of main species is also observed. The help of google maps overlaid on geo referenced digital compartment map were taken to identify the tree cover in compartment and then visiting the compartment to identify the dominant and sub-dominant species. The field maps so prepared were then prepared on GIS platform and prepared the same on SHP format and hard copies has been prepared on A3 size and further placed in CH files.

12.4.3. LAYOUT OF SAMPLE PLOTS IN THE FIELD

12.4.3.1.

After reaching the sampling unit i.e. the centre of the sub-grid, a square plot of 0.1 ha (Central plot) will be laid out by measuring 22.36 m horizontal distance i.e. half of the diagonal in all the four directions at 45° in North-East, at 135° in South-East, at 225° in South-West, and at 315° in North-West corners of the plot from the true north. Check the dimensions of the plot, i.e. all sides should measure 31.62 m horizontal distance. Care should be taken for laying out the proper dimensions of the plot. Each sampling unit may contain 5 sample plots of 0.1 ha (31.62m X 31.62m) each for tree inventory. Four side plots (namely North Plot, East Plot, South Plot and West Plot) of 0.1 ha (31.62m) will be laid at a distance of 50m from the centre of the central plot to their centre in all the four directions i.e. North, East, South and West. Nested quadrates of size 3m x 3m and 1m will be laid out a distance of 30 meters from the centre of the central plot in all four directions along diagonals in non-hilly area and along trails in hilly areas for the enumeration of shrubs (including regeneration status) and herbs respectively. The provision of side plots in each sampling unit for enumeration of trees may be systematically reduced by the state government subject to local conditions and objectives of the management.

12.4.3.2

Three nested quadrates of size 5m x 5m, 3m x 3m and 1m x 1m was laid at the centre of the central plot for the estimation of carbon stock. In 5m x 5m, all the dead wood above 5cm diameter was collected, weighted and recorded. In 3m x 3m, all the woody litter, that is all branches below 5cm diameter was collected, weighted and recorded. All shrubs (including all the trees below 10cm dbh) and climbers in 3m x 3m plots was up-rooted, weighted and recorded. For trees, allocation of carbon in root, stem, branch, twigs and leaves was obtained separately. In 1m x 1m, all the herbs including leaf litter was collected, weighted and recorded. Dry biomass was converted into carbon stock. For collecting data on humus and soil carbon, forest floor of 1m x plot was swept and materials thus collected, was weighed and a portion of the same was kept for the carbon analysis. After that, a pit of 30cm x 30cm x 30cm was dug at the centre of the 1m x 1m plot and a composite sample of soil weighing 200gm was kept for organic carbon analysis.

12.4.4 General plot variables to be recorded

General information related to land use, physiographical features like altitude, aspect, slope, soil and water resources; crop composition, regeneration status, injury to the crop, fire incidence, grazing incidence, presence of weeds, presences of grasses, occurrence of bamboo, plantation status, distance from water course, drivers of degradation, etc. was recorded for every sampling unit of 2 (two) hectare area in the PLOT DESCRIPTION FORM (Annexure-II). This information along with the general observations made in PLOT APPROACH FORM (Annexure-I) was used for writing the compartment description. General definition and description of terms not specifically mentioned here was taken from the manual for national forest inventory of India (FSI, 2010).

12.4.5 Plot Enumeration

For the Sample Plot, which cannot be laid out due to steep slopes or other conditions, was left out of enumeration and its inaccessibility conditions was mentioned in Plot Enumeration Form. All trees having diameter 10cm and above is enumerated, species and diameter class wise, from all the identified sample plots of 0.1 ha and recorded in the PLOT **ENUMERATION FORM**. Trees below 10cm diameter at breast height over bark was not enumerated. Enumeration of trees/bamboo was started from the NE corner of the plot and proceed in clockwise direction. For bamboo, average diameter of the clump was measured and number of green culms of different age class (up to 1 year, 1-2 years and above 2 years) and dry & damaged culms in the given clump was recorded. Also, the height of the trees, at least from the central plot was measured and recorded for ascertaining the

site quality. The date of the shrubs, climbers and regeneration status from all 4 quadrates of 3m x 3m laid at the centre of the plots was collected and recorded in the PLOT ENUMERATION FORM. The data of herbs from all nested quadrates of 1m x 1m laid within each quadrate of 3m x 3m at the centre was collected and recorded in the PLOT ENUMERATION FORM.

12.5 GROWING STOCK ESTIMATION

From the enumeration/field data, species wise distribution of trees in each diameter class was generated for compartment. Ratio method of estimation was used for estimating the growing stock of important trees species using local volume table of previous plan. Adding the growing stock of all compartment, the growing stock of the particular forest is estimated, which is again integrated up to range level and further at divisional level. Stratification developed by FSI based on forest type, density, land use using GIS is also used for increasing the precision of the estimates.

12.5.1 Statistics of Forest Carbon Stock

The total carbon stocked in the forest is divided into different pools and the changes in carbon stocks in these carbon pools are estimated as per Good Practices Guidance (GPC) developed by Inter-governmental Panel on Climate Change (IPCC). Changes in Carbon stock based on inventory data is measured using Stock-Difference method based on tier 2 and tier 3 approach of IPCC guideline.

Stock maps has been prepared using modern technologies using open series maps (OSMs) on a scale 1:15000 or fitting to the compartment size and A-3 paper both in digital and analogue form. The maps have been placed in C.H. files

12.6 COMPARISION OF GROWING STOCK:

The comparison of growing stock of current working plan with that of previous working plan by Sh. Sushil Kumar IFS is as under

Comparison of the growing Stock

Table 12.9

Sr no	Working Circle	Growing stock as per Sushil Kumar plan	Growing stock as per current plan
1	Chil	Not calculated working circle wise	1205073.26
2	Oak		598800.36
3	Coppice		174925.30
4	Plantation		1325459.42

5	Protection		4346427.24
	Total		7650685.58

The only inference which is evident is that due to non-compliance of prescriptions of previous working plan due to ban on green felling has resulted in Presence of over mature crop and accumulation of forests in higher age classes (Increase of forests and area in PB-I group specially in Sal working circle which is main crop in the division)

The effort to restore the management system is required and needs vigorous effort at appropriate level.

PART-II

FUTURE MANAGEMENT DISCUSSED AND PRESCRIBED

CHAPTER-1

BASIS OF PROPOSAL

1.1 General

Forest have always since their inception served the humanity which in turn has interacted with exploitative attitude over the time. This renewable resource has played a pivotal and significance role in the fabric of National economy in general and socio-economic condition of rural population in particular. The give and take relationship with the forest has however at no point of time struck a balance. Infact human interests have always outweighed the necessary obligation towards the forests. With the changing socio-economic scenario at the national level, the forests have witnessed an exposure to an over expanding range of their utility. In concurrence with this Efforts have always been there to replenish this resource. Such package of efforts has been embedded in the National Forest Policy of 1952 which during 1988 stand further tailored to the changing needs and reaction of public. With a principle aim of ensuring environmental stability and maintenance of ecological balance which are vital for sustenance of all life forms human, animal and plants.

Over a period of time there has been a change in the general outlook of public towards forests. Now fortunately the protective role of forests is being well appreciated of various needs of public, the fuelwood and fodder occupy the prime position.

This division being mostly in the foot hills of Siwalik zone has a very fragile and friable geological formation which in the absence of any vegetal mantle erodes easily. This aspect assumes more significance in view of the Pong Dam in the area. Thus, soil conservation measures supplemented by afforestation form an important tool to restore the green cover and prevent any soil erosion. While the Forest conservation Act. 1980 has largely halted the process of alienation of land form the control of Forest Department, but this has not put halt to the condition of vegetation cover of forests.

1.2 Objects of Management:

Management of Forest should in general aim at nurturing the rich heritage of biodiversity, maintenance of eco balance and in particular to increase the proportion of such profitable spp. So far as the silvicultural consideration indicate to be desirable. Consistent with the mandate of National

Forest Policy,1988 the general objects of management of Forests under the plan area s under: -

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

1.3 CONSTITUTION OF WORKING CIRCLES AND GENERAL TREATMENT:

Keeping in view the treatment essential for different species as per their silvicultural

characteristics the overall physiographic condition and objects of management following working circles have been constituted:

1. CHIL WORKING CIRCLE

2. OAK WORKING CIRCLE
3. COPPICE WORKING CIRCLE
4. PLANTATION WORKING CIRCLE
5. PROTECTION WORKING CIRCLE
6. KHAIR (OVERLAPPING) WORKING CIRCLE
7. ALPINE PASTURE IMPROVEMENT (O) WC
8. WILD LIFE MANAGEMENT (Overlapping) WC
9. JOINT FPREST MANAGEMENT (OVERLAPPING) WC
10. FOREST PROTECTION

1.4 Felling Series:

There will be Three Felling Series.

1. Legal Felling Series (RF& DPF)
2. Voluntary Felling Series(UPF & UF)
3. Co-Operative Forest Felling Series

1.5 PERIOD OF WORKIGN PLAN:

This plan is prepared for period of 10 years commencing from 2024-25 to 2033-34. The working plan under revision expired on 31st March, 2022. There were no silviculture felling since then and the salvage removals made with effect from 2022-23 to 2024-25 has been duly accounted in the divisional Control forms based on the prescriptions of previous plan. The other operations like plantations under state schemes, Compensatory Afforestation, Control burning, repairs of boundary pillars and other departmental works were done on the basis of Annual Plan of Operations. Hence, there is no problem in making the plan operative prospectively

CHAPTER-2

CHIL SHELTERWOOD WORKING CIRCLE

2.1: GENERAL CONSTITUTION AND GENERAL CHARACTER OF VEGETATION:

This Working Circle comprises of all the pure or nearly pure Chil areas of the Division. This largely remain much the same as the Chil Shelterwood Working Circle of the plan under revision except that a few chil bearing areas from other working circles and some of the plantations raised in the Un-delimited Protected and Co-operative Society Forests which have been (are) considered to be well established have been included for regular management. The total area of the working circle is 10252.05 ha. The following table summarizes the distribution of the circle in various ranges:

Table2.1 Range wise Area under Different Forest Categories (in ha):

Chil Working Circle(In Ha.)						
Forest Class	Ranges					Grand Total(Ha.)
	Dharamshala	Kangra	Lapiana	Malan	Shahpur	
DPF	799.23	488.1	1255.37	412.77	1628.84	4584.31
UPF	759.55	974.88	606.57	543.55	1704.82	4589.37
CFS	473	52.2		333.46	219.71	1078.37
Grand Total	2031.78	1515.18	1861.94	1289.78	3553.37	10252.05

The general character of the vegetation has already been discussed in detail in para below. The forests, on the whole, are under stocked, vastly variable in density and the desired distribution of age classes is lacking except in PB-IV and PB-III areas of Delimited Protected and Co-operative Society Forests. The forests are irregular, poor in growth and burdened with excessive rights The quality is generally I. The forests at high locations are better stocked than those lower down which are being constantly invaded by scrub species. The forests under these two Periodic Blocks have undergone the process of conversion to uniform during the last seventy years and position of the growing stock in these is quite near to the normal. The Un-Delimited Protected Forests were brought under

regular management for the first time during Malhotra's plan in 1966-67. Many of these have generally pure, young crop raised artificially and middle aged & mature trees are much in deficit.

2.2: FORESTS BLOCKS AND COMPARTMENTS:

The boundaries of the forest blocks and compartments/sub-compartments remain the same as in the previous plans as listed in Annexure 4 Volume II.

2.3: FELLING SERIES:

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

(i) Rotational Closure Felling Series or Felling Series I: Includes Reserved and Delimited Protected Forests and is subject to the scheme of rotational closure (Except Reserved Forests)

(ii) Voluntary Closure Felling Series or Felling Series II: Comprises of Un-delimited Protected Forests only. In these forests, the right to closure though not unrendered by the govt., is as per the established practice but extremely difficult to exercise without the consent of the people.

(iii) Co-operative Forest Societies Felling Series or Felling series III: Contains the forests under the control of co-operative forest societies.

2.4: SPECIAL OBJECTS OF MANAGEMENT:

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

- (i) To continue the conversion of generally irregular forests to more or less regular crops
- (ii) To provide for the requirements of the right holders for constructional timber & firewood;
- (iii) To restock areas having deficient regeneration either with naturally or with artificial regeneration.
- (iv) Consistent with the above objectives to obtain maximum possible sustained yield of timber and resin.

2.5: AREA AND ALLOTMENT:

The following tables give the area in ha. of each felling series allotted to different Periodic Blocks. The forest-wise detail of allotments has been given in Appendix II A.

Table 2.3 Felling series- I

Felling Series-I					
Ranges	I	II	III	IV	Grand Total
Dharamshala	177.64	173.6	219.34	228.65	799.23
Kangra	104.01	111.71	150.14	122.24	488.1
Lapiana	316.87	258.19	395.01	285.3	1255.37
Malan	103.6	95.1	88.22	125.85	412.77
Shahpur	441.11	409.94	492.9	284.89	1628.84
Grand Total	1143.23	1048.54	1345.61	1046.93	4584.31

Table 2.4 Felling series- II

Felling Series-II					
Ranges	I	II	IV	Other	Grand Total
Dharamshala	104.39	104.39	138.01	412.76	759.55
Kangra	285.3		206.81	482.77	974.88
Lapiana	152.15		93.07	361.35	606.57
Malan	72.44		337.41	133.7	543.55
Shahpur	524.04	42.09		1138.69	1704.82
Grand Total	1138.32	146.48	775.3	2529.27	4589.37

Table2.5**Felling series-III**

Felling Series-III					
Ranges	I	II	III	IV	Grand Total
Dharamshala	70.41	53.01	99.93	249.65	473
Kangra				52.2	52.2
Malan	57.86	95.11	93.09	87.4	333.46
Shahpur		101.55	59.07	59.09	219.71
Grand Total	128.27	249.67	252.09	448.34	1078.37

2.6: ANALYSIS AND VALUATION OF THE CROP: The crop is analysed as under:

2.6.1: STOCK MAPS:

All areas of the working circle have been stock mapped and the stock maps showing necessary details have been prepared on GIS plate form having adequate scale which is visible because of some compartments having small areas. Copies of the same have been placed in respective compartment history files. Chil is the prominent species all over.

2.6.2: SITE QUALITY AND AGE CLASSES: The site quality of each compartment / sub compartment has been assessed and noted in the compartment history files. The general site quality is III. Some forests are, however, below quality I. The stands on the whole, are irregular having preponderance of younger age classes. However, the crop in the PB II and PB IV areas is more or less uniform.

2.6.3: DENSITY: Canopy density of each compartment/ sub compartment has been estimated ocularly and noted in the compartment history files.

2.6.4: ENUMERATION AND THEIR RESULTS:

Enumerations:

The technique of Survey and Assessment of Forest Resource using Grid and Quadrants method (Sample Plots) has been adopted and complete counting of all tree species class wise has been done. A total of 54 Sample Plots (FSI), of 0.1 hac. were laid in this working circle covering all PBs. The detail of PB wise sample plots is as under.

Table 2.6**Felling series I**

Felling Series-I			
Sr. No	PB	No. Of Plots	Total Area Counted Hac.
1	PB-I	11	1.1
2	PB-II	7	0.7
3	PB-III	9	0.9
4	PB-IV	7	0.7
G total		34	3.4

Table 2.7**Felling Series II**

Felling Series-II			
Sr. No	PB	No. Of Plots	Total Area Counted Hac.
1	PB-I	20	2
2	PB-II	2	0.2
3	Other	19	1.9
G total		41	4.1

Table 2.8**Felling series III**

Felling Series-III			
Sr. No	PB	No. Of Plots	Total Area Counted Hac.
1	PB-I	7	0.7
2	PB-II	4	0.4
3	PB-III	5	0.5
4	PB-IV	5	0.5
G total		21	2.1

ABSTRACT OF CHIL ENUMERATION:

Felling Series I

PB1

Table 2.9

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	6235	17668	33257	31179	27021	8314	6235	1039	1039	131987
Deodar	0	0	0	0	0	0	0	0	0	0
Khair	6235	18707	2078	3117	0	1039	0	0	0	31176
Ban	0	0	0	0	0	0	0	0	0	0
Rai	0	0	0	0	0	0	0	0	0	0
Tosh	0	0	0	0	0	0	0	0	0	0
BL	25982	20786	5196	1039	1039	0	0	0	0	54042
Grand Total	25982	20786	5196	1039	1039	0	0	0	0	217205
Tree Volume (M ³)										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	311.75	4063.64	21617.05	42403.44	63769.56	30096.68	32422.00	5402.80	5402.80	205489.72
Deodar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Khair	296.16	2665.75	610.93	1525.77	0.00	566.26	0.00	0.00	0.00	5664.87
Ban	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rai	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tosh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BL	727.50	2930.83	2940.94	1176.15	1176.15	0.00	0.00	0.00	0.00	8951.55
Grand Total	1335.41	9660.21	25168.92	45105.36	64945.71	30662.94	32422.00	5402.80	5402.80	220106.14

PB II

Table 2.10

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	46435	22468	37447	20970	5991	8987	8987	7489	1497	160271
Deodar	0	0	0	0	0	0	0	0	0	0
Khair	1497	1497	0	0	0	0	0	0	0	2994
Ban	2995	7489	1497	0	0	0	0	0	0	11981
Rai	0	0	0	0	0	0	0	0	0	0
Tosh	0	0	0	0	0	0	0	0	0	0
BL	16477	22468	4493	2995	0	0	0	0	0	46433
Grand Total	19472	29957	5990	2995	0	0	0	0	0	221679
Tree Volume (M ³)										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	2321.75	5167.64	24340.55	28519.20	14138.76	32532.94	46732.40	38942.80	7784.40	200480.44
Deodar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Khair	71.11	213.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	284.43
Ban	89.85	1572.69	1122.75	0.00	0.00	0.00	0.00	0.00	0.00	2785.29
Rai	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tosh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BL	461.36	3167.99	2543.04	3390.34	0.00	0.00	0.00	0.00	0.00	9562.72
Grand Total	2944.06	10121.64	28006.34	31909.54	14138.76	32532.94	46732.40	38942.80	7784.40	213112.88

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	11960	22426	14951	23921	20931	26912	17941	5980	53824	198846
Deodar	0	0	0	0	0	0	0	0	0	0
Khair	0	0	0	0	0	0	0	0	0	0
Ban	7475	11960	8970	0	0	0	0	0	0	28405
Rai	0	0	0	0	0	0	0	0	0	0
Tosh	0	0	0	0	0	0	0	0	0	0
BL	16446	16446	1495	7475	1495	0	1495	0	1495	46347
Grand Total	23921	28406	10465	7475	1495	0	1495	0	1495	273598
Tree Volume (M ³)										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	598.00	5157.98	9718.15	32532.56	49397.16	97421.44	93293.20	31096.00	279884.80	599099.29
Deodar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Khair	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ban	224.25	2511.60	6727.50	0.00	0.00	0.00	0.00	0.00	0.00	9463.35
Rai	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tosh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BL	460.49	2318.89	846.17	8461.70	1692.34	0.00	2115.43	0.00	2115.43	18010.43
Grand Total	1282.74	9988.47	17291.82	40994.26	51089.50	97421.44	95408.63	31096.00	282000.23	626573.07

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	8973	14956	19442	17947	10469	5982	8973	1495	0	88237
Deodar	0	0	0	0	0	0	0	0	0	0
Khair	0	1495	0	0	0	0	0	0	0	1495
Ban	0	0	0	0	0	0	0	0	0	0
Rai	0	0	0	0	0	0	0	0	0	0
Tosh	0	0	0	0	0	0	0	0	0	0
BL	5982	4486	4486	0	0	0	0	0	0	14954
Grand Total	5982	4486	4486	0	0	0	0	0	0	104686
Tree Volume (M ³)										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	448.65	3439.88	12637.30	24407.92	24706.84	21654.84	46659.60	7774.00	0.00	141729.03
Deodar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Khair	0.00	213.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	213.04
Ban	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rai	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tosh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BL	167.50	632.53	2539.08	0.00	0.00	0.00	0.00	0.00	0.00	3339.10
Grand Total	616.15	4285.44	15176.38	24407.92	24706.84	21654.84	46659.60	7774.00	0.00	145281.17

Chil Felling series- II

PB I

Table 2.13

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	16505	23904	29027	12521	6260	1707	1707	569	18213	110413
Deodar	0	0	0	0	0	0	0	0	0	0
Khair	9675	21058	8537	569	0	0	0	0	0	39839
Ban	0	0	0	0	0	0	0	0	0	0
Rai	0	0	0	0	0	0	0	0	0	0
Tosh	0	0	0	0	0	0	0	0	0	0
BL	55777	36426	9106	3414	2276	569	0	569	1707	109844
Grand Total	55777	36426	9106	3414	2276	569	0	569	1707	260096
Tree Volume (M ³)										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	825.25	5497.92	18867.55	17028.56	14773.60	6179.34	8876.40	2958.80	94707.60	169715.02
Deodar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Khair	459.56	3000.77	2509.88	278.53	0.00	0.00	0.00	0.00	0.00	6248.73
Ban	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rai	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tosh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BL	1561.76	5136.07	5154.00	3864.65	2576.43	805.14	0.00	805.14	2415.41	22318.57
Grand Total	2846.57	13634.75	26531.42	21171.73	17350.03	6984.48	8876.40	3763.94	97123.01	198282.32

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0	0	0	1464	732	1464	2929	1464	3662	11715
Deodar	0	0	0	0	0	0	0	0	0	0
Khair	0	0	0	0	0	0	0	0	0	0
Ban	0	0	0	0	0	0	0	0	0	0
Rai	0	0	0	0	0	0	0	0	0	0
Tosh	0	0	0	0	0	0	0	0	0	0
BL	0	0	0	0	0	0	0	0	0	0
Grand Total	0	0	0	0	0	0	0	0	0	11715
Tree Volume (M ³)										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0.0 0	0.0 0	0.0 0	1991.0 4	1727.5 2	5299.6 8	##### #	7612.8 0	19042.4 0	50904.24
Deodar	0.0 0	0.0 0	0.0 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Khair	0.0 0	0.0 0	0.0 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ban	0.0 0	0.0 0	0.0 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rai	0.0 0	0.0 0	0.0 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tosh	0.0 0	0.0 0	0.0 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BL	0.0 0	0.0 0	0.0 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Grand Total	0.0 0	0.0 0	0.0 0	1991.0 4	1727.5 2	5299.6 8	##### #	7612.8 0	19042.4 0	50904.24

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	3101	23259	72878	63574	23259	8528	5427	1550	23259	224835
Deodar	0	0	0	0	0	0	0	0	0	0
Khair	0	0	0	0	0	0	0	0	0	0
Ban	0	0	0	0	0	0	0	0	0	0
Rai	0	0	0	0	0	0	0	0	0	0
Tosh	0	0	0	0	0	0	0	0	0	0
BL	6977	3876	775	775	0	0	0	775	0	13178
Grand Total	6977	3876	775	775	0	0	0	775	0	238013
Tree Volume (M ³)										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	155.05	5349.57	47370.70	86460.64	54891.24	#### ##	#### ##	8060.00	##### ##	382325.76
Deodar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Khair	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ban	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rai	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tosh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BL	195.36	546.52	438.65	877.30	0.00	0.00	0.00	1096.63	0.00	3154.45
Grand Total	350.41	5896.09	47809.35	87337.94	54891.24	#### ##	#### ##	9156.63	##### ##	385480.21

PB Other

Table 2.16

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	30617	55910	90521	77209	31948	6655	2662	5324	7987	308833
Deodar	0	0	0	0	0	0	0	0	0	0
Khair	0	1331	19967	2662	0	0	0	0	0	23960
Ban	0	0	0	0	0	0	0	0	0	0
Rai	0	0	0	0	0	0	0	0	0	0
Tosh	0	0	0	0	0	0	0	0	0	0
BL	111820	23961	14643	9318	9318	5324	1331	0	0	175715
Grand Total	111820	23961	14643	9318	9318	5324	1331	0	0	508508
Tree Volume (M ³)										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	1530.85	12859.30	58838.65	##### ##	75397.28	##### #	##### #	##### ##	41532.40	360781.02
Deodar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Khair	0.00	189.67	5870.30	1303.05	0.00	0.00	0.00	0.00	0.00	7363.01
Ban	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rai	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tosh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BL	3130.96	3378.50	8287.94	10547.98	10547.98	7533.46	1883.37	0.00	0.00	45310.18
Grand Total	4661.81	16427.47	72996.89	##### ##	85945.26	##### #	##### #	##### ##	41532.40	413454.21

Chil Felling series-III

PB I

Table 2.17

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0	549	1282	549	1832	1465	732	366	1649	8424
Deodar	0	0	0	0	0	0	0	0	0	0
Khair	0	0	0	0	0	0	0	0	0	0
Ban	0	0	0	0	0	0	0	0	0	0
Rai	0	0	0	0	0	0	0	0	0	0
Tosh	0	0	0	0	0	0	0	0	0	0
BL	1099	366	183	183	183	0	0	0	0	2014
Grand Total	1099	366	183	183	183	0	0	0	0	10438
Tree Volume (M ³)										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0.00	126.27	833.30	746.64	4323.52	5303.30	3806.40	1903.20	8574.80	25617.43
Deodar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Khair	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ban	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rai	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tosh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BL	30.77	51.61	103.58	207.16	207.16	0.00	0.00	0.00	0.00	600.27
Grand Total	30.77	177.88	936.88	953.80	4530.68	5303.30	3806.40	1903.20	8574.80	26217.70

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0	0	3120	6241	1248	4369	1248	3745	4993	24964
Deodar	0	0	0	0	0	0	0	0	0	0
Khair	0	0	0	0	0	0	0	0	0	0
Ban	0	0	0	0	0	0	0	0	0	0
Rai	0	0	0	0	0	0	0	0	0	0
Tosh	0	0	0	0	0	0	0	0	0	0
BL	5617	4369	4993	624	0	624	0	0	0	16227
Grand Total	5617	4369	4993	624	0	624	0	0	0	41191
Tree Volume (M ³)										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0.00	0.00	2028.00	8487.76	2945.28	15815.78	6489.60	19474.00	25963.60	81204.02
Deodar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Khair	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ban	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rai	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tosh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BL	157.28	616.03	2826.04	706.37	0.00	882.96	0.00	0.00	0.00	5188.67
Grand Total	157.28	616.03	4854.04	9194.13	2945.28	16698.74	6489.60	19474.00	25963.60	86392.69

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0	0	2016	7562	2520	2016	1008	504	5041	20667
Deodar	0	0	0	0	0	0	0	0	0	0
Khair	0	0	0	0	0	0	0	0	0	0
Ban	0	0	0	0	0	0	0	0	0	0
Rai	0	0	0	0	0	0	0	0	0	0
Tosh	0	0	0	0	0	0	0	0	0	0
BL	1260 4	11091	4537	0	1008	1008	504	504	504	31760
Grand Total	1260 4	11091	4537	0	1008	1008	504	504	504	52427
Tree Volume (M ³)										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0.00	0.00	1310. 40	10284. 32	5947. 20	7297. 92	5241. 60	2620. 80	26213. 20	58915.44
Deodar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Khair	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ban	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rai	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tosh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BL	352.9 1	1563. 83	2567. 94	0.00	1141. 06	1426. 32	713.1 6	713.1 6	713.16	9191.54
Grand Total	352.9 1	1563. 83	3878. 34	10284. 32	7088. 26	8724. 24	5954. 76	3333. 96	26926. 36	68106.98

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	11656	11656	23313	26003	10760	3586	2690	896	7173	97733
Deodar	0	0	0	0	0	0	0	0	0	0
Khair	6276	3586	2690	896	0	0	0	0	0	13448
Ban	0	0	0	0	0	0	0	0	0	0
Rai	0	0	0	0	0	0	0	0	0	0
Tosh	0	0	0	0	0	0	0	0	0	0
BL	86977	49317	15243	4483	0	1793	896	0	896	159605
Grand Total	86977	49317	15243	4483	0	1793	896	0	896	270786
Tree Volume (M ³)										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	582.80	2680.88	15153.45	35364.08	25393.60	12981.32	13988.00	4659.20	37299.60	148102.93
Deodar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Khair	298.11	511.01	790.86	438.59	0.00	0.00	0.00	0.00	0.00	2038.57
Ban	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rai	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tosh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BL	2435.36	6953.70	8627.54	5074.76	0.00	2537.10	1267.84	0.00	1267.84	28164.12
Grand Total	3316.27	10145.58	24571.85	40877.43	25393.60	15518.42	15255.84	4659.20	38567.44	178305.62

The following table indicates comparative statement of existing growing stock (GS.), the normal growing stock (as per yield) table figures corresponding to the crop age and the growing stock at the beginning of the plan under revision (the figures for the corresponding periodic blocks).

Comparative Stock, Felling series I

Table 2.21

PB	No. trees/ ha	Present GS/ha/ M ³	Normal /ha/ M ³	GS	GS/ ha in M ³ - Beginning of WP
I.	190	192.53	234		158.48
II.	211	203.24	198		151.09
III.	203	465.64	169		179.76
IV.	100	138.76	86		142.24
Average	176	250.04	160		157.89

Comparative Stock, Felling series II

Table 2.22

PB	No. trees/ ha/ M ³	Present GS/ha/ M ³	Normal /ha/ M ³	GS	GS/ ha in M ³ - Beginning of WP
I.	228	174.18	234		104.17
II	162	347.51	189		111.69
IV	307	497.20	86		79.22
other	201	163.46	86		-
Avg.	224	295.58	169.66		98.36

comparative Stock, Felling series III

Table 2.23

PB	No. trees/ ha/ M ³	Present GS/ha/ M ³	Normal /ha/ M ³	GS	GS/ ha in M ³ - Beginning of

				WP
I.	81	204.39	234	172.26
II.	165	346.02	198	179.49
III.	208	270.16	169	183.31
IV.	604	397.70	86	140.21
Average	264	304.56	172	168.81

Above table indicates a satisfactory position of growing stock only in PB II & PB IV areas of Felling Series 1, II| and P.B. IV areas of Felling Series II and the process of conversion to the uniform crops is progressing in desired manner. The growing stock in P.B IV areas is much higher than the normal for reasons of congestion in the crop and on account of presence of seed bearers. The position of growing stock in all other P.B. of all the three-felling series is discouraging which is attributable mainly to much lower than desired number of mature trees in these PBS.

2.7: INCREMENT: Annual volume increment for each felling series worked on the basis of rate of increment as given as under:

Increment, Felling series-I (Area 4584.31 ha)

Table 2.24

FS-I	V	IV	III	IIA	IIB	IA	IB	IC	ID	Grand Total
No. of trees	73603.00	77518.00	105097.00	94017.00	64412.00	50195.00	42136.00	16003.00	56360.00	579341.00
Vol (M³)	3680.15	17829.14	68313.05	127863.12	152012.32	181705.90	219107.20	83215.60	293072.00	1146798.48
Increment	239.21	677.51	2186.02	2173.67	1824.15	999.38	0.00	0.00	0.00	8099.94

Increment, Felling series- II (Area 4589.37ha)**Table 2.25**

FS-II	V	IV	III	IIA	IIB	IA	IB	IC	ID	Grand Total
No. of trees	50223	103073	192426	154768	62199	18354	12725	8907	53121	655796.00
Vol (M³)	2511.15	23706.79	125076.90	210484.48	146789.64	66441.48	66170.00	46316.40	276229.20	963726.04
Increment	163.22	900.86	4002.46	3578.24	1761.48	365.43	0.00	0.00	0.00	10771.68

Increment, Felling series-III (Area 1078.37 ha)**Table 2.26**

FS-III	V	IV	III	IIA	IIB	IA	IB	IC	ID	Grand Total
No. of trees	11656	12205	29731	40355	16360	11436	5678	5511	18856	151788.00
Vol (M³)	582.80	2807.15	19325.15	54882.80	38609.60	41398.32	29525.60	28657.20	98051.20	313839.82
Increment	37.88	106.67	618.40	933.01	463.32	227.69	0.00	0.00	0.00	2386.97

Total annual increment of Chil working circle 21258.59 or say 21200 M³

2.8: SILVICULTURAL SYSTEM:

The silviculture system will be the Modified Shelter-wood system known as "Punjab shelterwood System" or Indian irregular Shelter-wood System as described in detail in technical Order No. given in Punjab Forest Manual Vol. I. This system permits retention of compact groups of healthy and vigorously growing pole crop upto 20 cm d.b.h. at least 0.2 ha in extent and density not less than 0.7, as part of the future crop. Thus, certain amount of irregularity in the young crop is allowed. The marking confirms to the selection principles where topographical features of the ground inhibit concentrated felling. Most of the undemarcated protected forests of this division being primarily and intermediate sub-type natural regeneration is profuse as a result of effective closure and

protection against biotic injury. This may be supplemented by artificial means, wherever necessary, will be relied upon.

2.9: CHOICE OF SPECIES:

Chil shall be the principal species and will be preferred over miscellaneous Broad-leaved species. All cultural works shall aim at encouraging chil in the forests of this working circle.

2.10: ROTATION AND CONVERSION PERIOD:

Rotation of 120 years, in keeping with the requirements of the scheme of Rotational Closure, has been adopted. At this age, the crop diameter of chil, in this locality, is about 55 cm, suitable for conversion into sleepers and for resin extraction. The forests of the felling series I are under the process of conversion to Uniform since Walter's plan with the conversion period of 120 years. More than half of this period has elapsed and the rate of conversion is generally keeping pace. The conversion period of 120 years is being retained for all the three-felling series.

2.11: REGNERATION PERIOD:

The scheme of rotational closure is based on a closure period of 30 years. Keeping in view the periodicity of good seed years, the danger from forest fires and the growth rate of chil the locality; this period is sufficient to obtain adequate established regeneration and, therefore, regeneration period of 30 years is being adopted.

2.12: REDUCING FACTORS AND REDUCED AREAS:

There is not much variation in the site quality of the forests. Though, density is quite variable yet as the yield is being regulated by volume and not by area; it is considered unnecessary to reduce the areas for site quality and density.

2.13: DIVISION INTO PERIODS AND ALLOTMENT TO PERIODIC BLOCKS:

With a rotation of 120 years and regeneration period of 30 years, there will be four periodic blocks of 30 years each. Definite allotment to each periodic block has been made in case of felling series I and III. In felling series II, however, definite allotment has been made in case of PB I and PBIV areas and the remaining forests have been kept under PB others.

2.13.1: The second regeneration period in respect of felling series I expired on 31st March, 1981 and the third period started from 1st April, 1981; the regeneration is,

thus, to be completed all over the P.B. | areas of this felling series by 31 st March, 2011. Allotment to various periodic blocks in primarily in the sequence fixed by the closure scheme (In case of felling series 1), the following broad principles have, however, been kept in view in making the allotments.

2.13.1.1: PB I: Forests with comparatively mature to over mature trees, of lower density blanks with maturity areas have been allotted to this periodic block.

2.13.1.2: PB II: The crop approaching maturity or mature and with comparatively better stocking have been allotted to this Periodic block. As for as the crop age and the crop diameter are concerned, the forests of this Periodic block and of PB I are generally similar, there being no appreciable distinction on these accounts. In such cases, stocking has been the main consideration for allotment.

2.13.1.3: PB III: The areas regenerated during Walter's and Mohan's plan, the first regeneration period, and now having preponderance of IV and III class trees have been allotted to this PB. The crop is reasonably well stocked and more or less uniform in character.

2.13.1.4: PB IV: The forests successfully regenerated during Romesh's, Malhotra's and M. P.Singh's Plans are allotted to this Periodic block. In many cases, the over wood is still present and the young crop is quite congested. With a few exceptions the areas allotted to different P.B. are the same as in the Plan under revision.

2.14: CALCULATION OF YIELD: The yield will be of two types viz.

(i) Main yield: All felling from P.B.I and felling of trees class II A and above in P.B.IV areas will form the main yield.

(ii) Intermediate yield: The cleaning and thinning in P.B.I, P.B.V and P.B. Others will constitute the intermediate yield. Yield from the above P.B. will be regulated by volume and will be restricted to the increment put on by the crop.

2.15: CALCULATION OF YIELD FROM FELLING SERIES-I:

Total Yield: Annual increment over the entire felling series, comes to about 20300 M³. The annual yield according to Simon's modification of Von Mantel's formula is calculated below:

According to Simon's modification of Von Mantel's formula:

$$\text{Annual yield } y = 2RxV/R^2 - X^2$$

Where V= Volume of the growing stock measured

R=Rotation period

X= Age corresponding to the dia. down to which the growing stock is measured

V= 1146798.48 M³

R= 120 Years

X= 30 Years

Therefore Y = $2 \times 120 \times 1146798.48 / 120 \times 120 - 30 \times 30$

20387.52 M³ or say 20300 M³

2.15.1: YIELD FROM PB I: The yield is calculated below:

(i) Growing stock in PB-I at the time of enumeration = 205479.72 M³

(ii) Deduct

(a) volume of 20 trees per ha. (I1 /3, IIA/8, 1 | B/7, IA/3)

Appox 40 M³/ha over 1143.23 ha to be retained

as seed bearers = **45729.20 M³.**

(b) Volume of 25% of V and IV class trees to be

retained as advance growth = **546.92 M³.**

(iii) Net volume available for felling = i)-ii) = **159203.60 M³**

(iv) Annual Yield: Y= 159203.60/ 30 = **5306.78 M³ or say 5000 M³**

2.15.2: YIELD FROM PB II: No yield is prescribed from P.B. II as no silvicultural fellings are prescribed. The removals, if any like salvage (dry and fallen) shall count towards yield of P.B.I.

2.15.3: YIELD FROM PB III: Abstract of chil enumeration in this P.B. is as below:

Table 2.27

Tree Volume (M ³)										
Sp p.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chi I	598.0 0	5157. 98	9718. 15	32532. 56	49397. 16	97421. 44	93293. 20	31096. 00	279884. 80	599099.2 9

The yield in this P.B. shall comprise mainly from thinning of trees and belonging to class IV, III and IIA and salvage removals. It is estimated that about 10% volume of trees shall be available in thinning during the WP period.

Annual Yield (Y) thus works out as under:

$$Y = 10\% \text{ of } (5157.98 + 9718.15 + 32532.56) / 15 = \mathbf{3160.57 \text{ M}^3 \text{ or say } 3000 \text{ M}^3}$$

2.15.4: YIELD FROM PB IV:

In a good many of forests a sizeable number of I and II class (seed bearers) are still standing over and mixed with the established regeneration. All the I class trees are out of place and are to be removed except those standing as isolated trees in open places or on the periphery of the forest. It is estimated that about 80% of the class I trees will be available for felling. As for II class trees, a good many will be retained as they exist mostly, in groups blended with the advance growth and also to cater to the requirement of right holders etc. It is estimated that about 60% of the II class, trees will be available for removal. The annual yield is therefore calculated as under:

$$\text{Yield} \quad Y = C_1 V_1 + C_2 V_2 / P$$

Where C₁ and C₂ are constants representing proportion of I and II class trees respectively available for felling and are assessed as 0.8 and 0.6; V₁ and V₂ represent the volume of I and II class trees respectively and P is the period during which felling's are to be completed.

$$Y = 0.8 \times 76088.44 + 0.6 \times 49114.76 / 30$$

$$= \mathbf{3011.32 \quad \text{or say } 3000 \text{ M}^3}$$

With the regular removal of 5000 M³, 3000 M³ and 3000 M³ from PB I, PB III and PB IV respectively there would still be a left over of 8300 M³ in felling series I which is expected to be sufficient to meet the demand of right holders and free guarantees. All removals of V class and above trees for whatever purpose shall

count towards the prescribed yield. A deviation of +/- 25% in the annual yield is allowed provided the commutative yield remains within 10% for each 5 years interval.

2.16: CALCULATION OF YIELD FROM FELLING SERIES II:

The annual yield according to Simon's modification of Von Mantel's formula is calculated below:

Simmon's Modification of Von Mantel's formula

$$\text{Annual Yield} = 2R \times V / R^2 - X^2$$

$$= 2 \times 120 \times 963726.04 / 120 \times 120 - 30 \times 30$$

$$= 17132.90 \text{ M}^3 \quad \text{or say } 17000 \text{ M}^3$$

2.16.1: YIELD FROM PB I:

(i) Growing stock in PB I at the time of enumeration **= 169715.02 M³**

(ii) Deduction

(a) Volume of 20 trees / ha (I1/2, IA/8, 11B/7, IA/3)

Appox 40 M³/ha over 1138.32 ha to be retained

as seed bearers **= 45532.8 M³.**

(b) Volume of 25% of V and IV class trees to be

retained as advance Growth **= 1580.79 M³**

(iii) Net Volume available for felling = (i) - (ii) **= 122601.43 M³**

(iv) Annual yield Y = 76790.39 / 30 **= 4086.71 M³ or say 4000 M³**

2.16.2 Yield from PB III **Nil**

2.16.3 Yield from PB IV

As discussed in case of yield from PB IV for Felling Series I

$$\text{Yield } Y = C1 V1 + C2 V2/P$$

Where C1 and C2 are constants representing proportion of I and II class trees respectively available for felling and are assessed as 0.8 and 0.6; V1 and V2 represent the volume of I and II class trees respectively and P is the period during which felling's are to be completed

$$= 0.8 \times 47185.68 + 0.6 \times 3718.56/30$$

$$= 1332.65 \text{ M}^3 \quad \text{or say } 1300 \text{ M}^3$$

2.17: CALCULATION OF YIELD FROM FELING SERIES III:

The annual yield according to Simon's modification of Von Mantel's formula is calculated below:

Simon's Modification of Von Mantel's formula: Annual Yield = $2R \times V / R^2 - X^2$

$$Y = 2 \times 120 \times 313839.32 / 120 \times 120 - 30 \times 30$$

$$= 5579.36 \text{ M}^3 \quad \text{or say } 5500 \text{ M}^3$$

2.17.1: YIELD FROM PB I:

(i) Growing stock in PB I at the time of enumeration = **25617.43 M³**

(ii) Deduction

(a) Volume of 20 trees / ha (I1/2, IA/8, 11B/7, IA/3)

Appox 40M3/hac over 448.34 ha to be retained

as seed bearers = **17933.60 M³**.

(b) Volume of 25% of V and IV class trees to be

retained as advance Growth = **31.60 M³**

(iii) Net Volume available for felling = (i) - (ii) = **7652.23 M³**

(iv) Annual yield $Y = 7652.23 / 30 = 255.07 \text{ M}^3$ or say **250 M³**

2.17.2: YIELD FROM PB II: No yield is prescribed from PB II. The removals, if any like salvage (dry and fallen) shall count towards yield of PB I.

2.17.3. YIELD FROM P.B.III: Abstract of enumeration of chil trees in this P.B, is as under

The yield from this P.B. shall comprise mainly from thinning of trees belonging to class IV, III and IIA. It is estimated that about 15% volume of these trees shall be available in thinning during the working plan period. Annual yield (Y) thus works out as under:

$$Y=10\% \text{ of } 11594.72/10$$

$$=115.94 \text{ M}^3$$

or say 110 M³

2.17.4: YIELD FROM PB IV:

As discussed in case of yield from PB IV for Felling Series 1

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

Where C1 and C2 are constants representing proportion of I and II class trees respectively available for felling and are assessed as 0.8 and 0.6; V1 and V2 represent the volume of I and II class trees respectively and P is the period during which felling's are to be completed

$$=0.8 \times 60928.12 + 0.6 \times 60757.68 / 30$$

$$=2839.90 \text{ M}^3$$

or say 2500 M³

2.18: CONTROL OF YIELD AND DEVIATION:]

The control of yield will be by volume, felling series wise. All the trees of chil down to 10cm D.B.H: removed for whatsoever purpose will count towards the yield of the concerned felling series. A deviation of +25% in the annual yield should be allowed provided the cumulative yield remains within +10% for each 5 years intervals. It is also laid down that the removals from PB II where from no yield is prescribed will count towards PB I.

2.18.1: METHOD OF EXECUTING FELLING IN PB I:

There will be only two kinds of felling in this periodic block; (i) seeding felling and (ii) final felling. The detailed marking instructions are contained in Punjab Forest leaflet No. 2 paragraph 12. The following general principles are, however, laid down for the guidance of the marking officer.

2.18.1.1: SEEDING FELLING:

(i) About 20 trees (11/2, 11A/8, 11B/7, 1A/3) per ha but not above 1A, as far as possible, with long, clean, cylindrical boles, a well-developed crown and free from disease will be retained as seed bearers where other suitable trees of required classes are not available for retention

(ii) The seed bearers, in moderately sloping areas should be as far as possible uniformly distributed with an average spacing of 23-25 m, but in more hilly areas these will be retained on ridges and spurs.

(ii) On steep and broken ground, along the banks of nallas and other vulnerable spots marking should conform to selection principles.

(iv) Compact groups of healthy and vigorously growing pole crop upto 20 cm d.b.h., at least 0.2 ha in extent with a density not less than 0.7 shall be retained as part of the future crop; isolated poles should not be retained. All trees of larger size which are suppressing the young crop should be removed.

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

(vi) In certain case, regeneration of sapling to pole stage may already be present. Marking the over wood standing over such groups of regeneration shall be heavier so as to afford better grown conditions to these groups;

(vii) Except when considered necessary for the development of or interfering with the chil regeneration and advance growth, the broad leave trees shall not be removed as it is advisable to retain them as a healthy mixture for improvement of the soil and also to meet the local requirements of fuel, fodder;

2.18.1.2: FINAL FELLINGS:

There will not be final fellings in this P.B. during the period of this plan. The following guidelines are, however, laid down in case of necessity.

(i) Seed bearers will be marked for removal only if the regeneration is at least 2.5 meter in height and has been controlled burnt at least thrice;

(ii) About 5 tall clean bole, vigorously growing and healthy trees per ha will be retained until the end of regeneration period as a fire insurance measure and to obtain maximum volume increment and to meet the demands of right holders;

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

(iv) Seed bearers will be lopped before felling to decrease damage to young regeneration. Cleaning will be done after removal of seed bearers; A marking note along with detailed marking map of the area deliberating the type of markings carried out in various parts of the compartments and advance growth retained shall be prepared by the marking officer and posted in the compartment history file for further guidance. A record of seed bearers retained at the time of seeding felling should also be prepared and kept in the compartment history files as a check over markings and future removals.

2.18.2: METHOD OF EXECUTING FELLING IN PB II:

No felling shall be carried out in this periodic block in order to safeguard the future yield. Removal of only fire-burnt, dead, diseased and wind fallen trees is permitted to improve the hygiene of the crop. No green tree should be granted in timber distribution rights from the areas allotted to this PB.

2.18.3: METHOD OF EXECUTING FELLING IN PB III:

These forests will be gone over in thinning and improvement felling. The markings will be done only to meet the local timber and other right holder's requirements. The guidelines to be followed will be as under:

(i) Removals shall be confined to mainly dead, dying, diseased, dry and fallen trees which shall be marked first;

(ii) Dense compact groups of poles will be thinned by removal of suppressed trees along with unusually bigger trees, if any occurring in such groups;

(iii) The intensity of thinning in no case to exceed D grade thinning;

(iv) All markings are primarily to be done for improvement of the crop. The tendency to remove selected, well grown better stems must be avoided.

2.18.4: METHOD OF EXECUTING FELLING IN PB IV:

In this periodic block many compartments still contain the mother trees which are no longer required. The felling shall aim at removal of such trees. Cleaning and early thinning in young crop is also necessary to ease congestion.

The cut material of such poles is normally utilized as fuel. The following marking guidelines are recommended:

(i) All class and most of II class trees shall be marked for felling unless required to be retained on silvicultural considerations;

(ii) Isolated II and II class trees standing over the young crop that are likely to develop as wolf trees shall be marked;

(iii) Along the nalla-banks and on very steep terrain, removal of the over wood should be conservative.

(iv) All malformed, dead, diseased, dry and fallen trees shall be removed to improve the crop; Thinning and cleaning shall be carried out in the congested young crop conforming to the C grade of thinning. Detailed guidelines about thinning and cleaning are available in Chapter I of the Volume IV of H.P. Forest manual.

2.19: Sequence of fellings: The following sequence of fellings for each felling series is laid down. It can, however, be altered by the Divisional Forest Officer with the permission of CCF, working plans and Settlements.

2.19.1: Felling series- I felling in PB I (area given in ha)

Table 2.28 : Sequence of Felling in PB-I areas from Chil WC for the Period

Range	S.No-Forest	Comptt	Area in Ha
Year 2024-25			
Dharamshala	P43K Cheli Kareri	1B	21.43
Shahpur	P44K CB Dulli	2C	15.78
		Total	37.21
Year 2025-26			
Shahpur	P1K Ban Boh	1C	34.4
		Total	34.4
Year 2026-27			
Lapiana	P24K Lunj	2C	37.23
		Total	37.23
Year 2027-28			

Shahpur	P4K Sunkanal	2C	18.62
Kangra	P37K Kharat	1G	9.31
Mallan	P58K Cheli Narwana	3	10.52
		Total	38.45
Year 2028-29			
Mallan	P27K Pathiar	3	49.37
		Total	49.37
Year 2029-30			
Kangra	P38K Ghin	1C	29.14
		Total	29.14
Year 2030-31			
Dharamshala	P51K Naddi	3A	36.02
		Total	36.02
Year 2031-32			
Lapiana	P21K Jol	1C	43.7
		Total	43.7
Year 2032-33			
Shahpur	P3K Rirakmar	2C	10.12
Dharamshala	P43K Cheli Kareri	4C	12.95
Shahpur		3	12.14
		Total	35.21
Year 2033-34			
Lapiana	P14K Pandhwar	2C	93.08
		Total	93.08

2.19.1.1: FINAL FELLING-CUM-THINNING PB IV:

Table 90: Sequence of Felling in PB-IV areas from Chil WC for the Period 2024-25 to 2033-34:

Table 2.29 Sequence of Felling in PB-IV areas from Chil WC for the Period

Range	S.No-Forest	Comptt	Area in Ha
Year 2024-25			
Dharamshala	P43K Cheli Kareri	2B	11.33
Shahpur	P45K Borusarna	3A	16.59
Mallan	P28K Mansu	1B	9.31
		Total	37.23
Year 2025-26			
Mallan	P27K Pathiar	2	14.57
		Total	14.57
Year 2026-27			
Kangra	P39KR anital	3B	17
Mallan	P28K Mansu	2A	22.66
		Total	39.66
Year 2027-28			
Lapiana	P14K Pandhwar	1B	33.18
		Total	33.18
Year 2028-29			
Lapiana	P19K Chelidhar Thehr	1B	35.21
		Total	35.21
Year 2029-30			
Dharamshala	P43K Cheli Kareri	1C	25.9
Shahpur	P5KCB Tahl Behnala	1B	16.59
		Total	42.49
Year 2030-31			
Dharamshala	P54K Sihnal	1B	49.37
		Total	49.37
Year 2031-32			

Lapiana	P24K Lunj	1B	33.99
		Total	33.99
Year 2032-33			
Shahpur	P45K Barusarna	4A	27.11
Kangra	P37K Kharat	1C	10.12
		Total	37.23
Year 2033-34			
Kangra	P37K Kharat	1C	10.12
Shahpur	P44KCB Dulli	1C	24.28
		Total	34.4

2.19.2: FELLING SERIES-II:

Keeping in view their legal status difficulties are envisaged in securing closures in the forests belonging to this felling series. The felling sequence in these forests is therefore suggestive in nature and it may be altered by the Divisional Forest Officer:

Table 2.30 : Sequence of Felling in FS-II

Range	S.No-Forest	Comptt	Area in Ha
Year 2024-25			
Shahpur	UP137K Daini-II	10	52.6
		Total	52.6
Year 2025-26			
Shahpur	UP137K Drini-II	6	59.08
		Total	59.08
Year 2026-27			
Shahpur	UP137K Drini-II	13	40.06
		Total	40.06
Year 2027-28			

Shahpur	UP137K Drini-II	12	25.9
Shahpur	UP242K Jassai	2	12.95
		Total	38.85
Year 2028-29			
Dharamshala	UP140K Chari	4	61.5
		Total	61.5
Year 2029-30			
Dharamshala	UP139K Dharamshala	16B	20.23
Kangra	UP245K Busal	C3	18.62
		Total	38.85
Year 2030-31			
Kangra	UP237K Rajiana-II		21.04
Kangra	UP242K Jassai	C4	19.43
		Total	40.47
Year 2031-32			
Shahpur	UP137K Drini-II	4	57.45
		Total	57.45
Year 2032-33			
Kangra	UP242K Jassai	C5	27.52
		Total	27.52
Year 2033-34			
Lapiana	UP79K Khola	1	24.28
Shahpur	UP17K Ladal	1	10.12
		Total	34.4

2.19.2.1. Final Felling in PBIV

Table 2.31 Sequence of Felling in PB-IV areas from Chil WC for the Period

Range	S.No-Forest	Comptt	Area in Ha
Year 2024-25			
Mallan	CFS Erla	P29	12.14
		Total	12.14
Year 2025-26			
Mallan	CFS Danoa	P25	13.35
		Total	13.35
Year 2026-27			
Dharamshala	CFS Sidhbari	UP6c	5.66
		Total	5.66
Year 2027-28			
Mallan	CFS Ertla	UP34	6.88
		Total	6.88
Year 2028-29			
Shahpur	CFS Bahnala	UP17a	15.38
		Total	15.38
Year 2029-30			
Mallan	CFS Erla	UP33	3.64
		Total	3.64
Year 2030-31			
Dharamshala	CFS Sudhed	P3	16.19
		Total	16.19
Year 2031-32			
Mallan	CFS Danoa	P3	17
		Total	17
Year 2032-33			
Dharamshala	CFS Sudhed	P5	3.64
		Total	3.64

Year 2033-34			
Dharamshala	CFS Sudhed	UP12	10.93
		Total	10.93

2.19.1.2: FINAL FELLING-CUM-THINNING IN PB IV

Table No 2.32: Sequence of Felling in PB-IV areas from Chil WC for the Period 2024-25 to 2033-34

Range	S.No-Forest	Comptt	Area in Ha
Year 2024-25			
Dharamshala	UP143K Maned	C2	14.16
Lapiana	UP2K Bharup Lahar	C1	16.19
		Total	30.35
Year 2025-26			
Dharamshala	UP143K Maned	C1	18.62
Mallan	UP149K Romehar	C5	16.19
		Total	34.81
Year 2026-27			
Shahpur	UP10K Sadoon	C5	33.99
		Total	33.99
Year 2027-28			
Shahpur	UP10K Darni Khurd	W	38.45
		Total	38.45
Year 2028-29			
Dharamshala	UP146K Kuned	C5	31.57
		Total	31.57
Year 2029-30			
Kangra	UP227K Rajiana I	C2	21.85
Kangra	UP227K Rajiana I	C3	10.12

		Total	31.97
Year 2030-31			
Mallan	UP149K Romehar	C4	6.48
Mallan	UP265K CB Ambuari	C1	26.3
		Total	32.78
Year 2032-33			
Shahpur	UP9K Romehr	C1	16.19
Kangra	UP249K Sunli	C7	12.55
		Total	28.74
Year 2032-33			
Mallan	UP210K CB Chearehr	C1	20.23
Kangra	UP250K Chak Ban Pathrai	1A	10.84
		Total	31.07
Year 2033-34			
Mallan	UP150K Sihund	C3	28.33
Lapiana	UP57K Simbal Lahar	C1	3.64
		Total	31.97

2.20: FINAL FELLING IN PB IV (FSIII)

Table 2.33: Final Felling in PB-IV

Range	S.No-Forest	Comptt	Area in Ha
Year 2024-25			
Shahpur	CFS Bahnala	U 18	17.4
		Total	17.4
Year 2025-26			
Dharamshala	CFS Gharoh	P 20	18.21
		Total	18.21

Year 2026-27			
Mallan	CFS Arla	P 7	10.52
		Total	10.52
Year 2027-28			
Dharamshala	CFS Sudhed	UP 8	8.09
		Total	8.09
Year 2028-29			
Mallan	CFS Danoa	P 26	4.86
		Total	4.86
Year 2029-30			
Dharamshala	CFS Gharoh	P 19	19.42
		Total	19.42
Year 2030-31			
Mallan	CFS Erla	UP12	3.24
		Total	3.24
Year 2031-32			
Dharamshala	CFS Sudhed	UP 9	11.73
		Total	11.73
Year 2032-33			
Mallan	CFS Danoa	UP 42	7.28
		Total	7.28
Year 2033-34			
Kangra	CFS Kohli	UP 19	7.69
		Total	7.69

2.21: SUBSIDIARY SILVICULTURAL OPERATIONS IN PB I:

Details of the various subsidiary silvicultural operations to be carried in P.B.I areas are given below:

2.21.1: DISPOSAL OF FELLING DEBRIS:

Often local people take away the debris for fuel and should be encouraged to do so. In areas where regeneration already exists and where final fellings are to be made no attempt at burning the felling debris should be made. In such places the refuse should simply be dumped in depressions and nailas so that the young growth is kept free of slash and lops and tops of felled trees.

2.21.2: SUBSIDIARY FELLINGS:

All marked trees left un-felled should be cut back before burning of the debris and allowed to be removed by the local people; the left over should be burnt along with the felling refuse. The climbers, along with other unwanted growth should be cut away if necessary.

2.21.3: WEEDING:

If the area is lantana infested then the standard method for removal of lantana and subsequent planting is to be followed (Chapter II). Weeds are normally not a serious problem in these forests.

2.21.4: CLEANING:

Natural regeneration of chil is generally profuse and dense. Cleaning from the very beginning is therefore essential for proper growth of the stems. Before it reaches a height of one meter, the crop should be cleaned so that the saplings are spaced about one meter apart. However, in all cleaning operations, the vigour and the quality of the saplings should be given more consideration than the spacing. Second cleaning will be carried out when the crop is about two meters high, the saplings will be spaced about two meters apart. Cut material, unless required by the villagers, should be collected at open places or in nallas and dumped in order to reduce fire hazard.

2.21.5: SOWING AND PLANTING:

Chil regeneration is plentiful in this locality if adequate protection against fire and grazing is ensured. However, in some lower areas where the conditions are not so favourable, artificial regeneration will have to be resorted to. This should be done after waiting for about 2-3 years for natural regeneration. The fixed programme of sowing and planting cannot be prescribed. Chil seedlings

raised in polythene bags are to be planted in July-August. The nursery and plantation techniques of Chil are now well established

and understood by the field staff. The planting should not be left entirely to the labour and must be carried out under the supervision of trained personnel. Proper care in handling of the seedlings during transportation and timely planting, during early monsoon, are of vital significance. Collection of seed should be given due consideration so that the best quality seed only from the selected stems is utilized.

2.21.6: CULTURAL OPERATION IN PB IV:

Tending operations, such as cleaning and mechanical thinning, should be carried out in the dense crops. The cut material, if not so should be used departmentally given or to right holders. Non-sale-ability of such material should not be taken as an excuse to neglect these operations, as these are very necessary to reduce fire hazards.

2.21.7: CONTROL BURNING:

The area under regeneration will be control burned only when the saplings reach a height of 1.5 m. The instructions are contained in chapter "Protection Against Fire" in H.P. Forest manual Volume IV.

2.22: OTHER REGULATIONS: Other regulations for this working circle will be as under:

2.22.1: CLOSURES:

Immediately after felling is over all PBI areas shall be closed to grazing by proper fencing till the end of the working period, as during this period of 10-15 years the chil saplings will grow beyond the reach of animals. Closure should be got notified well in advance before the commencement of regeneration operations in the case of UPF and UCF. It has, however, been the experience that such closures are not effective wherever they are done. What seems to have worked in the past is that if the area proposed to be closed is handed over to a local SHG of women (who are the grass cutters), and they be allowed to take away the grass from that area till the seedlings saplings are considered established, then the chances of effective closure against grazing are that much more. Further, in view of their interest in better grass production, the SHG will ensure that the area remains free of invasive weeds and will also prevent fires there.

2.22.2: GRAZING AND GRASS CUTTING:

Grass cutting will be prohibited in all the P.B.I areas after commencement of regeneration operations till the young crop is beyond the stage of damage i.e. about 50 cm and up. Grass cutting shall be allowed to be carried out under the strict supervision of the forest guard so that seedlings are not cut along with grass. Grazing should be strictly prohibited in the regeneration areas till the regeneration reaches a height of 1 meter. After that light cattle grazing (not sheep and goat) should be permitted to reduce inflammable grasses, unselected grazing should not be allowed till regeneration is fully established.

2.22.3: FIRE PROTECTION AND CONTROL BURNING:

Chil forests are more vulnerable to the risk of forest fires than any other type of forests. Considerably large areas of chil forests get burnt every year. In case of severe fires, even the well regenerated pole crops receive serious set back. Therefore, it is most essential that forests allotted to this working circle are adequately protected against fire. Apart from various measures of fire protection viz. earning the goodwill and cooperation of the local people by meeting their genuine demands, education and publicity, taking punitive action against cases of incendiarism etc., the control burning is the most important operation. However, if need arises the control burning can be carried out earlier also with the permission of C.F. Detailed instructions on control burning as contained in the Punjab Forest leaflet No. 2 are summarized below:

- (i) The control burning should be done always during winter; in January-February
- (ii) Burning should progress from up-hill to down hill in calm weather and special care should be taken to keep the line of fire as straight as possible and under control.
- (iii) The fire should start along the ridges, cleared path or specially cleared lines
- (iv) Chil needles and other inflammable material should be fully raked to ensure thorough burning
- (v) In forests under resin tapping, it must be ensured that all chips, fallen resin, needles etc are cleared about 1.5 m away from the base of the trees by the resin coolies
- (vi) Cleaning and early thinning s in young regeneration must be completed before the control burning is carried out under the supervision and control of the executive staff and shall never be left to the engaged labour

(vii) It is however, to be noted that areas under regeneration should not be control burnt until the regeneration reaches a height of about 1.5 m. In such areas however, the grass cutting / needle collection by right holders be encouraged. The control burning will also form a part of control forms and deviation reflected therein very clearly giving reasons

(viii) The existing fire-lines, should be properly maintained and kept clear of all inflammable material so as to act a fire barrier. The roads, bridle paths and protection paths must be kept clear of all inflammable material so as to act as fire lines.

(ix) Sufficient number of trained fire watchers should be employed during the fire season to help the field staff and provided with necessary equipment. Chil forests, especially in D'sala FD are more vulnerable to fire risk than any other type of forests. Large areas of chil get burnt every year. In case of severe fires even the well regenerated pole crops are seriously affected. Therefore, it is most essential that the forests of this working circle are well protected. Where control burning becomes necessary, the job should be entrusted to the same SHG / JFM Group that is active in the area. This helps maintain local interest in preventing forest fires and is related to the grass yield from the area. Similarly, annual cleaning of fire lines and road sides should be entrusted to the same groups every year, especially women SHGs, This work MUST be got done every year and timely. Funds from NPV can now be earmarked annually for this work. Since faulty resin tapping has been time and again cited to be the reason behind early mortality and premature falling of chil trees, it is important that the field staff keep a proper check on faulty and illicit resin tapping. This is an important job of the field staff in Chil forests and unfortunately is either ignored or only token checking done. The DFO and the ACF of the division need to make it a point to check resin tapping in Chil forests regularly.

In recent years a market for Chil pine needles has emerged; mainly for burning in furnaces. This is a good trend and the FD needs to encourage local SHGs in Chil areas to collect and sell the needles to such units. DFO should explore possible market tie-ups for such groups and facilitate marketing of pine needles. Some NGOs have developed cottage scale pine needle briquette making enterprises and these could be started through initial seed support to enterprising SHGS in the area.

2.22.4: FIRE MAPS:

All cases of fire should be promptly reported giving the extent of damage. A tracing of all the burnt areas 0.4 ha and above in extent should be prepared on 16"=1 mile scale and sent along with the report; copy also being placed in the respective compartment history files.

2.22.5: MONITORING:

It is also prescribed that the fire prevention measures will be monitored by CCF (Protection) /CCF (Working Plan and Settlement).

2.23: RESIN TAPPING:

Resin tapping must be carried out conservatively in accordance with the instructions issued by the Pr.CCF.from time to time. Though the resin tapping operation is now being carried out by the H.P. State Forest Corporation Limited yet the responsibility of the territorial staff to enforce the instructions still to be of paramount importance.

The Chil forests of the Division have been under resin tapping for quite a long time. Some areas have started showing adverse effects of constant tapping in the form of premature drying/dying of the trees, unusually large number of wind broken trees etc. Moreover, in many cases there is no proper space left on the trunk of the trees for fixing of the blaze. Such forests must be given rest from resin tapping and rotation.

The "lip and cup method" of resin tapping resulted in deep cuts around the bole, thereby causing a loss of timber and making the trees less resistant to the wind and storms . urther, after covering the circumference of the tree, a second cycle of tapping is not possible because of slow healing of deeper blazes. This generally resulted in an abrupt fall in resin production. In order to overcome this, an improved method, known as "Rill method" has been evolved at Forest Research Institute, Dehradun.

2.23.1: RILL METHOD:

This technique has been described in detail in the booklet "Field Guide to modern Methods of Resin tapping" by V P S Verma revised by N.K. Gulati a F.R.I. publication,1983. The Divisional Forest Officer is advised to procure sufficient number of copies for the guidance of the filed staff.

- (i) The freshening knife is so designed that the depth of the blaze does not exceed 2 mm in live bark and sap-wood. This eliminates the damage to heartwood.
- (ii) Fast healing up of shallow blazes will make it possible to tap the trees for a second cycle, thereby increasing the tapping of a tree
- (iii) The essential use of stimulant facilitates a prolonged tapping season resulting in increased resin producing and employment to the tappers for almost the whole year.
- (iv) There being practically no scrape resin, the loss of turpentine is negligible.

CHAPTER -3

THE OAK SHELTERWOOD WORKING CIRCLE

3.1: GENERAL CONSTITUTION AND GENERAL CHARACTER OF VEGETATION:

The Working Circle includes all the pure or nearly pure Ban-Oak forests. The general character of Ban-Oak forests has been described in detail in Para. Except the areas regenerated in part the forests of this circle are generally under stocked and age class distribution is far from normal. The forests near the habitations are excessively lopped for fodder particularly during winter. The ban-oak trees are generally gnarled, malformed and crooked due to heavy lopping.

Deodar was introduced in some of the Ban-Oak forests with variable success. In the lower fringes, Chil has come up along the ridges where canopy is rather open. The following table gives the area distribution by ranges and class of forests. The total area of this WC is 2102.85 ha, which lies in Dharamshala and Shahpur Ranges.

3.2: BLOCKS AND COMPARTMENTS: No change has been made in the forests. The Compartments and sub-compartments also remain unchanged **Table 3.1**

List of Forest Oak Working Circle							
Range	Block	Beat	Forest Type	Forest	Compartment No	PB	Net Area (Hac.)
Dharamshala	Dharamshala	Gharoh	CFS	CFS sudhed	U-22	I	4.45
	Kareri	Paloon	DPF	P 42 k leondnal	C-1	II	26.71
					C-2	IV	29.14
					C-3	I	52.2
		Salli	DPF	P 41 k kutharna	C-1	II	37.62
	Kareri	Kareri	DPF	P 40 k C.B kareri	C-23	II	189.36
					C-6	II	31.97
					C-7	IV	22.26
					C-8a	II	27.11

					C-8b	I	39.66
					C-9a	IV	73.24
		Salli	DPF	P 40 k C.B kareri	C-1	IV	68.79
					C-16	II	361.32
					C-2	I	44.91
					C-20	II	133.12
					C-21	I	144.44
					C-22	I	185.31
					C-3a	II	104.39
					C-3b	I	116.13
					C-4	IV	59.89
					C-5	I	75.67
	Khanyara	Dhallon	DPF	P 59 K Dhaloon	C-1-a	II	9.71
					C-1-b	IV	15.38
		Yol	DPF	P 59 K Dhaloon	C-1-c	I	16.19
	Khanyara	Dhaloon	CFS	CFS dhaloon	P-1	II	22.66
					P-2a	IV	16.18
					P-2b	II	16.59
					U-10	III	8.09
					U-16	III	2.43
		Manji	CFS	CFS Khanyara	P-11	IV	27.52
					P-12	I	31.56
		Manooni	CFS	CFS Khanyara	P-13	II	44.5
					P-17	III	13.76
		Yol	CFS	CFS YOL	P-1	I	12.55

	Mecloedga nj	Dharmk ot	DPF	P 50K Dharamkot	C-4	IV	16.19
Shahpur	Shahpur	Shahpu r	CFS	CFS Shahpur	P1	IV	4.85
					P2a	I	4.05
					P2b	III	5.26
					U2	IV	2.43
					U3	Unallot ed	0.81
					U4	I	2.02
					U5	Unallot ed	2.43
Grand Total							2102.85

3.3: FELLING SERIES:

There is a complete ban on felling of green Ban Oak trees as per Oder letter No. Fts (F)-13-38-84 dated 11.3.1986 from: Under Secretary (Forests) to the Govt. of Himachal Pradesh addressed to the Chief Conservator of forests, H.P. hence such no separate felling series is prescribed as was done in previous plan where a separate felling series namely Depot felling series, Preservation felling series and CFS felling series was in operation but never implemented. It is now being merged and only forests are managed as preservation series. No felling is as such prescribed in this working circle

3.4: SPECIAL OBJECTS OF MANAGEMENT: The objects of management for these forests are:

- (i) To protect and preserve these forests for water and soil conservation functions;
- (ii) To improve the stocking of ban-Oak crop in poorly and under stocked areas and to restock the blanks through planting and sowing of ban-oak

3.5: AREA AND ALLOTMENT:

Range wise area is as under

Table 3.2

S No	Range	Area (Hac)
1	Dharamshala	2081.00
2	Shahpur	21.85
	Total	2102.85

3.6: ANALYSIS AND VALUATION OF THE CROP: The crop is analysed as under:

3.6.1: STOCK MAPS: All the compartments have been stock mapped on GIS platform on visible scale maps and the copy of the same have been placed in the respective Compartment History Files.

3.6.2: AGE CLASSES: The stands are generally irregular and younger age classes are deficient except in areas regenerated during the previous plans.

3.6.3: DENSITY: Canopy density has been estimated ocularly and noted in the Compartment History Files. The density of forests of Depot Felling Series is generally better 0.7 to 0.8 than of Series it is about 0.4 to 0.6.

3.6.4: ENUMERATIONS AND THEIR RESULTS: The technique of Survey and Assessment of Forest Resource using Grid and Quadrants method (Sample Plots) has been adopted and complete counting of all tree species class wise has been done. A total of 54 Sample Plots (FSI), of 0.1 hac. were laid in this working circle covering all PBs. The detail of PB wise sample plots is as under: -

Filling series I

Table 3.3

S.No	PB	No. of plots	Total area counted Hac
1	PB-I	13	1.30
2	PB-II	14	1.40
3	PB-III	01	0.10
4	PB-IV	04	0.40
5	PB Unalloted	03	0.30
	Total	33	3.30

enumeration. The results of enumeration for each compartment /sub-compartment are as under

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0	1121	560	0	1121	1121	1121	1121	5608	11773
Deodar	0	0	560	1121	0	0	0	0	0	1681
Khair	0	0	0	0	0	0	0	0	0	0
Ban	1682	9534	17948	10656	1682	2804	3926	4487	2804	55523
Rai	0	1682	5608	560	0	0	0	0	2243	10093
Tosh	0	0	0	560	1682	0	0	0	0	0
BL	1065 6	5608	7852	5047	3365	2243	2243	2243	3926	43183
Grand Total	12338	16824	31408	16823	6729	5047	6169	6730	8973	122253
Tree Volume (M ³)										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0.00	257.8 3	364.00	0.00	2645.5 6	4058.0 2	5829.2 0	5829.2 0	29161. 60	48145.4 1
Deodar	0.00	0.00	235.20	1412.4 6	0.00	0.00	0.00	0.00	0.00	1647.66
Khair	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ban	50.4 6	2002. 14	13461. 00	15664. 32	3935.8 8	9449.4 8	17824. 04	20370. 98	12730. 16	95488.4 6
Rai	0.00	235.4 8	4710.7 2	940.80	0.00	0.00	0.00	0.00	18841. 20	24728.2 0
Tosh	0.00	0.00	0.00	940.80	5180.5 6	0.00	0.00	0.00	0.00	6121.36
BL	298. 37	790.7 3	4444.2 3	5713.2 0	3809.1 8	3173.8 5	3173.8 5	3173.8 5	5555.2 9	30132.5 4
Grand Total	348.83	3286.18	23215.15	24671.58	15571.18	16681.35	26827.09	29374.03	66288.25	206263.63

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0	1435	3589	717	0	0	0	0	0	5741
Deodar	1435	2153	5025	2153	717	0	0	0	0	11483
Khair	0	0	0	0	0	0	0	0	0	0
Ban	2081 9	1507 5	16511	9332	10768	5743	4307	3589	7179	93323
Rai	0	717	1435	0	1435	0	0	0	0	3587
Tosh	0	0	0	0	0	0	0	0	0	0
BL	4163 8	2656 2	22972	5025	2871	5025	0	2153	2153	108399
Grand Total	6245 7	4235 4	40918	14357	15074	10768	4307	5742	9332	222533
Tree Volume (M ³)										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0.00	330.0 5	2332.8 5	975.12	0.00	0.00	0.00	0.00	0.00	3638.02
Deodar	0.00	301.4 2	2110.5 0	2712.7 8	1706.4 6	0.00	0.00	0.00	0.00	6831.16
Khair	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ban	624.5 7	3165. 75	12383. 25	13718. 04	25197. 12	19353. 91	19553. 78	16294. 06	32592. 66	142883. 14
Rai	0.00	100.3 8	1205.4 0	0.00	4419.8 0	0.00	0.00	0.00	0.00	5725.58
Tosh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BL	1165. 86	3745. 24	13002. 15	5688.3 0	3249.9 7	7110.3 8	0.00	3046.5 0	3046.5 0	40054.9 0
Grand Total	1790. 43	7642. 84	31034. 15	23094. 24	34573. 35	26464. 29	19553. 78	19340. 56	35639. 16	199132. 80

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0	0	0	0	0	0	0	0	0	0
Deodar	0	0	0	0	0	0	0	0	0	0
Khair	0	0	0	0	0	0	0	0	0	0
Ban	0	0	0	0	0	0	0	0	0	0
Rai	0	0	0	0	0	0	0	0	0	0
Tosh	0	0	0	0	0	0	0	0	0	0
BL	0	1181	3840	2067	295	0	0	0	0	7383
Grand Total	0	1181	3840	2067	295	0	0	0	0	7383
Tree Volume (M ³)										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Deodar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Khair	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ban	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rai	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tosh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BL	0.00	166.52	2173.44	2339.84	333.94	0.00	0.00	0.00	0.00	5013.75
Grand Total	0.00	166.52	2173.44	2339.84	333.94	0.00	0.00	0.00	0.00	5013.75

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0	0	0	0	0	0	0	0	0	0
Deodar	0	0	0	0	839	839	0	2519	15114	19311
Khair	0	0	0	0	0	0	0	0	0	0
Ban	0	0	0	0	0	0	0	0	0	0
Rai	0	0	0	0	0	0	0	0	0	0
Tosh	0	0	0	0	0	0	0	0	0	0
BL	0	4198	9236	9236	6717	6717	9236	6717	3358	55415
Grand Total	0	4198	9236	9236	6717	6717	9236	6717	3358	74726
Tree Volume (M ³)										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0.0 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Deodar	0.0 0	0.00	0.00	0.00	1996. 82	2936.5 0	0.00	15164. 38	105798. 00	125895.7 0
Khair	0.0 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ban	0.0 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rai	0.0 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tosh	0.0 0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BL	0.0 0	591. 92	5227. 58	10455. 15	7603. 64	9504.5 6	13068. 94	9504.5 6	4751.57	60707.91
Grand Total	0.0 0	591. 92	5227. 58	10455. 15	9600. 46	12441. 06	13068. 94	24668. 94	110549. 57	186603.6 1

PB Unallotted

Table 3.8

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0	0	0	10	0	0	0	0	0	10
Deodar	0	0	0	0	0	0	0	0	0	0
Khair	0	0	0	0	0	0	0	0	0	0
Ban	0	0	64	108	75	97	108	64	43	559
Rai	0	0	0	0	0	0	0	0	0	0
Tosh	0	0	0	0	0	0	0	0	0	0
BL	10	0	21	32	10	10	0	10	0	93
Grand Total	10	0	85	140	85	107	108	74	43	662
Tree Volume (M ³)										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0.00	0.00	0.00	13.60	0.00	0.00	0.00	0.00	0.00	13.60
Deodar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Khair	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ban	0.00	0.00	48.00	158.76	175.50	326.89	490.32	290.56	195.22	1685.25
Rai	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tosh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BL	0.28	0.00	11.89	36.22	11.32	14.15	0.00	14.15	0.00	88.01
Grand Total	0.28	0.00	59.89	208.58	186.82	341.04	490.32	304.71	195.22	1786.86

Oak working circle (Overall growing stock)

Table 3.9

Oak Working Circle								
Class	Species							Grand Total
	Chil	Deodar	Khair	Ban	Rai	Tosh	BL	
V	0	1435	0	22501	0	0	52304	76240
IV	2556	2153	0	24609	2399	0	37549	69266
III	4149	5585	0	34523	7043	0	43921	95221
IIA	727	3274	0	20096	560	560	21407	46624
IIB	1121	1556	0	12525	1435	1682	13258	31577
IA	1121	839	0	8644	0	0	13995	24599
IB	1121	0	0	8341	0	0	11479	20941
IC	1121	2519	0	8140	0	0	11123	22903
ID	5608	15114	0	10026	2243	0	9437	42428
Total Tree	17524	32475	0	149405	13680	2242	214473	429799
Volume	51797.03	134374.52	0	240056.85	30453.78	6121.36	135997.097	598800.637

3.7: SILVICULTURAL SYSTEM:

The forests under preservation series will continue to remain under protection. Culturable blanks and under stocked forests will be closed and planted with Ban-Oak

3.8: CHOICE OF SPECIES:

Ban-Oak will be the main species and will be favoured through both natural and artificial regeneration. Kail, Deodar, Chil, Tun, Khirk etc. wherever occurring, will not

be unnecessarily sacrificed. Introduction of Deodar in ban forests is not permitted as per latest instructions of the Government.

3.9: ROTATION AND CONVERSION PERIOD:

Rotation of 120 years, in keeping with the requirement of the rotational closure scheme is adopted. The crop diameter at this age is about 35 cm, a size suitable for yielding both fuel wood and small timber.

3.10: DIVISION INTO PERIODS And Allotment TO PERIODIC BLOCKS:

The rotation of 120 years is divided into four Periods of 30 years each. Two Periods have already elapsed and third commenced from 1st April 1981. Allotment to all the Periodic blocks has been made. The first group of areas closed in 1921 has now been allotted to PB III and the second group closed in 1951 to PB IV. Out of the PB unallotted areas of the plan under revision, the forests having comparatively more mature crop, with lesser stocking and with sizeable chunks of cultivable blanks have been allotted to PB I and the remaining to PB II. The detail of allotment of compartments to various Periodic blocks is given in Appendix IIA. The following table summarizes the allotment of area to different Periodic blocks:

3.11: CALCULATION OF YIELD:

The main yield will be realized by way of seeding felling in PB I. None of the PB I areas will be ready for final fellings during the period of this plan. Intermediate yield from other PB's will be reserved to meet various demands of right holders and other local requirements.

3.11.1: YIELD FROM PB I:

About 45 trees per ha (IIA=20, IIB= 15, IA=10) are required to be retained in seeding felling. From examination of enumeration data, it is revealed that the number of trees to be retained in PB I at the time of seeding felling is more than are actually available in the forest. Thus, no yield is prescribed from PB I areas.

3.11.2: YIELD FROM PB IV:

The yield from PB IV will be in the form of removal of over wood standing over established regeneration and thinning in advance growth and thinning/cleaning in congested patches of natural regeneration, The felling will be done to meet the requirements of right holders and of the department. No yield from PB IV is, therefore, calculated and prescribed. In view of the increasing requirement of right holders and total ban imposed by the Govt. on Oak felling except for certain purposes, no yield is prescribed.

3.11.3: METHOD OF EXECUTING FELLING IN PB I:

The object of felling in this Periodic block is to replace the existing mature and over mature stock of Ban-Oak by even aged young crop. As all the PB I areas are new ones, there may be only one type of felling, seeding felling, during this plan. Ban-Oak is a moderate light demander. Natural germination can take place under heavy shade; a moderate shade is necessary for survival of the seedling during earlier stages which can with stand shade for a time, after which it requires more light for its subsequent growth. The following markings rules are, thus, laid down for felling in the PB I areas.

- (i) About 40-50 seed bearers per ha shall be retained. Where only small sized or heavily lopped trees are available the number of seed bearers should be increased to 60 trees per ha;
- (ii) In selecting the seed bearers, trees past middle age to mature with large crowns and long clean boles shall be preferred. These should be located on commanding spurs and should be evenly distributed as far as possible,
- (iii) Compact well stocked groups of poles, of at least 0.2 ha in extent, shall be retained as part of the future crop. Such groups will be thinned along with the main fellings. All growth of seeding and sapling stage shall be retained,
- (iv) No tree under 30 cm d.b.h. shall be felled, and will be retained till the regeneration is well-established;
- (v) On steep and precipitous ground and along the banks of nallas the marking shall conform to selection type;
- (vi) A judicious mixture of other broad-leaved species shall be maintained. Healthy trees of Walnut, Maral, Horsechestnut, Acer, Khirk and Tun etc. shall not be felled except for inducing regeneration. Over mature, diseased trees of Rhododendron and other miscellaneous species shall be removed unless occurring in blanks;
- (vii) Final fellings shall not be carried out till the area is fully regenerated and the young crop is at least 2 m high. About 5 trees per ha should be retained at the time of final fellings to meet the demands of right holders,
- (viii) The trees must be thoroughly lopped before felling in order to minimize damage to the existing young crop.

3.11.4: METHOD OF EXECUTING FELLING IN PB IV:

- (i) Trees standing over the established regeneration will be removed to free the young crop;
- (ii) The young crop shall be properly cleaned and thinned. The dense patches of advance growth shall also be thinned,
- (iii) All dead, dying, diseased trees shall be removed.

3.11.5: METHOD OF EXECUTING FELLING IN PB I & II:

No felling except some conservative felling to meet the requirements of right holders is prescribed, while carrying out such marking dead, dying diseased and inferior trees should be removed first.

3.11.6: SEQUENCE OF FELLING IN PB I AREAS:

In view of non-availability of trees over and above the minimum number to be retained at the time of seeding felling, no sequence of felling is either warranted or prescribed. Fellings as and when needed may, however, be carried out after getting the programme approved from P.C.C.F. from PB I areas.

3.12: SUBSIDIARY SILVICULTURAL OPERATIONS IN P.B.I

3.12.1: SUBSIDIARY FELLINGS:

All marked and other damaged trees left un-felled should be cut back and allowed to be removed by the local people. The felling refuse and debris, if any left after charcoal burning, should be dumped in nallas and depressions ARUTIUR

3.12.2: SOWING AND PLANTING:

All felled PB I areas of Depot Felling Series and under stocked (density below 0.3) and blank areas in the Preservation Felling Series are to be artificially restocked mainly with Ban Oak. The felled areas will be taken up for regeneration immediately after subsidiary fellings and other subsidiary operations, no separate programme is therefore required for these areas.

The sequence for raising Ban nurseries, as per the new Nursery policy is summarized below:

1. Sowing of seeds in mother beds / cow dung in November;

2. Transplanting germinated seedlings to 4x6" poly bags in March/ April;
3. Shifting the seedlings to 7x15" poly bags in July / August;
4. Shifting the seedlings to 12x20" poly bags in July August next year,
5. Planting out in July of next year.

Thus 2 and half year-old nursery raised seedlings are to be planted out in the field. More details are available in the new nursery policy document.

3.12.3: WEEDING:

The existing natural seedling and sapling growth will be carefully examined and excess growth of miscellaneous species hampering regeneration of ban, oak will be removed, In the planted areas, one weeding a year will normally be sufficient. Grass and shrub growth suppressing the young regeneration should be removed. Unnecessary shrub cutting should, however, be discouraged as these protect the young crop from frost and sun.

3.12.4: CLEANINGS AND EARLY THINNINGS:

The dense patches of young regeneration and coppice shoot should be properly cleaned. All suppressed and sick seedlings in such patches should be removed. Early thinning may not be necessary in most of the areas but should invariably be carried out whenever necessary after getting permission from CCF WP & S.

3.12.5: CULTURAL OPERATIONS IN PB IV:

Mechanical thinning shall be carried out along with the main fellings and thinning wherever necessary. Cleaning and stick - thinning will generally be necessary in natural regeneration from time to time. The available material will generally be removed by the right holders. Even though, the disposal of such cut material involves certain expenditure, the same will, undoubtedly, be repaid in course of time by accelerated increment of the crop.

3.13: OTHER REGULATIONS: Other miscellaneous regulations for these forests are given below

3.13.1: CLOSURE:

All PB I areas will remain closed till 2010-2011 irrespective of the fact whether any seeding fellings have been carried out or not. This will help in restoration and induction of natural regeneration. The areas of the reservation

felling series which are taken up for sowing / planting shall be closed for at least 20 years. All other areas will remain open for grazing and exercises of their rights.

3.13.2: GRASS CUTTING:

Grass cutting will be ALLOWED In all PB 1 areas and other plantation areas. The rationale and mechanism for this has already been explained in Chapter II of Part 1 Because it is not possible to effect such long closures without the active co-operation of the people, it is critical that local communities / SHGs etc, have a stake in the grass produced in closed areas and are able to benefit from it.

3.13.3: FIRE PROTECTION:

The ban oak forests are not themselves inflammable but, in many localities, suffer a good deal from fires spreading up from the pine zone below. (Though the fires are not of considerable consequence in these forests, yet the regeneration areas need to be protected against fires. The charcoal burning in felled areas may sometimes become a source of fire and cause damage to the existing natural young crop. This must receive proper attention when charcoal burning is in progress.

3.13.4: LOPPING:

Lopping will not be permitted in PB I areas as it adversely affects seed production and growth of trees. In other areas also restriction of lopping is necessary and should be effectively enforced in case of Ban Oak new leaves appear in March/April and old leaves fall thereafter, thus making Oak appearance during growing season, when it needs full protection from lopping. The shoots become woody and the leaves coriaceous during 2nd winter. Therefore, the lopping cycle prescribed is 2 years. (e.g. Ban Oak lopped in October/December 1999; new shoots in March/April, 2000; new shoots ready for lopping again in 2nd winter i.e. October/December 2001). The rotational lopping programme for the Ban/Oak forests situated in the vicinity of villages is given as under:

3.14: EXERCISE OF OTHER RIGHTS:

Exercise of rights will be allowed as per record of rights subject to the restrictions imposed in the closed areas. Mother trees standing over the young crop in PB IV should preferably be removed only for meeting the demand of right holders. In certain cases, trees may have to be given to right holders from areas other than PB IV. in such events removals should strictly be on silvicultural ground.

CHAPTER-4

THE COPPICE WORKING CIRCLE

4: THE COPPICE WORKING CIRCLE

This Working Circle comprises predominantly of Khair and Scrub/ miscellaneous broad-leaved forests which were managed under the same working circle under the plan under revision. All the better stocked dry deciduous scrub areas allotted to the plantation Working Circle under the plan under revision have also been included. These generally carry bushes and over wood consisting of a varying proportion of broad-leaved trees Chil trees are occasionally found mixed with the scrub and occur either singly or in groups. The stocking varies considerably and in typical scrub areas is generally dense and the brushwood completely covers the ground. The trees of over wood are branchy and mature and have extensive thrown. In drier localities the tree growth is very much limited and whatever it exists, is stunted. A reasonably good number of areas being allotted to this working circle carry almost Pure young Khair crops raised artificially during last about 25-30 years. Few areas are degraded and almost blank Total area of this working circle is 1059.02 ha. The choice of species in this Working circle is as - In the depressions and pockets with good soil depth and gentle slope- Kachnar, Harar, Bahera, amla, Dhaman, Shisham, Mulberry etc.; On moderate sloping pockets khair, Drek, Ritha, Ohi etc.; On refractory pockets kainth sowings (patch sowing); On slips-Bio-engineering species.

4.1: BLOCKS AND COMPARTMENTS

The boundaries of the forest Blocks and compartments remain the same as in the previous Working Plan.

Table 4.1

List of Forest Coppice working Circle Forest						
Range	Block	Beat	Forest Type	Forest	Compartment No	Net Area (Hac.)
Kangra	Ghurkar i	Ghurkari	CFS	CFS Ghurkari	C-I	10.93
			DPF	P-62 Jalaru	C-2a	11.74
		Rajiana	CFS	CFS Kholi	P1	16.59

					P4(a)	5.66
			DPF	P 61k Naina Devi	C2A	14.57
	Ranital	Balugloa	DPF	P 38K GHEEN	5A	7.69
					5B	8.09
					5C	8.5
					6A	31.97
					6B	31.16
					6C	35.21
				P39K RANITAL	c8a	21.85
					c8b	32.37
					c8c	42.08
		Gheen	DPF	P 38K GHEEN	C-2a	24.28
					C-2b	22.66
					C-2c	31.17
					C-3a	7.28
					C-3b	18.62
					C-3c	32.37
					C-4a	18.62
					C-4b	18.61
					C-4c	16.6
				P37 K Khaart	c-2a (ii)	19.83
					c-2b (ii)	15.78
					c-2c (ii)	14.16
			UPF	UP243K JANDRAH	C-7	7.28
		Jassai	DPF	P39K RANITAL	C2B	14.57
		Ranital	DPF	P39K RANITAL	C-7a	38.04
					c-7c	35.21
	Ranital	Jassai	DPF	P39K RANITAL	C2A	39.66

Lapiana	Lapiana	Pargor	DPF	P 20 K PARGOR KALRU	C2A	21.45
					C2B	23.47
					C2C	24.69
	Lunj	Gahlian	DPF	P25K GAHLIAN	C2B	31.16
					C2C	27.53
		Lunj	DPF	P-24K LUNJ	c5a	20.23
					c5b	32.77
					c5c	29.13
Malan	Samloti	Samloti	CFS	CFS J/Kothi	U-35	28.73
					U-36 a	12.14
					U-5	10.93
	Sarotri	Danoa	CFS	CFS Airla	P10	8.09
					U22	3.64
Shahpur	Rait	Salol	CFS	CFS Salol	U12	21.04
	Shahpur	Bassa	CFS	CFS Bhanala	P8	16.59
					P9	10.52
					U17b	8.09
		Manjgran	CFS	CFS Manjgran	U5	5.26
		Shahpur	CFS	CFS Dobh	S7	10.52
					S8	12.54
				CFS Shahpur	P5	10.93
Grand Total						1022.6

4.2: SPECIAL OBJECTS OF MANAGEMENT:

1. To preserve and protect these forests;

2. To improve the existing stocking of forest by propagation of valuable and indigenous species but monoculture plantations will be discouraged;
3. To meet the bona fide demands of local communities for fodder, fuel, grazing and timber;
4. Consistent with the above, to obtain progressively increasing sustained yield of fuel wood, fodder, timber, Khair wood & non-timber forest produce.

4.3: AREA AND ALLOTMENT:

Table 4.2

Sr No	Range	Area
1	Kangra	653.15
2	Lapiana	210.43
3	Mallan	63.53
4	Shahpur	95.49
	Total	1022.60

4.4: ANALYSIS AND VALUATION OF CROP:

4.4.1: STOCK MAPS:

All the compartments have been stock mapped on GIS platform on visible scale maps and the copy of the same have been placed in the respective Compartment History Files. culturable blanks, under stocked patches and the areas under different kind of vegetation have been depicted on these maps.

4.4.2: ENUMERATIONS: The technique of Survey and Assessment of Forest Resource using Grid and Quadrants method (Sample Plots) has been adopted and complete counting of all tree species class wise has been done. A total of 54 Sample Plots (FSI), of 0.1 hac. were laid in this working circle covering all PBs. The detail of PB wise sample plots is as under

Felling series - I

Table 4.3

S.No	No. of plots	Total area counted Hac
1	03	0.30
	03	0.30

Enumeration results

Table 4.4

Tree Count										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0	6817	6817	13634	6817	10226	3408	6817	0	54536
D/dar	0	0	0	0	0	0	0	0	0	0
Khair	0	3408	0	0	0	0	0	0	0	3408
Ban	0	0	0	0	0	0	0	0	0	0
Rai	0	0	0	0	0	0	0	0	0	0
Tosh	0	0	0	0	0	0	0	0	0	0
BL	129529	71582	37495	0	3408	3408	0	0	0	245422
Grand Total	129529	71582	37495	0	3408	3408	0	0	0	303366
Tree Volume (M ³)										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	0.00	1567.91	4431.05	18542.24	16088.12	37018.12	17721.60	35448.40	0.00	130817.44
D/dar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Khair	0.00	485.64	0.00	0.00	0.00	0.00	0.00	0.00	0.00	485.64
Ban	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rai	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tosh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BL	3626.81	10093.06	21222.17	0.00	3857.86	4822.32	0.00	0.00	0.00	43622.22
Grand Total	3626.81	12146.61	25653.22	18542.24	19945.98	41840.44	17721.60	35448.40	0.00	174925.30

4.4.3: SITE QUALITY AND AGE CLASSES

The site quality determination is neither required nor determining. All age classes are found in the Working Circle. However, middle age classes are in preponderance over the rest

4.4.5: DENSITY:

The density of each forest by compartment / sub compartment has been estimated ocularly and recorded in the respective compartment history files

4.5: SILVICULTURE SYSTEM

The forests allotted to this working circle will be managed under Coppice with Standard system. The standards will also be kept as they serve the purpose of safeguarding against erosion and frost. Besides, these meet the requirement of right holders for fodder and timber. The regeneration will be by coppice supplemented with artificial planting. The natural regeneration of seed origin if any will also be relied upon.

4.6: ROTATION AND CONVERSION PERIOD

The rotation of 30 years for coppice and 60 years for standards is prescribed. Rotation of 30 years for coppice is suitable for yielding small size timber and firewood for manufacture of charcoal as well as khair-wood. The conversion period here is of no significance

4.7: YIELD CALCULATION AND CONTROL:

Yield shall be regulated by area. Total area for working circle for felling series I and II is 842.13 and 180.47 ha respectively. Keeping in view the rotation period of 30 years, an annual target of 34 ha is prescribed for both the felling series. The control of yield will be by area. The outturn of fire wood, charcoal and khair wood to be depicted in control forms

4.8: METHOD OF EXECUTING FELLING

1. Fellings will be carried out with accordance of the following rules:
2. Entire area shall be felled retaining about 40 to 50 sound trees;
3. Trees of any size and species along nallahs, ridges and on steep slopes shall be retained;

4. The standard should be middle aged, healthy and vigorously growing with well-developed crown and suitably staggered (1-2 crown width apart depending upon aspect and slope) These should preferably be of timber and fodder species,
5. Khair trees above 30 cms dbh only shall be marked for felling unless required to be retained as standards on vulnerable locations.
6. Dhow, Chil, Harar, Bahera and Mango trees will not be felled irrespective of their size;
7. Felling should be completed within 1st October to 28th February and conversion by 31st March The converted material should be carried out of forest areas by 30th June. The converted material should not be stacked over stumps;
8. The height of stool should be 10 cm and the cut surface should slope towards the ground and may even touch the ground level for better coppice growth;
9. The cut material and charcoal kilns should be stacked / located in depressions and nallahs away from the standards retained
10. Accurate record of yield from fellings in each coup will be maintained and incorporated in the control forms

4.9: SEQUENCE OF FELLINGS:

Table 4.5

S.No	Year	Range	Forest	Comptt	Area (in Ha)	Total for the Year (Ha)
1	2024-25	Kangra	P61K Nainadevi	a	25.5	
		Shahpur	CFS Salol	UP 12	21.04	46.54
2	2025-26	Lapiana	P20K Pargor Kalru	2c	24.49	24.49
3	2026-27	Kangra	P39K Ranital	8b	32.37	32.37
4	2027-28	Kangra	P39K Ranital	7c	35.21	35.21
5	2028-29	Kangra	P38K Ghin	6c	35.21	35.21
6	2029-30	Lapiana	P24K Lunj	5b	32.77	32.77
7	2030-31	Lapiana	P24K Lunj	5c	29.13	29.13

8	2031-32	Lapiana	P25K Ghalian	2b	31.16	31.16
9	2032-33	Lapiana	P20K Pargor Kalru	2b	23.47	
		Kangra	P38K Ghin	5b	8.09	31.56
10	2033-34	Lapiana	P24K Lunj	6c	40.06	40.06

4.10: SUBSIDIARY SILVICULTURAL OPERATIONS

4.10.1: CLEARING OF COUPES:

Felling debris be collected in heaps and burnt by 31" march, exercising due care not to damage standards or stumps.

4.10.2: SOWING/PLANTING:

Khair seedlings raised in polythene bag will be planted in the area the same year just after the year of felling, during July. There will be two plantation series:

(i) Felled area treatment plantation series: This plantation series contains the areas which had been felled under coppice with standard system and could not be stocked within last 5 years and need special treatment for stocking. Such areas are listed below:

(ii) Felled area treatment plantation Series: his series includes the areas which were felled during the last 5 years under coppice with standard system and are under treatment of regeneration and the areas which are to be felled as per the felling programme of working circle. The felled area should be planted in the year following the one in which it is worked. Thus, plantation programme will exactly follow the felling programme laid in para 4.9. (No area was felled during the last 5 years). Planting will be done at a distance of 3mx3m. The earth work must be completed during March-April.

The choice of species will be as under:

In the depressions and pockets with good soil depth and gentle slope- Kachnar, Harar, Bahera, amla, Dhaman, Shisham, Mulberry etc.; On moderate sloping pockets khair, Drek, Ritha, Ohi etc.; On refractory pockets kainth sowings (patch sowing); On slips-Bio-engineering species.

4.11: Strategy to Treat Lantana: Most of the Infested Areas allocated to this WC including established Khair plantations are heavily infested with lantana.

Therefore, successful plantation and rehabilitation needs to first tackle the lantana menace. The method of tackling lantana infested areas and the strategy has been spelt out in detail and is given in Chapter 7 Part II. Similarly, the norms for working lantana areas have been revised and in 2010-11 stood at Rs 33,000/ha.

4.11.1: Tall Plants for Lantana Areas.

In order to effectively suppress and eliminate lantana, it is necessary to use tall plants with a good mixture of bamboo. The need to raise tall plants in nurseries and the method and costing has been worked out and is detailed in the new Nursery Policy of the department. Bamboo is also known to suppress lantana effectively and the division would need to raise bamboo on a large scale for introduction in lantana areas. Further, the broadcasting of local grass species before the onset of the monsoon, when planting is also done, would offer competition to lantana and once established would not let the weed come up easily. It is important that as in other plantation areas, local women or SHGs be allowed to share and cut the grass which would be an incentive to keep the areas lantana free.

4.12: CLOSURES:

While closures of 10 to 15 years have been recommended for regeneration of felled areas in several WPs in the past and these are also required to be notified; in practice this never happens with the result that regeneration has not kept pace with felling and more recently with general degradation of the forests. It is important to understand why this happens before any effective closure strategy can be implemented successfully.

1. The FD has been unable to get closures notified for so long that now no efforts are made towards this end; Proposals for closure and for notification of established plantations under section 4 of the IFA have been lying with Govt. for decades;
2. We do not have a fencing method that stays good for even a year, let alone for 15 years Normally under plantations the maintenance period is 3 years and that is the time for which funds for maintenance of plantations are supposed to flow. However, with ever increasing plantation targets under the 20 Point Programme, it has not been possible for several decades now to maintain all the plantations that have been carried out. Resultantly, many plantations just die for want of effective maintenance.

3. For closure (again 3 strand B/wire fence) of felled areas / PB I areas and the like there is neither money in the budgets nor any effective way of making the closures work.

4. Local cattle grazing pressures on forests are so high especially around habitations that it has become very difficult for either the forest guard or the forest worker to keep cattle out. Where the species planted are not palatable, like Chil, plantations have shown better survival

5. In most forest plantations or closed areas, the local communities do not have any stake and view the closures as against their interests. It has been seen that wherever the forest staff has managed to involve local women / SHGs in protection and allowed them even the grass that comes up well in closed areas, there has been very encouraging survival and rehabilitation of the closed area.

4.12.1: Lessons Learned for Effective Closure

1. It is critical to involve local people.

This is achieved through interaction with women's groups who generally cut grass and/or graze cattle in the area. When these women groups are involved in refining the area, paid for planting activities and erection of fences where necessary and maintenance in subsequent years and above all offered an arrangement to share the grass from the closed area, there is mostly a positive response and the likelihood of the closure remaining intact greatly improves. Kind of Win-Win situation

2. Use of tall plants.

These should be above browse-able height and also get established quickly, thereby making the closed area free for grazing after a few years

3. Use of unpalatable bio-engineering species in fencing.

As the proportion of these species is increased there is less and less need to use barbed wire. Further live fences or hedges grow over time and make for very efficient barriers in due course, also offering space and conditions for several local species of small insects, amphibians and birds to breed.

4. More mix of fodder, wild fruit and medicinal trees in plantations. Traditionally, people tend to protect such species more than others

5. For every "forestry" plantation raised there should also be an "energy" plantation raised nearby. Conscious efforts need to be made to meet people's energy needs.

4.12.2: CLEANING OF COPPICE SHOOTS:

It should be carried out when the coppice shoots are about 2 years old. Only 2 coppice shoots per stool be retained. The cost of this operation can be cut down if the villagers are allowed removal of the marked shoots in presence of the forest guard.

4.13: OTHER REGULATIONS:

4.13.1: GRAZING AND GRASS CUTTING

No grazing is permitted in reserved forests. The right holders will be allowed grass cutting from closed areas under proper supervision till the plants grow above grass height, so that the plants are not cut along with grass.

4.14: REGENERATION ASSESMENT SURVEY:

The regeneration assessment survey will be carried out every year after felling till a period of 5 years and various reports be placed before the review committee of Govt of India.

4.15: Compensatory Afforestation under Maintenance:

Following Table 4.6 depicts compensatory afforestation carried out in the last five years which are maintenance. Budgetary provision be compulsorily be kept for the success of these plantations.

Maintenance of old Plantation under Compensatory Afforestation					
Sr. No.	Name of Division	Name of sector	Year of Plantation	Name of Area	Area in hac
1	D/shala	C/o HRTC workshop Nagrota Bagwan	2018-19	P 40 KCB Kareri	2
2	D/shala	C/o Bus Stand Baba Baroh	2018-19	CFS Danoa U-21	1
					3
3		Nil	2019-20	Nil	
4		Nil	2021-20	Nil	
5		NIL	2021-22	NIL	

6	D/shala	C/o Dharamshala Mecleodganj Ropeway	2023-24	Non Forest Land Mohal Thear (Non Forest Land wegot against diversion to Ropway Dharamshala)	2.0731
7	D/shala	Diversion of 0.3535 hac. Forest Land c/o Inspection hut & IPH Division Store	2023-24	CFS Shahpur P-2, P-4	0.3535
8	D/shala	Laying of 132 KV Transmission Line from dehra to Kangra	2023-24	UP175K Janyankar C-2	2.5
9	D/shala	Diversion of 7.0713 hac. Forest Land for the C/o two line of HH-20 A(New NH- 303 KM 5/0 to 18/00 Road Nagrota Bagwan- Ranital Mubarkpur	2023-24	UP 253 K Khawa C-6a & UP 254 k Kandi C-8	14.15
10	D/shala	Diversion of 11.9hac. Forest Land for Tramission Line From Kangra to 33/132 Chambi	2023-24	P 1 K Ban Boh C-1d	22.8
11	D/shala	C/O Bus Stand D/shala	2023-24	CFS Khaniyara	1
12	D/shala	C/O Transmission line 33/132 KV at Chambi	2023-24	UP 6 k Dibba C-2	33.75
13	D/shala	C/o Ghera Road Kms0/000 to 8/135(0/00 to 5/030	2023-24	P 40 KCB Kareri	3.967
14	D/shala	C/o road from boh to Gargoon 0/0 to 3/240 Km.	2023-24	P 49 KCB D/shala C-4	1.804
15	D/shala	C/O Leond Small Hydro Project 5 MW	2023-24	CFS Khaniyara P- 15	1.55

CHAPTER 5

KHAIR (OVERLAPPING) WORKING CIRCLE

GENERAL CONSTITUTION AND CHARACTER OF VEGETATION:

This Working Circle overlaps Chil, Protection and Plantation Working Circle. The khair bearing areas are mostly found in Kangra, Shahpur, Lapiana, Mallan Ranges. The Khair in coppice working circle will be worked under the same circle. The Khair (Overlapping) Working Circle covers the Delimited protected, Undelimited Protected and also forests of the co-operative Forests Societies of the Division.

5.1: SPECIAL OBJECT OF MANAGEMENT

- (i) To harvest mature and over mature stock of khair growing sporadically or in small clusters which are not feasible to be worked in a concentrated manner.
- (ii) To increase the proportion of khair in suitable localities both by artificial and natural means;
- (iii) To arrest the spread of lantana and lessen its infestation in khair bearing forests.

5.2: ANALYSIS AND VALUATION OF CROP:

The crop is analysed and evaluated as under:

Table 5.1

Khair Overlapping Working Circle										
Tree Count (No. of Trees)										
Khair	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Grand Total	353835	390111	207662	108941	68660	56215	8134	2288	3556	1199402
Tree Volume (M ³)										
Khair	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Grand Total	16807.1625	55590.818	61052.628	53326.62	37419.7	30637.175	4433.03	1246.96	1938.02	262452.1125

5.2.1: ENUMERATION:

The enumeration of khair was done in Chil, Protection and Plantation working circles in 10 cm diameter classes down to 10 cm d.b.h. Abstract of the enumeration is given below. The detailed enumeration results are given in Appendix-IIA.

5.3: SILVICULTURAL SYSTEM:

It will be the Selection System but thinning will be carried out wherever required.

5.4; EXPLOITABLE DIAMETER:

Exploitable d.b.h. as per the current working plan is 25cm. Field inspections revealed that rot does not set in the area at this d.b.h. Coppicing power of khair trees at this diameter class was also observed to be vigorous. The increase in the outturn of khairwood and katha contents of khair trees of 25cm d.b.h. as compared to 20cm d.b.h. is about 60%. It is, therefore, felt prudent that exploitable d.b.h, be retained as 25cm.

5.4.1: MONEY YIELD TABLE:

Money yield table is prepared based upon royalty rate (Rs. 1890/ per meter girth) paid by H.P.S.F.C. Ltd. to the forest department.

5.5 FELLING CYCLE:

Felling cycle will be of 10 years duration. All the areas as indicated will be gone over in the Plan period of 10 years. The felling unit will be a mauza or a group of mauzas.

5.6: CALCULATION OF YIELD:

For the convenience of management and working one mauza or a group of mauzas has been adopted as an annual unit. The yield is prescribed number of selection trees and is calculated by the Brandis method as below:

FELLING SERIES I, II and III:

Khair trees available for exploitation:

According to the Brandis formula, during 14 years all trees of 25-30cm class will enter into > 30 cm class and 1/11th of 20-25cm class trees will also pass onto > 30 cm class.

Total recruitment in 15 years	=195055+17332 =212387
The average annual recruitment	=212387/15=14159
To harvest 14159 trees on 10 years cycle a working stock of $14159 \times 10/2$	= 70795 trees of 30cm and above dia class are needed on the ground.
So, the surplus	=455456-70795= 384661 trees will be felled in 10 years
Therefore, annual liquidation	=384661/10 =38466
Thus, total trees to be felled annually	=38466 =Or say 35000

5.7: PRESCRIBED YIELD:

The prescribed annual yield will be as under: Felling series I, II, III = **35000 trees**.

5.7.1: METHOD OF EXECUTING FELLING

The following rules shall be followed:

- (i) All available khair trees 25 cm d.b.h. and over shall be removed except those standing isolated or on steep and very steep ground
- (ii) All dead, dry, fallen and diseased trees will be marked.
- (iii) The stump height should be 10 cm and one side of the stump should be kept sloping preferably touching the ground level to promote effective coppicing
- (iv) All fellings to be completed by February end every year.

5.8: CONTROL OF YIELD:

The yield is regulated by area subject to number of trees of exploitable size. All trees of 25 cm d.b.h. and over, except those granted to right holders which

shall be recorded against "Neither Prescribed nor Suggested", will count against the prescribed yield.

5.9: SEQUENCE OF FELLINGS:

The following sequence of felling for the forests falling under this circle is laid down as below:

Table 5.2

Year	Range	Mauza	Area	Area to be felled Annually
2024-25	Lapiana	Baranj	494.08	
	Mallan	Sadun	345.57	
	Shahpur	Sihwan	92.88	
	Kangra	Daulatpur	938.08	1870.61
2025-26	Lapiana	Dharkhurd	162.47	
	Dshala	Dhalun	26.71	
	Mallan	Pathiar	249.25	
	Shahpur	Badiara	82.92	
	Kangra	Jassal	882.92	
		Kuled	160.25	
		Ujjain	42.9	1607.42
2026-27	Lapiana	Manai	453.6	
	Shahpur	Shahpur	265.03	
	Mallan	Badhwar	112.51	
	Shahpur	Rajol	375.1	
	Kangra	Kharat	347.37	
		Mandal	71.62	1625.23
2027-28	Lapiana	Manai	450	
	Shahpur	Behnala	293.73	
	Mallan	Luhana	278	
	Shahpur	Tiara	77.69	

	Kangra	Ghin	286.5	
		Kohala	174.44	
		Balugloa	15.13	1575.49
2028-29	Lapiana	Dharkalan	445.54	
	Kangra	Jalot	255.77	
		Sarotri	350.44	
	Shahpur	Harnera	262.91	
	Kangra	Nandrul	294.9	1609.56
2029-30	Lapiana	Manai	450	
	Shahpur	Manjegran	53.81	
	Mallan	Masal	468.23	
	Shahpur	Harnera	300	
	Kangra	Samirpur	474.11	1746.15
2030-31	Lapiana	Thehr	89.21	
	Mallan	Erla	303.93	
		Romehr	71.24	
		Sihund	78.11	
	Shahpur	Nerti	347.77	
	Kangra	Rajol	387.23	
		Sakaut	347.7	1625.19
2031-32	Lapiana	Lapiana	316.83	
	Mallan	Danoa	372.72	
		Upperli Kothi	527.24	
	Shahpur	Baniar	47.75	
	Kangra	Kuthar	245.83	
		Bhangwar	85.8	1596.17
2032-33	Lapiana	Pargor	494.32	
	Shahpur	Salol	639.39	

	Mallan	Ghorab	36.43	
	Kangra	Jalari	499.17	1669.31
2033-34	Lapiana	Pargor	400	
	Mallan	Kandi	519.14	
	Shahpur	Bhangwar	13.35	
	Kangra	Takipur	275.6	
		Sunhi	419.64	1627.73

5.10: SUBSIDIARY SILVICULTURAL OPERATIONS: These are given below:

5.10.1: WEEDING: In areas where artificial planting of khair is carried out one weeding every year for two years will be sufficient.

5.10.2: CLEANINGS: The number of coppice shoots per stool may be reduced to two in the third year after felling. This operation should be carried out before the growing season commences.

5.10.3: HANDLING LANTANA: It has been experienced that lantana is established and spreading in many khair plantations. It would therefore be logical to expect that lantana infestation would be one of the major problems wherever felling is carried out. Especially, if there is a long gap between felling and subsequent closure. It is necessary that the felled areas must be closed for regeneration / coppicing as soon as possible after felling. Wherever lantana is found within the felled area, it must be uprooted and the area planted up with bamboo and sown with local grasses in early July each year.

5.11: Eco Restoration

From eco restoration point of view quick growing species like bamboo, native grasses and energy plantations be raised on the cleared areas. Subsequent monitoring of these areas will be carried out to prevent lantana infestation.

CHAPTER 6

THE PLANTATION WORKING CIRCLE

6.1 General Constitution:

General constitution of working circle:

This working circle comprises of following areas:

- (i) All the areas of plantation working circle of the expired working plan.
- (ii) Areas of plantation/Coppice working circle of co-operative society forests which have failed and are suitable for afforestation.

Basis of the Constitution:- Basis of constitution of this working circle lies with the analysis of the available degraded areas, blank patches, in lieu of diverted areas, fire affected areas and for improving the density of already existing forest areas.

The area which are suitable for planting with khair, chil bamboo and other broad-leaved species have been included in this working circle. The areas which can be planted after removal of bushes or which are open for planting with good soil depth have been included in this working circle. This has been estimated from the density and height of tree vegetation. Detailed suitability maps on 16" =1 mile scale have been prepared indicating the species which have to be raised on different parts of the compartment. The range wise distribution of area is as under

Table No. 6.1

Range wise distribution of Area				
Range	Feling Series			Total Area
	Legal	Voluntary	Co-operative Society	
Dharamshala	202.76	668.04	943.62	1814.42
Kangra	514.39	2113.69	41.68	2670.26
Lapiana	439.27	970.41	0	1409.68
Mallan	89.43	791.80	265.89	1147.21

Shahpur	370.27	486.38	222.47	1079.12
Total: -	1616.12	5030.32	1473.66	8120.69

6.2 Special objects of management:

- i) To manage the degraded, sparsely stocked and blank forest on scientific basis to increase the area under forest cover, thereby, reducing the pressure on traditional forests.
- ii) To augment the resources of timber, fodder and fire wood, to meet the increasing demand of local people in the vicinity of these forests.
- iii) To check denudation and soil erosion.
- iv) To raise compact plantation to make available raw material for wood based industries.
- v) To rehabilitate degraded areas by planting fodder trees and high yielding varieties of grasses.
- vi) To increase trees cover of valuable species so as to increase supply of fuel – wood and fodder to meet with demand of local community.
- vii) To increase employment opportunities (wage earning) to rural man folk

6.3. Blocks and Compartments:

The distribution of area in working is as under

Table No. 6.2

List of Forest Plantation Working Circle						
Range	Block	Beat	Forest Type	Forest	Compartment No	Net Area(Hac.)
Dharamshala	Dharamshala	Chari	UPF	UP 142 k Bandi	C-1	14.57
					C-2	16.59
		Garoh	CFS	CFS Garoh	U-15	28.32

					UP-1	19.42
					UP-11	16.19
					UP-22	10.52
		Gharoh	CFS	CFS sudhed	U-16	6.07
		Sihnal	UPF	UP 143 k Maned	C-1	18.62
					C-2	14.16
				UP 144 k Sakoh	C-1	11.74
					C-2	12.95
					C-3	6.47
					C-4	25.09
					C-5	49.36
					C-7	25.09
		Tharu	UPF	UP 141 k Rehlu	C-2	53.41
					C-3	45.72
					C-4	57.05
					C-6	23.88
	Dharmash ala	Sihnal	CFS	CFS sarah	UP-14	26.3
					UP-15a	4.05
					UP-16a	4.45
					UP-16b	2.43
					UP-17	0.81
					UP-18	1.21
					UP-19	4.86
					UP-21	4.05
					UP-22	3.64
					UP-27a	2.02
					UP-27b	7.28

					UP-28	4.45
					UP-8	7.69
	Dharmshala	Dharamshala	UPF	UP 139 k Dharamshala	C-12	20.23
		Tharu	DPF	P 47K Tharu	C-1	28.33
					C-2	28.33
					C-3	44.51
	Khanyara	Dhaloon	UPF	UP 148 k Tangroti	C-1	25.5
					C-2	8.09
		Tahu	UPF	UP 139 k Dharamshala	C-1	91.44
					C-2	85.78
		Yol	UPF	UP 147 k Barwala	C-1	15.38
					C-2	11.33
	Khanyara	Dhaloon	CFS	CFS dhaloon	P-3	26.71
					P-4	21.85
					P-5	24.68
					U-18	7.69
					U-20	26.71
					U-7	13.76
					U-8	16.19
		Manji	CFS	CFS Khanyara	P-3	288.48
					U-8	41.67
					U-9	59.88
		Manooni	CFS	CFS Khanyara	UP-28	52.6
		Sheela	CFS	CFS sidhbari	UP-1	38.04
		Sheela	CFS	CFS sukkar	UP-2	6.88
		Tahu	CFS	CFS Khanyara	S-29	7.28
					UP-19a	6.47

					UP-20a	40.06
					UP-21	84.2
					UP-22a	26.71
	Mecloedganj	Dharamkot	UPF	UP 139 k Dharamshala	C-4	53.41
		Macleodganj	UPF	UP 139 k Dharamshala	C-3	47.34
		Mecloedganj	UPF	UP 139 k Dharamshala	C-5	36.43
Kangra	Daulatpur	Daulatpur	DPF	P 29K DAULATPUR	C-2a	47.75
					C-2b	63.13
					C-2c	45.73
					C-3b	14.17
					C-3c	13.76
			UPF	UP 191 k Chonda	C-1	8.19
				UP 192 k Panjlahr	Whole	10.93
				UP 194 k Katwalhar	Whole	12.14
				UP 195 k Dugiyal	C-1	6.48
					C-2	25.9
				UP 196 k Bag	C-1	22.66
					C-2	27.52
				UP 198 k Kulthi	Whole	20.23
				UP 200 k Bhai	C-1	11.74
					C-2	24.28
				UP 202 k Chakban	C-1	85.26
					C-2	117.25
					C-3	18.21
		JALARI	UPF	UP 173 K HAR	C-1	35.61
				UP 175 K JANYANKAR	C-1	6.07

					C-3	6.07
				UP 178 KRUHALKAR	C-1	13.76
					C-3	16.19
				UP 180 K KANJER	C-1	7.69
					C-2	10.12
				UP 183 K CHELIN	C-1	6.48
					C-2	20.23
					C-3	14.16
				UP 184 K KULAHKAR	C-1	6.07
					C-2	15.38
				UP 185 K BARACH	Whole	11.33
				UP 186 K TAKIPUR	C-1	10.93
					C-2	8.9
				UP 187 K CHATRA	C-1	8.09
				UP 188 K CHUHARU	C-1	6.48
					C-2	17.4
				UP 189 K RIHALKAR	C-1	17.81
					C-2	4.86
					C-3	3.24
					C-4	2.02
				UP 190 K GHATA	C-1	3.24
					C-2	18.62
					C-3	6.48
				UP174 K SIRT	C-2	24.69
		Sunhi	UPF	UP 246 K THANA	C-5	25.09
					C-6	107.23
				UP 247 K CHANDROT	C-3	42.89

					C-4	29.55
					C-5	15.38
				UP 248 K BALOL	C-1	21.04
					C-10	61.51
					C-2	34.4
					C-3	44.51
					C-5	12.95
				UP 249 K SUNHI	C-4	25.5
					C-9	103.6
	Ghurkari	Ghurkari	CFS	CFS Ghurkari	Sep.Kh.No.	3.24
					UP-1	11.33
					UP-2	10.12
					UP-3	2.83
					UP-4	2.02
			DPF	P-62 Jalaru	C-1a	14.97
					C-1b	37.24
					C-1c	21.45
					C-2b	12.14
					C-2c	15.79
			UPF	Up-229-K Ghiana Kalan	C-3	3.24
				Up-231-K Kachiari	C-1	27.52
					C-2	34.4
					C-3	10.93
				Up-232-K Kohala	C-2	12.14
					C-3	20.23
					C-4	18.21
					C-5	26.71

					C-6	35.21
					C-8	18.21
				UP-233-K Jheol	C-1	40.86
					C-2	49.36
					C-3	29.54
				UP-235-k Ghiana	C-1	6.07
					C-2	7.28
		Rajiana	CFS	CFS Kholi	P5	12.14
			DPF	P 61k Naina Devi	C2B	14.57
					C2C	9.71
					C3A	25.5
					C3B	17.4
					C3C	17
					c4b	14.16
					c4c	5.67
			UPF	UP 230 k Kuled	C2	14.16
					C3	46.94
		Shamirpur	UPF	UP 153k Dehrian	Whole	12.14
				UP154k Chaklu	Whole	42.08
				UP156k Tarngu	Whole	20.54
				UP157k Samirpur	Whole	22.66
				UP158k Aima	Whole	5.26
	Kangra	Nandrool	UPF	UP-162-K Bhatlahru	C1	6.07
					C2	4.86
					C3	28.73
				UP-163-K Bandaku	W	26.71
				UP-164-K Bhartha	C1	6.07
					C2	8.09

				UP-170-K Maira	C1	15.38
					C2	37.22
	Ranital	Gheen	DPF	P37 K Khaart	c-2a (i)	6.07
					c-2b (i)	14.16
					c-2c (i)	16.19
			UPF	UP243K JANDRAH	C-1	26.31
					C-5	6.88
				UP244K KHARAT	C-4	22.26
		Jassai	DPF	P39K RANITAL	C2C	32.38
			UPF	UP 245 K Busal	C-6	10.93
		Ranital	DPF	P39K RANITAL	C-6a	10.12
					c-6c	8.5
					C-7b	36.83
			UPF	P237K RAJIYANA	C3A	32.78
					C3B	32.36
				UP236K KUTHAR	4b	16.19
					C-1a	19.42
					C-2a	70.41
					C-3a	23.47
Lapiana	Lapiana	Dharkalan	DPF	P18 K NIHAR KHOLA	C1A	19.83
					C2A	12.95
					C2B	6.88
					C2C	7.28
			UPF	UP 57 K SIMBAL LAHAR	C3	6.88
				UP 58 K UPPERLA THANA	W	10.12
				UP 59 K DHULARI	C1	8.09
				UP 60 K	W	17.4

				HARCHAKIAN		
				UP 65 K DHARKALAN	C1	25.09
		Lapiana	UPF	UP 66 K MAKREAR	C1	9.71
					C2	16.19
				UP 68 K NERA	W	16.18
				UP 69 K NAGRETA	W	7.69
				UP 86 K GUBBER	C1	10.12
					C2	28.33
		Pargor	DPF	P 22 K ULANI DA KHOLA	C1A	10.52
					C2A	9.71
					C3A	12.95
			UPF	UP 72 K PARGOR KHAS	C2	12.14
				UP 73 K BARETA	C1	4.05
					C2	3.64
		Ther	UPF	UP 49 K SEOG	C1	11.33
					C2	19.42
				UP 50 K SAREHR	W	17.4
				UP 54 K LAPIANA KHAS	W	20.23
				UP 55 K JUGEHR	W	13.55
	Lunj	Bhoharkw alu	DPF	P24 K LUNJ	C3A	14.57
					C3B	64.74
					C3C	30.35
			UPF	UP105K SIRMANI	C1	10.93
					C3	36.02
		Gahlian	DPF	P25K GAHLIAN	CIA	29.54

					CIB	27.92
					CIC	38.45
			UPF	UP129 K JATEHAR	C1	12.95
					C2	11.33
				UP136 K ANDRETA	W	38.85
		Kothru	UPF	UP 100 K CHAMNI	C2	3.24
		Lunj	DPF	P-24K LUNJ	C4A	35.81
			UPF	UP110KSAMLETA	C1	13.76
					C2	24.28
				UP113K KABIAL	C1	12.14
				UP114K GHAR	C1	12.14
					C2	6.48
				UP115K DADOLI	C1	16.19
				UP116K HAR	C1	30.35
					C2	7.28
		Talla	DPF	P25K GAHLIAN	C3BI	23.88
			UPF	UP122K BANDAL	C1	16.19
					C2	5.67
				UP124 K PALERA	W	10.12
	Pandhwar	Jole	UPF	UP 76 K SIMBALBALLA	W	16.19
				UP 78 K CB JOLE	W	12.95
				UP 80 K PATIALKAR	C1	10.12
					C2	7.28
				UP 81 K KARNOLA	C1	11.33
					C2	4.05
					C3	6.48
				UP 82 K BHAROOPLAHAR	C1	16.79

					C2	20.23
		Manai	UPF	UP 88K CB MANAI	C1	23.06
					C2	39.66
				UP 90 K NERA	W	10.93
				UP 92 K GUJRERA	C1	74.86
					C2	14.57
					C3	40.46
					C4	14.97
				UP 93 K FOGAL	C1	23.06
					C2	29.14
		Pandhwar	DPF	P 14 K PANDHWAR	C4AI	8.09
					C4AII	15.38
					c4b	39.66
					c4c	30.76
			UPF	UP 45 K JHIKLA PANDHU	C1	12.55
		Salwana	UPF	UP 36 K BARANJ	C2	16.19
					C8	13.76
					C9	26.3
Malan	Malan	Mallan	UPF	UP 208 K Tanda Massal	C-1	37.64
				UP 256 K Ambari	C-2	6.07
					C-3	10.12
		Massal	DPF	P28 K Mansu	C-3a	17.81
					C-3b	25.5
					C-3c	22.65
					C-4b	23.47
		Pathiar	UPF	UP 255 K Pathiar	C-4	2.83
	Narwana	Badoi	UPF	UP 145 K Dhar	C-14	73.24

				Narwana		
					C-8	79.3
					C-9	79.71
		Narwana	UPF	UP 145 K Dhar Narwana	C-1	37.23
		Romeher	UPF	UP 150 K Sihund	C-3	28.33
		Serathana	CFS	CFS Serathana	U-2	6.48
					U-4b	20.23
					U-5	4.05
	Samloti	Saddun	CFS	CFS Jalot	U-11	21.87
					U-12	7.28
					U-17	3.64
					U-2	7.28
					U-3	9.3
		Samloti	CFS	CFS J/Kothi	U-15	7.69
					U-20	4.05
					U-22	2.83
					U-23	2.43
					U-24	2.43
					U-28	14.16
					U-29	6.48
					U-30	24.68
					U-31	4.86
					U-33	7.28
					U-36 c	6.07
					U-62	2.43
					U-65	14.97
					U-6b	3.24

					U-73	3.24
					U-77	2.02
					U-79	2.83
		U/Kothiyan	UPF	UP 213 K CB U/Kothian	C1	101
					C2	36.97
				UP 214 K Bag	C1	15.78
					C2	53.41
				UP 215 K Neher	C1	9.31
					C2	48.55
				UP 216 K Guleher	C1	6.07
					C2	9.71
				UP 219 K Patola	W	17.81
				UP 220 K Bhatti	W	18.21
				UP 221 K Gadiara	W	26.3
	Sarotri	Danoa	CFS	CFS Airla	U21	5.66
					U35	6.47
					U37	9.73
					U38	17.41
					U42	8.09
				CFS Danoa	U10	5.26
					U14	2.02
					U41	1.62
					U56	2.43
					U61	4.86
					U7	10.52
		Kandi	UPF	UP 254 K Kandi	C-3	30.76
					C-5b	25.09

		Sarotri	UPF	UP 250 K Sarotri	C-2	12.14
					C-4	26.31
Shahpur	Rait	Balla	DPF	P11K Ramgarh Kuriala	C2	47.74
			UPF	UP26K Nerti	c7c	90.63
		Rehlu	DPF	P46K Rehlu	C1	25.9
					C2	25.09
					C3	24.28
			UPF	UP25K Lanjot	C1	8.09
		Salol	CFS	CFS Salol	U19	16.59
					U20	11.74
					U23	2.83
					U24b	24.69
					U25	12.95
					U27	12.55
					U28	3.64
					U32	2.43
					U34	4.05
					U36	2.43
					U42	4.05
		Tiara	DPF	P23K Tiara	C2B	21.04
					C2C	25.9
			UPF	UP-34K Bhadiara	C1	8.09
					C2	8.09
					C3	18.21
					C4	16.19
				UP35K Tiara	C1	16.59
					C2	19.02

	Rirkmar	Dulli	UPF	UP137K Darini	C1	33.59
		Rirkmar	UPF	UP18K Lahari	C2	58.67
	Shahpur	Manjgran	CFS	CFS Chhatruh	Whole	25.81
				CFS Manjgran	U2	0.81
					U3	2.83
			DPF	P-9K Sanantung	C1A	19.42
					C1B	39.25
					C1C	31.97
					C2A	9.31
					C2B	17
					C2C	24.28
			UPF	UP22K Gujrehar	C1	13.76
					C2	10.52
				UP24K Sewhan	C2	10.12
					C4	8.09
				UP37K Bag	Whole	10.12
				UP43K Bhariar	C1	16.19
					C2	24.27
					C3	14.16
					C4	30.76
		Shahpur	CFS	CFS Shahpur	P6	8.5
					P7	6.47
					P8	12.54
					U1	1.21
					U21	3.64
					U24	2.83
					U26	10.52
					U27a	6.47

					U28	3.24
					U29	8.9
					U30	8.9
					U31	16.19
					U32	5.66
			DPF	P-10K Sadoon	C1A	10.93
					C1B	19.42
					C1C	28.74
			UPF	UP26K Nerti	C1A	4.86
					C1B	66.36
Grand Total						8120.69

6.4 Analysis and Valuation of the Crop:

STOCK MAPS: All the compartments have been stock mapped on GIS platform on visible scale maps and the copy of the same have been placed in the respective Compartment History Files. culturable blanks, under stocked patches and the areas under different kind of vegetation have been depicted on these maps. The total area under plantation working circle is 8120.69 ha,

6.5 Enumerations:

The technique of Survey and Assessment of Forest Resource using Grid and Quadrants method (Sample Plots) has been adopted and complete counting of all tree species class wise has been done. A total of 64 Sample Plots of 0.1 hac. were laid in this working circle covering all PBs. The detail of PB wise sample plots is as under

Table No. 6.3

S.No	No. of plots	Total area counted Hac
1	64	6.40

GROWING STOCK

Table No. 6.2

Tree Count (No. of trees)										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	20301	83744	105315	90088	63442	15226	24108	17764	83744	503732
Deodar	0	0	0	0	0	0	0	0	0	0
Khair	87551	49485	27914	10150	0	2537	1268	0	1268	180173
Ban	0	0	0	0	0	0	0	0	0	0
Rai	0	0	0	0	0	0	0	0	0	0
Tosh	0	0	0	0	0	0	0	0	0	0
BL	282955	203017	138305	67249	17764	8882	1268	1268	1268	721976
Grand Total	282955	203017	138305	67249	17764	8882	1268	1268	1268	1405881
Tree Volume (M ³)										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	1015.05	19261.12	68454.75	122519.68	149723.12	55118.12	125361.60	92372.80	435468.80	1069295.04
Deodar	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Khair	4158.67	7051.61	8206.72	4968.43	0.00	1382.67	691.06	0.00	691.06	27150.21
Ban	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Rai	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tosh	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
BL	7922.74	28625.40	78280.63	76125.87	20108.85	12568.03	1794.22	1794.22	1794.22	229014.17

6.6 Treatment of Afforestation:

The areas are to be cleared of bushes before taking up for closure and planting. Ranges are heavily infested with lantana bushes. Its repeated removal is required for success of plantation. Three cuttings are required in a year so that useful planted species are not suppressed by the bush growth. Three cuttings are suggested in a year during May-June, September-October and January-February. The normal financial norms provided for plantations are not enough to meet the requirement for repeated cuttings. Repeated lantana removal is essential for success of plantations in such areas and therefore separate financial norms may be provided for afforestation of lantana infested area. Territorial D.F.O. may calculate and suggest norms for various lantana densities viz. high, medium and low lantana intensities. Naturally growing economical species such as Buel, Toon and Jamun etc. should not be cut back but instead tending of such species be done. With the exception of the reserved forests, demarcated forests can be closed for only 10 years and other type of forests for a like period but only voluntarily. Closures of undemarcated protected forests for only 10 years and other type of forest are to be easily forth coming only if the results are speedy, spectacular and impressive.

The main clash of the plantation activities of closures in this working circle will be with the grazing requirements of the local people. Damage by frost and other biotic agencies is to be considered. Therefore, small and affective closures are suggested. The areas closed should be promptly planted and thrown open to grazing at the earliest.

Detailed suitability maps on 16" = 1 mile scale delineating the areas to be brought under different species and those considered unfit for planting have been prepared. These maps have to be used as single guide and may be amended before carrying out actual planting if some change is considered necessary.

The main factor to be taken in consideration for declaring as area as fit for planting has been depth of soil/ parent rock for penetration of roots. This has been primarily judged from cutting density and height of existing crop found in the areas.

Based on field observations following recommendation are made in the working circle:

- i) Grazing pressure from the local people and migratory gaddies and gujjars is very high, therefore small and rotational closures with effective results are suggested.

- ii) Three complete bushes cutting in January –February, May-June and October- November are suggested in lantana infested areas while undertaking for plantations. These repeated cuttings are to be carried out till the planted species grow beyond bush growth.
- iii) Two-year-old tall plants of Shisham and Khair are suggested for lantana infested area. Bamboo is also suitable species for lantana areas with deep and moist soil/
- iv) The existing norms of plantations for lantana infested areas are required to be revised depending upon intensity of lantana.
- v) The valuable naturally growing species in bush growth should not be cut back along with bush cutting but should be tended.
- vi) Separate norms are required to be worked out for plantation along roads and railway line.

6.7 Choice of Species:

The main species will be Chil, Khair and Bamboos in addition other broad-leaved species such as Buel, Toon Darek and Siris etc. should also be planted depending upon the site conditions and requirement of the local people. Bamboo is suitable for depression with better water regime and soil depth-ornamental species are recommended for road side plantation. Monoculture practice should be avoided and planting of indigenous species like Bamboo, Kachnar, Khair, Shisham. Dhau. Tun. Harar, Arjun, Amla, Bhera etc. will be encouraged. Culturable Blanks (CB) have been identified in the DPFs, UPFs and CFSs in the 5 ranges of the division. A year wise plantation target has been fixed for plantation of CBs identified in the DPFs. However, no target is fixed for the CBs identified in UPFs and CFSs, because of the problem of enforcing closures in these forests are to be planted over the 10 years of this WP. In addition, this WC will comprise of the earlier plantations (including failed ones) that have been carried out in the division during the period of the last plan and the intervening period upto 2019-20. These plantations are found in all categories of forests viz RFS, DPFS, UPFs and CFS.

Plantations in Dharamshala FD over last 30 years. During the period of the last WP, the overall emphasis under plantation programmes remained on Chil and Khair, despite recommendations to the contrary in the WP. Chil plantations have by and large done well and evidence of young Chil plantations can be seen well scattered over the division. Khair plantations have fared less, but a good number have established and have already or are nearing exploitable diameter. In Khair plantations particularly, there is heavy infestation of lantana which makes them

very vulnerable to destruction by fire. BL plantations have generally done badly and many such areas could be considered for re-plantation. One of the reasons for lower survival of plantations is the poor quality of nursery stock. In the lower parts of the division (where most of the planting has been done), the rainfall is erratic and there is a long dry season of nearly six months. Poor nursery stock with under-developed root system is especially vulnerable to dry conditions failure to effectively protect the plantations from grazing is commonly cited as another reason. However, this could actually be the failure to involve local communities sufficiently by way of tangible incentives to ensure that they do not allow grazing in closed areas. Detail of closed areas for plantations done in last ten years in Annexed as Appendix III in Volume II

6.8: New Areas for Plantation & Species:

It has been noticed for the last several years that in many beats and blocks new plantations are being carried out over very small patches, typically 1, 2 or 3 ha. There is obviously not much land available for new plantations or sometimes the local people are unwilling to get areas closed for 4 or 5 years. In such cases, and as the trend is likely to persist, it is recommended that smaller areas be taken up for raising Energy Plantations, wherein about 3000 pits / ha are planted with firewood & fodder yielding species like Robinia and local people / SHGs allowed to harvest these after 5 years Such an intervention would satisfy the firewood and fodder requirement of people to a great extent and be in consonance with the directives of the National Forest Policy, 1988.

6.9 Plantation Planning:

It is observed that the average plantation per year for the last 10 years comes to 170 ha/year. Assuming 200 ha approx. or more to be the annual plantation target for the division for the next 10 years, the planting sequence including a 5-year maintenance period would be made.

Since very large chunks of land are not available the plantation will be carried out on the basis of assessment keeping in view the degraded forest, blank areas, keeping in view the national forest policy 1988 to enhance the forest cover. Even Charagah Drakhtan and similar categories of waste land declared as forest land in H.P. can also be considered for raising plantations to achieve this goal.

6.10 Plantation Strategy

As of 2023 end there are nurseries in Dharamshala FD covering a gross area of about 5 ha. Some of these nurseries are small and have to be brought up to a

size of at least 0.50 ha as per the state nursery policy. It has also been directed that henceforth plants in nurseries will ONLY be raised in poly-bags and bed raised nursery stock is to be totally discontinued. In poly-bags of 9"x5" size, about 1.5 to 2.0 lakhs plants can be raised in a half hectare nursery, provided adequate water is available during the dry months. For BL species other than Chil and Khair, a poly-bag of 7"x15" is recommended. For avenue planting, planting in peri-urban areas, schools and other institutions, housing colonies and so forth, the FD nurseries need to raise tall plants by use of larger poly-bags and increasing the period of retention in the nursery by at least one year for both BL and coniferous species. The use of 12"x20" poly bags with proportionately thicker material has been recommended.

6.11 Annual yield and removals

No felling is prescribed in this working circle except salvage removals and removals by right holders. However keeping in view the annual increment, the removal from this working circle is restricted to 7000 M³ per annum

6.12 Area for plantation

It is not feasible to accurately identify suitable areas to be planted under different schemes at this stage as other externally aided projects like JICA, KFW and world bank are also doing plantations. The areas, norms applicable and the scheme would need to be finalized each year at the time to making the APO. Preferably, this exercise should be done a year in advance so that nursery, advance work and other inputs needed may be planned for well in time. What, however, needs to be kept in mind is that the plantations should be more or less equitably distributed among various working circles and species chosen to meet the objectives of fulfilling the firewood and fodder needs of local communities, first.

6.13 Fire Prevention in Plantations:

It has been noticed that many of the established plantations, especially of khair, have heavy invasion of lantana. Younger Chil plantations are anyway susceptible to fire. Fire can completely destroy younger plantations and cause heavy damage to older ones. Therefore, it is important that an effective strategy to prevent forest fires in plantations is put in place

The following actions are recommended:

(a) Removal of lantana in plantations already infested and intensive sowing of local grass; funds under NPV and MNREGA can be tapped for this work;

(b) Pruning of lower branches of Chil trees in younger plantations to lessen pine needle fall and quicken growth of the plants;

(c) Entrusting JFMCs to look after and prevent fires in plantations and offering an incentive (out of Fire schemes) to them. Alternatively, supporting JFMCs to deploy their own fire watchers;

(d) Supporting local NGOs / SHGs (out of PES funds) to take up viable briquette making ventures from lantana and chil pine needles . his has been tried and could become a viable option if

some support for collection of pine needles or uprooting of lantana is given by the FD;

(e) Doing staggered contour trenching in new plantation areas to improve the soil moisture and help root stock of native species to come and make the plantation more mixed.

6.14: Monitoring of Plantations

Monitoring of plantations has been a weak point with the Forest Department. Although regular inspections are made by officers of various ranks, these serve little purpose as plantations visited are usually of the same year (and therefore have a good survival percentage) and little can be done by way of improvement once the work has been done. Monitoring of plantations should lead to better ways of doing things and ensure improved survival of plants. Towards this end the following guidelines are suggested:

Monitoring of plantations begins with the nursery. The better the quality of the nursery stock, the higher the rate of plantation survival. Therefore, regular visits to nurseries by the RFO, ACF, DFO and the CF are essential. Apart from physically checking the numbers and quality of the stock each such visit should aim to impart some knowledge and skills to the nursery labour. Nursery labour including the forest workers should be retained in their postings for as long as feasible and regularly imparted training. The visiting officers need to write their observations and comments in the nursery journals while seeing that it has been properly and regularly updated.

Wherever feasible, touring officers should find out and look at areas to be taken up for planting in the next year. For larger areas (> 5 ha), the ACF should be asked to prepare a rough site specific plan

using GPS and camera to document site conditions prior to planting. When this is done, the plan requires to be approved at the appropriate level so that it is not subject to usual norms of plantation that apply uniformly to all areas. Site specific planning and approval is useful and important especially to tackle very degraded and recalcitrant areas successfully.

In 2018, new plantation journals have been introduced to keep a record of all plantations and other works undertaken in a year beat wise. This journal is expected to last for 5 years. In order to make this a useful document it is important that visiting officers record their observations, suggestions in these journals. The use of photographs to capture progress of plants and so forth needs to be encouraged amongst the staff.

An important aspect to monitor in every plantation is whether a local SHG or user's group has been involved with the maintenance of the plantation? Offering monetary incentives to such groups by way of allocating them maintenance funds or even initial plantation work has been seen to go a long way in their effective protection and quick establishment.

Under FDA and some other CSS, funds for monitoring are provided each year. Use of these funds for third party monitoring of plantations and other works is an effective way to assess quality and success of afforestation work taken up by the department, besides giving credibility to the finding / outcome. Third party monitoring is better carried out at Circle level.

The Divisional Forest Officer may exceed these annual targets & may alter the sequence of planting depending upon the availability of the area, budget & administrative considerations. But at no cost area felled under this system should remain idle for more than a year else any opening will further deteriorate the condition of area, make it erosion prone & will invite the unwanted species & weeds. Broad-cast sowing of Dholu' & other palatable grasses to be got done in order to improve the quality of grasses.

6.15: Subsidiary Silvicultural Operations

6.16.1: Other Regulations

1 Closure: All areas taken up for plantation will remain closed for 10-15 years to establish the crop. It has, however, been the experience that such closures are not

effective wherever they are done. What seems to have worked in the past is that if the area proposed to be closed is handed over to a local SHG of women (who are the grass cutters), and they be allowed to take away the grass from that area till the seedlings / saplings are considered established, then the chances of effective closure against grazing are that much more. Further, in view of their interest in better grass production, the SHG will ensure that the area remains free of invasive weeds and will also prevent fires there.

2 Fire Protection: Fire line and road side clearing of chil needles be done yearly through JFM groups.

6.16.2: General:

Plantation journal be prepared & all operation done from time to time be properly entered, along with expenditure incurred. New beat wise plantation journals have been introduced in 2018 and these need to be regularly checked by touring officers who need to record their observations in the plantation journal itself -General tendencies on the part of staff to grow khair in chil areas must be curbed forthwith Chil must be raised in chil areas.

CHAPTER 7

THE PROTECTION WORKING CIRCLE

7.1 General Constitution

Forests situated on difficult and precipitous slopes, at the head of streams and nallas or other erosion prone localities have been allotted to this working circle. In such sites, the need for forest cover is dictated by purely physical considerations such as prevention of erosion, conservation of moisture and control/moderation of rushing torrents and floods. They are thus essentially protection forests whose value lies mainly in protection of snow scrubbed hill sides on which they grow. It is, therefore, best to protect these forests for their ecosystem services flows.

Total area of the circle is 39136.59 ha which includes 68.77 ha of RF, 18871.71 ha of DPF, 13153.02 ha of UPF and 6973.09 ha of CFS forests. The general character of the vegetation has been described in Chapter II of Part I. The density of the crop generally is very poor and blanks are common. Bushes of Carrisa, Dodonea, Murraya, Myrsine, Rubus, Flacourtea, Pyrus etc. are common. At several places, the areas are in an advanced stage of soil erosion.

7.2 Range wise distribution of Area

Table 7.1

Forest	Dharamshala	Kangra	Lapiana	Mallan	Shahpur	Total
RF	138.77	0	0	0	0	138.77
DPF	7939.4	260.68	982.13	3311.54	6377.96	18871.71
UPF	1469.78	3938.1	2665.37	3477.02	1602.75	13153.02
CFS	5173.82	79.32	0	849.08	870.87	6973.09
Total	14721.77	4278.1	3647.5	7637.64	8851.58	39136.59

From the above table it is seen that about 20126.11 ha. Which is 52% area of the circle is under UPF and CFSs effective closure is a big problem. This is a major constraint the management of these forests.

Forests Blocks and compartments

Table 7.2

List of Forest Protection Working Circle						
Range	Block	Beat	Forest Type	Forest	Compartment No	Net Area(Hac.)
Dharamshala	Dharamshala	Chari	UPF	UP 140 k chari	C-5	51.79
					C-6	8.09
					C-7	17.4
					C-8	10.93
		Dharamshala	DPF	P 63-K Civil forest	C-1	1.21
					C-10	5.26
					C-11	3.24
					C-12	2.83
					C-13	3.64
					C-14	2.02
					C-2	2.83
					C-3	3.64
					C-4	3.24
					C-5	2.83
					C-6	4.05
					C-7	3.64
					C-8	1.21
					C-9	2.83
		Garoh	CFS	CFS Garoh	P-3	4.05
					P-4	19.42
					P-5	16.99
					P-6	15.78
					P-7	4.86
					P-8	5.26
					U-16	20.23

					UP-10	15.78
					UP-12	22.66
					UP-13	26.71
					UP-14	29.15
					UP-2	15.39
					UP-21	17.81
					UP-23	17.4
					UP-24	5.26
					UP-25	5.26
					UP-9	15.78
		Gharoh	CFS	CFS sudhed	U-18	5.66
					U-21	7.28
					U-23	3.64
		Tharu	UPF	UP 141 k Rehlu	C-5	17
	Dharmash ala	Sihnal	CFS	CFS sarah	P-1	16.19
					P-3	19.02
					Seprat Khasra	1.62
					U-25	4.45
					UP-10	2.43
					UP-11	4.86
					UP-12	6.47
					UP-15b	25.49
					UP-20	3.64
					UP-23	9.31
					UP-24	3.64
					UP-26a	10.12
					UP-26b	1.62
					UP-29	4.45
					UP-4	1.21

					UP-5	7.28
					UP-6	6.07
					UP-7	5.66
					UP-9	4.05
	Dharmshala	Chari	DPF	P 48 K.C.B. Charri	C-1	43.06
					C-2	53.42
					C-3	42.48
					C-4	54.22
		Dharamshala	UPF	UP 139 k Dharamshala	C-11b	42.08
	Kareri	Bhitlu	UPF	UP 138 k kareri	C-14	131.9
					C-15	53.81
					C-16	104.1
					C-17	112.19
					C-20	54.22
		Kareri	UPF	UP 138 k kareri	C-8	59.08
		Paloon	UPF	UP 138 k kareri	C-10	30.35
					C-11	27.11
					C-12	9.31
					C-5	28.73
					C-6	44.1
					C-7a	7.28
					C-7b	8.9
					C-9	32.37
		Salli	DPF	P 41 k kutharna	C-2	34.8
			UPF	UP 138 k kareri	C-1	82.94
					C-2	66.76
					C-3	7.28
	Kareri	Kareri	DPF	P 40 k C.B kareri	C-10	41.67
					C-24	57.86

					C-25	252.88
					C-26	185.72
					C-27	227.39
					C-28	220.11
					C-30	529.62
					C-31	354.03
					C-32	101.96
					C-33	106.82
					C-34	1518.87
					C-35	441.02
					C-8c	44.1
					C-9b	27.11
					C-9c	26.3
		Salli	DPF	P 40 k C.B kareri	C-17	388.83
					C-18	303.45
					C-19	203.11
	Khanyara	Dhaloon	CFS	CFS dhaloon	Seprat Khasra	5.66
					U-13	4.86
					U-15	6.88
					U-17	23.47
					U-19	25.49
					U-9	23.88
					UP-6	29.14
		Manji	CFS	CFS Khanyara	P-1	1307.6
					P-14	12.95
					P-15	10.12
					P-16	6.47
					P-18	2.02
					P-2	254.09

					P-4	1092.42
					U-10	2.83
					UP-23	21.45
					UP-24	16.59
		Manji & Manooni	CFS	CFS Khanyara	P-5	622.28
		Manooni	CFS	CFS Khanyara	P-6	370.73
					P-7	610.95
					UP-25	0.81
					UP-26	19.02
					UP-27	8.09
		Sheela	CFS	CFS sidhbari	UP-2	30.76
					UP-3	5.26
					UP-4a	2.02
					UP-4b	4.86
					UP-5a	2.43
					UP-5b	4.05
		Sheela	CFS	CFS sukkar	UP-1	4.04
					UP-3	9.31
		Tahu	CFS	CFS Khanyara	Seprat Khasra	14.57
					UP-19b	12.14
					UP-20b	20.23
					UP-22b	16.19
		Yol	CFS	CFS YOL	Seprat Khasra	7.69
					UP-3	23.47
					UP-4	14.97
					UP-5	2.83
					UP-6,7	109.25
	Meclodganj	Balh	DPF	P 40 k C.B kareri	C-11	453.15

					C-12	101.96
					C-13	38.45
					C-14	43.29
					c-15a	81.73
					c-15b	7.28
					C-29	492.8
		Banoi	RF	R-1K Banoi	C-1	4.86
					C-2	2.83
					C-3	17
					C-4	17.8
					C-5	25.09
					C-6	21.04
					C-7	2.91
			UPF	UP 139 k Dharamshala	C-14	54.62
					C-15	44.1
		Dharmkot	DPF	P 50K Dharmkot	C-1	14.97
					C-2	68.39
					C-3	32.37
				P-49 K.C.B. D/shala	C-1	25.09
					C-2	21.45
					C-3	97.92
					C-4	94.27
					C-5	80.92
					C-6-a	46.13
					C-6-b	82.14
					C-7	87.41
					C-8	312.76
					C-9a	169.53
					C-9b	119.36

		Meclodganj	RF	R-1K Banoi	C-8	8.09
					C-9a	20.23
					C-9b	9.72
					C-9c	9.2
			UPF	UP 139 k Dharamshala	C-6a	47.34
					C-6b	9.71
					C-7	20.23
		Satobari	DPF	P 51K Naddi	C-1-a	46.94
					C-1-b	44.92
					C-1-c	38.45
					C-5-a	15.78
					C-5-b	8.5
					C-5-c	12.14
			UPF	UP 139 k Dharamshala	C-17	30.75
					C-18	171.15
					C-19	84.16
Kangra	Daulatpur	Daulatpur	DPF	P 29K DAULATPUR	C-1a	45.72
					C-1b	58.76
					C-1c	72.03
					C-3a	14.16
			UPF	UP 197 k Majhakar	Whole	8.5
				UP 199 k Dhinu	C-1	20.64
					C-2	26.23
				UP 201 k Mandhal	Whole	29.95
				UP 203 k Palwana	C-1	36.4
					C-2	17.4
		JALARI	UPF	UP 172 K RAH	Whole	36.42
				UP 173 K HAR	C-2	48.55
				UP 175 K JANYANKAR	C-2	12.95

				UP 176 K PANIHARKAR	C-1	24.28
					C-2	14.57
				UP 177 K SAMELA	C-1	33.99
					C-2	16.19
					C-3	32.38
					C-4	9.71
				UP 179 K JATHER	C-1	32.37
					C-2	64.74
				UP 187 K CHATRA	C-2	28.33
				UP 190 K GHATA	C-4	3.24
					C-5	41.27
					C-6	21.04
				UP174 K SIRT	C-1	35.61
				UP182K KASWARA	Whole	29.95
		Sunhi	UPF	UP 246 K THANA	C-1	29.95
					C-2	43.29
					C-3	14.57
					C-4	6.07
				UP 247 K CHANDROT	C-1a	12.14
					C-1b	18.61
					C-2a	6.48
					C-2b	5.26
				UP 248 K BALOL	C-4	29.95
					C-6	91.44
					C-7	132.31
					C-8	31.56
					C-9	93.06
				UP 249 K SUNHI	C-1	39.25
					C-10	76.07

					C-11	42.09
					C-2	27.11
					C-3	8.5
					C-5	32.78
					C-6	27.92
	Ghurkari	Ghurkari	CFS	CFS Ghurkari	C-2	16.19
		Rajiana	CFS	CFS Kholi	(Seprate)	1.62
					P11	7.69
					P15	3.64
					P2	11.33
					P3	5.26
					P4(b)	19.02
					P7	6.07
					P9	8.5
		Shamirpur	UPF	UP155k Chakban Samirpur	C1	115.32
					C2	208.37
					C3	47.74
	Kangra	MC Kangra	UPF	UP-171-K Quila	W	14.16
				UP-257-K MC Kangra	3a	5.26
					3b	12.55
					C1	9.71
					C2	15.38
		MUNDLA	UPF	UP-204-K SAKAUT	C1	56.65
					C2	23.06
					C3	36.02
					C4	158.31
					C5	34.4
					C6	39.26
				UP-205-K MUNDLA	C1	8.09

					C2	6.07
					C3	57.46
				UP-206-K AMATRAR	C1	32.78
					C2	16.19
					C3	30.76
					C4	50.17
					C5	41.27
					C6	58.67
					C7	9.71
		Nandrool	UPF	UP-159-K Chourar	C1	12.95
					C2	21.04
				UP-160-K Balehar	C1	13.35
					C2	40.46
				UP-161-K Khairkar	C1	8.09
					C2	13.76
				UP-165-K Sath	W	18.21
				UP-166-K Ghumarkar	W	26.6
				UP-167-K CB Rajal	C1	64.74
					C2	97.1
				UP-168-K Nandrool	C1	105.2
					C2	101.15
				UP-169-K Nandrool	C1	32.37
					C2	89.42
	Ranital	Balugloa	UPF	UP 239 K Khapernala	C-1	41.67
					C-2	51.79
					C-3a	14.57
					C-3b	5.26
				UP 240K Balugloa	C-2	12.95
					C-3	16.19

					C-4	37.64
					C-5	13.35
					C-6	12.95
					C-7	6.48
		Gheen	UPF	UP241K GHEEN	C-1	28.33
					C-2	24.69
					C-6	6.88
					C-7	3.64
					C-8	6.88
					C-9	6.07
				UP243K JANDRAH	C-2	27.92
					C-3	11.33
					C-4	14.16
					C-8	15.78
				UP244K KHARAT	C-2	38.45
		Jassai	UPF	UP 242 K Jassai	C-13	78.9
					C-6	16.19
				UP 245 K Busal	C-4	15.79
					C-5	20.23
		Ranital	DPF	P39K RANITAL	C-1a	21.45
					C-1b	18.21
					C-1c	25.9
					C-6b	4.45
			UPF	P237K RAJIYANA	C1	21.04
					C4	29.54
				UP236K KUTHAR	4a	10.52
					C-1b	31.16
					C-1c	22.86
					C-2b	12.14

					C-3b	32.78
					C-3c	6.88
				UP238K BANGWAR	C1	12.14
					C2	73.66
	Ranital	Balugloa	UPF	UP 240K Balugloa	C-1	14.57
		Jassai	UPF	UP 242 K Jassai	C-14	17.8
Lapiana	Lapiana	Dharkalan	UPF	UP 61 K CHHAL	W	15.78
				UP 62 K DAWAR	W	27.11
				UP 63 K MADHAN	W	35.21
				UP 64 K CHHAMB	C1	3.24
					C2	20.23
					C3	24.28
				UP 65 K DHARKALAN	C2	19.02
		Lapiana	UPF	UP 67 K CHALLIAN	W	23.47
				UP 71 K SURDIYAL	W	36.42
		Pargor	UPF	UP 74 K CB KALRU	C1	22.26
					C2	80.1
		Ther	DPF	P 16 K CHOTI DHAR	C1A	6.48
					C1B	24.28
					C1C	24.28
					C2A	18.62
					C2B	15.78
					C2C	8.9
				P 17 K THER	C1	10.52
					C2	7.28
					C3	6.07
					C4	11.33
			UPF	UP 44 K DHAR KHURD	C1	21.85
					C2	24.28

					C3	17
				UP 48 K CB LAPIANA	C1	29.14
					C2	7.28
					C3	26.3
				UP 51 JHAROLI	W	13.35
				UP 52 K DIBBER	C1	30.35
					C2	31.56
				UP 53 K JHIKLA DIBBER	W	10.12
				UP 56 K CB THER	C1	20.64
					C2	19.82
	Lunj	Bhoharkwalu	UPF	UP102 K TARKHANKAR	C1	6.48
					C2	17.81
				UP103 K DHANKER	C1	28.33
					C2	32.37
				UP104 K PALAHCHATAR	W	14.16
				UP105K SIRMANI	C4	29.14
					C5	23.47
				UP106 K BOHARKWALU	C4	12.14
				UP117 K KALARI	C1	16.19
					C2	20.23
				UP119 K JHURARU	C1	25.09
					C2	40.87
		Gahlian	DPF	P25K GAHLIAN	C2A	10.52
			UPF	UP 126 K CHAKBAN GAHLIAN	C1	93.06
				UP 127 K CHOTIBEHI	W	80.92
				UP 128 K BADI BEHI	W	12.14
				UP 130 K PANTEHAR	W	23.47
				UP 131 K GADHOON	W	42.08
				UP 132 K KAMLIYALA	W	48.55

				UP 133 K RIHALA	W	4.86
				UP 134 K GHUMALA	W	32.37
				UP129 K JATEHAR	C3	17
		Kothru	UPF	UP 96 K PARAI	C1	51.79
					C2	12.95
					C3	8.09
				UP 97 K KOTHRU	C3	24.28
					C4	29.95
					C5	38.45
					C6	17
					C7	44.51
					C8	22.66
		Lunj	DPF	P-24K LUNJ	c4b	18.21
					c4c	23.88
					c6a	42.89
					c6b	43.7
					c6c	40.06
					c7a	29.14
					c7b	43.7
					c7c	33.58
					c8a	19.02
					c8b	15.38
					c8c	23.46
			UPF	UP107KCB LUNJ	C2	40.46
				UP109K MALADU	C1	16.19
					C2	17
				UP111K KODIAN	C1	6.48
					C2	19.82
				UP112K CHAMRAL	W	11.33

				UP118K MOHARBALLA	W	0
				UP120K KAHLIAN	W	8.09
		Talla	DPF	P25K GAHLIAN	C3A	10.12
					C3BII	19.42
					C3C	29.54
					C4A	15.78
					c4b	9.31
					c4c	21.85
			UPF	UP 135 K BAMNEHAR	C1	22.66
					C2	32.37
				UP121 K TALLA	C1	27.11
					C2	100.75
					C3	36.42
					C4	14.57
				UP122K BANDAL	C3	27.52
				UP123 K DAKA	W	20.23
				UP125 K CB MEHDUDA	W	32.37
				UP126 K CHAKBAN	C2	116.52
	Pandhwar	Jole	DPF	P 21 K JOLE	C2A	12.14
					C2B	8.09
					C2C	4.05
			UPF	UP 77 K JOLE	W	7.69
				UP 83 K BATBALLA	W	27.92
				UP 84 K RUMBAL	W	10.93
				UP 85 K TALUKHAR	W	10.12
				UP 94 K DIBBER	C1	21.86
					C2	24.26
		Manai	DPF	P 14 K PANDHWAR	C5D	17.4
					c6a	10.53

					c6b	12.95
					c6c	14.16
					c7a	35.61
					c7b	30.76
					c7c	35.61
			UPF	UP 87 K LANGHANA	W	26.3
				UP 88K CB MANAI	C3	12.95
					C4	64.74
					C5	9.71
					C6	31.16
					C7	27.92
				UP 89 K MOWA	W	9.71
				UP 91 K BHANDRELA	W	41.27
				UP 95 K BALLA	C1	31.16
					C2	33.99
		Pandhwar	DPF	P 14 K PANDHWAR	C2E	36.42
					C3A	31.16
					C3B	31.57
			UPF	UP 45 K JHIKLA PANDHU	C2	18.21
		Salwana	DPF	P 15 K SALWANA	C1B	8.09
					C1C	13.76
					C1D	6.88
					C2A	36.83
					C2B	23.88
					C2C	29.14
			UPF	UP 36 K BARANJ	C10	7.69
					C11	9.31
					C12	56.65
					C13	44.51

					C14	86.99
					C4	11.33
					C5	13.35
					C6	4.86
					C7	41.67
Malan	Malan	Mallan	UPF	UP 208 K Tanda Massal	C-2	9.31
				UP 210 KCB Jharet	C-2	17
		Massal	DPF	P28 K Mansu	C-4c	31.57
			UPF	UP 207 K Dhangoo	C-2	24.28
				UP 209 K Owch	Whole	31.57
				UP 210 KCB Jharet	C-3	9.31
					C-4& 6	40.46
					C-5	4.05
	Narwana	Badoi	DPF	P 57 K Dhar Narwana	C-1	236.7
					C-2	108.44
					C-3	106.01
					C-4	100.34
					C-8	947.77
					C-9	451.54
			UPF	UP 145 K Dhar Narwana	C-10	89.82
					C-11	111.68
					C-12	97.11
					C-13	91.44
					C-15	128.67
		Narwana	DPF	P 57 K Dhar Narwana	C-5	92.66
					C-6	104.8
					C-7	992.49
			UPF	UP 145 K Dhar Narwana	C-2	90.63
					C-3	148.08

					C-4	159.42
					C-5	50.98
					C-6	129.88
					C-7	102.77
		Romeher	UPF	UP 149 K Romehar	C-3	14.57
				UP 150 K Sihund	C-1a	4.86
					C-1b	17.81
					C-2	27.11
		Serathana	CFS	CFS Serathana	U-1	5.66
					U-3	14.16
					U-4a	9.31
	Samloti	Saddun	CFS	CFS Jalot	Sep. Khasra no.	8.9
					U-1	12.95
					U-10	31.17
					U-13	12.95
					U-14	16.2
					U-15	34.8
					U-16a	12.54
					U-16b	6.47
					U-4	1.21
					U-5	1.21
					U-6	7.69
					U-7	14.97
					U-8	29.95
					U-9	15.39
			DPF	P 31 K Saddun	C-2a	22.67
					C-2b	28.33
					C-2c	29.94
			UPF	UP 252 K Saddun	C-1	20.23

					C-2	32.78
					C-3	76.88
					C-4	14.97
					C-6	15.38
					C-7	31.16
		Samloti	CFS	CFS J/Kothi	separate khasra No.	19.55
					U-1	2.43
					U-10	9.71
					U-11	5.26
					U-12a	2.83
					U-12b	2.83
					U-13	14.16
					U-14	2.43
					U-16	7.28
					U-17	6.88
					U-18	6.88
					U-19	4.05
					U-2	2.43
					U-21	10.12
					U-25	6.07
					U-26	4.45
					U-27	4.05
					U-3	13.35
					U-32	4.86
					U-34	26.71
					U-36 b	3.64
					U-37	2.43
					U-38	2.83
					U-39	2.83

					U-4	6.07
					U-41	8.5
					U-42	4.86
					U-43	3.64
					U-45	4.86
					U-46	2.43
					U-49	3.24
					U-50	2.02
					U-51	2.83
					U-52	6.07
					U-53	3.64
					U-54	4.86
					U-55	3.64
					U-56	4.45
					U-57	2.43
					U-58	22.66
					U-59	6.47
					U-60	6.07
					U-61	8.5
					U-63	2.02
					U-64a	4.05
					U-64b	13.35
					U-66	16.51
					U-67	6.48
					U-68	4.86
					U-69	2.83
					U-6a	2.83
					U-7	6.47
					U-71	5.66

					U-74	2.83
					U-75	2.02
					U-8	12.54
					U-80	3.24
					U-81	4.05
					U-9	4.05
		U/Kothiyan	UPF	UP 211 K Bhadrer	C-1	25.5
					C-2	10.93
				UP 212 k Jamula	W	11.74
				UP 217 K Barana	C1	42.08
					C2	12.14
				UP 218 K Batlehar	W	11.74
				UP 222 K Chamber	W	17.4
				UP 223 K Honsti	W	12.14
				UP 224 K Gujrehra	W	26.3
				UP 225 K Bhorna	W	50.58
	Sarotri	Danoa	CFS	CFS Airla	U14	3.64
					U16	1.62
					U19	1.62
					U20	7.28
					U23	6.07
					U24	7.28
					U25	2.83
					U31	4.05
					U32	4.86
					U36	8.5
					U39	10.93
					U40	5.66
					U41	2.02

					U43	2.43
					U6b	4.86
				CFS Danoa	U1	4.86
					U11	4.05
					U13	1.62
					U16	6.07
					U17	3.64
					U18	0.81
					U2	10.52
					U20	1.21
					U29	9.31
					U30	8.9
					U31	10.93
					U33	10.93
					U34	10.12
					U35	4.05
					U36	2.83
					U39	2.02
					U43	10.12
					U44	12.14
					U45	8.09
					U54	2.43
					U55	6.88
					U58	4.45
					U59	2.83
					U6	10.55
					U60	2.43
					U62	4.45
					U63	4.05

					U8	3.24
					U9	7.28
		Kandi	UPF	UP 253 K Khawa	C-1	36.02
					C-10	64.34
					C-11	58.26
					C-2	43.29
					C-3	5.27
					C-4	44.51
					C-5	13.35
					C-6	103.18
					C-8	85.38
					C-9	6.88
				UP 254 K Kandi	C-1	19.83
					C-2	78.9
					C-4	7.28
					C-5a	23.06
					C-6	52.6
					C-7	83.35
					C-8	114.91
		Saroot	UPF	UP 253 K Khawa	C-12	89.82
					C-13	48.96
					C-14	50.98
					C-15	95.49
				UP 254 K Kandi	C-10	16.59
					C-11	56.65
					C-9	10.12
		Sarotri	DPF	P 30 K Sarotri	C-1	11.33
					C-2	12.95
					C-3	34

			UPF	UP 250 K Sarotri	C-1	58.27
					C-5	35.21
					C-6	63.52
					C-7	37.64
					C-8	25.9
				UP 251 K Luhna	C-1	36.42
					C-2	14.16
					C-3	65.96
					C-4	10.12
					C-5	24.29
					C-7	83.75
Shahpur	Rait	Balla	DPF	P11K Ramgarh Kuriala	C1	35.61
					C3A	48.55
					C3B	17
			UPF	UP26K Nerti	c5a	2.83
					c5b	4.45
					c5c	2.43
					c6a	18.21
					c6b	60.69
					c7a	133.52
					c7b	8.5
		Rehlu	UPF	UP25K Lanjot	C2	5.26
				UP30K Manoh	Whole	113.29
				UP31K Thamba	Whole	31.16
				UP32K Rehlu	Whole	29.14
				UP33K Durgella	C1	60.69
					C2	26.3
					C3	26.3
		Salol	CFS	CFS Salol	Separate.	8.5

					U1	22.26
					U10	71.23
					U11	21.45
					U13	13.35
					U14	11.33
					U15	14.97
					U16	20.23
					U17	20.23
					U18	18.21
					U2	21.85
					U21	26.3
					U22	12.55
					U24a	5.66
					U29	7.69
					U3	16.59
					U30	3.24
					U31	8.9
					U33	8.5
					U35	2.83
					U37	18.21
					U38	13.76
					U39	4.05
					U4	20.23
					U40	2.02
					U41	6.07
					U43	6.88
					U44	6.48
					U45	4.86
					U46	13.76

					U47	4.86
					U5	19.43
					U6	14.98
					U7	20.64
					U8	17.81
					U9	15.38
		Tiara	DPF	P23K Tiara	C1A	29.54
					C1B	31.16
					C1C	25.09
					C2A	37.64
			UPF	UP27K Rajol	C1	106
					C2	98.73
				UP-34K Bhadiara	C5	32.37
				UP35K Tiara	C3	42.08
	Rirkmar	Boh	DPF	P1K Ban Boh	C2	301.87
					C3A	86.6
					C3C	1541.13
					C4A	84.97
					c4b	109.23
					c4c	93.07
					c4d	70
					C5	198.26
					P3b	76.49
			UPF	UP 1K Lam	C1	42.08
					C2	39.66
					C3	55.03
		Dulli	UPF	UP137K Darini	C11	51.79
		Kanol	DPF	P2K Darini Dhar	C2	255.74
					C3	192.61

					C4	1704.98
					C5	976.33
					C6	52.6
					c7a	50.58
					c7b	32.37
					c7c	26.71
					C7d	22.66
					C8	166.7
			UPF	UP 19 K Kanol	C3	61.1
				UP5 K Batuni	C1	25.9
					C2	16.19
					C3	14.16
				UP7 K Lag	Whole	57.46
		Rirkmar	UPF	UP16K Ghatarda	C1	42.08
					C3	45.32
				UP6K Dibba	C1	46.54
					C2	95.09
				UP8K Luharka	Whole	91.04
	Shahpur	Bassa	CFS	CFS Bhanala	P7	14.16
					Separate	18.61
					U11	10.92
					U12	7.69
					U13	9.71
					U19	8.09
					U20	14.97
					U21	7.28
					U22	1.62
					U23	9.71
		Manjgran	CFS	CFS Manjgran	P7a	7.69

					P7b	12.14
					S13	1.62
					S14	4.85
					U1	2.83
					U10	0.81
					U11	2.02
					U12	2.83
					U4	3.24
					U6	0.81
					U8	3.24
					U9	2.83
			UPF	UP21 KCB Bhanjar	Whole	23.47
				UP24K Sewhan	C3	6.48
				UP38K Harnera Khas	C3	6.07
				UP39K Bassa	C1	8.09
					C2	9.31
				UP-41 KCB HARNERA	C2	27.11
		Shahpur	CFS	CFS Dobh	S1a	6.88
					S1b	0.81
					S2	8.5
					S3	2.02
					S4	2.83
					S5	4.86
					S6	4.86
					separate khasra No.	1.21
				CFS Shahpur	P3	8.5
					P4	14.57
					Seprate	1.21
					U10	4.45

					U11	6.47
					U12	2.83
					U13	3.24
					U15	1.62
					U16	8.09
					U17	5.66
					U18	2.43
					U19	3.24
					U20	4.86
					U22	3.64
					U23	2.83
					U25	8.09
					U27b	4.86
					U33	8.5
					U34	10.93
					U35	12.98
					U36	10.12
					U37	6.88
					U38	9.71
					U39	9.71
					U6	2.43
					U7	2.02
					U8	2.43
					U9	3.64
			DPF	P-10K Sadoon	C2A	47.34
					C2B	30.76
					C2C	32.37
			UPF	UP26K Nerti	C2	20.64
					C3	12.14

					C4	4.05
Grand Total						39136.59

7.3: ANALYSIS AND VALUATION OF THE CROP:

7.3.1: STOCK MAPS:

All the compartments have been stock mapped on GIS platform on visible scale maps and the copy of the same have been placed in the respective Compartment History Files.

7.3.2: SITE QUALITY AND AGE CLASSES:

Ocular estimate of site quality was made during field inspection and observations recorded in respective compartment history files. The average site quality of Deodar is II/III and that of chil III and below. All age classes are found mixed with preponderance of middle age to mature trees. Reference about age classes has been given in each compartment history file. However, site quality and age class of misc. B.L. species is of no significance.

7.3.3: DENSITY:

The canopy density has been assessed visually and recorded in the respective compartment history files. There is variation in density from forest to forest; being relatively better (0.5 to 0.6) in case of Reserved and delimited protected forests and as low as nil elsewhere. The average density of the circle may be taken as 0.3.

7.3.4: ENUMERATION

The technique of Survey and Assessment of Forest Resource using Grid and Quadrants method (Sample Plots) has been adopted and complete counting of all tree species class wise has been done. A total of 74 Sample Plots of 0.1 hac. were laid in this working circle covering all PBs. The detail of PB wise sample plots are as under

Table 7.3

S.No	No. of plots	Total area counted Hac
1	171	17.10

7. 3.5 Results

Table 7.3

Tree Count(Nos.)										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	101183	284458	282549	190911	82092	66819	42000	22909	141274	1214195
Deodar	0	7636	21000	5727	3818	0	0	0	0	38181
Khair	202366	244367	122183	76364	57273	43909	5727	1909	1909	756007
Ban	303549	347459	295913	194730	59182	21000	7636	3818	22909	1256196
Rai	7636	0	1909	22909	15272	0	0	0	0	47726
Tosh	0	1909	0	0	0	0	0	0	0	0
BL	1009923	721646	353186	242458	112638	72546	61091	24818	85910	2684216
Grand Total	1321108	1071014	651008	460097	187092	93546	68727	28636	108819	5996521
Tree Volume (M ³)										
Spp.	Class									Grand Total
	V	IV	III	IIA	IIB	IA	IB	IC	ID	
Chil	5059.15	65425.34	183656.85	259638.96	193737.12	241884.78	218400.00	119126.80	734624.80	2021553.80
Deodar	0.00	1069.04	8820.00	7216.02	9086.84	0.00	0.00	0.00	0.00	26191.90
Khair	9612.39	34822.30	35921.80	37380.18	31213.79	23930.41	3121.22	1040.41	1040.41	178082.88
Ban	9106.47	72966.39	221934.75	286253.10	138485.88	70770.00	34667.44	17333.72	104006.86	955524.61
Rai	0.00	0.00	1603.56	38487.12	47037.76	0.00	0.00	0.00	0.00	87128.44
Tosh	0.00	267.26	0.00	0.00	0.00	0.00	0.00	0.00	0.00	267.26
BL	28277.84	101752.09	199903.28	274462.46	127506.22	102652.59	86443.77	35117.47	121562.65	1077678.35
Grand Total	52055.85	276302.41	651840.24	903437.83	547067.60	439237.78	342632.42	172618.40	961234.72	4346427.24

7.4 SILVICULTURE SYSTEM:

No definite silviculture system is prescribed. These forests are just to Be protected and preserved. Felling of only khair trees on selection principles, under Khair(overlapping) working circle is allowed besides removals for meeting the demand of local right Holders. The culturable blanks and poorly stocked areas will be taken up for planting with suitable Species.

7.4.1 ROTATION AND EXPLOITATION DIAMETER: In view of the above, these are not required to be Discussed.

7.5 CALCULATION OF YIELD:

No felling except of the dead, dry, fallen etc. trees and for the demand of right holders are allowed. No yield is therefore calculated and prescribed. Record of all such removals will be maintained on the prescribed control forms.

7.6 METHOD OF EXECUTING FELLINGS:

Marking of trees to right holders is to be done on selection Principles. Attempts should be made to mark dry, dead fallen etc. trees first. The tendency to remove the best selected stems in such marking be avoided.

7.7 SOWING AND PLANTING:

The culturable blanks and other understocked/degraded areas are to be restocked with suitable species. A few such species are Deodar, kail. Fir/Spruce, Quercus species, Horsechestnut, Robinia, Hill Mulbery etc. higher hills and Khair, Chil, Mulbery, Leucaena, Arjun, Ritha, Shisham, Toon, Harar, Amla, Bahera, Dhaman, Darek, Ohi, Kachnar etc. in lower tracts. The BL species will be planted in depressions and along nallas

7.8 SEQUENCE OF PLANTING:

Definite sequence of planting has been laid down for Demarcated Protected Forest as the closure in these forests can be ensured. However, for Undemarcated and Cooperative Society Forests, no definite sequence of sowing and planting has been laid down as it may not be possible for DFO (T) to follow the sequence due to the reasons beyond his control. The reasons may be inadequate budget in a year, availability of areas for closure and other administrative considerations. In the past, stress had been given on chil plantation. Many blank areas have been converted to good chil forests. A mention of these plantations has been given in respective compartment history files. In the changing scenario,

there is need to give stress on Broad leaved species which are of economic and fodder utility.

7.9 Threats:

Forest fires

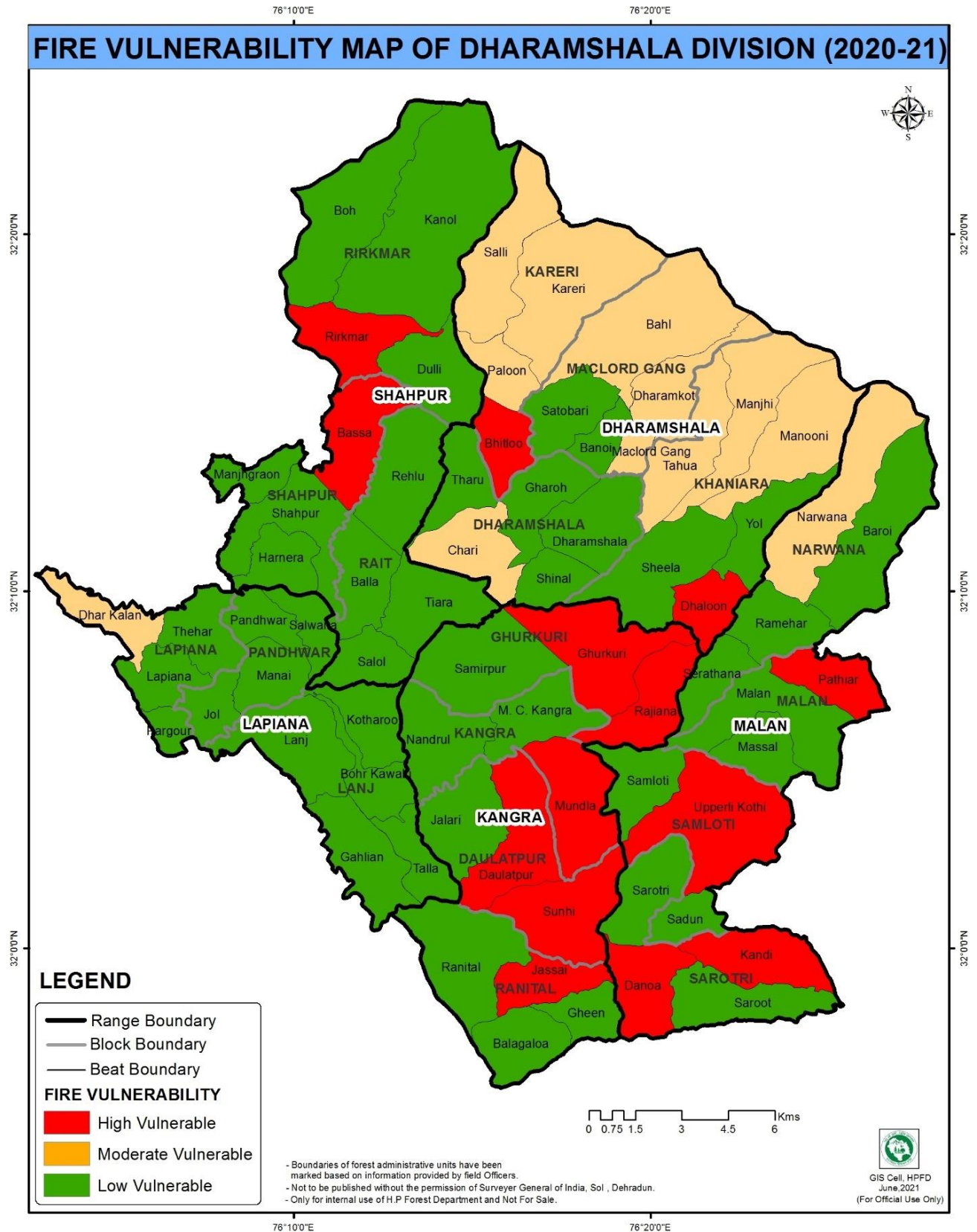
Fire constitutes the most serious threat to chil forests of the tract and also affects the scrub forests in areas of heavy frost. The highly inflammable chil pine needles are most susceptible to fires in the months of April, May and June. The incidence of fires during the plan under revision has been discussed in Chapter II of Part I. If fires are not controlled in time, these cause serious damage. The crown fires Play havoc with the forest. Fires wipe out the young regeneration and retard the growth of trees and cause a serious drop in resin yield and in addition to the numerous other well-known ill effects. Regeneration cannot be obtained without proper fire protection. The heavy salvage removals during the period of plan under revision have been due to repeated wide spread fires abetted by faulty resin tapping.

7.9.1: CAUSES: The causes attributable for the outbreak of fires are summarized as under:

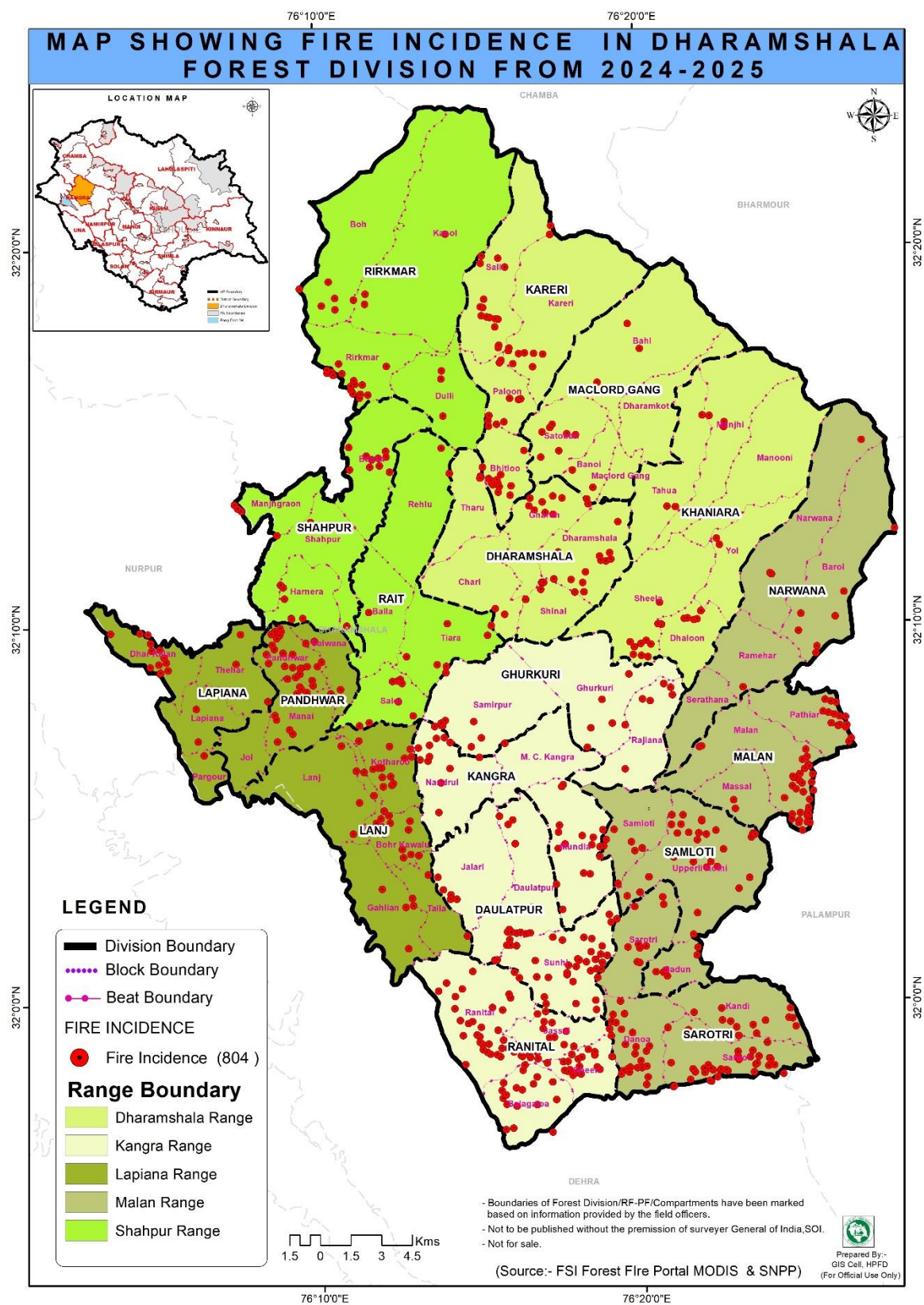
1. Accidents in charcoal burning and control burning the forests;
2. Gross carelessness of the smokers, graziers and labourers working in the forests;
3. People set fire to the forests under the belief that resultant grass growth will be more abundant and better in quality,
4. Fires are started for scaring away wild animals or for poaching;
5. Burning of refuse in the cultivated fields adjoining forests without suitable precautions or supervision;
6. Fires are caused to destroy evidence of offense committed such as illicit tapping and felling;
7. Fires are caused on account of the poor public relations of the forest Subordinate staff

The forests of whole of Dharamshala Division are susceptible to fires in summer season. Therefore, extensive fire control measures are needed throughout.

Map 7.1



Map No. 7.2



7.10 FIRE CONTROL MEASURES:

Various fire protection measures as mentioned in the Punjab Forest leaflets No. 6 and 8 are prescribed to be followed. The matters requiring special emphasis are Given below:

7.10.1 GOOD WILL OF THE PEOPLE:

The D.F.O. and Range officer must tour regularly through forest area and be accessible to local villagers and deal promptly on the spot with all complaints in an endeavour to have friendly relations with the local people. Since all the forests covered by this plan are reserved and the local people have no significant rights there cannot be any punitive measures to force the unwilling people. Still, we can hope for the minimum support from the locals if our staff has good relations with them.

Thikri Pehra Notifications, for all villages under which the forest fall, can be got issued from the Deputy Commissioner every year before the onset of fire season. Compliance of these notifications by the villagers should be monitored by the staff of forest department.

7.10.2 PREVENTING ENTRY OF FIRES FROM OUTSIDE:

The prevention of entry of fires from outside considerably difficult. Fire patrol, erection of notice boards along public roads passing through the forests and legal remedies should be resorted to, as a matter of course.

7.10.2.1. EXTERIOR FIRE LINES:

Exterior fire lines located along spurs and roads enlisted hereunder Should be kept clear of under growth and needles, particularly during the fire season. These form the Lines from which firefighting operations can be initiated and mobility to the labour force provided. The existing Fire lines are felt to be quite enough and there is no need to create more fire lines

List of Fire Lines

Table No. 7.5

Sr No	Range	Forest	Length	Width
1	Kangra	P39k Ranital C5a	1.6	10
2	Dharamshala	P43K Cheli kereri	8.7	10
3		P60K Kuned	5	10

4	Mallan	P58K Cheli Nerwana	1.1	
5		P28K Mansu	6.6	
6		P27K Pathiar	4	
7	Shahpur	P12K Raltung C14 & C2	2.4	15
8		P3K Parkumal C2a	2	10
9		P4K Sunkanal C2a	2	10
10		P4K Sunkanal C2c	2	15
11		P45K Borusarna	1.5	10
12	Lapiana	P19K Chelidhar Ther C2a & C2b	1	
13		P14K Pandhwar C2b & C2d	9.6	30
14		P19K Chelidhar Ther C2b	1	
15		P14K Pandhwar C2a	2.6	

7.10.2.2 INTERIOR FIRE LINES:

The interior fire lines sub-dividing the large blocks of forests and isolating plantations and regeneration areas by cut lines are essential in order to render it possible to localize fires. These should run along ridges where constructed, small foot paths, connected by level foot paths and dividing the area into units of manageable size. These will help the labor to reach the spot before the fire has spread over a wider area. These also serve as bases from which counter fires can be started with the object of confining the outbreak within definite limits. These fire traces around the plantations and regeneration areas will be control burnt area to keep clear of all inflammable material on ground.

7.10.2.3 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.

7.10.2.4 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 programmers 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.

7.11 REDUCING INFLAMMABILITY:

7.11.1 FELLING DEBRIS: The forests should be cleared off felling debris before the commencement of fire season.

7.11.2 DRY FUELWOOD AND CHIL CONES: These should be removed to decrease fire hazard and for the purpose villagers be encouraged to collect and use.

7.12 FOREST BOUNDARIES:

The boundaries will be kept clear to reduce fire hazard and act as fire lines for the fire coming from outsides and paths for firefighting.

7.13 RESIN TAPPED AREAS:

The ground around the resin tapped trees will be kept clear of grass, Resin shavings and other inflammable material upto a radius of 1.25m. Bushes will be cut to a radius of 2.5m at the time of setting of resin crop.

7.14 USE OF PINE NEEDLES:

Another way of addressing the issue of fire is to make use of 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 D'sala FD. 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 D'sala.

Similarly pine needle check dams, Pirule have been made in Uttarakhand Forest Department and have also been tried in Kalatop Khajjiar Wildlife 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 atleast twice in the fire season. This Condition should be built into the agreement with the Corporation at the time of handing over the Forest to them. Failure to comply should attract a penal price to the Corporation.

7.15 ENGAGING FIRE WATCHERS:

Sufficient number of fire watchers should be engaged during the fire season to keep watch at look-out points and when fire is observed they and the Forest guard should at once send a message to the Block Officer and the Range Officer. They should immediately inform the Lambardar and Chowkidar of the adjoining villages as well as the contractor's mate in-charge of gang of labor working near the scene of fire. Mobile charges are reimbursed to the forest guards during the fire season.

7.16 FIRE FIGHTING EQUIPMENT:

There should be sufficient equipment viz. fire beaters, shovels sickles, axes and buckets etc. with every Beat Guard for facilitating the speedy extinguishing of fire. In areas that are highly susceptible to forest fires provision has been made in recent years to engage Home Guards with facility of a vehicle hired for the fire season. This arrangement has reportedly not worked very well as the Home Guards are neither trained nor equipped nor mentally prepared for forest fire fighting. A more useful way is to make local firefighting squads involving young people and deployed with the forest guards of fire sensitive beats. Such squads need to be provided with useful equipment and also imparted some elementary training in forest fire fighting.

7.17 FIRE SENSITIVE BEATS:

A list of fire sensitive beats is at Appendix VI -Fire Beats for Dharamshala FD. The provision of fire-fighting equipment and the formation of firefighting squads should first be made in such beats. Since there is now an extensive motorable road network in the state, provision of hiring a vehicle during the fire season is essential in fire sensitive beats. It is important that forest guards in fire sensitive beats be provided with a GPS. Firefighting methods have been given in the Punjab Forest leaflet No. 8 and Practical Forest management by Trevor and Smithies’.

For guidance of the forest subordinates and 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 labour force. The labour force should be organized in sections of suitable strength each under the order of one man and given definite task. A couple of men should be kept waiting to take messages and instructions to the various sections. Should a fire get beyond control, it is necessary to localize it by counter fighting. Counter fighting should only be done under order of a senior officer in charge of operations and attempted from a defined line such as road or ridge or fire line. A line is formed along a ridge by clearing the soil covering and cutting bushes from which fire is started so as to consume the fuel in advance of the oncoming fire. Roads are even more useful and even narrow path is sufficient, provided enough manpower is present. After the fire, a roll should be taken of all villagers present.

7.18 FIRE RECORDS:

The old methods of recording and reporting forest fires are cumbersome and are seldom followed in the field. It is therefore recommended that the forest

guard is trained to use a GPS to record the fire burnt areas and transfer the co-ordinates to the GIS cell at the Forest HQ where the GIS cell will update and generate Fire Maps Forest Circle wise. This will also help to build up a good database on forest fires for the state. The method of calculation of loss / damage caused by forest fires is at Appendix VIII-Cal. Of Loss.

It has also been decided as a matter of policy that for any area above 5 ha damaged by forest fires will be personally inspected by the DFO and an FIR lodged with the local police. Forest officials deployed in Van Thanaas are also to conduct an enquiry into large forest fire cases. At the time of revision of the WP, the WPO will record damage for forest in the concerned CHF.

7.19 The Recharging of Natural Springs:

One of the effects of the general degradation of forests and, possibly exacerbated by climate change, is the reduced outflow or gradual drying up of natural springs. This trend in the last 2 or 3 decades is noticeable across the entire state. It is also likely that this trend will continue and possibly get worse. Since nearly all villages and small urban/peri-urban settlements are dependent on water from springs, their protection and conservation become a very high priority. This is more so when freshwater is taken as a forest product.

In neighbouring Palampur, the successful protection and conservation of the Bonal Spring which supplies water to Palampur town, by local women SHGS has led to the signing of a formal agreement with the MC of Palampur wherein an amount of Rs 20,000 is being paid to the SHGs yearly for protection of the Bonal Spring catchment. This is probably the first example of PES in the area. (Refer to WP of Palampur by Sh RS Baniyal for more details).

7.19.1 Action Required:

1. Survey and identify the major natural springs in forest areas;
2. Hire a professional agency to survey and delineate the exact re-charge catchment of each spring (as was done in Palampur). Once the catchments have been mapped the conservation plan would be guided by the extent and nature of the catchment and its underlying geology. which exactly marks out the high infiltration zone.
3. Local SHGS or User Groups need to be mobilized for protection of this catchment; it may not always be possible to have a clear provider-user arrangement for PES as in the case of Palampur. Nevertheless, a PES mechanism is necessary for long term sustainability of such efforts. Local User Groups or the

IPH department would be the direct beneficiaries of spring catchment conservation.

4. The DFO / ACF needs to facilitate this whole process, in collaboration with the SHGS/ UGS; 5. A Plan for conservation of the catchment is then drawn up in consultation with the local stakeholders and an arrangement of "payment" to the service provider (local SHG/UG) put in place. To begin with funds within NPV can be earmarked for such payments. In CAT Plans there is a specific provision for PES at 10% of the CAT Plan outlay, and these funds could easily be used for initiatives like these.

7.20 Improving the Moisture Regime in Forests:

Forest growth and natural regeneration in particular have been suffering due to either total lack or paucity of moisture in the soil. Moisture stressed forests allocated to the Protection WC are an example. In order to improve the moisture regime in these forests, it is essential that more rain water percolates into the ground rather than run off during the rainy season.

With precisely this objective in mind, a plan for taking up staggered, contour trenching within degraded forests was initiated in 2009-10. The contours at 10- or 20-meters interval, depending on the gradient, are to be marked along the hill side with the help of an A-frame, starting from the top. As far as possible, an entire hill side or complete hill should be taken up for this work. Trenches are then dug along these contour lines. Each trench is 30 cm wide and 30 cm deep. The length of the trench would depend on the workability of the soil, but it can go up to 5 meters. Rocky portions are not to be dug. The stones/soil that comes out of the trench can be put behind small check dams made at suitable places along the re-entrants/small depressions. These are then sown with local grass. In this way there will be a mesh of staggered contour trenches that would trap the rainfall and help percolate the rain water into the ground. This has resulted in very effective moisture improvement in 1 forest where it has been tried.

It is important to keep in mind that the effectiveness of this system will depend on the extent of area covered. It is necessary that at least 50 to 100 ha of forest is contour trenched before noticeable improvement in moisture levels take place.

At least one such project needs to be taken up in each range per year for the duration of this WP. Funds for this are allowed under MNREGA. Funding under Soil & Water conservation schemes can also be used for this work.

7.21 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 cameras is perhaps one of the most important invasive alien plant species (exotic weed) in forest ecosystems of India as also in Dharamshala Division. Other alien invasive plant species with significant impact on the forests of D'sala Division include *Parthenium hysterophorus*, *Eupatorium* (*Chromolaenaj adenophorum*, and *Ageratum conyzoides*). Whereas the incidence of Parthenium popularly known as "Congress Grass" is largely restricted to degraded and newly opened drier sites along roads and forest fringes, the other three invasive alien species tend to occupy all possible vacant places even under tree canopy. Even as Eupatorium and Ageratum show a clear preference for moister locales and show gregarious occurrence, at many places these share the niche and grow in an intimate mix with Lantana A reconnaissance was made during January 2011 to map the distribution of exotic weeds in various compartments in the Division. Whereas, it was possible to record the incidence of Lantana fairly accurately, the area infested with the other 3 main invasive alien species could not be recorded comprehensively due to these species being still in dormant condition.

Invasive alien species

Table No. 7.6

Range	No. of compartments	100% infestation in Hac	Average % for Range	Other weeds
Dharamshala	268	7210	34.91	Ageratum Parthenium (congress grass) Eupatorium
Lapiana	128	3216	45.11	
Shahpur	146	3594	26.42	
Mallan	259	8950	88.28	
Kangra	172	4556	49.97	
Total	973	27526	45.39	

By all counts, the incidence of lantana infestation is very high to alarming in the areas surveyed. As such lantana becomes the single greatest threat to forests and forest biodiversity. What is critical to understand is that the species is spreading at an accelerating rate and several chil and khair forests/ plantations have been fully affected. It is, therefore, obvious that the control and eradication of lantana would be a top priority in any forest management and conservation strategy.

7.21.1 STRATEGY FOR REHABILITATION OF FORESTS INFESTED WITH LANTANA AND OTHER INVASIVE EXOTIC WEEDS IS DEALT IN DETAIL AS UNDER:

Core principles of the strategy:

Contain further 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 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 exoticSpecies (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 areas and to progress towards areas with 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.

7.21.2 APPROACHES

APPROACH-I (FOR AREAS WITH LOW INFESTATION INTENSITY): More than 60% of the forest areas recorded to be under Lantana have been infested with this exotic weed within the past 10 years and have less than 25% intensity of infestation. 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 manual cutting of Lantana bushes 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:

- I. Method of cutting Lantana will be Cut Root Stock (CRS) method i.e. cutting the bushes below the soil to prevent coppicing.
- II. Forest beat will be the unit for rehabilitating Lantana infested sites. Financial resources available under various schemes will, therefore, be converged towards this end.
- III. 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:

1. Cutting tools/techniques
2. Calendar of rehabilitation activities
3. Cost models

A three-year active maintenance of the treated areas and triennial follow up thereafter will form integral part of the rehabilitation program till the areas gets fully rehabilitated. During this period, constant vigil will be maintained on any opportunistic springing back of sprouts/ seedlings of the invasive alien species and the same will be immediately removed. At the same time, progress of establishment of the native species will be actively monitored and encouraged. An average of 150 hectares of Lon tong infested areas will be taken up for rehabilitation per year.

7.21.3 METHOD FOR REMOVAL OF LANTANA

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 sever 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 center 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 just before rainy season, i.e. when the plants are not in flowering and fruiting.

7.21.4 Methods invented by Himalayan Forest research institute, Shimla and Tropical Forest research institute Jabalpur will be consulted for uprooting of lantana and successful rehabilitation of lantana infested areas with native species and bamboo. Budget Forecast will be made annually during the working plan period on the wage rates applicable for the years.

7.21.5 MANAGEMENT OF OTHER INVASIVE ALIEN SPECIES (PARTHENIUM, AGERATUM, EUPATORIUM)

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

APPROACH-1 (AREAS WHERE INFESTATION OVERLAPS WITH LANTANA):

Such situation occurs Under Chil miscellaneous broad-leaved and scrub forests in such area 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.

CHAPTER-8

ALPINE PASTURES IMPROVEMENT(Overlapping) WORKING CIRCLE

8: GENERAL CONSTITUTION AND CHARACTER OF VEGETATION:

This working circle is overlapping on protection working circle and consists of forests/ compartments with sizeable, compact chunks of alpine pastures, mainly in Dharamshala, Mallan and Shahpur ranges. Alpine pastures are found at an elevation of 3200 m and extend up to 4800 m above mean sea level. The soil is shallow, black and rich in organic matter (with acidic reaction). These pastures remain covered with snow from December to April and vegetative growth starts after snow melt. The melting snow and monsoon clouds provide sufficient moisture from April to August for luxuriant growth of grasses. Vegetation starts drying up from September with the fall of temperature.

Total area of the working circle is 6512.47 ha. These pastures are good sites for grass production and provide grazing from May to September for a large number of migratory flocks of sheep, goats and buffaloes.

8.1: BLOCKS AND COMPARTMENTS

The forests included in this circle are generally vast in extent. Areas under good pastures have been separated from those under permanent snow and pure rock out crops. The list of compartments sub-compartments is as under:

Table No. 8.1

Sr No	Range	Forests	Comptt	Area (Ha)
1	Dharamshala	P40K CB Kareri	1	7.69
			2	6.06
			5	3.64
			16	11.33
			19	61.5
			25	31.56
			26	116.94

			27	88.61
			28	19.42
			29	106.8
			30	151.72
			31	147.68
			32	36.41
			33	42.06
			34	1518.91
			35	441.02
		P49K CB Dharamshala	8	312.76
			9a	14.57
		CFS Khanyara	P1	1300.6
			P2	127.09
			P6	95
2	Mallan	P57K Dhar Narwana	7	443.45
			8	947.77
			9	112.08
3	Shahpur	P1K Banboh	4a	40.46
			4b	59.87
			4c	36.83
			4d	32.37
			5	198.26

6512.46

8.2: SPECIAL OBJECTS OF MANAGEMENT

- (i) To meet the legitimate requirements of right holders and other concessionaires as recorded in the Settlement. They are to provide for grazing and fodder;
- (ii) To improve the productivity and quality of these pastures in order to ensure continuous supply of nutritious grasses and fodder,
- (iii) To make transhumance a more sustainable livelihood for migratory graziers.

8.3: AREA AND ALLOTMENT

An area of 6512.47 ha has been allotted to this Working Circle. The entire areas fall in Dharamshala, Malan and Shahpur ranges and is a Demarcated Protected Forest and Co-operative Societies Forests.

8.4: LOWER FORESTS:

Forests in the WC located at lower altitudes (< 2500 m), could benefit from increasing the proportion of fodder species in departmental plantations as also encouraging planting of fodder trees in private lands especially Baan oak.

8.5: ANALYSIS AND VALUATION OF THE CROP:

The entire area has been stock mapped on 4"= 1 mile (1: 15840) scale, tracing of which has been placed in the respective compartment history files.

8.5.1: QUALITY OF FORAGE

These pastures provide most nutritious forage to the migratory sheep, goats and buffaloes during May- October. The availability of nutritious pastures coincides with the natural cycle of seasonal wool growth and the ewes bred in spring season receive a most nutritious diet in their late gestation and early lactation period, when the nutritional requirement of the foetus and growth of the off-springs are the most.

The studies conducted by the "Regional Livestock substation, Rishikesh (UP); "Indian Veterinary Research Institute regional Station Palampur (H.P.)" on various nutritional aspects of the alpine pastures have given below:

- (i) Most of grasses of these pastures have been found to be rich in crude protein content ranging from 10 to 21 %. Almost all grasses have a high percentage of magnesium from 0.4 to 1%. In respect of phosphorus however, majority of the grasses have been found to be deficient; 0.1 to 0.2 % only.

(ii) The grasses of these pastures are highly palatable. An adult sheep on an average consumes the composite pasture containing 15.03% crude protein and 21.15 % crudeform in the dry matter @ 3 kg/100 kg body weight.

(iii)The digestibility coefficient of dry matter, organic matter, crude protein, nitrogen free extract and total carbohydrates, on an average, are 66, 67, 49, 56, 71 and 67%respectively. It is interesting to note that the crude protein digestibility of these pastures is as high as 70%. Such a high protein digestibility can be observed only with very high-quality legumes. The crude fibre digestibility is also considerably high. The average digestibility, 71% for nitrogen free extract indicates that the pasture is rich in those types of carbohydrates that are readily assimilable by the animal organisms.

(iv) Application of 15 kg N, P, K/ha in May when the grasses are just sprouting, has shown that there is a definite increase in the yield of grass and the percentage of crude protein, calcium and phosphorous in the dry matter. Since the content of crude protein in the unfertilized pastures at the mature stage may be inadequate (12%) for meeting the requirement of locating ewes of yearling lambs, application of nitrogenous and phosphatic fertilizers may be quite useful.

8.5.2: GRAZING INCIDENCE

The cattle population and record of goat/sheep grazing for various years are shown below:

Live- stock population (1956 to 1998 and 2021) D/shala Forest Division

Table No. 8.2

Year of Census	Cattle	Buffalo	Sheep	Goat	Misc. (Ox/Cow/Mule)	Total
1956	83000	22500	9900	27900	1000	144300
1961	76400	19300	11600	25600	1200	134100
1966	76300	19300	11600	25500	1300	134000
1971	70629	23937	17945	27438	2363	142312

1976	96895	24513	21832	37326	2459	183025
1981	91470	25752	20341	36189	3836	177591
1998	99347	32821	81024	81024	7800	220992
2011	15796	10012	16301	41811	68633	152553
2021	86785	22562	21087	45623	6541	182598

Permits to Migratory Graziers: Dharamshala forest division

Table No. 8.3

Year	Permits	Goat	Kids	Sheep	Lamb	Buffaloes	Total
2011-12	114	5570	3010	5111	2464	0	16175
2012-13	105	4726	2284	5400	2338	4	14792
2013-14	97	5178	2308	4744	2401	4	14635
2014-15	98	4632	2366	4580	2572	13	14163
2015-16	109	5462	2907	5338	2903	0	16610
2016-17	106	5114	2658	4800	2357	14	14943
2017-18	98	5757	2874	5536	2768	0	16935
2018-19	98	5757	2874	5536	2768	0	16935
2019-20	106	5865	2994	4810	2384	3	16056
2020-21	99	4953	2713	4721	2448	8	14843

8.5.2.1: Determining Grazing Incidence

Table No. 8.4

Animals	No of units
Sheep	1
Goat	1.5
Cattlt/ Cow	4
Buffalo	6
Misc.	3

8.5.2.2: Determining Grazing Incidence

For determining the incidence of grazing the number of animals is reduced to sheep units as per the following norms:

Thus, the incidence of grazing in the forests as a whole in terms of area (ha) per sheep unit comes to about 0.084 ha/sheep or 0.021ha/ cow unit. The corresponding figure for the state is 0.7 ha/cow unit and for the country 2.4 ha/cow unit. The Grazing Advisory Committee has recommended a grazing incidence of 2 ha/cow unit. (On 1998 figures). Since any substantial increase in the forest area or even the quality to forage is very unlikely in the foreseeable future, the only option remaining is to drastically reduce the number of free ranging cattle. While the Cattle Census figures of the AH department do indicate some trend in this direction, it is clear that a concerted inter-departmental effort is needed to bring down the number of stray and free ranging cattle if forage quality is to have any chance of improvement and forests a chance of staging a comeback.

8.6: METHOD OF TREATMENT

Due to continuous incidence of grazing the pastures are deteriorating and are not likely to meet the ever-increasing requirements of forage. The following measures are suggested for their improvement;

(i) Removal of weeds: The challenge is to identify and map areas where there is high incidence of infestation by exotic weeds. These would normally be along the grazing routes or resting grounds used by migratory graziers. In case there are large patches of such weeds, uprooting should normally be not resorted to as it may cause soil erosion.

(ii) Rotational Grazing: If identified and degraded grazing grounds can be brought under rotational closure it could allow good recovery of pastures. However, to be

able to do this effectively, some innovative approaches need to be tried in close consultation with the migratory graziers. One way could be to offer incentives, as a PES mechanism, and link the payment of effective resting of earmarked pastures for one year. Another way could be to try a short-term rotational closure for 3 months during monsoon, which may help in providing necessary rest and increase in forage yield. In both approaches the willing and active co-operation of the migratory graziers is necessary.

(iii) Incentives to Reduce Flock Size: Again, through a PES mechanism, incentives could be Offered to migratory graziers to limit and/or reduce their flock sizes. This could be linked to stricter monitoring of actually allowing only the permitted number on the migratory

runs and penalizing excess numbers. The penalties realized could fund the PES? There is, of course a need to urgently and substantially increase the grazing permit fees which could also add to the PES kitty.

(iv) Study needed: There is also an urgent need to commission a comprehensive study of migratory grazing households / permit holders, assess the actual and potential numbers of sheep and goats that comprise these transhumant flocks, the trends in likely continuity of this avocation and so forth. A good study can greatly help understand the ground situation and throw up innovative ways to manage the transhumance, in the Alpine Himalayas of the state more sustainably.

8.7: SEQUENCE OF TREATMENT:

Is indicated as below, but the Divisional Forest Officer may alter the sequence at his discretion on account of administrative and financial considerations. This is a huge area to tackle and even for minimal interventions like removing exotic weeds, fund flow would be a problem. Therefore, a well investigated and identified pilot, for kind of demonstration purposes, needs to be considered first. Depending on outcomes, the pilots could be modified / replicated over larger tracts. Some innovative research studies through the Palampur University could be initiated during the course of this WP.

Table No. 8.5

Year	Range	Forests	Comptt	Area (Ha)
2024-25	Dharamshala	P40K CB Kareri	1	7.69
	Mallan	P57K Dhar Narwana	7	443.45
	Shahpur	P1K Banboh	4a	40.46
2025-26	Dharamshala	P40K CB Kareri	2	6.06
	Mallan	P57K Dhar Narwana	8	947.77
	Shahpur	P1K Banboh	4b	59.87
	Dharamshala	P40K CB Kareri	5	3.64
2026-27	Mallan	P57K Dhar Narwana	9	112.08
	Shahpur	P1K Banboh	4c	36.83
	Dharamshala	P40K CB Kareri	16	11.33
	Shahpur	P1K Banboh	4d	32.37
2028-29	Dharamshala	P40K CB Kareri	19	61.5
	Shahpur	P1K Banboh	5	198.26
2029-30	Dharamshala	P40K CB Kareri	25	31.56
	Dharamshala	P40K CB Kareri	26	116.94
	Dharamshala	P40K CB Kareri	27	88.61
	Dharamshala	P40K CB Kareri	28	19.42
2030-31	Dharamshala	P40K CB Kareri	29	106.8
	Dharamshala	P40K CB Kareri	30	151.72
	Dharamshala	P40K CB Kareri	31	147.68
2031-32	Dharamshala	P40K CB Kareri	32	36.41
	Dharamshala	P40K CB Kareri	33	42.06

	Dharamshala	P40K CB Kareri	34	1518.91
2032-33	Dharamshala	P40K CB Kareri	35	441.02
	Dharamshala	P49K CB Dharamshala	8	312.76
	Dharamshala	P49K CB Dharamshala	9a	14.57
2033-34	Dharamshala	CFS Khanyara	P1	1300.6
	Dharamshala	CFS Khanyara	P2	127.09
	Dharamshala	CFS Khanyara	P6	95

8.8: MISCELLANEOUS REGULATIONS

In order to meet the fodder requirement of the area, the following measures are suggested

- (i) Grazing rights have very liberally been allowed and are loosely defined in the Un-delimited Protected Forests. The right holders can keep and graze any number of cattle to bring the incidence of grazing as near the carrying capacity of the area as possible reduction of unwanted cattle is must.
- (ii) Better breed of sheep giving higher yield of wool should be introduced and the local breed should be upgraded through artificial insemination. More incentives should be provided for reduction in the number of goats.
- (iii) The existing grazing rules regarding movement and halts of migratory herds, permissible number of sheep and goat etc. should be strictly enforced by enumeration, registration and re-fixation of routes if necessary.
- (iv) The existing grazing fee (Tirini) is too low particularly in view of sharp increase in price of wool, milk, meat etc. Upward revision of these rates will serve as a disincentive for keeping useless/ uneconomic breeds.
- (v) During camps/halts in the pastures the live fires left over by the graziers at times become cause of forest fires which burns the pastures and adjoining wooded areas down below, such cases should invariably be detected checked and the culprits be dealt sternly.

Chapter 9

Water Resource management Working Circle

9.1 Constitution of working circle

The working circle is overlapping in nature and will include all working circles. Water resource management is the activity of planning, developing, distributing and managing the optimum use of water resources. It is an aspect of water cycle management. The field of water resources management will have to continue to adapt to the current and future issues facing the allocation of water. With the growing uncertainties of global climate change and the long-term impacts of past management actions, this decision-making will be even more difficult. It is likely that ongoing climate change will lead to situations that have not been encountered. As a result, alternative management strategies, including participatory approaches and adaptive capacity are increasingly being used to strengthen water decision-making.

Ideally, water resource management planning has regard to all the competing demands for water and seeks to allocate water on an equitable basis to satisfy all uses and demands. As with other resource management, this is rarely possible in practice so decision-makers must prioritize issues of sustainability, equity and factor optimization (in that order!) to achieve acceptable outcomes. One of the biggest concerns for water-based resources in the future is the sustainability of the current and future water resource allocation.

Sustainable Development Goal 6 has a target related to water resources management: "Target 6.5: By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate."

9.2 Sustainable water management

At present, only about 0.08 percent of all the world's fresh water is accessible and there is ever increasing demand for drinking, manufacturing, leisure and agriculture. Due to the small percentage of water available, optimizing the fresh water we have left from natural resources has been a growing challenge around the world.

Much effort in water resource management is directed at optimizing the use of water and in minimizing the environmental impact of water use on the natural environment. The observation of water as an integral part of

the ecosystem is based on integrated water resources management, based on the 1992 Dublin Principles (see below).

Sustainable water management requires a holistic approach based on the principles of Integrated Water Resource Management, originally articulated in 1992 at the Dublin (January) and Rio (July) conferences. The four Dublin Principles, promulgated in the Dublin Statement are:

1. Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment;
2. Water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels;
3. Women play a central part in the provision, management and safeguarding of water;
4. Water has an economic value in all its competing uses and should be recognized as an economic good.

Implementation of these principles has guided reform of national water management law around the world since 1992.

Further challenges to sustainable and equitable water resources management include the fact that many water bodies are shared across boundaries which may be international (see water conflict) or intra-national (see Murray-Darling basin).

9.3 Special Objects of Management: The special of Management are as under

1. To survey and identify the available source of water in the jurisdiction of working plan area'
2. To identify the recharge zone.
3. To prepare and implement spring shed management plan.
4. To link forest management with watershed management.
5. To develop forest as to increase percolation and to reduce run-off.

Constitution of working circle

The working circle is overlapping in nature and will include all working circles

9.4 Identification of spring sheds

The field survey was conducted and different information sources was compiled and the list has been prepared which has been tabulated as Table 1.

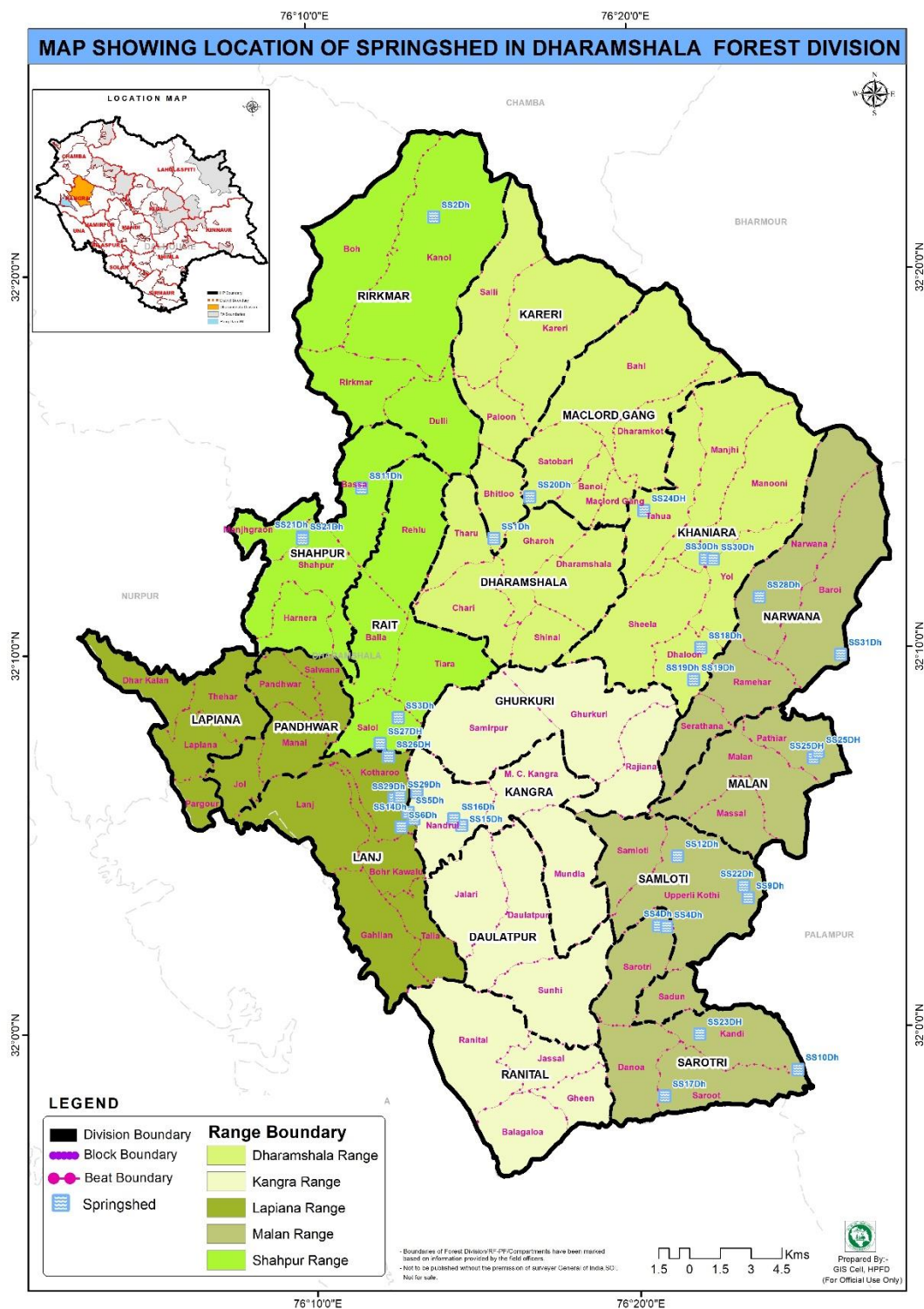
LIST OF SPRING SHEDS

Table No. 9.1

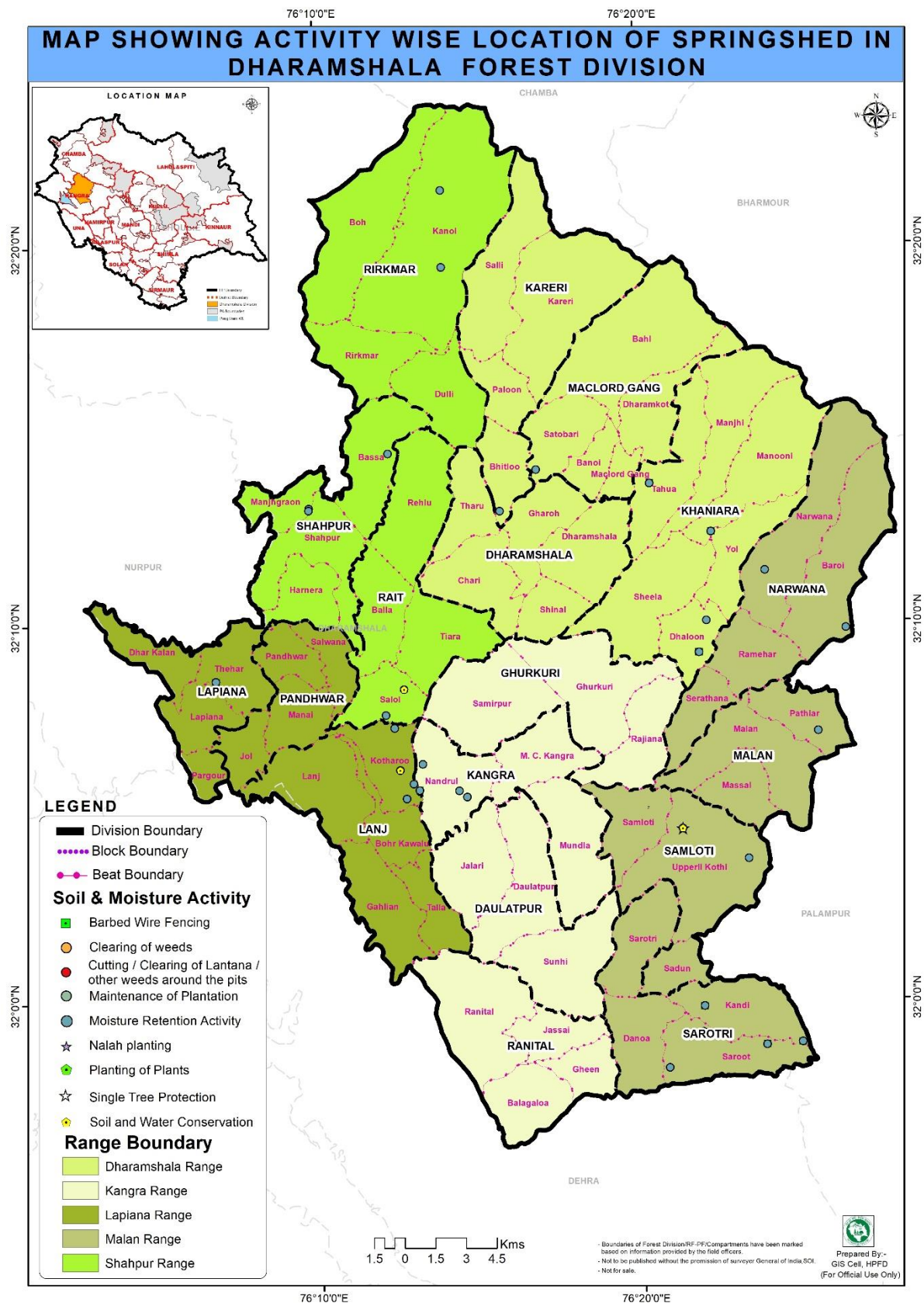
Sr. No.	Range	Block	Beat	VFMSs Name	Name of Spring Shed Plans (Yes/No)
1	2	3	4	5	6
1	Dharamshala	Dharamshala	Chari	Chari	Dhrindu
2	Dharamshala	Khaniara	Dhaloon	Karahpura	Karahpura Bowri
3	Dharamshala	Khaniara	Dhaloon	Rin	Shamshanghat Di Bowri
4	Dharamshala	Khaniara	Sheela	Rakkar	Panihar & Tillu Bowri
5	Dharamshala	Khaniara	Tahu	Tahu	Kutherni Panihar
6	Dharamshala	Kareri	Upper Satobary	Bhatala	Khola Bowri
7	Shahpur	Shahpur	Bassa	Bhanala	Sukar
8	Shahpur	Shahpur	Manj Ghran	Shahpur	Bardain-1 & Bardian - 2
9	Shahpur	Rait	Salol	Salol	Baser
10	Shahpur	Rait	Salol	Salol	Chakli-1
11	Mallan	Sarotri	Kandi	Chaprehar	Chaprehar
12	Mallan	Samloti	Samloti	Plahchaklu	Bowrni
13	Mallan	Samloti	Upper Kothiyan	Bagulehar	Dhara Da Amb
14	Mallan	Samloti	Upper Kothiyan	Bagulehar	Raneta
15	Mallan	Samloti	Upper Kothiyan	Bagulehar	Gujrehra
16	Mallan	Samloti	Saddun	Dadkar	Dadkar Bowri
17	Mallan	Mallan	Pathiyar	Mallan	Khui Basti & Dodu Nal Bowri
18	Mallan	Narwana Khas	Narwana Khas	Narwana Khas	Kasmaid
19	Mallan	Samloti	Samloti	Samiara	Tilla Tabba
20	Mallan	Narwana Khas	Banoi	Jule	Jule Patti
21	Mallan	Sarotri	Kandi	Khawa	Telkar Bowri
22	Mallan	Sarotri	Kandi	Kandi	Kharooni
23	Mallan	Samloti	Saroot	Eirla	Bharyalu
24	Mallan	Sarotri	Saroot	Chaprehar	Ker
25	Kangra	Kangra	Nandrool	Nandrool	Boudma
26	Kangra	Kangra	Nandrool	Nandrool	Bouru
27	Kangra	Kangra	Nandrool	Rajal	Madhuna
28	Kangra	Kangra	Nandrool	Rajal	Khairkar

29	Kangra	Kangra	Nandrool	Rajal	Kainth
30	Kangra	Kangra	Nandrool	Rajal	Bhatladu
31	Kangra	Kangra	Nandrool	Rajal	Sand & Dehru
G.Total					

Map No. 9.1



Map No. 9.2



9.5 PROPOSED TREATMENT

1. The recharge zone of water resource area be protected from biotic interferences
2. The forest cover around spring shed area should be increased by planting suitable tree, herb, shrubs and grasses species.
3. The rights and concessions of local right holders in recharge zone areas should be exercised in exigencies and in minimum quantities.
4. The measures like contour bunding, Contour trenching, percolation trenches etc. should be included in annual plan operations.
5. The engineering structures like water harvesting structures, farm ponds, percolation tanks /wells be included in annual plan operations
6. The funding be ensured from various schemes like state plan, centrally sponsored schemes, Campa etc.
7. Budgetary forecast will be made annually on the current wage rates applicable for that year.

CHAPTER 10

NON - TIMBER FOREST PRODUCE (OVERLAPPING) WORKING CIRCLE

General Constitution:

This is an overlapping WC and would include all the forests of the division under various working circles. The State has formulated Himachal Pradesh Forestry Sector Medicinal Plants Policy, 2006 which is aimed at conserving and strengthening medicinal plant resource base in forest areas as well as outside for use towards enhancing health and livelihood security of the people of the State on sustainable basis. Besides resin and katha (from *Acacia catechu*), other NTFPs include bamboos (now an NTFP under the FRA), several medicinal herbs like Atis (*Aconitum heterophyllum*), Karu (*Picrorhiza karruoa*); and several tree species like Amla, Harar, Behra and so forth.

10.1: NTFPs & Medicinal Plants:

Medicinal plants constitute by far the largest component of NTFPs. Several Government and other agencies are mandated to work for the development of the medicinal plant sector. While cultivation of medicinal plants (an agricultural activity) has been given much emphasis in policy and funding at both the National and State levels, conservation of medicinal plants (a forestry activity) has been lagging behind. Since, even now about 90 % of medicinal raw drugs are sourced from the wild, the conservation and sustainable harvest of medicinal plants becomes an over-arching priority. More so trade studies at national, regional and state levels clearly show that medicinal raw drugs from trees top the list of species in very high (>1000 mt) and high (>500 mt) demand.

Trees, however, are not amenable to cultivation and must be grown in the forests / other lands. It follows then that if in the future the demand for high consumption medicinal raw drugs is to be met, then it has to come from forests. The responsibility, therefore, of introduction of medicinal trees in forest plantation programmes in a big way, rests with the forest department.

Another area of concern is the conservation status of Himalayan high-altitude herbs. Since these herbs (PI see Appendix on Threatened Plants of HP), are quite locale specific and found above certain altitudes in the Himalaya, they too are not easily amenable to cultivation and must perforce be conserved (and sustainably harvested) in situ. The NMPB funds various schemes for the conservation and sustainable harvest of Himalayan medicinal herbs and presently

the HPFD is implementing two such schemes. Efforts need to be made by individual DFOs to write projects to access NMPB funding in these areas.

10.2: Special Objects of Management:

- i) To conserve and augment existing non timber forest produce including medicinal plants resource in its natural habitat;
 - ii) To encourage cultivation of commercially important species of medicinal plants on private lands,
 - ii) To develop a system of pricing the wild harvest so as to reflect both the conservation costs and the community benefits;
 - iv) To encourage public-private-community partnership for building capacity for cultivation
- value addition and processing of raw material before export from the state;
- V) To promote the use of commercially viable medicinal plants by the state owned and private pharmaceutical units and subsidiaries engaged in value addition;
 - vi) To maximize yield of medicinal plants through sustainable natural and artificial regeneration and scientific exploitation;
 - vii) To implement strategies and recommendations as per the State Medicinal Plants Policy 2006.

10.3: BLOCKS AND COMPARTMENTS: The entire tract of the division will be covered by taking beat as a unit.

10.4: AREA STATEMENT: The working circle is overlapping; no area statement is required.

10.5: ANALYSIS AND VALUATION OF THE CROP:

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

Common Medicinal Plants of Dharamshala:

Table No. 10.1

Sl No	Common/ Local Name.	Botanical Name	Type	Part used	Uses
1	2	3	4	5	6
1	Chil	<i>Pinus roxburghii</i>	Tree	Pine needles/ Oil	As liniment in rheumatic pains as stimulant, expectorant & in chronic bronchitis.
2	Khair	<i>Acacia Catechu</i>	Tree	Heart wood	Yield 'Katha' used as astringent, digestive, useful in cough & diarrhea, Externally applied to boils & eruptions on skin.
3	Amaltas	<i>Cassia fistula</i>	Tree	Pods/ Root bark	Fruit pulp is used as laxative, root bark is used in leprosy.
4	Amla, Aonla	<i>Emblica officinalis Gaertn</i>	Tree	Fruits	Diuretic & laxative. Phyllembin from fruit pulp mild depressant action on central nervous system & spasmolytic action. Rich source of vitamin 'C' and good liver tonic.
5	Atis	<i>Aconitum Hetrophyllum</i>	Herb	Root	Fever, Dysentery
6	Puthkanda	<i>Achyranthes aspera Linn</i>		Entire plant	Used in cough, & its decoction is given in renal dropsy & bronchial infection.
7	Bansa, Basuti	<i>Adhatoda vasica</i>	Herb	Leaves, Flowers	Used in treatment of Cough, Asthma & Ophthalmia
8	Bel	<i>Aegle marmelos</i>	Tree	Fruit	Fruit is chiefly used in chronic diarrhea & dysentery, sweet drinks- 'sharbat' soothing for intestines. Half ripe fruit is stringent, digestive & stomachic. Leaves are useful in diabetics.
9	Ramban	<i>Agave americana</i>	Shrub	Leaves & Stem	Fibre for rope making

10	Kikki, Siris	<i>Albizzia lebbeck</i>	Tree	Root, Bark, Flowers	Uses in hemicrania, cooling, alexiteric, anthelmintic. For asthma & snake bite.
11	Daru	<i>Punica granatum</i>	Tree	seed	Spice
12	Brahmi	<i>Centelia asiatica</i>	Shrub	whole	Ayurvedic medicine
13	Dharaphool	<i>Woodfordia fruticosa</i>	Shrub	Flower	Ayurvedic medicine.
14	Jung	<i>Dioscorea deltoides</i>	Shrub	Roots/	Ayurvedic medicine
15	Safed musli	<i>Asparagus adscendens Roxb.</i>	Shrub	Root	Used as demulcent and also in diarrhea and dysentery.
16	Khajoor	<i>Phoenix sylvestris</i>	Tree	Fruit leaves	Fruit, Broom
17	Taur	<i>Bauhinia vahlii</i>	Tree	Seed	Possesses tonic and aphrodisiac properties.
18	Kachnar	<i>Bauhinia variegata</i>	Tree	Bark	Astringent to bowels, tonic to liver, cures leucoderma, leprosy, asthma, wounds and ulcers.
19	Kashmal	<i>Berberis lycium</i>	Shrub	Roots	Yield 'Rasaunt' used in treatment of ophthalmia. Also used for piles & as tonic & laxative, in menorrhoea, skin disease & cholera.
20	Simal	<i>Bombax ceiba</i>	Tree	Wood/ Root	Wood used for planking, Toys, Well-curbs, Packing cases, Water shoots & Roots of saplings used as a nervine tonic.
21	Dhak, Palas	<i>Butea monosperma</i>	Tree	Wood/ Bark of roots/ Flower	Wood is used for well-curbs & Piles. The bark of the roots yields coarse brown fibre. Flowers give an Orange dye use to keep out white ants.
22	Ak	<i>Calotropis procera</i>	Shrub	Root/ Leaves	Roots bark is used in dysentery acts as diaphoretic, expectorant, emetic & is a valuable remedy in skin diseases. Tincture of leaves is useful

					in intermittent fevers & powdered flowers in cold, cough & Asthma.
23	Bhang	<i>Cannabis sativa</i>	Shrub	leaves/ flowers	Used as stomachic, antispasmodic, analgesic & sedative.
24	Daia	<i>Callicarpa macrophylla</i>	Shrub	Leaves	Heated & applied to rheumatic joints.
25	Chakunda, Kasonda	<i>Cassia occidentalis</i>	Weed	Roots	Useful in ringworm, elephantiasis & scorpion sting.
26	Malkangni	<i>Celastrus paniculata Wild</i>	Climber	Seeds/ leaves	Laxative, stimulant, aphrodisiac & used in leprosy, gout & rheumatism
27	Akanadi, Harjori	<i>Cissampelos pareira</i>	Climber	Roots	Used in diarrhea, dysentery, colic pains, cough & urinary troubles.
28	Akas-Bel, Sarag-Bali	<i>Cuscuta reflexa</i>	Climber	Leaves	Used in Veterinary Practice for poultice on sprains.
29	Mircha-gandh	<i>Cymbopogon martini</i>	Grass	Roots/ Leaves	Roots used as a souvenir for friends & from leaves Aromatic oil is extracted.
30	Kaladhatura	<i>Datura metel Linn</i>	Shrub	Leaves flowering tops & seeds	Used in treatment of asthma.
31	Thorn apple, Safed Dhatura	<i>D.stramonium Linn</i>	Shrub	Leaves flowering tops & seeds	Narcotic, used in treatment of asthma. Expectorant, antispasmodic, demulcent and anodyne in cough & asthma.
32	Lal dudhi	<i>Euphorbia hirta</i>	Shrub	Entire plant	Drug used in bronchial affections, cough, asthma & in removing worms in children & in bowel complaints.
33	Pipal	<i>Ficus religiosa</i>	Tree	Bark	An aqueous extract shows anti-bacterial activity.
34	Kangu	<i>Flacourtia indica</i>	Shrub	Seed	Fruit are edible, bark is astringent & diuretic & applied to eczemas. Past of the bark is given

					internally only once in dog bite. Fruit are digestive & stomachic.
35	Maror-phali	<i>Helictis isora</i>	Shrub	Fruit/ Bark/ Root	Root is used in cough & Asthma. Leaf paste against skin diseases including eczema. Fruit powder is used in dysentery & vomiting. Fried fruit is given to children to kill intestinal worms.
36	Aam	<i>Mangifera indica</i>	Tree	Fruit/ Bark	Acrid, cooling, astringent to the bowels.
37	Drek	<i>Melia azaderach</i>	Tree	Leaves seeds	Anthelmintic. Used in rheumatism.
38	Jangli pudina	<i>Mentha longifolia Huds</i>	Shrub	Leaves	Carminative and stimulant.
39	Kambel, Rohni, Kamala	<i>Mallotus Philippinensis</i>	Tree	Bark/ fruit	Drug kamela used for destroying tapeworms used externally in treatment of skin diseases.
40	Marua-bel	<i>Marsdenia tenacissima</i>	Shrub	Bark/ Juice	Bark yields a silky-white fibre used for fishing-lines, bow-string by mountaineers, coagulated milky juice used as Indian rubber.
41	Sahjan	<i>Moringa pterigosperma</i>	Tree	Fruit/ Bark/ Leaves	Used in gout & acute rheumatism.
42	Gandhela	<i>Murraya koenigii</i>	Shrub	Leaves	Used for flavour to curries.
43	Kaner	<i>Nerium indicum Mill</i>	Shrub	Leaves	Anthelmintic especially for tapeworms.
44	Harsingar	<i>Nyctanthes arbor-tristis</i>	Tree	Leaves/ Flower	Leaves used for polishing wood, in medicine as a febrifuge and flower used as orange dye.
45	Kakkar	<i>Pistacia integerrima</i>	Tree	Galls	Kakrasingi used in native medicine.
46	Chicha, Chita	<i>Plumbago zeylanica linn</i>	Shrub	Roots	As an appetizer, used in skin diseases, diarrhea, piles, used as application in scabies & unhealthy

					ulcers.
47	Bhekhhal, Bekkra	<i>Prinsepia utilis</i>	Shrub	Entire plant	Yields oil used as a rubefacient & in rheumatism.
48	Manjith, Satavar	<i>Rubia cordifolia linn</i>	Climber	Entire plant	Used in rheumatism & several Ayurvedic preparations.
49	Ritha	<i>Sapindus mukorossi</i>	Tree	Fruit	Used in salivation, epilepsy, chlorosis.
50	Arjun	<i>Terminalia arjuna</i>	Tree	Bark	Cooling, alexiteric, styptic, tonic, antidiysenteric, diseases of heart, anaemia, excessive perspiration, asthma.
51	Bahera	<i>Terminalia bellerica</i>	Tree	Bark	Mild diuretic, useful in anaemia & leucoderma.
52	Harad	<i>T.Chebula Retz.</i>	Tree	Fruits	Astringent, useful in dysentery & diarrhea, good in ophthalmia, diseases of the spleen, piles, cold in the head.
53	Banafsha	<i>V.Serpens</i>	Herb	Roots	Purgative, good febrifuge, tonic, expectorant, diuretic, removes inflammation
54	Nirgundi, Bana, Samhalu	<i>Vitex negundo</i>	Shrub	Leaves	Considered tonic, smoked for headaches and applied to rheumatic swellings of joints.
55	Ashwagandha	<i>Withania somnifera(L)Dunal</i>		Fruits	Used for liver complaints, asthma & biliousness.
56	Ber	<i>Zizyphus mauritiana</i>	Shrub	Leaves/ Fruit	Laxative, given in throat troubles, source of vitamin 'C' & Sugars.

Apart from the above species following grasses and bamboos also occur throughout the tract.

Lambi *Arisida depressa*

Dhalu *Chrysopogon fulvus*

Makora *Cymbopogon martini*

Bagar	<i>Eulaliopsis binata</i>
Lambh	<i>Hetropogan contortus</i>
Kahi	<i>Saccharum spontaneum</i>
Lunji	<i>Sorghum nitidum</i>

Bamboos

Magar	<i>Dendrocalamus hamiltonii</i>
Bans	<i>Dendrocalamus strictus</i>
Mohar	<i>Bambusa arundinacea</i>

The above NTFP species occur throughout the tract, both in the forests and non-forest areas which include land ceiling areas and Shamlats also.

10.6: STOCK MAPS:

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

10.7: METHOD OF TREATMENT:

10.7.1: ROTATIONAL EXTRACTION:

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

10. 8: ACTION ON BERBERIS CONSERVATION:

1. A study to answer the questions raised must be commissioned soonest possible
2. A PAR (Participatory Action Research) study be undertaken to evolve and adopt and monitor non-destructive ways of harvesting this species.
3. Berberis should be raised in large numbers in nurseries, as it is a very versatile species for use in Bio-engineering.

10.9: POLICY ON INTRODUCTION OF MEDICINAL TREES IN FORESTS:

It is now the state policy that in different plantations of the forest department about 30% of the trees being planted need to be of medicinal value

and also native to the tract where plantation is being done. There is thus a need to identify and grow suitable medicinal trees for different altitude zones in a particular forest division. While most trees may be technically "medicinal", it is important that species like deodar, khair, chil etc. which are normally grown in forest plantations are not reckoned as medicinal trees. In Dharamshala Forest Division, the low-lying nurseries i.e. < 1200 mts. need to grow species like Amla, Harar, Behra, Bel (bil) etc. in sufficient numbers. It is important that these species need to be grown as Tall plants in the nurseries before being planted out. Similarly, between 1200 and 2400 mts. Species like *Myrica nagi* (kaphal), *Pistachia integerrima*, walnut, bird cherry, hazelnut etc. need to be grown in nurseries.

10.10: CALCULATION OF YIELD:

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

10.11: SUBSIDIARY SILVICULTURAL OPERATIONS:

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

10.12: MISCELLANEOUS REGULATIONS:

This includes extraction or collection and export of NTFP's. The collection of NTFPs is allowed strictly as per provisions of Settlement report. The export is allowed under HP Forest Produce Transit (Land Rout) Rules, 1978 against payment of specified export permit fee. The HP Govt has recently notified that 37 species of medicinal plants / NTFPs can now be exported through a permit obtained from the panchayat pradhan on payment of the regular export permit fee.

10.13: National Bamboo Mission:

"The Development of Bamboos in HP" project has been taken up in the state since 2007-08. It is a 100 % CSS and aims to improve the status of bamboos in the state's forests. Funding is received yearly on the basis of annual plans. The project supports: Plantation of bamboo on forest lands with JFMCs; Plantation of bamboo on non-forest lands (on notional hectare basis); Improvement of existing bamboo forests and Capacity building of field staff/ farmers. So far plantations

over 2467 ha of forest land, 1054 ha of non-forest land and improvement in 626 ha of forests has been carried out. The project covers all of Dharamshala circle and therefore Dharamshala forest division also.

10.14: National Medicinal Plant Board:

A scheme for the "Conservation and Propagation of Medicinal Plant Species" has been approved by the NMPB for the Kangra district for a five-year period, between 2008-09 and 2012-13. This scheme is a 100 % CSS and includes the D'sala Forest Division. During the 5-year period, the scheme would plant over 628 ha of medicinal species including trees in Kangra district. So far about 324 ha have been covered. These plantations are aimed to strengthen fast dwindling medicinal plant resources in the State

Results would be known only after 4 to 5 years. This initiative has created good awareness & enthusiasm in local communities. Also, it has built capacity of field staff in mass multiplication of medicinal species.

10.15: Export of NTFPS

In 2003, the HP Govt notified that for 37 species of Medicinal Plants and some NTFPs, export permits would be issued by the concerned panchayat pradhans. Pl. see Appendix N 7. The permit is to be verified / vetted by the concerned forest guard. The export permit fee, also given in the notification is to become the revenue of the Gram Panchayat. How well or otherwise this system is working is yet to be assessed. A downside has been that the Forest division now does not usually have the record of NTFPs exported out, although a copy of each permit is supposed to be marked to the DFO's office. Now the system has been reverted and permits are being issued by the Divisional Forest Officers.

10.16: Survey

During the Working plan period a detailed survey of the NTFP Species availability is prescribed over the whole division.

CHAPTER 11

WILDLIFE MANAGEMENT (OVERLAPPING) WORKING CIRCLE

11.1: General Constitution of Working Circle:

Forests are inseparable part of wildlife habitat. If the forests flourish, the wildlife self-generates. However, since the beginning of the nineteenth century, ruthless destruction of wildlife habitat has resulted in pronounced improvement and regression of wild animals. Especially in the past five decades, the habitat of wild animals has been greatly affected by intensive agriculture, urbanization, and construction of dams and canals etc. Most of the land in the state has excess to human interference including forests. Intensive agriculture on one hand has depleted the habitat of large mammals and on the other hand has favoured rodent pests. The intensive use of pesticides and chemical fertilizers has a bad effect on the population of many of the aquatic and terrestrial animals. Effect of use of deadly pesticides has been pronounced on the populations of partridges, house sparrows, vultures and many others. After clearance of vegetation, the wild animals particularly the carnivores were indiscriminately hunted and killed from this area to the point of extinction. After independence, though, measures have been taken to restore the vegetation cover which has yielded positive results. The Wildlife (Protection) Act, 1972 was enforced in the state w.e.f. 01.04.1975 to save the environment and wildlife. The rules under this Act were also framed and notified Wildlife Divisions has been created to manage protected areas with its headquarter at Hamirpur to look after the protection of wildlife in this area. Besides, the Divisional Forest Officer (wildlife), the territorial D.F.O. and the subordinate staff is equally responsible for the protection and enforcement of wildlife (Protection) Act, 1972. Wildlife Working Circle has been created to look after the interests of wildlife and their habitat while managing the forests.

11.2: Objectives of Management: The following are the special objectives of management:

1. To conserve and protect the existing biodiversity of the ecosystem as a whole.
2. To improve the wildlife habitat in terms of living space, forage conditions, protective and breeding cover, water holes and salt licks.
3. To supplement the existing natural vegetation by planting fruit and fodder species with special emphasis on trees that provide shelter to wild animals and birds.

4. To prepare scientific data base for the maintenance and development of viable populations of fauna.

11.3: Importance of Wild Life

11.3.1 CULTURAL VALUE OF WILD LIFE

Indian mythology, art and literature are bound intimately with animals and birds in a hundred verses are echoed in the prayers of the Vedic hymns, praising the cattle Nandi as the Vahan of Shiva, Garuda of Vishnu, Swan of Saraswati and Peacock of Kartikeya, while Lakshmi is surrounded by elephants. How Krishna leans against a Kadamba tree attended by cows or driving them home at sun set to the gates of Vrindaban is depicted in thousand pictures. Similarly, lion is the charger of Durga in her fight against the forces of darkness and barbarism. It is because of this association that lion has become the symbol of Dharma.

11.3.2 SCIENTIFIC AND BIOLOGICAL VALUES:

In some quarters there is an erroneous notion prevalent that the wild animals are instrumental in damaging the field crops and domestic animals. Hence out of ignorance many people resort to indiscriminate destruction of these animals. The fact is other way round. The herbivorous animals do not damage the field crop if sufficient food is available in their natural habitat. The animals check the cover growth of vegetation and their population provides food for the carnivore. If man does not indiscriminately destroy the wild animals, the Carnivorous animals will not lift his domestic animals or attack him. When the natural balance of wild animal population is upset by the callousness of human beings, they invade the fields and human habitations. The birds are helpful and useful to man in innumerable ways. Apart from their beautiful look, feathers and sweet songs, they devour millions of crop pests and rodents. They also scavenge the forests; bring about pollination of flowers of some of the fruit and forest trees and help in dispersal of seeds. But for the help of birds in destroying the crop pests, which multiply at a tremendous rate, it would have been rather impossible to raise field crops. These pests live on wood, living on plant leaves, flowers and fruits and eat 2 to 200 times of their body weight per day, on alarming magnitude indeed. Thus, the contribution of bird population in maintaining the vegetational cover on earth and help in raising the field crops for food cannot be over emphasized. And hence the importance of balance in the constituents of nature nevertheless, the animals damaging crops, lifting domestic animals and man eaters have to be killed and thus the balance restored.

How then, can we dis-associate ourselves from these creatures? Ancient oriental wisdom constantly emphasized on the unity of all earthly life

and science is bringing us back to some point. And yet, we appear to be utterly impervious to the urges of the wisdom distilled either from ancient philosophy or from modern science. It is also wise to remember that we can destroy a species but surely, we can never recall it.

11.3.3 Economic value

There is economic side of wild life too. This implies the benefits or profits; we may get from the use of wild animals. The monkeys, for instance, have been useful in research for cures of human diseases. The musk pods of the musk deer are of great repute.

11.3.4 Recreational & Aesthetic value

The beauty of wild animals and birds fascinates the bird watchers, sport enthusiasts, photographers-both armature and professionals, animal and bird ecologists and biologists, and the gaiety hunters, the tourists from within and outside the country. The country side blessed with natural beauty bearing beautiful woods, wild animals and birds attract a multitude of tourists for sight-seeing, sport and rest in such surroundings. Tourism earns substantial revenue for the state. Besides, revenue, people of the areas including hoteliers, transporters etc. are also benefitted in many ways.

11.4 Character of Vegetation:

As already mentioned, the forests in the area comprise Dry Tropical forests, Sub Tropical pine forests, Sub-Tropical dry evergreen forests, Himalayan moist temperate forests, Sub-Alpine and Moist Alpine Forest types with predominance of trees such as Chil, khair, simul, shisam, ban oak, Rajain, Deodar, Rhododendron. Amaltas, Pyrus, and Kangu etc. The common bamboo found is *Dendrocalamus strictus*. A number of fruit and fodder trees for wildlife importance occur in the areas of which the following are important:

1. Bel (*Aegle marmelos*)
2. Amaltas (*Cassia fistula*)
3. Dhak (*Butea monosperma*)
4. Khair (*Acacia catechu*)
5. Phaai (*Acacia modesta*)
6. Kainth (*Pyrus pashia*)
7. Harar (*Terminalia chebula*)
8. Bohr (*Ficus glomerata*)

9. Pipal (*Ficus religiosa*)
10. Kangu (*Flacourtia indica*)
11. Amla (*Emblica officinalis*)
12. Jamun (*Syzygium cuminii*)
13. Ber (*Zizyphus jujuba*)
14. Bhera (*Terminalia balerica*)
15. Ban (*Quercus Spp.*)
16. Garna (*Berberis spp.*)
17. Akha (*Rubus Spp.*)

The following palatable grasses are found:

1. *Cymbopogon martinii*
2. Khabbal (*Cynodon dactylon*)
3. Panni (*Dicanthium annulatum*)
4. Kahi (*Saccharum spontaneum*)
5. *Agropyron Spp*
6. *Hitreopogon contortus*
7. *Bromus asper*
8. *Danthonia spp*
9. Dholu (*Chrysopogon spontaneum*)
10. Nari (*Fragmites carka*)
11. Dub (*Desmostachya bipinnata*)

Therefore, there is a variety of tree and grass forage found in these forests. However, there is a persistent scarcity of water in the dry and winter months in part of Mallan, Kangra and Lapiana ranges.

11.5: Analysis and evaluation of wildlife and its habitat.

Wildlife Institute of India in its bio geographical classification has recognized Dhauladhar region as one of the regions of biological significance. In this region, animals like Pangolin and Pythons are rare which are included in the International Red Data list of I.U.C.N. Sambar, barking deer and hog deer

which are included in the schedule III of Wildlife (Protection) Act, 1972 are also found in these forests. Leopards are found in the area. Apart from above, other animals such as Black buck, blue bull, Wild boar, Jackal, Rufous tailed hare, small Indian mongoose, fruit bat, Rhesus monkey, Indian Porcupine are common. The list of recorded animals in these forests is given in Table 11.2.

A variety of birds are also found in the area of which are peacock, koel, pied- crested cuckoo, red jungle fowl, blue rock pigeon, doves, lapwings, babblers, hoopoe, bulbuls, jungle mynas, grey tit, golden backed wood pecker, king crow, shama, common grey hornbill and grey partridges are important occurring in numbers. The main bird species which are not seen in other parts of the state but found in this tract include Himalayan slaty headed parakeet, Blue headed Rock thrush, yellow backed sunbird and paradise flycatcher. The list of birds found in the tract are given in Table 11.3.

11.6: Wildlife Conservation Measures:

The protection to wildlife can be afforded by adopting preventive, remedial and control measures. The preventive measures suggested are creation of public awareness, immunization of cattle in the surrounding areas to ensure that contagious diseases do not spread to wildlife. Controlling of grazing in the wildlife rich areas so that cattle do not encroach upon the rights of forage of wild animals. The awareness about the benefits of wildlife can be created effectively through meeting the elderly people, delivering lectures in schools and colleges, arranging public shows during village melas and Govt. functions. The public at large and concerned staff should be suitably rewarded for prevention, investigation and prosecution of cases relating to wildlife offences. Wild life club can be constituted to foster interest in wild life conservation as the town is inhabited by a large number of government employees and educated populace.

The remedial measures like habitat improvement, pasture development, creation of water holes, provision of salt licks, and periodical census of wildlife are of importance. The control measures suggested are anti-poaching measures through strengthening of infrastructure and communication network, prevention of forest fires and enforcing legal provisions of wildlife (Protection) Act, 1972.

11.7: Habitat Improvement:

Habitat especially for the endangered species and the species in the schedule-I of the Wildlife (Protection) Act, 1972 requires to be protected by all means. The areas where schedule-I animals are found, needs to be specially protected and entry of domestic animals should be stopped so that wild animals get the required forage and shelter. Regular monitoring of their

habitat should be done.

There should be no felling amounting to alteration of crop composition near the water holes and on the paths frequented by the wild animals. Gap planting with species such as Amla, Bahera, Jamun, Ber, Mallah, Bel, Kinu, Bauhinia and Dhak should be carried out in pockets. Lantana weed is the biggest hazard for deterioration of wildlife habitat. Measures to control its further spread, and eradication and utilization of the existing lantana weed as suggested in the Plantation Working Circle should be vigorously adopted.

Provisions have also been made in the various Working Circles to reserve the trees of wildlife importance near the water holes, baulis, near temples and shrines. Similarly, trees providing roosting and nesting for birds are to be left intact. One dead tree preferably of low commercial value per hectare should be retained for shelter and resting of wildlife. Unsound and hollow logs are to be left in the forest as shelter for wildlife provided, they are not fire hazard.

Salt licks may be provided at important water holes where the wild animals regularly make a visit. In addition to this, all measures which are undertaken like provision of water holes, salt licks, where ever required supplementing animal shelters, provision of interlink chain fencing at sensitive locations, sensitization drives to local students, public, Youwak Mandals, Mahila Mandals, PRIs may be provided in the annual plan of operations to strengthen conservations measures, spreading over all working circles.

11.8: Provision of Water holes:

Due to high gradient and lack of suitable water harvesting structures, the area is deficient in water to meet the needs of the wild animals. As a result, the animals in the dry months of summer and winter months usually migrate to the lower foothills and the farmers' fields to find water. It is therefore absolutely necessary to construct water holes at suitable locations for storage of water in the lean months. Such water holes may be in the form of ponds, water tanks, check dams at the choe heads, but they should be constructed in a manner to allow storage of water for the maximum period. To stop the seepage of water layers of bajri /gravel, two layers of polythene sheet in between the sand layers, and the uppermost layer of bajri should be prepared. Silt retention dams should be prepared in the catchment area. No vertical concrete walls are allowed around the ponds and they should be gradually slanted, for easy approach of wild animals.

11.9: Fire Protection:

Fire is potentially a deadly enemy of both forests and wildlife. Rapid running forest fires particularly crown fires are very destructive to wildlife. If it occurs in the nesting season of birds, breeding stock may be destroyed. The wild animals are usually trapped in the thick lantana bushes in case of fire. The rodents and reptiles are usually the bigger casualties as they are holed up. Therefore, strict fire protection measures as prescribed in the Protection Working Circle should be followed. The fire watch towers should be used for detection of fire outbreaks.

11.10: Anti-Poaching Measures:

Poaching is one of the main causes for destruction of wildlife. For effective protection of wildlife from poaching and hunting, preventive patrolling, establishment of check posts, arming of staff with vehicles and weapons and communication network are being done by the wildlife wing. Joint inspections by the wildlife and territorial staff should be conducted to stop the hunting of wild animals.

11.11: Census of Wild animals:

Census of wild animals give useful data for management. To have a clear picture of wildlife species and their diversity, the department should conduct at least one census during the period of Working Plan. Special census of red jungle fowl should be undertaken in the working plan period to know the population size of the species. Survey of ungulates population is essentially required to be conducted in order to assess general health of Biodiversity and to find out exact reason of increasing cases of attack by Leopard on domestic animals as depicted in the table 11.1 and related pie chart below.

11.12: Coordination between Forests and Wildlife Sections:

Coordination between forests and wildlife wings is imperative in the interest of forests and wildlife. Forest is the habitat for wildlife and wildlife is the protector of forest growth. The survival of wildlife is dependent on the existence of forests. The role of each component is required to be understood and appreciated in their respective roles. It is therefore suggested that not only the level of existing position of divisional functionaries of wildlife improved but effective wildlife management should be created. The support of fully equipped rapid response team of Wildlife wing is essentially required to supplement the efforts of Division level RRT for rapid rescue of the injured animals.

11.13: Man-animal conflict:

Usually in the winters and in the hot month of April- June when there is a scarcity of water and fodder inside the forests, the wild, animals move out of the forests and raid the adjoining fields of farmers. Thus, damaging the agricultural crops. And also, during the severe winters the animals also migrate from the regions of snow clad Dhauladhar Himalayas to lower elevations. This requires strict vigil to ensure safety of the Wild animals. To compensate the farmers, HP Forest Department has framed the rules. The compensation is provided to the farmers after assessment of damage by the local forest officer, or the revenue officer of the area. The following are the compensation rates and ex-gratia relief payable to the victims of predation/depredation by wild animals as under: -

Table Compensation rates: -

Table No. 11.1

Sr no	Particular	Rate
1	Death of Human Being	4,00,000
2	Permanent disability to human being	2,00,000
3	Grievous injury to human being	75,000
4	Simple injury to human being	15,000
5	Loss of horse, mule, buffalo, ox, yak and camel	30,000
6	Loss of Cow jersey and cross bred	15,000
7	Loss of Cow (Local), donkey, churu, churi and pashmina goat	6,000
8	Loss of sheep , goat and pig	3,000
9	loss of young one's of sheep, goat, cow all breeds, horse, mule, buffalo, yak, camel, churu, churi, and pashmina goat	1,500

Table 11.2: Wild Animal Attack Information

Wild Animal Attack Information w.e.f Year 2006-07 to 2022-23						
Sr.No.	Name of Division	Year	No. Of Cases	Name of Wild Animal attack	Animal Killed	Compensation Amount Paid
1	D/shala	2006-07	1	Attack By leopard	Sheeps=4	1600
		Total	1			1600
1		2007-08	1	Attack By leopard	Ox-1	1500

2		2007-08	1	Attack By leopard	Goats=3	1125
3		2007-08	1	Attack By leopard	Goats=16	6000
4		2007-08	1	Attack By leopard	Ox=2	1250
		Total	4			9875
1		2008-09	1	Attack By leopard	Goats=1 Sheeps=2	1125
2		2008-09	1	Attack By leopard	Goats=1	750
3		2008-09	1	Attack By leopard	Goats=1 Sheeps=2	1687
		Total	3			3562
1		2009-10	1	Attack By leopard	Goats=5 Sheeps=3	3000
2		2009-10	1	Attack By leopard	Sheep=9	3375
3		2009-10	1	Attack By leopard	Goat=10 Sheep=5	6000
4		2009-10	1	Attack By leopard	Goat=7	2625
5		2009-10	1	Attack By leopard	Calf=1	250
		Total	5			15250
1		2010-11	1	Attack By leopard	Goat=7	2625
2		2010-11	1	Attack By leopard	Buffalo=7	1500
3		2010-11	1	Attack By leopard	Goat=6	2400
		Total	3			6525
1		2011-12	1	Attack By leopard	Goat=12	3250
		Total	1			3250
1		2013-14	1	Bear Attack	Goat -11	33000
		Total	1			33000
1		2014-15	1	Attack By Bear	Cow killed by bear	6000
		Total	1			6000
1		2015-16	1	Attack By leopard	Goat=10	15000
		Total	1			15000
1		2016-17	1	Attack By leopard	Cow=1	6000
		Total	1			6000
1		2017-18	1	Attack By leopard	Sheep=9 Goat 2	15500
2		2017-18	1	Attack By leopard	Jersry cow=1	6000

3		2017-18	1	Attack By leopard	Billy goat=1	1500
		Total	3			23000
1		2018-19	1	Attack By leopard	Jersy cow =1	6000
2		2018-19	1	Attack By leopard	Jersy cow =1	6000
3		2018-19	1	Attack By leopard	Goat=6	18000
4		2018-19	1	Attack By leopard	Goat=3	9000
5		2018-19	1	Attack By leopard	Cow=1	15000
6		2018-19	1	Attack By leopard	Goat -3	9000
		Total	6			63000
1		2019-20	1	Attack By leopard	Goat=1	3000
2		2019-20	1	Attack By leopard	Goat=1	3000
3		2019-20	1	Attack By leopard	Ox=1	30000
4		2019-20	1	Attack By leopard	Jersy Cow=1	15000
5		2019-20	1	Attack By leopard	Ox=1	30000
6		2019-20	1	Attack By leopard	Goat=3	9000
		Total	6			90000
1		2020-21	1	Attack By leopard	Goat=8	24000
2		2020-21	1	Attack By leopard	Jersy Cow=1	15000
3		2020-21	1	Attack By leopard	Jersy Cow=1	15000
4		2020-21	1	Attack By leopard	Ox=1	30000
5		2020-21	1	Attack By leopard	Mule=1	30000
6		2020-21	1	Attack By leopard	Local breed cow=1	6000
7		2020-21	1	Attack By leopard	Goats =11	33000
		Total	7			153000
1		2021-22	1	Attack By leopard	Jersy Cow=1	15000
2		2021-22	1	Attack By leopard	Jersy Cow=1	15000
3		2021-22	1	Attack By leopard	Mule=1	15000
4		2021-22	1	Attack By leopard	Jersy Cow=1	15000
5		2021-22	1	Attack By leopard	Goat=4	12000
6		2021-22	1	Wild Animal Attack	Goat-7	21000
7		2021-22	1	Attack By leopard	Goat=6	18000
8		2021-22	1	Attack By leopard	Lamb-18	27000
9		2021-22	1	Attack By leopard	Local breed	6000

					cow =1	
10		2021-22	1	Attack By leopard	Local breed cow =1	6000
		Total	10			150000
1		2022-23	1	Attack By leopard	Goat =1	3000
2		2022-23	1	Attack By leopard	Horse=1	30000
3		2022-23	1	Attack By leopard	Cow=2 Local Breed	12000
4		2022-23	1	Attack By leopard	Ox=1	30000
5		2022-23	1	Attack By leopard	Goat=4	12000
6		2022-23	1	Attack By leopard	Goat Male=1	3000
7		2022-23	1		Ox =1	30000
8		2022-23	1	Attack By leopard	Jersy Cow=1	15000
9		2022-23	1	Attack By leopard	Cow=1	15000
		Total	9			150000
		Total Cases	62			729062

Figure 11

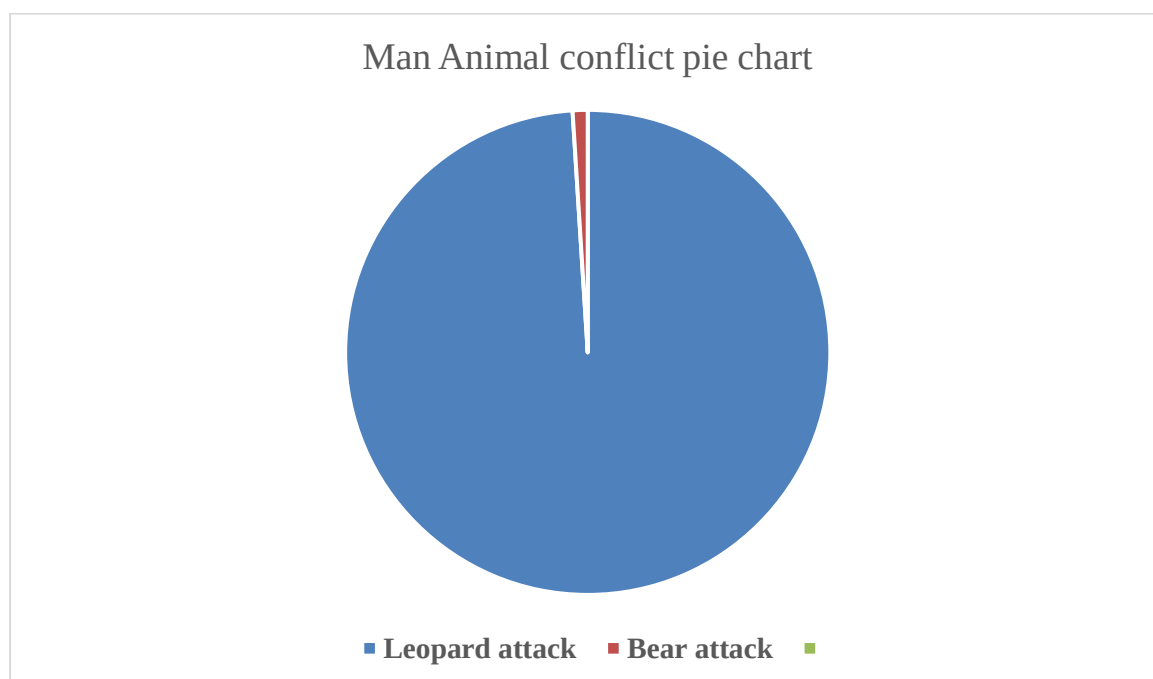


Table 11.3: List of Wild Animals found in Dharamshala Forest Division

S.No.	Common Name	Scientific Name
1.	Black buck or Indian Antelope	<i>Antelope cervicapra</i>

2.	Blue Bull	<i>Boselophus tragocamelus</i>
3.	Wild boar	<i>Sus scrofa</i>
4.	Spotted deer	<i>Axis axis</i>
5.	Barking deer	<i>Muntiacus muntlak</i>
6.	Sambhar	<i>Cervas unicolor</i>
7.	Hog deer	<i>Axis porcinus</i>
8.	Indian Pangolin	<i>Manis crassicaudata</i>
9.	Jackal	<i>Canis aureus</i>
10.	Rufous tailed hare	<i>Lepus nigricollis</i>
11.	Small Indian Mongosse	<i>Herpostes autopundatus</i>
12.	Common Mongoose	<i>Herpestus edwardsi</i>
13.	Fruit bat	<i>Rousettus leschenaultia</i>
14.	Smaller Indian Civet	<i>Vivesrricula indica</i>
15.	Rhesus Monkey	<i>Macaca mulatta</i>
16.	Indian Porcupine	<i>Hystrix indica</i>
17.	Common house rat	<i>Rattus rattus</i>
18.	Pale Hedge hog	<i>Paracchinus micropus</i>
19.	Grey Musk shrew	<i>Suncus murinus</i>
20.	Indian Fox	<i>Vulpes bengalensis</i>
21.	Palm squirrel	<i>Funambulus pennanti</i>
22.	Yellow monitor lizard	<i>Varanus flavescens</i>

Table 11.4: List of Birds found in Dharamshala Forest Division

S.No.	Common Name	Scientific Name
1	Little Grebe	<i>Podiceps luficollis</i>
2	Large Cormorant	<i>Phalacrocorax carbe</i>
3	Little Cormorant	<i>Phalacrocorax nigher</i>
4	Darter and Snakebird	<i>Anhinga rufa</i>
5	Grey heron	<i>Ardea cinerea</i>
6	Purple Heron	<i>Ardea purpurea</i>
7	Pond Heron	<i>Ardeola grayii</i>
8	Eastern Grey Heron	<i>Ardea cinerea rectirostria</i>
9	Eastern Purple Heron	<i>Ardea purpurea manilensis</i>
10	Cattle Egret	<i>Bubulcus ibis</i>
11	Large Egret	<i>Ardea alba</i>
12	Median Egret	<i>Ergetta intermedia</i>
13	Little Egret	<i>Egretta garzetta</i>
14	Night Heron	<i>Nycticorax nycticorax</i>
15	Chestnut Bittern	<i>Ixobrychus cinnamomeus</i>
16	Black ibis	<i>Pseudibis papillosa</i>
17	Glossy ibis	<i>Plegadis falcinellus</i>
18	Barheaded goose	<i>Anser indicus</i>
19	Brahminy duck	<i>Tadorna ferruginea</i>
20	Pintail duck	<i>Anas acuta</i>
21	Common teal	<i>Anas crecca</i>
22	Spotbill Duck	<i>Anas peocilorhyncha</i>
23	Mallard	<i>Anas platyrhynchos</i>
24	Gadwall	<i>Anas strepera</i>
25	Wigeon	<i>Anas penelope</i>
26	Garganey	<i>Anas quersuedula</i>
27	Shoveller	<i>Anas clypoata</i>
28	Redcrested pochard	<i>Netta rufina</i>
29	Common pochard	<i>Aythya ferina</i>
30	Whiteeyed pochard	<i>Aythya hyroca</i>
31	Tufted pochard	<i>Aythya fuligula</i>
32	Cotton Teal	<i>Nottapus coromeddellianus</i>
33	Comb Duck or Nakta	<i>Sarkidiernis melanotos</i>
34	Black winged Kite	<i>Elanus caeruleus</i>
35	Pariah kite	<i>Milvus migrans</i>
36	Laggar Falcon	<i>Falco hiarmicus jugger</i>
37	Asiatic merlin	<i>Falco colummarius insignis</i>
38	Brahminy kite	<i>Haliastur indus</i>

39	Shikra	<i>Accipitar badius</i>
40	Imperial Eagle	<i>Aquila helieca</i>
41	Tawny Eagle	<i>Aquila vindhiana</i>
42	Lesser spotted Eagle	<i>Aquila pomarina</i>
43	Greater spotted Eagle	<i>Aquila clanga</i>
44	Fall"s Fishing Eagle	<i>Haliaeetus leucoryphus</i>
45	Whitebecked vulture	<i>Gyps bengalensis</i>
46	Scavenger vulture	<i>Neophron perenopterus</i>
47	Pale Harrior	<i>Circus macrourus</i>
48	Marsh Harrier	<i>Circus aeruginosus</i>
49	Osprey	<i>Pondion heliactus</i>
50	Peregrine Falcon	<i>Falco peregrinus</i>
51	Black partridge	<i>Francolinus francolinus</i>
52	Grey partridge	<i>Francolinus pondicerisnus</i>
53	Bush Quail	<i>Perdicula asiatica</i>
54	Grey Quail	<i>Coturnix coturnix</i>
55	Kalij Pheasant	<i>Lophura leucomelana</i>
56	Pea fowl	<i>Pavo cristatus</i>
57	Red jungle fowl	<i>Gallus gallus murghi</i>
58	Ruddy crake	<i>Amaurornis fuscus</i>
59	Brown crake	<i>Amaurornis akool</i>
60	Baillon"s crake	<i>Porzana pusilla</i>
61	Whitebreasted water-hen	<i>Amaurornis pheenicurus</i>
62	Indian Moorhen	<i>Gallinul chloropus</i>
63	Purple moorhen	<i>Porphyrio porphyrio</i>
64	Coot	<i>Fulica atra</i>
65	Pheasant tailed Jacana	<i>Hydrophasianus chirurgus</i>
66	White tailed lapwing	<i>Venellus leucurus</i>
67	Red wattled lapwing	<i>Venellus indicus</i>
68	Peewit	<i>Venellus venellus</i>
69	Little ring plover	<i>Charadrius dubius</i>
70	Kentish Plover	<i>Charadrius alexandrinues</i>
71	Curlew	<i>Numenius arquata</i>
72	Redshank	<i>Tringa tetanus</i>
73	Dusky Redshank	<i>Tringa ery-thropus</i>
74	Green Sandpiper	<i>Tringa ochropus</i>
75	Marsh Sandpiper	<i>Tringa stragnatilis</i>
76	Green shank	<i>Tringa nebularia</i>
77	Dunlin	<i>Calidris alpina</i>
78	Curlew Sandpiper	<i>Calidris testacea</i>
79	Common Sandpiper	<i>Tringa hypoleucas</i>

80	Spotted Sandpiper	<i>Tringa gallingao</i>
81	Funtail snipe	<i>Callinago gallingago</i>
82	Little stint	<i>Callinago minutus</i>
83	Temrenik"s stint	<i>Calidria Lemmenckii</i>
84	Ruff & feaf	<i>Philomachus pugnax</i>
85	Blackwinged stilt	<i>Himantopus himantopus</i>
86	Great stone plover	<i>Rscacus magnirostria</i>
87	Lesser Blackbacked gull	<i>Larus fuscus</i>
88	Great Blackheaded gull	<i>Larus ichthyaetus</i>
89	Brownheaded gull	<i>Larus brunnicephalus</i>
90	Blackheaded gull	<i>Larus ridibundus</i>
91	Whishered Tern	<i>Childonias hybrida</i>
92	Gullbilled Tern	<i>Gelocheliden nilotica</i>
93	Indian River Tern	<i>Sterna aurantia</i>
94	Blackbellied Tern	<i>Sterna acutiaauda</i>
95	Indian Skimmer	<i>Rhynchops albicollis</i>
96	Blue rock pigeon	<i>Columba livia</i>
97	Green pigeon	<i>Treron phoenicoptera</i>
98	Indian ring dove	<i>Streptopelia decaocto</i>
99	Spotted dove	<i>Stroptapelia chinensis</i>
100	Red Turtle Dove	<i>Stroptopelia tranquebarica</i>
101	Large Indian Parakeet	<i>Pasittacula eupatria</i>
102	Rose Ringed Parakeet	<i>Pasittacula kramori</i>
103	Blossom headed parakeet	<i>Psittacula cyanocephala</i>
104	Slaty headed parakeet	
105	Common hawk Cuckoo	<i>Cuculus yarius</i>
106	Indian Cuckoo	<i>Cuculus micrope terus</i>
107	Plaintive Cuckoo	<i>Cacomantis passerines</i>
108	Pied crested cuckoo	<i>Clamator Jacobinus</i>
109	Crow Pheasant	<i>Centropus sinensis</i>
110	Dusky Horned Owl	<i>Bubo Coromandus</i>
111	Brown Fish owl	<i>Bubo Zeylonenensis</i>
112	Mottled Wood owl	<i>Strix ocellata</i>
113	Barn Owl	<i>Tyto alba</i>
114	Spotted Owlet	<i>Athene brama</i>
115	Great horned Owl	<i>Bubo bengalensis</i>
116	Shorteared Owl	<i>Asto flammous</i>
117	House swift	<i>Apus affinia</i>
118	Palm swift	<i>Cypsiurus parvus</i>
119	Pied King fisher	<i>Ceryle rudis</i>
120	Common king fisher	<i>Cerylo athis</i>

121	White breasted king fisher	<i>Halcyen smyrenesis</i>
122	Green Bee Eater	<i>Merops orientalis</i>
123	Blue tailed bee eater	<i>Merops superciliosus</i>
124	Indian Roller	<i>Coracias benghalensis</i>
125	Hoopoe	<i>Upupa epops</i>
126	Large green barbet	<i>Megalaima zeylanica</i>
127	Crimson breasted barbet	<i>Megalamia haemacephala</i>
128	Coppersmith	<i>Megalaima haemaceptala</i>
129	Wryneck	<i>Jynx torquilla</i>
130	Goldenbacked Wood-pecker	<i>Dinopium javanense</i>
131	Yellow fronted pied	<i>Picoides maharattensis</i>
132	Ashy wined Finch Lark	<i>Eremopterix grisea</i>
133	Rufoustailed finch Lark	<i>Ammomanes phoenicurus</i>
134	Redwinged bush Lark	<i>Mirarfa erythroptera</i>
135	Singing Bush Lark	<i>Mirafra javanica</i>
136	CresedLark	<i>Galerida cristaca</i>
137	Sky Lark	<i>Alauda gulgula</i>
138	Indian Collard Sand Margin	<i>Riparia riparia</i>
139	Common Swallow	<i>Hirundo rustica</i>
140	Wiretailed Swallow	<i>Hirundo smithii</i>
141	Grey shrike	<i>Lanius excubitor</i>
142	Baybacked shrike	<i>Lanius vittatus</i>
143	Rufousbacked shrike	<i>Lanius schach</i>
144	Black drongo	<i>Dicrurus adsimilis</i>
145	Starling	<i>Sturnus vulgaris</i>
146	Pied Myna	<i>Sturnus contra</i>
147	Common Myna	<i>Acridotheres tristis</i>
148	Bank Myna	<i>Acridotheres ginginianus</i>
149	Tree pie	<i>Dendrocitta vagvunda</i>
150	Grey Hornbill	<i>Tocks hirortris</i>
151	House crow	<i>Cervus splendens</i>
152	Jungle crow	<i>Corvus macrohynchos</i>
153	Raven	<i>Corvus cora</i>
154	Common wood shrike	<i>Tephrodornis pondicerianus</i>
155	Scarlet Minivet	<i>Pericrocotus flammeus</i>
156	Small minivit	<i>Pericrocotus cinnamomeus</i>
157	White cheeched bulbul	<i>Pycnonotus leucogenys</i>
158	Red vented bulbul	<i>Phononotus cafer</i>
159	Yellow eyed Babbler	<i>Chrysomma sinense</i>
160	Common Babbler	<i>Turdoides caudatus</i>
161	Striated Babbler	<i>Turdoidos earlei</i>

162	Jungle Babbler	<i>Turdoides striatus</i>
163	Red Wrested fly eatcher	<i>Muscicape parva</i>
164	Vorditor Fly catcher	<i>Muscicape thatssima</i>
165	White browed faintail fly catcher	<i>Rhipidura aurejola</i>
166	Brown fly catcher	<i>Muscicapa latirostris</i>
167	Paradise Fly catcher	<i>Terpsiphone paradise</i>
168	Indian wren warbler	<i>Prinia subflava</i>
169	Ashy wren warbler	<i>Prinia socialis</i>
170	Franklin"s warbler	<i>Prinia hodgsoni</i>
171	Yellow bellied wren warbler	<i>Prinia flaviantris</i>
172	Striated Marsh warbler	<i>Magalurus palustris</i>
173	Indian Great Reed Warbler	<i>Acrocephalus stentorous</i>
174	Blyths warbler	<i>Acrocephalus dumetoram</i>
175	Sand Lark	<i>Clandrella roytal</i>
176	Lesser Whitethroat	<i>Sylvia curruca</i>
177	Chiff Chaff	<i>Phylloscopus collybita</i>
178	Yellow browed loaf warbler	<i>Phylloscopus znornotus</i>
179	Greyhead Fly catcher warbler	<i>Phylloscopus znornotus</i>
180	Blue throat	<i>Eritacus svecicus</i>
181	Magpie Robin	<i>Copsychus saularis</i>
182	Black rodstart	<i>Phoenicures orchruras</i>
183	Plumbeous Redstart	<i>Rhyacorchis fuliginosus</i>
184	Whitesped Redstart	<i>Chaimarrornis laucocephalus</i>
185	Collared Bush Chat	<i>Saxicole torquata</i>
186	Pied Bush Chat	<i>Saxicole caprata</i>
187	Pied Chat	<i>Conanthera picata</i>
188	Black throated thrush	<i>Turdus ruficollis</i>
189	Grey tit	<i>Parus major</i>
190	Wall Creeper	<i>Tichodroma muraria</i>
191	Tree pipit	<i>Anthus trivialis</i>
192	Paddyfied pipit	<i>Motacilla gilava thunbergi</i>
193	Greyheaded yellow wagtail	<i>Motacilla gilava thunbergi</i>
194	Yellow headed wagtail	<i>Motacilla citreola</i>
195	Black yellow wagtail	<i>Motacilla flava calcarate</i>
196	Grey wagtail	<i>Motacilla cinerea</i>
197	Indian white wagtail	<i>Motacilla albe</i>
198	Masked Wagtail	<i>Motacilla personata</i>
199	Purple sunbird	<i>Nectarinia asiatica</i>
200	Large pied wagtail	<i>Motacilla maderaspatensis</i>

201	White eye	<i>Zosterops palpobrosa</i>
202	House Sparrow	<i>Masser domesticus</i>
203	Spanish Sparrow	<i>Passer Hisapniclonsis</i>
204	Crested Buntings	<i>Melophus lathamii</i>
205	Black headed Bunting	<i>Emberiza melanocephala</i>
206	Yellow throated sparrow	<i>Potronia zenthecollis</i>
207	Indian weaver bird or Baya	<i>Ploceas phillippinus</i>
208	Black throated weaver bird	<i>Ploceas Benghalansis</i>
209	Streaked weaver bird	<i>Ploceas manyar</i>
210	Red Munia	<i>Estrilda amandaya</i>
211	Spotted Munia	<i>Lonchura Buntautata</i>
212	White throated Munia	<i>Lonchura malabarica</i>
213	Braminy Mynah	<i>Sturmus pagodrun</i>
214	Tailor Bird	<i>Orthetonues sutorius</i>
215	Golden urial	<i>Oriulus oriulus Kundoo</i>
216	Kool	<i>Eudyananmy scolopacea</i>
217	Common sand grouse	<i>scolopacea</i>
218	Imperial Sandgrouse	<i>Teminnic austus</i>
219	Pitta	<i>Plerocles orientalis</i>
220	Grey headed gold finch	<i>Cardulinae carduelinae</i>
221	Black winged kite	<i>Elanus cearuleus</i>
222	Sparrow hawk	<i>Accipiter nisus</i>

11.14 WILD LIFE PRESERVATION AND MANAGEMENT:

In the fore-going paras, the miserable condition of wild animals and birds and their annihilation even from the sanctuary area, has been described. Indiscriminate killing of birds and animals by poachers, granting of too many crop protection licenses for fire arms and also increase in human population have been responsible for this apathetic state of wild birds and animals. Some of the important measures which should be adopted for the preservation and propagation of wild life are:

- i) Crop protection gun licenses be granted only in areas where there is a real danger from the wild animals to the fields. In case of any misuse of guns, the licenses be cancelled and guns confiscated.
- ii) The License of a poachers be cancelled and gun confiscated for this offence.
- iii) The vigilance to check poaching and shooting be increased and whenever, an offender is apprehended, his gun be confiscated. The civil administration and forest department should cooperate in apprehending the offenders and putting down this crime.
- iv) Prizes and certificates be instituted to be awarded to the subordinates of forest department, police and also the villagers who help in detecting the offence and apprehending the offenders.
- v) Public, village leaders and all other be educated to preserve the wild life. Its importance from economic, aesthetic and biological balance in nature, points of view be brought home to all by showing pictures, giving short talks and putting up suitable posters at prominent places.
- vi) Posting of wild life guards to check any poaching particularly in winter when the animals and birds migrate to lower elevations.
- vii) Provision of salt lick and water holes for the wild life, be made at suitable places.
- viii) Elimination of all grazing from the sanctuary areas so that enough food forth wild life to live on and to prevent spread of disease in the area through grazing animals.
- ix) Hay be stacked at various places in the sanctuary area for the use of wild life during the winter.
- x) Suitable shrubs and bushes which provide food and shelter to the animals and birds should be propagated in the area. All shrubs on the fruits of which wild birds feed like Principia, Rosa, Viburnum, Spirea and Ficus merit special mention. Where exotic fodder plants such as Clover can be safely introduced in not far distant parts of the same tract, the cultivation of these crops could be added to the local grazing supplies.

11.15 BRUSH PILES AND SLASH DISPOSAL:

Brush piles supply valuable safety cover for wild life in the forests, especially in the open woods. Slash disposal should be left piled rather than burnt unless hazards dictate its destruction.

11.16 ECOLOGY OF WILD LIFE:

Study of animal ecology evolving the knowledge of interdependence of plant and animal population fluctuate, food chains propagation and succession is very necessary for proper management of wild life. Hardly any information has so far been collected on this aspect for this tract. The field staff both of wild life wing and territorial wing should collect data about wild life ecology so that it may be of help in planning proper wild life management. Enlightened and improved methods of management of wild animals and birds, proposes adequate inventories and without such surveys and censuses, estimates of population of wildlife in any areas, will continue to be a matter of guess.

The tract has attraction or lack of attraction to a species according to how well it supplies, the essential. It is known to all that these essentials are food, cover and such other requirements as the species may need. Obviously, the critical time of the year will be most important and, in this area, the pinch period is usually winter. The number for which an area can provide essentials and thus carry through pinch period is designated as carrying capacity. It stands to reason that an area will not be able to maintain more than its carrying capacity in safety and that all above this capacity is subject to loss. But measuring the cover, determination of forage and range capacity, proper use factor for big game is not so easy as it may seem. In fact, determination of density and composition of the vegetation is baffling at time.

It is a fact that no sincere efforts were made in the past to save range and habitat conditions for the sake of wild animals of this tract and so, heavy incidence of grazing was recorded. Over grazing and damage to the forest as well as to the wild life has generally been underemphasized because of the economic factor involved. Reduction in grazing intensity is urgently needed in the sanctuary area at least not only for the sake of wild animals but also as a measure of protection of the range and animals in their rehabilitation. Though the principle of multiple use calls for grazing as one of the methods of utilizing forest resources, yet grazing requires rigid regulation not only from the stand point of forest reproduction but also from the stand point of wild life.

During current Working Plan period a comprehensive survey for population estimation of Ungulates, leopards, monkeys and Vultures is prescribed.

CHAPTER - 12

JOINT FOREST PLANNING AND MANAGEMENT

(OVER LAPPING –WORKING CIRCLE)

12.1. General Constitution:

This Working Circle will overlap with other Working Circle and includes Demarcated Forests near to habitations, which become degraded due to heavy pressure of grazing, lopping and T.D. marking and mismanagement in the past particularly the Ban forests. Besides these DPFs it also included the UPFs and waste lands, which are in small bits, honey combed surrounded by cultivations and left outs after demarcation and settlement. These categories of areas are heavily encroached upon and will be very good attempts to manage through people participation approach.

12.2 The need for J.F.M.:

The concept of Joint Forest Management is an intervention to evolve organized and collective thinking on the issues of management where maximum benefits for the society keeping the sustenance of the resources in mind. The people living in and around forests were given the rights to utilize the produce of the forests for their livelihood. These rights were modified, reduced and some cases eliminated as the state took over control of forest resources during 19th and early part of 20th century. Throughout most of this century forestry in India has developed with in the frame work characterized by state control. Since the extent of forests and consequently the growing stock was large as compared to demand and system functioned satisfactory. Some states started managing forest as a source of income, resulting over felling. Similarly liberal Nautor granted to landless and uncontrolled clearing forest for non-forestry purpose resulted degradation of forest wealth. The pressure of forest increased manifold, due to this and increase in population. The behavior of the people changed due to political set up and pleasing every one for catching vote. The people started considering forests as “No mans land”.

During 1970 in West Bengal, Haryana, Gujarat, Forest Protection Committee's were formed and given the responsibility of protecting degraded forest, departments land from illegal cutting, fires, overgrazing and encroachment. In return they were granted more concessions and share of the returns from plantation raised and protected. In 1990 Government orders were issued directing all the States to undertake participatory forest management on

degraded forests land, based on the experience of States as West Bengal, Gujarat and Haryana. This gave official sanction to the implementation of J.F.M

12.3. Special Objects of Management: The basic objects of Joint Management are given below:

1. To evolve consensus on the basic issues to conservation of soil, water and forest resources.
2. To provide an effective and immediate treatment for barren, wasteland, or degraded protected forests situated near villages through protection afforestation, pasture development, soil conservation by active participation of local people.
3. To maintain the environmental stability through preservation and wherever necessary and restoration of the ecological balance that has been adversely destroyed by depletion of the forests through involvement of local people in resource management.
4. To augment fuel wood, fodder and small timber production for use by local people.
5. To convert a hostile population living on fringes of forest areas into friends ultimately into resource managers are resource users.

12.4. Govt. Order of J.F.M:

To educate people and solicit their cooperation, participating process has to be introduced. Since forest lands near villages are mostly degraded to scrub, or even blanks, they offer opportunities of introducing Participatory Forest Management. As already stated, that forests land near to habitation is degrading or even blanks appear due to biotic factors. So, the cooperation and educate local people Participatory Forest Management require introducing. In 1990 this was complimented by another Government order directing all the States to undertake Participatory Forest Management on degraded forest land based on the experience of West Bengal, Gujarat and Haryana. This order also encouraged forest department of involve N.G.Os' as intermediaries and facilitators. To fulfil this objective, the Govt. of Himachal Pradesh issued order No. Forest(c) 3-4/80-V dated 12.5.93. Participatory Management on barren or degraded land it was decided by the Govt. to constitute village forest development committee for J.F.M. in the villages of H.P. for planning, protecting, forestation and judicious use of Eco Development of areas situated near the villages so as to arrest their further afforestation degradation and to augment fuel wood, and small timber production of use by local people through their active participation.

In Himachal Pradesh, as well as elsewhere in India, the need for introduction of Participatory Forest Management arises as the local people have no or very little interest in protecting forest resources. They left to Forest Department for protection, although they never forgo their rights of fuel woods, fodder, grazing and timber. Participatory Management will be developed stake of local people in development of these forests, just as their own lands and common land so that their demands meet with and economic condition improves. The following projects were introduced in this division along with other part of H.P. translate the object of J.F.P.M.

12.4.1 H.P. Forestry Project (ODA.UK)-DFID:The goal of this project is the development and implementation of sustainable system of forest area management, which will strike the optimum balance between the needs of local people and environment concerns. Joint Forest Planning and Management was introduced in accordance with the order of on participatory forestry on degraded forest area in pilot locations in the project area. The following pilot location selected in this Division and achievement made in this is tabulated overleaf.

Component of O.D.A. Project: The project is comprised of following five different components:

1. Project Coordination
2. Training
3. Forestry Operation
4. Joint Forestry Management support Team
5. Monitoring.

This Project will support three main types of forest operations as follows:

Operation based on micro plans prepared as part of the process of Joint Forest Planning and Management in selected pilot areas.

Operation based on the D.F.F.Cs' Divisional Level Working Plan Implementation of J.F.P.M. in the Project area will be followed and this will include the following activities

- i) Participatory rural appraisal.
- ii) Field training to D.F.F.C. staff in pilot location.
- iii) Training of local people through workshops, study tour and open days
- iv) Preparation of Micro Plan.

- v) Formalizing of forest management agreements.
- vi) Form Forestry.

Thus, the important aspect of this Project is preparation of micro plan by VFDC. The following activities/treatments is prescribed for implementation through local people VFDC.

(a) Artificial regeneration: A plantation of suitable species will be raised in the areas with the consensus of VFDC will play the key role in its success.

(b) P.B.I Areas of the pilot location will be selected. Cleaning and pruning operations will be carried out in such areas involving the VFDC and the local people of the pilot location. Besides the above, activities of maintenance of well-defined and marked forestland access, roads and fire lines, employment of fire watchers and fire fighters, in some cases enrichment planting of nursery grown seeding will be carried out. The Project will find a preparation of these activities in parallel with the review and introduction of modifications to these activities in parallel with review and introduction of this system. There will be no attempt to catch up.

12.4.2 Samanvit Gram Vanikaran (Samridhi Yojna):

National afforestation and Eco Development Board, Ministry of Environment & Forest, Govt. of India decided to introduce Samanvit Gram Vanikaran Samridhi Yojana (SGVSY). The scheme will aim of providing employment to the local village community through the forestation programme thereby creating valuable assets for the village community and other durable community assets for overall, eco-development of the target communities/villages.

In order to integrate and co-ordinate the administrable and activities of village level forest committee Federation of Forest Committee (FFCs) has been proposed to be constituted at Territorial Forest/Wild Division level. Each of the Divisions will constitute the planning unit of the project area for the Forest Development Agency (FDA) on an average, about 25-50 village would be covered under the SGVSY within the jurisdiction of each FDA and all house olds needing income augmentation will be targeted. In selecting the villages, the criteria will be: -

- a) Preponderance of SC/ST population.
- b) Willingness of people to participate in forest conservation efforts.
- c) Existence of FPC/EDCs.
- d) Extent of degraded forestland.

- e) Degree of dependence on biomass resources, etc.

The creation of FDA and adaptation of JFM Resolution is a prerequisite for this scheme. Each FDA would be headed by the respective Territorial/Wild Conservator of Forest with the respective territorial/Wild Life DFO as its member Secretary-cum-Chief Executive Officer.

The constitution of the FDA will be as under:

Table 12.1

S.No.	General Body	Executive Body
1.	Chair persons of all village Forest Committees.	Chairperson-Conservator of Forest
2.	Member Secretary of all Committees	Member Secretary cum Chief Executive Officer-Divisional Forest Officer.
3.	One designated Women Member from each Forest Committee	Ex-officio Member (without voting rights) District Development Officer, District Level Officer of Agriculture, Animal Husbandry, Soil Conservation, Tribal Welfare, Industries, Panchayat, Public Health and Engineering and Education Deptt.
4.	Chairperson of District Panchayat Forest Committee	Chairperson of District Panchayat Forest Committee
5.	Range Forest Officer, Asst. Cons. SDFs	Twenty-five nominees from the VFCs/EDCs to include of minimum of 14 women

Executive Body Members of the FDA shall be ex-officio members of the General Body of FDA, which would be headed by the respective Conservator of Forests.

FDA will provide the funnel mechanism through which assistance under various schemes would flow and be targeted to the areas covered by the FDA. While the FDA would constitute the administrative, supervisory and monitoring mechanism the respective VFCs and EDCs will undertake the actual implementation of the projects in the field utilizing the locally available laborers only.

This Project started in this Division during 2001 and 47 village Forest Committees were formed in all Ranges through micro planning exercise including PRA process, funds provided after preparing Micro Plan by VFCs which was assisted by the Department.

The important component of this project is mutual obligation and responsibilities of the major stakeholders, namely the FDA, the VFCs/EDCs, the Village Communities and Forest Department. The scheme is intended to promote afforestation and development of degraded forests by adopting and integrated approach to the development of land and other related natural resources on watershed basis through micro planning process.

There are some entry point activities, which can be supported under the SGVSY e.g. soil conservation works, digging of wells for drinking water, construction of roads, sheds for school and community use, construction of public toilets, energy saving devices electrification etc.

12.4.3 Sanjhi Van Yojana:

The scheme is also on the line of JFPM and the same has been launched in H.P. in 1998-99 by H.P. Govt. This scheme is also implemented in this Division since its inception. This scheme was further modified vide H.P. No. FFE-C(a) 1/2001 dated 23.8.01 after clubbing existing Sanjhi Van Yojana Scheme 1998, the Parisharam Van Hamara Scheme 2000 and the Apna Van, Apna Dhan Scheme, which was to launch during the year 2001.

The main objects of this scheme are tabulated as per modified scheme:

- i) Involvement of grass root level institution such as gram Panchayat, Mahila Mandal, Yuvak Mandal Ex-servicemen's bodies, Schools, VFDS, user groups, other community-based organization and N.G.O.s in sustainable management of forest resources.
- ii) Grant of 100% income from plantation to the VFDS and Panchayat.
- iii) Grant of total usufruct rights to the VFDS'.
- iv) Regeneration of degraded forest areas and conservation and sustainable use of better forest through community's involvement.
- v) Involvement of local communities in the choice of species to be planted under the scheme;
- vi) Creation and enhancement of Social, Physical and financial capital of the participation communities for poverty reduction;
- vii) Special emphasis on involvement of women in the scheme;

viii) Address problem of rural unemployment by utilizing degraded forest land for large scale plantation;

ix) Establish linkage between Food for work Programme and present scheme by making payments in the shape of food grains under the scheme.

x) Increasing productivity of the forest areas by improvement of nursery stock and adoption of mixed plantations.

xi) Training of forest staff, VFDS members and CBOs/NGOs for facilitating and strengthening community participation.

xii) Gradually empower local communities and local level institutions to become more proactive in sustainable forest management.

xiii) To help VFDSs achieve financial viability and sustainability by introducing proper mix of short and long duration cropping patterns as a short- and long-term objective to ensure their continued participation in the scheme.

The scheme envisages regeneration of degraded forest area and creation of assets for the benefit of masses. The areas are to be selected by HPFD field functionaries keeping in mind broad parameters of selection as are contained in above notification. The main point kept in mind are nearness to habitation, resource deficiency of the area, degraded condition of the forests and positive response of the villages.

The Forest Department will provide planting material to VFDS on demand free of cost for the three years including the year of plantation and after plant price shall be charged.

85% funds are to be provided by department and remaining cost will be borne by the members by way of *shramdan* or cash. The VFDSs can also take up maintenance of water resources and create irrigation facilities by raising water harvesting structure

12.5 Identification of J.F.M. Areas Local people enjoy liberal rights and concessions to use forestry resources. People are in the habit of getting all these at their door step. The people enjoy the following rights and concessions:

- i) Grazing of cattle sheep and goats.
- ii) Timber for house construction and repairs
- iii) Grass and leaves for fodder.
- iv) Timber for agriculture and domestic
- v) Wood for fuel and cremation.
- vi) Collection of N.T.F.P. (medicinal herbs) for own use and sale

Timber distribution (T.D) rights are most contentions as demand and actual distribution has been increasing particularly for valuable

deodar. Right holders still pay very nominal rates. At certain places villagers have temptation to sell whole or part of the allotted timber or to remove more number from the forest to supplement their income or to meet extraction charges.

Leave for fodder, or bedding are obtained unscientifically after lopping of conifer/broad leaved trees, sometimes even right up to the crown, resulting in drying in trees and making them susceptible to fungus attachment doing considerable damage to the forest.

Villagers also extract medicinal herbs and sell in open market through middlemen to earn money and their greed for money has brought many of medicinal herbs on verge of extinction.

Heavy grazing has also resulted in degradation in Demarcated Forests and Pasture lands.

The degraded forests areas as well as common village land are required to be identified by the department and then only villagers are to be approached and their willingness of collaborating be obtained. No area should be taken if the community is not willing to co-operate otherwise the object of J.F.M. will be forfeited

Preliminary enquiries be made from local people regarding willingness for works to be carried out e.g. treatments of barren, waste lands or degraded forests due to heavy pressure of grazing/loping, afforestation, pasture development, soil conservation and protection with their active participation. Similarly, the main objects of J.F.M are highlighted so that no complication arises later on for implementation. The process for the formation of V.F.D.C. and Micro-plan is done for area identified and selected with consequences.

It is not desirable to identify particular areas by the Working Plan Officer in advance. However, it is prescribed that forest areas, which needs immediate treatment and area situated in the vicinity of village should be included after adopting above procedure. There is large number of blanks in DPF and UPFs near the habitations. These area generally inferior and bushy types of vegetation, deteriorating pasture lands, Ban Oak Forest badly hacked and lopped. Coniferous forests badly lopped; over exploited Non-Timber Forest Produce areas and badly eroded area are suggested to be taken under Joint Forest Planning Management after going above requirements.

12.6 Status of JFM in Dharamshala Forest Division

The detail of JFM societies registered in division is as under

Status of empowerment of JFMCs

JFMC registered Under

FDA I

Table 12.2

S no	Range	Block	Beat	JFMC
1	Shahpur	Rirkmar	Rirkmar	Hathor
2			Kanol	Batuni
3			Boh	Lam
4		Shahpur	Bassa	Kharidi
5			Harnera	Chullan
6			Shahpur	Chatrewhar
7		Rait	Rehlu	Borusarna
8			Rehlu	Khola
9			Salol	Bhased
10			Tiara	Lam
11	Kangra	Ghurkari	Ghurkari	Kohala
12			Ghurkari	Ghurkari
13			Ghurkari	Jheol
14			Rajiana	Kuled
15			Samirpur	Samirpur
16		Daulatpur	Jalari	Samela Kaswara
17			sunhi	Tikri Patari
18		Ranital	Ranital	Rajiana Khas
19		Kangra	Mundla	Sakout Bharyalkar
20	Lapiana	Lapiana	Ther	Sehog
21			Dharkalan	Chhamb
22			Ther	Bhalwan
23		Pandhwar	Jol	Rumbal
24			Salwana	Jhakli Baranj
25			Salwana	Uparli Baranj
26		Lunj	Borkwalu	Borkwalu

27			Lunj	CB Lunj
28	Mallan	Narwana	Baroi	Bagiada
29			Baroi	Kand
30			Narwana	Salig
31			Narwana	Kasba
32		Sarotri	Kandi	Kanehar
33			Danoa	Cheprehar
34		Samloti	Uperli Kothian	Barana
35			Uperli Kothian	Gujrehra
36	Dharamshala	Mecloedganj	Satobri	Naddi
37			Satobri	Barnet
38		Kareri	Kareri	Kareri
39			Kareri	Khari Behi
40			Bhitlu	Maniana
41			Bhitlu	Chamiara
42			Pallon	Pallon
43			Pallon	Ser
44			Pallon	Noura
45		Khaniyara	Tau	Bangotu
46		Dharamshala	Chari	Uni

Under FDA 2

Table No. 12.3

S No	Range	Block	Beat	Jfmc
1	Kangra	Ranital	Gheen	Thtathal
2		Kangra	Nandrool	Rajal
3		Kangra	Nandrool	Nandrool
4		Kangra	Mundla	Mundladhar Lilly
5		Kangra	Mundla	Tarsuh Bhatti
6		Daultpur	Daultpur	Saretta Duguail
7		Ghurkari	Samirpur	Chakloo Tarengu
8	Dharamshala	Kareri	Kareri	Rawa
9		Karari	Paloon	Sei
10		Mecloedganj	Balh	Balh

11		Dharamshala	Chari	Gilar Bhera
12		Khaniyara	Tau	Chowla
13	Shahpur	Rait	Rehlu	Manoh
14		Rait	Salol	Nangla
15		Rirakmar	Rirakmar	Dibba
16		Rirakmar	Kanol	Rulhed
17		Rirakmar	Kanol	Kanol
18		Shahpur	Shahpur	Mahar Chemdera
19		Shahpur	Manjgran	Paid Chhatrooh
20	Lapiana	Lunj	Gahliyan	Jatehar
21		Lunj	Kothru	Prai
22		Lunj	Talla	Talla
23		Lapiana	Pargore	Nera / sardwal
24		Lapiana	Dharkalan	Dhar
25		Pandwar	Pandwar	Pandhu
26		Pandwar	Manai	Bhandrella

Under KFW Project

Table No.12.4

List of functional VFMS under HPFECF, KFW Project					
Sr. No	Range	Name of VFMS	Scheme under made	Area in ha	Present Status
1	Dharamshala	Tahu	HPFECF, KFW Project	25.09	Functional
2	Dharamshala	Sokni da Kot	HPFECF, KFW Project	20.5	Functional
3	Dharamshala	Sarah	HPFECF, KFW Project	29.85	Functional
4	Dharamshala	Lunta	HPFECF, KFW Project	24.95	Functional
5	Dharamshala	Patialkar	HPFECF, KFW Project	34.25	Functional
6	Dharamshala	Karahpura Dhaloon	HPFECF, KFW Project	32.5	Functional
7	Dharamshala	Bhitloo	HPFECF, KFW Project	32.6	Functional
8	Dharamshala	Chari	HPFECF, KFW Project	32.7	Functional
9	Dharamshala	Rin	HPFECF, KFW Project	52.6	Functional

10	Dharamshala	Rakkar	HPFECF, KFW Project	21.5	Functional
11	Dharamshala	Bhatala	HPFECF, KFW Project	20.75	Functional
12	Mallan	Jule	HPFECF, KFW Project	31	Functional
13	Mallan	Mallan	HPFECF, KFW Project	66.2	Functional
14	Mallan	Narwana Khas	HPFECF, KFW Project	51.23	Functional
15	Mallan	Massal	HPFECF, KFW Project	29	Functional
16	Mallan	Sihund	HPFECF, KFW Project	57.15	Functional
17	Mallan	Khawa	HPFECF, KFW Project	27.5	Functional
18	Mallan	Baguleher	HPFECF, KFW Project	94.2	Functional
19	Mallan	Plah Chaklu	HPFECF, KFW Project	73.2	Functional
20	Mallan	Jalot	HPFECF, KFW Project	55.2	Functional
21	Mallan	Sadoon Bargram	HPFECF, KFW Project	76.1	Functional
22	Mallan	Kandi	HPFECF, KFW Project	34.4	Functional
23	Mallan	Baldhar	HPFECF, KFW Project	42.4	Functional
24	Mallan	Danoa	HPFECF, KFW Project	56.9	Functional
25	Mallan	Eirla	HPFECF, KFW Project	35.55	Functional
26	Mallan	Saroot Dholru	HPFECF, KFW Project	42.2	Functional
27	Mallan	Dadkar	HPFECF, KFW Project	63.15	Functional
28	Mallan	Touru	HPFECF, KFW Project	23.5	Functional
29	Mallan	Chaprer	HPFECF, KFW Project	26.8	Functional
30	Mallan	Samara	HPFECF, KFW Project	56.2	Functional
31	Shahpur	Bhanala	HPFECF, KFW Project	93.8	Functional
32	Shahpur	Sadon (Shahpur)	HPFECF, KFW Project	28.15	NonFunctional
33	Shahpur	Salol	HPFECF, KFW Project	63.65	Functional
34	Shahpur	Kiyari	HPFECF, KFW Project	32.8	Functional
35	Shahpur	Shahpur	HPFECF, KFW Project	31.95	Functional
36	Shahpur	Maherna	HPFECF, KFW Project	75.75	Functional
37	Shahpur	Rirkmar	HPFECF, KFW Project	36.1	Functional

38	Shahpur	Tiara	HPFECF, KFW Project	61.85	Functional
39	Shahpur	Harnera	HPFECF, KFW Project	69.2	Functional
40	Shahpur	Har Boh	HPFECF, KFW Project	59.7	Functional
41	Shahpur	Darini	HPFECF, KFW Project	35.2	Functional
42	Shahpur	Tarkhankar	HPFECF, KFW Project	56.1	Functional
43	Kangra	Nandrool	HPFECF, KFW Project	57	Functional
44	Kangra	Rajal	HPFECF, KFW Project	44.3	Functional
45	Kangra	Morth Jassai	HPFECF, KFW Project	35	Functional
46	Kangra	Ratiyar	HPFECF, KFW Project	20.85	Functional
47	Kangra	Lahar	HPFECF, KFW Project	22.75	Functional
48	Kangra	Balu Galoa	HPFECF, KFW Project	31.75	Functional
49	Kangra	Amatrar	HPFECF, KFW Project	21.7	Functional
50	Kangra	Bhatti	HPFECF, KFW Project	24.75	Functional
51	Kangra	Tarsuh	HPFECF, KFW Project	31.9	Functional
52	Kangra	Jheol	HPFECF, KFW Project	58.5	Functional
53	Kangra	Samirpur	HPFECF, KFW Project	31	Functional
54	Kangra	Daulatpur	HPFECF, KFW Project	72.6	Functional
55	Kangra	Janainkar	HPFECF, KFW Project	43	Functional
56	Lapiana	Gahliyan	HPFECF, KFW Project	48.15	Functional
57	Lapiana	Harchakiyan	HPFECF, KFW Project	78.85	Functional
58	Lapiana	Lapiana	HPFECF, KFW Project	58.1	Functional
59	Lapiana	Dharkalan	HPFECF, KFW Project	83.9	Functional
60	Lapiana	Bhrooplaha	HPFECF, KFW Project	60.85	Functional
61	Lapiana	Manai	HPFECF, KFW Project	62.8	Functional
62	Lapiana	Pandhwar	HPFECF, KFW Project	60.25	Functional
63	Lapiana	Kothru	HPFECF, KFW Project	71	Functional
64	Lapiana	Upper Lunj	HPFECF, KFW Project	71	Functional
65	Lapiana	Nagreta	HPFECF, KFW Project	73.4	Functional

66	Lapiana	Pargor	HPFECF, KFW Project	75.3	Functional

VFDS functional Under JICA Project

Table No. 12.5

1	Shahpur	Bankhandi Mata Bhaled	JICA Project	20	Functional
2	Shahpur	Kanol-I	JICA Project	20	Functional
3	Shahpur	Lingru Nag	JICA Project	20	Functional
4	Shahpur	Manoh	JICA Project	20	Functional
5	Dharamshala	Tharu	JICA Project	20	Functional
6	Dharamshala	Balh	JICA Project	20	Functional
7	Dharamshala	Falotha	JICA Project	20	Functional
8	Dharamshala	Kutharna	JICA Project	20	Functional
9	Dharamshala	Khadi Behi	JICA Project	20	Functional
10	Dharamshala	Thathri	JICA Project	20	Functional

Table No. 12.6

Name of JFMC under Sanji Van Yojna in Dharamshala Forest Division				
Sr.No.	Name of Range	Name of Block	Name of JFMC	JFMC wise Afforestation carried out (in hac.)
1	Kangra	Ranital	Thtathal	30
2		Kangra	Rajal	55
3		Kangra	Nandrool	60
4		Kangra	Mundladhar Lilly	30
5		Kangra	Tarsuh Bhatti	40
6		Daulatpur	Saretta Duguail	15
7		Ghurkari	Chakloo Tarengu	25
8	Dharamshala	Kareri	Rawa	30
9		Kareri	Sel	26
10		M/Ganj	Bahl	21

11		D/shala	Gilar Bhera	25
12		Khaniyara	Chowla	26
13	Shahpur	Rait	Manoh	45
14		Rait	Nangla	30
15		Rirkmar	Dibba	60
16		Rirkmar	Rulhed	50
17		Rirkmar	Kanol	45
18		Shahpur	Mahar Chemdera	36
19		Shahpur	Paid Chhatrooh	32
20	Lapiana	Lunj	Jatehar	37
21		Lunj	Prai	38
22		Lunj	Talla	32
23		Lapiana	Nera/Sardwal	32
24		Lapiana	Dhar	30
25		Pandwar	Pandhu	48
26		Pandwar	Bhandrella	39

12.7 Preparation of Micro Plan:

To begin with the area be inspected by H.P.F.D. field functionaries keeping in mind the broad parameters of selection as are required under J.F.P.M. Main points kept in mind were nearness to habitation, resource deficiency of the area, degraded condition of the forests and positive response of the villagers. Thereafter information discussions were conducted with stakeholders and the process was repeated on the basis of encouraging response and eagerness on the part of villagers to become partners in development. A general house comprised of the village stake holders are to be summoned and VFDS in to form. The drafted micro plan be produced before the general house and submitted for scrutiny suggestion improvements. The suggestion and improvement as come forward are to be kept before the general house and the micro plan to be approved by the General House by a voice vote. The D.F.O.(T) after examining the soundness of the proposal contained in the micro plan especially the A.P.O. and percentage allocation of various activities in accordance with the final draft be approved.

The Micro-plan to be prepared on the following format as done in this Division under various Projects based on J.F.M.P:

Introduction

Description of Area and Resources

- Situation
- Configuration
- Extent of Area and land use pattern
- Forest Area (Classification, History, Composition)
- Water Resources

Social Structure of the community.

- Demographic data
- Social Structure
- Economic stratification and employment
- Agricultural and Animal Husbandry.
- Other local institutions.

Dependence on Resources and analysis of problem

- Assessment of needs of people
- Current level of production and usage patterns
- Gaps in demand and supply.
- Analysis of problems and constraints for sustainable production

Objects of future management

- Development options, opportunities and strategies
- General objector management
- Priority management options

Description of proposed activities

- Methods of treatment and maintenance
 - Protection of resources
 - Soil & Water Conservation
 - Water harvesting structure.
 - Plantation
 - Tending and thinning
 - Collection, harvesting and marketing of forest products
 - Non forestry welfare and development activities.
- Time schedule and area to be treated.
- Duties and responsibilities
- Cost estimates.

Control and records.

- Bye laws, constitution, and registration of VFDC/VFDS
- Agreement between FD and VFDC/VFDS

Membership register
Processing register
Fodder and Fuel use register
Register for use and sharing of benefits
Cash book, ledger receipt book, bank account records.
Social audit records and annual reports.

Appendices, maps and base line survey data
Micro plan cum action plan sheet for implementation

12.8 V.F.D.S. (Village Forest Development Society)

Vide H.P. Govt. order No. Ft.(c) 3-4/80-V dated 12.5.93 participatory forest management on barren and degraded land, it was decided by the Govt. to constitute village Forest Development Committees for J.F.P.M. in the villages of Himachal Pradesh for planned, protection forestation and judicious use for Eco. The development of the forest land situated near the villages so as to arrest their further afforestation degradation and to augment fuel wood, fodder and small timber production of use by local people through their active participation.

Procedure for constitution of Village Forest Development Committees as per narrated above-mentioned order is laid down as under:

Name of Committee: Village Forest Development Committee (VFDC)

Definition: A Village Forest Development Committee is a registered, non-political body representing all families of a Tikka/village.

Area Selection: There shall be only one Village Forest Development Committee in each Tikka/village.

Constitution:

One adult male and female member of each family will be enrolled as a member of the General House of VFDC of the village. President Mahila Mandal, President Yuvak Mandal, Members of Panchayat representing Tikka/Village will be nominated as member of the General House of VFDC by DFO concerned.

Executive Body:

The Executive Body will have 9 to 12 members including nominated ones. It will have President, Vice President, Treasurer etc., who will be elected by the Executive body itself. Two auditors will be elected in the General House. A uniform representation shall be given to each group of 10-20 families and

executive body will have minimum 5 members from the Tikka/Village out of which 50% will be women. Forest Guard will be ex-officio Member Secretary of the Executive Body. One member of Gram Panchayat, one member from Antodaya family one woman either from Mahila Mandal or otherwise will also be nominated members of the body.

Meeting:

There will be two meetings of the General House and four of the Executive Body in a year D.F.O. will convene the meeting with the President of the Executive Body of VFDC and the Range Officer concerned twice in a year to review the progress of the work. Quorum will be 50% of these meetings.

Registration of Committee:

The territorial Divisional Forest Officer will register VFDC, formerly.

Management Plan

The Range Officer concerned will prepare Joint Forest Management Plan with the help of Executive Body, which will be discussed with General House of VFDC and finally approved by the DFO

Duties of VFDC.

To persuade the villagers to give the available areas for plantations. To assist the Forest Department in planning, protection, afforestation, protection, judicious use of all existing rights and equitable sharing of usufructs and eco development of the area as per approved Management.

Responsibilities:

It will be responsibility of the Committee

- (i) to just and fair distribution the usufructs derived
- (ii) to ensure its management as per prescribed norm
- (iii) settlement of disputes between villages
- (iv) honor all the commitments.

Powers of the Committee:

Committee will make its own bye laws with the concurrence of concerned D.F.O.

Duties & responsibilities of Forest Department:

- (a) To explain Joint Management Plan to the villagers
- (b) to recognize the VFDC in letter and spirit and give weight age to the recommendations.

Powers of the Forest Department:

Membership of any individual from the General House/Executive body can be dissolved by the General House in consultation with the DFO. who can dissolve the Executive Body and in case it fails to fulfill its duties and responsibilities

Dispute Arbitration, Termination of Agreement:

Appeal of the aggrieved/

Executive Body will lie with the Conservator of Forests who will communicate his decision within a months' time and will be final.

Usufruct Sharing:

The entire quantity of usufructs will be distributed to the villagers under the supervision of Forest Guard (Member Secretary) 25% of the net sale proceeds of final harvests will be given to the VFDC out of the plantations/coppice to raise and kept in common fund of the committee known as Village Development Fund which can be utilized for village development works with the approval of General House and in consultation with the concerned DFO. The exercise of other rights viz., timber, fuel wood etc. will be exercisable as per provisions of settlements.

Monitoring and evaluation of J.F.P.M:

The effective management and planning of any programme depends largely upon timely availability of information. A team comprising of C.F.(T) public representatives and D.F.O(T) will visit the VFDS area at least twice a year. The team will also involve the VFDS members. They will make assessment of the VFDS processes and document the information gathered at circle level for future planning. The story of success and failure along with shortcoming during the implementation of Micro plan is listed and improvement be suggested after consulting public representatives. This will not only keep check on proper utilizing funds but also be guidelines to implement other projects under J.F.M. in future.

Chapter-13

BIO-DIVERSITY CONSERVATION (OVERLAPPING) WORKING CIRCLE

13.1 Constitution of the Working Circle:

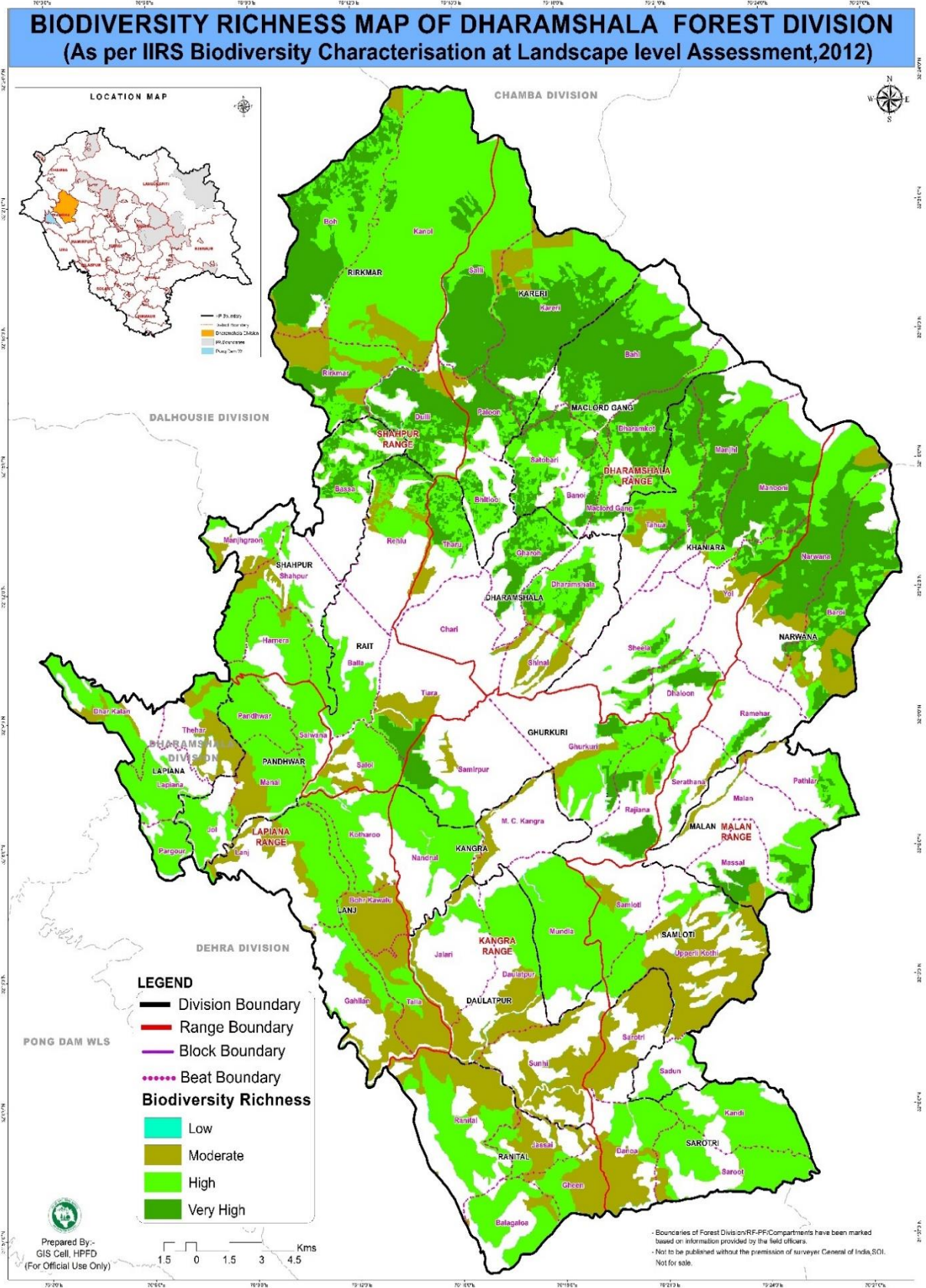
Biodiversity is the totality of genes, species and ecosystem in a region. Richness of biodiversity of a region or country shows its richness of biological heritage, high conservation values and the richness of its population's socio-economic culture, as the biodiversity directly or indirectly affects the living standards of the human populations, health conditions and overall prosperity. In a bio-diversity rich country, there are multiple food choices, multiple choice of medicinal plants and multiple economic avenues. While biodiversity provides the people with a host of organic products, it is the people's duty to conserve the biodiversity which is the product of hundreds of millions of years of evolutionary history.

In the recent past, biodiversity as a subject was not given the due importance. It is only after the Earth Summit held in 1992 at Rio de Janeiro, where on Convention on Biological Diversity' (CBD) was adopted. The CBD having near universal membership has set out commitments for maintaining the biological resources underlining three main goals: conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits from the use of genetic resources. India is a party to the CBD and committed to conserve the natural heritage. Peoples Biodiversity register has been prepared at Gram Panchayat levels to record, preserve and enhance the native biodiversity.

Biodiversity is conveniently studied into genetic diversity, species diversity and ecosystem diversity. Genetic diversity refers to the variation of genes within species, covering distinct populations of the same species or genetic variations within a population. Species diversity refers to the variety of species within a region. Ecosystem diversity is harder to measure than species or genetic diversity.

The Shivalik hills, Dhauladhar are the areas in Himachal having remnants of biodiversity which needs to be preserved. The forests dealt in this working plan are situated in the Shivalik hills. It is imperative to have special consideration of these forests for conservation of biodiversity by constituting a separate Working Circle. The biodiversity Working Circle will encompass all areas of the Working Plan.

Map No. 13.1



13.2 Objectives of Management: The state has prepared the strategy and Action Plan for Conservation of Biodiversity. The principal objectives of the plan are to: -

- Assess the existing status of biodiversity.
- Identify the causes of its deterioration, if any.
- Promote conservation and sustainable use of the state's biological resources.
- Promote awareness among and dissemination of information amongst government departments and the public for realizing people's involvement and participation in conservation activities.
- Create mechanisms required to plan for natural resource management and long-term conservation.
- Promote cooperation between all stakeholders including government, public institutions, social and economic groups and the masses.
- Incorporate principles of restoration, conservation and sustainable use of biodiversity in planning and execution of sectoral and cross-sectoral policies.
- Identify legal and financial instruments to achieve these objectives.

The conservation strategy is guided by the following principles:

- Recognizing the right of survival of each species.
- Identifying the root causes of biodiversity loss and taking corrective action.
- Restoring degraded habitat components to recover dwindling species.
- Promoting in situ and ex-situ conservation of particular species.
- Ensuring the share of local communities in the benefits obtained from use of natural resources which they have helped to conserve over long periods of time.
- Ensuring sustenance of common property resources through local institutions.
- Promoting biodiversity education
- Generating biodiversity data base.
- Adopting a multi-disciplinary approach in biodiversity research.
- Taking up economic evaluation of bioresources.

The above objectives and principles will guide the conservation of biodiversity of this Working Circle.

13.3 The Present Status of Biodiversity:

Because of different geological formations, physical geographical conditions and climate regime of the area, there are different bio-forms, ecosystems and forest types in the area. The Sal are unique forest ecosystems of the area. Among the tree components *terminalia tomentosa* and *Diospyros montana*, *Lannea grandis*, *Carissa opaca* and *Flacourtia indica* are characteristics of the vegetation. The biodiversity of the area was studied during the Resource Assessment Survey. The tree component was assessed by laying out quadrats of 36.2m×36.2m, the shrubs component by laying out quadrats of 3m×3m and herbs and grasses in 1m×1m quadrats.

The list of recorded trees, shrubs and herbs is given in Table 13.1

The analysis shows that there is a high species diversity as many equally or nearly equally abundant species are found in the population. The number of tree species in the Dry deciduous forests is high.. It is also seen that the number of tree species is as high as the number of herb species. This is because the survey was done in one season and also due to thick mass of invasive species. the diversity of herb species has declined.

Importance Value Index (IVI) is the sum of relative density, relative frequency and relative dominance for each species involved. It may be expressed as a range from 0 to 3 to give importance percentage, which will range from 0 to 1 or 100 per cent, may be divided into 300 per cent. In the present case, 300 per cent has been considered. Importance value provides an overall estimate of the influence or importance of a species in a community. IVI of tree species found in three different forests were calculated and given in Table

It is found that Chil has the maximum IVI in Chil, and Plantation working Circles. Miscellaneous broad leaved and Chil in coppice working circles, Ban oak and Miscellaneous broad leaved in Oak working circle forest and Miscellaneous broad leaved and Chil in protection working circles. The other species having IVI more than 20 are Deodar, Khair and other miscellaneous broad-leaved species.

Among the economically important species are *Acacia catechu*, *Dalbergia sissoo*, *Diospyros tomentosa*, *Emblica officinalis*, *Eucalyptus* , *Lannea grandis*, *Mangifera indica*, and Chhal.

There are a number of medicinal plants as well. Among them are *Acacia catechu*, *Adhatoda vesica*, *Aegle marmelos*, *Azadirachta indica*, *Cordia myxa*, *Emblica officinalis*, *Nyctanthes arboretristis* and *Murraya koengii*.

Species recorded were screened for their uniqueness with references in the literature. No species under Red Data Book was recorded. All the species were found abundant in nature. No rare plants were encountered during the survey.

Table 13.1: Biodiversity recorded in the Working Plan are

1	<i>Acacia catechu</i>
2	<i>Acacia modesta</i>
3	<i>Acacia nilotica</i>
4	<i>Aegle mormelos</i>
5	<i>Albizia procera</i>
5	<i>Azadirachta indica</i>
6	<i>Bauhinia variegata</i>
7	<i>Butea monosperma</i>
8	<i>Bombax ceiba</i>
9	<i>Casearia tomentosa</i>
10	<i>Cassia fistula</i>
11	<i>Cordia myxa</i>
12	<i>Dalbergia sissoo</i>
13	<i>Diospyros tomentosa</i>
14	<i>Diospyros montana</i>
15	<i>Flacourtia indica</i>
16	<i>Holoptelia integrifolia</i>
17	<i>Lannea grandis</i>
18	<i>Leucacena leucocephala</i>
19	<i>Limonia acidissima</i>
20	<i>Mallotus philippinensis</i>
21	<i>Moringa olifera</i>
22	<i>Tamban</i>
23	<i>Tamarindus indica</i>
24	<i>Tectona grandis</i>

25	<i>Murraya paniculata</i>
26	<i>Nyctanthes arboretristis</i>
27	<i>Ficus benghalensis</i>
28	<i>Ficus glomerata</i>
29	<i>Ziziphus mauritiana</i>
30	<i>Rihaan</i>
31	Jacaranda
32	<i>Carissa opaca</i>
33	<i>Boehmeria platyphylla</i>
34	<i>Emblica officinalis</i>
35	<i>Erythrina suberosa</i>
36	<i>Eucalyptus tereticornis</i>
37	<i>Grevia leavigata</i>
38	<i>Mangifera indica</i>

Shrub Species

Table 13.2

1	<i>Adhatoda vesica</i>
2	<i>Adiantum pedatum</i>
3	<i>Ageratum conyzoides</i>
4	<i>Carissa opaca</i>
5	<i>Dodonaea viscosa</i>
6	<i>Galium aparine</i>
7	<i>Lantana camara</i>
8	<i>Flacourtia indica</i>
9	<i>Murraya koengii</i>
10	<i>Parthenium conyzoides</i>

11	<i>Solanum xanthocarpum</i>
12	<i>Holarrhena antidysenterica</i>
13	<i>Asparagus racemosum</i>
10	<i>Chenopodium album</i>
15	<i>Eurphobia royleana</i>
16	<i>Woodfordia fruticosa</i>
17	<i>Tribulus terrestris</i>

Herb species

Table 13.3

1	<i>Tridax procumbent</i>
2	<i>Achyranthes aspera</i>
3	<i>Adiantum paniculata</i>
4	<i>Anagalis arvensis</i>
5	<i>Ageratum conyzoides</i>
6	<i>Argemone maxicana</i>
7	<i>Cannabis sativa</i>
8	<i>Galium asperuloides</i>
9	<i>Carissa opaca</i>
10	<i>Galium aparine</i>
11	<i>Geranium rotundifolium</i>
12	<i>Eulaliopsis binata</i>
13	<i>Cynodon dactylon</i>
14	<i>Chrysopogon spontaneus</i>
15	<i>Heteropogon contortus</i>
16	<i>Dicanthium annulatum</i>
17	<i>Saccharum arundinaceum</i>

18	<i>Typha elephantina</i>
19	<i>Mimosa pudc</i>
20	<i>Murraya koengii</i>
21	<i>Sonchus asper</i>
22	<i>Lantana camara</i>
23	<i>Oplismenus burmanii</i>
24	<i>Parthenium hysterophorus</i>
25	<i>Oxalis corniculata</i>
26	<i>Solanum indicum</i>
27	<i>Sida rhombifolia</i>
28	<i>Solanum xanthocarpum</i>
29	<i>Jungli patha</i>
30	<i>Stellaria media</i>
31	<i>Sisymbrium irio</i>
32	<i>Persistrophe paniculata</i>
33	<i>Urena lobata</i>
34	<i>Pupalia loppacea</i>
35	<i>Pupalia lappaca</i>
36	<i>Bidens pilosa</i>

Grasses:

Table 13.4

1	<i>Eulaliopsis binata</i>
2	<i>Cynodon dactylon</i>
3	<i>Chrysopogon spontaneul</i>
4	<i>Heteropogon contortus</i>
5	<i>Dicanthium annulatum</i>

6	<i>Saccharum arundinaceum</i>
7	<i>Typha elephantina</i>

Climbers:

Table 13.5

1	<i>Ichnocarpus frutescens</i>
2	<i>Bauhinia vahlli</i>
3	<i>Tinospora malabarica</i>
4	<i>Millettia auricua</i>

Bamboos:

Table 13.6

1	<i>Dendrocalamus strictus</i>
2	<i>Bambusa arundinacea</i>
3	<i>Dendrocalamus hamiltonii</i>

Table 13.7: IVI of Tree Species in Dharamshala Forest Division

Working Circle	Species	Relative Density	Relative Frequency	Relative basal Area	IVI=RD+RF+RBA
Chil working Circle	Acacia catechu	5.43	9.05	0.33	14.80
	Cassia fistula	1.78	4.76	0.03	6.57
	Dalbergia sissoo	0.79	4.29	0.01	5.09
	Emblica officinalis	0.71	2.38	0.02	3.12
	Ficus benghalensis	0.08	0.48	0.01	0.57
	Mangifera indica	0.44	3.33	0.23	4.00
	Miss(B/L)	29.23	28.57	1.54	59.34
	Pinus roxburghii	60.24	45.24	97.74	203.22
	Quercus leucotrichophora	1.11	1.43	0.06	2.60

	Terminalia arjuna	0.20	0.48	0.02	0.70
Chil working Circle Total		100.0	100.0	100.0	300.00
Coppice Working Circle	Acacia catechu	1.12	12.50	0.87	14.49
	Dalbergia sissoo	2.25	12.50	0.57	15.31
	Miss(B/L)	78.65	37.50	43.83	159.98
	Pinus roxburghii	17.98	37.50	54.74	110.21
Coppice Working Circle Total		100.0	100.00	100.0	300.00
Oak Working Circle	Abies spectabilis	0.56	1.67	0.50	2.73
	Cedrus deodara	5.89	5.00	16.35	27.25
	Miss(B/L)	33.94	30.00	18.44	82.38
	Picea smithiana	3.23	6.67	3.26	13.15
	Pinus roxburghii	4.21	8.33	8.60	21.14
	Quercus leucotrichophora	52.17	48.33	52.85	153.36
Oak Working Circle Total		100.0	100.00	100.0	300.00
Plantation Working Circle	Acacia catechu	12.78	17.12	5.24	35.15
	Cassia fistula	2.25	4.79	0.13	7.17
	Dalbergia sissoo	1.55	6.16	0.69	8.41
	Emblica officinalis	1.04	6.16	0.24	7.44
	Ficus benghalensis	0.09	0.68	0.09	0.87
	Mangifera indica	2.07	4.11	1.24	7.42
	Miss(B/L)	45.68	33.56	18.54	97.78
	Pinus roxburghii	34.28	25.34	73.33	132.96
	Terminalia arjuna	0.09	0.68	0.12	0.89
	Terminalia bellirica	0.17	1.37	0.37	1.91
Plantation Working Circle Total		100.0	100.00	100.0	300.00
Protection Working Circle	Abies spectabilis	0.03	0.30	0.01	0.34
	Acacia catechu	12.08	15.71	8.50	36.29
	Callistemon	0.09	0.30	0.25	0.64
	Cassia fistula	0.85	2.11	0.08	3.04

	Cedrus deodara	0.60	0.30	0.48	1.39
	Dalbergia sissoo	1.09	5.14	1.36	7.58
	Emblica officinalis	0.63	2.11	0.19	2.94
	Ficus benghalensis	0.06	0.30	0.09	0.45
	Mangifera indica	0.69	3.32	1.05	5.07
	Miss(B/L)	42.34	37.76	34.75	114.86
	Picea smithiana	0.79	1.51	0.93	3.22
	Pinus roxburghii	19.30	15.71	36.85	71.86
	Quercus leucotrichophora	21.29	13.90	15.43	50.62
	Terminalia arjuna	0.06	0.60	0.02	0.68
	Terminalia bellirica	0.09	0.91	0.01	1.01
Protection Working Circle Total		100.0	100.00	100.0	300.00

Table 13.9 Ecological parameters of Herb species

Importance Value Index Herb				
Species	Relative Density	Relative Frequency	Relative Cover	IVI=RD+RF+RC o
Achyranthes bidentata	9.62	11.69	7.41	28.72
Ageratum conyzoides	29.81	23.38	11.49	64.67
Ainsliaca aptera	39.42	40.26	8.82	88.51
Asplenium polypotoides	5.77	5.19	10.01	20.97
Bupleurum lanceolatum	0.96	1.30	6.67	8.93
Cannabis sativa	0.96	1.30	6.67	8.93
Cuscuta Reflexa Roxb	0.96	1.30	6.67	8.93
Fragaria vesca	3.85	3.90	8.90	16.64
Habenaria goleondra	0.96	1.30	6.67	8.93
Hyrocotyle aristica	0.96	1.30	6.67	8.93
Iris nepalensis	0.96	1.30	6.67	8.93
Valeriana hardwichii	0.96	1.30	6.67	8.93
Viola canascens	4.81	6.49	6.67	17.97
Grand Total	100	100	100	300

13.4 Proposed Management:

The following guidelines are proposed for follow- up:

- Tree species whose IVI is less than 5.00 will be promoted by planting and preservation.
- Fruit trees such as Mango, Amla, Bel, Diospyros, Jamun, Bahera, Bohr and Pipal will not be felled during any operation.
- Areas infested with dense lantana and Parthenium be replaced by useful economical species.
- Fire protection will be done to save the biodiversity.
- Compartments or parts of compartments which have population of fruit trees, or trees of lesser-known species shall be preserved against any exploitation activity.
- During plantation or felling operations, care should be taken not to sacrifice the rarely found species or their regeneration.

13.5 Treatment Proposed

Natural regeneration or assisted natural regeneration shall be promoted. The regenerative capacity of the species shall be studied and on the basis of their capacity to regenerate, exploitation of medicinal herbs and plants shall be followed.

A total ecosystem conservation concept needs to be adopted for conservation of these forests. An effective naturalization plan needs to be devised based on principles for maintaining natural diversity. To enrich the low diversity areas, efforts should be made to restore native complementing natural species rather than planting as many different kinds of trees as possible without looking into the natural regeneration and the needs of the natural fauna of the site. Further, introduction of exotic species in the area be restricted and plantation of both, slow and fast-growing native species of herbs, shrubs, and trees shall be promoted.

Involvement of local communities especially women in forest and wildlife protection through awareness, participatory planning and equitable sharing of responsibility and benefits needs to be promoted. Excluding local population can often lead to illegal activities which can cause further degradation of the environment. The efforts therefore be to impose minimum restrictions on local populations and allow traditional practices to continue to ensure their long-term success. For this purpose capacity building programmes may be taken up. Further efforts should be made to preserve as many patches of natural communities as possible. This will help to sustain regional diversity.

Wherever possible, fragmentation of large patches of natural vegetation be avoided. Even a narrow access road through a forest can act as a barrier to movement of small organisms and effect their habitats.

Ecotones between natural communities support a variety of species from both

communities. Hence, these should be allowed to develop naturally between adjacent communities.

Regular monitoring and updation of species data through R & D activities needs to be taken up taking the present data as the base. Ethno-biological information also needs to be generated.

13.6 Permanent Preservation Plot:

Due to increasing biotic pressure and imminent climatic change, the natural regeneration of most of the tree species has not been coming. To preserve the natural floristics of the forest, it is proposed to establish a permanent preservation plot in each working circle. The area preserved will be demarcated on the ground with erection of suitable stone structures. The various coordinates of longitude, latitude, altitude will be recorded along with a map. This preservation plot shall not be less than 3 ha area and will be studied for ecological succession and biodiversity of the area. No grazing shall be allowed in this area nor any type of cultural operations will be done. Biannual studies on composition and structure of the forest will be done. In case of trees, girth at breast height shall be recorded. The biodiversity will be studied by laying out 3m×3m and 1m×1m quadrats as explained in the methodology of Resource Assessment Survey. The Conservator of Research Circle shall inspect the area annually along with the Divisional Forest Officer of Dharamshala Forest Division to record their findings. A copy of the findings should be sent to the Central Silviculturist, FRI Dehradun for further investigation.

CHAPTER 14

Eco-Tourism and Human resource development

14.1 Concept of Eco- tourism

Himachal Pradesh is known for its picturesque landscapes and popular hill stations. Himachal Pradesh gives an opportunity to one and all to enjoy nature in its pristine state and is one of the top tourist destinations in the country, both for domestic and international visitors. Eco-tourism is a new era of nature enjoyment and learning keeping in view the 4Cs of Eco- tourism i.e. Conservation, Community, Commerce and Culture. Eco-tourism is responsible travel to natural areas for conserving the environment, sustaining the well-being of the local people and involving interpretation and education especially to the visitors. The Eco-tourism activities in Himachal Pradesh are based on the involvement of local communities to help them in providing livelihood opportunities as well as their involvement in environment awareness and conservation.

The Eco-tourism activities proposed at the sites are as per the “Guidelines for sustainable Eco-tourism in forest and Wildlife areas-2021” issued by the ministry of Environment, Forest and Climate Change and as per the instructions provided in the Forest (conservation) Amendment Act, 2023. These guidelines are applicable to Eco-tourism sites falling in all forest and wildlife areas irrespective of the ownership of the land with the overall goal of promoting better understanding of nature and wildlife conservation while generating income and opportunities for the local communities in ecologically, culturally, and economically sustainable manner.

Tourism in State of Himachal Pradesh is a growing industry after hydroelectric power project. Therefore, the question arises whether tourism will lead to disturbances in environmental equilibrium. In an article on Eco-tourism, Down to Earth, 31st July, 2002, a Mexican eco-tourism consultant is given with the credit for introducing the term “eco-tourism”. He has defined it is “traveling to relatively undisturbed or uncontaminated natural areas with the specific objective of studying, admiring and enjoying the scenery and its wild plants and Animals, as well as any existing cultural manifestations found in these areas”. The International Eco-Tourism Society (IETS) considers eco-tourism to be responsible travel to natural areas which conserves the environment and improves the well-being of local people. It demands ‘responsible’ travel so that the impact on ecology is minimized and the benefits of travel trade are shared, not just with tour operators, but with local communities an environment friendly smokeless industry for the many beautiful but destitute regions of the world. Responsible eco-tourism includes programs that minimize the negative aspect of conventional tourism on the environment and enhance the cultural integrity of local people. The Govt. of Himachal Pradesh, Forest Department has notified the “H.P. Forest Department Revised Policy on Development of Eco-

Tourism in Himachal Pradesh, 2005. Eco-tourism policy of Himachal Pradesh aims to bring the wilderness of Himalayas closer to the tourist visiting the state and at the same time attempts to put in place adequate safeguards and system leading to the preservation of these natural resources. The vision of the eco-tourism is to preserve and protect the forest, natural heritage, flora and fauna and attract discerning tourist and visitors to the state and to make Himachal Pradesh a leading eco-tourism destination in the country. The details objectives and strategies of the policy could be accessed from the website:

- <https://himachalecotourism.hp.gov.in/>

Eco-tourism interacts with environment in a two-way process. The environmental resources provide a critical input for the production of tourism product and virtually the tourism development of an area is dependent on the availability of attractive natural or manmade resources. On the other hand, tourism produces a variety of unwanted by products that are disposed to the environment causing negative effects on the environment of the host area. Among the negative effects of tourism on environment are: -

- Disruption of breeding habits, killing of wild Animals and change in extent and nature of vegetation cover through clearance to accommodate infrastructure.
- Water pollution through discharge of sewage, air pollution and noise pollution due to vehicle and population.
- Change in character of built area, changes to urban fabric and over load of infrastructure.
- Increased interest in cultural resources, changes in cultural landscape and festivals, prostitution and crime rate increased.
- Problem of pollution and garbage disposal.

There is large scope in eco-tourism in the tract of this Division. In Dharamshala Forest Division the eco-tourism activities are going on. Large number of tourists are visiting these places. Divisional Forest Officer must take preventive measures and the negative effect of tourism on environment under the provision of Indian Forest Act, 1927 and Environment Protection Act, 1986 and for the same purpose shall have to notify the rules under Section 32 of Indian Forest Act, 1927.

14.2 Background

A MoEFCC vide its letter no. F.No. 1-57/2014 WL (part-8) dated 29.10.2021 has issued “Guidelines for sustainable Eco-tourism in forest and wildlife areas-2021”. In these guidelines it is mentioned that

“Eco-tourism shall be promoted on the basis of science-based planning. The plan shall form part of the duly approved Working Plan or Management Plan or Conservation Plan of the forest of wildlife area as the case may be, and shall include the carrying capacity analysis-based description of the eco-tourism site, time, duration, route, mode of travel and number of persons for visitations, and any support infrastructure needed”

MoEFCC vide its letter no. File No.5-2/2017-FC-Part (1) dated 25.10.2021 has also clarified and amended the Para 11.10 of the Handbook of FCA, which now shall read as

"Development/construction of facilities which are not of permanent nature, in forest areas for the purpose of Eco-tourism by Government authorities shall not be considered as non-forestry activity for the purpose of Forest (Conservation) Act, 1980."

Recently The Forest (Conservation) Amendment Act, 2023 has provided vide amendment to Section 2 of the principal act that breaking or clearing of any forestland or portion thereof for

“(vii) eco-tourism facilities included in the Forest Working Plan or Wildlife Management Plan or Tiger Conservation Plan or Working Scheme of that area; will not be a non-forestry activity and will not attract provisions of FCA, 1980”.

Further Pr.CCF (HoFF), HPFD vide his letter no. Eco-tourism/Eco-tourism Policy/130/483-528 dated 25.08.2023 has also directed in reference to the above mentioned guidelines to prepare a chapter on Eco-tourism in respect of each division which shall be a part of Working plan or Management Plan or Conservation Plan of the forest or wildlife area.

Therefore this new chapter on Eco-tourism has been prepared keeping in view the guidelines issued by MoEF&CC and Re-revised Eco-tourism Policy of Himachal Pradesh, 2017 notified vide Govt. of HP Notification No. FFE-B-C915)-3/2005-III dated 25.02.2017.

14.3 The vision mission and goal of promoting Eco-tourism activities in Dharamshala Forest Division are:

Vision: The vision is to preserve and protect the natural (both flora and fauna)

and cultural heritage of Himachal Pradesh, providing opportunities to enhance livelihood of local people, generate resources for sustainable development and promote greater understanding and appreciation for this heritage through authentic Eco-Tourism initiatives and also to check the negative impacts of unregulated tourism in the forest areas.

Mission: To make Himachal Pradesh a leading Eco-Tourism destination, with attracting at least 10% of overall tourists visiting the State by the year 2030 at Eco-tourism destinations.

Goal: - Promoting better understanding of nature and wildlife conservation while generating income and opportunities for the local communities and also to check the negative impacts of unregulated tourism in the forest areas.

Objectives: The following are the broad objectives of the Eco-Tourism:

- Adopting low impact nature tourism which ensures ecological integrity.
- Promoting biodiversity richness and heritage values of State's wilderness
- Engaging local communities and developing mechanisms with a view of enriching the local economy and promoting sustainable use of indigenous materials Eco- Tourism related interpretation & education to the visitors.
- Establishing partnerships with all stakeholders for developing and promoting nature tourism.
- Transform all potential ecotourism sites in Dharamshala Forest Division into a sustainable and eco-friendly tourism site.
- Preserve the local environment and biodiversity.
- Engage the local community and create employment opportunities.
- Generate sustainable income through eco- tourism activities.
- Promote local culture, cuisine, and traditions.

14.4 Guiding Principles for Eco-tourism:

In Dharamshala Forest Division, we are committed to follow the guiding principles laid down by the Ministry of Environment, Forest, and Climate Change for the development of Eco- tourism:

- Adopt low-impact wildlife tourism that protects the ecological integrity of forest and wildlife areas, secures the wildlife values of the destination and its surrounding.

- Highlight the biodiversity richness, their values and their ecological services to people.
- Highlight the heritage value of State's wilderness and protected areas
- Build environmental and cultural awareness and respect.
- Facilitate the sustainability of Eco-tourism enterprises and activities.
- Provide livelihood opportunities to local communities.
- Use indigenous, locally produced and ecologically sustainable materials for tourism activities.

14.5 Eco-tourism Plan

- Identification of Sites: - Identify areas for Eco-tourism within the Protected areas, in pristine areas rich in biodiversity or of the aesthetic significance through a particularly the local communities. Parameters like Existing tourist destinations, Natural attractiveness, Cultural attractiveness and the existing Infrastructure Quality can be taken as the unique selling point (USP) of a destination.
- Routes for visitation/accessibility included the ease of accessing the destination.
- Identification of permissible activities
- Permissible time for visit.
- Means of travel: referred to the multiple ways, modes of transportation, and routes to reach the destination.

14.6 Eco-tourism Strategies

14.6.1 Eco-Tourism sites/potential Eco-Tourism sites to be identified and documented: -

- Areas inside and adjoining designated forests with eco-Tourism potential be identified and listed.
- Eco-tourism development plan to be programmed and implemented with the carrying capacity.
- Capacity building of eco-guides.
- Records of tourist inflows and commensurate benefit to the community.

14.6.2 Infrastructure Development: Infrastructure will be developed in eco-friendly manner infrastructure will be so designed that those merge with the ambient environment. Non- permanent structures need to be proposed. Natural Profile

and ecological integrity of forest and wildlife areas along with the biodiversity values shall be maintained. All the proposed activities will be eco-friendly and no permanent structures will be established in violation of Forest (Conservation) Act, 1980. The extent of the infrastructure developed will be limited to the carrying capacity of the area. In urban areas like Dharmshala town and vicinity Nagar Vans, Eco Parks to be developed to preserve the pristine environment, and to check negative impacts of unplanned urbanization, thereby conserving and augmenting green cover in the urban areas.

14.6.3 Carrying-capacity analysis and impact assessment: For sustainable Eco-tourism carrying capacity of visitors and vehicles those may be allowed to enter inside the identified area will be assessed and ceiling on number of visitors/vehicles will be fixed. Carrying capacity assessment will include:

Number of persons visiting the site

No. of tents pitched

No. of vehicles entering the site

Infrastructure

Duration of visit

Duration of exposure of site to Eco-tourism activities.

14.6.4 Capacity Building: Propose specialized training on Eco-tourism for Field functionaries. For capacity building of local people training programme need to be framed for nature guides, birdwatchers, Trekking guides, hospitality management, natural science interpreters, patrol partners for protection work, entrepreneurs for small scale homestead-based hospitality industries, small business operators like souvenir shops, photography, VFDS, VFMS etc.

14.6.5 Community Participation: As per the “Guidelines for sustainable Eco-tourism in forest and wildlife areas-2021 the local communities are the principal stakeholders. Thus, the provision of the benefits flowing from the visitation in the area must also accrue to the local communities by way of providing livelihood opportunities arising from the proposed Eco-tourism activities by involving Eco Development committees (EDCs), VFDs, JFMCs local youths, Yuvak mandals, Mahila mandals, Channel managers, Service providers like HPTDC, Site may be run as per Government leasing out process as per approved policy etc.

14.6.6 Benefit sharing: Considering that eco-tourism is an economic activity. It is important that the eco-tourism plan incorporates a feasible revenue sharing mechanism for the stakeholders. Provision will be made for establishment of foundations, either for each of the identified area or an umbrella foundation to cover multiple areas. The funds accrued from eco-tourism activities in the Foundations will be utilized for community development, and running of eco-tourism facilities. Benefit sharing will be done as per the provisions of Re-revised Eco-tourism policy 2017 of H.P. Fair and equitable benefit sharing of common

eco-tourism revenues with the local community is key to sustainability.

In case of community based Eco-tourism an indicative revenue sharing model will be based on the Ecotourism Policy 2024 Notified vide Notification No. FFE-B-C (15)-1/2024 Dated Shimla-2 29/10/2024 annexed as Appendix X in Volume II.

- 14.6.7 Monitoring:** A dynamic monitoring mechanism, covering multiple biological parameters to monitor stress on wildlife vis-à-vis number and patterns of tourist visitation and their level of satisfaction, involvement of local people, scope for improvement in flow of eco-system services, etc. need to be developed. At the Division Level Management Units shall endeavour to initiate a ranking system for the respective. Eco-tourism sites. There shall be regular monitoring by the Division Levels Management Units on the implementation of the guidelines spelt out in the Guidelines for Sustainable Eco-tourism in forest and wildlife areas-2021. An active team at range level will be framed for monitoring each ecotourism site.
- 14.6.8 Education and interpretation:** For effective use of the eco-tourism potential of the area, the management has to work on an effective education and interpretation plan. It will be a good idea to put in place electronic visuals tools, well equipped interpretation centre, appropriate signages, audiovisual presentation centres, interactive learning tools, and safety protocol and information material on the area, for the visitors.
- 14.6.9 Marketing and Promotion:** Strategy need to be developed by DFOs. Services of the services provided already working in this field like Bookings through channel managers, Himachal Pradesh tourism corporation, service provider for Hospitality services in forest rest houses Managed under HPECOSOC will be taken.
- 14.6.10 Institutional Mechanism:** HPECOSOC will work with the Eco-tourism societies at Divisional/Circle level societies to facilitate Eco-tourism activities in the State. Other than this Divisional level Eco-tourism committees to take ground level decisions.
- 14.6.11 Communication Plan:** Effective communication plan covering all eco-tourism sites of Division need to be developed.

14.7 Proposed Activities

Following potential Eco-tourism activities can be carried out in the division.

- **Hiking**
- **Trekking**
- **Tenting/Camping**
- **Bird watching**
- **Dense forest walking**

- **Mountain biking**
- **ATV Biking**
- **Wildlife sighting**
- **Nature cum adventure parks**
- **Historical tourism**
- **Religious tourism**
- **Cultural tourism**
- **Adventure activities supported by Atal Bihari Vajpayee Institute of Mountaineering and Allied Sports (ABVIMAS)**

Activity wise, potential areas have been identified and developments of these areas have been proposed to provide basic civic amenities and to enhance tourist satisfaction and experience.

14.7.1 Hiking: -

Hiking refers to the recreational activity of walking or trekking in natural landscapes, typically on trails or footpaths that are surrounded by forests, mountains, or other wilderness areas. It is usually done for pleasure, exercise, and exploration of the outdoor environment. Hiking may vary in difficulty, duration, and terrain, ranging from easy walks on gentle slopes to more challenging climbs on rugged terrain. It often offers opportunities to connect with nature, enjoy beautiful scenery, and engage in physical activity.

Proposed development (Infrastructure): -

It is proposed that all hiking routes must compulsorily have an entry gate, awareness boards, sitting benches, huts, selfie points, wooden bridge platform, watch towers, Eco friendly toilets etc. The development of these hiking routes be done in a phased manner by taking up priority routes first.

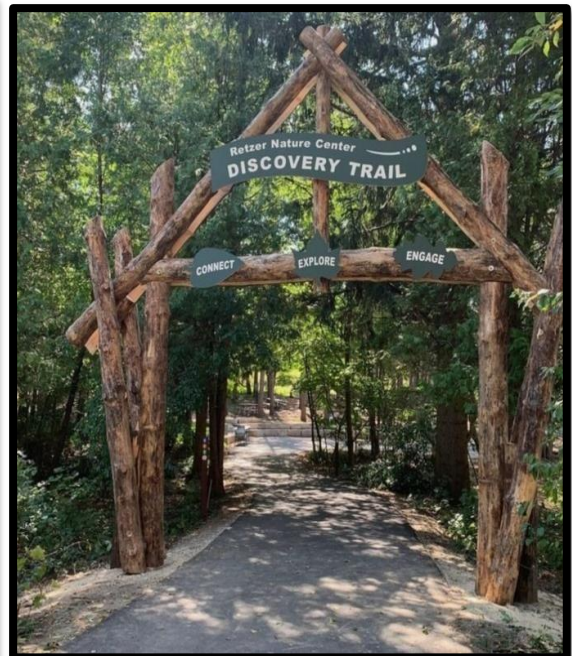


Trek Guide Map at Entry Points





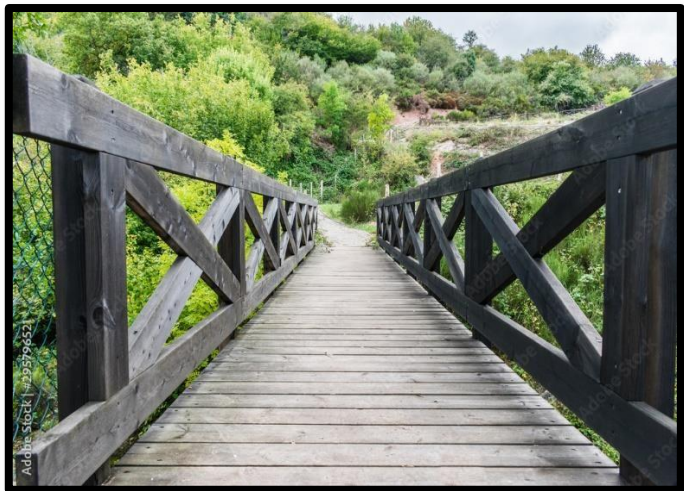
Signages and Awareness Boards



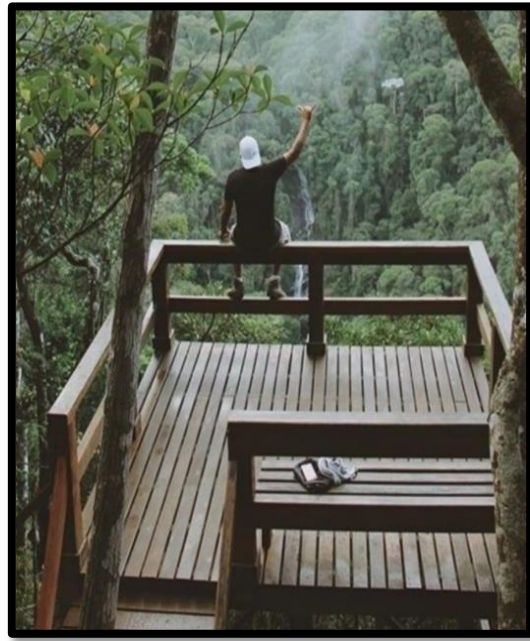
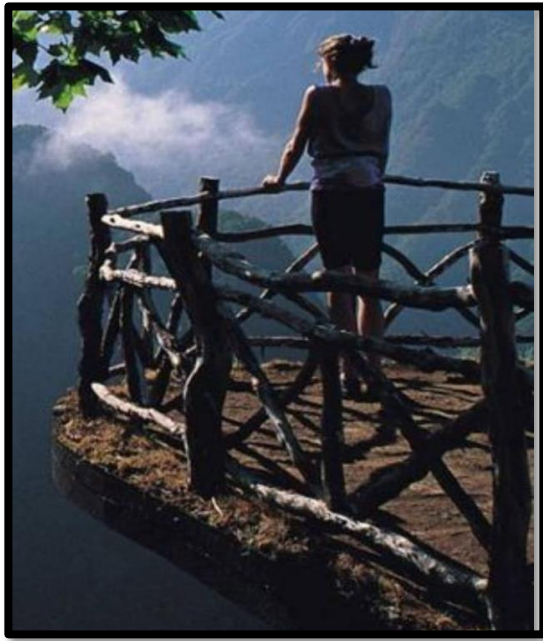
Design of Entry Gates



Design of Selfie Point



Wooden Bridge



Watch towers

14.7.2 Trekking: -

Trekking is an outdoor activity of walking for more than a day. It is a form of walking, undertaken with the specific purpose of exploring and enjoying the scenery. Trekking could be a motive; it could be a commitment, an aim, an objective, a mission, a party, a social gathering. It could be a place where you find friends, and it could be a journey. It could be the slightest chance to save our future generation from losing the nature lovers, Mother Earth holding within. It can be shortened or extended as per the desire of trekkers. It also involves camping overnight enroute. Trekking is more challenging than hiking since it tests one's ability, endurance, and mental as well as psychological capacity. There are many different ways to do a trek and trekking culture often varies from country to country. It usually takes place on trails in areas of relatively unspoiled wilderness.



14.7.3 Tenting/Camping



Camping in Forest Areas (Triund)

Some prominent Tenting/Eco tourism sites are Triund I,II,III and IV, Tulip Garden/Biodiversity park Tang Narwana, Khaniyara, Thatharna, Log huts Dharamkot, Stowary Tents, Kareri I,II and III, Rawa I and II, Nohli, Kutharna, salli, Boh I and II etc .Carrying capacity of each site will be worked out separatly before starting proposed Eco-Tourism Activities.

14.7.3.1 Proposed development (Infrastructure): -

No Permanent infrastructure is proposed for camping sites as the sites need to be restored ecologically and require utmost care to prevent it from environmental degradation. However, awareness boards on Do's and Don'ts in camping sites are required to be placed. However, provision for Eco friendly Toilets, Gazebos be kept in view as per requirement. Development of trekking Paths, Basic amenities, Provision of safe drinking water as per requirement of site be provided to the trekkers. In addition to this there is always a scope in this internationally renowned tourist destination, development of new tenting/camping sites at some other unexplored destinations.

14.7.4 Bird watching

Bird watching, or birding, is the observing of birds, either as a recreational activity or as a form of citizen science. A birdwatcher may observe by using their naked eye, by using a visual enhancement device like binoculars or a telescope, by listening for bird sounds, or by watching public webcams. Most birdwatchers pursue this activity for recreational or social reasons, unlike ornithologists, who engage in the study of birds using formal scientific methods. Viewing birds in their natural habitat is known as bird- watching or Avi tourism. This practice developed mostly from a local pastime watching birds in one's backyard or park to observing birds further afield. Various species or destinations are targeted by bird-watching tourists. As a broader nature tourism niche, bird-watching forms a specialist market. As a result, it has traditionally been viewed as a homogenous group of people obsessed with seeing as many new species as possible. Despite this perception, more comprehensive research has uncovered that these tourists consist of a diverse population, with participants exhibiting varying levels of dedication and commitment to the activity.

Bird watching trails have been identified as per presence of bird's diversity in the areas.

14.7.4.1 Proposed development (Infrastructure): -

It is proposed that all bird watching trails must compulsorily have an entry gate, awareness boards on bird's species, watch towers etc. The development of these trails be done in a phased manner by taking up priority trails first.



Bird watching entry gate, awareness boards

14.7.5 Dense Forest Walk

Healing Forest walks are meditative walks that we take in nature, either alone or in small groups. It is an effective way of finding calm and balance. Nature helps us in becoming free of negative thoughts that pull us down, and through the walks we find answers to difficult questions which bring clarity to our lives. The 3 key values of a healing forest walk are silence, going slow and focusing on our senses. It is not about physical exercise or collecting information. The aim is to quieten the voice in our heads and fill ourselves with a feeling of calm. This experience is unique to each person as we all interpret the world differently. No one knows your mind better than you. Look for things in nature which call out to you and fill you with peace.

Senses: Focus on the senses to bring your awareness to the present moment. Give importance to each of the different senses, one at a time. This directs your attention away from unwanted thoughts. When you notice nature more closely it's easy to fill yourself with awe, wonder, and inspiration.

Slow: Don't hurry or rush. Make a conscious effort to slow down your pace. By spending more time at a place, you build a deeper relationship with it. You begin to

observe more and will start to make new connections.

Silence: Shift from thinking to sensing, and from sensing to feeling. By staying with our feelings, we can learn to carry the forest within us. Even when we are not in nature, the peace and serenity of the forest can be a part of us and influence people around us.

14.7.5.1 Proposed development (Infrastructure): -

It is proposed that all forest walking trails must compulsorily have an entry gate, awareness boards, signages, sitting huts, benches etc. The development of these trails be done in a phased manner by taking up priority trails first.



Forest Walk

14.7.6 Electric ATV Biking and Mountain Biking

An all-terrain vehicle (ATV), also known as a light utility vehicle (LUV), a quad bike or quad (if having four wheels), is a vehicle that travels on low-pressure tires, has a seat that is straddled by the operator, and has handlebars. As the name implies, it is designed to handle a wider variety of terrain than most other vehicles. Tourists

14.7.6.1 Proposed development (Infrastructure): -

It is proposed that all these trails must compulsorily have an entry gate, awareness boards on Do's and Don'ts, signage's, sitting huts, benches, wooden bridges etc. The development of these trails be done in a phased manner by taking up priority trails.



Mountain Biking trails

14.7.7 Wildlife Sighting

Forests of Dharamshala forest division have excellent diversity of wild animals. The forests are habitats of prominent wild animals namely Himalayan Black Bear, Leopard, Himalayan Civet, apart from more commonly found wild animals like Langurs, porcupine, musk deer etc.

There are identified Himalayan Black Bear habitats, caves which can be viewed using high power monocular from strategically constructed watch towers so that the safety of tourists and ecology of the wild habitats are not disturbed. Thus, promoting eco-friendly way of wildlife sighting of such prominent wild life species.

14.7.7.1 Proposed development (Infrastructure): -

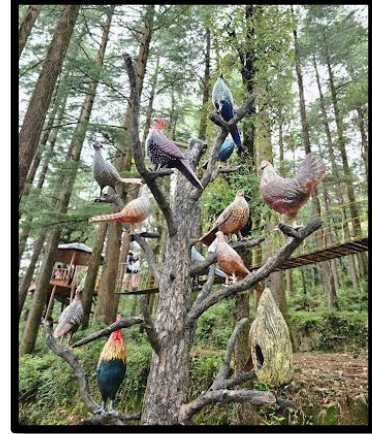
It is proposed that watch towers, and awareness boards on Wildlife be only constructed at such sites at least 1-2 km away from the habitats. The developments of these watch towers be done in a phased manner by taking up priority habitats first.



Watch Towers

14.7.8. Adventure- cum -Nature Parks

Eco parks on various themes like biodiversity, wildlife, orchids, medicinal plants, and children awareness can boost Eco-tourism in the area on a large scale, as there are No. of Eco Parks like Eco Park Banoi, Green Plaza Parks I, II, III, IV in Dharamshala town, Biodiversity Park at Tang Narwana and these Parks not only Provide Educative, Informative and Nature conservation themes but also strengthen the cause of conservation in urban and semi-rural areas. Various adventure activities like zip lining, tree top walk, sky walk, mountain climbing etc. can also be carried out in such eco parks in order to engage the tourists in adventure activities apart from providing knowledge on nature theme-based knowledge through interpretation centres, awareness boards, animal models, statues etc. These theme-based Eco parks in the division, having approximate area of 1-4 hectare are as follow: -



Eco Park Banoi

14.7.8.2 Further Proposed development (Infrastructure): -

It is proposed that Provision of Benches, Rest rooms, Safe drinking water be made available.

Biodiversity Park Tang Narwana

This park is built over an area of 4 Hc. It has excellent infrastructure. Keeping in view the conservation aspect, this site will be run as per the guidelines issued by MoEF on Ecotourism and Notified Policy of HP state Government. Participation of local stakeholders like Yuvak Mandals, Mahila mandals and other forest dependent communities will be promoted.

Green Plaza I, II, III, IV Dharamshala:

These are the urban Eco Parks with the central theme to provide information on Biodiversity, Conservation to children, Visiting Tourist, Urban local population and bring them to the mission of conservation in urban areas.

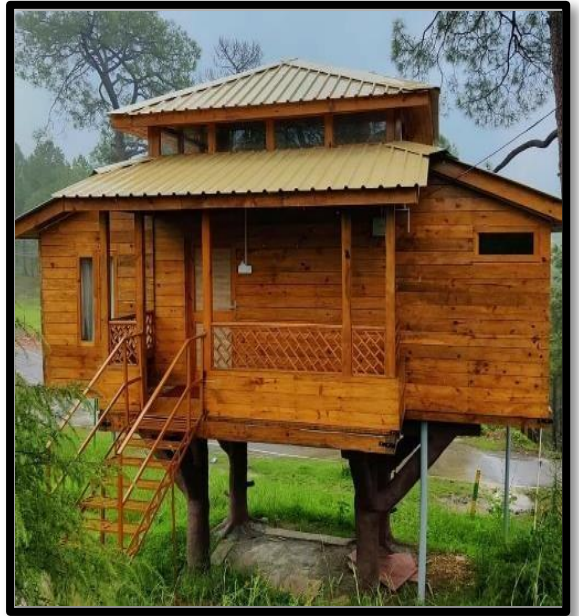
Further Scope

There is a potential scope in areas like kareri, Rirkumar, Naddi, Dhar Narwana to build such thematic Eco Parks to fulfil the goal of conservation in fragile Himalayas.

14.7.9 Eco Huts and Camping Sites: -

FRH Stowary and Tenting Site





Log Huts Dharamkot



14.7.9.1 Forest Rest Houses Managed Under HPECOSOC

- FRH Triund
- FRH Kalapul
- FRH Stowary
- FRH Kareri
- FRH Rirkumar
- FRH Mallan
- FRH Daulatpur
- FRH Lapiana
- FRH Pargod
- FRH Srotari

For better management of these rest houses under ECOSOC, Services of service providers for Room Keeping, cooking, Laundry, Cleaning and sweeping etc. need to be engaged on benefit sharing basis. A model could be developed engaging VFMS, VFDS, Mahila Mandal etc. be framed at state level ECOSOC as per Notified policy of HP State Government on Ecotourism. Benefit sharing be rolled out and need to be implemented at Divisional level.

14.8 Scope and Types of Eco-tourism in Dharamshala Forest Division

14.8.1 Religious, Adventure, Historical and Cultural Eco-Tourism

Religious tourism is a special type of tourism that is strongly motivated by religious reasons. Its variants are faith tourism or spiritual tourism. Religious tourism is an important part of the tourism industry it called special interest tourism, which usually related to the followers of particular faiths who visit locations that are considered as holy sites. Religious sites are not only visited by the pilgrims but also visited by non-religious tourists since they have cultural, historical and religious significance.

Potential Sites of Religious and Adventure Eco-tourism in Dharamshala Forest Division

14.8.1.1 Adi Himani Chamunda Trek

The hills and mountains have special significance and Mountains have traditionally been regarded as abodes of gods. Mountain's area also held sacred due to their association with deities, mythology and legends.

Aadi Himani Chamunda is a Hindu temple dedicated to Shri Chamunda Devi, situated in Chandar Bhan, Jia in Kangra Valley, Himachal Pradesh, India, in the Himalayas. Aadi Himani Chamunda Temple (3185 meters) is located on a hilltop North East of the existing Shri Chamunda Devi Mandir in Kangra District of Himachal Pradesh. One can reach there after hiking about 13 Kilometers from Dharamshala Palampur state Highway (Jadrangal Village) and 8.5 Kilometers from the last motorable road at Kardiana. The trek to Aadi Himani Chamunda Devi requires about 6–7 hours and moderate expertise is required. Devotees visit the sacred shrine throughout the year except for winters. As per local's goddess, Shri Chamunda Devi killed two demons, Chand and Mund, from the top of the mountain by throwing huge boulders on them, one can still find one of the boulders above the Shiva Temple located near the existing Shri Chamunda Devi Temple on Dharamshala Palampur state highway. The recent temple built in the past decade was destroyed by the fierce fire in 2014 and now it has been under reconstruction again with the help of devotees and Temple Trust. The water is available till halfway and after that pilgrims need to carry their own. One can also find tea shops cum resting locations multiple times till the hilltop temple.

Also known as Aadi Himani Chamunda is a beautiful trek for any traveller and trekking enthusiast. The trek is in Dhaula Dhar Range and is famous for the goddess Chamunda Temple. The temple environs are of outstanding natural beauty and for that reason a destination for trekkers.

Trek can be commenced from Jia village. The trek from Jia village is 7.4 kilometres one way. While the ascent takes 3-4 hours to complete; the descent can be completed in 2-3 hours. The route has many shops, solar lights and shelters. The entire Kangra valley is visible from the trek.

Travel to base – Jia is 12km away from Chamunda. Chamunda also have a chamunda temple. There are a lot of local buses between Kangra and Chamunda. The nearest railway is Chamunda Devi. Trekkers coming from a different state can take rail till Pathankot and then if have extra time they can board toy train or alternatively take the bus till Kangra. The nearest airport is Kangra.

Short itinerary for Himani Camunda Trek Dharamshala to ADI Himani Chamunda:- Trekkers need to reach Dharamshala from where they can take a shared Taxi to Jia Or Narawana village. Trek will start from Jia or Narwana village. The total trek distance is 7.4km. Trekkers need to ensure that they are carrying enough water as water sources are not available on the trek. Once reaching the top you can camp for the night at the top or Trekkers may ascend down on the same day.

Day 2 – Himani Chamunda to Dharamshala: - For those who are staying for the night they can start ascending towards Jia or Narwana village. From Jia or Narwana



trekkers will be transferred to Dharamshala or Kangra and Trek end here.



Adi Himani Chamunda Temple

14.8.1.2 Kareri Lake Trek

The Kareri Lake trek, located in the Kangra district of Himachal Pradesh, takes us through lush sub-tropical pine forests. The forests are filled with Oak, Rhododendron, Fir and spruce forest interspersed with broad-leaf species. They are also a host to the high-density birdlife, which is easily spotted. In the latter half of the trail, the forests open up to rocky grasslands along the lake-fed Leund *nallah* which serves as both guide and refreshing companion. The forests are dotted with pines and shrubs. The lake itself is glacial and close to the snow line. All these combines to make the transition of vegetation zones with altitude easily visible on this trail. Kareri Lake Trek is a lovely weekend adventure for people looking for options away from the more beaten Himachal trails like Kheerganga, Prashar Lake, Triund, etc. This trek is also potential Camping site. The entire valley becomes snow-covered during the winter months, from December to February.



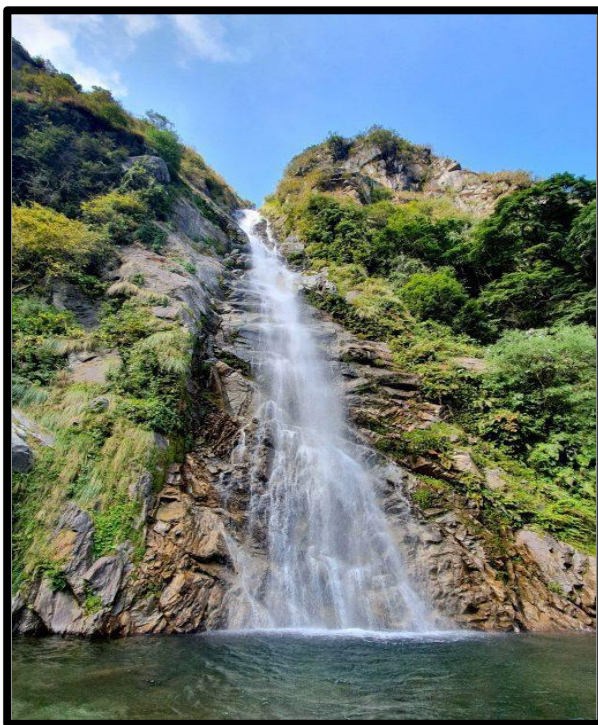
Kareri Lake in Winter and summers

14.8.1.3 Khabru Waterfall Trek: -

Khabru waterfall trek is located in Boh Valley. Boh valley is around 50 kilometers from the Kangra district in Himachal Pradesh. Khabru waterfall is nearly six kilometers short walk from Boh village. One can enjoy the fast-changing and soothing shades of nature at this place. Greenery all around will make us forget all worries and get lost in the beauty of mother nature.

The picturesque place is a hidden gem of Kangra. Boh valley is full of surprises and people here are very welcoming. It is one of the best places for the family and team outing as it has a beautiful waterfall short hike and the fishing pond.

Boh Valley Attractions: Tal Mata, Temple, Khabru Waterfall, Gou Rattanam Trek – 2 hrs, Fish Farming



Khabru Waterfall

Other Prominent Treks in Dharamshala division are

- Yol to Rising Star Peak(6-7Kms.)
- Indrunag-Karthani-Triund-Laka Trek (8-10Kms)
- Bhagsunag-Karthani-Triund Trek(5-6Kms.)
- Naddi-Guna Mata Trek(5-6Kms.)

Some of the treks in Dharamshala forest Division are traditional crossing like Indrahara Pass, Kareri Lamdal Trek. There is always a scope of developing these

traditional and new treks.

14.9 Objectives Religious tourism which will help the organization in following aspects:

Livelihood Generation: Generating livelihood for the local communities living in the vicinity of the Eco-tourism site.

Protection and Awareness: Religious tourism will help in spreading awareness about different kind of flora and fauna among the tourists visiting the site and making them learn their importance, which in-turn will help in protection of forests and wildlife.

Potential of Religious Tourism Activities

Due to the advantageous location for the religious tourism, it has lot of potential for various activities. Also as mentioned above a good number of tourists reaching these Treks are the ones who come here without any prior Booking and are on the lookout for all possible activities in and around. Many of such tourists are interested in any kind of excursions which can provide them opportunity to get a glimpse of the nature.

14.10 Road Map

Proposed Rudiments

Various potential activities which can be developed along these treks:

- Entrance gate
- Eco Friendly toilets
- Mobile change room
- Natural stone sitting area
- Garbage collection area
- Dustbins
- Repair of pathways
- Construction of view tower
- Construction of water tank
- Sign boards
- Log Huts

Immediate Potential Activities:

- Camping
- Forest walks/Nature walks
- Nature/wildlife photography
- Bird watching
- Trekking
- Cultural Display Boards

Development and Repair of Natural Tracks: These treks are to be maintained Regularly as per the requirement of the site.

14.11 Implementation Phases

The following are the principal steps in implementation of the present proposals after the project has been sanctioned.

14.11.1 Preparation Phase

This phase would include making enabling provisions where required in policy and law and communicating the same to all stakeholders with the intention of promoting at the site proposed. Role clarity will be defined among all the stakeholders through MOUs and or agreements which will be arrived at in a participatory manner.

This will prepare the HPFD, local communities, the local tour operators and the staff for owning up the project after reaching clear understanding of mutual obligations, duties, and responsibilities. Detailed work plans for creation of tourist facilities as well as the standard operation procedures for use and management of these facilities and ancillary services will be clearly spelt out in documents.

14.11.2 Training Phase

In this phase training will be organized for various field level staff. These training will be done one of the most important parts of the programme and will lead to capacity building in management, as well as enhancing ability to appreciate the importance of Eco-tourism as a conservation tool. The effectiveness of capacity building exercise will determine the long-term sustainability of the project.

14.11.3 Implementation Phase

In this phase physical infrastructure and facilities will be created. It will be the principal responsibility of HPFD and the construction agency involved to ensure proper implementation using proper designs and procedures fitting to the area In the

ownership of HPFD.

14.11.4 Operation Phase

Under this phase tourists will start flowing in small or large groups and for various different activities. Local staff will be playing their roles for enabling the tourist activities in an orderly manner and providing services to the tourists.

14.11.5 Monitoring and Improvement Phase Constant monitoring will carry out for tourist responses received through feedbacks and impact of the tourist activities in the habitat. A predetermined set of criteria and indicators, developed during the preparation phase in a participatory manner, will be used for measuring and monitoring the impact and success of the project.

14.11.6 Publicity Suitable Hoarding, pamphlets and site-specific marketing material will be published and hoarding will be erected at suitable places and pamphlets will be distributed to tourists coming to these sites in the initial period. Services of Channel Manager, HPTDC and Other Already established Players in Tourism sector, NIFT for Designing of Hoardings and Displays shall be undertaken.

Table 14.1: Details of Publicity Strategy		
S. No	Particular	Description
1.	Product	Eco-tourism sites
2.	Marketing Medium	Posters, Pamphlets, Signboards, Brochures, social media, News Paper, channel Manager Etc.
3	Target Market	Tourist visiting the Eco-tourism sites
4	Media Content	Name of Eco-tourism Sites, Tag Line. Salient features, Photographs of the sites, How to Reach, Contact Details
5	Tag Line	Trek to Heaven
6	Features of the Product	Jungle Camping, Trekking, Cycling, Horse Safari, Bird Watching, Photography, Glimpse of Folk Culture
7	How to Reach	Location of Eco-tourism Sites indicated with elaborated route map.
8	Contact Details	Dedicated helpline number Dedicated website Address of Eco-tourism office at the site

14.12 Ecotourism Implementation Strategy: Overview

Role of Societies registered under Society Act, 2006/H.P. ECOSOC:

The project aims to transform all potential eco-tourism sites in Dharamshala Forest Division into a Sustainable and Eco-friendly eco-tourism sites with the help of local peoples by making registered societies under Society Act, 2006 like Village Forest Development Society / Eco tourism Development Societies/ Self Help Groups made under these societies, registered Adventure Tour Operators, local Hotel Associations, Registered Guides etc. The eco-tourism sites will focus on preserving the local environment, engaging the local community, and generating income through eco-tourism activities.

In Dharamshala Forest division we are working in collaboration with local societies to implement various forestry schemes like The Sanjhi Van Yozna based Afforestation scheme was launched by the HP Govt. on 25th December, 1998. The main objectives of this scheme were: -

- a) Involvement of grass-root level institutions e.g. Gram Panchayats, Mahila Mandals, Yuvak Mandals, VFDCs, NGOs etc. in eco-restoration.
- b) Regeneration of degraded forest areas through community involvement.
- c) Creation of social assets for the benefit of the communities.
- d) Increasing the productivity of the forest areas by improvement of nursery stock through adoption of modern nursery techniques.
- e) Re-orientation of forest staff for facilitating community participation.
- f) Generation of employment opportunities in rural areas.
- g) To bring more area under tree cover by encouraging rehabilitation/plantations of private waste lands on cost/benefit sharing basis.

In support of the participatory management the State Govt. had issued a notification vide No. Fts.II (B) 15-10/87 dated 23rd August, 2001, called the Himachal Pradesh Participatory Forest Management Regulations, these rules were applicable to such government land and forests, including common lands, where participatory management was envisaged.

Similarly, Ministry of Environment and Forests, Govt. of India has launched new scheme called Samanvit Gram Vannikaran SamridhiYojna (SGVSY) under the overall supervision of the FDA (Forest Development Agency). The main objectives of the scheme are:

- Arrest and reverse the trend of forest degradation due to the unsustainable removal of forest products by communities living in and around the forest by making the community responsible for management and monitoring of the forest;
- Provide sustainable and assured employment opportunities to the tribal and other weaker sections of the rural populations in such areas all around the year; and
- Create permanent community assets for each population, which would contribute to overall eco-development in the target areas.
- To involve the village community for execution of the scheme and make them to exercise fully participatory management.
- Create an effective mechanism in order to ensure that the medium of the FDA is used to reach the beneficiaries by other government departments also.

Special Objective of JFM:

The basic objects of Joint Forest Management are given below:

- To evolve consensus on the basic issues to conservation of soil, water and forest resources.
- To provide effective and immediate treatment for barren, wastelands, or degraded protected forests situated near villages through protection, Afforestation, pasture development, soil conservation by active participation of local people.
- To maintain the environmental stability through preservation and wherever necessary, restoration of the ecological balance that has been adversely destroyed by depletion of the forests through involvement of local people in resource management.
- To augment fuel wood, fodder and small timber production for use by local people.
- To convert a hostile population living in the fringes of forests areas into friends and ultimately into resource managers and resource users.
- To evolve policy and law, this will help in the continuity in the planning and implementation.
- To make environment conducive for the adoption and implementation of the JFM in the State and Area.

Another World Bank aided Mid – Himalayan Watershed Development Project was launched in the State in 2005 and ended on 31.03.2017. It was implemented under the leadership of HPFD. It has been implemented through community driven approach through Gram Panchayat (GP) by devolution of powers to these constitutional bodies

Similarly, **Swan River integrated Watershed Management project** funded by JBIC in Una district which ended on March 2017, was implemented under the leadership of FD through 95 Panchayat Development Committees (PDC) registered under Societies Registration Act, 1860.

Now a days, Forest Department is implementing another project entitled **Project for Improvement of Himachal Pradesh Forest ecosystems Management** and Livelihoods in society mode w.e.f. 2018-2028. Ten No. of Societies (VFDS) are already registered in Dharamshala and Shapur Ranges.

Under German Bank Funded Forest Eco-System Climate Proofing Project 66 No. of societies (VFMS) are already registered across Dharamshala forest Division.

Factors supporting Role of JFMCs

Proximity to Adventure Sports Hotspots/FRH:

Our project's locations offer proximity to adventure sports hotspots such as paragliding sites and trekking trails. This strategic positioning provides an additional draw for adventure enthusiasts.

Project Analysis:

- a. **Current Tourism Trends:** In Dharamshala forest Division we have plenty British time Bridal path and region has been witnessing a growing trend in eco-tourism, with an increasing number of travelers seeking immersive, sustainable experiences in nature. This trend aligns perfectly with our project's objectives.
- b. **Market Potential:**
 - The region's natural beauty, including lush forests and picturesque landscapes, attracts nature enthusiasts and adventure seekers.
 - Surveys and market research indicate a strong demand for eco-friendly and community-engaged tourism experiences.
 - Target demographics include eco-conscious travellers , adventure travellers , and those seeking authentic cultural encounters.
- c. **Local Conservation Organizations:**

We are proud to partner with local conservation organizations like Waste warriors dedicated to preserving the region's biodiversity. These partnerships ensure responsible environmental stewardship and foster positive relationships within the community.

d. Community Collaboration:

Our project actively engages with the local community, collaborating with local artisans, farmers, and cultural groups. This collaborative approach not only benefits the community but also enhances the authenticity of the visitor experience

Key Project Components

Eco-Friendly Infrastructure:

- Running of all potential eco-tourism sites in society mode
- Eco-friendly construction methods and materials.
- Non-permanent camp structures like Log huts etc. to minimize environmental impact.
- Café built with sustainable practices and materials.
- Restrooms designed with eco-conscious technology (composting toilets, rainwater harvesting, E-toilets).

Engaging the Local Community:

- Collaborate with local artisans and craftsmen for the construction and operation of the eco-tourism sites.
- Training and employment opportunities for locals in various aspects of the eco-tourism sites.
- Promote local culture through workshops, performances, and handicraft shops.

Major Eco-Tourism Activities:

- Campsite facilities for tourists, with non-permanent, eco-friendly camp structures like Log huts, Swiss Tents etc.
- Guided nature walks and hikes to explore the beautiful surroundings.
- Local food experiences with traditional cuisine.
- Cultural events showcasing local music and traditions.
- Opportunities for adventure sports like trekking and paragliding etc.

Revenue Generation:

- Income from tourism activities, including accommodation, guided tours, Trekking fee, Tent Pitching Charges and cultural experiences.
- Revenue from the café and local handicraft shops.
- Potential partnerships with travel agencies and online booking platforms.

Marketing and Promotion:

- Develop a strong online presence through a website and social media.
- Collaborate with the HP Tourism Department for promotion.
- Highlight the site's eco-friendly and sustainable practices in marketing materials.

Monitoring and Evaluation:

- Regularly assess the environmental impact of the site.
- Gather feedback from tourists and the local community for continuous improvement.
- Adjust the project plan as needed based on evaluations.

Scope of Inter Sectoral Convergence/Synergy:

- Utilize renewable energy sources (solar power, wind turbines) for electricity.
- Implement waste management and recycling systems.
- Biodiversity conservation efforts, including afforestation and protection of local flora and fauna.
- Regular environmental audits to ensure sustainability practices are upheld.

To full fill above mentioned prescribed activities we will do convergence with following stakeholder Departments:

- ✓ Renewal Energy Department
- ✓ H.P. State Biodiversity Board
- ✓ H.P. State Council of Science, Technology and Environment
- ✓ Himalayan Forest Research Institute, Shimla,
- ✓ HPTDC
- ✓ Rural Department

- ✓ Local District Administration
- ✓ Local NGOs
- ✓ Local Hotel Association
- ✓ Local registered Adventure tour operators, Guides

Example:

a) Renewable Energy:

- Implement renewable energy sources such as solar panels and wind turbines to meet electricity needs.
- Ensure energy-efficient lighting and appliances throughout the site.

b) Waste Management and Recycling:

- Establish a robust waste management system, including Collection, Carriage, recycling and composting.
- Educate visitors and staff on responsible waste disposal.

c) Biodiversity Conservation:

- Collaborate with local conservation organizations, local youth, School children to protect local flora and fauna.
- Engage in afforestation and habitat restoration efforts on the site.

d) Environmental Audits:

- Conduct regular environmental audits to assess the site's sustainability practices.
- Use audit findings to make necessary improvements and adjustments.

Eco-Friendly Eco tourism Entrepreneurship:

a) Sustainable Construction:

- Utilize eco-friendly construction methods and materials, minimizing the site's carbon footprint.
- Emphasis non-permanent camp structures made from sustainable materials like Wooden and recyclable materials.

b) Eco-Friendly Café:

- Construct a café with sustainable practices, using local, organic, and eco-friendly

ingredients.

- Incorporate energy-efficient appliances and solar heating.

c) Environmentally Conscious Restrooms:

- Install composting toilets to reduce water usage and promote eco-friendly waste disposal.
- Implement rainwater harvesting systems for restroom facilities.

d) Collaboration with Local Artisans:

- Partner with local artisans and craftsmen, NIFT Kangra for the design and construction of camp structures, café, and handicraft shops.
- Showcase local craftsmanship in site aesthetics.

e) Training and Employment:

- Provide training programs and employment opportunities for the local community in various roles, including site maintenance, guided tours, and cultural performances.

f) Promotion of Local Culture:

- Organize regular workshops and events to promote local music, dance, and traditions.
- Establish local handicraft shops to sell authentic products made by the community.

g) Accommodation:

- Provide a range of accommodation options, including non-permanent, eco-friendly camp structures for tourists.

h) Guide Nature Experiences:

- Offer guided nature walks and hikes to explore the beautiful natural surroundings
- Arrange bird-watching tours and educational sessions on local wildlife.

i) Culinary Experiences:

- Showcase local cuisine through the café, offering traditional dishes made from locally sourced ingredients.
- Host cooking classes to engage tourists in the culinary culture.

j) Cultural Events:

- Organize regular cultural events, including music performances, dance shows, and storytelling sessions.
- Create an immersive experience of the local culture.

k) Adventure Sports:

- Capitalize on the site's natural beauty by offering adventure sports like trekking, paragliding, and mountain biking.

Revenue Generation:

Tourism Income:

- Generate revenue through various tourism activities, including accommodation, guided tours, and cultural experiences.
- Utilize online booking platforms and partnerships with travel agencies for promotion.

Café and Handicraft Shops:

- Generate income through the café and local handicraft shops, selling authentic products.
- Promote these revenue streams through local marketing.

Marketing and Promotion:

Strong Online Presence:

- Develop a user-friendly website with online booking capabilities.
- Maintain active social media profiles to engage with potential tourists.

Collaborative Promotion:

- Collaborate with the HP Tourism Department for promotion and inclusion in their marketing materials.
- Highlight the site's eco-friendly and sustainable practices.

Capacity Building to Stakeholders:

Project Developers and Managers:

- **Management Fees:**

The developers and managers of the project can earn fees for overseeing day-to-day

operations, marketing, and maintenance.

- **Café and Shop Revenues:**

If they operate the café and handicraft shops, they can generate income from these outlets.

- **Tourism Activities:**

Revenues from accommodation, guided tours, cultural events, and adventure sports will contribute to their income.

Tourists:

- **Accommodation Fees:**

Tourists pay fees for staying in the non-permanent camp structures.

- **Tour and Activity Fees:**

Visitors pay for guided tours, trekking, pitching of tents nature experiences, cultural events, and adventure sports.

- **Café and Shop Purchases:**

Money spent on food, beverages, and local handicrafts contributes to the project's income.

Local Food Producers and Suppliers:

- **Sales to Café:**

Local farmers and food producers can supply ingredients to the café, creating a source of income for them.

- **Local Food Experiences:**

Producers of traditional local foods can participate in culinary experiences, earning money through workshops and tastings.

Local Artisans and Craftsmen:

- **Product Sales:**

Artisans can make money by selling their handmade products in the on-site handicraft shops.

- **Workshop Fees:**

Some artisans may offer workshops to tourists, generating additional income.

Dynamic Monitoring and Evaluation Mechanism:

a) Environmental Impact Assessment:

- Regularly assess the environmental impact of the site and its operations.
- Implement corrective actions as needed to mitigate negative effects.

b) Stakeholder Feedback:

- Gather feedback from tourists, the local community, and staff to continually improve the site's offerings.
- Use feedback for future development and expansion.

c) Adaptive Management:

- Be flexible in adapting the project plan based on evaluations and changing circumstances. Benefits for stakeholder from the eco-friendly tourism project.

d) Sustainability Metrics:

1. Carbon Footprint Reduction:

- Target to reduce carbon emissions through the use of renewable energy sources and eco- friendly construction methods.
- Aim to achieve a carbon-neutral status within five years of operation.

2. Waste Reduction:

- Implement a comprehensive waste management system, with a goal to recycle at least 80% of waste generated on-site.
- Promote waste reduction practices among staff and visitors.

3. Biodiversity Conservation:

- Collaborate with local conservation organizations to protect the region's diverse flora and fauna.
- Implement afforestation and habitat restoration programs on the site.

Technology Integration: Enhanced Visitor Experience:

- Utilize technology to enhance visitor experiences, including interactive guided tours through mobile apps and virtual reality experiences.
- Implement online booking and reservation systems for convenience.

Operational Efficiency:

- Integrate smart building management systems to optimize energy consumption.
- Use data analytics for resource allocation and demand forecasting.

Regulatory Compliance:**Environmental Regulations:**

- Ensure full compliance with environmental regulations, obtaining all necessary permits and approvals.
- Regularly monitor and report environmental impact to relevant authorities.

Safety Standards:

- Implement strict safety protocols and training for staff and visitors, adhering to industry safety standards. Community Impact: Job Creation:
- Expect to create over 100 jobs within the local community, providing employment opportunities for residents.
- Offer training programs to enhance skills and employability.

Infrastructure Improvement:

- Plan to invest in local infrastructure improvements, such as road maintenance and waste disposal facilities, benefiting the entire community.

Source of Revenue to Local stakeholders and Government:

- **Tax Revenue:**

As the project generates income, various taxes such as property taxes, sales taxes, and others will contribute to government revenue.

- **Tourism Promotion:**

A successful project will enhance the region's reputation and attract more tourists, leading to increased tourism-related revenue for the government.

a. **Local Community:**

- **Employment Opportunities:**

Local community members can earn income through various job opportunities within the project, such as site maintenance, tour guiding, and cultural performances.

- **Handicraft Sales:**

Those involved in producing local handicrafts can earn money by selling their products in the on-site shops, appealing to tourists looking for authentic souvenirs.

- **Cultural Events:**

Local artists and performers can earn money through regular cultural events and workshops.

- b. **Investors:**

- **Return on Investment (ROI):**

Village Forest Development Society / Eco tourism Development Societies/ Self Help Groups can make money through their initial investment in these projects. This includes returns from various revenue streams, such as accommodation, tours, the café, and handicraft sales.

- **Share of Profits:**

Depending on the project structure, investors may receive a share of the project's profits after operational expenses.

- **Long-Term Income:**

Eco-friendly tourism projects often have a long-term income potential, providing investors with steady returns over time.

Education and outreach Programs:

- a. **Visitor Education:**

Eco-Education Programs:

During their stay, visitors will have the opportunity to participate in eco-education programs, including guided nature walks and workshops on sustainable practices. These programs aim to raise awareness about the importance of environmental conservation.

- b. **Feedback and Continuous Improvement:**

Stakeholder Input:

We value feedback from all stakeholders, including tourists, the local community, and staff. Regular surveys and feedback mechanisms will be in place to gather insights for continuous improvement.

Adaptive Management:

Our project's management team is committed to adaptive management, allowing us to swiftly address issues and make enhancements based on feedback and changing circumstances.

c. Marketing and Promotion Budget:

Strategic Marketing Allocation:

We have allocated a significant budget for strategic marketing and promotional activities. This investment will help us reach a wider audience and establish the project as a premier eco- tourism destination.

d. Sustainable Supply Chain:

Local Sourcing:

The café and handicraft shops will prioritize sourcing ingredients and products from local suppliers, creating a sustainable and mutually beneficial supply chain.

e. Crisis Management:

Comprehensive Crisis Plan:

We have developed a comprehensive crisis management plan to address a range of potential emergencies, ensuring the safety and well-being of visitors and staff. Services from DDMA may be engaged in.

f. Monitoring and Reporting:

Performance Metrics:

Key performance metrics, including financial performance, environmental impact, and community engagement, will be regularly monitored and reported to stakeholders.

Socio-Cultural Impact:

I. Local Culture Preservation:

Our project is dedicated to preserving and promoting the rich local culture and heritage. This includes regular cultural events, performances, and workshops showcasing the traditions of the region.

II. Long-Term Vision:

Sustainability and Growth:

Our long-term vision for the project includes achieving sustainability milestones and

expanding our offerings to provide even more enriching experiences for future generations of travelers.

14.13 Project Challenges:

a. Risk Assessment:

Challenges and Mitigation:

- **Weather-Related Disruptions:**

We acknowledge the region's susceptibility to weather-related disruptions, such as heavy rainfall or snowfall. To mitigate these risks, we have invested in robust infrastructure that can withstand extreme conditions and developed contingency plans for visitor safety.

- **Economic Downturn:**

In the event of an economic downturn affecting tourism, our diversified revenue streams, including the café and handicraft shops, provide a buffer. We have also set aside a financial reserve to navigate such challenges.

b. Legal Framework:

Stakeholder Agreements:

- We will establish clear legal agreements with investors, the government, and local partners to ensure transparent and mutually beneficial partnerships.
- These agreements outline the rights, responsibilities, and dispute resolution mechanisms for all stakeholders.

c. Tourist Safety:

d. Visitor Safety Measures:

- The safety of our visitors is paramount. We have trained staff in first aid and emergency response.
- Medical facilities and communication systems are in place to handle any unforeseen emergencies.

e. Accessibility: Inclusivity and Accessibility:

- We are committed to providing an inclusive experience. The site is designed to be accessible to people with disabilities, adhering to accessibility standards.
- Special accommodations are available upon request to ensure every visitor can enjoy their stay.

f. Promotion of Responsible Tourism:

Responsible Tourism Practices:

- We promote responsible tourism by educating visitors on the importance of respecting local ecosystems and cultures.
- Guided tours include information on responsible behaviour and eco-conscious practices.

Community Development: Education Initiatives:

- We allocate a portion of profits to support local education initiatives, including scholarships and educational infrastructure improvements.
- Engaging local students in educational programs on site fosters a culture of learning.

g. Stakeholder Communication:

Open Dialogue:

- We maintain open and transparent communication channels with all stakeholders, including regular updates, meetings, and avenues for feedback.
- An online platform allows stakeholders to access project information and provide input.

- **Visitor Demographics:**

Target Demographics:

- Our target demographic includes eco-conscious travelers, adventure enthusiasts, and cultural explorers. Market research indicates a growing interest in these segments.
- We anticipate a diverse mix of domestic and international tourists.

- **Economic Impact Analysis:**

Economic Contribution:

- Our project is expected to significantly boost the local economy by creating jobs, increasing tourism-related income, and supporting local businesses.
- Economic impact studies project a substantial increase in the region's GDP.

14.14 Carrying Capacity analysis and Impact Assessment of Ecotourism Sites: -

14.14.1 Carrying Capacity of the Camping Sites

14.14.1.1. Triund Camping Site

Carrying capacity of proposed site at Triund defines maximum permissible footfall wide MoEF&CC guidelines on sustainable eco-tourism in protected area and tiger reserves using below formulation.

Physical carrying capacity=PCC=A *V/a * Rf

Total proposed area of the site=4 ha

Whereas, Area available for public use of proposed site is=1ha=10000m²

- o V/a=one visitor/M²
- o Rf= rotation factor
- o Therefore V/a=10000
- o Rotation factor=Opening period/Total Time Spent
- o Opening period is prescribed to be 10 hours from 7-5. Time spent by an average visitor in park is approximately 2-3 hrs which gives o Rotation factor=10/2.5=4
- o On the basis of above Physical Carrying Capacity for on foot visitors= 1 x 10000x 4 =40000 visits per day

Real Carrying capacity (RCC)

RCC is the maximum permissible number of visits to a site, once the “reductive factors” (corrective) derived from the particular characteristics of the site have been applied to the PCC. These “reductive factors” (corrective) are based on biophysical, environmental, ecological, social and management variables.

$$RCC = PCC * \frac{(100 - CF_1)}{100} * \frac{(100 - CF_2)}{100} \dots \dots \frac{(100 - CF_n)}{100}$$

Where; CF=corrective factor

Corrective factors are site specific and are expressed in percentage as below:

$$CF = M_1 / M_t * 100$$

M₁= limiting magnitude of the variable M_t = total magnitude of the variable

i.) Soil compaction: Here the susceptibility of the site is taken into account.

Total usable area is 10000m² (M_t)

Medium soil compaction risk = 1000 m² (weighting factor: 2)

High soil compaction risk= 1000 m² (weighting factor: 3)

$$M_1 = 1000 \times 2 + 1000 \times 3 = 2000 + 3000 = 5000 \text{ m}^2$$

Therefore $CF_1 = (5000/10000) \times 100 = 50\%$

ii.) Aesthetic value of Site: Here aesthetic value of site is taken into account.

Total usable area is 10000m²(Mt)

Medium vulnerable stretch = 1500 m²(weighting factor: 2)

Highly vulnerable stretch= 1000 m² (weighting factor: 3)

$M_1 = 1500 \times 2 + 1000 \times 3 = 3000 + 3000 = 6000 \text{ m}^2$

Therefore $CF_2 = (6000/10000) \times 100 = 60\%$

Computation of RCC: -

$RCC = PCC \times (100 - CF_1)/100 \times (100 - CF_2)/100 \dots (100 - CF_n)/100$

$RCC = 40000 \times (100 - 50)/100 \times (100 - 60)/100 = 40000 \times (0.5 \times 0.4) = 8000 \text{ visits per day}$

Effective Permissible carrying capacity (ECC):

it is the maximum number of visitors that a site can sustain, given the management capacity (MC) available. ECC is obtained by multiplying the real carrying capacity (RCC) with the management capacity (MC). MC is defined as the sum of conditions that proposed site administration requires if it is to carry out its functions at the optimum level. Limitation in management like lack of staff and infrastructure limit the RCC.

For the proposed site owing to the paucity of staff the MC is around 10%.

Hence ECC of proposed site at Triund= 800 visits per day

Duration of exposure of site to eco-tourism activities—throughout the year Except in Rainy season during heavy rainfall and Winters During Heavy Snowfall Notified by Administration from Time to time.

14.14.1.2. Kareri Camping Site

Physical carrying capacity=PCC=A *V/a * Rf

Total proposed area of the site=3 ha

Whereas, Area available for public use of proposed site is=0.8ha=8000m²

- o $V/a = \text{one visitor}/M^2$
- o $Rf = \text{rotation factor}$
- o Therefore $V/a = 8000$
- o $\text{Rotation factor} = \text{Opening period}/\text{Total Time Spent}$
- o Opening period is prescribed to be 10 hours from 7-5. Time spent by an average visitor in park is approximately 2-3 hrs which gives o $\text{Rotation factor} = 10/2.5 = 4$
- o On the basis of above Physical Carrying Capacity for on foot visitors=

$$1 \times 8000 \times 4 = 32000 \text{ visits per day}$$

Real Carrying capacity (RCC)

RCC is the maximum permissible number of visits to a site, once the “reductive factors” (corrective) derived from the particular characteristics of the site have been applied to the PCC. These “reductive factors” (corrective) are based on biophysical, environmental, ecological, social and management variables.

$$RCC = PCC \times \frac{(100 - CF_1)}{100} \times \frac{(100 - CF_2)}{100} \dots \dots \frac{(100 - CF_n)}{100}$$

Where; CF=corrective factor

Corrective factors are site specific and are expressed in percentage as below:

$$CF = M_1 / M_t \times 100$$

M₁ = limiting magnitude of the variable M_t = total magnitude of the variable

i.) Soil compaction: Here the susceptibility of the site is taken into account.

Total usable area is 8000m² (M_t)

Medium soil compaction risk = 800 m² (weighting factor: 2)

High soil compaction risk = 800 m² (weighting factor: 3)

$$M_1 = 800 \times 2 + 800 \times 3 = 1600 + 2400 = 4000 \text{ m}^2$$

$$\text{Therefore } CF_1 = (4000 / 8000) \times 100 = 50\%$$

ii.) Aesthetic value of Site: Here aesthetic value of site is taken into account.

Total usable area is 8000m²(M_t)

Medium vulnerable stretch = 1000 m²(weighting factor: 2)

Highly vulnerable stretch = 1000 m² (weighting factor: 3)

$$M_1 = 1000 \times 2 + 1000 \times 3 = 2000 + 3000 = 5000 \text{ m}^2$$

$$\text{Therefore } CF_2 = (5000 / 8000) \times 100 = 62.5\%$$

Computation of RCC: -

$$RCC = PCC \times (100 - CF_1) / 100 \times (100 - CF_2) / 100 \dots (100 - CF_n) / 100$$

$$RCC = 32000 \times (100 - 50) / 100 \times (100 - 62.5) / 100 = 32000 \times (0.5 \times 0.375) = 6000 \text{ visits per day}$$

Effective Permissible carrying capacity (ECC):

it is the maximum number of visitors that a site can sustain, given the management capacity (MC) available. ECC is obtained by multiplying the real carrying capacity (RCC) with the management capacity (MC). MC is defined as the sum of conditions that proposed site administration requires if it is to carry out its

functions at the optimum level. Limitation in management like lack of staff and infrastructure limit the RCC.

For the proposed site owing to the paucity of staff the MC is around 10%.

Hence ECC of proposed site at Kareri= 600 visits per day

Duration of exposure of site to eco-tourism activities—throughout the year Except in Rainy season during heavy rainfall and Winters During Heavy Snowfall Notified by Administration from Time to time.

14.14.1.3. Rawa Camping Site

Physical carrying capacity=PCC=A *V/a * Rf

Total proposed area of the site=1 ha

Whereas, Area available for public use of proposed site is=0.5ha=5000m²

- o V/a=one visitor/M²
- o Rf= rotation factor
- o Therefore V/a=5000
- o Rotation factor=Opening period/Total Time Spent
- o Opening period is prescribed to be 10 hours from 7-5. Time spent by an average visitor in park is approximately 2-3 hrs which gives o Rotation factor=10/2.5=4
- o On the basis of above Physical Carrying Capacity for on foot visitors= 1 x 5000x 4 =20000 visits per day

Real Carrying capacity (RCC)

RCC is the maximum permissible number of visits to a site, once the “reductive factors” (corrective) derived from the particular characteristics of the site have been applied to the PCC. These “reductive factors” (corrective) are based on biophysical, environmental, ecological, social and management variables.

$$RCC = PCC * \frac{(100 - CF_1)}{100} * \frac{(100 - CF_2)}{100} \dots \dots \frac{(100 - CF_n)}{100}$$

Where; CF=corrective factor

Corrective factors are site specific and are expressed in percentage as below:

$$CF = M_1 / M_t * 100$$

M₁= limiting magnitude of the variable M_t = total magnitude of the variable

iii.) Soil compaction: Here the susceptibility of the site is taken into account.

Total usable area is 5000m² (M_t)

Medium soil compaction risk = 500 m² (weighting factor: 2)

High soil compaction risk= 500 m² (weighting factor: 3)

$$M1=500 \times 2 + 500 \times 3 = 1000 + 1500 = 2500 \text{ m}^2$$

$$\text{Therefore CF1} = (2500/5000) \times 100 = 50\%$$

iv.) Aesthetic value of Site: Here aesthetic value of site is taken into account.

Total usable area is 5000m²(Mt)

Medium vulnerable stretch = 750 m²(weighting factor: 2)

Highly vulnerable stretch= 500 m² (weighting factor: 3)

$$M1= 750 \times 2 + 500 \times 3 = 1500 + 1500 = 3000 \text{ m}^2$$

$$\text{Therefore CF2} = (3000/5000) \times 100 = 60\%$$

Computation of RCC: -

$$\text{RCC} = \text{PCC} \times (100 - \text{CF1})/100 \times (100 - \text{CF2})/100 \dots (100 - \text{CFn})/100$$

$$\text{RCC} = 20000 \times (100 - 50)/100 \times (100 - 60)/100 = 20000 \times (0.5 \times 0.4) = 4000 \text{ visits per day}$$

Effective Permissible carrying capacity (ECC):

it is the maximum number of visitors that a site can sustain, given the management capacity (MC) available. ECC is obtained by multiplying the real carrying capacity (RCC) with the management capacity (MC). MC is defined as the sum of conditions that proposed site administration requires if it is to carry out its functions at the optimum level. Limitation in management like lack of staff and infrastructure limit the RCC.

For the proposed site owing to the paucity of staff the MC is around 10%.

Hence ECC of proposed site at Rawa= 400 visits per day

Duration of exposure of site to eco-tourism activities—throughout the year Except in Rainy season during heavy rainfall and Winters During Heavy Snowfall Notified by Administration from Time to time.

14.14.1.4. Kutharna Camping Site

$$\text{Physical carrying capacity} = \text{PCC} = A \times V/a \times R_f$$

Total proposed area of the site=1 ha

Whereas, Area available for public use of proposed site is=0.5ha=5000m²

- o V/a=one visitor/M²
- o R_f= rotation factor
- o Therefore V/a=5000
- o Rotation factor=Opening period/Total Time Spent

- o Opening period is prescribed to be 10 hours from 7-5. Time spent by an average visitor in park is approximately 2-3 hrs which gives o Rotation factor=10/2.5=4
- o On the basis of above Physical Carrying Capacity for on foot visitors= 1 x 5000x 4 =20000 visits per day

Real Carrying capacity (RCC)

RCC is the maximum permissible number of visits to a site, once the “reductive factors” (corrective) derived from the particular characteristics of the site have been applied to the PCC. These “reductive factors” (corrective) are based on biophysical, environmental, ecological, social and management variables.

$$RCC = PCC * \frac{(100 - CF_1)}{100} * \frac{(100 - CF_2)}{100} \dots \frac{(100 - CF_n)}{100}$$

Where; CF=corrective factor

Corrective factors are site specific and are expressed in percentage as below:

$$CF = M_1 / M_t * 100$$

M₁ = limiting magnitude of the variable M_t = total magnitude of the variable

- v.) Soil compaction: Here the susceptibility of the site is taken into account.

Total usable area is 5000m² (M_t)

Medium soil compaction risk = 500 m² (weighting factor: 2)

High soil compaction risk= 500 m² (weighting factor: 3)

$$M_1 = 500 \times 2 + 500 \times 3 = 1000 + 1500 = 2500 \text{ m}^2$$

$$\text{Therefore } CF_1 = (2500 / 5000) \times 100 = 50\%$$

- vi.) Aesthetic value of Site: Here aesthetic value of site is taken into account.

Total usable area is 5000m²(M_t)

Medium vulnerable stretch = 750 m²(weighting factor: 2)

Highly vulnerable stretch= 500 m² (weighting factor: 3)

$$M_1 = 750 \times 2 + 500 \times 3 = 1500 + 1500 = 3000 \text{ m}^2$$

$$\text{Therefore } CF_2 = (3000 / 5000) \times 100 = 60\%$$

Computation of RCC: -

$$RCC = PCC * (100 - CF_1) / 100 * (100 - CF_2) / 100 \dots (100 - CF_n) / 100$$

$$RCC = 20000 \times \frac{(100 - 50)}{100} \times \frac{(100 - 60)}{100} = 20000 \times (0.5 \times 0.4) = 4000 \text{ visits per day}$$

Effective Permissible carrying capacity (ECC):

it is the maximum number of visitors that a site can sustain, given the management capacity (MC) available. ECC is obtained by multiplying the real carrying capacity (RCC) with the management capacity (MC). MC is defined as the sum of conditions that proposed site administration requires if it is to carry out its functions at the optimum level. Limitation in management like lack of staff and infrastructure limit the RCC.

For the proposed site owing to the paucity of staff the MC is around 10%.

Hence ECC of proposed site at Kutharna= 400 visits per day

Duration of exposure of site to eco-tourism activities—throughout the year Except in Rainy season during heavy rainfall and Winters During Heavy Snowfall Notified by Administration from Time to time.

14.14.1.5. Boh Camping Site

Physical carrying capacity=PCC=A *V/a * Rf

Total proposed area of the site=1 ha

Whereas, Area available for public use of proposed site is=0.5ha=5000m²

- o V/a=one visitor/M²
- o Rf= rotation factor
- o Therefore V/a=5000
- o Rotation factor=Opening period/Total Time Spent
- o Opening period is prescribed to be 10 hours from 7-5. Time spent by an average visitor in park is approximately 2-3 hrs which gives o Rotation factor=10/2.5=4
- o On the basis of above Physical Carrying Capacity for on foot visitors= 1 x 5000x 4 =20000 visits per day

Real Carrying capacity (RCC)

RCC is the maximum permissible number of visits to a site, once the “reductive factors” (corrective) derived from the particular characteristics of the site have been applied to the PCC. These “reductive factors” (corrective) are based on biophysical, environmental, ecological, social and management variables.

$$RCC=PCC*\frac{(100-CF1)}{100}*\frac{(100-CF2)}{100}.....\frac{(100-CFn)}{100}$$

Where; CF=corrective factor

Corrective factors are site specific and are expressed in percentage as below:

$$CF=M1/Mt*100$$

M1= limiting magnitude of the variable Mt = total magnitude of the variable

- vii.) Soil compaction: Here the susceptibility of the site is taken into account.

Total usable area is 5000m² (Mt)

Medium soil compaction risk = 500 m² (weighting factor: 2)

High soil compaction risk= 500 m² (weighting factor: 3)

$M1=500 \times 2 + 500 \times 3 = 1000 + 1500 = 2500 \text{ m}^2$

Therefore $CF1 = (2500/5000) \times 100 = 50\%$

viii.) Aesthetic value of Site: Here aesthetic value of site is taken into account.

Total usable area is 5000m²(Mt)

Medium vulnerable stretch = 750 m²(weighting factor: 2)

Highly vulnerable stretch= 500 m² (weighting factor: 3)

$M1 = 750 \times 2 + 500 \times 3 = 1500 + 1500 = 3000 \text{ m}^2$

Therefore $CF2 = (3000/5000) \times 100 = 60\%$

Computation of RCC: -

$RCC = PCC \times (100 - CF1)/100 \times (100 - CF2)/100 \dots (100 - CFn)/100$

$RCC = 20000 \times (100 - 50)/100 \times (100 - 60)/100 = 20000 \times (0.5 \times 0.4) = 4000 \text{ visits per day}$

Effective Permissible carrying capacity (ECC):

it is the maximum number of visitors that a site can sustain, given the management capacity (MC) available. ECC is obtained by multiplying the real carrying capacity (RCC) with the management capacity (MC). MC is defined as the sum of conditions that proposed site administration requires if it is to carry out its functions at the optimum level. Limitation in management like lack of staff and infrastructure limit the RCC.

For the proposed site owing to the paucity of staff the MC is around 10%.

Hence ECC of proposed site at Boh= 400 visits per day

Duration of exposure of site to eco-tourism activities—throughout the year Except in Rainy season during heavy rainfall and Winters During Heavy Snowfall Notified by Administration from Time to time.

14.14.1.6. Narawana Biodiversity Park

Physical carrying capacity=PCC=A *V/a * Rf

Total proposed area of the site=1 ha

Whereas, Area available for public use of proposed site is=0.5ha=5000m²

- o V/a=one visitor/M²
- o Rf= rotation factor
- o Therefore V/a=5000

- o Rotation factor=Opening period/Total Time Spent
- o Opening period is prescribed to be 10 hours from 7-5. Time spent by an average visitor in park is approximately 2-3 hrs which gives o Rotation factor=10/2.5=4
- o On the basis of above Physical Carrying Capacity for on foot visitors= 1 x 5000x 4 =20000 visits per day

Real Carrying capacity (RCC)

RCC is the maximum permissible number of visits to a site, once the “reductive factors” (corrective) derived from the particular characteristics of the site have been applied to the PCC. These “reductive factors” (corrective) are based on biophysical, environmental, ecological, social and management variables.

$$RCC = PCC * \frac{(100 - CF_1)}{100} * \frac{(100 - CF_2)}{100} \dots \frac{(100 - CF_n)}{100}$$

Where; CF=corrective factor

Corrective factors are site specific and are expressed in percentage as below:

$$CF = M_1 / M_t * 100$$

M₁ = limiting magnitude of the variable M_t = total magnitude of the variable

ix.) Soil compaction: Here the susceptibility of the site is taken into account.

Total usable area is 5000m² (M_t)

Medium soil compaction risk = 500 m² (weighting factor: 2)

High soil compaction risk= 500 m² (weighting factor: 3)

$$M_1 = 500 \times 2 + 500 \times 3 = 1000 + 1500 = 2500 \text{ m}^2$$

$$\text{Therefore } CF_1 = (2500 / 5000) \times 100 = 50\%$$

x.) Aesthetic value of Site: Here aesthetic value of site is taken into account.

Total usable area is 5000m²(M_t)

Medium vulnerable stretch = 750 m²(weighting factor: 2)

Highly vulnerable stretch= 500 m² (weighting factor: 3)

$$M_1 = 750 \times 2 + 500 \times 3 = 1500 + 1500 = 3000 \text{ m}^2$$

$$\text{Therefore } CF_2 = (3000 / 5000) \times 100 = 60\%$$

Computation of RCC: -

$$RCC = PCC * (100 - CF_1) / 100 * (100 - CF_2) / 100 \dots (100 - CF_n) / 100$$

$$RCC = 20000 \times (100 - 50) / 100 \times (100 - 60) / 100 = 20000 \times (0.5 \times 0.4) = 4000 \text{ visits per day}$$

Effective Permissible carrying capacity (ECC):

it is the maximum number of visitors that a site can sustain, given the management capacity (MC) available. ECC is obtained by multiplying the real carrying capacity (RCC) with the management capacity (MC). MC is defined as the sum of conditions that proposed site administration requires if it is to carry out its functions at the optimum level. Limitation in management like lack of staff and infrastructure limit the RCC.

For the proposed site owing to the paucity of staff the MC is around 20%.

Hence ECC of proposed site at Biodiversity Park Narwana= 800 visits per day

14.14.2 Carrying Capacity of the Trekking Routes

Carrying capacity of proposed sites defines maximum permissible footfall needs to be calculated given size of area. The carrying capacity limits is calculated vide MoEF&CC guidelines on sustainable eco-tourism in protected area and tiger reserves using below formulation.

Physical carrying capacity=PCC=A *V/a * Rf

Total proposed area of the trek= Length * Width (Width taken average 1.5m)

- o V/a=one visitor/M²

For the convenience of visitors and ecological aspect let's keep 200 visitors in 1km stretch, which means $V/a = 200/(1000*1.5) = 0.13$

V/a for the Whole Area = Area*0.13

- o Rotation factor=Opening period/Total Time Spent

Since trekking involves camping and overnight stays, here we are keeping rotation factor as 1 (12hrs opening period and 12hrs stay).

- o On the basis of above

Physical Carrying Capacity for on foot visitors=

$V/a \times \text{Area in Ha} \times 2 \text{ visits per day}$

For example: Let's take 6 km trek.

$PCC = 9000 * 0.13 * 0.9 * 1 = 1053 \text{ visits/ day}$

Real Carrying capacity (RCC)

RCC is the maximum permissible number of visits to a site, once the “reductive factors” (corrective) derived from the particular characteristics of the site have been applied to the PCC. These “reductive factors” (corrective) are based on biophysical, environmental, ecological, social and management variables.

$$RCC = PCC * \frac{(100 - CF_1)}{100} * \frac{(100 - CF_2)}{100} \dots \frac{(100 - CF_n)}{100}$$

Where; CF=corrective factor

Corrective factors are site specific and are expressed in percentage as below:

$$CF = M_1 / M_t * 100$$

M₁ = limiting magnitude of the variable M_t = total magnitude of the variable

Computation of RCC:

$$RCC = PCC * (100 - CF_1) / 100 * (100 - CF_2) / 100 \dots (100 - CF_n) / 100$$

For Trekking purpose, we assume Soil compaction factor to be 20% as only factor.

$$CF_1 = 20\%$$

$$RCC = 1053 * 0.8 = 824 \text{ visits/day}$$

Effective Permissible carrying capacity (ECC):

It is the maximum number of visitors that a site can sustain, given the management capacity (MC) available. ECC is obtained by multiplying the real carrying capacity (RCC) with the management capacity (MC). MC is defined as the sum of conditions that proposed site administration requires if it is to carry out its functions at the optimum level. Limitation in management like lack of staff and infrastructure limit the RCC.

For the proposed site owing to the paucity of staff the MC is around 60%.

$$ECC = RCC * 60\% \text{ For example:}$$

$$RCC = 824,$$

$$ECC = 824 * 0.6 = 494 \text{ visits per day}$$

For all the trekking routes mentioned below we have taken:

$$V/a = \text{Area} * 0.03$$

$$\text{Rotation factor} = 1$$

Corrective factor for soil compaction, CF₁ = 20%

Management capacity = 60%

S. No	Trek Details	Area (m ²)	PCC visits/day	RCC visits/day	ECC visits/day
1.	Galun to Triund	9000	1053	824	494
2.	Bhagsunag to Triund	9000	1053	824	494

3.	Kharota to Thatharna	6000	702	561	336
4.	Nohli To Kareri Lake	12000	1404	1123	673
5.	Salli To Chandrella	6000	702	561	336
6.	Boh to Khabru Waterfall	6000	702	561	336
7.	Jia to Himani Chamunda	12000	1404	1123	673
8.	Yol to Himani chamunda	12000	1404	1123	673
9.	Yol to Rising star	6000	702	561	336

14.15 Waste Disposal: -

Management of Waste is an integral part in regulating the Eco-tourism activities in the Dharmshala Division. Strategy of Waste Disposal includes three-pronged strategy.

- Infrastructure for Waste collection.
- Segregation of collected Waste.
- Ultimate Disposal.

14.15.1 Infrastructure for Waste collection

For waste Collection Eco friendly Waste Collection dustbins will be installed along the trek and in the vicinity of the Camps. Also Sign Boards to enhance awareness among people of trash disposal into dustbins only will be installed along the trek and in the vicinity of the camps.



14.15.2 Segregation of collected Waste: -

Waste collection, segregation and will be the ultimate responsibility of the operators of the camps. Waste along the trek and in the vicinity of the camps will be collected by the operators of the camps and after segregation of the waste in to Recyclable Waste and Non-Recyclable Waste it will be transported by them in to the waste facilities at Dharamshala.

14.16 Conclusion:

Dharamshala is an internationally renowned tourist destination and is already on international tourist Map. This place is also an abode of His Holiness Dalai Lama. Large No. of international tourist also visit this place in search of religious discourse, tranquillity and peace. Similarly, very large no. of Indian tourist also visits this place. No. of weekend tourist is also very high from the nearby planes of adjoining states. Eco-tourism activities in Dharamshala forest division have to cater the needs of all categories of tourist. In conclusion, in order to flourish,

Eco-tourism requires that natural and cultural resources be protected. Forest department must increasingly partner with conservation NGOs, put in place regulatory mechanisms to administer and protect natural areas. While local communities protect their territories and holdings in order to attract Eco-tourism development, NGOs, private companies and individuals create private reserves that often have a combined conservation and Eco-tourism business mission. Tourism brings a range of threats and opportunities that must be evaluated before deciding to proceed with a conventional tourism or Eco-tourism development project. Threats can include: environmental degradation, cultural distortions, economic distortions, increased control by outsiders and industry instability. Any or all of these could result in diminished visitor experience, and congestion may occur at popular visitor sites. Eco-tourism has the potential to reduce the threats posed by conventional tourism to natural areas and to the people who live in and around them via income generation for: conservation, local enterprise and employment, cultural exchange, environmental education, protected area justification and visitor appreciation. Eco-tourism requires rigorous planning and management to realize this potential to achieve goal of conservation with sustainability of resources.

CHAPTER –14+1

GENERAL FINANCIAL FORECAST AND FINANCIAL PLAN OF OPERATION

14+1.1 Future Revenue and Expenditure

Due to all round development of the region, rise in the living standards of the people and improvement in the means of communication, the prices of the forest commodities have registered a steep rise during the past years. This trend is likely to continue in the future also. There is a complete moratorium on the green felling in the state since 1980 and there is likely hood of continuance of this moratorium in the near 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 this working plan. An attempt has therefore been made to estimate the future surplus based on the current price of forest produce and the present cost of carrying out various operations prescribed in the Working Plan. However, an estimate of revenue and expenditure, based on present market rates has been made in the working plan.

14+1.2 Past Revenue and Expenditure:

The details regarding past revenue and expenditure under various schemes incurred during Sushil Singl's plan are given in the current working plan.

14+1.3 Future Yield:

The total annual yield (in M³) expected from all the Working Circles are tabulated and given in the yield table 14+1.1

Table 14+1.1

Abstract of Annual Yield Working Circle Wise Dharamshala Forest Division					
Sr No	Working Circle	Felling series	PB (If Any)	Prescribed Annual Yield	Remarks
1	Chil SW WC	I	I	5000 M ³	Seeding felling
			II	Nil	Salvage removal only
			III	3000 M ³	Only thinning and salvage removal
			IV	3000 M ³	Final felling
		II	I	4000 M ³	Seeding felling

			II	Nil	
			III	Nil	
			IV	1300 M3	Final Felling
		III	I	250 M3	Seeding felling
			II	Nil	
			III	110 M3	Only thinning and salvage removal
			IV	250 M3	Final Felling
		Total WC		16910 M3	
2	Oak WC			Nil	No felling prescribed
3	Coppice WC	All		34 hac	
4	Khair (O) WC	All		35000 Trees	In all WC including protection & Plantation
5	Plantation WC	All		7000 M3	Salvage & right Holders
6	Protection WC	All		No Prescription	Salvage & right Holder's removals

14+1.4 Expected Revenue

The expected annual revenue based upon the current royalty rates fixed for different species for the year 2021-22 works out is tabulated in the table No. XI+1.2

Table 14+1.2
Future Revenue

a) Sale of Timber trees			
Species	Volume (in M³)	Rate per cubic meter (in Rs.)	Amount (in lacs)
Chil	16910	8211	1388.48
Khair	35000 trees	1782	467.78
Total			1856.26
b) Resin			
	Number	Rate per blaze	Amount (in lacs)
	110000	57	62.7
c) Miscellaneous Revenue			
			37.50
G. Total			1956.46

To assess the revenue for subsequent years, 10% increase be given annually.

14+1.5 Future Expenditure: - The future estimated annual expenditure is calculated on the basis of expenditure incurred for the year 2021-22 and tabulated in the table No.14+1.3

Table 14+1.3
Future Expenditure

Sr. No.	Particulars	Estimated Expenditure (in Lacs)
	A. Establishment Cost	
1	Salary of staff	730
2	Travelling Expenses	5.55
3	Office Expenses	4.50
4	Medical Expenses	5.00
5	Wages of contingent staff	4.00
6	30-Motor Vehicle	3.00
7	20-Other Charges	4.00
	Sub Total	756.05
	B. Conservancy and Development	
1	Regeneration of forests	0.00
2	101 (03) Forest protection	8.19
3	Timber & other produce removed by Govt. Agency	0.45
4	Timber & other produce removed by consumer and purchasers	0.30
5	Consolidation & demarcation	2.80
6	2402 -Soil Plan	58.00
7	2406-Repair of Buildings, Roads and Paths	15.98
8	101 (03) C-90 Integrated Forest Protection Scheme	6.50
9	101 (04) Working Plan Organisation	2.00
10	102 (01) Development of pasture and grazing land	1.10
11	102 (04) Improvement of tree cover /raising of plantation and other programmes/ related activities	68.50
12	102 (05) Raising of nursery for Departmental Planning and Public Distribution	48.00
13	102 (07) Maintenance of Plantation	7.10

	and Nursery	
14	102 (38) Samudayik Van Samvardhan Yojna	0.00
15	800 (06) New Forestry Scheme - "Sanjhi Van Yojan".	0.00
16	800 (09) Vidyarthi Van Mitra Yojana	2.45
17	800 (10) Van Samridhi-Jan Samridhi Yojana	5.30
	102 (41) Ek Buta Beti Ke Naam	0.00
18	110-Wildlife Preservation	3.25
19	4216 Capital Outlay 37- Major work(Residential Building)	60.64
20	4406 Capital Outlay Roads, Paths and Buildings	42.10
21	Demand No. 15-BSP	10.30
22	2235-Social Security and Welfare	5.70
23	Demand No. 32	9.50
	Sub Total	358.16
	Total Expenditure	1114.21

Based upon the above calculations, the future annual net revenue, expenditure and surplus / deficit is tabulated Table No: - 14+1.4

Table No: - 14+1.4

Future Net Revenue (Rs. In Lakhs)	Future Net Expenditure (Rs. In Lakhs)	Surplus /Deficit (Rs. In Lakhs)
1956.46	1114.21	842.25

14+1.6 Cost of Working Plan:

Table XI+1.5

Sr. No.	Item	Amount (in lacs)
1	Cost of enumeration works, field work, Motor Vehicle and other Wages.	4.00
2	Machinery	1.00
3	Material and supply	1.00
4	Office expenses	8.00

5	Travelling Expenses	0.00
	Total	14.00
	Cost of WP for brought under management (RFs, DPFs & UPFs) Rs./per hac.	26.07

CHAPTER –14+2

MISCELLANEOUS REGULATIONS

14+2.1 Petty Fellings

Felling of petty nature, as detailed below may be treated as prescriptions of this Working Plan:

- i. Where illicit felling of trees has been done to meet the Bonafide domestic requirements and the offence is petty in nature.
- ii. Right holders suffering from natural calamities/fire sufferers will be granted timber for construction of house/repair from free of cost as per the actual requirements 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 of Himachal Pradesh (Timber Distribution to the Right Holders) Rules, 2009 and 2016.
- iii. No felling will, however, be done till the alignments of electric lines, or transmission lines, roads or water channels to be constructed have been finally approved by the Govt. of India under Section 2 of Forest (Conservation) Act, 1980.
- iv. Timber required for departmental purpose i.e. for new construction or repair of building i.e. field staff quarter, Inspection Hut or for construction of bridges or inspection path passing through forests etc. may be obtained from free of cost or departmental norms as fixed by the State Govt. from time to time.
- v. The expression ‘petty offences’ in relation to illicit felling shall mean the offence where the amount involved is less than rupees two lakh for determining that the offence is for bonafide domestic use, it must be established during investigation that timber has actually been used for domestic purpose only.
All the trees and poles marked for such purpose shall be recorded in the respective compartment History Files and such felling will appear in Control Forms. Silvicultural principles shall be strictly adhered to while carrying out such marking.

14+2.2 Deviations

Any large or unusual felling operation not prescribed in the Working Plan will constitute a deviation, and will require prior sanction of the Principle Chief Conservator of Forests. The following type of fellings will constitute the deviation: -

- (i) Large scale damage by fire and wind storms.
- (ii) Special fellings to meet the sudden unexpected heavy demand of defence purposes.
- (iii) Fellings of trees in the alignment of major road, electric transmission line and Hydro Power Projects etc. approved by the Govt. of India under Section 2 of Forest (Conservation) Act, 1980.
- (iv) No Forest working is allowed in forest area if not covered by the approved Working Plan by the Govt. of India.

14+2.3 Demarcations and Survey

The Reserve Forests, I & II Class Demarcated Protected Forests have been surveyed and mapped of 4" = 1 mile scale but no proper boundary register has been prepared. The boundaries of each Reserve Forests, I & II Class Forests Demarcated Protected Forest have to be checked with the help of its map and detail boundary register should be prepared and magnetic bearing should be recorded for checking of boundaries and for avoiding encroachments etc.

Since the boundaries of III Class listed UPFs has not been properly defined and delineated on the grounds which are urgently required to be so attended. The boundary pillars are not properly serially numbered and maintained creating confusion at all stages. This is a specialized job. Special task force comprising of ACF, Rangers and Deputy Rangers be constituted which will carry out complete checking and all the boundary pillars of RFs, I & II Class DPFs as well as along the boundary of included cultivations must be regularly repaired and maintained in good condition to check encroachments in the forests.

14+2.4 Revisions of Forest Settlement Right

The Forests of Himachal Pradesh happen to be the first ones to have been taken up for colonial scientific management by the British Empire in Sutlej, Beas and Chanab Valley. The local populations were granted the rights and concessions of timber and other forest produce to meet their bonafide needs under the provision of Forest Settlement Report, prepared by Anderson. It is very strange to know that the uses of forest resources are still continue to be governed by the Forest Settlement Report by Anderson without any changes except T.D. (Timber Distribution) rights. All these rights and concession is meant for the satisfaction of personal bonafide requirements and subject to the condition that forests are to be maintained in perpetuity. Thus, rights will not be exercised to an extent which will endanger the existence of the forests.

Therefore, it is suggested that Century old Settlements of rights should be revised and the rights etc. recorded precisely keeping in view the existing condition and needs of the society in order to meet the changes of such new situations to achieve sustainable management of forests.

14+2.5 Compartment and Sub-compartment Boundaries

These boundaries have been shown on the management and stock maps and are also described in the Compartment History files. The sign board indicating the compartment and sub-compartment though exist in some forests of this division at places but are required to be prepared and affixed on prominent sites/locations indicating the Compartment No. It is also suggested that such board should be fixed at all prominent points especially where the inspection paths, bridle paths cross the boundaries of the compartment and sub-compartments.

14+2.6 Maps

Two sets of stock maps showing necessary details for each forest on 1:15000 scales have been prepared and appended in the respective compartment history files. The administrative map has also been prepared on 1:50000 scale and is lying with Divisional Forest Officer, Anni. The detail of survey sheets/maps available in the division.

14+2.7 Beat Map

Each forest guard should be provided with a map of his beat on 4"=1 mile scale showing the boundaries of all the forests, position of boundary pillars, included cultivations inspection and bridle paths etc. The Range Officer/DFO should check these maps during field tours and should ensure that these are kept up to date.

14+2.8 Timber for Right Holders

Right holders' requirements of timber are increasing manifold day by day in view of the general rise in the standard of living. As far possible, local demands of timber will be met with from the salvage trees as per H.P. Govt. Notification No. FFE-B-A (3) 4/2015 Dated: Shimla -2, the 26 February, 2016 under Himachal Pradesh (Timber Distribution to the Right Holders) Rules, 2016, in exercise of recorded rights. The trees for agricultural implements, repairs of water channels, and other ceremonial purposes will be allowed as per settlement regulations in such a way that these species are not ruthlessly exterminated. The detail grant of timber has also been discussed.

14+2.9 Forest Rights and Duties

The bartans are subject to the condition that bartandars will be responsible for the protection of the forests in which the bartans are exercised i.e. they are responsible that no trees are felled without permission and the forests are protected against fire. In case of failure, the rights can be curtailed or suspended. Another condition attached with bartans is that, the forests whether demarcated or un-demarcated cannot be burnt to get fresh growth of grass. Grazing, grant of timber, lopping & collection of minor forest produces are some of the important Bartans admitted in the settlement report. This excellent rule has gone a long way in preserving forest wealth of this tract if sincerely to be followed by the field functionaries.

In view of the Hon'ble court, it has been pointed out that "right and duty co-exist. There cannot be any right without any duty and there cannot be any duty without any right" Our Constitution lays down the fundamental duty of every citizen "to protect and improve the natural environment including forests, lakes, rivers and wild life and to have a compassion for living creatures". A feeling should be generated in them that there should be decreased dependence on the forests and encourage them to avails acceptance of the alternatives. It is a social obligation and get let every citizen be reminded that it is his fundamental duty.

The Hon'ble High Court has also further pointed out that there is no right to claim compensation by means of filing writ petition. When a person performs his duties and unfortunately suffers injury or dies, it is, for the State to decide whether it should grant adequate compensation to its citizen or not.

14+2.10 Person bound to Assist Forest Officer

Section 79 (1) of the Indian Forest Act, 1927 makes obligatory on every person, who exercises any right in a reserved or protected forest or who is permitted to take any forest produce from forest or Govt. employee shall be bound to furnish without un-necessary delay to the nearest Forest Officer or Police Officer any information with respect to any commission of forest offence, and shall forthwith take steps, whether so required by Forest Officer or Police Officer or not

- (a) To extinguish any forest fire in such forest of which he has knowledge or information;
- (b) To prevent by any lawful means in his power any fire in the vicinity of such forest of which he has knowledge or information from spreading to such forest, and shall assist any Forest Officer or Police Officer demanding his aid.
- (c) In preventing the commission in such forest of any forest offence and when there is reason to believe that any such offence has been committed in such forest in discovering and arresting the offender.

And any violation of the provision of this Section is punishable under Section 79(2) with imprisonment for term which may extend to one month, or with fine which may extend to two hundred rupees or with both.

Therefore, field functionaries/staffs must take action accordingly so that the object of fundamental duty could be achieved.

14+2.11 Timber as Free Grant

The right holders are entitled to grant of trees free of cost for the sake of marriage ceremonies, agricultural implements and religious ceremonies, after obtaining prior permission from the Forest Department. However, free grant of timber for cremation of the dead is permitted and permission of the department is not required and the information of trees so cut or remove is to given within 15 days to the Forest Guard concerned. Resultantly, these days right holders are misusing these practices and trees are felled after cremation of the dead body and use the same for building purpose.

The liberal rights and concessions are admitted in the Forest Settlement Report prepared by Anderson. These rights including timber for temple have not been touched upon by the State Govt. in its notification dated 2-1-2010 and would remain to be exercised as they were in the past. For the regulation of grant of wood and avoid of misuse of rights in present system vogue in the department, trees shall be divided into two classes; the first-class species of trees must be declared as reserved under Section 30(a) of IFA, 1927 and the second class containing all other species.

The trees of second class may be granted by the Range Officer so long as these are not used for building purposes of any kind, whatsoever, and where trees of second class are available, unsound or malformed or crooked trees of the I Class with the exception of listed second class species can be granted. However, for actual burning of dead, a sufficient quantity of wood from the listed second-class species trees may be cut without being first marked provided that the notice is given to local forest official within ten days.

Therefore, Divisional Forest Officer to take up necessary steps, with the Government for the same purpose and may notify the rules and notification under Section 30 (a) of Indian Forest Act, 1927. Similarly, the rules applicable to the un-classed forests i.e. other than DPF under Section 76 of the Indian Forest Act, 1927 may be notified in public interest so that the forest resources shall be used or removed in such a way that the resources are perpetuated and not endangered.

14+2.12 Grazing

The problem of grazing is very important because it has far reached effects on forest growth and land and water conservation. There is on one hand, the problem of local Zamindars and on the other, of outside professional graziers like Gujjars and migratory graziers. In order to reduce the incidence of grazing all forms of grazing by the animals of the professional graziers should be restricted as per the provision of Settlement Report so that more grazing grounds are available for local Zamindars.

It is essential to close effectively, plantation, and regeneration areas in immediate vicinity of villages. But as the closures are the resented and lead to incendiarism, it is advisable to restrict them to the minimum essential area and time necessary for establishment of plantation and regeneration. Not more than 30% of the area should be closed at a time to avoid causing resentment and hardship to local graziers. The closure should not be more than 10-15 years at a time. Cattle should be admitted as soon as the young plants are established. All closed regeneration areas near villages must be fenced effectively. The grazing requirement of livestock of villages located in and around forests should be addressed within the carrying capacity of forest areas.

XI+2.13 Closure Notifications

This has been discussed in detail in every Working Circle and suggested that the notification for such closure should be got issued under Section 30 (b) of Indian Forest Act, 1927. The area will have to be closed for grazing/lopping till the regeneration is established.

XI+2.14 Lopping

Lopping especially of coniferous species of trees has caused wide spread damage in the past. The forests close to the habitations have suffered on this account. Strict control has to be exercised to curtail this right within the permissible limit. Local communities need to be made aware of the impact of their consumption on forest resources. Persons requiring the fuelwood could obtain by lopping their

requirements as per the norms of Forest Settlement Report. Heavy and indiscriminate lopping of Deodar during Rainy season makes Deodar susceptible to attack by *Fomes annosus* fungus. In blue pine heavy lopping results in attack by beetle *Pityohenus scitus*. Severe attack by this beetle make tree dry within 6-7 months. Heavily lopped Chir- pine trees of diameter 28-57 cms are susceptible to infestation by destructive bark borer *Polygraphus longifolia*. Similarly lopping of forests beyond the prescribed limit as per the provision of Forest Settlement Report must stop and violation of cases not to be compounded and be treated as forest offence under Section 33 of Indian Forest Act, 1927. The State Govt. is now implementing the Govt. of India's Scheme "Ujjwala Yojana" which is an alternative source of fuelwood especially LPG connections which are being provided at free of cost and subsidized rates depending upon their economic conditions of the local people. The local residents should be encouraged to take the fuelwood from fuelwood sale depot of this Division. Similarly, there should be policy of the State Govt. for providing an alternative source of fuel. The solar energy also needs to be given a much greater attention to reduce the biotic pressure from forest biodiversity.

14+2.15 Fire Protections

Forest fires are very frequent in low lying area of this division. Most of these fires incendiary, started by villagers to get new flush of green grass. The worst to suffer are the coniferous forests, where regeneration is damaged by such fire. The detail of fire protection measures has been described in Chapter No. IX and taken care of accordingly. The budgets under fire lines and controlled burning should be demanded regularly so as to maintain fire lines, engage fire watchers in the fire prone areas. Publicity and Extension for education of local population regarding fire protection etc. should also be done. While on tour, the DFO and his staff should personally contact villagers and Panchayats members and try to convince them, inter-alia, about the harmful effects of forest fires and gravity of forest offence under the Indian Forest Act, 1927 and IPC.

14+2.16 Encroachments

Encroachments are common throughout the Division. All categories of forests are affected with this menace but there have been large scale encroachments in the garb of enactment of Forest Rights Act, 2006 {Scheduled Tribes & other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006}, almost all the III Class listed UPFs or other land in absence of proper demarcation and record of such areas. Boundary pillars have been displaced and the forests have been converted into orchard and agricultural fields. Many of the boundary pillars in DPFs have been shifted, washed away or removed from their original position in adjoining to cultivated private land. This should be looked into priority. It is important to note that included cultivation as identified during the Anderson's Forest Settlement, in the demarcated protected forests have not been properly delineated and proper record of such lands have not been maintained by the forest department. These cultivations have increase in area through encroachment over a period of time and trees adjoining

have been removed through griddling and consequent drying etc, there is an urgent need for proper demarcation of land from competent revenue authority and reconciliation with revenue record. The legal action should be initiated against the encroachers and forest lands should be liberated from unauthorized possession.

CHAPTER –14+3

Forest and Climate Change

14-3.1 Introduction

Climate change is a major global environmental and developmental problem. Though all the possible consequences of climate change are yet to be understood, it is now established that adverse impacts are likely from an increased frequency of extreme weather, floods and droughts. Impacts of climate change are also likely to be visible particularly with the poor, women, the aged and the very young are relatively more vulnerable due to their greater dependence on climate-sensitive sectors such as agriculture, fisheries and forestry for their livelihoods or their limited adaptive capacity.

A number of new concepts have emerged in forestry sector at the international level over the last few decades. Notable among these is REDD+, the institutional and governance framework for reducing emissions from deforestation and forest degradation, and for promoting conservation, sustainable forest management and forest carbon stock enhancement. This concept is an issue of concern due to over increasing of climate change and realization that it cannot be addressed without focusing on the forestry sector both as major source and sink of greenhouse gases. With these two additional concepts have also gained currency in recent decades viz. ecosystem approach, developed by Convention on Biological Diversity and a landscape approach which focuses on management of forests as an integral component of large dynamic landscapes.

14-3.1.1 Climate Change Impact, adaptation and mitigation

Forests and climate operate at varying spatiotemporal scale. Role of Forests influencing the climate and vice versa is becoming a matter of concern for understanding climate change. Therefore, Forests have emerged as global common concern in recent years for defining its crucial role in mitigation and adaptation strategy for climate change. Climate change invariably affects the availability of land resources to support different types of forest. Thus, Forests are exposed to various levels of vulnerability under the influence of climate change. Understanding vulnerability of forest ecosystem and probable impact is crucial for the effective management of planning of forest to address adaptation and mitigation options. Therefore, there is need for consideration of issues relating to impact, adaptation and mitigation in working plan.

The current working plan aims at improving the forests and its productivity through effective intervention and planning and thus increasing the carbon sequestration capability of the forests which reduces the atmospheric carbon dioxide concentration. Deforestation and degradation related issues of the forest are addressed to ensure efforts and mechanism to measure forest carbon. The climate change has undoubtedly emerged as an issue of global concern. Climate change has a potential to

completely and adversely affect the way of human life. The terms global warming and climate change are often use interchangeably, but there is a difference. “Global warming’ is the gradual increase of the earth’s surface temperature due to greenhouse gases in the atmosphere, whereas the climate change is a broader term. Climate change phenomenon is more complex and the result of activities that alters the composition of atmosphere due to undesirable and unwanted over exploitation of our natural resources. As the forest generally operate on the large temporal scales, it becomes necessary to monitor the changes occurring within the forest at various level preferably for longer duration. Climate change impacts are generally assessed through measuring changing in other associated attributes of the forest which can be a consequence of direct or indirect impacts. The current working plan ensure monitoring of these attributes in the form of species range shifts, changing biodiversity, extension of species, physic logical changes in plant life cycle, forest growth pattern of species changing boundaries of eco system, changes in other factors which can stress forest eco systems. The evidences which can be linked to climate change such as increased in the frequency and severity of forest fire, changes water regimes and expending forest insect infestation etc. are also to be monitor through the working plan.

The information compiled in the current working plan has an ample scope for the Divisional Forest Officer to have a quick inside into the multitude of the conservation aspects. This includes information related to floral and faunal diversity, status of threated category of flora and fauna, health of the forests from its canopy to soil, productivity of the forests, climate change impact upon forests, type and extent of social pressure that drives forest degradation (Forest resource dependence) or its conservation (Like sacred grooves) and other issues of conservations. This current working plan focus more toward the conservation as compared to the earlier approach of extraction for meeting the commercial requirements of the forest produce. Further the focus is also now for the extraction of NTFP instead of the timber. Intensions are more for utilizing the NTFP as a source of revenue and livelihood support to forest dependent communities of the locality without compromising with the forest conservation. More stress is towards the improvement of degraded forest land, gape filling of open space to improve the diversity and density, actions for enhancing the productivity for the forest and adoption of silviculture practices for cleaning, thinning and improving regeneration of the forests.

The current working plan envisages for sustainable management of forest, conservation of the forest together with the improvement its health and productivity. It also ensures to protect the right of the people for regulated extraction of forest products.

14+3.1.2 Issues and Challenges

The Himalayan ecosystem is particularly at risk with the rise in global temperatures. The biodiversity which resides in the higher altitudes will have less and less place to occupy and will be at increased risk of extinction. The increase in global

temperatures will cause an increased occurrence of GLOFs (glacial lake outburst floods) and will affect the size of the glacial lakes. The breakage of such lakes can be extremely devastating to human habitations, among others. It can be stated that the precipitation will be with increased intensity and will become more erratic. This will make the fragile ecosystems susceptible to damage by cloudbursts, increased soil erosion, etc. The overall pattern of rainfall is expected to be heavy rainfall followed by long period of droughts. This will reduce the overall availability of water in the hills. The alpine meadows have high soil organic content and are very good at sequestering carbon. They are also extremely rich in biodiversity. The increase in global temperatures threatens the existence of alpine meadows and makes them vulnerable to extinction. There will be a gradual shift of plant species towards higher altitudes. This will force local communities to shift to newer agricultural and fodder species.

The whole world is vulnerable to climate change which has emerged as a major threat to the eco system. The Himalayan regions are most vulnerable, to the climate change. The forests of the tract have significant economic and ecological value as a provider of eco system services and also supporting the livelihood of many people. The major issues like deforestation, landslides, land degradation, desertification and Glacier Lake outburst floods (GLOF) are some of the common but critical environmental issues in regions. The major challenges faced by the environment are the escalation of issues through atmospheric as well as man-interferences. The conservations, sustenance of these ecologically fragile region is a biggest challenge being faced in this area.

Most of the people of this Division particularly in the rural area are dependent directly or indirectly on forest for their livelihood and utilized and significant quantity of forest produce as well as services like NTFP, Eco Tourism, Fuel, fodder and Timber etc. The immediate repercussions of climate change on the forest are: -

- ❖ Visible in the form of shifting of tree line to higher altitudes.
- ❖ The situation is also visible and more alarming that temperature is likely to be increased by three degree and precipitation will decrease by 20 percent. In that situation the effect is more visible and alarming also.
- ❖ Many of the floral and faunal species are facing the problem of extinction or declining because of rising temperature which indirectly is affecting health, well-being and livelihood of the people who rely on such resources.
- ❖ Beside the biodiversity is also affected adversely.
- ❖ The surfaced temperature is also increasing.
- ❖ The trend of monsoon rainfall has become erratic and there are extreme weather conditions.
- ❖ The higher peaks of the area of this Division possess largest reserve snow and ice and major water fall for perennial rivers, streams/khad. In the recent years it has been observed that there is recession of glaciers resulting into scarcity of water sources.

❖ Water Resources

It has been observed that climate change will affect the water balance, run off and recharge characteristics of the river systems. The water volumes stored in glaciers and snow covers are very likely to decline affecting a river flow during summer and autumn. It is also anticipated that resistance of many ecosystems is likely to exceed by an unprecedented combination of climate change and associated climate change drivers. One of the negative consequences of the rising temperature will be the reduction in solid precipitation, depletion in snow cover and shrinking the size of glaciers. In the long run this will influence very seriously the discharge of rivers when water will be required the most in summer months. The decline in stream flow will trigger multiple impacts, affecting irrigation, agriculture, drinking water and energy sectors the most.

14+3.1.3 Biodiversity Conservation and climate change

Overlapping international negotiations at the UNFCCC on REDD+ was the growth of a body of research and consensus on the importance of a broader set of ecosystem services. The Millennium Ecosystem Assessment (MEA) in the early 2000s popularized the concept of ecosystem services in four broad categories:

- Provision of food and water production.
- Regulating, such as climate change mitigation.
- Cultural, such as recreational and spiritual benefits from natural sites.
- Supporting, such as pollination and nutrient cycles.

All four services derive from native biological diversity, which is often threatened because of proliferating invasive alien species. Biodiversity and ecosystem services are interrelated. Modern research on ecosystem services supports the contention that climate change is triggered as we lose native biological diversity. This can further be elaborated as under: -

- i. Native vegetation has greater capacity to provide ecosystem services under changing environmental conditions. Three important indicators of a natural forest are that it exerts influence on the local climate, maintains the water regime, and shelters wildlife and produces wood. However, invasive alien species can adversely affect this “naturalness.” The introduction of so many exotic species (e.g., Lantana, Parthenium, Wattles, Eucalyptus, and numerous others) in Himalayan/in the tract of this Division and other forests, including protected areas, are diminishing the capacity of natural ecosystems. Conversely, the diversity of indigenous species can decrease the probability of invasions of non-native species, many of which have had substantial economic, conservation, and societal consequences.
- ii. Biological insurance emphasizes rare species conservation. The extinction of native species in temperate ecosystems can cause a cascade of other extinctions, accelerating the rate of community change.
- iii. Biodiverse systems, on average, store more carbon and do so more reliably.

iv. Biodiversity is multidimensional as it supports livelihoods, spiritual wellbeing, climate regulation, and carbon sequestration, in a natural ecosystem.

v. Thus, more ecosystem functions and services need more local species. If the indigenous biodiversity is compromised, ecosystems collapse. There are many examples of industrial waste killing wetlands and rivers, and of fumes in the atmosphere killing plants and animals and resulting in air pollution.

The forests in Himachal Pradesh are highly vulnerable and the climate change will have adverse impact on forest biodiversity, forest regeneration and production. Forest type shifts are expected to occur in more than 80% of forest grids and the vulnerability of higher altitude forests is relatively more. It is believed that incidents of forest fires will increase with the rising temperature. The other impact that is expected is the initial increase in forest productivity. The vegetation pattern in the State of HP is closely associated with climate as plant linkage communities with climatic regimes. It is apprehended that climate change will bring about noticeable change in the biodiversity, increase in temperature, changes in vegetation, rapid deforestation and scarcity of water, coupled with habitat destruction and corridor fragmentation may lead to a great threat to the existence of both flora and fauna. The alpine ecology nurture very important natural resources and influence the geo-hydrological cycle considerably. Alpine area in the State is particularly vulnerable as many species start their growth with the supply of snow melt. Reduction in snow fall will disturb the growth cycle of such species.

14+3.1.4 Guidelines for integrating Biodiversity Conservation

The following guidelines are suggested for integrating Biodiversity conservations

➤ **Watershed catchment protection and improvement:** To maintain and improve forest health for its climate mitigation and adaptation benefits, use of Joint Forest Management to engage major stakeholders. This can be done through a partnership between the government and project representatives and villagers through a legally recognized committee such as Joint Forest Management Committees (JFMCs).

➤ **Loss of biodiversity:** By and large, anthropogenic influences have been a major cause of biological diversity loss. For example, in the Himalayan state of Himachal Pradesh, local biodiversity is impacted due to an exponential increase in urbanization and Agriculture, and the construction of roads to open up the remote areas. In addition, forest fires and climate changes can adversely affect biological diversity. Identification of these factors that can add to biodiversity loss Emerging concepts and their operationalization can help plan for the reversal of such processes.

➤ **REDD+ in aid to biodiversity conservation:** REDD+ can help implement safeguards, which could include planting of only local species, avoiding monocultures, forbidding the felling of old growth forests, and barring plantations of exotics and uprooting of invasive alien species. The Government of Himachal Pradesh spends a sizeable amount on Lantana (an invasive alien species) removal. Similarly, other alien species such as Eucalyptus, Poplars, Jacaranda, Lucania, Robinia, etc. can

also be removed and replaced by native species which are more beneficial to the local ecology.

➤ **Invasive alien species:** REDD+, as a system, has to be clear on invasive alien species, which include microbes, plants, and animals, all non-native to an ecosystem and which cause economic or environmental harm, and/or adversely affect the ecosystem and human health. “In particular, they cause decline or elimination of native species – through competition, predation, or transmission of pathogens and the disruption of local ecosystems and ecosystem functions”. Invasive alien species, introduced and/ or spread outside their natural habitats, have affected native biodiversity in almost every type of ecosystem on earth and are one of the greatest threats to biodiversity.

➤ **Ecosystem approach to forest management (EAFM):** Monocultures in forestry are now seen as very different from biodiverse forest areas. They are bereft of interdependent ecosystem processes, which need a multitude of floral and faunal species. A forest spread over a larger landscape with its intact biological diversity is expected to mitigate/ minimize the risks of climate change by enhancing resilience of the forest ecosystems. EAFM is expected to maximize and sustain impact by

i. Developing sustainable institutional frameworks and capacity for its stated objectives at the regional and community levels.

ii. Creating an appropriate policy and legal framework, this remedies the numerous policy failures that have led to unsustainable and inequitable exploitation of the forest resource.

iii. Improving the sustainable financial basis for the state through exploring the potential of increased use of proven technologies for low-carbon or carbon-neutral energy. EAFM seeks use of “natural resources, while maintaining the biological richness and ecological processes necessary to sustain the composition, structure and function of the habitats or ecosystems concerned”. Important within this process is setting explicit goals and practices that anticipate the needs of the future, regularly updated in the light of monitoring and research activities.

iv. EAFM requires new information – different from the management practices to enhance timber production. The shift toward ecosystem services will need to have more nuanced information about interrelations of various indigenous floral and faunal components of an ecosystem. In addition, EAFM will have to ensure the role of civil society, including local user groups, women groups, and non-governmental organizations for the sustainability of efforts and results. There will be options to review and change EAFM during its implementation to ensure its sustainability. An early impact assessment can further ensure this aspect.

➤ **Protected Area management-**The protected area management in this area can be prioritized to adopt EAFM and the related REDD+ system. For example, the Great Himalayan National Park in the Kullu district of Himachal Pradesh has recently (2014) been designated as a World Heritage Site for its biodiversity values. The ecosystems being preserved in the vast park landscape are contributing to water provision, hydro-electricity, community-based ecotourism, and many religio-cultural values. The park acts as reservoir of local biological values, and is well protected under the Indian Wildlife (Protection) Act of 1972 against any developmental activity

XI+3.1.5 Role of forests in climate change

The Forests are important carbon pools which continuously exchange CO₂ with the atmosphere, due to both natural processes and human action. Understanding forests' participation in the greenhouse effect requires a better understanding of the carbon cycle at the forest level. Organic matter contains carbon susceptible to be oxidized and returned to the atmosphere in the form of CO₂. Carbon is found in several pools in the forest, the vegetation, living plant biomass consisting of wood and non-wood materials. Although the exposed part of the plant is the most visible, the below-ground biomass (the root system) must also be considered. The amount of carbon in the biomass varies from between 35 to 65 percent of the dry weight (50 percent is often taken as a default value). dead wood and litter: dead plant biomass, made up of plant debris. Litter in particular is an important source of nutrients for plant growth, soil organic matter, the humus. Humus originates from litter decomposition. Organic soil carbon represents an extremely important pool.

At the global level, 19 percent of the carbon in the earth's biosphere is stored in plants, and 81 percent in the soil. In all forests, tropical, temperate and boreal together, approximately 31 percent of the carbon is stored in the biomass and 69 percent in the soil. In tropical forests, approximately 50 percent of the carbon is stored in the biomass and 50 percent in the soil.

Wood products derived from harvested timber are also significant carbon pools. Their longevity depends upon their use: lifetimes may range from less than one year for fuelwood, to several decades or centuries for lumber.

The participation of forests in climate change is thus three-fold:

- They are carbon pools.
- They become sources of CO₂ when they burn, or, in general, when they are disturbed by natural or human action
- They are CO₂ sinks when they grow biomass or extend their area.

The earth's biosphere constitutes a carbon sink that absorbs approximately 2.3 GtC annually. This represents nearly 30 percent of all fossil fuel emissions (totaling from 6.3 to 6.5 GtC/year) and is comparable to the CO₂ emissions resulting from deforestation (1.6 and 2 GtC/year).

Current scientific evidence suggests that the scientific managed forests (of the temperate and boreal zone) sequester carbon at rates of up to 6-ton ha. These results shows that the old growth forests are in equilibrium with a net carbon balance. On the other hand, infrequent disturbances (fires, pest outbreaks, storms.) are triggering a sporadic, but massive return of carbon to the atmosphere. A soil specialist has emphasized that there is a potential for reversing some of these processes and sequestering carbon in soils in terrestrial ecosystems. The magnitude of the potential

is estimated to be up to 50 to 75 percent of the historic carbon loss. Theoretically, the annual increase in atmospheric CO₂ can be nullified by restoration of 2 billion ha of degraded lands, which would increase their average carbon content by 1.5 ton / ha in soil and vegetation.

The carbon cycle (photosynthesis, plant respiration and the degradation of organic matter) in a given forest is influenced by climatic conditions and atmospheric concentrations of CO₂. The distinction between natural and human factors influencing plant growth is thus sometimes very difficult to make. As per research increase of CO₂ in the atmosphere has a "fertilizing effect" on photosynthesis and thus, plant growth. There are varying estimates of this effect: + 33 percent, + 25 percent, and + 60 percent for trees, + 14% for pastures and crops. This explains present regional tendencies of enhanced forest growth and causes an increase in carbon absorption by plants. This also influences the potential size of the forests carbon pool.

There are still questions regarding the long-term future of the biospheric carbon pool. Several bio-climatic models indicate that the ecosystems' absorption capacity is approaching its upper limit and should diminish in the future, possibly even reversing direction within 50 to 150 years, with forests becoming a net source of CO₂. Indeed, global warming could cause an increase in heterotrophic respiration and the decomposition of organic matter, and a simultaneous decrease of the sink effectiveness, thereby transforming the forestry ecosystems into a net source of CO₂.

The capacity of the vegetation to adapt to an increase in temperature is also largely unknown. The recent research shows that results from long-term soil warming in a boreal forest contradict the idea that the projected rise in temperature is likely to lead to forests that are now carbon sinks becoming carbon sources in a foreseeable future. It further postulates that the strength of the sink should increase in the future (by 10 to 20 percent) due to CO₂ fertilization, and then decline, followed by long-term saturation, due to the respiration increase caused by the rise in average temperatures. These forecasts refer to ecosystems that are not used for production, and are not managed or reforested.

XI+3.1.6 Forestry activities to mitigate climate change

Several actions can be taken in the forestry sector in order to mitigate climate change.

❖ Plant trees to create carbon sinks

Planting new forests, rehabilitating degraded forests and enriching existing forests contribute to mitigating climate change as these actions increase the rate and quantity of carbon sequestration in biomass. This potential has certain physical limitations such as plant growth and available area. Agro-forestry and the planting of multiple- use trees (fruit trees, rubber wood, etc.) also contribute to this objective.

Tree planting projects are doubly interesting from the point of view of CO₂ sequestration, in as much as carbon storage in durable products such as boards, plywood, or furniture complements the permanent stock in standing trees. Even if the life span of products is limited, an average life span of several dozen years is still significant, since it allows to "gain time" while waiting for cleaner technologies in the energy and transportation sector to develop, and it can also help avoid concentration peaks of CO₂ in the planet's atmosphere. If a part of the annual harvest replenishes and increases the pool of wood products, the forestry sector's storage capacity can increase considerably without occupying more space in the landscape.

❖ **Protect existing forests to reduce emissions from deforestation**

The carbon reservoir in the forest biomass and soils is very large, highlighting the importance of conserving natural forest, and eliminating agricultural practices which contribute to the deterioration of these reservoirs.

One of the issues about carbon sinks is whether conservation activities should be accounted or not. These activities aim to protect a forest area threatened by human-induced deforestation, particularly from farming, to the extent that it contributes more effectively to carbon storage and preserves the biodiversity associated with old-growth forests.

❖ **Improve forestry techniques to reduce emissions**

Numerous forestry activities emit greenhouse gases; these emissions can be curtailed by applying appropriate techniques. Forest harvesting can cause serious damage to the soil and the forest stand when carried out inappropriately. Reduced impact logging in the context of forest management and harvest plans involves using a set of techniques, such as pre-planning skidding trails; optimizing landings; directional felling; employing appropriate skidders, which reduce damage to soils, harvested trees and the remaining stand; these damages would heighten mortality and release carbon unnecessarily.

Timber processing also generates a considerable quantity of waste wood, which could either be reduced, or used as a raw material for production or as fuel. Improving the forest industry's efficiency helps limiting the amount of wood waste created by the production process. This could be achieved by increasing product yield, reducing residues, or adding production lines which utilize them as parquet, molding, etc. Using wood wastes in combined heat and power generation, thereby simultaneously generating heat for kiln-drying of wood, energy for running the machines, and electric power for the outside would reduce emissions and valorize these residues, which can substitute for fossil fuels. Moreover, charcoal production also is a process of widely varying efficiency, depending on the method and techniques used, which could be improved.
