

**GOVERNMENT OF HIMACHAL
PRADESH
FOREST DEPARTMENT**



**WORKING PLAN
FOR SHIMLA FOREST DIVISION**



**VOLUME –I
FROM 2011-12 TO 2025-26**

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ACKNOWLEDGEMENT

The job of writing this Working Plan was entrusted to me in December, 2011. Initially, I was, little skeptical, whether I shall be coming up to the expectations or not because of two reasons, one being very short time given to complete this work and secondly, whether I shall be able to produce a quality document or not. However, because of the kind support and help of many individuals, I was able to complete this assignment successfully, and this work will remain incomplete if I fail to extend my sincere thanks to all of them.

I take this opportunity to express my gratitude to Sh R. K. Gupta IFS Pr.CCF (HP), for his guidance, and constant support throughout the course of writing of this Working Plan.

I would like to express my gratitude towards Sh K. Sehrawat IFS, Addl. Pr. CCF (Central) for his valuable inputs which have been incorporated in the final report.

I would like to express my special thanks to Sh. Ishwar Singh IFS Conservator of Forest (Central) for sparing his valuable time for thorough scrutiny of this working plan.

My sincere thanks to Sh. Tejinder Singh, IFS, Chief Conservator of Forests (WP), for going through the First Draft and making valuable suggestions for the improvements and giving final shape to this Working Plan.

My sincere thanks are also due to Sh. Avtar Singh Addl. Pr. CCF for coordinating with Addl. Pr. CCF Central for getting approval of PWPR and final Working Plan.

I wish to thank Sh S.K. Sharma, CF Shimla for his vital encouragement and support and also giving final shape to the PWPR and extending administrative support for organizing workshops for this working plan field work.

I also extend my sincere gratitude towards Sh. R. K. Sood IFS (Pr.CCF Wildlife) for his constant encouragement and giving technical input for writing Wildlife Chapter and making wildlife as part of holistic working plan.

I acknowledge the support and help of Sh R. S. Banyal IFS (CF Working Plan Palampur), Sh O. P. Solanki IFS (CF Working Plan Solan) and Sh Anil Vaidya IFS (DFO) and other friends with whom I shared my day-to-day experience and received lots of suggestions that improved the quality of work.

I share the credit of this work with Sh. Dhanwant Singh Thakur HPFS (AWPO) for his tireless and dedicated efforts in accomplishing this working plan. I am highly thankful to him for his hard work during the period of this assignment.

Special thanks are due to Sh K.D. Sharma IFS (Conservator of Forests Eco Tourism) for providing valuable inputs in the form of NTFP Chapter. Efforts of Smt. Richa Banchta RFO (R.O. Mashobra) for writing JFM Chapter are duly acknowledged.

Thanks are also due to Sh G.S. Verma HPFS (Rtd) for agreeing as a resource person for the workshop of the working plan field work.

All the ROs of Shimla Division are duly thanked for their valuable inputs in whatever form it was required.

Thanks are also due to office staff of Shimla Forest Division specially Sh Durga Singh (Junior Assistant) for typing this working plan and Sh Gopal (Surveyor) for preparing various maps.

Needless to mention, errors and omissions are mine.

Sd/-

Nagesh Kumar IFS

DFO Shimla cum Working Plan
Officer.

INTRODUCTION

The present working plan revises Dr. Lalit Mohan's working plan. It excludes the Theog Division which was a part of the earlier working plan. It will remain operative for the period 2011-12 to 2025-26.

Sh. Nagesh Kumar Gularia, IFS, DFO Shimla was entrusted with the revision of this working plan during October, 2011 and the enumeration work was started in November/December, 2011.

In a record time of only 4 months the entire work of enumeration, compartment description, stock mapping and the writing of working plan has been done by Sh. Nagesh Kumar Gularia and his staff. The contribution of Sh. Dhanwant Thakur, ACF Shimla Division deserves special mention. The entire Shimla Forest Division under the guidance of DFO-cum-WPO Shimla worked day and night to complete the working plan in such a short time.

I put on record my appreciation for DFO Shimla and his staff for the efforts put in by them in the preparation of a very fine document which will guide the management of the forests of Shimla Division for the next 15 years.

Dated: 8-5-2012

(S.K.SHARMA)

IFS

Conservator of

Forests,

Shimla

Circle,

Shimla.

i

INDEX

Subject (1)	Paragraph (2)	Page (3)
Maps		I-V
Glossary of Vernacular Terms		VI-VII
List of important trees, shrubs, herbs and climbers found in the tract		VIII-XIV
Forest Fauna		XV-XVIII
Statistics at a glance		XIX
PART-I SUMMARY OF FACTS ON WHICH PROPOSALS ARE BASED CHAPTER -I: THE TRACT DEALT WITH		
Name and situation	1.1	1
Configuration of the ground	1.2	2
Ridges and watersheds	1.4	2
Geology, Rock and Soil.	1.5	3
Climate	1.6	6
Water supply	1.7	9
Distribution of area	1.8	12
Demarcation and settlement	1.8.2	13
Diversion of forest land under FCA	1.8.3	14
State of boundaries	1.9	21
Forest maps	1.10	21
Compartment history files	1.11	23
Legal position	1.12	23

Rights and concessions	1.13	25
CHAPTER -II A: FOREST FLORA		
General description	2.1	31
Composition and condition of crop	2.2	33
Type 5B/C2 Northern Dry Mixed Deciduous Forests	2.2.1	34
Type 9/CIb Himalayan Chil (Chir) Pine Forests	2.2.2	35
Type 9/CI/DSI Himalayan Sub Tropical Scrub Forests	2.2.3	36
Type 12/CIa Ban Oak Forests	2.2.4	37
Type 12/CIb Mohru Oak Forests	2.2.5	37
Type 12/CIc Moist Deodar Forests	2.2.6	38
Type 12/DS2 Himalayan Temperate- Park Land	2.2.7	39
Type 12/EI Cypress Forests	2.2.8	39
Type 12/2SI Low Level Blue Pine Forests	2.2.9	40
Plantations	2.3	40
Injuries to which crop is liable	2.4	40

CHAPTER-IIB: FOREST FAUNA		
General description	2.5	54
Injuries to which the fauna is liable	2.6	57
Protection and management of fauna	2.7	58
CHAPTER -III: UTILIZATION OF THE PRODUCE		
Agricultural customs and wants of population	3.1	59
Markets and marketable products	3.2	65
Lines of export	3.3	70
Method of exploitation and their cost.	3.4	70
Past and current prices	3.4.3	72
CHAPTER-IV : ACTIVITIES OF FOREST CORPORATION		
General description	4.1	74
CHAPTER-V: FIVE YEAR PLANS		
General description	5.1	77
CHAPTER-VI: STAFF AND LABOUR SUPPLY		
Staff position	6.1	81
Administrative and executive setup	6.2	82

Labour supply	6.3	82
Wage rates	6.4	83
CHAPTER –VII: PAST SYSTEM OF MANAGEMENT		
General history of past management	7.1	84
Pre-independence period	7.2	85
Bhajji state forests	7.2.1	85
Sutlej catchment forests (Shimla Division)	7.3	86
Koti state forests	7.4	86
Patiala (Enclave) forests	7.5	87
Keonthal state forests	7.6	89
Past yield	7.7	90
Forests of Dhami Range	7.8	90
Post independence period	7.9	91
Period from 1936-55 (Working Plan for Patiala state)	7.9.1	92
Period from 1935-64 (Working Plan for Keonthal state)	7.10	93
Period from 1940-55 (Working Plan for Bhajji state)	7.11	97
Period from 1951-66 (Working Plan for Shimla Forest Division)	7.12	98
Period from 1956-87 (Working Plan for Solan Forest Division, Taradevi Range)	7.13	101
Period from 1948-80 (Working Plan for Kunihar Forest Division, Dhami Range)	7.14	103
Period from 1961-71 (Working Plan for Kunihar Forest Division, Dhami Range)	7.15	104
Period from 1966-80 (Working Plan for Shimla Forest Division)	7.16	106
Period from 1977-91 (Working Plan for Kunihar Forest Division, Dhami Range)	7.17	110
Period from 1981-95 (Working Plan for Shimla Forest Division)	7.18	113
Period from 1984-1998 (Working Plan for Solan Forest Division, Taradevi Range)	7.19	126
Period from 1996-11 (Working Plan for Shimla Forest Division)	7.20	129
Deodar-Kail Working Circle	7.20.1	130
Chil Working Circle	7.20.8	133

Fir/Spruce Working Circle	7.20.15	136
Oak Working Circle	7.20.16	136
Biosphere Conservation Working Circle	7.20.21	138
Plantation Working Circle	7.20.25	140

CHAPTER – VIII: STATISTICS OF GROWTH AND YIELD

Quality class assessment	8.1	142
Density	8.2	142
Enumerations	8.3	142
Stock maps	8.4	142
Volume table	8.5	143
Fuelwood and Charcoal	8.6	143
Diameter growth	8.7	143
CAI %	8.8	144

CHAPTER-IX: ESTIMATES OF CAPITAL VALUE OF THE FORESTS

Capital value of forests	9.1 to 9.3	149
--------------------------	------------	-----

PART-II FUTURE MANAGEMENT DISCUSSED AND PRESCRIBED

CHAPTER –I : BASIS OF PROPOSAL

General description	1.1	155
General objects of management	1.2	156
Methods of treatment	1.3	157
Constitution of Working Circles	1.4	158
Deodar-Kail Working Circle	1.4.1	159
Chil Working Circle	1.4.2	159
Biosphere Conservation Working Circle	1.4.3	160
Plantation Working Circle	1.4.4	160
Protection (over lapping) Working Circle	1.4.5	160
Non Timber Forest Produce (over lapping) Working Circle	1.4.6	161
Joint Forest Management(over lapping)Working Circle	1.4.7	161
Soil and Water Conservation(over lapping) Working Circle	1.4.8	162
Wild Life Management (over lapping) Working Circle.	1.4.9	162
Working Circles, their areas and distribution	1.5	162

Blocks and compartments	1.7	163
Enumerations	1.8	163
Period of Working Plan	1.10	164
CHAPTER-II:DEODAR-KAIL WORKING CIRCLE		
General constitution	2.1	165
General character of vegetation	2.2	165
Blocks and compartments	2.3	165
Felling series	2.4	166
Special objects of management	2.5	166
Area statement	2.6	166
Analysis and valuation of the crop	2.7	167
Silvicultural system	2.8	168
Choice of species	2.8.1	169
Rotation and conversion period	2.8.2	169
Regeneration period	2.8.3	169
Exploitable diameter	2.8.4	169
Division into periods and allotment to PBs	2.9	169
Yield calculation	2.10	171
Prescribed yield	2.14	176
Control of yield	2.15	177
Method of executing felling	2.16	177
Table of felling	2.17	179
Subsidiary silvicultural operations in PB I	2.18	181
Miscellaneous regulations	2.19	184
CHAPTER-III: CHIL WORKING CIRCLE		
General constitution	3.1	186
General character of vegetation	3.2	186
Blocks and compartments	3.3	186
Felling series	3.4	186
Special objects of management	3.5	186
Area statement	3.6	187
Analysis and valuation of the crop	3.7	188
Silvicultural system	3.8	189
Rotation	3.8.3	190
Regeneration period	3.8.4	191
Division into periods and allotment to PBs	3.9	191
Areawise allotment to periodic blocks	3.10	192
Felling cycle	3.11	193
Yield calculation	3.12	193
Prescribed yield	3.12.13	197

Control of yield	3.13	198
Method of executing felling	3.14	198
Sequence of felling	3.15	200
Subsidiary silvicultural operations in PB I	3.16	201
Miscellaneous regulations	3.17	203
Exercise of rights and concessions	3.18	207
Regeneration assessment	3.19	207
Resin tapping	3.20	207

CHAPTER-IV: BIOSPHERE CONSERVATION WORKING CIRCLE

General constitution	4.1	208
General character of vegetation	4.2	208
Blocks and compartments	4.3	209
Special objects of management	4.4	209
Area statement	4.5	210
Analysis and valuation of the crop	4.6	210
Silvicultural system	4.6.5	212
Treatment prescribed	4.6.6	212
Subsidiary silvicultural operations	4.7	212
Regeneration assessment	4.8	213
Tending operations	4.9	214
Miscellaneous regulations	4.10	214
Closures and statement showing forests requiring sowing/planting	4.10.7	215

CHAPTER -V: PLANTATION WORKING CIRCLE

General constitution	5.1	218
General character of vegetation	5.2	218
Special objects of management	5.3	218
Blocks and compartments	5.4	218
Area statement	5.5	219
Analysis and valuation of the crop	5.6	219
Silvicultural system	5.7	220
Planting programme	5.8	221
Control and deviation	5.9	224
Regeneration assessment	5.10	224
Closures and grass cutting	5.11	224
Fire protection	5.13	224
Plantation technique	5.14	225
Nursery technique	5.15	227
New concept of nursery	5.16	227
Tall planting	5.17	228

Plantation practices	5.18	230
Beating up	5.20	231
Pruning, Cleaning and Thinnings	5.21	231
Weeding	5.22	231
Treatment map	5.23	231
Plantation Journal	5.24	232
CHAPTER-VI: PROTECTION (OVER LAPPING) WORKING CIRCLE		
General constitution	6.1	233
General prescription	6.2	233
General character of vegetation	6.3	233
Special objects of management	6.4	233
Area statement	6.5	234
Method of treatment	6.6	234
Fire management	6.6.1	234
Strategy for fire management,	6.6.1.1	241
Illicit fellings,smuggling of timber etc.	6.6.2	243
Strategy	6.6.2.1	243
Invasive alien species	6.6.3	244
Core principles of the strategy	6.6.3.1	246
Management of lantana	6.6.3.2	247
Methodology for removal of lantana	6.6.3.3	248
Management of other invasive alien species	6.6.3.4	251
Encroachments	6.6.4	251
Preventive and remedials measures	6.6.4.1	251
Strategy on smuggling of timber	6.6.4.2	252
Illegal mining on forest land	6.6.5	253
Preventive and remedials measures	6.6.5.1	254
Strategy	6.6.5.2	254
CHAPTER-VII: SOIL AND WATER CONSERVATION (OVER LAPPING) WORKING CIRCLE		
General constitution	7.1	255
Reasons for degradation	7.2	256
Approach and strategy	7.3	257
General character of vegetation	7.4	258
Special objects of management	7.5	258
Treatment of critical areas	7.6	258
Annual plan of operation	7.7	259
Sediment monitoring stations	7.8	263

**CHAPTER- VIII: JOINT FOREST MANAGEMENT
(OVER LAPPING) WORKING CIRCLE**

General description	8.1 to 8.3	264
Strengthening of Joint Forest Management	8.4	265
Special objects of management	8.5	265
Implementation of JFM in Shimla Forest Division	9.7	266
Future scope	8.8	267
Selection of JFM working areas	8.9	268
Participatory Rural Appraisal	8.10	269
The PRA process	8.11	270
The PRA technique	8.12	270
Role of front line staff	8.13	271
Field level training	8.14	271
Villagers reorientation	8.15	272
Micro plan	8.16	272
Duties and responsibilities of JFM committees	8.17	273
Powers to JFMCs	8.18	273
MoU between Forest Department and JFMCs	8.19	274
NTFPs	8.20	274
Development of technology for value added products	8.21	275
Eco-tourism	8.22	275
Vermi-composting	8.23	275

**CHAPTER-IX :NON TIMBER FOREST PRODUCE
(OVER LAPPING) WORKING CIRCLE**

General constitution	9.1	276
Special objects of management	9.2	277
Blocks and compartments	9.3	277
Area statement	9.4	278
Analysis and valuation of the crop	9.5	278
Stock maps	9.6	279
Method of treatment	9.7	279
Artificial propagation	9.8	279
Propagation technique	9.9	280
Other NTFP plants/products	9.10	282
Fungi	9.11	283
Action on general NTFPs conservation	9.12	284
Future line of action	9.13	284
Policy on introduction of medicinal trees in forests	9.14	285
Yield calculation	9.15	286

Subsidiary silvicultural operations	9.16	286
Miscellaneous regulations	9.17	286

CHAPTER-X: WILDLIFE MANAGEMENT (OVER LAPPING) WORKING CIRCLE

General constitution	10.1	287
Importance and values of wildlife	10.2	287
Management practices and their impact on wildlife	10.3	288
Threat assesement to wildlife	10.4	288
Distribution of wildlife	10.5	289
Special objects of management	10.6	289
Management strategy	10.7	290
Working with the local communities	10.8	296
Dependence of local communities on the important habitats of wildlife	10.9	296
Crop depredation.	10.10	297
Livestock depredation.	10.11	298
Compensation.	10.12	298
Dealing with leopards in Shimla Division.	10.13	299
Monkey- human interaction.	10.14	301
Facts about monkeys.	10.15	303
Mitigation measures.	10.16	303
Pheasants census in Shimla Division.	10.17	306
Method of census.	10.18	306
Vultures and other raprors	10.19	309
Proposal for a conservation reserve	10.20	309
Field craft	10.21	310

CHAPTER - XI: ESTABLISHMENT AND LABOUR

Establishment	11.1	314
Field staff	11.2	314
Labour	11.3	314

CHAPTER-XII: CONTROL AND RECORD

System of control	12.1	315
Control forms	12.2	315
Deviation statement	12.3	315
Compartment history files	12.4	316
Nursery Journals	12.5	316
Plantation note book	12.6	316
Divisional note book	12.7	317
Fire records	12.8	318

Register of book and maps	12.9	318
Register of forests	12.10	318
Register of roads and buildings	12.11	318
TD register	12.12	318
Forests guard manual	12.13	318
Register of boundary pillars	12.14	319
Research Journals	12.15	319
Forest block book	12.16	320
Record of capital expenditure	12.17	320

CHAPTER-XIII: MISCELLANEOUS REGULATIONS

Petty felling	13.1	321
Timber distribution	13.2	322
Roads, paths and bridges	13.3	323
Buildings	13.4	323
Water supply	13.5	324
Telephone/ wireless	13.6	324
Fire protection	13.7	324
Demarcation and survey	13.8	326
Declaration of Reserved Forest	13.9	327
Forest boundaries	13.10	327
Periodic check of boundaries	13.11	328
Compartment of sub-compartment boundaries	13.12	328
Maps	13.13	329
Forest settlement	13.14	329
Nautors	13.15	329
Encroachment	13.16	330
Research and sample plots	13.17	330
Preservation plots and monumental trees	13.18	330
Meteorological data	13.19	331
Medicinal harbs plants	13.20	331
Grazing	13.21	331
Lopping	13.22	332
Resin tapping	13.23	332
Soil and water conservation	13.24	332

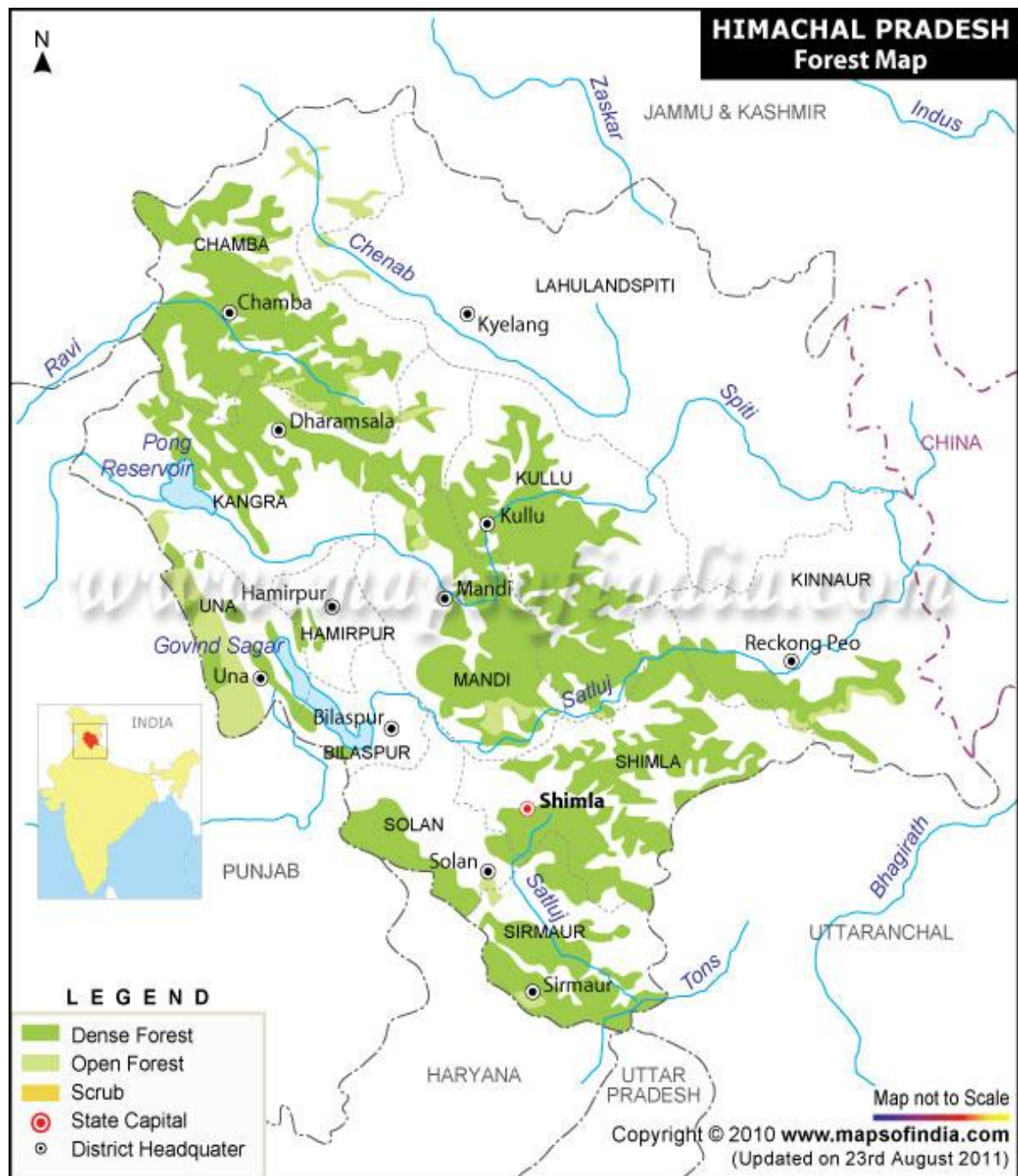
CHAPTER-XIV: FINANCIAL FORECAST AND COST OF THE PLAN

Past yield	14.1	333
Future yield	14.2	333
Future revenue	14.3	333
Future expenditure	14.4	335
Cost of the plan	14.5	335

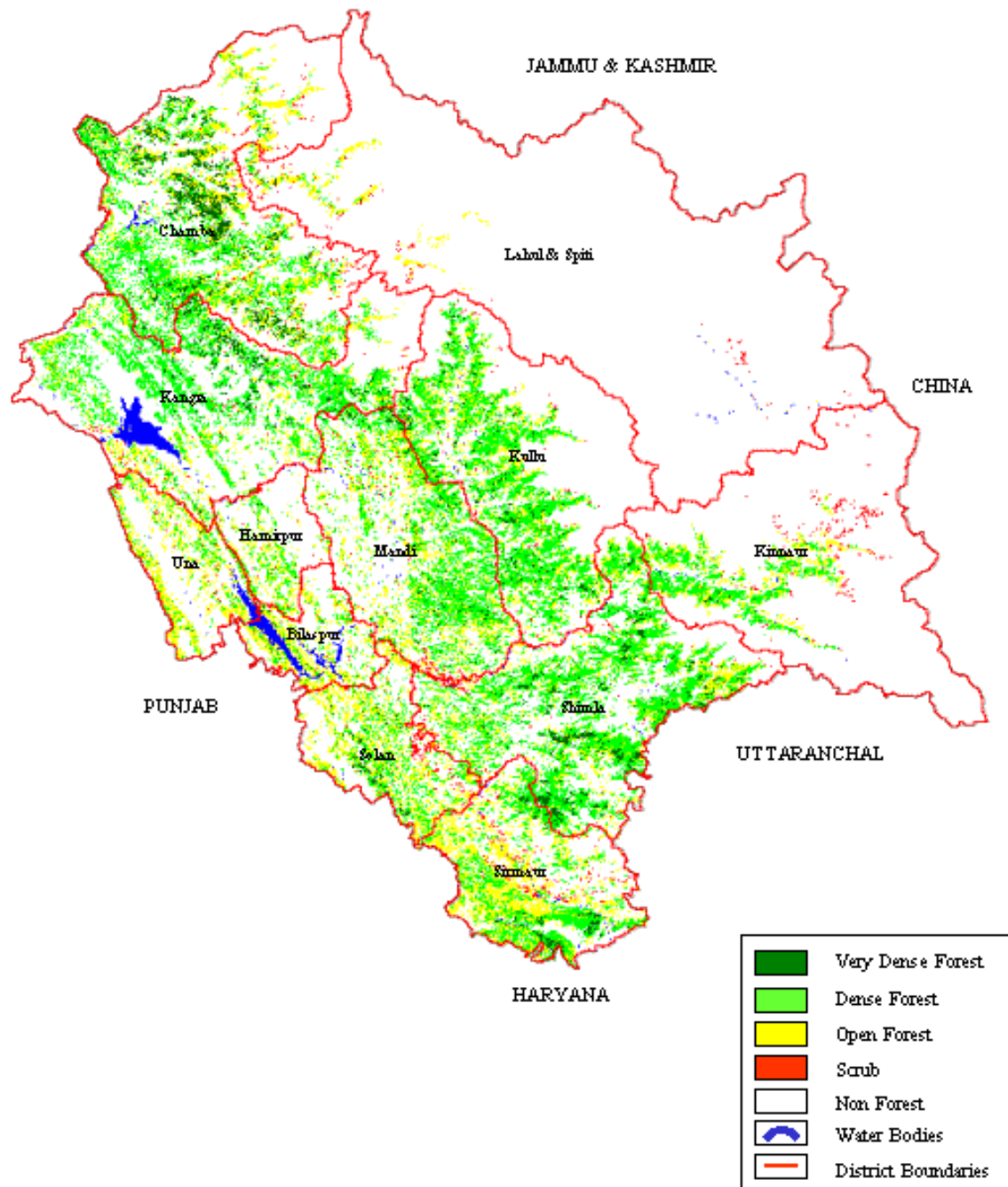
CHAPTER-XV: SUMMARY OF PRESCRIPTIONS		
Summary of prescription		336-342
Approval of chapter on wildlife management	APPENDIX-I	364

I

Himachal Pradesh Forest Map



FOREST COVER MAP OF HIMACHAL PRADESH



III
Administrative Map of H.P. Forest Department

IV

Administrative Map of Shimla Forest Division

V

Management Map of Shimla Forest Division

GLOSSARY OF VERNACULAR TERMS

1. Baht	Footpath
2. Banjar	Wasteland
3. Baoli	Small spring
4. Balli	Pole with diameter of 10-30 cms
5. Chak	Included Cultivation
6. Charand/ Chugan	Grazing land, pasture
7. Chhang	Lopping
8. Dabar	Pond
9. Darat	Shickle
10. Dehat	Undemarcated Protected forests, Village Forests.
11. Devta	Local deity
12. Dhar, Dharti	Ridge
13. Dhulan	Manual Carriage
14. Dimdima	Odd sized billet roughly squared
15. Dogri	Temporary second residence
16. Gaddi, Kinaura	Nomadic Shepherds
17. Ghall	Timber floated down river or stream
18. Ghasni/ Ghain	Grass land
19. Ghati	Saddle or pass
20. Gorkha	Nepali labourer
21. Ghrat	Water mill
22. Gujjar	Nomadic buffalo grazier
23. Hakri	Small triangular billet
24. Hoaka	Pipe for smoking
25. Illaqua	Locality
26. Jagti	Torch wood
27. Jungle Mehduda	Demarcated protected forests
28. Jungle Mehfuza	Reserved Forests
29. Karam	A revenue unit of measurement usely 146.05cms
30. Karri	Roughly squared scant
31. Khal	Ravine or Gully
32. Khala	Wide and deep ravine
33. Khad/ Gad	Deep mountain stream

VII

34. Kair/ Kiar	Irrigated field
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35. Kilta	A conical wooden basket carried on the back
36. Kuhal	Water channel
37. Mela/ Jattar	Local fair
38. Small stream	Small stream
39. Nautor	Land granted for fresh cultivation
40. Shamlat	Village common land
41. Thach	Grassy blank inside forest
42. Tibba	Peak of hill

VIII

**LIST OF IMPORTANT TREES, SHRUBS, HERBS AND CLIMBERS
FOUND**

IN THE TRACT.

BOTANICAL NAME	COMMON NAME	REMARKS
	(i) TREES	
(1)	(2)	(3)
<i>Abies pindrow</i>	Tosh (Silver fir)	For news print and packing cases
<i>Acacia catechu</i>	Khair	Katha is extracted from heartwood
<i>Acer caesium</i>	Maple	For gun butts and furniture
<i>Aesculus indica</i>	Khanor Horse chestnut	Wood for household purpose fruit for cattle
<i>Ailanthus excelsa</i>	Ailanthus	Fast growing species used as fuel
<i>Albizzia stipulata</i> <i>A. lebbek</i>	Dic, Siris	Wood for furniture, leaves for fodder
<i>Alnus nitida</i> <i>Bauhinia variegata</i>	Kunish (Alder) Kachnar, Karial	For slope stabilization leaves for fodder and buds for vegetable
<i>Betula utilis</i>	Bhojpatra (Brich)	Bark for writing, warapping and roofing
<i>Bombax ceiba</i>	Semul	Wood for match sticks, leaves for fodder
<i>Buxus sempervirens</i>	Shamshad (boxwood)	Wood for making combs
<i>Cedrela serrata</i> <i>C. toona</i>	Darle (mill toon)	Wood for furniture leaves for fodder
<i>Cedrus deodara</i>	Deodar, diar Kelo	As constructional timber
<i>Celtis australis</i>	Khirak	Wood for toys and churn sticks leaves for fodder
<i>Cornus medica</i>	Nimbu	Wood for fuel and fruits eatable
<i>Cornus capitata</i>	Khagsa (dogwood)	Leaves as fodder, fruit eaten

(1)	(2)	(3)
<i>C.macrophylla</i>	BhutiaBadam (hazel nut)	Fruit is eaten
<i>Cupressus</i>	Saru (Himalayan Cypress)	As timber and incense
<i>Dalbergia sissoo</i>	Shisham	As timber and furniture
<i>Dendrocalamus strictus</i>	Ban	Timber for Baskets and house making, leaves as fodder, seed eatable
<i>Debrigevsia hypoleuca</i>	Siaru	Leaves for fodder
<i>Emblica officinalis</i>	Ambla	Fruit eaten and used in medicine
<i>Flacourtia ramontechii</i>	Kandel	Leaves for fodder
<i>Ficus palmata</i>	Fagara	Fruits eatable by birds
<i>Ficus religiosa</i>	Pipal	A sacred tree
<i>Ficus auriculata</i>	Tiamble	Fruit eaten by birds
<i>Fraxinus floribunda</i>	Ash	Used for agriculture implements
<i>Grewia optiva</i>	Beul	Inner bark yields fibre used in rope making, leaves for fodder
<i>Ilex dipyrena</i>	Kanderu	----
<i>Juglans regia</i>	Akhrot	For gun stocks and ornamental, furniture, fruit is eaten. Bark as dye and for cleaning teeth
<i>Jacaranda mimosae</i>	Gulmohar	Avenue tree
<i>Pieris ovalifolia</i> <i>Mallotus philipinensis</i>	Aria Rohini, Kambhal	Bark for tanning
<i>Mangifera indica</i>	Aam	Timber for packing cases, furniture. Fruit eatable
<i>Melia azaderach</i> <i>Morus alba</i>	Darek, Bakain Tut (Mulberry)	Leaves for fooder. Silk worm tree; fruit is edible, wood for furniture and sports goods
<i>M. serrata</i>	Kinu (Hill mulberry)	Furniture & fruit eatable

(1)	(2)	(3)
<i>Myrica opida</i>	Kaphal	Fuelwood & fruit eatable
<i>Olea cuspidata</i>	Kahu (olive tree)	Oil in medicine, leaves for dodder
<i>Ovgenia duglnensis</i>	Sandon	Fodder trees
<i>Picea smithiana</i>	Rai (spruce)	For news print, air-craft frames & packing cases
<i>Pinus wallichiana</i> <i>P. roxburghii</i>	Kail (Blue pine) Chil (Chirpine)	As timber, also yield resin
<i>Pistacia integerrima</i>	Kakkar	Galls (kakkarsingi) used in medicine, leaves for fodder
<i>Phoenix humilis</i>	Khajoor	Fruit eatable, leaves for broom
<i>Populous ciliata</i>	Pahari Pipal (poplar)	Leaves for fodder wood for packing cases
<i>Prunus armeniaca</i>	Chuli (Wild apricot)	Fruit is edible
<i>P. cornuta</i>	Paja (birdcherry)	Fruit eaten by birds
<i>Punica granatum</i>	Daroo (wild-pomegranate)	Fruit is eaten, bark for tanning
<i>Pyrus pashia</i>	kainth	Walking sticks
<i>Prunus persica</i>	Aru	Fruit is eaten, wood for fuel
<i>Quercus dilatata</i> <i>Q. glauca</i>	Mohru Bani	Agriculture Implements as firwood and charcoal
<i>Q. leucotrichophora</i> <i>Q. semicarpifolia</i>	Ban Kharsu	Leaves for fodder
<i>Rhododendron</i>	Buras	Flowers are eaten and used in medicine
<i>Rhus punjabensis</i>	Titri	-
<i>Robinea pseudoacacia</i>	Robinia	Exotic fast growing species, leaves for fodder; wood as fuel
<i>Salix alegans</i>	Binus, majnu (willow)	Leaves for fodder, twigs for basket making
<i>Sapindus mukorossi</i>	Ritha (Soap-nut-tree)	Fruit used for washing clothes especially silk and woolen
<i>Syzygium cumini</i>	Jamun	Fruit is eaten

(1)	(2)	(3)
<i>Terminalia belerica</i>	Behra	Medicinal fruit, fuelwood for timber.
<i>Terminalia chebula</i>	Harar	Medicinal fruit, fuelwood for timber.
<i>Ulmus wallichiana</i>	Impol, Marn (Himalayan alm)	Leaves for fodder
<i>Zizyphus mauritiana</i>	Ber	Fruit edible, leaves for fodder
	(ii) SHRUBS	
<i>Agave americana</i>	Ramban	For soil conservation
<i>Adhatoda vasica</i>	Basuti	In medicine
<i>Artemisia vulgaris</i>	Chamror (artemisia)	In medicine
<i>Arundinaria falcata</i>	Nirgal, Ringal (Hill bamboo) Cobra plant	For basket making
<i>Arisema wallichia</i> <i>anum</i> <i>Asparagus racemosus</i> <i>A. adscendens</i>	Satmuli	In medicine
<i>Berberis aristata</i>	Kashmal	Root extract used in medicine.
<i>B. lycium</i> <i>B. chitria</i>		Leaves eaten by sheep & goats.
<i>Bambusa arundinacea</i>	Bans	Baskets and sticks.
<i>Carissa spinarum</i>	karaunda	Berries eaten by birds.
<i>Colebrookia oppositifolia</i>	Bambker	-
<i>Cotoneaster bacillaris</i>	Renus	For walking sticks.
<i>C. microphylla</i>	Chamror	-
<i>Daphne cannabina</i>	Caula	-
<i>Desmodium tiliacifolium</i>	Murt	-

XII

(1)	(2)	(3)
<i>Deutzia corymbosa</i>	Philru	For hedges and soil conservation areas.
<i>Dodonea viscosa</i>	Mehndu	-
<i>Euphorbia royleana</i>	Thar	-
<i>Indigofera pulchella</i>	Kathi, Neel	-
<i>Jasminum pubescens</i> <i>J. hummile</i> <i>J. officinale</i>	Chameli	-
<i>Lantana camara</i>	Phul lakri	-
<i>Lonicera angustifolia</i>	Pirlu	-
<i>L. quinquelocularis</i>	Taknol, Bhakra (Himalayan honey suckle)	-
<i>Murraya koenigii</i>	Gandhela	Leaves used as kari patta
<i>Myrsine africana</i>	Banwan	Fruit used in medicine
<i>Phoenix acaulim</i> <i>P. humilis</i>	Khajur	Fruit is eaten, leaves for matting and brooms.
<i>Punica granatum</i>	Daru	Seed used and medicine
<i>Plectranthus rugosus</i>	Chilchhri	-
<i>Prinsepia utilis</i>	Bhekhal	-
<i>Ricinus communis</i>	Castor	Oil used in medicine
<i>Rosa macrophylla</i>	Jangligulab	-
<i>Rubus ellipticus</i>	Lal anchu, akhi	Fruit edible
<i>R. paniculatus</i>	Kala anchu, akhi	Fruit edible
<i>Sarcococca saligna</i>	Tiliari	Leaves eaten by musk deer.
<i>Skimmia laureola</i>	Shashru	-
<i>Spiraea canescens</i>	Takru	-
<i>S. lindleyana</i>	Longtri	-
<i>Strobilanthes atropurpureus</i> <i>S. alatus</i> <i>S. dalhousianus</i>	Mashna	-

XIII

(1)	(2)	(3)
<i>Viburnum continifolium</i>	Loz	-
<i>V. nervosum</i> <i>V. foetens</i>	Throni	
<i>Vitex negundo</i>	Bana	-
<i>Woodfordia fruticosa</i>	Dhau	For walking sticks and brushing teeth.
<i>Woodfordia floribunda</i>	Dhau	
<i>Xanthoxylum alatum</i>	Tirmir	
	(iii) HERBS	
<i>Acyranthes bidentata</i>	Puth-kanda	-
<i>Aconitum heterophyllum</i>	Patis	In medicine
<i>Adiantum capillus</i>	Maiden hair fern	-
<i>Ainslaed aptera</i>	Kali, Ghatti (arrons rod)	-
<i>Aerissaema wallichianum</i>	Sarpator (Cobraplant)	-
<i>Asplenium polypodioides</i>	Lingar	As vegetable
<i>Bergenia ligulata</i>	Pathar tor	-
<i>Baenninghausenia albiflora</i>	Pissu mar	Insect repellent
<i>Cannabis sativa</i>	Bhang	Fibre used for making ropes medicine weed
<i>Delphinium denudatum</i>	Larkspur	-
<i>Dioscoria deltoidea</i>	Tardi	In medicine
<i>Fragaria indica</i>	Bhumla	-
<i>F. vesca</i>	Strawberry	-
<i>Geranium napalensis</i>	-	-
<i>G. wallichianum</i>	-	-

XIV

(1)	(2)	(3)
<i>Gerardiana heterophylla</i>	BichhuButi (Stinging nettle)	-
<i>Glycosmis pentaphylla</i>	Ban Nimbu	In medicine
<i>Hydrocotyle asiatica</i>	Brahmi	In medicine
<i>Impatiens thomsoni</i> <i>I. racemosa</i>	Jangli timber balsam	-
<i>Iris nepalensis</i>	-	-
<i>Mentha cylvestris</i>	Podina	In medicine
<i>Pteris creton</i>	Bracken fern	In medicine
<i>Podophyllum emodii</i>	Bankakri	Roots in medicine
<i>Rumex hastatus</i>	Malora	-
<i>R. nepalensis</i> <i>Salvia glutinosa</i>	Sage	-
<i>Saxifraga liqulata</i>	Pathar tor	-
<i>Solanum indicum</i>	Ban Tobacco	-
<i>Thymus serphyllum</i>	Ban jawain	-
<i>Urtica parviflora</i>	Kuga (common nettle)	-
<i>Veleriana wallichii</i>	MushkBala	In perfume
<i>Valeriana hardwickii</i>	Nakh nihani	-
<i>Verbascum thapsus</i>	Gidar tamaku	-
<i>Viola canescans</i>	Banshafa	In medicine
(iv) CLIMBERS		
<i>Bauhinia vahlli</i>	Majaup, taur	Leaves for making umbrella plate, and for fodder
<i>Clematis montana</i>	Garol	-
<i>Hedera helix</i>	Mithiari	-
<i>Hedra nepalensis</i>	Kural (Ivy)	-
<i>Rosa moschata</i>	Kuja	
<i>Smilax parvifolia</i>	Ram datum	
<i>Vitis himalayana</i>	Pan bel	

FOREST FAUNA

Local Names	English Names	Zoological Names
(1)	(2)	(3)
A. ANIMALS		
i) Carnivora		
LakkarBagha	Leopard	<i>Panthera pardus</i>
BaghBilli	Leopard Cat	<i>Felis bengalensis</i>
JangliBilli	Common Jungle Cat	<i>Felis chaus</i>
Lomeri	Indian Fox	<i>Vulpes bengalensis</i>
ii) Herbivora		
Ghoral	Goral	<i>Nemorhaedus goral</i>
Thar	Himalayan Tahr	<i>Hemitragus jemlahicus</i>
Kastura	Musk Deer	<i>Moschus moschiferus</i>
Kakkar	Barking Dear	<i>Montiacus muntjak</i>
Sambar	Sambar	<i>Cervus unicolor</i>
Jangli suwar	Wild Pig	<i>Sus scrofa</i>
Bhalu	Black Beer	<i>Selenarctos thibetanus</i>
Khargosh	Rufoustailed Hare	<i>Lopus nigricaltoy</i>
Gilehari	Common Five striped squirrel	<i>Humambulus penanti</i>
Een Koryal	Kashmir flying squirrel.	<i>Hylopetes fimbriaty</i>
Languor	Common languor	<i>Presbytis entellus</i>
Bandar	Monkey	<i>Macaca mulatta</i>
Gidar	Jackal	<i>Canis aureus</i>
Newla	Common Mongoose	<i>Harpestes edwardsil</i>
-	Hill mouse	<i>Mos homourus.</i>
-	Indiam Mole rat	<i>Nesekia indica.</i>
Chamgadar	Indian Flying Fox	<i>Pteropus giganteus</i>
-	Brown flying squirrel	<i>Pteromys petauriste</i>
B. BIRDS		
Chehar	Chir pheasant	<i>Catreus wallichii</i>
Monal	Himalayan Monal	<i>Lophorus impejanus</i>
	-	
Mor	Peafowl	<i>Pavo-cristatus.</i>
Kulsha	Kalij	<i>Lophirrale ucomilanos</i>

XVI

(1)	(2)	(3)
Lal murga	Red jungle fowl	<i>Gallus gallus</i>
Palash	Koklass pheasant	<i>Pucrasia macrolopha</i>
Kala titar	Black partridge	<i>Francolinus franedinus</i>
Chakor	Chakor	<i>Alectoris chukaiz</i>
Kabutar	Rock pigeon	<i>Cotumba rupestris truke stanica.</i>
Ghugi	Spotted dove	<i>Streptopelia chinensis</i>
Malyo	Blue Rock Pigeon	<i>Columba livia.</i>
-	Barheaded goose	<i>Aneer indicus</i>
-	Snow pigeon	<i>Columba leuconta</i>
-	Estern soock	<i>Columba lversmanni</i>
-	Pintail	<i>Anas acuta</i>
-	Common tail	<i>Anas creca</i>
Sham Kukra	Wood cook	<i>Scoopax rusticola</i>
	Fantail snipe.	<i>Capella ballinago</i>
Bulbul	Black bulbul	<i>Hypsiyetes madagascensis</i>
Kaua	Jungle crow	<i>Corvus macrorhynchos</i>
Cuckoo	Cuckoo	<i>Cuculus canorus aureua</i>
-	Pied crested cuckoo	<i>Clamator jacobinus</i>
Tota	Saity headed parakeet.	<i>Pistaculla himalayana</i>
Tota	Blossom headed parakeet.	<i>Psittacula cyangicephala</i>
Tota	Blossom headed parakeet.	<i>Streptopelia orientila</i>
Kathphora	Scaly bellied green wood pecker.	<i>Picus squamatus</i>
Gidh	Himalayan griffon	<i>Gyps himalayensis</i>
-	Golden eagle	<i>Aquila chrysactus</i>
-	Crested serpenteagle	<i>Spilornis cheela</i>
-	Black kite	<i>Milvus migrans</i>

XVII

(1)	(2)	(3)
-	Nut cracker	<i>Nucifraga caryocatactes</i>
Eurasian	Sparrow hawk	<i>Accipiter nisus</i>
-	Egyptian scavenger vulture	<i>Neophron percnopterus</i>
Ullu	Collared pigmy owl	<i>Glaucidium prodlei</i>
-	Mountain scops owl	<i>Otus spilocephalus</i>
-	Great hill barbet	<i>Megalaima virens</i>
-	Spotted forktail	<i>Enicurus maculatus</i>
-	Sooty fly catches	<i>Muscicapa ceylonesis</i>
-	Willow warbler	<i>Phylloscopus trochilus</i>
-	Green backed Tit	<i>Parus monticolus</i>
-	Brown crested Tit	<i>ParusD chorus kanfrae</i>
-	Yellow browed Tit	<i>Parsylvi parus modestus</i>
-	Himalayan tree creeper	<i>Crethia himalayana</i>
-	Black lored tit	<i>Parus xanthogenys</i>
Myena	Common myena	<i>Acridotheres tristis</i>
-	Brown dipper	<i>Cinclus pallarii</i>
Chirya	Chest nut Shouldered sparrow	<i>Petronia xanthocallis</i>
-	House sparrow	<i>Passer domesticus indicus</i>
-	Masked wagtail	<i>Metacilla alba persouated</i>
-	Gray wagtail	<i>Motacilla cinerea</i>
-	Tree pipit	<i>Anthus trivialis</i>
-	Purple sun bird	<i>Nectarinia asiatica</i>
-	Streaked Finch	<i>Carpodacus rubicillolides</i>
C. REPTILES		
SNAKES		

XVIII

(1)	(2)	(3)
Sapp	Himalayana pit viper	<i>Ancistrodous himalapanus</i>
Krait	Common Indian krait	<i>Bungarus cacrules</i>
Kharpa Sapp	Indian cobra Rat snake	<i>Naja naja</i> <i>Pyyas macosus</i>
LIZARDS		
Goblida	Common Indian monitor	<i>Varanus monitor</i>
-	Common house gecko	<i>Hemidactylus brooki</i>
Girgit	Common Indian monitor	<i>Onlotas vessicoloan</i>
-	Rock lizard	<i>Agamo tuberculata</i>
-	Blood sucker	<i>Techydrmous spp.</i>
D. FISHES		
Mahasheer	Fish	<i>Torputitora</i>
Barangali	Fish	<i>Allia caile</i>
Maohes	Salmo trout	<i>Salmo trutta faric</i>
Bhareli	Fish	<i>Barilius barila</i>
Lohani	Fish	<i>Barilus vegra</i>
Mrigal	Moigal	<i>Cirrhunis mrigala</i>
Dogru	Fish	<i>Crossochelus latius</i>
-		<i>Punjagensis</i>
-		<i>Garra gotyla</i>
Bhnnga	Fish	<i>Labeo boga</i> <i>Labeo dero</i>
Ticto	Fish	<i>Puntius ticto</i>
Chitratu	Fish	<i>Tor mosal</i>
Bhareli	Fish	<i>Namachilus botia aureus</i>
Dhung	Fish	<i>Clumpsoma motona</i>
Goach	Fish	<i>Bagarious bagarius</i>
Mochi	Fish	<i>Glyptothroax conirostris</i>

XIX

STATISTICS AT A GLANCE

Sr. No.	Particulars	
1.	Total Geographical Area	68300 ha
2.	Total Forest Area (RF/DPF/UPF)	31340.44 ha
3.	Percentage of forests area to the total Geographical area.	45.88%
4.	Forest area by Legal Status	
a)	Reserved Forest	1156.90 ha
b)	Percentage of RF area to the total	i) Forest area 3.69%
		ii) Geographical area 1.69%
c)	Demarcated Protected Forest	11467.10 ha
d)	Percentage of DPF area to the total	i) Forest area 36.58%
		ii) Geographical area 16.78%
e)	Undemarcated Protected Forest	18716.44 ha
	Percentage of UPF area to the total	i) Forest area 59.72%
		ii) Geographical area 27.40%
5.	Area by working Circles	
a)	Deodar Kail working Circle	i) Total area 3012.30 ha
		ii) Percentage of Total Forest area 9.61%
b)	Chil working Circle	i) Total area 3442.80 ha
		ii) Percentage of Total Forest area 10.98%
c)	Bio-Sphere Conservation Working Circle	i) Total area 15248.72 ha
		ii) Percentage of Total Forest area 48.65%
d)	Plantation working Circle	i) Total area 9636.62 ha
		ii) Percentage of Total forest area 30.75 %
e)	Other working circles	Over lapping

xx

f)	Total growing stock	4173666.2m ³	
g)	Prescriptions:		
i)	Deodar Working Circle	Deodar	Kail
	PB I	3000m ³	100m ³
	PB II	-	-
	PB III	-	-
	PB IV	50m ³	30m ³
	Total	3050m ³	130m ³
ii)	Chir Working Circle	Chir	
	PB I	1200m ³	
	PB II	-	
	PB III	-	
	PB IV	300m ³	
	Total	1500m ³	

CHAPTER-I

THE TRACT DEALT WITH

1.1 Name and situation

This working plan is the revision of working plan for Shimla Forest Division prepared by Shri Lalit Mohan (1996-2011) and deals with all Reserved Forests (RFs), Demarcated Protected Forests (DPFs) and Undemarcated Protected Forests (UPFs) of Mohan's Working Plan. However, it does not include those forests of Mohan's working Plan which fall in the jurisdiction of Theog Forest Division as these forests will be described separately under working plan of Theog Forest Division. The area of Shimla Forest Division is mostly situated in the west of Shimla district and comes under Shimla (Rural) Sub-Division and its boundaries coincide with the administrative boundaries of Shimla (Rural) Sub-Division. The Headquarter of Shimla Forest Division is located at Khalini in Shimla.

1.1.1 The area of this working plan is situated between north latitude $30^{\circ}-56'-55''$ and $31^{\circ}-17'-50''$ and east longitude $77^{\circ}-00'-10''$ and $77^{\circ}-22'-5''$. In the north, there are Suket and Karsog Forest Divisions, which have river Sutlej as common boundary with Shimla Forest Division. The boundary in the east touches Theog Forest Division. In the west to Kunihar Forest Division, Rajgarh and Solan Forest Division are in the southern side.

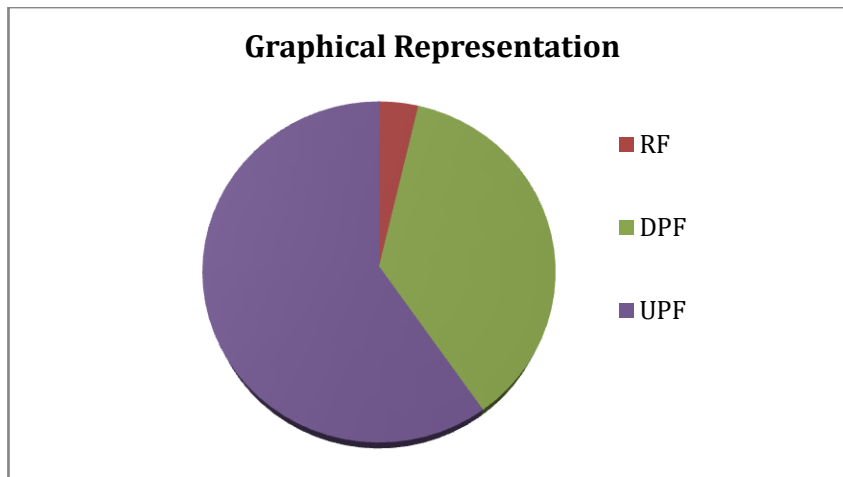
1.1.2 It excludes the area of Shimla town and the surrounding forests which are being managed by Shimla Municipal Corporation.

1.1.3 The total geographical and forest area of this working plan is worked out in table-1.

Table-1

Total geographical and forest area of Shimla Forest Division in ha

Geographical area	Reserved Forest	Demarcated Protected Forest	Undemarcated Protected Forest	Total area
1	2	3	4	5
68,300	1156.90	11467.10	18716.44	31340.44



1.2 Configuration of the ground

The entire tract is mountaineous. The slopes are moderate to steep and at place precipitous, particularly in the northern portion viz. Shali-Dhar and Lambi-Dhar in Bhajji Range.

1.3 Altitude

The altitude varies from 580 m above MSL near Annun (a little downstream of Tattapani) on the Sutlej river to 2867 above MSL at Shalli Peak in the north east portion of Shimla Forest Division.

1.4 Ridges and watersheds

The Kufri, Sanjauli, Jakhu and Taradevi are the main ridges which form the watershed between the Sutlej in the north and Giri in the south. The south eastern part forms watershed Giri and the north east part forming the watershed for Sutlej. Other ridges are Taradevi, Ganahatti Dhar which form the watershed of Ghambar river in the south west. The main ridge Shalli-Dhar with Shalli peak as its highest point is the prominent ridge dividing Shimla and Theog Forest Divisions.

1.4.1 Rivers and streams

There are two main rivers viz. Giri and Sutlej, the tributaries of which flow through the area of this working plan. The Giri river flows in the southern part and crosses over to Rajgarh Forest Division to drain into Yamuna river. The main tributaries of Giri river are Mangled khad, Badhog khad and Ashni khad. This river has a perennial flow except from October to June when the volume of water is low. This Division is bounded by

river Sutlej in the north which has Sainj khad, Nauti khad, Malgi khad and Bag khad as its main tributaries. The river Sutlej has perennial flow as it originates from Mansarovar in Tibet and a number of hydroelectric projects are being constructed on it.

- 1.4.2** The branches and spurs of these ridges contain a large number of villages and watersheds mainly for Sutlej and Giri river along with their tributaries.

1.5 Geology, Rock and Soil

1.5.1 Geology and Rock

The Shimla Forest Division is dominated by Jutog, Shalli, Jaunsar and Shimla groups of rocks apart from their development of Balaini formation. Jutog, the oldest group of rock is better developed along the eastern and western boundaries of Shimla Forest Division while Shalli group is exposed along the northern and north western part of the Division. Rest of the area is dominated by Shimla group of rocks. The major rock formations are as follows:

1.5.1.1 Jutog formation

It is the oldest, medium grade Meta sedimentary sequences occupying the highest tectonic position in the area. It is better developed along the eastern and western boundaries of Shimla Forest Division and well exposed in and around Shimla particularly in the Taradevi Range. Physically, it rests over the rocks of Balaini formation in Sanjauli along the well defined Jutog schists. In Shimla area, the quartzite and limestone are dominant. Panjareli and Manal formations are well exposed just south of Halog, east of Shimla in Sanjauli, Taradevi and Kusumpti. Bhotli khirki and Taradevi formations dominated by shale, phyllite, limestone, schist, gneiss and amphibolite are well exposed at Shimla, Kalihatti and Kalbog areas. Bhotli formation is well developed near Shoghi and the proportion of garnetiferous schist increases further east of Shoghi Railway station. The Khirki formation comprising quartzite with schist bands is well exposed between Taradevi and Boileauganj in Shimla area. A brief description of Litho units is given below:-

AGE	GROUP	FORMATION	LITHOLOGY
Middle Proterozoic	Jutogh	NAURA Formation	Garnet schist, amphibolite, psammitic gneiss quartzite, garnetiferous schist, graphite schist, mica schist, white marble.
		KANDA FORMATION TARADEVI	Quartzite schist, carbonaceous phyllite, limestone schist with garnet, staurolite and sporadic kyanite amphibolite, quartz gneiss.
		BHOTLI FORMATION	Shale, phyllite, garnetiferous schist, sporadically staurolite bearing quartzite, rare dolomite, amphibolite.
		KHIRKI FORMATION	Quartzite, amphibolite, subordinate schist locally carbonaceous.
		MANAL FORMATION	Quartzite schist one at places carbonaceous dolomite band.
		PANJRELI FORMATION	Carb-State, phyllite, schist with limestone and quartzite.

This type of formation forms micaceous clayey loam soil which are fertile and support dense oak, fir, spruce and deodar forests.

1.5.1.2 Shalli group

Shalli group is well developed along northern boundary of the Shimla Forest Division and also just south of Suket Forest Division and confined mostly in Bhajji Range. This group has following stratigraphic set up:-

GROUP	FORMATION	LITHOLOGY
Shalli	BANDIA FORMATION	Shale, siltstone, sand, stone, quartzite, dolomite
	PARNALI FORMATION	Cherty, dolomite, quartzite and limestone.
	MAKRI FORMATION	Shale, slate, quartzite and dolomite.
	TATTAPANI FORMATION	Massive dolomite and phyllitised shale.
	SARGHARWARI FORMATION	Limestone and shale
	KHAIRA FORMATION	Quartzite with thin shale bands along the upper contact with dolomite.
	KHATPUT FORMATION	Massive dolomite and quartzite.

The part of the Shalli group comprising Sargharwari and Tattapani formation are dominated by limestone and shale. These are exposed just south of Suket Forest Division. In Shalli area, cherty, dolomite, quartzite and limestone of Purnali formation, sand stone, quartzite, dolomite of Bandla formation are exposed. These types of rocks give sandy loam and clayey loam soil which supports a good growth of chil and oak forests. On exposed rocky outcrops in the northern aspect of Lambi Dhar, scattered crop of *Cupressus torulosa* is seen to occur.

1.5.1.3 Shimla group

This group is exposed along both the limbs of the North West to South East extending regional Shimla and is divided into Basantpur, Kunihar, Chhaosa and Sanjauli formations in younging order. The rocks of Shimla group are arenaceous in nature. The litho units are given below:-

AGE	GROUP	FORMATION	LITHOLOGY
Upper Proterozoic	Shimla	SANJAULI	Shale silt stone, graywacke, quartzite, sand stone, slate.
		CHHAOSA	Shale, silt stone, quartzite graywacke
		KUNIHAR	Shale, silt stone, limestone
		BASANTPUR	Platy limestone, shale, massive to bedded limestone, sporadic quartzite.

A large area of Dhami, Bhajji and Mashobra is covered by Shimla group of rocks. Basantpur formation is exposed between Sunni and Basantpur. The lithology is dominated by limestone, shale and quartzite whereas Kunihar formation is relatively less developed and is exposed at Malaun west of Basantpur. It is characterised by shale, sand stone and limestone. The Chhaosa formation is exposed at Dhalli and south of Malaun. However, Sanjauli formation is dominated by

relatively coarse elastics and exposed at Halog and east of both Sanjauli and Kusumpti.

The soil from this rock is generally clayey to clayey loam and supports mainly Chil and Ban forests.

1.5.1.4 Balaini formation

It is exposed just west of Sanjauli and extends in north-western direction. It comprises of bleached dark grey shale with dinuctite bands. This type of rocks gives clayey loam soil and supports Deodar, Kail and Oak forests.

1.5.2 Soil

The soil is more or less clayey and clayey loam all over the tract except at few places where it tends to be sandy loam. Generally speaking, on ridges and spurs, tends to be shallow and dry with numerous outcrops of bare rocks. The same is true of denuded slopes exposed to the full force of the monsoon which erode away any soil that may be formed. On the northern aspects in folds and hollows as well as on easier slopes, the soil is deep, fertile and usually moist which supports good dense forests.

The areas which support dense forests, have well developed profile whereas the lower areas suffer from soil erosion.

1.6 Climate

The climate varies a lot depending upon the altitude and aspects. It is mostly temperate in the higher elevations and sub-tropical at the lower ones. The places at higher elevation, especially the northern aspects are cooler than those situated at lower elevations. Generally snowfall occurs during winter month in area above 1800 m elevation whereas along Giri and Sutlej, the winter is comparatively moderate. Seasons are very distinct viz, summer (April to June), monsoon (July to September) and winter (October to March).

1.6.1 Summer

Summer season starts in April and lasts for three months till June. In the higher elevation the weather remains pleasant but

in lower valleys along the rivers Giri and Sutlej, strong dusty winds blow. Sometimes drought also occurs in May and June. The maximum and minimum temperature remains between 30⁰C to 16⁰C, but in the lower areas along the river Giri and Sutlej the temperature rises upto 35⁰C. Due to spell of droughts, the volume of water is reduced in the rivers, nallas, khads and ponds, which create problem of drinking water and also affect adversely the survival of plantations. However, the flow of water in Sutlej increases because of melting of glaciers. The hailstorms are also common during this period.

1.6.2 Monsoon

The monsoon season begins from July and continues till middle or end of September but pre-monsoon showers are received in late June. During this season, the sky is overcast with clouds, the air is highly humid and the weather is foggy and misty. The relative humidity remains as high as 80%. Due to rains, the temperature also falls with the maximum and minimum being 22⁰C and 15⁰C respectively. Main precipitation is due to monsoons and about 60% of the entire precipitation is received during these three months. This is the best period for the growth of plants because of optimum temperature and humidity. Rainfall data is given in table-2.

1.6.3 Winter

The winters are long which begins from October and continues upto March but sometimes it may be extended a little more. The weather remains cold and severe, especially at elevation higher than 180 m. The precipitation in the form of snow is received in January and February at higher elevations whereas lower elevations have rains during this period. Sometimes, snowfall is also noticed in November or December. The melting of snow begins by the end of March, depending upon the aspect and altitude. During winter the minimum temperature goes down to below 0⁰ C while the maximum temperature remains below 10⁰ C.

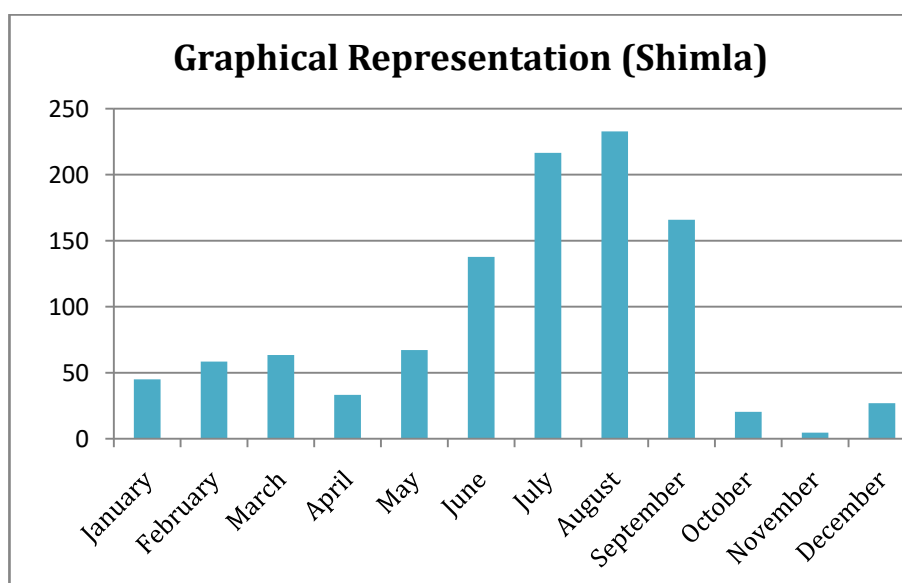
1.6.4 Rainfall

The data for mean monthly rain fall in mm of different stations in Shimla Forest Division, recorded for the period 2006 to 2011 is given in table-2.

Table-2
Rainfall data of different places (mm)

Month	Sunni	Shimla
January	27.95	45.03
Feb.	58.50	58.45
March	54.84	63.41
April	24.50	33.16
May	70.75	67.21
June	191.26	137.73
July	154.34	216.48
August	264.62	232.8
Sept.	257.54	165.9
Oct.	17.15	20.41
Nov.	8.54	4.63
Dec.	24.26	26.86
Total	1154.25	1072.07
Average	96.186	89.339

Source: Department of Meteorology and BBMB, discharge section, Sunni.



1.7 Water supply

The area generally depends for the water supply on snow and rainfall. There are some springs also which form the source of water supply. The two main rivers, Sutlej and Giri, and their tributaries like Nauti and Sainj khads of the former and Chhoti nadi, Dabhrot, Arhaila, Kairtu, Damehar and Ashwani khads of the later are sources of perennial water supply. The low lying areas, particularly where the forest growth is negligible have small streams and nallas which dry up during summer and are only seasonal source of water supply.

1.7.1 The supply of drinking water is satisfactory except in the lower dry and hot areas which are devoid of vegetation. To fulfill the requirement of drinking water a large number of drinking water schemes have been started since 1966. The source of water is generally springs or tributaries.

1.7.2 Some of the major water supply schemes, meant for drinking water and irrigation purposes, are given in table-3

Table-3
List of Major Water Supply Schemes

Sr No	Name of scheme	Type of scheme	Year of completion	Source of water	No. of beneficiaries
1	LWSS Halog Dhami	Lift	1979	Dhami ka nalla	N.A
2	LWSS Ghanahatti	Lift	1981	Khad	N.A
3	Taradevi Shoghi	Lift	1982	Parog ka nalla	N.A
4	LIS Deola	Lift	1981-82	Shanola khad	2000
5	LWSS for Mehli	Lift	1983	Nalla	N.A
6	LWSS Dumi Poabo in GP Dhami	Lift	1983	Nalla	N.A
7	LWSS Goro Kunana GP Anandpur	Lift	1983	Guru spring	N.A
8	LWSS for Mehli	Lift	1983	Nalla	N.A
9	LWSS Dhanda	Lift	1984	Nalla	N.A
10	LWSS Bholi Dhar in GP Jabri	Lift	1985	Spring	N.A
11	LWSS Nihari Nereti in	Gravity	1985	Spring	N.A

	GP Mashobra.				
12	LWSS Sanval in GP Baldain	Gravity	1985	Spring	N.A
13	LWSS Kathori Marhog	Lift	1986	Nalla	N.A
14	GWSS Kambal Banyan	Gravity	1986	Nalla	N.A
15	LWSS Baneoti in GP Dadhalti	Lift	1987	Nalla	N.A
16	LWSS Kala Binu Bhageg in Anandpur	Lift	1987	Taprala ka Nalla	N.A
17	LIS Shalidhar Deothi	Lift	1987-88	Kiari Nalla	2100
18	LWSS Gharog Ghandal in GP Sakrah	lift	1988	Nalla	N.A
19	GWSS Jahari Bihar Kholoya in GP Rajhana	Gravity	1988	Madhuban Spring source	N.A
20	GWSS Drawl Alotio in GP Nahal	lift	1989	Spring	N.A
21	GWSS Chilla Chadrain in GP Deothi	Gravity	1989	Nalla	N.A
22	Lift Water Supply scheme for village Palana Khaprol in GP Kair	Lift	1991	Kair khad	N.A
23	LWSS Koti in GP Koti	Lift	1991	Shalot ka Nalla	N.A
24	LWSS Kot in GP Junga	lift	1991	Spring	N.A
25	LWSS Jubber hatti	Lift	1992	Gambar khad	N.A
26	GWSS to LOH Chewra GP Junga	Gravity	1996	Spring	152
27	GWSS Shilon Bag Kag Kuftu GP Dhagag	Gravity	1997	Spring	220
28	GWSS to LOH Dubloo in GP Balog	Gravity	1997	Spring	542
29	GWSS Pujarli in GP Junga	Gravity	1997	Spring	167
30	LWSS New Totu (Extention) Totu in Teh & Distt Shimla HP	Lift	1997	Khad/Nalla	983
31	GWSS Ganyog Dochi in Teh & Distt Shimla HP	Gravity	1997	Spring	36
32	GWSS Kair GP Chailly in Teh & Distt Shimla HP	Gravity	1997	Spring	155
33	LWSS Argaoon Kot GP Kot	Lift	1997-98	Nalla	1791
34	LWSS Shilru in GP Bagi	Lift	1997-98	Khad	140
35	LWSS Sharai in GP Mashobra	Lift	1997-98	Spring	150
36	Aug LWSS Kelti in GP Dhalli	Lift	1997-98	Spring	235
37	LWSS Ghanahatti & its adjoining villages in GP Ghanahatti in Teh &	Lift	1997-98	Nalla	957

	Distt Shimla HP				
38	LWSS to Jungle Neen, Neen in GP Koti (2stage)	Lift	1998	Khad	2831
39	GWSS Chaneon Shallot Bhalagaon in GP J/Ghat	Gravity	1998	Spring	479
40	GWSS to LOH census Vill. Kot Dhaliana Chouri in GP Junga	Gravity	1998	Nalla	164
41	LWSS Neun Karyali Kiargiri in Neri, Teh & Distt Shimla HP	Lift	1998	Khad	144
42	GWSS Tul GP Shakrah in Teh & Distt Shimla HP	Gravity	1998	Spring	55
43	GWSS Shakrah GP Shakrah in Teh & Distt Shimla HP	Gravity	1998	Spring	177
44	GWSS Mulberi GP Devnagar in Teh & Distt. Shimla HP	Gravity	1998	Nalla/Spring	204
45	Prov. LWSS for Leftout pop. of vill Rajhana in GP Rajhana	Lift	1999-2000	Nalla	415
46	Prov. LWSS for LOH of vill. Shoghi Pawad in GP A/pur	Lift	1999-2000	Nalla	1855
47	GWSS LOH of CV Baneri, Oddu in GP Naldehra	Gravity	1999-2000	Spring	150
48	GWSS Palo-ka-Jubber in GP Patgehar	Gravity	2000	Spring	65
49	GWSS to LOH Jungle Karoili Palyar in GP Peeran	Gravity	2000	Spring	35
50	GWSS Showa Chowki in GP Kufri	Gravity	2000	Spring	87
51	LWS Bag/Bagri	Lift	2000-01	Sainj khad	1100
52	LIS Chalahal	Lift	2000-01	Thachi khad	1500
53	LIS Jaishi	Lift	2000-01	Ropari nala	2000
54	LIS Sainj Panwoa Malgi	Lift	2000-01	Bag khad	2000
55	GWSS Bharyal GP Totu in Teh & Distt Shimla HP	Gravity	2001	Spring	583
56	LWSS Bhakhri Malyana in GP Malyana	Lift	2001-02	Nalla	595
57	Prov. LWSS Kawara Kanoura in GP Beolia	Lift	2001-02	Nallh	355
58	Aug. of LWSS Dhar Jug Chalawag in GP Baldian	Lift	2001-02	Spring	1255
59	LIS Talah/ Hiwan	Lift	2001-02	Sainj khad	800

60	GWSS Shanol GP Devnagar in Teh & Distt. Shimla HP	Gravity	2002	Nalla	118
61	GWSS Khanet (ext Biunt Khad) in Teh & Distt. Shimla HP	Gravity	2002	Khad	70
62	GWSS Dawad GP Tuto in Teh & Distt. Shimla HP	Gravity	2002	Spring	63
63	LIS Matlod/Gani	Lift	2005-06	Hazal nalla	2000
64	LWS Juni	Lift	2006-07	Sainj khad	900
65	LIS Reog Hiwan	Lift	2006-07	Gharat nalla	1300
66	LIS Dharogra	Lift	2006-07		1500
67	LIS Dargi Disti	Lift	2007-08	Sainj khad	500
68	LIS Nagar	Lift	2007-08	Sainj khad	900
69	LIS Sainj	Lift	2007-08	Sainj khad	1500
70	LIS Thachi Seri	Lift	2008-09	Thachi khad	600
71	LWS Ghalru Juber	Lift	2010-11	Thachi khad	900

Source: Offices of Executive Engineers I & PH Division no.1 Shimla and Division Sunni.

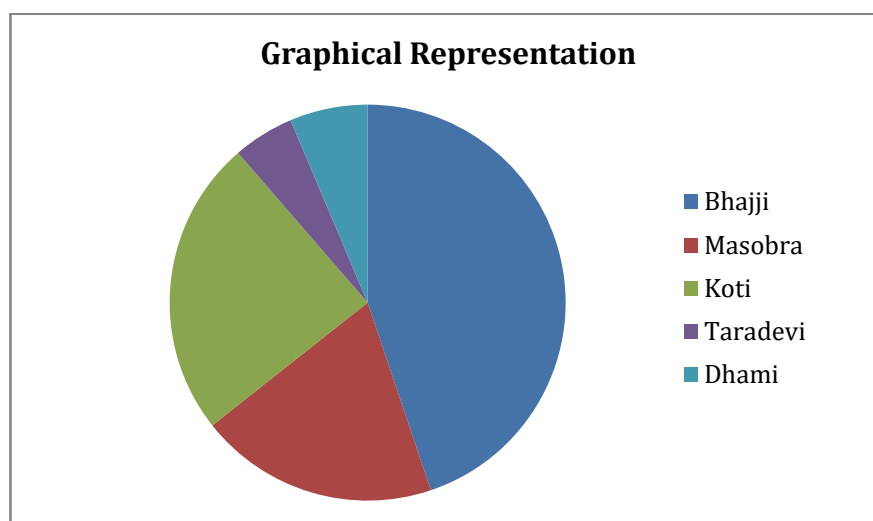
1.8 Distribution of area

The total geographical area and forest area of Shimla Forest Division, Range wise alongwith the types of forests (by legal classification) in different ranges of this division, is given in table-4.

Table-4

Range wise distribution of forest area in ha (without NDPF's)

Forest Division	Geographical area (ha)	Range	RF (ha)	DPF (ha)	UPF (ha)	Total forest area (ha)
Shimla	68300.00	Bhajji	52.60	4341.00	9653.47	14047.07
		Mashobra	235.30	1696.60	4190.42	6122.32
		Koti	212.60	3508.40	3889.9	7610.9
		Taradevi	656.40	908.50	-	1564.9
		Dhami	-	1012.60	982.65	1995.25
Total	68,300.00	-	1156.90	11467.1	18716.44	31340.44



1.1.8.1 This working plan includes Reserved, Demarcated and Undemarcated Protected Forests of Shimla Forest Division. The entries of UPFs have not been made in revenue records and these are still entered as “Charagah Darakhatan (grazing land with trees) or Charagah villa Darakhatan” (grazing land without trees) and common Govt. land at some places. The area of most of the UPFs does not tally with the actual area in the field. However, the area of these UPFs as has been recorded in Mohan’s Working Plan; the same has been accounted for. Thus, it is essential to demarcate these UPFs at the earliest possible and accordingly entries should be made in revenue records.

1.8.2 Demarcation and settlement

Forest settlement and demarcation operations were undertaken in Bhajji Forest Range during the past working plan period and some new DPFs have been carved out and notified as DPFs. Resultantly, area under DPFs has increased whereas the area under UPFs got decreased to the same extent which is 4814.9 ha (4814-96-75 ha). The range wise distribution of forest area (by legal classification) after notification of new DPFs is depicted in table-5.

Table-5**Range wise distribution of forest area in ha (with NDPF's)**

Forest Division	Geographical area (ha)	Range	RF (ha)	DPF (ha)	UPF (ha)	Total forest area (ha)
Shimla	68300.00	Bhajji	52.60	9155.90	4838.57	14047.07
		Mashobra	235.30	1696.60	4190.42	6122.32
		Koti	212.60	3508.40	3889.90	7610.90
		Taradevi	656.40	908.50	–	1564.90
		Dhami	–	1012.60	982.65	1995.25
Total	68,300.00	–	1156.90	16282.0	13901.54	31340.44

There are certain areas left in this division which are small in bits, honeycombed and surrounded by cultivation. These areas are not measured and therefore not covered under this working plan.

1.8.3 Diversion of forest land under Forest Conservation Act, 1980

The developmental works like road construction, hydroelectric projects, installation of industries, construction of building constitute the priority of the Govt. for which forest land are diverted for non-forestry purposes. In our state, the private land holdings are small and the pressure on forest lands remains for the execution of developmental activities. The forest clearance for the establishment of Kol Dam has been taken at state level. The latest position of all FCA cases of Shimla Forest Division (As on, Feb 2012) is as under

Table-6
Proposals/ projects approved under FCA

Sr No	Name of proposal	User agency	Extent of forest land transfer red (ha)	Status
1	Diversion of Forest land for const of Kol Dam Project	GM. NTPC, Barmana	107.0284 64.1901	Approved by CF (C) 11.06.1990 dated 23.11.2000
2	Extension of Airport, Jubberhatti.	Airport Authority of India	4.953	Approved by CF 9-758/99 (C) 06.09.1999
3	Const. of Sewerages scheme for Shimla Town	XEN, IPH Divn, Shimla	0.1268	Approved by CF (C) 17.12.2002
4	Petrol Pump at Nadukhar	Bhart Petroleum	0.728	Approved by CF (C) 19.02.03
5	C/o Solid Waste Management Project	Commissioner, MC, Shimla	2.45	Approved by CF (C) 25.02.05
6	Field Research unit Anandpur	Asstt. Director, FRU, ARC, Anandpur, Shimla	0.045	Approved by CF (C) 12.01.2005
7	33/11 KV Sub-station at Mehli	Sr XEN, Trans Divn, HPSEB, Totu, Shimla	0.43	Approved by CF (C) 05.09.05
8	33/11 KV 1-2.5 Sub-station at Ghandal	Sr. XEN, Trans. Divn, HPSEB, Totu, Shimla	0.68	Approved by CF (C) 05.09.05
9	C/o Dharogra to Malgipul	XEN, PWD, Shimla Divn. No.1	3.5031	Approved by CF (C) 09.08.2005
10	C/o Snajauli to Dhalli bye pass	XEN, PWD, Shimla Divn. No.1	1.28	Approved by CF (C) 03.03.05
11	C/o Distribution Center for Store of Food grain	Regional Manager, CWC Regional Office, Bay NO. 35-38, Sector -4, Panchkula	1.4	Approved by CF (C) 11.08.2009
12	Pamu Stone crusher	Pramod Kumar Stone Crusher, Naggar	0.68	Approved by CF (C) 03.03.06
13	C/o Kalihatti to Bangora road	XEN, HPPWD, Division No.-1, Shimla	0.22	Approved by CF (C) 07.12.04
14	DAV School Tutu	Principal DAV School, Totu, Shimla	0.4	Approved by CF (C) 01.02.04

15	C/o Kadharghat to Domehar road	XEN, PWD, Kumarsain Division	3.542	Approved by CF (C) 23.07.2007
16	C/o LWSS Grech Soya Charabra	XEN, IPH, Shimla Divn.	0.1	Approved by CF (C) 25.07.05
17	C/o Mehli Shogi road	XEN, PWD, Division No-1	0.61	Approved by CF (C) 30.12.05
18	C/o Koti Rohalti to Satlai road	XEN, PWD, Division No-1	4.8503	Approved by CF (C) 01.06.07
19	C/o Mandyalu Link road	XEN, PWD, Kumarsain Division	0.57	Approved by CF (C) 07.2.06
20	C/o By pass ITBP at Taradevi	DIG, ITBP, Hqrs.HP, Taradevi	0.17	Approved by CF (C) 04.06.08
21	Bhawana to Cheri road	XEN, PWD, Division No-1	1.8136	Approved by CF (C) 02.02.06
22	C/o Banoona Himri road	XEN, PWD, Kumarsain Division	2.145	Approved by CF (C) 25.03.08
23	Realingment of Shimla Mandi road near Naldehra	XEN, PWD, Shimla Divn. No.1	1.2831	Approved by CF (C) 25.01.07
24	Establishment of Planetarium	Addl. Secretary (S&T) to the GOHP Shimla-2.	0.92	Approved by CF (C) 4.06.08
25	C/o Cheri to kair koti road	XEN, PWD, Shimla Divn. No.1	1.2196	Approved by CF (C) 04.06.2010
26	M/S Pammu Stone Crusher at Naggar	Pramod Kumar Stone Crusher, aggar	0.0372	Approved by CF (C) 14.08.2006
27	C/o Cricket Stadum at Kutashani	Director Youth Services and Sports HP, Shimla	4.4531	Approved by CF (C) 05.04.07
28	C/o Karyali to Saharanal road	XEN, PWD, Kumarsain, Division	3.354	Approved by CF (C) 14.03.08
29	C/o Tipra Patagiari road	XEN, PWD, Shimla Divn. No.1	2.9382	Approved by CF (C) 01.06.2007
30	C/o Elysiyum Devidhar Ever sunny Pagog road	XEN, PWD, Shimla Divn. No.1	2.976	Approved by CF (C) 12.02.07
31	Stone Cruser Suman Enterprises	K.L.Verrma, Suman Enterprises, Shimla	0.0263	Approved by CF (C) 02.04.08
32	C/o Dargi Macharyana Jundloo	XEN, PWD, Kumarsain, Division	2.2191	Approved by CF (C) 25.03.2008
33	Secret Heart Convent School Tara Hall	Principal, Convent Shool, Tara hall, Shimla.	0.8924	Approved by CF (C) 04.08.06
34	C/o Retail outlet of IBPL Shoghi	Indian Oil Corporation, Chd.	0.0357	Approved by CF (C) 17.04.06
35	C/o Longwood Barmu road	XEN, HPPWD, Division No.-1, Shimla	0.8736	Approved by CF (C) 04.01.07

36	Approach road to residential plot to Shri Ram Dass	Sh. Ram Dass at Up Mahal Dochi, Mahal Sargheen, Tehsil & Distt. Shimla.	0.0049	Approved by CF (C) 15.02.07
37	C/o Pabo Doomi road	XEN, HPPWD, Division No.-1, Shimla	2.424	Approved by CF (C) 04.01.07
38	R&D activities - DRDO	Chief CE (R&D), DRDO, New Delhi	0.173	Approved by CF (C) 16.04.2010
39	C/o Road Hotle Asia the Dawan to Chakkar	District & Sessions Judge, Shimla	1.525	Approved by CF (C) 18.10.07
40	C/o Judicial Complex at Chakkar	District & Sessions Judge, Shimla	1.6494	Approved by CF (C) 11.12.07
41	C/o Shiv Mander Shakti Bihar road	XEN, HPPWD, Division No.-1, Shimla	0.48	Approved by CF (C) 10.03.08
42	Establishment Data Collection Center	Controller of Admin, NTRO o/o National Security Adviser, GOI, J-16, Hauz Khas, New Delhi	4.92	Approved by CF (C) 09.02.2009
43	Auditorium -cum -Sports Complex	Director, HIPPA	0.1518	Approved by CF (C) 19.07.2009
44	C/o Jeepable road to Village Mandrech	XEN, PWD, Kumarsain, Division	0.7366	19.05.2009
45	Land Fill Site	Commissioner MC, Shimla.	9.9123	Approved by CF (C) 19.04.2010
46	Cherri to Kiar Koti road	XEN, HPPWD, Division No.-1, Shimla	1.2196	Approved by CF (C) 04.06.2010
47	Sanjaulli Dhalli bye pass road.	XEN, HPPWD, Division No.-1, Shimla	1.087	Approved by CF (C) 19.05.2003
48	ISBT Tuti Kandi Ph-I	Chief XEN, HP, Bus Stand Management & Development Authority, Shimla.	0.4868	Approved by CF (C) 16.04.2004
49	ISBT Tuti Kandi Ph-II	Chief XEN, HP, Bus Stand Management & Development Authority, Shimla.	0.32	Approved by CF (C) 24.07.2006
50	Sulabh Souchalya near High Court	Commissioner, MC Shimla	0.00701	Approved by CF (C) 29.09.2006
51	Pagog road	XEN, HPPWD, Division No.-1, Shimla	2.976	Approved by CF (C) 20.09.2007

52	Sangti Neri road	XEN, HPPWD, Division No.-1, Shimla	2.811	Approved by CF (C) 20.06.2007
53	Dumping site at BCS	Commissioner, MC Shimla	0.03376	Approved by CF (C) 26.09.2007
54	Dumping site at Annadale	Commissioner, MC Shimla	0.1723	Approved by CF (C) 26.09.2007
55	Dummping site at IGMC Longwood nala	Commissioner, MC Shimla	0.2234	Approved by CF (C) 03.10.2007
56	Community Centre at Keleston	Commissioner, MC Shimla	0.035	Approved by CF (C) 30.02.2009
57	Car Parking near lift	Commissioner, MC Shimla	0.6471	Approved by CF (C) 05.12.2008
58	Car Parking near IGMC	Commissioner, MC Shimla	0.323	Approved by CF (C) 14.12.2009
59	C/o Ambulance road Kaithu	Commissioner, MC Shimla	0.0792	Approved by CF (C) 23.12.2009
60	Modern Abattoir (Slaughter house) Bolieauganj	Commissioner, MC Shimla	0.1125	Approved by CF (C) 21.12.2009
61	Stray dog shelter at Panjri	Commissioner, MC Shimla	0.24	Approved by CF (C) 01.09.2009
62	Cricket Acadamy, Lalpani	Commissioner, MC Shimla	0.671	Approved by CF (C) 30.07.2009
63	Jakhoo Ropeway, Shimla		0.345	Approved by CF (C) 23.07.2007
64	Sub-station Malyana	Sr. XEN, Trans. Divn, HPSEB, Totu, Shimla	0.3446	Approved by CF (C) 17.06.2011
65	C/o Road Phyal to Dawati	XEN, HPPWD, Division No.-1, Shimla	1.04	Approved by CF (C) 30.06.2011
66	C/o Deothi road	XEN, HPPWD, Division No.-1, Shimla	0.9328	Approved by CF (C) 28.07.2011
67	PHC Koti	BMO, Primary Healh Centre, Mashobra	0.564	Approved by CF (C) 31.12.2010
68	C/o Chamber Bar High Court	Registrar, GAD, High Court, H.P.	0.093054	Approved by CF (C) 09.03.2011
69	Constt. of Training Institute, Home Guard	Commandant (Training) HG & DCTI, Junga	0.6619	Approved by CF (C) 06.04.2011
70	Const. of office building for Hydrology and Maint. Divn., Shimla	XEN, Hydrology and Maint. Divn., Shimla	0.0976	Approved by CF (C) 08.03.2011
71	C/o Shilon Bag to Bhara to Drabla Road	XEN, HPPWD, Division No.1, Shimla	0.7212	Approved by CF (C) 16.05.2011

72	Car Parking near Cancer Hospital cart road	Commissioner, MC Shimla.	0.235	Approved by CF (C) 28.07.2006
73	Car Parking at Chotta Shimla	Commissioner, MC Shimla.	0.183	Approved by CF (C) 29.7.2006
74	Zila Parishad Bhawan	Commissioner, MC Shimla.	0.093	Approved by CF (C) 18.04.2007
75	Prestressed Bridge over Snowdon Nalla	Commissioner, MC Shimla.	0.09	Approved by CF (C) 15.05.2007
76	Chamber for Bar Association of Hon'ble High Court	Registrar, GAD, High Court, HP.	0.0225	Approved by CF (C) 04.03.2010
77	C/o Link road village Juni	XEN, HPPWD, Kumarsain	0.6652	Approved by CF (C) 26.02.2008
78	C/o kanda to Moolkoti	XEN, HPPWD, Divn. No.1, Shimla	2.1656	Approved by CF (C) 10.4.06
79	C/o 132/33 KV Sub-station Malyana	Sr. XEN, Trans. Divn, HPSEB, Totu, Shimla	0.3446	Approved by CF (C) 26.08.2010
	Total Area approved for Diversion	=	265.166	

Proposal/Projects in which in principle, principle approval has been granted.

1	Establishment of Film City at Gharog	M/S Snowball Studio, Pvt. Ltd., Kay Apartment, Shimla.	2.0229	Approved by CF (C) 03.03.2011- In principlally approved
2	C/o Kakar Bagora road	XEN, PWD, Shimla Divn. No.1	0.6547	03.03.2011- In principlally approved
3	C/o Ever Sunny Golcha Bhont road	XEN, PWD, Shimla Divn. No.1	2.447	05.07.2011- In principlally approved
4	C/o Jatole, to Kuffer road	XEN, PWD, Shimla Divn. No.1	0.8826	05.07.2011- In principlally approved
5	C/o Mandhorghat to Dargi via Naggar road	XEN, PWD, Kumarsain	0.291	20.10.2010- In principlally approved
	Total Area in which in-principle approval has been granted.	=	6.2982	

Proposals/projects submitted for approval

1	Transmission Time Jathia Devi to Maliyana	Addl. Supdt. Engg. (ES) ESCM Divn, HPSEB Ltd.	3.606	Submitted for approval
2	Judicial Academy at Ghandal	Director HP Judicial Academy	3.4106	Submitted for approval
3	C/o Link road from Danpar to Sandoa road	XEN, PWD, Kumarsain	4.6641	Submitted for approval

4	C/o Sanjauli Dhalli bye pass	XEN, PWD, Shimla Divn. No.1	2.5862	Submitted for approval
5	C/o District Ayurvedic Office & Ayurvedic Health Centre, Tuti Kandi	District Ayurvedic Officer, Shimla	0.056213	Submitted for approval
6	C/o Mashobra to Kanda road	XEN, PWD, Shimla Divn. No.1	4.1854	Submitted for approval
7	Const. of College ground, Sunni.	Principle Govt. College, Sunni	0.2898	Submitted for approval
8	Const. of Veterinary Hospital, Himri	Dy. Director, Animal Husbandry, Shimla	0.075	Submitted for approval
9	C/o Sub-station at Bhatta Kuffer	Sr. XEN, Shimla (E) Divn. No.-II	0.0808	Submitted for approval
10	C/o Khalini Bihar road	XEN, PWD, Shimla Divn. No.1	0.2304	Submitted for approval
11	Const. of Ambedkar Bhawan , Basant Pur	DWO, Shimla	0.042	Submitted for approval
12	C/o Missing link of old Kasumpti Junga road`	XEN, PWD, Shimla Divn. No.1	1.092	Submitted for approval
13	Const. of Ambedkar Bhawan , Batlana	DWO, Shimla	0.0417	Submitted for approval
14	C/o linkroad Village Devidar to Shedal via Ambri	XEN, PWD, Kumarsain	2.0732	Submitted for approval
15	Const. of bridge across river Satluj	Sr. Vice President, Lafarge India Pvt. Ltd., Shimla	0.3514	Submitted for approval
16	Luhri Hydro Power Project	Dy. DGM R&R/ Land Acquisition Deptt. Luhri Hydro Elect. Project	31.3614	Submitted for approval
17	Muck dumping site at Boleaugang	Commissioner, MC Shimla	0.079031	Submitted for approval
18	Muck dumping site on bye pass road near Bakhraim	Commissioner, MC Shimla	0.258512	Submitted for approval
19	Muck dumping site at Oakwood	Commissioner, MC Shimla	0.41629	Submitted for approval
20	Muck dumping site at Police Ground Bharari	Commissioner, MC Shimla	0.121626	Submitted for approval
21	Muck dumping site on Kh. No. 161.1694 on road from Sanjauli to ridge via IGMCI	Commissioner, MC Shimla	0.100922	Submitted for approval
22	Muck dumping site at opposite cremation ground Kanlog	Commissioner, MC Shimla	0.267342	Submitted for approval
23	Muck dumping site at Adda villa	Commissioner, MC Shimla	0.086501	Submitted for approval
24	Muck dumping site near Deepak Project	Commissioner, MC Shimla	0.08356	Submitted for approval
25	Muck dumping site near Capital Hotel	Commissioner, MC Shimla	0.027266	Submitted for approval
26	Muck dumping site in Kh. No. 663/1 on Shimla by pass road	Commissioner, MC Shimla	0.145799	Submitted for approval
	Total area applied for approval	=	55.7331	

1.8.4 Nomenclature of forest

Names of forests will remain the same as in the preceding working plan. Newly created Demarcated Protected Forests have been given serial numbers starting from next to the last number in the preceding working plan.

1.9 State of boundaries

The Reserved Forests and DPFs of Shimla Forest Division are demarcated by boundary pillars. Some of these boundary pillars are made of loose stone masonry and thus are mostly not well maintained in the field and need repair. Many boundary pillars are missing also. These are required to be located and restored by constructing new boundary pillars in cement concrete on priority basis.

1.9.1 The boundary pillars of RFs and DPFs are serially numbered on survey sheets but some of the numbers in the field are either missing or not visible.

1.9.2 The boundary registers have not been maintained properly in the ranges. These registers are meant for showing location of boundary pillars with forward and backward compass bearing and the distance between them. Longitude and latitude of each boundary pillar are to be found out with the help of GPS and recorded in the boundary pillar register maintained at the range level.

1.9.3 The boundary pillars are being raised in newly created DPFs where settlement operation is concluded.

1.10 Forest maps

The survey of all the RFs, DPFs and UPFs pertaining to this working plan, has been conducted by Survey of India and all these forests have been projected on the maps in the scale of 1:15000. As the demarcation of most of the UPFs have not been done except in Dhami Range, so the estimated area has been taken into account. Thus, there are chances that the area of these UPFs may slightly change after their proper demarcation.

1.10.1 Stock maps of the forests have been prepared on 1:15,000 scale survey sheets. This will help in locating the forests in the field because the survey sheets have got all the details as compared to stock maps prepared on tracing clothes. These stock maps are placed in the respective compartment history files.

1.10.2 The following maps given in table-7 are available which cover all forests of this working plan.

Table-7

List of maps prepared by Survey of India, covering the tract

Sr No	Survey sheet No.	Scale	Year of survey	Year of publication
1	53E/3/SE	1:15000	1986-87	1989
2	53/E/3/SW	1:15000	1986-87	1990
3	53/E4/NE	1:15000	1977-78	1979
4	53/E/4/SE	1:15000	1977-78	1979
5	53/E/4/NW	1:15000	1977-78	1979
6	53/E/4/SW	1:15000	1977-78	1978
7	53/E/7/3	1:15000	1972	1979
8	53/E/8/1	1:15000	1972	1979
9	53/E/8/2	1:15000	1972	1979
10	53/E/8/3	1:15000	1972	1979
11	53F/1/NE	1:15000	1971	1972
12	53F/5/1	1:15000	1971	1979
13	53E/3	1:50000	1964-65	1973
14	53E/4	1:50000	1964-65	1974
15	53E/7	1:50000	1964-65	1970
16	53E/8	1:50000	1964-65	1967
17	53F/1	1:50000	1966	1968
18	53F/5	1:50000	1966	1968

1.11 Compartment history files

The compartment history (CH) files of all the forests have been maintained both at range and division level.

1.11.1 The CH files of each compartment of forest have to be written again keeping in view the present field condition of the forests.

1.11.2 The important thing to be done is that the detail of work done in a particular forest should immediately be incorporated in the compartment history file of the respective forest.

1.12 Legal position

After the merger of all Princely states of Shimla Hills, Himachal Pradesh was created on 15th April 1948 and the ownership vested with Govt. of Himachal Pradesh of such lands which are covered with tree or devoid of tree growth but were not assessed for land revenue. Thus the following notifications were issued for such lands under chapter-IV of IFA, 1927 except for RFs.

- (i) Notification No. Ft.-29-241/BB/49 dated 25.02.1952, making provisions of Chapter-IV in the Indian Forest Act, applicable to all forests or waste land in HP which were the property of the Government or over which the Govt. had proprietary rights or to the whole or any part of the produce of which the Govt. was entitled, as recorded in the forest settlement or the land revenue settlement except to the RFs.
- (ii) Notification No. Ft.-29-241-BC/49 dated 25.02.1952 and 13.11.1963 declared all trees in the above forests as reserved trees.
- (iii) Notification No. Ft.-43-241-E/49-3 dated 25.02.1952 prohibited the breaking up of land for cultivation or building, herding of cattle or for any other purpose in the DPFs.
- (iv) Notification No. Ft.-43-241-A/49-3 dated 25.02.1952 framed the notes under section 32 of the IFA 1927, for protected forests in the old Keonthal, Koti and Bhajji states, including the pepsu enclave.

Copies of the above mentioned notifications are given in the Appendix-I (i-iv)

- 1.12.1** Prior to the merger of Princely states, the rulers of the erstwhile state of Bhajji, Keonthal, Patiala exercised their rights of ownership on all the forests in their respective territories, subject to the rights of users, except in case of Reserved Forests of Keonthal, Bhajji and Patiala (enclave), which were free from all rights of user.
- 1.12.2** The first forest settlement was done in 1890 by G. G. Miniken, Deputy Conservator of Forests in Taradevi Range which was under Patiala state. At that time, the waste land was classified as 1st and 2nd class forests. In 1909, the revenue settlement was conducted and these 1st and 2nd class forests were declared as State property subject to the rights of the users. Mian Budhi Singh, IFS revised the forest settlement report and according to which the 1st and 2nd class forests were declared as Reserved and DPFs respectively. All other common waste lands were recorded as Shamlat Deh and the rule for management of those forests (third class forests) were also framed vide ljalas-i-khas on Home Minister Arazdasht No. 422 dated 17th October, 1912 (Patiala forest rule). The Shamlat Deh lands have been transferred to the Govt. under HP Village Common Land (Vesting and Utilization) Act, 1974.
- 1.12.3** Dhامي Range is the part of Dhامي state and before merger i.e upto April, 1948 the ruler of Dhامي state was the owner of forests, wastelands, charands, etc. This ownership was subject to the rights of users enjoyed by the local people. After merge, the HP Govt. was vested with the ownership of these forests, wasteland, charand, etc. HP Govt. vide its notification No. Ft.-43-241-A/49-4 dated 25.02.1952 framed rules under section 32 of IFA, 1927 to regulate various matters in Protected Forests in the old Dhامي and other states which were part of Solan Forest Division. Now Dhامي Range is under Shimla Forest Division. According to this notification all the forests have been divided into two categories viz, (i) 1st class Protected Forests which consist of all old Mahfuza and Mahduda forests (ii) 2nd class

Protected Forests which consist of UPFs. The main distinction between the two categories is that the Nautor is prohibited in the 1st class Protected Forests whereas it can be granted in the 2nd class Protected Forests. However, the rights and concessions have been given in both types of forests to the users.

1.13 Rights and concessions

The erstwhile rulers of the state of Keonthal, Koti, Bhajji, Pepsu enclave (Patiala state) and Dhami had granted some rights and concession to the villagers in the forests of their respective states. These rights were approved by Superintendent, Hill States, Shimla and were recorded in the record of rights which are given statewise in Appendix-II (i – v). After merger of these states, the Govt. of HP vide its Notification No. Ft. 43-241-A/49-3 dated 25.02.1952, approved these rights and concessions as such for exercise in the forests declared as Protected Forests, subject to certain conditions, important among them are:-

- (i) The rights were restricted and it was decided that produce so obtained as right, cannot be bartered, sold, given as gift and also the right holder can not dispose off it by other means.
- (ii) Trees can be granted from DPFs only if these are not available in UPFs.

1.13.1 In general, considering the whole tract, the forest areas have been classified into three broad categories viz. RFs, DPFs and UPFs and their status with regard to the exercise of rights is as follows:-

1.13.2 Reserved Forests

These forests are the exclusive property of the Government and no rights are admitted except in the flowing cases:

Bhajji Range (i) Right to remove slates from R.I. Mohra Nal

(ii) Pathindu Devta to get deodar trees with permission of Govt. from R-2 Khatnol.

1.13.3 Demarcated Protected Forests

In these forests, rights have been admitted for each forest according to the record of rights prepared at the time of ascertaining of rights under section 29 of the Indian Forest Act. In Keonthal state, these forests had been divided into first class protected forests (Mahfuzas) and second class protected forests (Mahdudas). Rights were admitted on a very limited scale in the “Mahfuza” forests while the “Mahduda” forests were open to all rights of user. The underlying object of constituting the “Mahfuza” forests appears to have been that these forests would ultimately be converted into Reserved Forests, Such first and second class protected forests existed in Patiala (enclave) also. In Madhan State, “Mahfuza” forests were free from all rights.

1.13.4 Undemarcated Protected Forests

These forests were primarily meant to meet the requirements of rightholders and consequently, are heavily burdened with rights of all description. The boundaries of these forests are not fixed and the control of the forest department in these forests has been lax. Because of liberal and even excessive exercise of rights, almost all these forests are now practically treeless or bear scattered trees of practically no commercial value of utility.

1.13.5 As elsewhere in the state, the rights and concessions admitted in the forest settlements are appended to the ownership of cultivatable land and are recorded to the ownership in favour of the land holders and their agricultural tenants and are not personal. Detailed record of rights for each erstwhile state is given in the respective forest settlements and extracts of these are reproduced in the Appendix-II (i-v).

1.13.6 The nature of rights and concessions enjoyed by the villagers in the RFs, DPFs and UPFs are more or less same through out the tract, though they differ in extent from village to village as detailed in the various settlements. In general the rights and

concessions recorded in the various forest settlements are of the following type:

- i) Grazing of cattle
- ii) Fodder for cattle.
- iii) Fuel wood for domestic use.
- iv) Dry fuelwood for cremation.
- v) Timber to meet bonafide domestic or agricultural requirements.
- vi) Wood for making charcoal.
- vii) Collection of needles for bedding cattle.
- viii) Collection of honey, herbs and nirgal.
- ix) Right of way to water sources.

1.13.7 It is evident from the forest settlement reports that it was the intention of the settlement officers that all rights should, as far as possible, be satisfied from the second class protected forests or the UPFs and, only if the resources there in were insufficient, the rights were to be met with from the DPFs.

1.13.8 In Dhami, D-252 Salaun, D-251 Bado and D-247 Bareli were classed as Mahfuza forests, which are practically free of rights. In the remaining demarcated and undemarcated forests the following rights and concessions have generally been recognized as per wajib-ul-Arz:

- i) Timber for the buildings.
- ii) Timber and wood for charcoal for making and repairing agricultural implements.
- iii) Wood for marriage feasts, burning the dead and for funeral rights.
- iv) Grazing.
- v) Grass cutting and lopping of trees.
- vi) Collection of dry and fallen chil needles for litter and manure.

1.13.9 Detailed record of rights for both first class and second class forests pertaining to Taradevi Range is appended within Mian Budhi Singh's forest settlement report. The principal rights admitted are.

- i) To graze their own cattle kept for agriculture purposes.
- ii) To take trees for the construction and repair of their dwelling houses, cattlesheds and other agricultural buildings for the cremation of dead and for making charcoal required for the preparation and repair of agricultural implements.
- iii) To take the following articles of forest produce:-
 - a) Grass of all kinds for fodder, thatching, rope making and other domestic or agricultural purposes.
 - b) Leaves and side branches of certain trees to be lopped for fodder, manure or hedges.
 - c) Leaves of certain trees for tanning and other purposes used by the villagers.
 - d) Bark and leaves creepers for rope making and other purposes.
 - e) Brush wood for fencing and other purposes.
 - f) Dry fallen wood for fuel.
 - g) Roots and fruits for food.
 - h) Old splinters of chil stumps for torches without destroying the hammer marks of forest department.
 - i) Dry fallen leaves for manure.
 - j) Stones for building and other purposes from quarries working in the forest area.

1.13.10 In first class forest the number of cattle permitted for grazing is generally fixed and the area over which this right may be exercised is also specified. Grazing of browsiers, that is camel, sheep and goat, not kept for agricultural requirements is prohibited. In case of second class forests, the right holders can graze all over the area of the forest any number of cattle which are kept for agricultural requirements except browsiers. There has been fairly large increase in the number of cattle and this has resulted on the whole, in increase in the incidence of grazing. The grazing of nomadic flocks is prohibited in first and second class forests. A fee according to scheduled rates of the forest department is recovered when such flocks pass to other territories through or along.

1.13.11 As per various forest settlement reports, it is clear that the intention of the settlement officers was to admit the rights in UPFs only and if the resources were insufficient the rights were given in DPFs and also in some reserved forests. Because of geometric increase in the human population, the demand of forest produce has increased manifold. It is also observed that there was no proper control on exercise of rights in the past.

Further, as a result of the joint family system breaking up, the land holdings have been divided and consequently demand of timber has gone up. Due to these reasons, the UPFs are no longer in a position to satisfy the demands of right holders and the conditions of many of the DPFs and RFs are also deteriorating. The continuous exercise of rights has direct impact on the management of forests.

1.13.12 Timber

As already explained, every right holder has right in the respective forest to get timber for construction and repair of his house. The trees of different species and different classes were given on nominal rates without any comparison with market rates under timber distribution policy. Timber Distribution (TD) is a unique policy in the colonial history of forest management. It is a policy that provides every landowner with the right to harvest timber for the construction and repair of their houses. This policy while providing for a basic need of the local population is also the single largest reason for timber harvest in the western Himalayan region. It results in the harvest of 100,000 cubic meters of prime timber till recently before Hon'ble High Court while disposing a PIL directed the State Govt. to rationalize the process as rates for TD were fixed at 20% of the market rates at the time of the initial forest settlements, for all species that had a market value at that time. Thus, practically while the market rates had increased manifold, state use to charge the original rates till 2005. Since the timber was available at such dead cheap rates, most of it was also mis-used and was sold further at commercial rates. The state has recently notified HP Forest (Timber Distribution to Right

holders) Rules, 2010 for the rationalization of grant of timber which is appended as appendix-III.

1.13.13 Grazing

The rights to graze domestic and agricultural cattle have been admitted in UPFs, DPFs and also in some of RFs. The population of cattle has also increased manifold in which most of the cattle are unproductive. This further caused the deterioration of these forests. Besides it, the migratory cattles also have adverse impact on the condition of these forests.

1.13.14 Lopping

Though, the lopping is admitted to a limited extent only but in actual practice the people indulge in indiscriminate and heavy loppings of all species, especially Oak for fodder and fuel. The lopping is more prominent near the habitation. Due to heavy lopping, most of the Kail is fungus infected and rotten. The right of lopping the trees for fodder and litter has been admitted only in respect of Oak, Fir and Spruce. Heavy and continuous lopping of these species near the villages is resulting in the death of trees. It is extremely necessary to prohibit the indiscriminate lopping of Ban oak trees.

1.13.15 Minor forest produce

There is privilege/right of cutting of grass, collection/sale of flowers, fruits, medicinal herbs, honey and nirkals admitted for the right holders. Besides, they can extract slates, stones for their buildings and earth for plastering. The removal of bark from oak and other suitable species is also permitted for tanning. Extraction of torch wood is permissible from stumps of all species provided hammer mark is kept intact.

CHAPTER-II A

FOREST FLORA

2.1 General description

Trees

The important tree species occurring in Shimla Forest Division are Chir pine (*Pinus roxburghii*), Deodar (*Cedrus deodara*), Kail (*Pinus wallichiana*), Spruce (*Picea smithiana*), Fir (*Abies pindrow*), Ban oak (*Quercus leucotrichophora*), Mohru oak (*Quercus floribunda*), Kharshu oak (*Quercus semecarpifolia*). Besides, a number of other trees are found in the tract, list of which is given in glossary. A brief summary of description, composition and condition of these species is given here under:-

Chir pine (*Pinus roxburghii*): This species occupies about 44% of the total forest area of the division and is found most commonly on private land as well. All age classes of trees are present but the young trees are dominant. Similarly, the site quality varies from II to III. The regeneration is good and the health of the crop is also good.

Deodar (*Cedrus deodara*): Deodar is found mostly mixed with Kail in this division. This along with Kail occupies, about 21% of the forest area but in mixture it is dominated by Kail in 40:60 ratio. Regeneration is moderate due to biotic factors. The site quality found is I to II mainly. The middle-aged trees are most common as compared to other classes. The health of trees is good in general.

Kail (*Pinus wallichiana*): It covers 60% area of Deodar-Kail working circle of the plan. Regeneration is moderate to scattered and the site quality is low to moderate (II to III). The health is fairly good but large trees are often hollow and fungal infested. Due to pressure of TD grant of Deodar, this species is expanding in mixture.

Spruce (*Picea smithiana*): It occurs on higher elevations and is found in very less proportion (about 400 to 500 ha), hence no

separate management prescriptions/treatment is suggested for this species. It is being protected as a natural reserve. No standardised quality classes have been defined for Spruce so site quality is not defined. The density is assessed at 0.3 to 0.5. The health condition is good although like Kail, large trees are hollow and prone to fungal infections.

Fir (*Abies pindrow*): It occurs on higher elevations and is found scattered in very less proportion, hence no separate management prescriptions/treatment suggested for this species. It is being protected as a natural reserve. The site quality for Fir is also not defined so far. The condition of crop is good.

Ban oak (*Quercus leucotrichophora*): It is a protected species of the state and no green felling is allowed for commercial use and is subject to heavy lopping near habitations. Amongst the broad leaved species, Ban oak is most common and occupies about 18% of the total forest area of the division. Regeneration of Ban oak is a problem. The site quality varies from II to III and middle-aged trees are dominant. This species is being protected to maintain/preserve moisture regime of the forest and to meet fodder requirement during lean season.

Mohru oak (*Quercus dilatata*): It is an associate of Deodar-Kail and Spruce forests and is found in less proportion in a forest. This species is protected as such to retain biological diversity of the forest. Like Ban oak, it is also a protected species.

Kharsu oak (*Quercus semicarpifolia*): In this division, it is found in very less proportion confining to the upper reaches of Bhajji, Koti and Mashobra Ranges along with Spruce and Fir. It is a protected species and is being maintained as such as natural reserve.

Khanoor (*Aesculus indica*): It is also an important associate of Deodar forest and is found in small patches in moist locations along the depressions and nallas in Himri Block of Bhajji Range of this division. The trees are tall, big and gigantic in size.

During the year 1998, the title of “Mahavriksh” was conferred upon a vigorously growing Khanoor tree that comes from that area and an award of “Mahavriksh Purskar” was given under national mahavriksh scheme. Vigorously growing Khanoor trees are found in Himri Block of this division in patches mostly along depressions.

Akhrot (*Junglans regia*): This is found in small proportions in association with Deodar-Kail forests in patches confining to area having good moisture regime across Himri Block of Bhajji Range.

Khair (*Acacia catechu*): In this Division, this is mainly found in lower belt of Sunni and Jubberhatti Blocks and Okhroo areas spread in Bhajji, Taradevi and Dhami Ranges. The total spread is estimated to be in about 2000 ha area. Khair is also found on private land in lower belt of this division.

Shisham (*Dalbergia sissoo*): This is also found in lower belts along Sutlej river in Sunni Block. However, its overall spread is lesser in extent.

2.2

Composition and condition of crop

The composition and condition of the crop varies due to variation in controlling factors such as altitude, aspect, climate, geological formation, etc. which gives rise to various forest types. The forests, throughout the tract are both coniferous and broad leaved which can be grouped into Dry Tropical, Montane Subtropical and Montane Temperate types. The forests which are inaccessible and away from the habitation are densely stocked as area found in parts of Bhajji Range (Himri Block) whereas the forests near to the habitation are generally honeycombed. According to Champion and Seth classification of the Indian Forerst types, the forests of the tract may be broadly classified into following types, as shown in table-8.

Table-8
Forest types and subtypes in the tract

Major	Groups	Group	Sub-group	Forest type
I	Dry Tropical Forests	5-Tropical Dry Deciduous Forests	5-B- Northern Tropical Dry Deciduous Forests	5 B/C2- Northern Dry Mixed Deciduous Forests.
II	Montane Sub-Tropical Forests	9-Sub-Tropical Pine Forests	-	9/CIb Himalayan Chil Pine Forests. 9/CI/DSI- Himalayan Sub- Tropical Scrub Forests.
III	Montane Temperate Forests	12- Himalayan Moist Temperate Forests	-	12/CIa Ban Oak (<i>Q leucotrichophora</i>) Forests. 12/CIb Mohru Oak (<i>Q. dilatata</i>) Forests. 12/C1c Moist Deodar (<i>C. deodara</i>) Forests. 12/ DS2 Cypress Himalayan Temperate Parkland 12/EI Cypress (<i>Cupressus torulosa</i>) Forests. 12/2sI low level Blue Pine (<i>Pinus wallichiana</i>) Forests.

2.2.1 5B/C2 Northern Dry Mixed Deciduous Forests

Forests of this type are available at low altitude ranging upto 1400 meters elevation. These cover an area of about 2500 ha. Such forests are mostly found on eroded hills and alluvial terrace, along the banks and slopes of river Sutlej particularly in the Sainj valley (e.g. DPFs Mahasa-ser, Hiwan and adjoining UPFs) and along the Mashobra-Tattapani Road (e.g. Mohranal

RFs and adjoining UPFs). In the northern aspect and nallas, the density of the forest is fairly good whereas on hotter aspect and near habitation the crop is open and patchy with poor growth because of uncontrolled felling, excessive lopping and grazing. Some of these poor quality forests have further deteriorated to the degradation stage of Dry Deciduous Scrub (5/DSI) with scarce and stunted tree growth and browsed bushes except the thorny and unpalatable shrubs like *Carissa species* and *Dodonea*. In a small area along the river Sutlej, between Sunni and Tattapani, *Dalbergia sissoo* and *Acacia catechu* occur particularly along the Nauti khad which is a primary seral stage of the Khair-Sissu type (5/IS2).

The most common tree species of this type occurring in the forest are:- *Acacia catechu*, *Bombax ceiba*, *Toona ciliata*, *Dalbergia sissoo*, *Olea glandulifera*, *Pistacia integerrima*, *Albizia lebbek*, *Grewia oppositifolia*, *Bauhinia variegata*, and *Emblica officinalis*. The important shrubs are *Carissa spinarum*, *Berberis lycium*, *Dodonea viscosa*, *Woodfordia fruticosa*, *Adhatoda vasica*, *Flacourtia indica*, *Zizyphus jujuba* and *Euphorbia royleana*. The *Bauhinia vahlii* is the common climber in many places.

2.2.2 9/C Ib Himalayan Chil (Chir) Pine Forests

Chil (*Pinus roxburghii*) forests are found at the elevation ranging from 1000 m to 1800 m. These are extended upto Ban oak zone in the higher zone and overlap with Tropical Dry Deciduous Forests at lower altitudes covering an area of about 2800 ha. The Chil forests are found mainly in Kariali, Lambidhar and Phulagalani areas in the Sutlej valley and in Junga and Karoli areas of the Giri catchment. Some chil forests also exist around Tutikandi, Taradevi and Ghanahatti (Dhami Range).

In general, the Chil forests are pure except in depressions and nallas where chil is mixed with or replaced by broad leaved species. The top canopy is of Chil and its associates occupying the understory in depressions and nallas are *Quercus*

leucotrichophora, *Rhododendron arboreum* and *Pyrus pashia* whereas *Pistacia integerrima* and *Euphorbia royleana* are found on dry rocky ground. Chil is also mixed with *Quercus leucotrichophora*, *Pinus wallichiana* and *Cedrus deodara* along the upper fringe where it occupies the exposed spurs. Shrub growth under the Chil forests is either absent or sparse and is comprised of *Berberis aristata*, *Principia utilis*, *Rubus paniculatus*, *Woodfordia fruticosa*, *Xanthoxylum alatum*, etc. The ground cover is either thin or absent at many places due to heavy grazing.

The Chil forests get burnt frequently because these are highly susceptible to fire. The fire is either due to negligence or deliberate attempts made by villagers to get more production of grass. This results in poor density of stocking and absence of regeneration. Though the species regenerate naturally with more ease, except in places where incidence of grazing is high. In areas which are far away from the habitation and are well protected, regeneration has come up well e.g. DPF Mahasaser. But the forests are generally middle aged and understocked. The density varies from 0.3 to 0.5 whereas quality varies from III to II, average being II/III. The biotic interferences are responsible for maintaining Chil forests at the seral stage otherwise they would progress to the Ban oak climax vegetation. In many forest of Taradevi and Dhami Ranges, the Chil has invaded the ground because of heavy lopping of Ban trees.

2.2.3 9/C I/DSI Himalayan Sub Tropical Scrub Forests

This type of forests covering about 5000 ha occurs on shallow soils and southern slopes. These are found in Bhajji Range comprised of degraded vegetation, particularly along the Sutlej river and in the lower reaches of the Nauti khad catchment viz. Gumma to Chaba and right upto Tatapani. Such types of forests are formed because of disappearance of main species, *Pinus roxburghii* due to biotic interference like fellings, grazing, fires, etc. leaving residual scrub forests of *Sapium insigne*, *Euphorbea royleana*, *Dodonea viscosa*, *Carissa opacca*, etc.

These types of forests occur at the elevation ranging from 800 m to 1800 m.

2.2.4 12/C1a Ban Oak (*Quercus leucotrichophora*) Forests

Quercus leucotrichophora is a climatic climax, occupying the lowest portion of the temperate belt and occurring above the *Pinus roxburghii* belt, generally from 1500 m to 2300 m altitude. Such type of forests covers about 3100 ha area. The Ban oak forests in the track are found around Bhalaog (near Junga), Taradevi, Nin below Koti, Himri Block of Bhajji Range and also in some parts of Dhami Range. Ban forests are mostly heavily lopped for fuel and fodder near habitation. So, they are thin and in poor condition. The crop varies in age from young coppice to mature trees. Many of the Oak forests are being replaced by Chil because of heavy lopping of Oak. Such change is visible in some of the forests of Dhami Range.

Rhododendron arboreum, *Pieris ovalifolia*, *Pyrus pashia*, *Cormus capidata* and *Myrica nagi* are some of the common associates of Ban. However, the undergrowth is dense comprising of *Berberis lycium*, *Myrsine affricana*, *Rubus niveus*, *Bounighansonia albiflora*, *Indigofera gerardiana*, *Lonicera quinquelocularis*, *Daphne cannabina*, *Desmodium tilliaefolium*, *Viburnum cotonifolium*, etc. The common climbers are *Hedera helix*, *Smilax parvifolia* and *Vitis himalayana*.

2.2.5 12/C1b Mohru Oak (*Quercus dilatata*) Forests

The sub type covers an area of about 1800 ha. In these forests the elevation ranges from 2000 m to 2500 m. The Mohru oak is found pure but sometimes mixed with Kail which is generally confined to spurs and warmer aspects. In the lower zone Ban oak is mixed whereas in the upper zone Kharsu oak and Fir are found mixed with Mohru. Mohru oak in the pure form is found near Koti and patches of Mohru oak mixed with other species are found near Himri and Salonbag areas. The common associates of Mohru are *Quercus leucotrichophora*, *Q. semicarpifolia*, *Abies pindrow*, *Picea smithiana*, *Rhododendron*

arboreum, *Pieris ovalifolia* and *Taxus baccata* in the top canopy. The undergrowth is not very dense. It consists of *Viburnum cotinifolium*, *Sarcococca saligna*, *Daphne cannabina*, *Desmodium tiliaefolium*, etc.

Mohru forests, away from habitation is well stocked whereas the trees are heavily lopped for fuel and fire wood near habitation. In Salonbagh area, very heavily lopped Mohru crop have been invaded by Kail.

2.2.6 12/C1c Moist Deodar (*Cedrus deodara*) Forests

This sub type covers an area of about 2950 ha. The elevation varies from 1500 m to 2600 m. Deodar form almost pure and large compact blocks particularly near Junga, Kufri and Naldehara. *Pinus wallichiana* and *Pinus roxburghii* occur on exposed sites and spurs towards the lower limit of Deodar zone whereas Oaks and Spruce are found in the upper fringe. The understorey is almost absent except in nallas and depressions where it consists of *Quercus leucotrichophora*, *Quercus dilatata*, *Rhododendron arboreum*, *Pieris ovalifolia*, *Cornus capidata*, *Aesculus indica*, *Prunus cornuta*, *Juglans regia*, etc. The shrub growth is sparse and comprised of *Berberis lycium*, *Principia utilis*, *Sarcococca saligna*, *Desmodium tiliaefolium*, *Myrsine africana*, *Indigofera gerardiana*, *Salvia glutinosa*, *Lonicera angustifolia*, *Viburnum nervosum*, *Daphne cannabina*, *Skimmia laureola*, etc. The ground cover is mainly composed of *Viola serpens*, *Fragaria indica*, *Alnslea aptara*, ferns and grasses etc. The climbers are *Hedera helix*, *Vitis parvifolia*, *Clematis montana* and *Rosa moschata*. Though, the upper storey is almost pure of *Cedrus deodara* whereas in some forest it is mixed with *Pinus wallichiana* which is dominating.

The forests which are away from habitation are generally well stocked whereas the trees are lopped or heavily lopped near habitation. The age class varies from young to middle aged with scattered mature or over mature trees. The reason for less availability of higher class deodar tree is the heavy demand of these trees by right holders. Though, these forests do not suffer

much because of biotic interference but heavy lopping is noticed except in RFs. The grazing is heavy which interfere in natural regeneration. The Deodar is of site quality I/II but the growth is faster in Giri catchment as compared to the Sutlej catchment.

2.2.7 12/DS2 Himalayan Temperate - Parkland

This type consists mostly of blank pastures with scattered and stunted trees of broad leaved and coniferous species which exist in small extent on the southern and western slopes. It occurs over high ridges of the tract at the elevation of 2200 m to 2600 m, like, Shalidhar and Biru ki dhar in Bhajji Range. During rainy season, there is a thick herbaceous growth including grasses with bushes and shrubs scattered.

Due to continuous grazing in these blanks during summer, the area is extending gradually occupying the place in the adjoining well stocked forests. These areas are now no more suitable for regeneration of tree species because of heavy biotic interference.

2.2.8 12/EI Cypress (*Cupressus torulosa*) Forests

Cypress is found mixed with conifer forests scattered on very steep and precipitous lime stone rocks along the northern aspect of Shalidhar. It covers an area of about 1500 ha and forms an edaphic climax. It is mixed with *Picea smithiana* on higher elevations whereas at lower elevations, it is mixed with *Abies pindrow*, *Pinus wallichiana* and *Cedrus deodara*. The broad leaved associates are *Quercus dilatata*, *Aesculus indica*, *Acer pictum*, *Prunus pardus*, *Cedrella serrata* which are found in depressions and nallas.

As this type is found on steep and inaccessible areas, hence, these can not be exploited. Though, the forests do not have economic value but are important from soil conservation point of view. Natural regeneration is generally satisfactory.

2.2.9 12/2SI Low Level Blue Pine (*Pinus wallichiana*) Forests

This type occurs between 1500 m to 2500 m covering an area of about 2500 ha and characterised by almost pure Kail crop which forms secondary seral type. The quality is mostly II/III. It is also found scattered in higher zones of *Quercus leucotrichophora*, *Quercus dilatata* and mixed conifers. This type owes its occurrence to the destruction of the pre-existing climax forests by natural and biotic factors. It is found extensively around Mashobra and in some parts of Koti Range as well. The forests occur mostly pure but mixed with *Cedrus deodara* and *Quercus leucotrichophora* at lower altitude and *Quercus dilatata* and *Picea smithiana* at higher altitude. The broad leaved associates which are found in depressions and nallas are *Quercus leucotrichophora*, *Q. dilatata*, *Pieris ovalifolia*, *Rhododendron arboreum*, *Aesculus indica*, *Juglans regia*, etc. The undergrowth consists of *Berberis spp.*, *Myrsine africana*, *Lonicera spp.*, *Indigofera spp.*, *Viburnum spp.*, etc.

Because of heavy lopping of Kail forests by the villagers for getting litter, the trees are infected with fungus known as *Trametes pini*. The trees are of different age classes varying young to mature. Natural regeneration particularly on exposed and open sites is profuse. In many of the Deodar forests mixed with Kail the regeneration of kail is good and these forests of Deodar are being replaced by Kail. This may be because of large scale felling of Deodar trees to right holders.

2.3 Plantations

In Shimla Forest Division large scale plantings of Chil, Kail, Deodar and broad leaved species have been carried out. A list of such plantations along with species raised from 1995 onwards is enclosed as Appendix-IV.

2.4 Injuries to which crop is liable

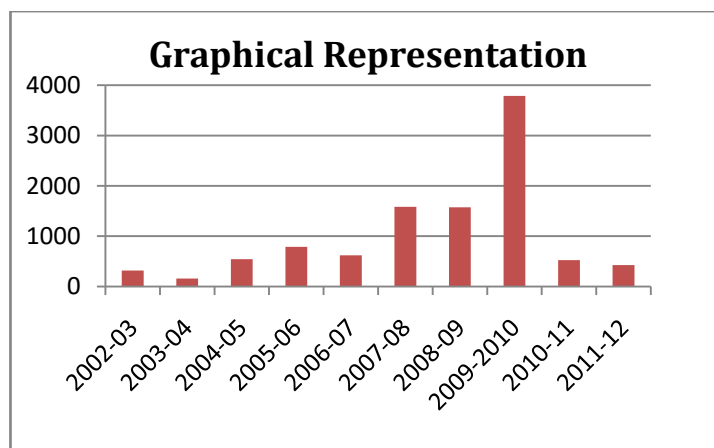
The important agencies causing damage to the forests are given below:-

2.4.1 Fire

Fire occupies a prominent place among the causes of injury to Chil forests and even to the Ban and Deodar forests in the tract. Forest fires commonly occur during the dry periods and their intensity depends upon the degree of drought and prevailing temperatures and wind conditions, the type of forest and the amount of grass, fallen wood and other inflammable material present on the forest floor. There are two distinct fire seasons: the pre-monsoon (April to commencement of monsoons) and the post monsoon (October to commencement of winter rains). Of the two, the former is more important and the more damaging fires occur during this period. The Deodar forests mixed with Kail are subjected to fire more as compared to pure Deodar forests. Broadly speaking, almost all the forest fires are caused by man either accidentally, negligently or deliberately. To get the flush of tender grass, the local people burn the grass of Ghasnis and the fire usually spread over to the adjoining forests. It causes damage to the regeneration, sapling and even to the trees. It is reported that fire in 1921 and 1970 caused widespread damages. Fire also causes the replacement of higher forest types by lower ones and also encourages the spreading of *Lantana camera*. The forests around Sunni and Kariali in Bhajji Range, Koti and Bhalaug in Koti Range, parts of Dhami and Taradevi Ranges, are especially susceptible to fire. The following table shows the extent of areas burnt during' the period 2002-03 to 2011-12.

Table -9
Areas burnt from 2002-03 to 2011-12

Year	Number	Area burnt
2002-03	13	318.7
2003-04	19	159.9
2004-05	16	543.5
2005-06	18	787.2
2006-07	8	619
2007-08	31	1584.5
2008-09	36	1574.7
2009-10	147	3788.1
2010-11	54	525.8
2011-12	19	425.5



2.4.2 Grazing

People of the tract possess a large number of cattle, sheep and goats. There is no practice of stall feeding. Thus, there is heavy grazing by these animals in the forests which are adjoining to the habitations. Unrestricted grazing by excessive number of cattle has changed the very complexion of natural vegetation in the tract and it is no exaggeration to say that control over this evil would automatically solve most of the problems connected with protection of forests and their natural regeneration, afforestation and soil conservation. The damage is caused through the selective elimination of valuable and unfortunately palatable species and their replacement by inedible weeds and by trampling and browsing which retard regeneration destroy existing vegetation and lead to accelerated erosion. The extent of damage caused depends upon the incident of grazing. The pressure of grazing has also increased in DPFs because of liberal grant of Nautor in the UPFs in the past and also due to the fact that most of the UPFs have been converted into 'ghasnis' by the villagers. Thus, judiciously controlled grazing is compatible with sound forestry and soil management practices. The total number of domestic animals in the tract based on the assessment during the year 2007 is 105663.

2.4.3 Lopping

The local people carry out lopping of the trees for fodder, fuel and to procure manure by spreading needles and leaves of the trees under their cattle. The leaves of Ban oak are used as

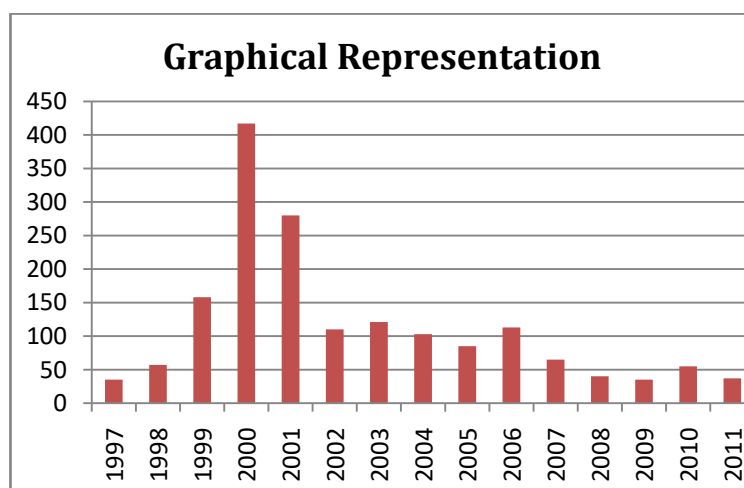
fodder whereas its branches/twigs are used as fuelwood. This species is lopped very badly wherever occurring near the habitations and has been reduced to mere scrub state. Kail trees are also lopped for getting needles for spreading under their cattle to procure manure and because of this, Kail trees are infected with fungus. Moreover, even the Deodar trees are also lopped for fuelwood purpose and the incidence of lopping of Deodar is peculiar in many Deodar forests. Though, there are lopping rules but these are not being followed strictly because of high demand of fuel wood and fodder which is due to increase in human and cattle population.

2.4.4 Illicit felling and smuggling of timber

2.4.4.1 The damage by illicit felling is very common throughout the tract and quite frequently along the roads. With development of good network of roads and communication there has been an increase in incidences of illicit felling and smuggling of timber. The gist of no. of cases detected in the past is given in table-10.

Table-10
Incidences of illicit fellings in Shimla Forest Division since 1997

Year	No. of cases detected	Volume m³	Estimated value (Rs)
1997	35	37.239	66,313.00
1998	57	34.727	18,209.00
1999	158	35.646	NA
2000	417	72.174	NA
2001	280	50.664	NA
2002	110	62.658	NA
2003	121	54.642	NA
2004	103	60.341	2,56,577.00
2005	85	46.309	2,44,254.00
2006	113	61.973	2,93,750.00
2007	65	43.4005	5,21,357.00
2008	40	50.700	10,48,261.00
2009	35	14.166	3,24,343.00
2010	55	45.463	8,37,963.00
2011	37	23.5885	9,07,085.00
Total	1711	693.691	



2.4.4.2 The high price of timber in the market has attracted/created tendency to become rich overnight and hence the smuggling of timber takes place more than often. The illicit felling and smuggling are both related, many times organized. The incidences of smuggling have, however reduced after the amendment in Indian Forest Act, 1927 vide which DFO has been designated as Authorized Officer to hear the cases pertaining to illegal transportation of Govt. forest produce i.e. timber, resin, khairwood and katha and may order confiscation of both forest produce and the vehicle involved. The detail of cases of vehicles seized and tried under section 52A of Indian Forest (HP 2nd Amendment) Act, 1991 is given in table-11.

Table-11
Vehicles seized and tried under Section-52A

Year	No. of cases	Vehicles seized	Forest produce seized	Remarks
1991	1	1	Timber	Vehicle and timber confiscated.
1992	1	1	Timber	Vehicle and timber confiscated.
1994	1	1	Timber	Timber confiscated, vehicle released.
1996	3	3	Timber	Vehicles released and timber confiscated.
1997	1	1	Timber	Vehicle and timber released.

1998	1	1	Timber	Vehicle released and timber confiscated.
1999	4	4	Timber, Resin	In three cases vehicles released and timber confiscated. In fourth case, vehicle and resin released after imposing fine.
2000	7	7	Timber	All vehicles released and Timber confiscated.
2001	1	1	Timber	Vehicle released and timber confiscated.
2002	4	4	Timber	Vehicles released and timber confiscated in three cases. In fourth case timber being of TD was released to the real owner
2003	3	3	Timber, Cedar oil	Vehicles and Cedar oil released and timber confiscated in second case. In third case timber being private property released to real owner.
2004	2	2	Timber	In one case vehicle and timber confiscated and second case was transferred to criminal court.
2005	4	4	Timber	In one case vehicle released and timber confiscated. In second case vehicle and timber confiscated. Third case is under trial and fourth case handed over to SHO Kotkhai.
2006	6	6	Timber	One case has been decided and vehicle alongwith timber confiscated and four cases are under trail. Sixth case transferred to criminal court.
2007	2	2	Timber	Under trial.
2008	1	1	Timber	Under trial.
2009	1	1	Timber	Under trial.
2010	1	1	Timber	Under trial.
2011	2	4	Timber	Under trial.

2.4.5 Grass cutting

Though, this practice is beneficial but the damage is only caused by inadvertent cutting of seedlings during grass cutting operation.

2.4.6 Encroachment

This is a serious and contagious issue. Encroachment is done in a very surreptitious but planned manner. It is a common tendency of the people living either on the outer boundary of

government forest or in hamlets honey-combing such forests. Generally, this work is done during the rains. While increase in population is the root cause for this, low productivity of the agricultural fields is another reason. When a villager cannot produce enough food for his family from his limited agricultural field, he thinks of extending area. This is not possible inside the village as everyone guards his own field. Thus it is usually done by villagers whose fields adjoin the boundary of forests, particularly in UPFs and other lands due to absence of clear demarcation of boundaries. The chances of encroachment are greatly increased in such areas because neither the villager nor the forest guard, who is responsible for protection, knows where exactly the boundary is. However in protected forests the incidence of encroachment is not uncommon. Absence of clear policy of government is another factor responsible for encroachment on forest land. At one point of time, the government keeps on issuing orders of stopping encroachments; at another point of time it also keeps on issuing order to regularize them. This dichotomy in approach results in encouragement to encroachers on the one hand and on the other, discouragement to those sincerely forest subordinates who work hard to prevent encroachment. For example, some years back government issued order that all the encroachment will be regularized. This generosity has given a lot of relief to offenders against whom action was likely to be taken and the forest staff who will have lesser burden of legal cases; it will encourage villagers to encroach upon forest land in the hope of its being regularized in future. Absence of clear or extensive jurisdiction results in delay in detection of encroachment. The greater is the delay in detection more difficult it is to prosecute offenders successfully. Consequently, the villagers are encouraged to encroach upon forest land with impunity. Even after the detection of encroachment and prosecution of the offender in court of law, he continues to cultivate the land and from its earning, keeps on pursuing the case in the court. Often, he tries to delay the case because the greater delay, the greater are chances of his being acquitted. As far as there is no ban on

his cultivation during the trial of the case he does not loss anything. If, however, an injunction could be issued against further cultivation or use of forest land the offender will have to bear expenses of the case from his other sources of income. He may then try to get the case decided early and leave the encroachment as per decision of the court. A sizeable chunk of forest land is encroached most commonly adjoining private land holdings as depicted in table-12.

Table-12

Statement showing status of encroachment cases filled in the court of Collector cum DFO Shimla, Shimla Forest Division (1996-2012)

Year	No. of cases detected	Total forest area encroached (ha)	No. of cases decided	Total forest area vacated (ha)	Balance number of cases	Total balance forest area (ha)
1996	3	00-13-52	1	00-08-26	2	00-05-26
1997	9	00-34-85	0	0	9	00-34-85
1998	5	00-71-16	1	0-00-06	4	00-71-10
1999	0	0	0	0	0	0
2000	1	00-00-38	1	00-00-38	0	0
2001	0	0	0	0	0	0
2002	3	00-00-82	3	00-00-82	0	0
2003	10	00-39-78	10	00-39-78	0	0
2004	61	07-05-16	58	06-74-95	3	00-30-21
2005	30	09-03-39	27	07-68-08	3	01-35-31
2006	38	05-39-88	22	03-03-53	16	02-36-35
2007	27	03-47-20	11	00-41-02	16	03-06-18
2008	8	00-47-29	2	00-18-08	6	00-29-21
2009	0	0	0	0	0	0
2010	4	00-12-29	1	00-08-47	3	00-03-82
2011	12	00-96-17	2	00-15-77	10	00-80-40
Total	211	28-11-89	139	18-79-20	72	09-32-69

Besides above, 368 cases having area 85-32-86 ha were evicted through special task force constituted for the purpose at division level. 761 cases having area 61-92-26 ha were returned to the revenue authorities for taking action at their own level as misals of these cases had been prepared by them.

2.4.7 Removal of torch wood and Walnut bark

The trees of Deodar, Kail and even Chil are damaged near the base for extraction of resinous heartwood by villagers. These damages are more severe near the villages. The roots and stem of walnut trees are also debarked by the villagers, which is known as 'Dandasa' and used for cleaning the teeth. Due to these cut injuries; the trees are exposed to insect and fungal attacks.

2.4.8 Removal of humus

The decomposed humus is usually removed by the habitants and generally used as manure in their agricultural fields. Thus, the soil is exposed which leads to soil erosion besides loss of fertility. Chil needles are also collected and used as litter and also as packing material for packing apple in boxes. It causes great loss to the trees as well. Fully stocked chil forest yields about 2 MT of the needles per year which if removed mean a loss of 40 kg of Nitrogen per ha.

2.4.9 Mining

The quarrying for building stones and slates for roofing is also done which causes damage hill side and forest growth especially in UPFs. With increase in population and better living standard, the demand for minerals such as stone, sand and lime stone had greatly increased. The extraction of stones and sand is done unauthorizedly in a very surreptitious and clandestine manner at certain places by the sides of the link roads and along the nallas and streams which results in destruction of forests. Such activities need to be checked as its continuance would cause landslides and also turn the drainage channels into deep gullies to destroy surrounding vegetation. In addition to destruction of forests the mining activities result in soil erosion, air pollution and water pollution in the streams as well as the ground water. Under the Mining Act, powers have been vested now with forest guards to take cognizance of illegal mining within their respective jurisdiction. Notification in this regard is enclosed as Appendix-V.

2.4.10 **Cultivation and road construction**

The forest areas at lower elevations and near habitations are interspersed and even honeycombed with cultivations which is being carried on even moderately steep slopes. It causes formation of gullies and slips in the forests area and thus results in soil erosion. The road construction activity also causes considerable damage to the plantations and tree growth as the debris is generally dumped down the hill. Further, the road cutting causes more surface run off leading to soil erosion.

2.4.11 **Injuries by nature:** - Due to climatic variations, the following injuries are caused by nature

- (i) **Snow:** Snow damage occurs chiefly at higher altitudes but exceptional heavy snowfall at low elevation also does considerable damage. The congested Kail crop is more susceptible to snow damage and many trees are uprooted, while several others are top broken, unthinned Deodar plantation also suffers heavily from snow break.
- (ii) **Hail and storms:** Hail and Storms during summer do not do any considerable damage in the forests. Strong winds, water, heavy snow or rain results in uprooting of large number of trees in these forests every year. Hail storms are quite frequent and heavy during March and do considerable damage in Deodar and other nurseries by killing the young seedlings germinating at that time.
- (iii) **Lightening:** The damage due to lightening is not appreciable but solitary trees are sometime killed. In some cases the trees are not killed, top is broken and the bole splits up.
- (iv) **Frost:** The damage by frost is confined to lower hills. Frost does little damage to chil, but when it is exceptionally severe the seed production is adversely affected.
- (v) **Drought:** Drought condition prevails in the lower overgrazed areas during May and June and sometimes during October and November also. In case of severe

drought, fairly large number of plants dies in the plantation areas, especially on southern, exposed and overgrazed slopes. Deodar seedlings also die of drought during summer, if there is no sufficient over-head shade. Besides, killing young seedlings, drought increased fire hazard in Chil and other low lying forests.

- (vi) **Erosion and land slips:** Soil erosion in the lower overgrazed areas of Chil and other miscellaneous forest is doing considerable damage by washing away fertile soil and deteriorating site quality giving rise to poor quality crop. Some of the low lying areas have become so refractory that it is a problem to afforest them satisfactorily. Although land slip problem is not very acute. Small landslips are not uncommon in Chil and Scrub forests.

2.4.12 **Animals and birds**

The damage caused by these agencies is not of much importance. However, monkeys and langures (Baboons) pull up young seedlings to eat the roots. The porcupines also nibble the roots of the young plants. Pheasants eat seed sown in nurseries and plantation areas. Black bear peels off the bark of Deodar and Kail to suck the sap of trees.

2.4.13 **Insects**

The insects also do damage by eating up the seed, cutting of the roots of the young seedlings, defoliation of the trees and the saplings, infesting the bark of the trees and injuring the roots and the tender branches through which the fungi and other parasites enter. The defoliator *Entropies deodare* attacks on Deodar and causes damages particularly in Naldehra and Nin (Bhajji) forests. Cock chafer grubs and Wire worms damage roots of young seedlings in nurseries. Dead, dying and felled trees of Chil trees are attacked by the pinhole or shot hole borer (*Platypus biformis*) causing damage to the timber. The insect pest identified as *Pityogenes scitus* attacks on Kail trees and causes damage to green thick bark. The tree starts drying from the top to down side. The management strategy to tackle this

menace has been suggested by the HFRI Shimla which should be followed to control this problem.

2.4.14 Fungi

The attack of fungus is more frequent through the openings caused due to heavy and indiscriminate lopping. The most damaging fungus of the Kail is *Trametes pini* which causes heart rot. The lopping carried out during July/August is more damaging because the infection spreads during these months. Thus, lopping that too silviculturally should be restricted to winter or spring seasons only. The fungus infection is very common in the Kail forest of Mashobra and Koti Ranges where the intensity of the lopping is high, badly drained sites, Deodar saplings are killed by deodar root fungus called *Fomes annosus*. The leading shoots of the Deodar is attacked by mother fungus called *Peridermium cedri* which causes "Witches brooms" and thereby killing the trees. *Fusarium spp.* causes "damping off" of the seedling on the wet sites. Other fungi are not of much consequence except for *Trametes pini*.

2.4.15 Climbers and parasites

Hedera helix, *Vitis semicordata* and *Rosa moschata* are some common climbers found in the forests of the tract. These climbers suppress young plants and retard the growth of the trees especially in the forests of this division. Climber cutting unfortunately is not done during any of the forestry operation carried out. Loranthus and Viscum are commonly found parasites in this division. They do some damage in Ban oak and broad leaved forests of the lower zone.

2.4.16 Invasive species

Invasive Species pose a very serious problem in all altitudes; however their distribution in high hills is less. In lower zone *Lantana camera* and *Ageratum spp.* are actively encroaching upon the open scub forests and have caused serious threat to forest growth. Parthenium is found in abundance along road sides and paths across the forest area. The areas having new

infestation (about 10%) need to be focussed in order to make sure that this does not spread further. Parthenium has been noticed mainly along roads and in Ghasnis, Trifolium and Ageratum is sparse in certain pockets of the tract. However the main concentration is only agricultural fields. As these weeds normally confine to wastelands having grazing pressure they have not actually intruded deep in to forests so far. However, they need to be managed now to check their spread and become a problematic weed.

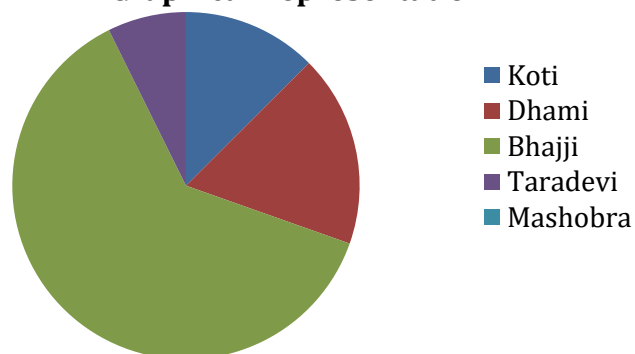
The distribution of Lantana in Shimla Forest Division is given in table-13.

Table-13
Lantana infestation in Shimla

Division	Range	Beat	Name of forests	Area (ha)	Elevation (m)	Lantana infestation
Shimla	Koti	Karyali	UF-268 Jhandi	244	1340-1770	30-40%
			Total	244		
	Dhami	Okhroo	UF-Dadyog	9.7	990-1260	0-25%
		Okhroo	UF-Karori	4	1130-1260	0-25%
		Okhroo	UF-Binnu	7.2	1200-1360	0-25%
		Okhroo	UF-Panjali-Navti	36	1150-1260	26-50%
		Okhroo	UF-Panjali Bainsh	35.6	950-1310	26-50%
		Okhroo	UF-Bakharel	9	1100-1300	0-25%
		Okhroo	UF-Bajiar -Ghat	22.4	1200-1400	0-25%
		Okhroo	UF-Jania	8.4	1070-1255	0-25%
		Okhroo	UF-Bai-Kiar	8	1062-1365	26-50%
		Okhroo	UF-Madhya	44.4	986-1213	51-75%
		Dhalaya	U-547 Dhalaya	28	1260-1395	51-75%
		Badoo	UPF-530 Dhar	30	1515-1715	26-50%
		Badoo	UPF-533 Saden Maroug	66	1345-1450	0-25%
		Badoo	UPF-533 Jakhari	14	1345-1450	26-50%
		Badoo	UPF-554 Shahach	6.5	1235-1340	26-50%
		Badoo	UPF-557 Shahach	9.75	1340-1455	51-75%
		Badoo	UPF-558 Tul	9.8	1380-1575	26-50%
			Total	348.75		

	Bhajji	Mandhorghat	UPF-38 Nagar	11.2	760-1100	26-50%
		Mandhorghat	DPF-II Mashashasher	16.2	860-1665	51-75%
		Mandhorghat	Mandhorghat U-36	116	760-1100	51-75%
		Chanawag	UPF-577 Jaimnali	62.4	860-1660	26-50%
		Chanawag	UPF-583 Sohal	29.2	1020-1200	>75%
		Chanawag	UPF-582 Jammu	0.9	1200-1260	51-75%
		Bajhol	U-596 Bajhal	34.4	950-1200	26-50%
		Chanawag	UPF-581 Chanwag	16.2	1030-1213	26-50%
		Chanawag	DPF-258 Basharu	35.6	901-1244	51-75%
		Chanawag	UPF-580 Paniali	35.6	1060-1380	51-75%
		Himri	U-13 Ogli-Suma	423	700-1200	0-25%
		Sandoa	U-10 Malgi-Kothi	15.8	730-1250	0-25%
		Karyali	U-21 Khaira-Padain	211	700-1230	0-25%
		Pandoa	U-3 Bag Saing	59	1100-1320	51-75%
		Pandoa	U-4Gharyana	147	1100-1470	51-75%
			Total	1213.5		
	Taradevi	Kalzoon	R-22 Charaind	7.6	1300-1500	51-75%
		Kalzoon	D-217 Khariar	32	1400-1550	> 75%
		Kalihathi	D-220 Bhanoon	5.6	1400-1550	> 75%
		Kalihatti	D-219 Jaijer	23.2	1450-1525	> 75%
		Jubberhatti	GCL Manjola	10	1390-1450	51-75%
		Shoghi	D-221 Jauresh	64.4	1500-1700	51-75%
			Total	142.8		
			Grand Total	1949.05		

Graphical Representation



CHAPTER IIB

FOREST FAUNA

2.5 General description

A wide range in altitude with varied tropical to temperate flora offers diverse type of wild animals and birds capable of thriving under different climatic conditions ranging from tropical to arctic climate and from densely wooded area to sparse tree growth. The undisturbed forest in the past gave safe harbourage 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 wildlife. The increase in human population and breaking of forest lands for agriculture has also reduced the domain available to the wildlife. The forests of Shimla Forest Division are full of rich fauna. The important fauna found in Shimla Forest Division is given as under:

2.5.1 Animals

Leopard or Panther (*Panthera pardus*), Himalayan Black Bear (*Selenarctos thibetanus*), Jungle Cat (*Felis chaus*), Leopard Cat (*Felis bengalensis*), Jackal (*Canis aureus*), Ghoral (*Nemorhaedus goral*), Sambar (*Cervus unicolor*), Himalayan Weasel (*Mustela sibirica*), Kakkar (*Muntiacus muntjak*), Indian Wild Boar (*Sus scrofa*), Monkey (*Macaca mulatta*), Hanuman Langurs (*Presbytis entellus*), The Giant Indian Flying Squirrel (*Eta uristapetaurista*), Indian Hare (*Lepus nigricollis*), Yellow Throated Martin (*Martes flavigula*), Common Mongoose (*Herpestes edwardsi*), Indian Porcupine (*Hystrix indica*), Himalayan Palm Civet (*Paguma larvata*), Small Indian Civet (*Viverricula indica*).

2.5.2 Birds

Himalayan Griffon Vulture (*Gyps himalayensis*), Golden Eagle (*Aquila chrysaetos*), Cheer Pheasant (*Catreus wallichii*), Chakor (*Alectoris chukar*), Koklas (*Pucrasia macrolopha*), Kaleej Pheasant (*Lophura leucomelanos*), Red Jungle Fowl (*Gallus gallus*), Black Partridge (*Francolinus francolinus*), Wood Cock (*Scoopax rusticola*), Indian Peafowl (*Pavo cristatus*).

2.5.3 Fishes

Kali macchi (*Schizothorax plagiostomus*), Mahasheer (*Torputitora spp.*), Barangali (*Allia caile*), Bhareli (*Barilius barila*), Mochi (*Glyptothroax conirostris*), Goach (*Bagarius bagarius*).

2.5.4 Reptiles

Sapp (*Ancistrodous himalapanus*), Krait (*Bungarus cacrules*), Kharpa (*Naja naja*), Goblida (*Varanus monitor*), Girgit (*Onlotas vessicoloan*).

2.6 Injuries to which the fauna is liable

The biggest injury, to which our wild life is exposed, is man himself. The fauna of the tract is decreasing due to reduction of the habitat as a result of on going development activities. The need of growing population is the cause of animal-human conflict. The normal living conditions of the wildlife are disturbed which is a matter of concern. A brief resume of the damages done to forest fauna is listed below:-

2.6.1 Development activities

The state is in the development phase and the road, path construction is the main activity which intern is slowly damaging/destroying the natural habitat. The tandency to expand the cultivations into the forests/natural habitat of wildlife is another cause of animal-human conflict.

2.6.2 Hunting/poaching

The destruction of wildlife at the hands of bonafide residents is common because most of them possess arms. Although, most of the arms are used for crop protection but these are sometimes also used in shooting game. The wild animals are shooted for their meat or other valuable products like fir, musk, medicines and trophies are only for sports. Carnivorous animals are killed because they are dangerous to people and farm animals. Other animals are killed to save agricultural crops and orchards. Number of species have either become extinct or on the verge of being extinct. Poaching is done by outsiders also.

2.6.3 Fire

It plays havoc with forest fauna. The animals get trapped in fire and perish. The eggs and young ones are destroyed in nests, nestholes and hollows in the trees trunks and rocks and dead stumps. The entire food chain is destroyed and the pyramid structure of wildlife is broken. The habitat is rather destroyed completely.

2.6.4 Epidemics

It is not a common feature in wildlife but Sambhar and other members of deer family suffer from infectious and contagious diseases like rinder pest through domestic cattle grazing in the forests. No cases of epidemics have been reported in the tract.

2.6.5 Atmospheric influences

The adults are seldom affected by the climatic disturbances but the young ones suffer casualties mostly from frost. The bird hatching is adversely affected by heavy rains. Drought causes the drying up of natural water holes.

2.6.6 Animals

The ecological balance maintained by the predator-prey relationship has been disturbed by man. Carnivora prey on herbivora and herbivora eats grasses and fodder trees; thus, there is food chain in ecosystem. Indiscriminate shooting of particular animal species like Sambhar and Deer has recoiled on depletion of food for carnivora like panthers and is one of the causes for the extinction.

2.6.7 Man animal conflict

2.6.7.1 The data available with this office reveal that most of the cases of man animal conflict pertain to leopard killing livestock both at the animal sheds and in open. Habitat degradation, shrinking space and shortage of food often forces the wild animals towards populated areas and it has resulted into the loss of the lives of domestic animal; as well as property local people. Due compensation were granted to the grieved family. The cases of killing the domestic animals and cattle are reported every year. For the last 5 years around 198 cattle/sheep/goats were killed and an amount of about Rs. 2,46,649/- was paid as compensation to the affected. Besides, 17 No. cases of attacks

by leopard and other wild animals have occurred in this division for the last 5 years for which Rs. 1,97,000/- has been paid as compensation. In order to ameliorate the situation, plantation of fruit bearing trees like *Myrica esculanta*, Kaydal, *Quercus leucotrichophora* were generally done in the forest areas.

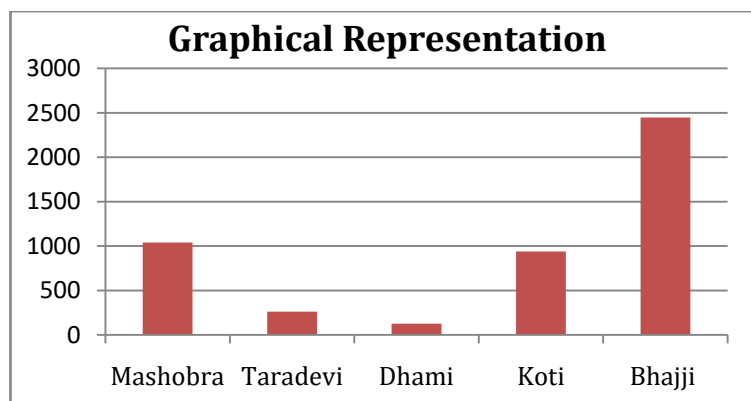
2.6.7.2 Few stray incidences of black bear attacking human being have also been reported in past. The area has remained most affected by these conflicts where the incidence of animal killing have taken place both in cattle shed and forest areas. As a long term strategy, habitat improvement can be done by planting fruit trees in the forest areas.

2.6.7.3 In recent years a few cases of monkey biting have also been reported. As in other part of the state, monkeys are attracted to towns and other habitation for easy availability of food which is catered to them by piles of garbage lying in open. To address this issue, proper management of garbage needs to be done. Monkey census was conducted in the division in the last week of Feb.2012 and Range wise population of monkeys is given in table-14.

Table-14

Population estimation of monkeys (only on Hot spots)

Range	Date	Number of troops	Total adult	Total juvenile	Total
Mashobra	Feb.2012	25	761	279	1040
Taradevi	Feb.2012	14	178	83	261
Dhami	Feb.2012	2	108	18	126
Koti	Feb.2012	32	680	258	938
Bhajji	Feb.2012	41	1720	726	2446
Total	Feb.2012	114	3447	1364	4811



2.7 Protection and management of fauna

Wildlife Protection Act, 1972 has an impact in protecting wildlife. Because of ban on shooting of wildlife in HP, the number of many species of wild animals has also increased. It is suggested to protect the wild animals as they are also part and parcel of the forest and required to maintain the balance in the ecosystem.

2.7.1 Measures for protection

Wildlife tourism is the latest trend extensively projected in the state. The complete check on poaching through local people participation is the key for protection. The road communication has increased the menace of hunting. The following measures are suggested:-

- (i) Renewal of existing arms licenses and grant of new ones to be judiciously done.
- (ii) Adequate staffing particularly of FGs is a must for the protection of wildlife.
- (iii) Seeking public cooperation and rewarding informers who help apprehending poachers.
- (iv) Addressing the problem of crop damage by wildlife on priority
- (v) Wide publicity for wildlife protection. Services of retired teachers, ex-servicemen, NGOs should be taken for this onerous task.

CHAPTER-III

UTILISATION OF THE PRODUCE

3.1 Agricultural customs and wants of population

Majority of the population of the tract dealt in this plan resides in rural areas. Therefore, the economy is based primarily on agriculture and horticulture. The industrial and commercial activities are not of much importance. Therefore, the dependence of the people on these activities is negligible. Only a few persons are engaged in Government jobs.

3.1.1 The land holdings are small to the tune of approximately 1.25 ha per family. The agricultural fields are generally un-irrigated except in few cases where irrigation channels have been constructed along the rivers/nallas. Main crops are maize, paddy, wheat, pulses and millets. Potato and vegetable cultivation is attracting the attention of growers by and by. On horticulture side, stone fruits dominate the scene. The economy of the area has improved considerably due to vegetables/fruits cultivation.

3.1.2 The agricultural fields/orchards are along suitable sites of land which are scattered all over the area. Consequently, the population has also settled near agricultural fields/orchards in small hamlets all over.

3.1.3 In general, the houses are simple which are made up of stone walls with wooden binders. The roofing is of slates and wooden planking. Of late, better houses constructed with bricks and RCC slabs have come up all across the tract.

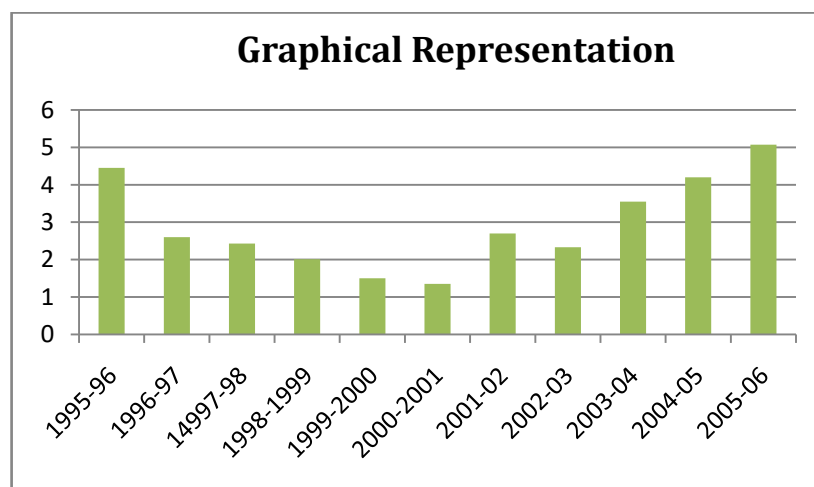
3.1.4 People depend on forests mainly for timber, fuelwood and fodder. In addition, torchwood, stones, leaf litter, slates and various other minor forest produce are also important items of their day to day requirements.

3.1.5 Timber is granted to right holders for bonafide domestic and agricultural use. The detail of timber granted to right holders

during the period from 1995-96 to 2006-07 is given in the table - 15.

Table-15
TD grant (in m³)

Year		Deodar	Kail	Chil	Other BL	Total value (Rs.)
1995-96	Volume	4862.748	583.927	668.562	177.313	44537840
1996-97	Volume	2686.378	501.583	413.065	216.318	26056674
1997-98	Volume	2608.778	379.768	320.795	160.680	24342609
1998-99	Volume	2126.230	356.198	285.109	46.392	20193403
1999-00	Volume	1477.546	344.735	366.452	96.361	15054066
2000-01	Volume	1256.608	373.977	116.544	38.642	13539600
2001-02	Volume	1243.403	275.428	249.209	76.287	27003741
2002-03	Volume	1073.935	246.816	170.473	46.708	23396290
2003-04	Volume	1594.361	50.387	111.667	36.526	35524877
2004-05	Volume	1789.667	40.664	105.195	17.745	42037901
2005-06	Volume	1972.738	56.118	71.593	10.882	50776094
2006-07	Volume	NIL	NIL	NIL	NIL	Nil
2007-08	Volume	NIL	NIL	NIL	NIL	Nil
2008-09	Volume	NIL	NIL	NIL	NIL	Nil
2009-10	Volume	NIL	NIL	NIL	NIL	Nil
2010-11	Volume	NIL	NIL	NIL	NIL	Nil
Total	Volume	22692.392	3209.601	2878.664	923.854	322463095



3.1.5.1 TD was being given in different parts of the tract as per very old rates fixed at the time of initial forest settlements. These rates remained same till 2005-06 when Hon'ble High Court while disposing a PIL directed the state Govt. to rationalize the process as rates for TD were fixed at 20% of the market rates at the time of the initial forest settlements, for all species that had a market value at that time. Thus practically while the market rates had increased manifold over the time, state used to charge the original rates till 2005-06. Since the timber was available at such dead cheap rates, most of it was also misused and was sold further at commercial rates. There is change in the TD Policy now and the trees are to be given in converted form. The state has recently notified HP Forest (Timber Distribution to Right Holders) Rules, 2010 for the rationalization of grant of timber which is given in the appendix-VI.

3.1.5.2 Merits of these rules over previous provisions of TD in various settlements

The advantages of these rules over provision for grant of TD under various settlements are as under:-

- i) These Rules of TD have been integrated and unified for whole of the state.
- ii) Timber will be available in converted form and near to the place of residence of the people helping them in saving precious time and money during this schedule.
- iii) The rules are forest centered as well as right holder centered based on the guiding principles of HP Forest Settlement Rules, 1965 as indicated in point 3 which will help in conservation of forests and so also catering to the demand of TD to the present and future generations.
- iv) The periodicity and quantity has been made based on optional requirement so that forest remains and TD continues to be given in perpetuity.

- v) Priority has been given to poor and needy (BPL) followed by other people who need wood in TD.
- vi) A detailed procedure for grant is enshrined in the Rules itself which is time scheduled for the year.
- vii) People have been empowered as the application for needy will start from the Gram Sabha.
- viii) The right holder now has to simply give application duly authenticated by the Gram Sabha of the Panchyat to the Forest Guard which will pass through the various channels of the Forest Deptt. and the applicants would get their converted TD at the earmarked depots between September to December.

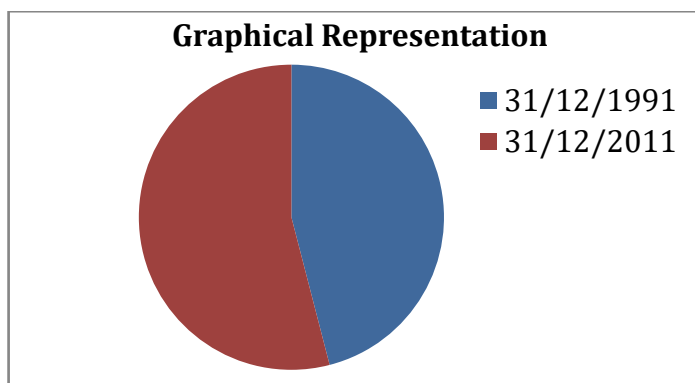
3.1.6 The demand of non right holders is being met with mainly by depots maintained by HP State Forest Corporation Ltd. The corporation also supplies timber to non-right holders for their bonafide use. Due to ever increasing demand of timber, 37 no. of timber sale depots have come up in Shimla Forest Division being operated by private individuals, besides one at Kanlog being run by HP State Forest Development Corporation. There are 44 no. saw mills and 19 no. furniture and joinery units registered with the Division.

3.1.7 The human population of the area under this division as per 1991 and 2011 census is given in the following table -16.

Table -16
Human population of the division

Name of Tehsil/ Sub Tehsil	Population as per census	
	1991	2011
Shimla	180599	216076
Sunni	29950	31425
Total	210549	247501

Source: Director, Economics and Statistics, Shimla (HP).

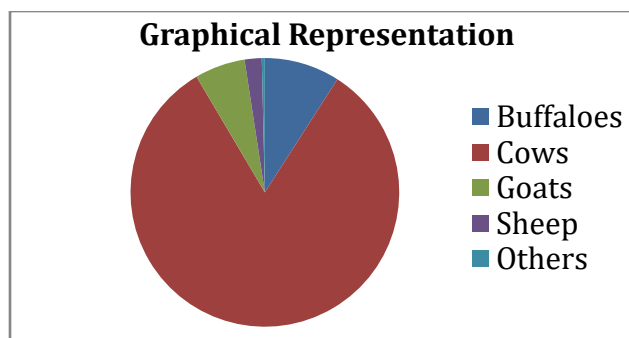


3.1.8 Most of the villagers keep large number of cattle simply for the sake of status symbol and for getting farmyard manure. The quality of cattle is generally very poor and the yield of the milk is considerably low. To supplement income, the sheep and goats are also kept by the villagers. The animals are hardly stall fed and depend upon the neighbouring forests and grasslands for their existence. But since the previous plan period population of animals has drastically decreased by 93003 which show that people have changed their mindset and look for animals of good quality. There is sharp decline in no. of goats and sheep which would prove good thing for the protection of forests and their regeneration. The animal population of the division for the year 2007 is given in the following table-17.

Table-17
Number of domestic animals in the division
(Livestock Census- 2007 provisional figures)

Kind of animals	No. of animals	Cow units
Buffaloes	9589	28767
Cows	87094	87094
Goats	6420	2140
Sheep	2168	723
Others (Horses, Mule)	392	784
Total	105663	119508

Source: District Animal Husbandry Office, Shimla (HP).

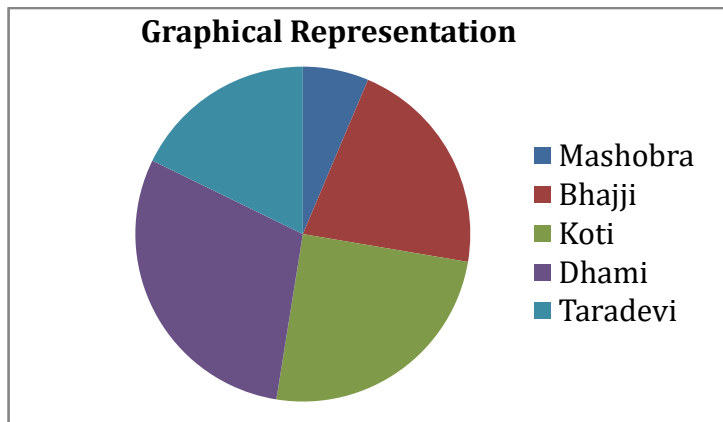


3.1.9 Migratory graziers graze the herds of goats and sheep in the tract particularly in winters. This leads to excessive pressure of grazing in forests, particularly those which are situated near the habitation as well as along the roads. The grazing fee charged from the migratory graziers is Rs 0.50 for each goat and sheep and kids are allowed to graze free of charge. The detail of migratory graziers along with forest area allowed to them to graze their animals during the year 2011-12 is given in table-18.

Table-18

Range	No.of graziers	Forest area (ha)	Detail of animals			
			Goats	Sheep	Kids	Total
Mashobra	1	190.00	140	100	150	390
Bhajji	12	511.50	576	439	290	1305
Koti	4	1155.70	757	410	357	1524
Dhami	4	715.75	765	580	475	1820
Taradevi	2	385.00	569	270	250	1089
Total	23	2957.95	2807	1799	1522	6128

Source: Record Branch, Forest Division Shimla.



3.2 Markets and marketable products

The principle marketable forest products are timber, resin, fuel wood, charcoal and medicinal herbs.

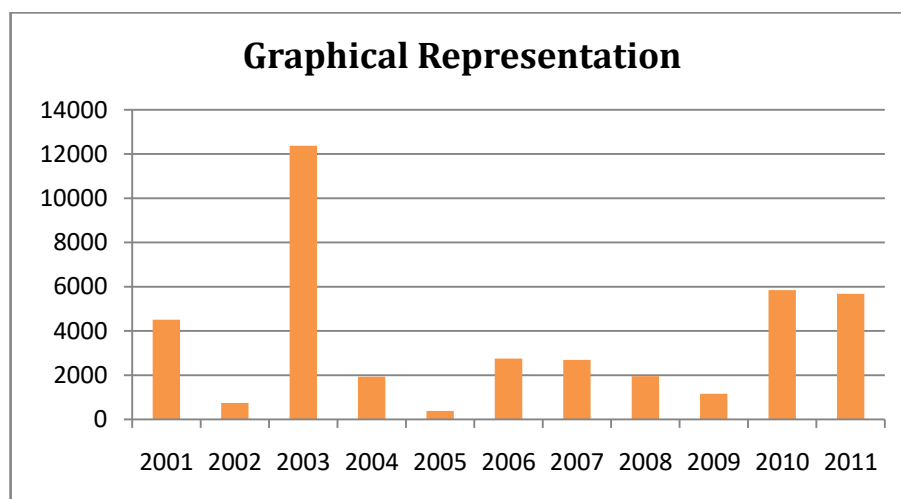
3.2.1 Timber

The major marketable forest product is coniferous timber viz. Deodar, Kail, Fir, Spruce and Chil. The felling, conversion and extraction work is conducted by the HP State Forest Corporation Ltd (HP Govt, undertaking) and the timber so extracted is transported for sale to their wholesale depots at Shimla and Baddi. As there is ban on green felling, so, only the salvage lots are being handed over to HP State Forest Development Corporation Ltd. by the Forest Department for extraction of timber. The timber of various species removed (Standing Volume) from the tract between 2001 to 2011 is given in the table-19.

Table-19
Detail of timber marked for extraction from Shimla Forest
Division (standing volume in m³)

Year	Nature of marking	Deodar	Kail	Chil	Rai/Fir	Ban/Mohru	OBL	Total
		Vol	Vol	Vol	Vol	Vol	Vol	
2001	Salvage	61.88	985.773	3382.928	38.635	0	35.215	4504.431
2002	Salvage	50.188	212.196	480.936	0	0.891	2.956	747.167
2003	Salvage	322.01	2856.471	9085.397	111.216	0	0	12375.09
2004	Salvage	233.51	849.646	740.358	67.06	24.462	15.484	1930.520
2005	Salvage	5.614	53.576	324.194	0	0	0	383.384
2006	Salvage	252.29	1309.973	659.448	209.928	296.026	18.698	2746.363
2007	Salvage	912.98	54.49	1388.893	1.754	180.849	149.9049	2688.8709
2008	Salvage	118.32	422.753	1099.293	158.763	96.101	58.563	1953.793
2009	Salvage	591.97	326.673	186.147	49.99	3.623	0.685	1159.088
2010	Salvage	855.66	2674.586	2107.648	5.60	142.5665	57.368	5843.4285
2011	Salvage	773.6	1775.744	2841.815	37.798	157.98	93.001	5679.938

Source: Record Branch, Forest Division Shimla.



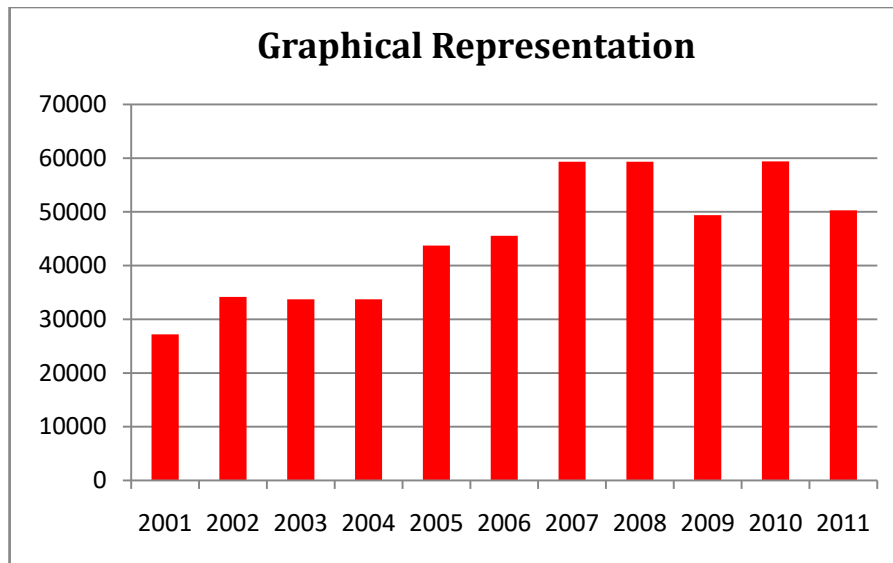
3.2.2 Resin

Resin is the main minor forest product of Chil forests of Mashobra, Bhajji, Koti, Taradevi and Dhami Ranges. It is got tapped through HP State Forest Development Corporation Ltd. and sent to Rosin and Turpentine Factories at Nahan and Bilaspur for further conversion into rosin and turpentine oil. These two factories too are units of the HPSFC Ltd. Rosin and turpentine oil extracted from resin is sold by the Corporation generally to various manufacturers who use these products as raw materials for their finished products. Some quantity is also supplied to private factories. Quantity of resin and average yield per section in Qtl. since 2001 to 2011 extracted by the HPSFDC Ltd. is given in table-20.

Table-20

Detail of resin extracted from Shimla Forest Division in qtls

Year	No. of blazes	Resin extracted	Average yield per thousand blazes(Qtls)
2001	27208	NA	—
2002	34154	1206.18	35.31
2003	33716	NA	—
2004	33716	1211.55	35.93
2005	43722	1570.58	35.92
2006	45549	1664.08	36.53
2007	59343	2026.97	34.15
2008	59343	1851.54	31.20
2009	49386	1613.19	32.66
2010	59407	1362.12	22.92
2011	50282	1860.67	37.00



3.2.3 Fuelwood and charcoal

Most of the Oak forests of Mashobra, Koti, Bhajji and Dharni Ranges were being managed for fuelwood and charcoal supply. The conversion, extraction and marketing were done by the HP State Forest Corporation Ltd. However, as per latest policy of the Government, there is ban on green felling of Oak trees. Therefore, the fuelwood and charcoal are extracted out of salvage removals by the HPSFDC Ltd.

3.2.4 Minor forest produce

People have rights for collection and sale of minor forest products and medicinal herbs. Besides, minor forest products like walnut fruits and bark, cottonseed sticks, the important medicinal herbs like Guchhies, Kakkarsinghi, Banaksha, Mushakbala, Berberis, Daru, Bahera, Amla, Harad, Gloe, Bichubutti, Brass flowers, Banhaldi, etc. are extracted for domestic use as well as sale in the markets at Shimla and even out of the state.

3.2.4.1 The minor forest products are controlled as per rights under settlement reports. These are collected from the forests by the right holders without any permission in exercise of rights as enshrined in the forest settlement report or purchased from the right holders by the applicant seeking pass. Earlier the non right holders could not collect or purchase the minor forest produce without the

permission of concerned DFO till 2003 when the Govt. appointed the Pardhan of the Gram Panchayat in HP as forest officers for the issuance of pass of transport of minor forest produce collected from the forests in the concerned Panchayat. The Pradhans of the concerned Panchayats shall issue pass with certain conditions like verification of stock by forest guard, the species not banned for export, the species are extracted from the prescribed area in the approved extraction cycle, and that the extraction has been done in sustainable manner and has not caused any ecological or environmental damage, for 37 items/species in view of the Govt. HP notification no. FFE-B-G (9)-9/94-II dated 28/02/2003 as per export fee prescribed therein and the fee so realized shall form the revenue of the Gram Panchayat. The copy of notification and the royalty rates of minor forest produce are given in Appendix-VII (i-ii).

3.2.4.2 Latest data is not available with this division for quantity of NTFP collected by the right holders/contractors through Panchayats as permits were issued by the Pradhans in view of Govt. HP notification dated 28/02/2003. As per data available, the detail of NTFP collected in this division is given in table -21.

Table-21
Data of NTFPs of Shimla Forest Division

Year	NTFPs	Quantity in Qtls	Income (Rs)
1996-97	Gucchhi	123.75	1237500
	Kathha	495.00	75
1997-98	Gucchhi Deo/	88.53	85300
	Kail Cones	140.00	21000
2001-02	Gucchhi	14 kg 120 gms	Not available

Note: After 28-02-2003, this power was given to the Panchayats and data of which are not available.

3.2.5 Demand and supply of forest produce

The demand of almost all forest produce is ever increasing and it definitely has huge pressure on forests. Although the state has imposed ban on green felling yet meeting requirements of the people is a challenge. All the forest produce like timber, fuel wood, NTFPs are in great demand. The demand of timber requirement for construction/repair of houses has increased manifold. The yield position of PB-II, PB-III is on plus side in both Deodar-Kail and Chil working circle as trees were removed as salvage as well as granted in TD.

3.3 Lines of export

There is a network of all weather, metalled and unmetalled roads in Shimla Forest Division, therefore, the forest produce is carried in the trucks and transported by roads. The produce is generally transported from forest to roadside manually or by mules and ropeways. Some timber floating is also done where streams, khads with sufficient water are available. Otherwise generally there are link roads all over the area to the National Highway 22 and from there the timber is carried to depots at Baddi/Shimla and other places also. However, the resin tins are only transported through roads and carried to factories at Nahan/Bilaspur or to the private factories.

3.4 Methods of exploitation and their cost

In the past, the felling, extraction and conversion of timber was done through open public auctions of the lots to the private contractors. Since the nationalization of the forest, extraction and all the logging operations are being done by the HPSFC Ltd. (An HP Govt. undertaking). Similarly, resin tapping too is done by the Forest Corporation.

3.4.1 Because of increase in labour cost, the cost of extraction has also increased. The present cost of various operations of extraction of timber per cum and for Resin extraction is given in table-22 and 23 respectively.

Table – 22
Timber extraction cost statement

Sr. No.	Name of work	Timber cost per m³ (Rs)
1	Lopping and felling	90
2	Sawing and conversion	865
3	Carriage from forest to roadside	1098
4	Carriage by trucks	649
5	Contingency charges and	4252
	Total	6954

Source: Office of D.M. Shimla, HPSFDC Ltd.

Table-23
Resin extraction cost statement

Sr. No.	Name of work	Cost per quintal (Rs)
1	Setting up of crop including collection charges	25.00
2	Resin Extraction up to RSD	1071.00
3	Store Consumed	
4	Carriage Charge From RSD to Factory	45.00
5	Establishment Charges	4438.00
6	Miscellaneous Charges	114.88
	Total	5693.88

Source: Office of D.M. Shimla, HPSFDC Ltd.

3.4.2 Royalty rates obtained from HPSFDC Ltd.

The average royalty rates of timber of various species at which these trees are handed over to HPSFDC Ltd. are tabulated in table-24.

Table-24
Average rates per m³ (Rs)

Year	Deodar	Kail	Fir/Spruce	Chil
2007-08	4315	2388	677	43
2008-09	4315	2388	677	43
2009-10	5664	2944	836	626
2010-11	5903	3098	790	572

The average royalty rates for Resin are given in table- 25.

Table-25
Average rates of resin per blaze (Rs)

Year	Rs
2007	23.00
2008	27.70
2009	33.70
2010	35.00
2011	65.00

Source: Record Branch, Forest Division Shimla

3.4.3 Past and current prices

The market rates for green standing trees (Rs /cum), for non right holders and other Govt. Departments by the Forest Department during 2009-10 to 2011-12 are given in table- 26.

Table-26
Market rates of green standing conifer trees (Rs)

Name of species	Year		
	2009-10	2010-11	2011-12
Deodar	44031	47624	47624
Kail	38044	38044	38044
Chil	15372	15372	18630
Fir/Spruce	17271	17271	22437

3.4.4 The market rates for green standing trees of broad leaves are given in table- 27.

Table -27

Market rates of green standing board leaved trees (Rs)

Name of species	Year		
	2009-10	2010-11	2011-12
Ban/Kharshu/Mohru	18000	18000	18000
Shisham/Walnut	21663	21663	23711
Sal	10839	10839	14957
Sain	11229	11229	14849
Kokath	5254	6109	6888
Kikar	7818	3443	4704
Eucalyptus	6076	7093	10381
Mango	7877	9577	10424
Poplar	8907	8907	8907
Jamun	2024	3443	4704
Neem	1804	3443	4704
Simbal	17992	17992	17992
Tun	6503	6503	6503
Mapple	2356	9545	9545
Khair	26557	26557	28113
Siris and other Misc. BL Species	3443	3443	4704

(Source: Office record of DFO Shimla)

CHAPTER-IV

ACTIVITIES OF FOREST CORPORATION

4.1 General description

HP State Forest Development limited an undertaking of the HP Govt. which came in to existence on the 25th March 1974. This corporation deals with the marketing of mainly timber, fuelwood, pulpwood, bamboos, khair, rosin, turpentine oil and subsidiary products (viz, phenyl, varnish and black japan). In addition, a Fiber Board Factory at Baijnath is presently engaged in the joinery works, timber chemical treatment and timber seasoning for Government as well as private timber.

The corporation has been mainly created with the following objectives:

- i) To carry out the extraction of timber and resin on scientific lines by adopting suitable modern techniques.
- ii) To eliminate the contractor's agency in respect of work of timber extraction and resin tapping.
- iii) To obviate the chances of illicit felling of trees, illicit tapping of resin and other malpractices.
- iv) To work the forests on commercial lines by recycling of funds for works and also by raising funds from financial institutions as per requirements.

As per the policy of the Govt. timber extraction work was transferred to the corporation in a phased manner and the corporation took over the complete working of the Govt. forests w.e.f. 25/01/1983. The corporation has been working salvage lots comprising of dry, diseased, uprooted and damaged trees, handed over to it by the HPSFDC Ltd. for working. The lots of green trees made of trees coming in the road alignments approved under Forest Conservation Act are also exploited through the Corporation. On an average, approx. ≈ 0.03339 Lac m³ standing volume is being felled and converted every year from Shimla Division by the corporation, which is sold in auction through Sale

Depots and also supplied to the Govt. Department, non right holders, small scale industries, etc. The work of felling and conversion of timber is done by professionally trained labour and its carriage to road side depots is done either by manual labour or by roadways and in some cases, where possible through waterways. All these works are done through Labour Supply Mates under the direct supervision of the corporation staff.

4.1.1 Harvesting/exploitation of timber

Only dry and fallen trees referred to as salvage are handed over to Divisional Manager, HPSFDC Ltd. Shimla in normal course who has jurisdiction over this division. In addition, green trees coming in the road alignments approved under Forest Conservation Act are also handed over for exploitation.

4.1.2 Extraction of resin

For the year 2012, 49805 resin blazes have been handed over to the Forest Corporation for extraction of resin. The work of resin extraction generates employment opportunities for the general public of the area. On an average 480 mandays per annum are generated per section of resin tapping and carriage of resin upto road side.

4.1.3 Supply of timber/fuelwood

One timber cum fuelwood depot is being maintained by the Forest Corporation at Kanlog. Timber/Fuelwood is supplied from this depot which caters to the needs of general public of Shimla town and surrounding area. The total timber 251.461 m³ was sold at HPSFDC sale depot at Kanlog for an amount of Rs. 84,44,049 and 3837.19 Qtl fuelwood was sold for Rs. 14,85,143 during the period from April 2011 to January 2012.

4.1.4 Marketing of forest produce

The timber extracted from Shimla Forest Division is marketed through sale depots located at various places like Kanlog, Baddi,

Mantaruwala and Dhanotu/Sundernagar. The resin is processed and further sold through Nahan and Bilaspur factories.

- 4.1.4.1** The market rates for supply of timber of various species to public for domestic and commercial use and Govt. Departments/Public undertakings from the sale depots of HPSFDC Ltd. has been fixed to be effective w.e.f. 31/12/2010 as given in the table-28.

Table-28
Market rates of sawn timber (Rs per m³) of different species.

Kinds and sizes in cms	Species (Rates /m ³)			
	Deodar	Kail	Fir	Chil
1. SAWN SIZES				
183X21X10	22400	19100	7900	5000
2. AXE HEWN				
305-366X13X13-16X16 & up	30000	22000	11000	7300
183-244X13X13-16X16 & up	24000	17000	8500	6400
3. DIM DIMAS				
(All Sizes)	23100	17900	7500	6000
4. HAKRIES				
85 cms & Above	14000	13000	9000	3000
Below 85 cms	12000	9000	7000	2700
5. LOGS				
275 cms & above length	27000	15000	9200	7800
Below 276 cms length	20000	10700	6700	7300
6. SIDE SLABS				
All Sizes	21400	18000	7700	4600
7. ROUND BALLIES				
306-366X55	17500	11200	8100	6000
244X55	10100	7900	6200	5400
305-366X45	13000	8600	7100	4700
Other sizes of Round Ballies	7300	6000	4900	3600

CHAPTER –V

FIVE YEAR PLANS

5.1 General description

The forests of the division have been managed for getting sustainable yield. The silvicultural fellings were aimed at making the forest uniform and the regeneration achieved through natural as well as artificial means. Till the early seventies, the emphasis was on planting commercially important species such as Deodar, Kail, Chil, Fir, Spurge, etc. Growing demand of forest produces in the state especially that of timber resulted into focus on large scale plantation of commercially important species. Although the plantation programme started from the 1st five year plan but it gained momentum from IIIrd plan onwards. The plan wise management of forest is depicted as under:-

5.1.1 Ist Five Year plan (1951-56): After the merger of princely states the forests of the tract were densely stocked and exploited commercially. The forests of Deodar-Kail and Chil working circles were managed under the system of simple thinning and improvement fellings. Oak forests were managed under selection working circle to meet local demands of fuel and fodder. Sowing and planting of deodar and broad leaved species was prescribed in all working circles and the results thereof were generally satisfactory but in some areas success were found only partial for obtaining the maximum production of timber and bringing about a more normal distribution of the age classes.

5.1.2 IInd Five Year plan (1956-61): During this period, the conifer forests were exploited for revenue with emphasis on plantations in blanks. The artificial regeneration in the form of patch sowing and planting had been carried out in Chil and Deodar forests. However, Deodar planting was not found successful. Regeneration felling was not prescribed anywhere in conifer forests.

5.1.3 IIIrd Five Year plan (61-66): The commercial working of all conifer species was continued with thrust on natural regeneration to be supplemented with artificial regeneration by way of sowing and planting in blanks. Thinning and improvement felling was prescribed which were not followed. The actual markings were selective in taking out mature trees with the result these forests had become deficit in mature stock and young crop remained unthinned. Sowing and planting operations had also not yielded any appreciable results. The total volume of conifers removed including grant to right holders is in far excess than the prescriptions as given below in table - 29.

Table-29

Species	Volume removed
All Conifers	230204 cft

5.1.4 IVth Five Year plan (1969-74): Removal of Deodar was higher to satisfy the demand of right holders whereas Kail and Fir/Spruce were removed less than the prescription. In Chil working circle the removal was on higher side and due to over felling, this crop was very open. The plantation working circle was created with main object of management to rehabilitate the poorly stocked and degraded forests to meet the local requirements. Total area allotted to this working circle was 8501.2 ha in erstwhile Shimla Forest Division. A plantation programme was also laid down.

5.1.5 Vth Five Year plan (1974-1979): For the period from 1966 to 1980 the yield removed in respect of conifers is far in excess than prescribed. The emphasis had already shifted to raise plantation on blank degraded forests. However results of plantations were not much satisfactory due to inadequate protection and heavy pressures of grazing. The plantations were also not carried out as per prescriptions.

- 5.1.6 VIth Five Year plan (1980-85):** With the launch of social forestry project, the social forestry working circle was created (Pankaj Khuller's Working Plan 1981-1995) with the focus shifted towards raising of fuel, fodder, small timber and grasses to meet the domestic needs of rural communities. But the results were not much satisfactory mainly because of biotic interferences in UPFs, heavy demand for fuel, fodder and timber and lack of protection.
- 5.1.7 VIIth Five Year plan (1985-90):** As no seeding fellings, final fellings or other commercial fellings have been done because of ban on green felling even then the removals were higher. The regeneration was not good because of lack of protection. The social forestry works were in full swing. Emphasis was on raising fuel, fodder, small timber and grasses in UPFs and degraded forests.
- 5.1.8 VIIIth Five Year plan (1992-97)** There was huge deviation in yield prescribed and removed from 1981-82 to 1992-93 from almost all the forests of different working circles which revealed that removal was higher in Deodar, Kail, Chil and other B/L species. Sowing and planting of Deodar was also not successful where the protection was not ensured. The JFM approach also started in the division and forestry activities were implemented under departmental schemes and under ODA project. As ban on green felling continued, the objective remained afforesting denuded/degraded forests. The constitution of forest management committees and their participation in planning and implementation was started.
- 5.1.9 IXth Five Year plan (1997-2002):** The activities of ODA/DFID continued in the pilot phase and in the C&D phase. The works of afforestation, soil conservation, entry point activities started by the VFDCs and microplan process learnt and executed. Sanjhi Van Yojna started on the principles of JFM. Here again the focus remained on restocking/regeneration of degraded forests.

5.1.10 Xth Five Year plan (2002-2007): Both the JFM programmes, DFID & SVY created mass awareness about forestry but the focus was again on raising plantation besides soil conservation works and entry point activities. The contribution in works to the tune of 5 to 15% was desired but could not be pursued properly. CAT plan of Kol Dam was also implemented with emphasis on afforestation & soil and water conservation.

5.1.11 XIth Five Year plan (2007-2012): Total yield prescribed and removed from 1996-2011 (Mohan's working plan) working circle wise is given below in table-30.

Table-30

Working circle	Yield prescribed (cum)	Yield extracted (cum)	Deviation (cum)
Deo/Kail	54000	20533.42	-33466.58
Chil	19500	8599.28	-10900.72
Oak	-	10028.065	+10028.065
Biosphere	-	24516.664	+ 24516.664
Plantation	-	3451. 345	+ 3451. 345

During this period afforestation work was under taken on large scale under CAT plan in Shimla Division. Plantation rose under CAT plan from 2005-06 to 2010-11 in Shimla Forest Division is given in table-31.

Table-31

Year	Afforestation (ha)	Pasture development	Total (ha)
2005-06	262	45	307
2006-07	700	192	982
2007-08	385	52	437
2008-09	346	33	379
2009-10	190	-	190
2010-11	120.45	-	120.45
Total	2003.45	322	2325.45

CHAPTER-VI

STAFF AND LABOUR SUPPLY

6.1 Staff position

The detail of staff sanctioned and in position in respect of Shimla Forest Division as on 31/03/2012 is given in table-32.

Table- 32

Staff position of Shimla Forest Division

Sr. No.	Name of post	Sanctioned strength	Existing strength	Variation	Strength required	Remarks
1	DCF	1	1	-	-	
2	ACF	2	1	-1	1	-
3	Forest Ranger	7	7	-	-	
4	Dy. Ranger	25	22	-3	3	
5	Forest Guard	95	83	-12	12	
6	Supdt.Gr.II.	1	1	-	-	
7	Sr. Asstt.	3	2	-1	1	
8	Jr. Asstt / Clerk	6	5	-1	1	
9	JDM	1	-	-1	1	
10	Surveyor	1	1	-	-	
11	NT	1	-	-1	1	
12	Kanungo	1	1	-	-	
13	Patwari	3	2	-1	1	
14	Electrician	1	-	-1	1	
15	Carpenter	1	-	-1	1	
16	Driver	-	1	+1	1	
17	Plumber	1	-	-1	1	
18	Peon	15	13	-2	2	
19	Chowkidar	8	8	-	-	
20	Sweeper	3	2	-1	1	
21	Mali	7	5	-2	2	
22	Forest Worker	71	66	-6	6	2 FW deployed on Secondment basis in Printing & Stationery Deptt. of HP Shimla
23	Mazdoor	-	2	+2	2	

6.2 Administrative and executive setup

At present, the number of Ranges, Blocks, Beats and Check Posts in Shimla Forest Division which are meant for administrative control and execution of various forest related and other development works are given in the following table-33.

Table-33

No. of Ranges	No. of Blocks	No. of Beats	No. of Check Posts
5	14	51	1

Five Ranges of the Division are Mashobra, Bhajji, Taradevi, Koti and Dhami with headquarters at Mashobra, Sunni, Tutu, Koti and Dhami respectively. These ranges are further divided into Blocks and Beats for proper administrative control and execution of forestry works. Overall control of all Ranges rests with Divisional Forest Officer.

6.3 Labour supply

For departmental works, local labour is available in sufficient number throughout the year except during sowing and harvesting of agricultural, horticultural crops and local fairs. The works are being executed through the labourers who are already on the roll of the Shimla Forest Division as daily wagers continuously for the last more than 8 years. Nearly 77 daily wagers are working in this division as casual labourers on various seasonal forestry works. Now all the works of this division are being done on bill/tender basis as per Notification No. FFE-B –C (I)-35/2009 dated 28/04/2009 issued by the Govt HP as given in Appendix-VIII and no new labourer is being engaged now in Shimla Forest Division. In Shimla Forest Division, 63 persons have been regularized so far since the year 2000 as per Govt. policy. The forest corporation also engages labour locally for timber exploitation and resin tapping

works but about 50% labour including skilled ones come from outside the forest division.

6.4 Wage rates

The wage rates of labour have been increased manifold. The rates are generally revised by the Govt. every year under Minimum Wage Act by giving reasonable increase. The wage rate for normal unskilled labourer was Rs 20 per day in 1990 which is now Rs 120 per day (March, 2012)

CHAPTER – VII

PAST SYSTEM OF MANAGEMENT

1.7.1 General history of past management

This Working Plan is the revision of Dr. Lalit Mohan Plan for Shimla Forest Division (1996 to 2011). Prior to this, the tract was covered under Pankaj Khullar Plan for Shimla and Theog Forest Divisions (1981-1995). The present plan will deal with forests of Shimla Forest Division and Forests of Theog Forest Division will be dealt with separately under working plan of Theog Forest Division. During the period of Pankaj Khullar Plan, the erstwhile Shimla Forest Division was reorganized and carved out into Shimla and Theog Forest Divisions vide CCF/HP Notification no. Fts.SC-a (i) 1/83 dated 28.4.84. At that time the forests of present Shimla Forest Division comprised of the former princely states of Bhajji, Koti, Keonthal, Patiala (enclave). Later on vide HP Govt, letter No.Fts.S-1 (a)-1-2/86 dated 20.4.86, the Taradevi Range of Solan Forest Division and part of Dhimi Range of Kunihar Forest Division were also merged with present Shimla Forest Division. The forests of these two ranges were managed under former princely states of Patiala (enclave) and Dhimi.

1.7.1.1 The history of these forests is not known prior to 1885. It is presumed that unrestricted and selective fellings took place in most of these forests where regular forest management was prescribed as early as 1885. After this the Working Plan/Schemes were prepared for the forests of other states and by 1937, these forests of the tract were brought under various silvicultural systems. Forests and revenue settlements were also initiated simultaneously.

1.7.1.2 The history of past management of Shimla Forest Division can be divided into two periods i.e. pre-independence period and post independence period.

7.2 Pre-independence period

Before independence the forests of present Shimla Forest Division were being managed under various princely states like Bhajji State, Sutlej Catchment forests, Koti state forests, Keonthal state forests, Patiala state forests (Taradevi Range) and Dhami state forests. The past history of these forests for the areas covered by each working circle has been described below in detail.

7.2.1 Bhajji state forests

Little is known of the history of the *forests before 1898 but it is almost* certain that prior to this all the big trees of marketable species were removed in heavy and irregular fellings. The salvage removals were carried out in the Shalli forests from 1898 to 1905.

7.2.1.1 Period prior to 1906

The forests of the state were demarcated for the first time in 1904-05 in pursuance of the Punjab Government Notification No. 125 dated 5th February, 1904 where 36 forests covering an area of 4576.40 ha were demarcated. A record of rights for these forests was drawn up in 1906-07. Mature trees of marketable species were felled in accessible areas depending upon the demand. For some years immediately preceeding 1906 there was little demand for any timber species. The oak forests remained unworked because of difficult extraction and expensive transport to Shimla.

1.7.2.1.2 Period from 1906 to 1918 (Mayes' Working Plan)

First working plan in 1906 was prepared by Mayes when a record of Rights was drawn up. Selection felling of trees of over 6 feet girth of Fir, Cypress, Chil and Oak were prescribed. Sowing of Deodar and Chil proposed in certain forests were not carried out. Roads proposed for transporting charcoal to Shimla were also not constructed.

7.2.1.3 Period from 1918 to 1926. (Gibson Scheme)

In 1918, Gibson prescribed enumerations of chil but it is not clear if the enumerations were actually done or not. Felling of spruce, cypress, chil and oak were carried out on selection principles. The roads and bridges were also constructed to facilitate transport. Felling in the chil UPFs were also made according to the prescriptions of the DFO at annual inspections.

7.2.1.4 Period from 1926 to 1939: Annual plans of operation were drawn up by DFO Shimla on the basis of inspection note of 1926 of Glover, Conservator of Forest, which were sanctioned by the Superintendent, Hill states, Shimla upto 1936 and the political agent, Punjab Hill States Agency from 1937 onwards. During this period thinnings and improvement fellings were carried out in chil forests and coppice with standards was applied to the oaks and broad leaved forests. The protection given to Chil forests resulted in considerable improvement. The felling in oaks, spruce and cypress crops were somewhat conservative. The results of sowing and planting particularly of deodar were very good.

7.3 Sutlej catchment forests

The forests of the erstwhile states of Koti, Madhan, Theog (Part) and Patiala enclave (actually situated in Giri catchment) were covered by one working plan in 1952 called working plan for Sutlej Catchment Forests of Shimla Forest Division. (Raina's Working Plan, 1952 to 1966. Prior to 1952 they were covered by different plans/schemes. However, nothing is known about the history of these forests prior to 1886 except that indiscriminate fellings were done at the will of the Rulers and public.

1.7.4 Koti state forests

In 1890, an area of 800 ha of forests in the state was demarcated by McIntire and heavy felling continued till 1903 when the control of these forests was taken over by the Govt. In 1904, Gibson

further demarcated the DPFs in the state and bringing the total area of DPF to 1890 ha (including cultivation). Rights were also regulated. Upto 1932, the forests were worked under a simple system of thinning and improvement felling based on annual plans of operation drawn by DFO Shimla.

7.4.1 Period from 1932 to 1951 (Bakshi Sant Ram's Working scheme)

DPFs were divided into three distinct areas as under:-

- i) **Thinning area:** - "C" grade thinnings on a 10 years cycle were prescribed for all deodar, kail and chil forests (4,197 acres) purely on silvicultural lines irrespective of the revenue. The annual yield was prescribed by area and roughly estimated at 50 cft per acre.
- ii) **Plantation area (305 acres):-** Plantation of deodar, horsechest nut, walnut and Kail was prescribed on suitable sites.
- iii) **Amenity area:** - An area of 86 acres comprised of mixed crops of conifers and broad leaved species. Under this prescription, this mixture was to be maintained and deodar, cypress, horsechest nut, robinia, acacia, willow and rhododendron were to be introduced on suitable sites.

7.4.2 Results of working

The prescribed thinnings were carried out regularly. The suggestion of rotational lopping on 3 years cycle was not followed whereas excessive and indiscriminate lopping of Kail and Oak continued. Results of sowing in plantation areas were generally satisfactory but in some area success was only partial.

1.7.5 Patiala (Enclave) forests

There is no record available on the working of the forests prior to 1905. The only assumption is that heavy fellings were done to

meet the local demand of timber, fire wood, etc. and also the trees were sold by the contractors.

1.7.5.1 Period from 1905 to 1935 (Fazal-ud-Din's Working Plan)

It is the first working plan when the forests of the state were brought under scientific management. The following working circles were constituted:-

- I. Deodar Working Circle.
 - II. Chil Working Circle.
 - III. Oak High Forest Working Circle.
 - IV. Oak Coppice Working Circle.
 - V. Scrub Working Circle.
 - VI. Bamboo Working Circle.
- i) **Deodar Working Circle:** - It comprised of Deodar, Kail, Fir and Spruce forests. These forests were worked under selection system where thinnings and improvement fellings were prescribed. The deodar was given preference over kail, spruce, oaks, etc, in mixed crops.
 - ii) **Chil Working Circle:-** The forests having chil as predominant species, were allotted to this working circle. The crop being irregular, selection felling system with a felling cycle of ten years combined with improvement felling was the system prescribed, for obtaining the maximum production of timber and to bring about a more normal distribution of the age classes. The exploitable size was fixed over 180 cms girth.
 - iii) **Oak High Forest Working Circle:** - These forests were managed under selection cum improvement felling on a 15 years felling cycle.
 - iv) **Oak Coppice Working Circle:** - These forests were managed under coppice with standard system with a rotation of 30 years. The annual felling coupe was 13-20 ha.

Retention of 10 standards per ha and saplings under 22.5 cm girth was also prescribed.

(v) & (vi) Scrub Working Circle and Bamboo Working Circle:-

As the forests allotted to both of these working circles are not confined to the present Shimla Division, so these are not being discussed here.

1.7.5.2 Results of working

The selection fellings were carried out as per prescription in Deodar Working Circle. The selection and improvement fellings were not carried out as per prescriptions in chil working circle. Due to lack of demand, less felling were done as compared to prescriptions in the Oak High Forest Working Circle and also in Oak Coppice Working Circle.

1.7.6 Keonthal state forests

Before 1898, heavy and selective felling of all big and marketable trees was carried out. In 1898, the management of the state was taken over by British Govt., excess felling were stopped and a protective establishment appointed. A Forest Settlement Report was prepared by Mian Durga Singh in 1902 and a working plan was prepared by Mayes in 1905.

1.7.6.1 Period from 1905 to 1934 (Mayes' Working Plan)

Regular management began in 1905 and seven working circles were constituted. All pure deodar, kail and chil forests were allotted to working circle I, II and III respectively. All oak forests were allotted to working circles IV (Tarab) V (Junga) and VI (remaining oak areas). All forests of Rawin Pundar were allotted to working circle VII. Thinnings and improvement felling were prescribed in all coniferous and oak forests on a 10 year cycle except for oak forests of working circle V (Junga) where coppice with standard system was applied. Selection fellings were

prescribed in working circle VII. Yield in all working circle was fixed by area. Exploitable size was fixed 6 feet girth for Deodar, Kail and Chil and 4.5 feet girth for Oak.

7.6.2 Results of working

The forests responded favourably to the treatment and general improvement was noticed. Fir trees were cut, deodar planted in fir burnt blanks, and road and buildings constructed.

1.7.7 Past yield

The yield was regulated by area and no volume check was provided and also not recorded in control forms.

1.7.7.1 Past revenue and expenditure

The total average annual figures of revenue, expenditure and surplus for period 1901-02 to 1932-33 (excluding the period from 1904-05 to 1909-10 for which figures are not available) for the whole working plan area are given in table-34.

Table-34

Year	Revenue	Expenditure	Surplus
Total 1902-03 to 1932-33	8,13,392	3,14,456	4,98,936
Annual Average	31,284	12,094	19,190

1.7.8 Forests of Dhami Range

The forests which are presently in Dhami Range and some forests of Bhajji Range of Shimla Forest Division were transferred from Kunihar Forest Division at the time of creation of Shimla and Theog Forest Divisions from erstwhile Shimla Forest Division during 1984. These forests were managed under Dhami State.

1.7.8.1 Period from 1890 to 1966 (MC Intire Plan)

MC Intire prepared first Plan for the forests of Dhamsi which remained in force from 1890 to 1906. It covers Oak forests which were managed under coppice with standards with a rotation of 26 years. The number of standards was not stated, with the result that enough standards were not retained in some cases.

1.7.8.2 Period from 1906 to 1916 (Maye's Plan)

It was a continuation of MC Intire's Plan in so far as it dealt only with Oak Forests. The system of coppice with standards remained unchanged. The number of standards to be retained unchanged. The number of standards to be retained per acre was fixed at 25 with rotation of 32 years.

1.7.8.3 Period from 1916-17 to 1947-48 (A. J. Gribson's Plan)

The Oak Forests continued to be worked on the lines laid down in Maye's Plan. All the Oak Forests in the state were felled. The Chil forests were to be thinned on 10 years cycle but this operation was never carried out.

1.7.9 Post-independence period

Post independence period witnessed the forests, of the present Shimla Forest Division, being managed under the following working plans.

- i) Mian Budhi singh's working plan for Patiala state (1936-1955)
- ii) Saigal's Working Plan for Keonthal state (1935-1964)
- iii) Hari singh's Working Plan for Bhajji state (1941-1955)
- iv) Raina's working Plan for erstwhile Shimla Forest Division (1951-1966)
- v) Sandhu's Working Plan for Solan Forest Division (Taradevi Range) (1956-1987)
- vi) Puran Singh's Working Plan for Kunihar Forest Division (Dhami Range) (1948-1980)
- vii) G.S. Mathouda's Working Plan for Kunihar Forest Division (Dhami Range) (1961-1971)
- viii) P.C. Sharma's Working Plan for erstwhile Shimla Forest Division (1966-1980)
- ix) D.D. Shagotra's Working Plan for Kunihar Forest Division (Dhami Range) (1977-1991)
- x) Pankaj Khullar's Working Plan for erstwhile Shimla Forest Division (1981-1995)
- xi) K.K. Gupta's Working Plan for Solan Forest Division (Taradevi Range) (1986-1998)
- xii) Dr. Lalit Mohan's Working Plan for Shimla Forest Division (1996-2011)

7.9.1 Period from 1936 to 1955 (Budhi Singh's Working Plan for Patiala state)

The following working circles were constituted:-

- I. Deodar Working Circle
- II. Chil Working Circle
- III. Oak Working Circle
- IV. Protection Working Circle

- V. Scrub Working Circle
- VI. Bamboo Working Circle
- VII. Khair Working Circle.

- i) **Deodar Working Circle:** - Deodar, Kail and mixed with Fir/Spruce forests were allotted to this working circle. Selection system was prescribed as the system of management and a felling cycle of 10 years was adopted.
- ii) **Chil Working Circle:** - The pure or mixed chil forests were allotted to this working circle. Selection system with a felling cycle of 10 years was prescribed for these forests. The rotation was fixed at 130 years.
- iii) **Oak Working Circle:** - This comprised of two felling series. Oak High Forest working circle areas of Fazal-ud-Din Working Plan which contained all age classes intimately mixed were constituted as felling series I, and the Oak Coppice Working Circle areas of his plan which had been worked under Coppice with Standard System and contained only young crop, were constituted as felling series II under this working circle. The forests were worked under Selection cum Improvement Felling with a felling cycle of 10 years and exploitable diameter of 55 cms in felling series I. Coppice with Standard System was adopted in felling series II with exploitable diameter of 50 cm. Mixture of deodar and kail was to be maintained. Chil was to be discouraged in these forests.
- iv) **Protection Working Circle:** - The forests without tree growing or poor tree growth were allotted off this working circle. The management was to aim at protection of soil and preservation of forest cover in general by rotational closures. No felling except for right holders was prescribed. Sowing and planting of suitable species was prescribed.

v), (vi) & (vii) **Scrub, Bamboo and Khair Working Circles:-**

As the forests allotted to these working circles are not confined to present Shimla Forest Division, so these are not discussed here.

7.9.2 Results of working

Thinnings or improvement felling prescribed for deodar working circle were not carried out and the growth suffered due to congestion in younger classes. In chil working circle, excess yield was removed as compared to prescribed yield and the irregular crop could not be converted into regular crop. The prescriptions of felling and silvicultural operations were almost carried out in oak working circle. As no proper record was available, so the achievements of sowing and planting under protection working circle could not be assessed.

7.10 Period from 1935 to 1964 (Saigal's Working Plan for Keonthal state) the following Six working circles were constituted.

7.10.1 Improvement Working Circle

All Deodar and Kail forests, covering an area of 3286 acres of Junga and Fagu-Matiana ranges, were allotted to this working circle. Two felling series viz. Deodar felling series and Kail felling series were formed. Thinnings and improvement felling in favour of deodar were prescribed on a 10 year felling cycle. Exploitable diameter was fixed at 20" for both deodar and kail. No rotation was fixed and yield was calculated by area. Sowing and planting of deodar was recommended.

7.10.2 Results of working

Artificial regeneration of deodar in Kufta DPF has come up fairly satisfactory. In Kufta DPF the fungus attack was removed but deodar planting was not successful. The working has been generally satisfactory. Felling record from 1935 to 1950 is not available. The working plan expired in 1964 and in 1965 felling was carried out under annual felling programme in accordance with the principles of expired working plan and annual area

prescribed for felling has been adhered to. The volume removed during the period is given in table-35.

Table-35

Species	Volume (cft)
Deodar	196554
Kail	83499
Fir	11645
Chil	3710

7.10.3 Chil Working Circle

Pure chil forests of old Junga and Fagu - Matiana ranges, covering an area of 3979 acres were allotted to this working circle. Rotation was fixed at 125 years and only PB-I areas (25 years) allotted while other PBs were not allotted. Chil was to be managed under Shelterwood System and natural regeneration was proposed to be supplemented by sowings. The annual yield from PB-I was fixed at 8000 cft. No year wise programme of felling was laid down. Seeding and Secondary fellings were left to the discretion of the DFO subject to the condition that the prescribed yield should not exceed. In other PBs, thinnings were prescribed; yield was calculated by area i.e. an average of 165 acres (1/15th of the area) per year on a 15 year cycle.

7.10.4 Results of working

The working in PB-I and other PBs in general has been quite satisfactory. PB-I areas burnt during 1920-21 were prescribed for plantation with deodar and kail. Deodar has failed while kail has come up. Records of felling from 1935 to 1950 are not available. During the period 1951 to 1964, the yield removed is much in deficit as compared to prescribed yield from PB-I. Total volume

removed from entire working circle from 1951 to 1965 is given in table-36.

Table-36

Species	Volume (cft)
Deodar	51828
Kail	20048
Fir	590
Chil	67948

7.10.5 Oak Working Circle

All valuable Ban and Mohru forests situated in old Junga range, covering an area of 4828 acres were allotted to this working circle. Two felling series viz (a) Coppice felling series and (b) Local felling series were formed. Coppice with Standard System was prescribed for coppice felling series and rotation was fixed at 60 years for coppice and 180 years for standards. Thinnings and improvement felling on a 15 years cycle was prescribed for local felling series and no rotation was fixed. Yield was prescribed by area in both the felling series. The average annual coup being $1/60^{\text{th}}$ of the total area in coppice felling series and $1/15^{\text{th}}$ in the local felling series.

7.10.6 Results of working

Record of felling for the period 1935 to 1950 is not available whereas prescription of felling by area has been followed from 1951 to 1965. The sowing and planting of deodar in coppice coupes was unattended. The rotation of 60 years for coppice was rather high when the object was only to utilize the produce for firewood and charcoal. Working in the local felling series has been generally satisfactory.

7.10.7 Selection Working Circle

The forests allotted to this working circle are now outside the jurisdiction of Shimla Forest Division, therefore not discussed here.

7.10.8 Afforestation Working Circle

It also covered all the forests which are now outside the jurisdiction of the present Shimla Forest Division and therefore not discussed here.

7.10.9 Protection Working Circle

High lying, inaccessible, very open or steep forests, as also forests heavily burdened with rights, were allotted to this working circle. The object was the preservation of the existing forests with underlying aim to bring as many as of these forests as possible under systematic management at the end of working plan. The exploitable diameter was fixed at 30" dbh for deodar and 24" dbh for kail. Thinning and improvement fellings in favour of deodar were prescribed. Deodar planting was also suggested by replacing inferior species. There was no prescription for yield but by amendment in 1943, the yield was fixed at 2000 trees of class IB per annum.

7.10.10 Results of working

Record for 1935 to 51 is not available. The volume removed from 1952 to 1965 is given in table -37.

Table-37

Species	Volume (cft)
Deodar	5514
Kail	9810
Fir	18541

The results of working have been fairly satisfactory, though lopping continued unchecked.

7.11 Period from 1940 to 1955 (Hari Singh's Working Plan for Bhajji state)

Three working circles were constituted. Deodar, Kail and Chil forests were managed under thinning and improvement working circle. The fir, cypress and some oak forests were allotted to Selection Working Circle. Coppice with Standard System was applied to the oak and scrub forests.

7.11.1 Results of working

Though the felling record of the working of these forests is not forthcoming but the field observations did not reveal any appreciable change in the general condition of the growing stock.

7.11.2 Period from 1955 to 1972

No working Plan was prepared from 1955 to 1960. Parmar wrote Working Plan for the period 1960 to 1972 which was not approved in which four Working Circles, were constituted, namely (i) Regular Working Circle comprising all deodar, kail and chil forests (ii) The Selection Working Circle including fir, cypress and oak forests situated on steep and precipitous terrain (III) Coppice Working Circle consisting of oak forests and (IV) Protection Working Circle covering mixed deciduous and broad leaved forests and also Undemarcated Protected Forests were included. The total volume of conifers removed (including grant to right holders) from 1954-55 to 1965-66 is given below:-

Table-38

Species	Volume removed (cft)
Deodar	20702
Kail	16361
Fir	235

Chil	88971
Total	126269

7.12 Period from 1951 to 1966 (Raina's Working Plan for erstwhile Shimla Forest Division)

A single integrated working plan for the Shimla Forest Division was prepared by Raina comprising the forests of erstwhile Princely States of Koti, and Patiala (enclave) was forming part of Sutlej catchment. Following three working circles were constituted.

7.12.1 Thinning and Improvement Working Circle

Chil, kail and deodar forests were allotted to this working circle. The treatments prescribed were, cleanings in saplings and young pole crops, improvement felling in favour of more valuable species in mixed crops and thinnings in pole crop. Deodar plantation was prescribed in blanks and in areas occupied by fungus attacked or diseased kail. Exploitable size and age were not determined but were taken as 24" dbh corresponding to 120 years of age. The yield was prescribed by area and estimated to be 70 cft. per acre. Markings were prescribed purely on silvicultural principles with the object of developing the growing stock. A felling programme was prepared and each forest was prescribed for felling once in 10 years. Lopping of kail was allowed as per lopping rules framed under the record of rights with the object to control excessive lopping. Under the subsidiary silvicultural operations, areas containing isolated trees or small patches of kail poles with dense growth of shrubs were prescribed for artificial restocking with deodar supplemented by such kail as may come in naturally. Resin tapping from chil trees was also done in small scale and proposed to be expanded.

7.12.2 Results of working

The thinnings and improvement fellings as prescribed were not followed upto 1965-66. The actual markings were selective in

taking out mature trees with the result that these forests became deficit in mature stock and young pole crop remained unthinned. The total annual volume removed (including trees granted to right holder) is in excess than the prescriptions as given below in table-39.

Table-39

All conifer (cft)	Volume prescribed (cft)	Volume removed (cft)	Deviation (cft)
Annual volume	57543	103935	+46392

7.12.3 Oak Working Circle

Ban and Mohru oak forests were allotted to this working circle. It was divided into coppice felling series which was managed under Coppice with Standard System and local felling series in which thinnings and improvement felling were prescribed. Rotation for Coppice with Standards was fixed at 60 years and 180 years respectively. No rotation was fixed for local felling series. Yield was fixed by area. 1/60th of the total area in the coppice felling series and 1/10th of the total area in local felling series was to be gone over annually. After felling, the blanks located above 5000 ft were prescribed for sowing/planting with deodar whereas ban sowing was prescribed below 5000 ft.

7.12.4 Results of working

In the coppice felling series the areas prescribed have been worked but the sowing or planting of deodar has not been given due attention, proper protection and weeding and cleaning were particularly neglected. Hence, the results on the whole are not encouraging. In the local felling series the area worked during the first 14 years was in excess of the prescription.

7.12.5 Amenity Area Working Circle

The forests area (148 acres) around Naldehra golf course and forests in a 50 ft wide belt along Shimla Naldehra road were allotted to this circle with objective being entirely aesthetic.

7.12.6 Results of working

Though the forests were preserved but nothing substantial was done to improve it by introduction of species as prescribed.

7.12.7 Past yield

Total yield of conifers removed during the period 1953 to 1965 (Except 1952 of which figures are not available) is given in table-40.

Table-40

S.No.	Species	Volume (cft)
1	Deodar	4,21,165
2.	Kail	7,38,095
3.	Fir	99,656
4.	Chil	92,241

7.13 Period from 1956 to 1987 (Sandhu's Working Plan for Solan Forest Division, Taradevi Range)

Mr. Sandhu further revised the working plan of Mian Budhi Singh, for the period from 1956-57 to 1986-87. The following working circles were constituted.

- I. Deodar Shelterwood Working Circle.
- II. Chil Shelterwood Working Circle.
- III. Oak Coppice Working Circle.

- IV. Afforestation Working Circle.
- V. Selection Working Circle.
- VI. Scrub Coppice Working Circle.

7.13.1 Deodar Shelterwood Working Circle

Deodar and kail forests were allotted to this working circle. These forests were managed under Punjab Shelterwood System. Exploitable Diameter was fixed at 60 cms dbh. Only thinning was prescribed in compact portions of immature woods. Rotation was fixed at 150 years and 5 periodic blocks of 30 years each were constituted. Yield was prescribed by area.

7.13.2 Results of working

Prescriptions regarding thinning marking favouring deodar were carried out and the results were fairly successful. Deodar planting in Taradevi Range has come up fairly well. Walnut planting failed miserably. However, chil planting has come up in some patches very well.

7.13.3 Chil Shelterwood Working Circle

This working circle comprised of all chil forests which were better stocked and economically important. These forests were managed under Punjab Shelterwood System. Rotation was fixed at 120 years with exploitable diameter of 60 cms. Three types of fellings viz. seeding, secondary and final were prescribed.

7.13.4 Results of working

Prescriptions of the working plan have been more or less followed. Regeneration felling could not be done regularly because the prescribed yield in the plan was achieved by salvage markings with the result that some PBI areas remained unfelled and therefore, unregenerated. Resin tapping has not been done according to the instructions as laid in Punjab leaf let no. 13.

7.13.5 Oak Coppice Working Circle

The ban forests were allotted to this working circle. Three felling series, namely, Barog, Chail, and Taradevi were formed. These forests were managed under Coppice with Standard System. Rotation of Coppice was controlled by area.

7.13.6 Results of working

On account of heavy lopping in forest situated near habitations, coppice shoots had not come up. After felling, the areas were to be restocked with deodar and walnut where walnut was almost completely failed and deodar plantations had been fairly successful.

7.13.7 Afforestation Working Circle

The blank and poorly stocked forests which were not allotted to any other working circle were managed under this working circle. Annual planting programme was framed. Mainly khair and bamboo along with other suitable species were recommended for planting.

7.13.8 Results of working

There were sufficient funds under the various developmental schemes for carrying out plantations and accordingly, khair and bamboo in most of the areas were planted which mostly failed.

7.13.9 Selection Working Circle

This circle consists of forests adjoining Kalka–Shimla railway line, forests forming catchment area of Chail water works, forests adjoining snow view place and cricket ground Chail (now not in Shimla Forest Division) and small isolated patches less than 1.2 ha in extent. Improvement was prescribed by area.

7.13.10 Results of working

Forests along Kalka–Shimla railway line and those along the National Highway remain untouched. On the whole no efforts were made during the plan.

7.13.11 Scrub-Coppice and Bamboo Working Circle

As no forest of the tract was allotted to these working circles, therefore, these are not described here.

7.14 Period from 1948 to 1980 (Puran Singh's Working Plan for Kunihar Forest Division, Dhامي Range)

This had five Working Circle. The Oak Working Circle comprised of openly stocked Oak Forests in which no change was made in the method of treatment and rotation. Areas were felled according to prescription of the Plan. The prescription in this circle were (i) closure of 1/5th of each forest for a period of 10 year (ii) sowing and planting of suitable species in the closed portion during the first 5 years of the closure period and (iii) thinnings and improvement fellings on 10 years cycle. These prescriptions were not adhered to anywhere.

7.15 Period from 1961 to 1971 (G.S. Mathauda's Working Plan for Kunihar Forest Division, Dhامي Range)

The present Kunihar Forest Division (previously called Solan Forest Division) covers the area of nine erstwhile Princely States which were merged to form lower Mahasu District of Himachal Pradesh in 1948. Mathauda prepared the first Working Plan after merger, which dealt with all the forest of Kunihar Forest Division (including forests of Dhامي Range which are now under the control of Shimla Forest Division), and revised the Working Plans of the forests of Bhagal, Bhagat, Beja, Bhajji (Part), Dhامي, Mangal, Mailog and Kuthar States, which had expired; or in force even after the expiry of this plan. The following Working Circles were constituted.

I. The Chil Working Circle

- II. The Coppice Working Circle
- III. The Plantation Working Circle
- IV. The Protection Working Circle

7.15.1 Chil Working Circle

All the Chil forests were included in this Working Circle. Exploitable size was fixed at 60 cm dbh with rotation of 120 years and conversion period of 96 years. One fourth area was allotted to PBI, one fourth to PBII and the balance half was allotted to PB Inter. The main yield was to come from PBI and the accumulated deviation was not allowed to exceed 20% at any stage. The seeding, secondary and final fellings were prescribed in PBI areas. No felling was prescribed in PBII forests. In PB Inter, the yield was prescribed by area for carrying out thinnings.

7.15.2 Results of working

All PBI areas could not be worked as per prescriptions of the plan and few areas have been fully regenerated. The main cause of failure was fire, lack of protection and retention of more mother trees than required. The resin tapping was also carried out including from PBI areas where regeneration fellings were done.

7.15.3 Coppice Working Circle

All better stocked Ban and deciduous broad leaved species forests which could be worked economically for fuel, were allotted to this working circle. These forests were managed under Coppice with Standards System. Rotation was fixed at 35 years for coppice and 70 years for standards. Yield was prescribed by area. Annual felling programme was also laid down.

7.15.4 Results of working

Regeneration from Coppice in Oak forests was good. Plantation of Oak, Eucalyptus and Robinia, etc. in blanks had almost failed but Chil was successful. Deodar has also come up on cooler sites in some of the forests. Annual felling Programme was more or less carried out according to schedule.

7.15.5 Plantation Working Circle

Mostly grassy blanks or areas occupied by low quality mixed deciduous broad leaved species were allotted this Working Circle. The Circle partly overlapped Coppice Working Circle. Definite plantation programme for areas in Coppice Working Circle was prescribed. Species suggested to be raised were Deodar, Walnut Chil, Khair, Eucalyptus, etc.

7.15.6 Results of working

The annual programme of raising plantation was strictly adhered to. Eucalyptus plantations had almost failed whereas Khair and Chil plantations were successful where protection was ensured.

7.15.7 Protection Working Circle

This Working Circle comprised of forests which were situated on too steep or geologically unstable ground and also which needed protection besides old ghasnies of Dhami State. No commercial felling was prescribed except those marked on conservative selection principles or under thinnings for meeting the right holders demand. Sowing, planting and soil conservation works were recommended.

7.15.8 Results of working

Little attention was paid to implement prescriptions of the plan. Chil planting was successful as compared to broad leaved planting.

7.16 Period from 1966 to 1980 (P.C. Sharma's Working Plan for erstwhile Shimla Forest Division)

Sharma's plan revised and integrated the following seven working plans /schemes, some of which were operative even beyond 1966.

i)	Revised working plan for the Keonthal state forest by DD Saigal.	1935-36 to 1964-65
ii)	Revised working plan for the Bhajji state forest by Hari Singh.	1940-41 to 1954-55
iii)	Second revised working plan for the Giri catchment forest of Shimla Forest Division by V. Raina.	1951-52 to 1980-81
iv)	Revised working plan for the Sutlej catchment forest of Shimla Forest Division by V. Raina.	1952-53 to 1971-72

The following five working circles were constituted.

7.16.1 Regular Working Circle

This working circle includes pure or mixed crops of deodar and kail, also mixed with fir and spruce which occurs on easy slopes and cover 8970.1 ha area. The main object was the conversion of the forests to regular and even aged crops and to obtain maximum sustained yield. The forests were managed under Punjab shelter wood system. Two felling series viz. Giri and Sutlej felling series were formed. Rotation was fixed at 120 years with four definite periodic blocks of 30 years each. The exploitation size was fixed at 60cm d.b.h. Yield was regulated by volume and prescribed separately for each PB except for PBII. Sowing and planting of deodar, kail and even fir and spruce were prescribed at suitable sites to supplement natural regeneration.

7.16.2 Results of working

The area allotted to all four PBs almost in proportion. From PBI the deficit yield was removed in case of deodar, kail and chil whereas excess felling was done in the case of wood for packing cases. The markings in PBI has come up well in the forests though yield was not prescribed from PBII but the removals were done due to salvage markings right holder demands and even for packing cases. Excess removal was also done in PBIII forests. In PBIV the thinning were prescribed in pole crops and final felling over established regeneration but these operations were not carried out in most of the areas. Deodar and chil were removed in excess in PBIV where as kail and fir/spruce were removed less than the prescription. Removal of deodar was higher to satisfy the demand of right holders.

7.16.3 Chil Working Circle

All pure or predominantly chil crops, covering an area of 1646.4 ha which are situated on easy ground, were allotted to these working circle. The forests were prescribed for management under the Punjab Shelterwood System. Two felling series viz. Giri and Sutlej felling series were formed. The main object was of the conversion of the existing irregular and under stocked chil forests into comparatively even aged stand with normal stocking and to obtain maximum possible sustained yield of resin and timber. The rotation was fixed at 120 years with four definite periodic blocks of 30 years each. The exploitable size was fixed 60 cms dbh. Yield was fixed by volume and was prescribed to be obtained from PBs I, III and IV. A sequence of fellings was also laid down. Resin tapping operations were also recommended as per technical order no. 13 of the Punjab forest manual Vol III.

7.16.4 Results of working

Fewer yields were removed from PBI mainly because the prescription was very conservative. The markings in PBI areas were light. Regeneration in PBI was dense in places and missing

elsewhere. No cleaning and thinning were done. The thinning on PBIII have been removals of trees for packing cases. Resin tapping by the French “Cup and Lip” method has resulted in heavy damage in the trees. The yield prescribed for chil only. Though no yield was prescribed for deodar and kail but removals have been made mainly to meet the demand of right holders. Due to over felling, the crop was very open.

7.16.5 Selection Working Circle

All the forests important for their aesthetic and protective value, covering an area of 23,444.7 ha were allotted to this working circle. The forests contain deodar, kail, spruce, fir, chil, oaks and other broad leaved trees, either pure or in mixtures. Two felling series viz, Giri and Sutlej felling series were formed. The object of management was protection and preservation of forests. The forests were prescribed to be managed under the group selection system, with shelterwood fellings in compact groups of mature trees on easy ground and true selection fellings else where. Exploitable size was fixed at 70 cms dbh for all species and a felling cycle of 15 years was prescribed. The yield was prescribed by number of trees over 70 cms dbh. All felling of trees 40 cms dbh and over in case of deodar, kail and chil and 60 cms dbh and over in case of fir and spruce were also to be counted towards yields. The blank and open areas were prescribed for sowing and planting by suitable species.

7.16.6 Results of working

Because of extraction of Fir/Spruce for packing cases, the concentrated fellings were done which resulted to appear these forests like regular working circle than those of the selection working circle. The regeneration was deficient and plantations were suffered due to heavy grazing. Fewer yields were removed than prescribed though concentrated felling has done in some forests.

7.16.7 Oak Working Circle

All the Ban and Mohru oak foests, which were not allotted to any other working circle, were put to this working circle, covering an area of 3995.6 ha. The forest was divided into two felling series viz, coppice and local felling series. Each felling series was further sub- divided into two sub-series, namely Giri and Sutlej. The main object of the management was the supply of fuel wood and charcoal. Coppice with Standards System was prescribed for coppice felling series while thinning cum improvement fellings were prescribed for local felling series. Sowing /planting of deodar were proposed in suitable localities. Rotation of 45 years for coppice and 90 years for standards was fixed. No rotation was fixed for local felling series. Yield as fixed by area and the size of the annual coupes was fixed as 1/45 of the area under coppice felling series and 1/15 of the area under local felling series. In the local felling series, the exploitable size was fixed at 60 cms dbh. Felling programme was made for both felling series.

7.16.8 Results of working

Due to heavy pressure of grazing and lopping, quite a few of the coppice coupes have not regenerated satisfactorily. Cleaning and thinning have not been done as prescribed, resulting in congested pole crops. Deodar sowing and planting is successful in patches in some of the forests, though it was not a good prescription. Against the area of 1376.2 ha prescribed for coppicing and cleaning during the plan period, an area of 1740.2 ha was actually gone over which may be due to excess demand of fuel wood and charcoal in Shimla town.

7.16.9 Plantation Working Circle

Blank and poorly stocked forests, covering an area of 8501.2 ha were allotted to this working circle. The main object of management was to rehabilitate the poorly stocked and degraded forests to meet the local requirements. A choice of species according to altitudinal zones had been prescribed and plantation technique clearly spelt out. A plantation programme was also laid down.

7.16.10 Results of working

The results of plantations were not much satisfactory due to inadequate protection and heavy pressures of grazing. The plantations were also not carried out as per prescriptions.

7.17 Period from 1977 to 1991 (D.D. Shagotar's Working Plan for Kunihar Forest Division, Dhami Range)

Mathaudas Plan was revised by D.D. Shagotar. Following Working Circles were constituted.

- I. The Chil Working Circle
- II. The Coppice Working Circle
- III. The Plantation Working Circle
- IV. The Protection Working Circle.
- V. The Bamboo Working Circle
- VI. The Chil Working Circle

7.17.1 Chil Working Circle

All forests bearing a predominantly Chil crop were allotted to this Working Circle with the special objects of management for the conversion of uneven aged and openly stocked Chil crops into more or less evenaged fully stocked crops, to protect the forests from fires and other damages and also to obtain the maximum possible yield of resin, timber and pulp wood on sustained basis.

7.17.2 Silvicultural system

The forests were managed under Irregular Shelterwood System. Rotation of 120 years with a regeneration period of 30 years was fixed. Exploitable diameter was fixed at 50 cms dbh. Allotment to PBI and PBII was made while remaining areas were grouped as PB intermediate.

7.17.3 Yield

Yield was regulated by volume. The yield was mainly prescribed from PBI areas by means of seeding fellings and final fellings. Felling programme of PBI areas was laid down. No yield was

prescribed from PBII areas. Only salvage removal was prescribed from PB Inter. Artificial regeneration of Chil was prescribed to supplement natural regeneration in PBI areas.

7.17.4 Results of working

Fellings were not done as per prescriptions. Most of the PBI areas could not be regenerated because of lack of protection and also due to the fact that seeding fellings were not carried out. Chil planting is mostly successful where the protection was provided. The removal of trees are mainly to meet the right holders demand and also for packing cases. Over tapping of resin from most of the trees by "Cup and Lid" method caused damage to them.

7.17.5 Coppice Working Circle

Ban Oak forests were allotted to this Working Circle. The special objects of management were, to meet the demand of fire wood, charcoal and fodder, etc, and to improve the stocking of these forests.

7.17.6 Silvicultural system

The forests were managed under Coppice with Standard System. Rotation of 35 years for coppice and 70 years for standards was fixed. The felling cycle of 35 years was prescribed. The yield was regulated by area. The sequence of felling was laid down. It was suggested to plant Ban seedlings raised in polythene bags, to improve the Oak stocking.

7.17.7 Results of working

Ban forests which were fully protected have been coppiced well but silvicultural operations have not been carried out. Because of heavy lopping in some of the forests, Ban has almost disappeared and such forests have been planted with Chil in past which is coming well. Such forests have been allotted to Chil Working Circle or Plantation Working Circle as the case may be, in the

Plan. Ban planting is not successful mainly because of biotic interferences.

7.17.8 Plantation Working Circle

Mostly blanks and poorly stocked forests were allotted to this Working Circle. The special objects of management were to meet the demand of fuelwood, to rehabilitate the degraded blanks and to protect the hill side against soil erosion.

7.17.9 Silvicultural system

These forests were managed under the Modified Clear Felling System in which it was prescribed to clear fell the area after retaining 20 to 30 trees per ha. The rotation was not prescribed. The yield was controlled by area. Felling programme was laid down. Mainly Chil and Khair were prescribed for planting. The planting programme was also laid down.

7.17.10 Results of working

Both felling and planting programmes were not followed. Except for Chil, the survival of other species is not satisfactory. Mostly the trees were felled to meet the rightholder's demand.

7.17.11 Protection Working Circle

This working circle comprised of the forests which were too remote to work or which were very open and situated on steep ground. The special objects of management were to protect the area against further denudation and erosion, to provide rest to over exploited areas, to improve the stocking and to meet the right holders demand

7.17.12 Silvicultural system

As these forests were prescribed to be protected and planted, so, no silvicultural system and rotation was prescribed. Accordingly, the forests were divided into two categories. A type in which only planting was prescribed. B type which were prescribed to be protected. Chil and Khair were mainly recommended to be raised

in A type of areas. A planting programme was laid down, conservation works also prescribed in some of forests.

7.17.13 Results of working

Planting programme as laid down had not been followed. Survival of Chil in most of the area was good as compared to other species. Some removals had also been made to meet the right holders demand.

7.17.14 Bamboo Working Circle

As the forests allotted to this Working Circle was not available in the present Dhami Range, it was not described here.

7.18 Period from 1981 to 1995 (Pankaj Khullar's Working Plan for erstwhile Shimla Forest Division)

This working plan dealt with all Reserved, Demarcated Protected and Undemarcated Protected Forests of erstwhile Shimla Forest Division which was further divided into Shimla and Theog Forest Division vide CCF HP notification no FT SC-A (i) 1/83 dated 28.4.1984. It also included the Gohach Block of Kotgarh Forest Division which was transferred to Theog Forest Division after P.C. Sharma's plan had been compiled. It did not include the forests of Taradevi and Dhami Ranges which were transferred from Solan and Kunihar Forest Divisions respectively to present Shimla Forest Division. However, the past history of management of the forest of Taradevi and Dhami Ranges has been discussed separately. Though this working plan was operative for the period 1981 to 1995 but it was approved in 1987. Keeping in view the objects of management and the method of treatment, the following seven working circles were constituted.

I.	The Regular Working Circle	9339.1 ha.
II.	The Chil Working Circle	1522.7 ha.
III.	The Oak Working Circle	4549.2 ha.
IV.	The Protection Working Circle	29911.6 ha.

- V. The Plantation Working Circle 8365.0 ha.
 VI. The Social Forestry Working Circle 5767.1 ha.

7.18.1 Regular Working Circle

All the Reserved and Demarcated Protected Forests with predominance of deodar, kail, fir and spruce, which lie on comparatively easy ground, were allotted to this working circle. Some fir and spruce forests of Selection Working Circle of the P.C. Sharma's plan including those forests which were worked for supply of geltus to packing cases industry were also added to this circle. The forests were to be managed under Irregular Shelterwood System with the fixed periodic blocks. Complete enumerations of all conifers and important broad leaved species, down to 10 cm dbh was carried out in standard 10 cm diameter classes in all the forests allotted to this working circle.

7.18.2 Objects of management

The special objects of management were the conversion of existing irregular forests into regular and even aged crops, steady supply of wood for packing cases and replacement of diseased kail with deodar and spruce in suitable localities beside overall conservation of the environment and improving the density of these forests.

7.18.3 Rotation and allotment

The rotation was fixed at 120 years corresponding to the exploitable size of 60 cms dbh and the regeneration period as 30 years. Definite allotment to all four periodic blocks (30 years each) was made and area allotted to each PB is given below.

Table-41

PBI	2257.3 ha
PBII	2296.9 ha
PBIII	2382.6 ha

PBIV	2402.3 ha
Total	9339.1 ha

7.18.4 Yield

Yield was regulated by volume and prescribed separately for PBI and PBIV. In PBI 45 to 50 trees of deodar, 25 to 30 trees of kail and 50 to 55 trees of fir and spruce of class IIB and IA per ha were recommended to be retained as seed bearer. 10% of growing stock was also prescribed to be retained in PBI on account of situation of steep slopes etc. No commercial fellings were prescribed in PBII. Trees above class IIA were also not recommended to be given to right holders. Only salvage removals were prescribed and all the removals were accounted towards the yield of the working circle. As the crop was open so thinnings were not prescribed in PBIII which were included in the yield from this circle. In PBII after retaining some percentage of class IA and above trees, the rest were prescribed to be removed. This percentage for various species was fixed as deodar 40%, kail 20%, fir/spruce 50% and chil 10%. A deviation of 15% for every five years period and the total deviation at the end of working plan period not exceeding $\pm 10\%$ was prescribed. All removals were to be counted towards yield. Sequence of fellings was prescribed for PBI and PBIV areas. Seedlings fellings were to depend on the condition of the crop in PBI while final felling was prescribed in PBIV. Compact groups of poles up to 30 cms dbh of density not less than 0.7 and at least 0.25 ha in extent were to be retained as part of the future crop in PBI areas.

7.18.5 Sowing/planting

Sowing and planting of Deodar, Kail, Fir, and Spruce were advised to supplement natural regeneration. Cleaning was prescribed in the 2nd, 4th, 6th, 10th, and 15th years of regeneration.

At the end of 15 years the spacing of saplings was to be one meter apart. Closure for 30 years of all regeneration areas was advised.

7.18.6 Results of working

The area allotted to the entire periodic blocks was almost equal and thus it was a proportionate allotment. The total yield was prescribed and removed. But the removal was higher in case of deodar, fir and even broad leaved species. As no seeding fellings, final fellings or other commercial fellings had been done from PBI, PBIII and PBIV areas because of ban on green fellings even then the removals are higher. Deodar trees had been given to right holders even from PBI areas. The salvage working was also accounted for higher removal. Thinning and cleanings were prescribed in PBIV which did not seem to be carried out. Sowing and planting of deodar was also not successful where the protection was not ensured.

7.18.7 Chil Working Circle

This working circle included such forests which comprised of pure or predominantly chil crops and was situated on easy slopes. The forests were managed under Punjab Shelterwood System with fixed periodic blocks. Total enumerations down to 10 cms dbh were carried out.

7.18.8 Objects of management

The special objects of management were the conversion of existing irregular forests in to regular and even aged crop, to conserve and improve the density of stocking in these forests and to protect the forest against fire hazard.

7.18.9 Rotation and allotment

The rotation and conversion period had been fixed at 120 years, corresponding to average crop diameter of 60 cms dbh.

Regeneration period was fixed at 30 year each, were formulated. Area wise allotments to various PBs are given in table-42.

Table-42

PBI	387.8 ha
PBII	270.6 ha
PBIII	418.6 ha
PBIV	445.7 ha
Total	1522.7 ha

7.18.10 Yield

Yield was fixed by volume and was prescribed to be obtained from PBI and PBIV only. In PBI areas, 20 trees of class IIA to IA were recommended to be retained as seed bearers where as 10% of the growing stock was prescribed to be retained on account of situation of steep sloped etc. Though, the yield was calculated for prescription from PBI but it was found that no yield was available. Yield from PBIV was prescribed from trees on steep slopes, nallas, roads path, etc. Final fellings were prescribed in PBIV. Because of inadequate density in PBIII areas, no yield was prescribed. However, trees granted to right holders, for packing cases and salvage removals were prescribed from PBIII areas and all these removals were counted towards the total yield of the working circle. No removals of any sort were prescribed from PBII except salvage removals which were also counted towards the total yield of the working circle. It was suggested that deodar, kail, oaks and other broad leaved species would be retained as far as possible. A maximum deviation of $\pm 10\%$ over a five years period and the over all deviation over the plan period also up to $\pm 10\%$ was permitted. A sequence of felling was laid down for PBIV areas.

7.18.11 Resin tapping

Resin tapping was recommended by “Rill Method”. It was prescribed that the forest should be given a rest for five years and should be worked for five years alternatively. Tapping was not recommended in PBI areas where seeding fellings had been done and also from the trees which were below 40 cms dbh.

7.18.12 Fire protection

Precautions to be undertaken to avoid fire were prescribed. Fire lines particularly in regeneration areas and control burning were recommended.

7.18.13 Results of working

Against total yield prescribed for chil from 1981-82 to 1992-93, very less yield was removed. Though no yield was prescribed for deodar, kail and broad leaved species even then removals were carried out from 1981-82 to 1992-93. No seeding fellings and final fellings were carried out. The main removals were the grant to right holders and for packing cases besides salvage removals. The regeneration in PBI was good where full protection was provided. The commercial fellings had not been done, due to ban on green fellings. By introducing rill method for resin tapping, there were fewer damages to the trees.

7.18.14 Oak Working Circle

This working circle covered all Reserved, DPFs and UPFs predominated with Ban and Mohru oaks. The forests of Shimla Forest Division were divided into two felling series namely (i) depot and (ii) preservation and protection felling series.

7.18.15 Objects of management

The special objects of management were to increase the stocking of these forests to meet the local demand, to meet the demand of fuel wood and charcoal of the urban centres of Shimla and Sunni etc. and also the preservation of the ecosystem.

7.18.16 Stock maps, enumerations, etc.

Detailed stock maps on 1:15000 scales were prepared for all the forests allotted to this working circle. Density varied from open to well stock in the reserved and demarcated protected forests. Total enumerations were carried out down to 10 cms areas allotted to depot felling series. No enumeration had been done in the areas allotted to the preservation and protection felling series.

7.18.17 Silvicultural system

The forests allotted to the depot felling managed under “Coppice with Standards” system while only salvage removals were prescribed from preservation and protection felling series. The artificial regeneration of oaks was proposed in the areas which were blank or lacking adequate natural regeneration.

7.18.18 Rotation and yield

Rotation of 45 years for coppice and 90 years for standards was fixed. No rotation was fixed for preservation and protection felling series because no felling was prescribed except salvage removals. Yield was prescribed from depot felling series only which was fixed by as $1/45^{\text{th}}$ of the area under preservation and protection felling series for purpose of salvage removals. Detailed rules were laid down for carrying out fellings. 70 to 80 trees, preferably of seed bearers, per hectare were to be retained as standards in coppiced coupe. Singling in coppiced areas was prescribed to be carried out in the 6th years of felling, retaining 5 to 6 healthy and vigorous shoots per stump. Thinnings were prescribed in 15th year of fellings reducing the number of shoots to 2 to 3 on each stump. A felling programme was also laid down.

7.18.19 Results of working

Due to heavy pressure of grazing and lopping, quite a few of the coppice coupes had not been regenerated satisfactorily. There was almost disappearance of ban trees in some of the forests pertaining

to Dhami Range which was because of heavy lopping and due to chil planting; these had become good chil forests. Such forests had now been allotted to chil working circle. The areas which had been coppiced well but singling and thinning had not been done as per prescriptions. Natural regeneration of oak was lacking mainly because of lack of protection. Though no yield was prescribed for deodar, kail, chil and board leaved species even then there were some removals.

7.18.20 Protection Working Circle

The forests on steep and remote localities, along important streams, rivers, roads and around places of tourist interest were allotted to this working circle. These forests comprised of either pure or mixed crops of deodar, kail, fir, spruce, chil, oak or other broad leaved species.

7.18.21 Objects of management

The special objects of management were the preservation of forest, conservation of soil, water etc. improvement in the stocking of the forests and to provide aesthetic cover along the national high way and around the place of tourist interest.

7.18.22 Stock maps, density and enumeration

Stock maps for all the forests on 1:15000 scales were prepared. The average crop density estimated occularly varied from 0.5 to 0.8 in RFs and DPFs and from 0.2 to 0.7 in UPFs. Since no removal was prescribed in this working circle, thus enumerations were not carried out.

7.18.23 Silvicultural system

Since no removals were permitted therefore no silvicultural system and yield was prescribed. However, salvage removals were

allowed to meet the demands of right holders, for sale if there was sufficient demand with a felling cycle of 10 years.

7.18.24 Sowing and planting

In addition to natural regeneration, sowing and planting of the naturally occurring species in the locality were prescribed to fill up the gaps. Exotic species were not recommended for planting. All planted areas were prescribed to be closed for 10-15 years. A programme for sowing and planting was also laid down.

7.18.25 Results of working

The sowing and planting had not been done as per planting programme. Though, removals were not prescribed but TD had been given from some forests and also fir and spruce trees were removed for packing cases. By allotting some forests in this working circle along the national highway and around the places of tourist interest, had been preserved which also gave aesthetic view of the surrounding. Regeneration was generally deficient and plantations had suffered because of heavy grazing.

7.18.26 Plantation Working Circle

Mainly blank UPFs as well as poorly stocked and degraded RFs and DPFs were allotted to this working circle.

7.18.27 Objects of management

The special objects of management were raising of plantations of economically important species and protection of hill sides against erosion.

7.18.28 Stock maps and enumerations

Stock maps of all forests were prepared on 1:15000 scales. No enumerations were carried out in these forests.

7.18.29 Silvicultural system

No silvicultural system was prescribed since the main object was to raise the plantation. As no fellings were involved, so yield was also not prescribed.

7.18.30 Sowing/planting

A choice of species according to altitudinal zone had been prescribed land plantation technique clearly spelt out. A plantation programme for sowing/planting in these areas was also laid down. Beating up of failures and tending operations were also prescribed.

7.18.31 Results of working

Large scale plantations of conifers and broad leaved species had been carried out but the planting programme as prescribed had not been adhered to. Most of the plantations were not successful to the desired level because of inadequate protection, heavy pressures of grazing and some time due to wrong choice of species. The results were not much satisfactory in case of oaks and other broad leaved species while chil plantations were mostly successful. Deodar plantations in general, were satisfactory whereas not much efforts had been made to raise successful plantations of fir and spruce. Though, removals were not prescribed from this working circle even then trees had been granted to right holders besides salvage removals.

7.18.32 Social Forestry Working Circle

Mainly blanks and poorly stocked UPFs which were having fairly good soil and suited for raising broad leaved species were allotted to this working circle. Such areas were located close to villages and habitations.

7.18.33 Special objects of management

The main objects of management were to raise plantations of broad leaved species to meet the fuel fodder and timber requirements of the local population to provide better and

nutritional grasses for fodder and to protect the hill sides against soil erosion and other degradation.

7.18.34 Stock maps and enumerations

Stock maps of all the forests were prepared on 1: 15000 scale. Enumerations of these forests were not carried out.

7.18.35 Silvicultural system

Since only plantations were to be raised, so, no silvicultural system was prescribed. As no removals were recommended, so yield was also not prescribed.

7.18.36 Sowing/planting

Broad leaved species suited to locality according to altitudinal zone were prescribed. These species were suggested to be raised in consultation with villagers. Though the forests were selected under this working circle but plantation programme was not proposed. Selection of the area was left to the discretion of DFO. These works were suggested to be executed under various social forestry schemes. Plantation methodology was suggested in detail.

7.18.37 Results of working

Large scale plantations were carried out under social forestry project but results were not much satisfactory mainly because of biotic interferences in UPFs, heavy demand of fuel, fodder and timber and lack of protection. Social forestry project was launched in 1985 and continued up to March 1993 and after that no plantation was raised under this project, thus this working circle had not got any importance since then. Though, removals were not prescribed from this working circle but timber to right holders had been granted to some extent besides salvage removals.

7.18.38 Wildlife (Over lapping) Working Circle

This working circle overlapped all other working circles of this plan except the plantation and social forestry working circles. The wild mammals, reptiles, birds, fishes found in the tract had been described.

7.18.39 Objects of management

The main objects of management were the conservation of existing wildlife in the forests, to create conditions in the habitat conducive to the undisturbed propagation and survival of wild animals and to create certain areas to be reserved for the scientific study and for aesthetic entertainment of the people.

7.18.40 Silvicultural system

The Shelterwood System was prescribed. Various operations like weedings, cleanings and thinnings were also recommended, slash disposal was not recommended in case if it did not create a fire hazard. It was prescribed that the source of water should be preserved and blocks of salt should be provided along path.

7.18.41 Poaching

To control poaching, it was suggested that wildlife guards must be posted at important places where the incidence of poaching was high, strict action should be taken against poachers, educate people regarding values of wildlife and the policy in respect of issue of crop protection licences should be rationalized.

7.18.42 Plantations

It was suggested that wherever necessary for favour of wildlife enhancement, mixed plantations of deciduous and coniferous species should be done.

7.18.43 Results of working

Because of overlapping system of working, the results were not satisfactory. The prescriptions had not been followed in letter and

sprit. A forest area of 90.40 ha had been transferred to create Himalayan Nature Park at Kufri and 1062 ha forest area to Chail Wildlife Sanctuary which were neither prescribed nor suggested. The number of wild animals seemed to be increased, may be because of ban on shooting. In some areas wildlife was decreasing, may be because of biotic interferences in the forests.

7.18.44 Results of working

Most of the regulations so prescribed had not been followed. There had been increase in allotment of timber to right holders even from PBII and forests of protection working circles. The UPFs had not been demarcated properly and boundary pillars around reserved forests and demarcated protected forests had not been maintained to the desired level. There were large number of nautors and even enchroachments in UPFs and DPFs. Most of the roads, buildings and fire lines as prescribed had not been constructed. The notification of 13 DPFs as RFs had also not got done. In general, this aspect of the working plan seemed to have been largely ignored.

7.18.45 Deviation from prescribed yield during entire period of working plan

Total yield prescribed and removed along with deviation from all working circles during the plan period from 1981-82 to 1992-93 is given in the table-43.

Table-43

Volume removed (cum) from 1981-82 to 1992-93

Species	Yield prescribed	Yield removed	Deviation
Deodar	59280	118896.1	+59616.1
Kail	53280	78953.04	+25673.04
Chil	7920	44639.41	+36719.41
Fir	1800	38412.93	+36612.93

Spruce	10380	16418.729	+6038.729
B/L	0	4023.83	+4023.83

7.19 Period from 1984 to 1998 (K.K. Gupta's Working Plan for Solan Forest Division, Taradevi Range)

Sandhu's working plan was revised by Sh K.K. Gupta for the period from 1983-84 to 1997-98. The following working circles were constituted. Though the plan was written for whole of Solan Forest Division but the area under various working circles of Taradevi Range are given below:

I.	Chil Working Circle	77.20 ha.
II.	Oak Working Circle	99.40 ha.
III.	Rehabilitation Working Circle	202.80 ha.
IV.	Tourist Complex Working Circle	1150.40 ha.

7.19.1 Chil Working Circle

This working circle included all the chil forests except those situated near tourist complexes, national highway, the railway line or which had some important water sources. The special objects of management were to conversion of irregular crop to regular to meet the local demand of fuel, fodder, timber, etc, to provide the timber for packing cases and productions of resin, etc.

The forests were managed under Punjab Irregular Shelterwood system. Only one felling series was constituted. The rotation was fixed for 120 years with exploitable diameter at 60 cmsdbh. Regeneration period was 30 years and four periodic blocks of 30 years each were formed. The artificial planting of chil was recommended to supplement natural regeneration.

7.19.2 Yield

Yield was calculated by volume. Total annual yield prescribed for whole Solan Forest Division was 6000 m³. The yield for Taradevi

Range was not calculated separately, so not given here. Felling programme for PBI and PBIV areas was laid down. Guidelines for marking and method of felling in PBI and PBIV areas were prescribed.

7.19.3 Results of working

All the prescriptions were not followed in letter and spirit. The felling was not done as per prescriptions. Planting of chil is successful where proper protection was given. As the yield for Taradevi was not prescribed separately, so variations could not be worked out. Most of the removal even from PBII was for meeting the demand of right holder and for packing cases.

7.19.4 Oak Working Circle

This working circle included all the oak forests except those situated near the tourist complex along the national highway, railway line and also those having water sources located in them. The special objects of management were to improve the stocking of these forests and to meet the local requirement of fuel, fodder, small timber, etc.

The improvement fellings were prescribed in which only salvage removals were recommended. No commercial fellings were recommended. Sowing and planting of Ban oak was prescribed to improve the stocking of these forests. Planting programme was also laid down.

7.19.5 Results of working

The results were not encouraging. Lopping in most of the forests was very heavy. Sowing and planting of ban was also not successful because of biotic interferences and lack of protection. Planting programme was not followed.

7.19.6 Rehabilitation Working Circle

This working circle included all scrub forests, blank areas except those situated near the tourist complexes, the national highway, railway line or which had water sources located there in.

7.19.7 Objects of management

The main object of management was to meet the local demand of fuel, fodder, timber, etc. to improve the stocking of the degraded forests, to improve the environment and to protect the wildlife.

7.19.8 Silvicultural system

Clear Felling with retention of commercially important species as reserves, was prescribed. The felled area was prescribed to be planted with economically important species suited to the locality. Rotation of 30 years for coppice and 90 years for reserves was prescribed. Yield was not prescribed. Plantation programme was laid down.

7.19.9 Results of working

Bamboo forests were not available in Taradevi Range so working was not assessed. However in the other forests allotted to this working circle and Taradevi Range, the planting of chil and broad leaved species was carried out. Chil was mostly successful while the survival of broad leaved species was not satisfactory. Planting programme was not followed.

7.19.10 Tourist Complex Working Circle

The forests situated around tourist complexes along national highway and railway line, and which needed to be preserved from soil conservation or any other point of view, was allotted to this working circle.

7.19.11 Objects of management

The special objects of management were to preserve the environment, to give aesthetic view, to ensure water supply, to

check soil erosion and land slides and to improve the stocking by planting.

7.19.12 Method of treatment

No green fellings were prescribed except salvage removals. Right holder demand was prescribed to be fulfilled by salvage trees only. The forests were prescribed to be closed in phase manner for improving the stocking. In this respect DFO was authorized to prepare the annual programme of planting. The planting of ornamental trees was prescribed along the road and railway line. The camping sites and picnic spots were proposed for development. The hiking paths were also proposed. Rope way and mini zoo were also suggested.

7.19.13 Results of working

The various suggestions and proposals were not followed. Planting of various species except chil was also not successful to the desired level.

7.20 Period from 1996 to 2011 (Dr. Lalit Mohan's Working Plan for Present Shimla Forest Division)

This working plan dealt with all Reserved, Demarcated Protected and Undemarcated Protected Forests of present Shimla Forest Division. This working plan was operative for the period 1996 to March 2011. The prescription of this working plan would continue to be applicable

to the forests of Shimla Forest Division till the working plan under revision was approved which would be applicable for next 15 years from the date of its approval. Khullar working plan was revised by Dr. Lalit Mohan and following working circles were constituted.

- I. Deodar-Kail Working Circle
- II. Chil orking Circle
- III. Fir and Spruce Working Circle
- IV. Oak Working Circle

- V. Biosphere Conservation Working Circle
- VI. Plantation Working Circle

7.20.1 Deodar-Kail Working Circle

This working circle covered all the predominate Deodar and Kail Forests occurring on moderate to steep slopes fit for working under the concentrated fellings in various RFs , DPFs and UPFs. The crop was mostly young to middle aged with scattered mature trees. Stocking in general was moderate to fairly dense. Natural regeneration was mostly deficient. All forests of deodar and kail covering an area of 2966.10 ha were allotted to this working circle. The forests allotted to this working circle would be managed under Indian Irregular Shelterwood System. Compact groups of advance growth up to 30 cm dbh and 0.2 ha or more in extent would be retained as advance growth. Individual poles or middle aged trees would not be retained while carrying out seeding fellings. Efforts would be made to get PBI areas regenerated naturally and regeneration would be supplemented by artificial regeneration operations. No felling would be carried out in PBII areas except salvage removal. Thinnings would be carried out in PBIII wherever required. Final fellings alongwith thinning and cleanings as per requirement of the crop would be carried out in PBIV areas.

7.20.2 Objects of management

Without prejudice to the general objects of management, the special objects of management were:

- i) To convert the irregular and unevenaged crops into more or less uniform normal evenaged crops.
- ii) To restock the PBI and other blank areas as soon as possible by resorting to artificial regeneration.

- iii) To obtain progressive yield in perpetuity after meeting the legitimate demands of the local people.
- iv) To preserve and protect the forests to maintain the mountain ecosystem.

7.20.3 Rotation and allotment

The rotation of 120 years had been fixed for all the species in this working circle. As the forest of this circle were in the process of conversion from irregular to regular and conversion partly achieved also and therefore conversion period was fixed as 75 years. Regeneration period of 30 years was considered sufficient to regenerate PBI area. The exploitation diameter was fixed 60 cm dbh. Definite allotment to all four PBs was made and area allotted to each PB is given below in table-44.

Table-44

PBI	733.90 ha
PBII	441.00 ha
PBIII	746.90 ha
PBIV	744.30 ha
Total	2966.1 ha

7.20.4 Yield

The yield from this working circle was obtained from all the PBs except PBII and PBIII where no commercial fellings were prescribed. Yield would be regulated by volume, and would be limited to the increment put on by the crop.

7.20.5 Yield from PBI

All PBI areas had been enumerated down to 10 cm dbh. Those forests which were having mostly middle aged to mature tree and were allotted either to PBII of Regular working circle or other working circle as per previous working plan, were allotted to PBI where seeding fellings had been recommended. The total area was 381.50 ha in Shimla. In such areas all trees were to be felled except.

- i) Seed bearers
- ii) On strategic locations like along nalas/broken grounds etc.
- iii) Selection marking in steep precipitious slopes.
- iv) Advance growth.

The main volume to be retained would be of seed beares. On an average basis, 40, 30, 75, 40 and 22 trees per ha of Deodar, Kail, Fir, Spruce and Chil were to be retained as seed bearers. The average dia class was to taken as IIB. Since the crop was heterogeneous or in patches so the trees would also be retained accordingly. Annual yield for Deodar 1000 cum, Kail 1200 cum and Spruce 50 cum.

7.20.6 Yield from PBIV

There would be removal of overwood and thinning in young crop in PBIV. 60 % overwood i.e. trees of IIA and above required removal to free young poles from overhead shade. Annual yield for Deodar 800 cum, Kail 400 cum, Spruce 50 cum and Chil 100 cum.

7.20.7 Results of working

As no seeding fellings, final fellings or other commercial fellings had been done from PBI, PBIII and PBIV areas because of ban on green felling even then the removals were higher. Deodar trees had been given to right holders even from PBI areas. In most of the area allotted to PBI, the regeneration was not good because of less number of seed bearers or lack of protection. Thinnings and cleanings were prescribed in PBIV which did not seem to be

carried out. Sowing and Planting of Deodar was not successful where protection was not ensured. The total yield prescribed and removed from 1996 to 2011 is given in the following table-45.

Table-45
Deviation in Deo-Kail Working Circle

Periodic block	Yield prescribed (cum)	Yield extracted (cum)	Deviation (cum)
PBI	33750	4068.217	(-) 29681.783
PBII	0	6865.8736	(+) 6865.8736
PBIII	0	3820.774	(+) 3820.774
PBIV	20250	5778.5597	(-) 14471.4403

7.20.8 Chil Working Circle

All forests bearing a predominantly chil crop and located on easy slopes had been allotted to this working circle. It also included the areas where chil plantations had been established. Moreover, some of the forests which were managed under coppice/oak working circle as per previous plans, and having chil as predominant species, had also been allotted to this circle. The forests covering an area of 2537.90 ha were allotted to this working circle. The forests allotted to this working circle should be managed under the Indian Irregular Shelterwood System. Advance growth upto 30 cm dbh occurring in compact groups of 0.2 ha or more would all be retained to form part of future crop. No isolated single tree or pole would be retained. The forests would be generally regenerated naturally and supplemented with artificial regeneration.

7.20.9 Objects of management

In keeping with general objects of management, the special objects of management of the forest allotted to this working circle were:

- i) To convert the existing irregular crops into normal forests by obtaining normal growing stock, normal age class distribution and normal regeneration.
- ii) To improve the stocking of pure forests by artificial regenerations.
- iii) To obtain maximum, sustained yield of resin and timber.
- iv) To protect the forests including plantation areas against the fire hazard.

7.20.10 Rotation and allotment

With a rotation of 100 years and regeneration period of 25 years, the whole working circle had been divided into four periodic blocks to achieve the set objectives. Area wise allotment to various PBs was as given in the table-46.

Table-46

PBI	716.20ha
PBII	650.30 ha
PBIII	562.70 ha
PBIV	608.70 ha
Total	2537.90 ha

7.20.11 Yield

The yield from this working circle would consist of yield from PBI and PBIV areas.

7.20.12 Yield from PBI

All PBI areas had been enumerated down to 10 cm dbh. Those forests which were having mostly middle aged to mature trees and were allotted either to PBII of regular working circle or other

working circles as per previous working plans, allotted to PBI where seeding fellings had been recommended. The total area was 403.20 ha in Shimla felling series. All trees were to be felled except:

- i) Seed bearers
- ii) On strategic locations like along nallas/broken ground etc.
- iii) Selection markings on steep precipitous slopes.
- iv) Advance growth.

The main volume to be retained was of seed bearers. On an average basis, 22 trees of chil per ha were to be retained as seed bearers. The average dia class was to be taken as IIB.

7.20.13 Yield from PBIV

There would be removal of overwood and thinning in young crop in PBIV, while removing overwood, the trees would have to be retained on strategic locations like along nallas, broken grounds, etc. It was estimated that about 60% of the overwood i.e. trees of IIA and above required removal to free young poles from overhead shade.

7.20.14 Results of working

No seeding fellings and final fellings were carried out. The main removals were for the grant of right holders besides salvage removals. The regeneration in PBI was good where full protection was provided. The commercial felling had not been done due to ban on green felling. By introducing rill method for resin tapping, there was less damage to the trees. The total yield prescribed and removed from this working circle from 1996 to 2011 is given in the following table-47.

Table-47

Deviation in Chil working circle

Periodic	Yield prescribed	Yield extracted	Deviation
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block	(cum)	(cum)	(cum)
PBI	15000	1073.913	(-) 13926.087
PBII	0	2442.1895	(+) 2442.1895
PBIII	0	1664.8827	(+) 1664.8827
PBIV	4500	3418.2995	(-) 1081.7005

7.20.15 Fir/Spruce Working Circle

Fir and Spruce forests did not occur as pure crop or even in mixture supporting more than 10% of its composition now in Shimla Forest Division and therefore this has not been discussed here.

7.20.16 Oak Working Circle

All Reserved, Demarcated Protected and Undemarcated Protected Forests having Ban, Mohru and Kharsu oaks as predominant species had been allotted to this circle. Ban almost occurred pure in many forests of Taradevi, Koti, Dhami and Mashobra Ranges of Shimla Forest Division. The forest especially which were nearer to the habitation were under heavy pressure for collection of fuelwood and charcoal by the local villagers, so they were heavily lopped. The forest allotted to Oak working circle had been divided into two felling series namely (i) Commercial (ii) Biosphere conservation. 1st felling series would be managed under Coppice with Standard System and in 2nd category, no green felling was prescribed, however, salvage removals would be made. The forests covering an area of 4977.40 ha had been allotted to this working circle.

7.20.17 Objects of management

- i) To improve the stocking of the forest by both natural and artificial regeneration methods in the areas where the density is low.

- ii) To meet the rights of the local people for fuel, fodder, grazing and wood for agricultural implements.
- iii) Consistent with the above, to preserve and maintain the ecosystem and ensure soil conservation and steady supply of water in the springs and streams of the locality.
- iv) Consistent with the progress of regeneration, to ensure supply of fuel and charcoal to Shimla and other towns subject to Govt. policy regarding felling of Oak trees.

7.20.18 Rotation and allotment

The rotation of Ban/Oak was prescribed at 90 years for standards and 45 years for coppice in commercial felling series. As no green felling was prescribed for Biosphere Conservation series so, no rotation was fixed.

7.20.19 Yield

Yield was prescribed by area. In commercial felling series, the average annual coupe would be $1/45^{\text{th}}$ of the area allotted to this series. For Biosphere Conservation felling series the size of the annual coupe would be $1/15^{\text{th}}$ of the area for the purpose of salvage markings only.

7.20.20 Results of working

Due to heavy pressure of grazing and lopping, quite a few of the coppice coupes had not been regenerated satisfactorily. There was almost disappearance of Ban trees in some of the forests pertaining to Dharmi Range which was because of heavy lopping. There were areas which had coppiced well but singling and thinning had not been done as per prescriptions. Natural regeneration of Oak was lacking mainly because of lack of protection. Sowing and planting of Oak was also not satisfactory. Green felling of Ban/Oak was not done on commercial basis due to complete ban on its felling, however to meet the domestic and agricultural need of the right holders some removals had taken place. Total removal from this

working circle during the plan period is given in the following table-48.

Table-48

Deviation in Oak Working Circle

Yield prescribed (cum)	Yield extracted (cum)	Deviation (cum)
0	10028.065	+ 10028.065

7.20.21 Biosphere Conservation Working Circle

The forests which were situated on steep and precipitous slopes, near major streams and nallas, on either side of National/State Highways, railway line, areas susceptible to erosion, near habitations where the biotic interference was high and around places of tourist importance etc. were allotted to this working circle. As no exploitation of forests was involved therefore, no silvicultural system was prescribed. Thus there would be no green felling except to meet the bonafide demand of right holders. The requirements would however, be met with as far as possible from salvage removals. The forests would be protected from soil and water conservation, aesthetic and tourist point of view besides maintaining the ecological balances. The forests of this circle represent almost all forest types which were found in the tract. Total area of this working circle is 10271.32 ha.

7.20.22 Objects of management

- i) Protection of hills from denudation and erosion.
- i) Conservation of moisture and regulation of flow of water in nallas and streams.

- ii) To preserve the environment around tourist centres and along the highways to maintain and enhance their utility and beauty for tourist recreations and for wildlife.
- iii) To prevent indiscriminate lopping of trees.
- iv) To introduce valuable species especially for the production of fuel and fodder by artificial planting in the blank areas.
- v) Consistent with the above to meet the demands of local right holders entirely on silvicultural principles regarding timber, fuel wood and grazing.

7.20.23 Yield

No yield was prescribed but removals had taken place.

7.20.24 Results of working

Large scale plantations were carried out but the results were not much satisfactory to restock the forests fully mainly because of biotic interferences, heavy demand of fuel, fodder and timber and also lack of protection. Planting of various species except chil was also not successful to the desired level. Though, removals were not prescribed from this working circle but timber to right holders had been granted to some extent besides salvage removals.

Total removal from this working circle during the plan period is given in the following table-49.

Table-49
Deviation in Biosphere Conservation Working Circle

Yield prescribed (cum)	Yield extracted (cum)	Deviation (cum)

0	24516.664	+ 24516.664
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7.20.25 Plantation Working Circle

This working circle included mainly blank Undemarcated Protected Forests and degraded, barren or poorly stocked Reserved and Demarcated Protected Forests which required immediate attention and were not allotted to other working circle. Thus, this circle included most of the forests of plantation and social forestry working circles in Khullar's plan (for Shimla and Theog Forest Division), forests allotted to rehabilitation working circle in Gupta's plan (Taradevi Range only) and plantation working circle in DD Shagotar's plan (Dhami Range only) . Some of the forests allotted to Protection Working circle in previous plans where planting had been prescribed, were also allotted to this circle. These forests were either blank or poorly stocked with mixed deciduous species and some coniferous trees. There was heavy pressure of grazing, lopping, grass cutting and browsing in these areas. As the main object is to raise plantations, therefore, silvicultural system, rotation and exploitable sizes were not prescribed. Area allotted to this working circle under Shimla Forest Division is 10587.82 ha.

7.20.26 Objects of management

- i) To develop and augment the forest resources of the area by afforestation in blank and poorly stocked areas.
- ii) To improve the soil cover by closing eroded areas and thus improving the general environment of these degraded areas.
- iii) To regulate the flow of water in the streams and rivers by resorting to large scale plantations.
- iv) Raising suitable species which can fulfill the local demand of fuel, fodder, timber, etc.

7.20.27 Yield

No yield was prescribed but TD had been given from some forests besides removals in salvage.

7.20.28 Results of working

Large scale plantations of conifers and broad leaved species had been carried out but some of the plantations were not successful to the desired level because of fire, inadequate protection and some times due to wrong choice of species. The results were not satisfactory in case of Oaks and other broad leaved species. Deodar plantations were found satisfactory. Total removals from this working circle are given in the table-50.

Table-50

Deviation in Plantation Working Circle

Yield prescribed (cum)	Yield extracted (cum)	Deviation (cum)
0	3451.345	+3451.345

CHAPTER-VIII

STATISTICS OF GROWTH AND YIELD

8.1 Quality class assessment

Quality class assessment has been done in the same manner as adopted by Mr. P.C. Sharma and Pankaj Khullar in their Working Plans of Shimla Forest Division. Though, the site quality has been estimated on ocular basis but random checking was done in some of the forests. Dominant/Co-dominant trees of predominant species in some of the site quality of Deodar in Sutlej catchment varies from quality II to quality I, in Giri catchment, the average being I/II. The average quality classes for Kail as II/III and Chil as II have also been adopted as have been assessed by Mr. P.C. Sharma and Mr. Pankaj Khullar. As the quality classes of Fir and Spruce have not been standardized, so, it has not been determined. The quality class, so assessed in a particular compartment, has been recorded in the CH file.

8.2 Density

Density has been determined ocularly on the basis of canopy closure and recorded in the relevant CH file.

8.3 Enumerations

The enumeration figures have been worked out on the basis of 10% stratified random sampling carried out in Deodar-Kail and Chil Working Circles and in Biosphere Conservation and Plantation Working Circles. 5% stratified random sampling was carried out and final figures have been arrived after extrapolating the figures for each forest. The enumeration in standard 10 cm diameter classes, down to 10 cm dbh, has been carried out in each forest. The enumeration figures have been recorded in the CH files of respective compartment of the forests.

8.4 Stock maps

Stock maps of all the forests, RFs, DPFs and UPFs have been prepared on the survey sheets prepared by Survey of India, in the scale of 1:15000. These stock maps have been placed in the concerned CH files.

8.5 Volume table

The local volume tables as used in Mohan's plan for important coniferous and broad leaved species which were prepared by the Forest Survey of India, have again been adopted for the forests included in this working plan.

- 8.5.1** The diameter classes will continue to be of 10 cm because of standard practice. The volume factors of various species are tabulated in the table-52

8.6 Fuelwood and charcoal

The conversion factors for fuel wood and charcoal as given in Khullar's plan have been adopted as such. The weight per cubic meter of air dry ban wood is 10.83 quintals. The conversion factors for charcoal from all types of Oak and other broad leaved species in the area are given below:-

1 cubic meter stacked volume = 0.49 m³ solid volume

1 cubic meter stacked volume = 10.8 qtl.

1 qtl air dry wood gives 20 kg charcoal

1 cubic meter stacked volume = 216 kgs charcoal

The class wise conversion factors for other miscellaneous broad leaved species, found in the tract, is given in the table-53

8.7 Diameter growth

Diameter Growth for Deodar and Chil as given in Khullar's plan has been adopted and the same figures will be utilized as given in the table-54 and 55.

8.8 CAI%

The annual yield from the forests can be to the extent of Current Annual Increment (CAI). The CAI of Deodar, Kail and Chil have

been compiled from FRI yield tables. CAI% of conifer species is given in table-51

Table-51
CAI% of different species

Diameter class (cm)	Deodar	Kail	Chil	Fir	Spruce
10-20	6.55	7.81	4.56	3.99	4.72
20-30	1.96	3.676	3.75	3.99	4.72
30-40	1.346	2.25	2.69	3.91	4.69
40-50	0.69	0.878	2.26	2.16	2.57
50-60	0.609	0.448	1.99	1.85	2.09
60-70	0.609	0.448	1.56	1.31	1.36
70-80	0.609	0.448	1.14	1.16	1.20
80-90	0.609	0.448	0.92	0.51	0.53
90-100	0.609	0.448	0.66	0.50	0.51

Table- 52
Volume (m³)

Diameter Class (cm)	<i>Cedrus deodara</i>	<i>Pinus wallichiana</i>	<i>Abies pindrow</i>	<i>Picea smithiana</i>	<i>Pinus roxburghii</i>	<i>Acer Spp.</i>	<i>Quercus leucotrichophora</i>	<i>Quercus dilatata</i>	<i>Quercus semicarpifolia</i>	B/leave d Species
10-20 V	0.172	0.154	0.235	0.106	0.073	0.111	0.0815	0.104	0.106	0.115
20-30 IV	0.462	0.435	0.577	0.365	0.308	0.338	0.275	0.326	0.347	0.308
30-40 III	1.008	0.992	1.091	0.918	0.711	0.789	0.627	0.787	0.794	0.685
40-50 IIA	1.788	1.792	1.759	1.756	1.276	1.457	1.133	1.478	1.438	1.241
50-60 IIB	2.800	2.830	2.625	2.898	2.015	2.356	1.803	2.416	2.288	1.985
60-70 IA	4.021	4.076	3.651	4.334	2.921	3.478	2.631	3.592	3.334	2.915
70-80 IB	5.434	5.506	4.849	6.064	3.996	4.824	3.619	5.006	4.572	4.028
80-90 IC	6.208	6.284	5.511	7.039	4.596	5.581	4.172	5.803	5.262	4.654
90-100 ID	7.882	7.949	6.966	9.211	5.922	7.263	5.398	7.575	6.781	6.045
100 & IE above	9.708	9.744	8.591	11.676	7.416	9.169	6.783	9.585	8.480	7.611

Table- 53
Conversion factor for firewood and charcoal

	Ban		Mohru		Kharsu		Kokath	
Species diameter (cms)	Firewood (qtl)	Charcoal (qtl)	Firewood (qtl)	Charcoal (qtl)	Firewood (qtl)	Charcoal (qtl)	Firewood (qtl)	Charcoal (qtl)
10-15	0.572	0.114	0.853	0.171	0.788	0.158	0.972	0.194
15-20	1.188	0.238	1.404	0.281	1.512	0.302	1.523	0.305
20-25	2.236	0.447	2.603	0.521	2.819	0.564	2.559	0.512
25-30	3.704	0.741	4.449	0.889	4.676	0.935	4.104	0.821
30-35	5.605	1.121	6.934	1.387	7.096	1.419	6.134	1.227
35-40	7.938	1.588	10.066	2.013	10.055	2.011	8.672	1.734
40-50	12.236	2.447	15.962	3.192	15.530	3.106	13.403	2.681
50-60	19.472	3.894	26.093	5.219	24.710	4.942	21.449	4.289
60-70	28.415	5.683	38.794	7.759	36.007	7.201	31.482	6.296
70-80	39.085	7.817	54.065	10.813	49.378	9.876	43.502	6.700

Note:

1. The above conversion factors are based on volume of trees calculated down to 5 cms dbh.
2. Weight of firewood is in respect of solid volume.

Table-54
Dbh/Dsh relationship for Deodar (*Cedrus deodara*)

Sr. No.	Average Dbh (cm)	Average Dsh (cm)
1.	31.5	34.5
2.	31.5	36.5
3.	32.5	37.0
4.	34.5	41.0
5.	36.5	42.5
6.	37.5	41.0
7.	38.5	45.5
8.	38.5	39.5
9.	40.0	45.5

10.	40.5	42.5
11.	41.5	47.0
12.	42.5	43.5
13.	42.5	47.5
14.	43.5	48.5
15.	44.5	47.0
16.	45.5	51.0
17.	50.0	52.5
18.	51.5	55.0
19.	53.5	56.5
20.	53.5	60.0
21.	53.5	59.0
22.	54.5	61.5
23.	55.5	57.5
24.	56.5	59.0
25.	61.5	69.0
26.	61.5	66.5
27.	63.5	76.0
28.	64.0	73.0
29.	68.0	74.5
30.	69.0	70.5
31.	69.5	77.0
32.	70.5	73.0
33.	72.5	76.5
34.	72.5	89.0
35.	73.0	81.5
36.	73.0	78.5
37.	73.5	77.0
38.	82.5	86.0
39.	85.0	88.0
40.	88.0	90.5

Note:

Dbh = Diameter at 1.37 m above ground level.

Dsh = Diameter at 20 cm above ground level.

Table-55

Dbh/Dsh relationship for Chil (*Pinus roxburghii*)

Sr. No.	Average Dbh (cm)	Average Dsh (cm)
1.	31.0	33.5
2.	32.0	34.5
3.	32.0	33.5
4.	32.5	34.5
5.	34.0	35.5
6.	34.5	36.5
7.	34.0	38.5
8.	36.0	37.5
9.	36.5	39.0
10.	36.5	39.0
11.	37.0	39.0
12.	38.5	42.5
13.	39.5	43.5
14.	40.0	43.5
15.	48.5	44.5
16.	42.0	47.0
17.	42.0	46.0
18.	42.5	46.5
19.	42.5	45.0
20.	43.0	46.5
21.	43.0	46.0
22.	43.0	46.0
23.	43.5	45.5
24.	44.0	48.0
25.	44.0	45.0
26.	44.5	48.0
27.	44.5	47.0
28.	45.5	46.5
29.	45.5	47.5
30.	46.0	52.5
31.	47.5	51.0
32.	47.5	50.5
33.	47.5	48.5
34.	50.5	53.5
35.	51.5	55.0

36.	51.5	53.5
37.	52.5	54.5
38.	52.5	57.5
39.	53.0	60.0
40.	53.5	57.0
41.	53.5	56.0
42.	53.5	55.5
43.	54.0	57.5
44.	54.5	58.5
45.	55.0	57.5
46.	55.5	59.5
47.	55.5	59.0
48.	55.5	62.5
49.	58.5	63.5
50.	59.5	62.0
51.	59.5	63.0
52.	61.0	62.0
53.	61.5	63.5
54.	62.5	63.0
55.	63.0	66.5
56.	63.0	67.0
57.	63.0	70.5
58.	65.0	70.5
59.	67.5	73.0
60.	68.0	72.0
61.	71.5	78.5
62.	74.0	77.0
63.	75.0	78.8

Note:

Dbh = Diameter at 1.37 m above ground level.

Dsh = Diameter at 20 cm above ground level.

CHAPTER – IX

ESTIMATES OF CAPITAL VALUE OF THE FORESTS

- 9.1** As the forests give direct and indirect benefits, therefore, it is difficult to assess exact value of these forests in terms of money. However, some closeness to real value can be arrived by knowing the total growing stock of the tract.
- 9.2** The total growing stock has been calculated by extrapolating the results of enumeration arrived at on the basis of 10% stratified random sampling carried out in all PB areas of Deodar-Kail and Chil Working Circles and 5% stratified random sampling in forests selected as representatives in Biosphere Conservation and Plantation Working Circles. Therefore, the growing stock and estimated value of the forests are subject to some degree of variation.
- 9.3** In view of above and applying market rates of 2011-12; the capital value of the forests is worked out as given in table-56

Table-56**Capital value of forests of Shimla Forest Division.**

DEODAR-KAIL WORKING CIRCLE														
Total Area 3012.30 ha														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Species	Particulars	V	IV	III	IIA	IIB	IA	IB	IC	ID	IE	Total	Rate (Rs) per cum	Amount (Rs)
Deodar	No of trees	299519	81633	60892	47738	32891	16753	7325	2549	1126	43			
	Volume (cum)	51517	37715	61380	85354	92095	67367	39802	15828	8881	427	460366	47624	21924470384
Kail	No of trees	104359	30973	9634	5111	2966	1428	373	104	0	0			
	Volume (cum)	16071	13473	9556	9160	8393	5824	2059	654	0	0	65190	38044	2480088360
Chil	No of trees	94660	33999	2509	712	454	65	0	0	0	0			
	Volume (cum)	6911	10472	1784	908	914	189	0	0	0	0	21178	18630	394546140
Spruce	No of trees	26521	7522	3191	1858	1421	1274	637	135	43	0			
	Volume (cum)	2811	2610	2533	2672	3251	4247	2912	709	291	0	22036	22437	494415550
Ban/Oak	No of trees	43719	16425	13228	3164	383	57	0	0	0	0			
	Volume (cum)	3563	4517	8294	3585	690	151	0	0	0	0	20800	18000	374393389
B/L	No of trees	45138	16225	6156	1113	118	80	0	0	0	0			
	Volume (cum)	5191	4997	4217	1381	234	232	0	0	0	0	16252	4704	76449152

Total - 25744362975

Chil Working Circle														
Total Area 3442.8 ha														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Species	Particulars	V	IV	III	IIA	IIB	IA	IB	IC	ID	IE	Total	Rate (Rs) per cum	Amount (Rs)
Deodar	No. of trees	5504	2392	1247	149	300	22	0	0	0	0	9614		
	Volume (cum)	947	1105	1257	266	840	88	0	0	0	0	4503	47624	214450872
Kail	No. of trees	23676	15692	11250	5068	910	213	47	0	0	0			
	Volume (cum)	3646	6826	11160	9082	2575	868	259	0	0	0	34416	38044	1309331815
Chil	No. of trees	290261	230847	84574	36267	13010	5261	1154	290	62				
	Volume (cum)	21189	71101	60132	46277	26215	15366	4611	1333	367	0	246591	18630	4593985527
Ban/Oak	No. of trees	85053	50163	10701	1583	332	33	18	0	0	0			
	Volume (cum)	6932	13795	6710	1794	599	87	65	0	0	0	29980	18000	539644887
B/L	No. of trees	41317	21196	4846	1641	179	51	0	0	0	0			
	Volume (cum)	4751	6528	3320	2036	355	149	0	0	0		17140	4704	80625591

Total -6738038692

Biosphere Conservation Working Circle														
Total Area 15248.72 ha														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Species	Particulars	V	IV	III	IIA	IIB	IA	IB	IC	ID	IE	Total	Rate (Rs) per cum	Amount (Rs)
Deodar	No. of trees	371134	307028	193246	89422	39549	13277	4641	1097	338	28	1019760		
	Volume (cum)	63835	141847	194792	159887	110738	53386	25221	6810	2661	273	759450	47624	36168033226
Chil	No. of trees	332906	344946	194343	81293	36624	1406	309	56	0	0	991884		
	Volume (cum)	24302.2	106243	138178	103730	73797	4108	1236	259	0	0	451853	18630	8418029080
Kail	No. of trees	171193	121180	116876	68100	27904	7932	1013	141	28	0	514367		
	Volume (cum)	26364	52713	115941	122036	78968	32332	5576	884	224	0	435037	38044	16550546880
Spruce	No. of trees	171189	127467	135128	83160	35344	10312	1343	188	38	0	564169		
	Volume (cum)	18146	44231	107292	119584	80866	34379	6141	990	259		411887	22437	9241519318
Ban/Oak	No. of trees	1171516	445647	175075	39859	11561	3544	5035	28	0	0	1852265		
	Volume (cum)	95479	122553	109772	45160	20845	9325	18222	117	0	0	421472	18000	7586499631
B/L	No. of trees	616615	129168	36343	20590	6807	8523	4782	2363	0	0	825192		
	Volume (cum)	70911	39784	24895	25553	13512	24845	19309	10997	0	0	229805	4704	1081003464

Total - 79045631599

Plantation Working Circle														
Total Area 9636.62 ha														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Species	Particulars	V	IV	III	IIA	IIB	IA	IB	IC	ID	IE	Total	Rate (Rs) per cum	Amount (Rs)
Deodar	No. of trees	80963	60661	18523	5254	838	61	0	0	20	0	166321		
	Volume (cum)	13926	28025	18671	9395	2347	247	0	0	161	0	72772	47624	3465700490
Chil	No. of trees	666492	700451	137371	24330	6358	4457	654	307	0	0	1540420		
	Volume (cum)	48654	215739	97671	31045	12812	13019	2614	1409			422963	18630	7879809748
Ban/Oak	No. of trees	96276	11633	900	204	41	0	0	20	0	0	109075		
	Volume (cum)	7847	3199	564	232	74			85			12000	18000	216006778
B/L	No. of trees	76628	12758	2597	1308	327	225	82	41	0	0	93966		
	Volume (cum)	8812	3929	1779	1624	649	656	330	190			17970	4704	84528881

Total- 11646045897

Grand total of capital value for all Working Circles put together -123174079163

PART - II
FUTURE MANAGEMENT DISCUSSED
AND PRESCRIBED

CHAPTER-I

BASIS OF PROPOSALS

1.1 General description

Forests constitute an assemblage of versatile natural resources. A very large section of our rural and remote area population depends on forests for their sustenance needs. The urban populations which may not be in the proximity of forests also indirectly depend on forests and derive innumerable benefits from them. Forests provide environmental and productive services.

Forests of Himachal Pradesh are very important, being integral part of Himalayan Eco-System. They have been instrumental in the economic development of vast Indo-Gangetic plains and the Sutlej-Ganga basin. The forests of HP have undergone a sea change in the past few decades and are presently under a great stress. They have been venerated as an entity but over-used as a resource.

Forestry in the present times has undergone striking changes. The focus of management has shifted from production to conservation. Non Timber Forest Produce (NTFP) has come to the forefront of forestry management. The role of local people in protection and management of forests has grown from strength to strength. Joint Forest Management has taken a formal shape. The decentralized planning process for area specific forest management approach has resulted in formulation of micro plans.

Himachal Pradesh Forest Policy, 1980 envisages meeting the requirements of local right holders while giving importance to watershed management. Similarly, National Forest Policy, 1988 emphasizes on efficient utilization of forest produce and maintaining substitution of wood and to meet the requirements of fuel wood, fodder, minor forest produce and small timber of the rural

and tribal population. It further emphasizes on creating a massive peoples' movement with the involvement of women for achieving these objectives and to minimize pressure on existing forests.

1.2 Objectives of management

General objectives of management of forests of Shimla Forest Division are as under:-

- i) To preserve the hill sides against denudation and erosion so as to ensure equitable flow of water in the streams and rivers that originate from these hills.
- ii) To improve moisture regime of soil, maintain water table and recharge ground water.
- iii) To fulfill the bonafide domestic and agricultural requirements of the local people especially poorest of the poor for timber, fuel, grass and grazing and other forest produce subject to the capacity of the forests.
- iv) To conserve, sustain, protect and improve the quality and stocking of the existing forests through participatory forest management.
- v) To ensure the regeneration of all areas closed for regeneration or afforestation and to replace less valuable tree species by more valuable species in consistence with the environmental conservation.
- vi) To optimize the carrying capacity of pasture and grass lands through increased investment, silvicultural research and regulation of grazing techniques.
- vii) To ensure systematic development and exploitation of NTFPs those are found in the tract and to

increase their productivity by artificial means wherever possible.

- viii) To identify fauna which is getting extinct or dwindling fast in numbers and suggest measures aiming at conservation and rehabilitation of natural habitat and gene pool while also combating man-animal conflict.
- ix) To increase the size of carbon sinks so as to reduce green house effect.
- x) To improve the quality and stocking of the existing forests and to bring the growing stock and regeneration as near normal as possible.
- xi) To maintain and improve the aesthetic beauty of tourist places of the tract and nearby areas like Shimla, Taradevi, Naldehra, Chinibunglow, Shalli peak, etc. besides improving the environment along the national and state highways.
- xii) To protect the Ban oak forests from indiscriminate exploitation and to preserve these as representative eco- system of the region.
- xiii) In consistent with above, to obtain maximum sustained annual yield of timber and other forest produce.

1.3 Methods of treatment

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

- i) All the conifer forests which are on comparatively moderate slopes will be managed under Indian Irregular Shelterwood System. The mode of regeneration will be both natural and artificial

ensuring the completion of regeneration of the blank areas within the currency of plan.

- ii) All the forests which are on steeper slopes along the nallas or streams, along the National Highways or railway line and around the tourist places will be preserved and improved from tourist, aesthetic, soil and water conservation point of view.
- iii) All Ban oak forests and open crop of broad leaved species which were subjected to indiscriminate hackings in the past and require rest for recuperation will be protected from further degradation.
- iv) All poorly stocked and blank forests will be reafforested by planting suitable species to meet local demand of fodder, fuel, timber and forest based industries.
- v) Soil conservation works in a planned manner, wherever necessary will be undertaken to protect the hill sides from further denudation and erosion.
- vi) Participation of community will be ensured in the process of management and sharing of benefits through the concept of Joint Forest Management.
- vii) Working with the local communities to maintain ecological balance for the preservation and improvement of wildlife.

1.4 Constitution of working circles

Keeping in view the objects of management outlined in Para 2.1.2, the following working circles have been constituted:

- I. Deodar Kail Working Circle
- II. Chil Working Circle

- III. Biosphere Conservation Working Circle
- IV. Plantation Working Circle
- V. Forest protection (Overlapping) Working Circle
- VI. Non Timber Forest Produce (Overlapping) Working Circle
- VII. Joint Forest Management (Overlapping) Working Circle
- VIII. Soil and Water Conservation (Overlapping) Working Circle
- IX. Wildlife Management (Overlapping) Working Circle

1.4.1 Deodar- Kail Working Circle

Forests bearing predominance of Deodar and Kail either in mixture or pure and which are situated on moderate slopes have been allotted to this working circle. The forests which are on steep slopes, along the National Highways, around source of important streams or around the tourist places have been excluded from this working circle. Definite allotment of different periodic blocks has been made and yield is calculated for each PB. Indian Irregular Shelterwood System has been adopted for the management of these forests to get intensive regeneration and optimum yield. However, since there is a ban imposed on green felling, recommendations made regarding felling in the plan under revision will not be executed except either with the lifting of ban or with the prior approval of competent court of law. The total area under this working circle is 3012.30 ha.

1.4.2 Chil Working Circle

All reserved, DPFs and UPFs lying on easy slopes where Chil is the main species occurring either pure or in mixture and established Chil plantations have been allotted to this working circle for their proper management. Definite allotment of different periodic blocks has been made and yield is calculated for each PB.

Indian Irregular Shelterwood System has been adopted for the management of these forests to get intensive regeneration and optimum yield. However, fellings under silviculture system can be undertaken only after ban on green felling is lifted by the competent for of law. The total area of this working circle is 3442.80 ha.

1.4.3 Biosphere Conservation Working Circle

This working circle comprises of all RFs, DPFs and UPFs which are situated on steep and precipitous slopes, along with roads/streams/nallas, near habitations and around places of tourist importance and also all Ban oak forests which were subjected to indiscriminate hacking in the past and require rest for recuperation. In this working circle, no silviculture system is adopted. Moreover, green felling will not be allowed for these forests except salvage removal for meeting the bonafide demands of right holders. These forests will be protected from soil and water conservation, aesthetic and tourist point of view besides maintaining the ecological balances. The density of these forests will be improved by raising plantation of suitable species through artificial means. The total area of this working circle is 15248.72 ha.

1.4.4 Plantation Working Circle

This working circle includes such areas which are devoid of vegetation, carry open crop or have young plantations or crop which still needs protection. Only such areas have been taken in this working circle which has site factors favorable for raising successful plantations. No silviculture system is adopted. The total area of this working circle is 9636.62 ha.

1.4.5 Forest Potection (Overlapping) Working Circle

This working circle includes all the forests which are located on steep to precipitous slopes, on broken terrain

comprising Conifers, Ban or open crop of broad leaved species which was subjected to indiscriminate hacking in the past and requires rest for recuperation. These forests are mainly situated on difficult, precipitous and erodible terrains and form the catchments of rivers Sutlej and Giri and other perennial streams. It also includes such areas of Oak Working Circle of the plan under revision as are situated on difficult terrains and warrant protection from future degradation. In addition, areas having problems like invasive alien species; frequent fires, encroachment, illicit felling etc have also been included in this Working Circle.

1.4.6 Non Timber Forest Produce (Overlapping) Working Circle

This is an overlapping working circle and is constituted to ensure systematic development and exploitation of NTFPs that occur or can be introduced in this division. It will include all the areas which have high potential for raising NTFPs through natural or artificial regeneration techniques.

1.4.7 Joint Forest Management (Overlapping) Working Circle

This working circle includes the forest areas near the habitations where active participation of the local people has been taken in the past along with potential new areas. The experience gained from Social Forestry, ODA, DFID, SVY projects have been incorporated to enlist the potential Panchayats/villages where JFM approach can be successfully implemented. The selected forest areas are mostly DPFs situated near habitations that have become degraded, UPFs and wastelands that are in small bits, honeycombed, surrounded by cultivation and are left out after demarcation and settlement.

1.4.8 Soil and Water Conservation (Overlapping) Working Circle

This is an overlapping working circle and is constituted to protect degraded and erodible areas of the tract. The area will be treated with suitable package of treatment which includes vegetative measures as well as engineering measures. Such areas shall be tackled by sowing planting of suitable species and carrying out soil conservation works.

1.4.9 Wildlife Management (Overlapping) Working Circle

It is an overlapping working circle which includes all variety of fauna existing in the area and its critical habitat. The management plan for preserving existing wildlife and its habitat will be prepared. The provisions of Wildlife Protection Act, 1972 are to be enforced and the man-animal conflict reduced.

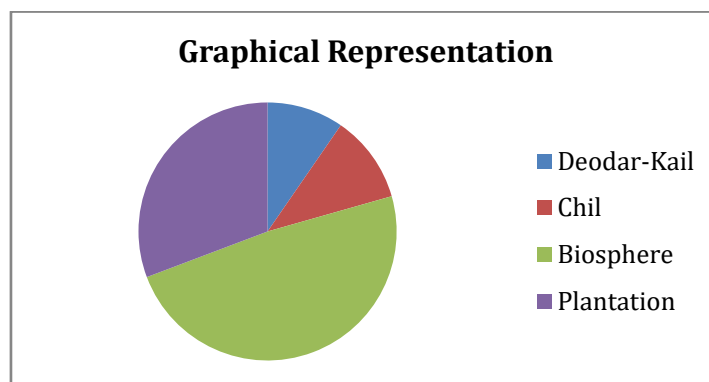
1.5 Working Circles, their areas and distribution.

The statement showing the areas (ha) of RFs, DPFs and UPFs allotted to different working circles is given in table-57.

Table-57

Forest class wise distribution of area (ha) of different Working Circles

Working Circle	RFs	DPFs	UPFs	Total
Deodar –Kail	263.00	1793.80	955.50	3012.30
Chil	83.10	1875.40	1484.30	3442.80
Biosphere Conservation	810.80	7488.10	6949.82	15248.72
Plantation	-	309.80	9326.82	9636.62
Total	1156.90	11467.10	18716.44	31340.44



All other Working Circles are overlapping and thus their forest class wise area is not given here.

1.6 Reasons for constitution of Working Circles

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

1.7 Blocks and compartments

No addition and alteration of compartments/sub-compartments has been made in the plan under revision and retained as such as per previous working plan. Invariably the natural features like ridges, nallas, and paths form the boundaries. The nomenclature of the forests has also been kept same. However, some new DPFs have been carved out in recent forest settlement in Bhajji Forest Range and given serial numbers starting from the next to the last number of forest which appeared in the list of forests of previous working plan.

1.8 Enumerations

10% stratified random sampling has been carried out in Deodar –Kail and Chil working circle. In Biosphere Conservation and Plantation Working circles, 5% stratified random sampling has been carried out for the enumeration process based on their composition, elevation, soil conditions, etc. Area was estimated

by graphical method from the stock maps. The total growing stock of the main species is given in each working circle described herein after.

1.9 Stock mapping

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

1.10 Period of Working Plan

The revised plan period shall be 2011-12 to 2025-26. No intermediate revision is anticipated except in case of major change in administrative and technical policy.

CHAPTER –II

DEODAR-KAIL WORKING CIRCLE

2.1 General constitution

This working circle covers all the predominate Deodar and Kail Forests occurring on moderate to steep slopes fit for working under the concentrated felling in various RFs, DPFs and UPFs . In addition, the established Deodar, Kail plantations/regenerations of 2.5 metres and above taken in the plantation working circle in the plan under revision are also allotted to this working circle.

2.2 General character of vegetation

The crop is mainly Deodar and Kail occurring either gregariously in pure patches or in mixture of varying proportions. In the upper reaches, spruce is found mixed with Deodar and Kail. Along the nallas and depressions and at places dense crop of Ban oak pure or mixed with Mohru also found. Along the lower limits Deodar is confined to sheltered places only. Chil is met within the lower altitudinal zone and is mainly confined to spurs and warmer aspects. The associates of Deodar-Kail besides Fir–Spruce are Ban, Mohru, Kharshu, Khanoor, Walnut, Poplar, Birdcherry and Rhododendron.

2.2.1 The crop is irregular with preponderance of younger classes and deficient in higher age classes. Natural regeneration is generally good, at places profuse also. The crop is mostly young to middle aged with scattered mature trees. Stocking in general is moderate to fairly dense. The forest included in this working circle mainly conform to 12/C1c and 12/2SI of Champion and Seth's Forest Types which have already been described in detail in chapter II of part I of the plan.

2.3 Blocks and compartments

No change has been made in the existing boundaries of forests and compartments and kept as such as in the previous working plan. Some of the plantations/regenerations having good

established crop of Deodar/Kail have been brought for the first time under this working circle for their proper management.

2.4 **Felling series**

Only one felling series, that is, Shimla Felling Series corresponding to the Shimla Forest Division has been formed.

2.5 **Special objects of management**

Without prejudice to the general objects of management, the special objects of management will be:

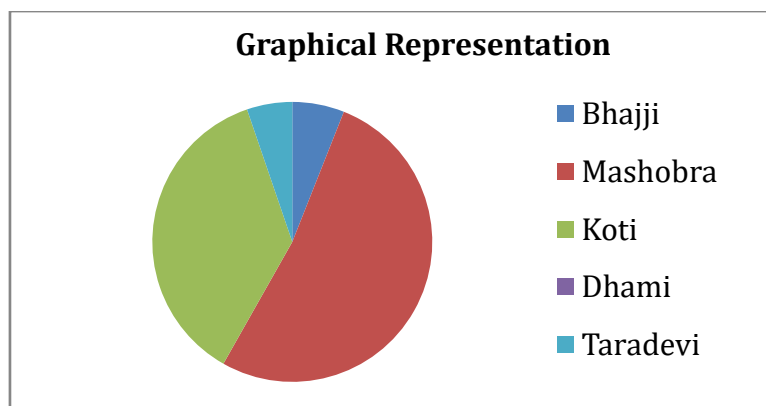
- i) To convert the irregular and uneven aged crops into more or less uniform, normal even aged crops.
- ii) To restock the PBI and other blank areas as soon as possible by resorting to artificial regeneration.
- iii) To obtain progressive yield in perpetuity after meeting the legitimate demands of the local people.
- iv) To preserve and protect the forests to maintain the mountain ecosystem

2.6 **Area statement**

The total area of this working circle is 3012.30 ha. Breakup of the area by ranges and different categories of forests is given in the table-58

Table-58
Range wise distribution of RF, DPF and UPF in Deo-Kail Working Circle

Ranges	Area (ha)			
	RF	DPF	UPF	Total
Bhajji	6.80	100.00	74.20	181.00
Mashobra	-	945.20	626.70	1571.90
Koti	147.80	699.00	254.60	1101.40
Dhami	-	-	-	-
Taradevi	108.40	49.60	-	158.00
Total	263.00	1793.80	955.50	3012.30



2.7 Analysis and Valuation of the Crop

2.7.1 Stock maps

Stock maps of all the forests allotted to this working circle have been prepared on 1:15,000 scale survey sheets and placed in the respective CH files.

2.7.2 Site quality

The average site quality assessed for deodar is I/II while that of Kail is II/III. Necessary entries in respect of site quality of all the forests have been made in respective CH files.

2.7.3 Age classes

The crop is mostly mixed age classes, with predominance of young to middle aged trees. The age classes of each forest have been recorded in concerned CH files.

2.7.4 Density

The density of each compartment/sub-compartment was determined by ocular estimate and recorded in the CH files. The density in general varies from 0.3 to 0.8 with an average of 0.5 approximately.

2.7.5 Enumerations

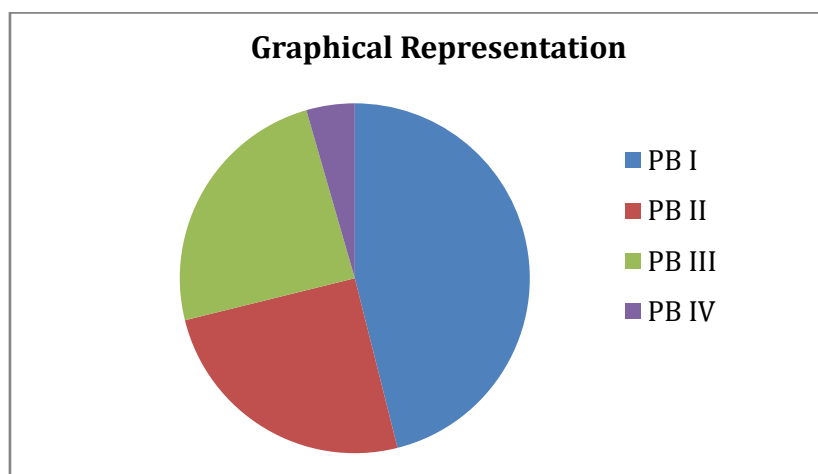
10% stratified random sampling has been carried out for the enumeration purpose and final figures have been arrived after extrapolating the figures for each forest. The enumeration in standard 10 cm diameter classes, down to 10 cm dbh, has been carried out in each PB areas selected as representative. The enumeration figures are recorded in the CH files. An abstract of

the total and per hectare number and volume of trees of coniferous species in each diameter class and periodic block is given in the table-59.

Table-59

**Total Growing stock of various species PB wise in
Deodar-Kail Working Circle (Volume in cum)
Total Growing Stock**

PB	Area	Parameter	Deodar	Kail	Chil	Total	Average per ha
I	733.9	No.	125517	8720	7379	141616	192.963619
		Volume	240168	6345	3158	249671	340.197574
II	741	No.	143231	33357	153	176741	238.516869
		Volume	109026	28158	65	137249	185.221322
III	746.9	No.	232997	89720	102563	425280	569.393493
		Volume	97226	22784	13886	133896	179.268978
IV	790.5	No.	48724	23151	22304	94179	119.138519
		Volume	13946	7903	4069	25918	32.786843



2.8 Silvicultural system

The forests allotted to this working circle will be managed under Indian Irregular Shelterwood system. Compact groups of advance growth up to 30 cm dbh and 0.2 ha or more in extent will be retained as advance growth. Individual poles or middle aged trees will not be retained while carrying out seeding fellings. Efforts will be made to get PBI areas regenerated

naturally and regeneration will be supplemented by artificial regeneration operation. No felling will be carried out in PBII areas except salvage removal. Thinning will be carried out in PBIII wherever required. Final fellings along with thinnings and cleanings as per requirement of the crop will be carried out in PBIV areas.

2.8.1 Choice of species

Species most suited to the locality along with Deodar and Kail as principal species will be preferred. No unnecessary removal of Kail will be done simply because Deodar is more valuable. Broad leaved will be introduced in nallas and depressions.

2.8.2 Rotation and conversion period

A diameter of 60 cm dbh is suited for conversion in to standard sized sleepers and other large size scantling which are mostly in demand. According to the growth data given in Khullar's Plan, this diameter is attained during 95 years by deodar and 93 years by kail. Giving an allowance for regeneration failures and other risks, the rotation of 120 years has been fixed for all the species in this working circle. The forests of this circle are in the process of conversion from irregular to regular and it has already been achieved partly. Taking field position in to consideration the conversion period is fixed as 75 years.

2.8.3 Regeneration period

Regeneration Period of 30 years is sufficient to regenerate PBI area, therefore, it shall continue.

2.8.4 Exploitable diameter

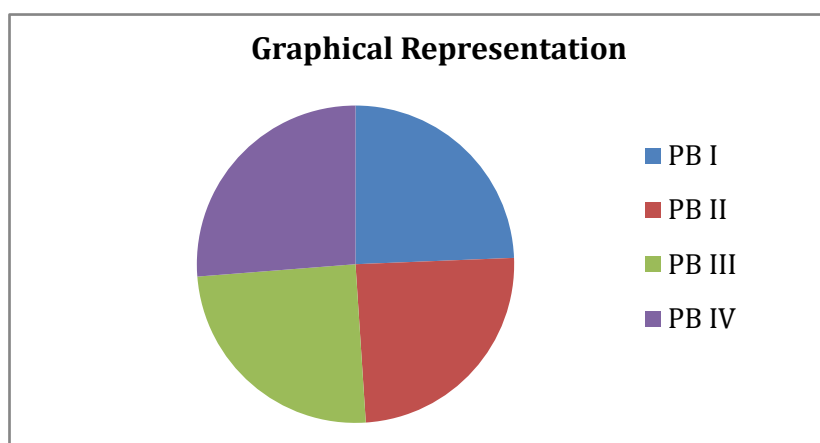
The exploitable diameter of Kail and Deodar is fixed 60 cm dbh.

2.9 Division into periods and allotments to the periodic blocks

With the rotation of 120 years and regeneration period of 30 years, there will be 4 periodic blocks of 30 years each. All the forests have been allotted to definite periodic blocks. The area allotted to different PB is given in the table-60.

Table-60**Area-wise allotment to periodic blocks (ha)**

Ranges	PBI	PBII	PBIII	PBIV	Total
Bhajji	20.20	18.60	49.90	92.30	181.00
Mashobra	418.40	257.00	399.30	497.20	1571.90
Koti	295.30	453.80	168.10	184.20	1101.40
Dhami	-	-	-	-	-
Taradevi	-	11.60	129.60	16.80	158.00
Total	733.90	741.00	746.90	790.50	3012.30



- 2.9.1** **PBI:** The old PBI areas which have not been regenerated or the regeneration is not established; the areas where the crop density is very low and have blanks and gaps, and also the areas which have mostly mature to over mature trees have been allotted to PBI.
- 2.9.2** If an area is seriously burnt amounting to destruction or drying of 50% or more of the standing volume, it should be transferred to PBI for restocking and an equivalent area of PBI in which regeneration fellings are yet to be done should be transferred to PBII.
- 2.9.3** **PBII:** Old PBII where the crop is not yet mature because of removal of mature trees in salvage removals etc. and also the areas where the crop is middle aged and approaching to maturity, have been allotted to this PB.

2.9.4 PBIII: Those forests have been allotted to this PB where the trees are mostly pole to middle aged.

2.9.5 PBIV: Old PBIV where the crop is in pole stage and previously allotted to PBIV and plantation areas where the regeneration has come up in pole stage have been allotted to this PB.

2.10 Yield calculation

The yield from this working circle is obtained from all PBs except PBII and PBIII where no commercial fellings are prescribed. Yield will be regulated by volume, and will be limited to the increment put on by the crop. Yield is calculated in the following manner:

- i) Von Mantel Formula, $Y=2GS/R$
- ii) $Y=CAI\%$ for QII crops in different diameter classes;
Where Y is yield, GS is growing stock, R is rotation & CAI is current annual increment.

The incremental volume of different dia classes for conifers of Shimla Forest Division is given in the table-61

Table-61
Number and volume of conifer in (Deodar-Kail Working Circle)
Total areas-3012.30 ha

Species	P.M.	V	IV	III	IIA	IIB	IA	IB	IC	ID	IE	Total
Deodar	No.	299519	81633	60892	47738	32891	16753	7325	2549	1126	43	550469
	Vol	51517	37715	61380	85354	92095	67367	39802	15828	8881	427	460366
	CAI	3374	739	826	589	561	410	242	96	54	3	6894
Kail	No.	104359	30973	9634	5111	2966	1428	373	104	0	0	154948
	Vol	16071	13473	9556	9160	8393	5824	2059	654	0	0	65190
	CAI	1255	495	215	80	38	26	9	3	0	0	2121
Chil	No.	94660	33999	2509	712	454	65	0	0			132399
	Vol	6911	10472	1784	908	914	189	0	0			21178
	CAI	315	393	48	21	18	3	0	0	0	0	798
Total	No.	498538	146605	73035	53561	36311	18246	7698	2653	1126	43	837816
	Vol	74499	61660	72720	95422	101402	73380	41861	16482	8881	427	546734

Accordingly the annual yield of conifers by the two methods shall be as given in the table-62.

Table-62

Species	Von Mantel (m³)	CAI (m³)
Deodar	7673	6894
Kail	1087	2121
Chil	353	798

2.10.1 Yield from PBI

10% stratified random sampling has been carried out for the enumeration purpose and final figures have been arrived after extrapolating the figures for each forest of PBI areas. The enumeration in standard 10 cm diameter classes, down to 10 cm dbh, has been carried out in each PB areas selected as representative. All PBI areas have been divided into two types.

Type A

Those areas which were in PBI as per previous working plans have been retained in PBI because of inadequate regeneration or where regeneration has not been established, and where the seeding fellings were carried out in the past. Concentrated fellings are not recommended in such areas. The DFO can however, after personal inspection allow petty fellings on lines of corrective fellings in these forests. However, the removals if any, would count against yield of type B areas. In such type of areas where regeneration is inadequate, may be supplemented with artificial regeneration operations. The total area of this type of PBI is 352.40 ha in Shimla Forest Division. As no felling is prescribed in such types of areas, so yield is not calculated.

Type B

Those forests which are having mostly middle aged to mature trees and were allotted either to PBII of regular working circle or other working circle as per previous working plans, now retained in PBI type B where seeding fellings have been recommended. The total area is 381.50 ha in Shimla Forest Division. The annual yield is calculated as follows:-

2.10.2 From the perusal of extent of type A and B areas, it is revealed that both types of areas are more or less equal in areas, which

means that only 50% of the total PBI areas in Shimla Forest Division require regeneration fellings. This area (Type B) in Shimla will therefore be felled for regeneration in 15 years. In such areas all trees are to be felled except.

- i) Seed bearers
- ii) On strategic locations like along nallas/broken ground etc.
- iii) Selection marking in steep precipitious slopes.
- iv) Advance growth

2.10.3 The main volume to be retained will be of seed bearers and of advance growth. On an average basis, 40, 30 and 22 trees per ha of Deodar, Kail, and Chil are to be retained as seed bearers. The average dia class is to taken as IIB. Since the crop is heterogeneous or in patches so the trees will also be retained accordingly. The proportion in which these are to be retained can be arrived at from the proportion of their occurrence which is given in the table-63.

Table-63

Total growing stock of conifer is 249671 cum and percentage of main species is calculated below:-

Species	Growing stock [in PB-I(m ³)]	Percentage
Deodar	240168	96.19
Kail	6345	2.54
Chil	3158	1.26

2.10.4 This proportion is further modified as given in following table-64

Table-64

Species	Percentage
Deodar	96
Kail	3
Chil	1

2.10.5 Applying this proportion to the entire crop m type-B, the volume to be retained as seed bearers comes as under

Table-65

Species	Vol/ha to be retained in case of pure	Vol/ha to be retained in this case on proportionate basis		Volume to be retained over an area of 381.5 ha
		Proportionate	Volume	
Deodar	112	96 %	107.5	41011.25
Kail	84.9	3 %	2.54	969.01
Chil	44.33	1 %	0.44	167.86

2.10.6 Volume shall also have to be retained on other accounts also like retaining of trees on strategic locations like along nallas/ broken grounds, selection marking in steep precipitous slopes and advance growth. This is assumed that 25% of the total volume shall have to be retained on account of these factors. Thus the volume available for felling is calculated in following table-66.

Table-66

Species	Total standing volume (cum) for type-B, 381.50 ha.	75 % of standing volume(cum)	Volume of seed bearers (cum)	Volume available for felling (cum)
Deodar	124845	93634	41011	52623
Kail	3298	2474	969	1505
Chil	1642	1232	168	1064

2.10.7 This volume is available for felling in 15 years. So the annual yield is prescribed as under:-

Table-67

Species	Volume available for fellings for 15 years (cum)	Volume available annually(cum)	Prescribed annual yield (cum)
Deodar	52623	3508	3000
Kail	1505	100	100
Chil	1064	70	Not Prescribed

2.11 Yield from PBIV

There will be removal of overwood and thinnings in young crop in PBIV. While removing over wood, the trees shall have to be retained on strategic locations like along nallas, broken grounds etc. It is estimated that about 60% of the over wood i.e. trees of IIA and above require removal to free young poles from overhead shade. Moreover, thinning C or C/D grade will also be carried out in young crop. It is estimated that 10% volume of III and below classes will be available for felling. Thus, the yield is calculated as under in table-68.

Table-68
Total growing stock (PBIV) (cum)

Particulars	Deodar	Kail	Chil	Total
Total volume IIA and above	1426	1701	164	3291
Total volume III and below	12520	6202	3905	22627
Volume available for felling is given as under in table-69				
Table-69				
60% of total volume of IIA and above classes	856	1021	98	1975
10% of total volume of III and below classes	1252	620	391	2263
Total	2108	1641	489	4238

2.11.1 It is expected that the regeneration in the entire PBIV area will get established in next 30 years and above volume will be felled in next 30 years. Therefore, annual yield from PBIV will be as under in table-70.

Table-70

Species	Volume available for felling in 30 years (cum)	Volume available annually (cum)	Prescribed annual yield (cum)
Deodar	2108	70	50
Kail	1641	55	30
Chil	489	16	Not prescribed

2.12 Yield from PBIII

As per field observations, it is gathered that the crop is mostly young to middle aged. The crop in most of the forests is thin. Though some yield can be available from some forests but it is not being prescribed because it will be negligible. But all type

of removals will be counted against the prescribed yield of this working circle towards PBI.

2.13

Yield From PBII

No yield is prescribed from PBII as it forms the approach class to PBI. However, all removals on account of hygienic or salvage fellings will be accounted against the prescribed yield from this working circle (in PBI)

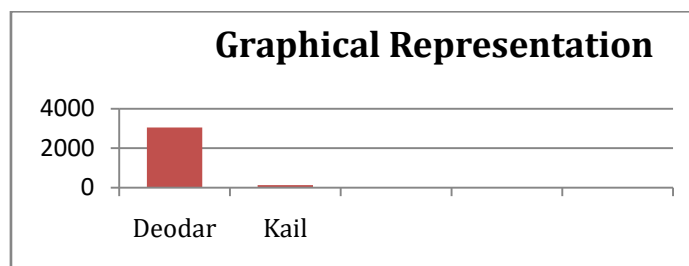
2.14

Prescribed yield

The prescribed annual yield (cum) thus comes as under in table-71.

Table-71

Species	PBI		PBII	PBIII	PBIV	Total
	A	B				
Deodar	-	3000	-	-	50	3050
Kail	-	100	-	-	30	130
Chil	-	-	-	-	-	-
Total	-	3100	-	-	80	3180



This yield is far low as calculated from Von Mantel's formula and incremental volume which is given in table-62.

Note:

- i) From table-62, it is seen that the annual yield calculated by CAI% method is less than calculated by Von Mantel formula. This has occurred due to the situation that distribution of age classes is not better proportioned in forests because of their being irregular.
- ii) Yield is read with the marking principles/rules given in the working plan.
- iii) The silviculture will take precedence over the mathematical calculation of yield.

- iv) The commercial fellings will be undertaken in accordance with the GOI guidelines to be issued in future as per the Supreme Court orders with respect to fellings in forests.

2.15 Control of yield

All removals down to V class trees will count towards the yield of this working circle. The yearly excess or deficit of each species will not exceed 25% and shall be carried forward in control forms and deviation statement adjusted at the end of every five years when it should not exceed 10%. The total deviation at the end of working plan period should be within $\pm 10\%$ of the prescribed yield. No efforts should be made to obtain the prescribed yield, if trees are not available silviculturally

- 2.15.1** It is therefore, most essential that critical survey of felled PBI areas is carried out annually so as to assess the progress of regeneration. It is revealed that regeneration is not keeping pace with the felling; further felling shall be discontinued or deferred till such time by which regeneration in felled PBI areas gains momentum. If regeneration stocking is less than 75% at the end of three years, or less than 55% at the end of two year or less than 50% at the end of first year, it shall mean inadequate regeneration under such circumstances, the area under felling will be reduced in direct proportion to the area under inadequate regeneration. All such deviation will have to be got approved from Pr. CCF through CCF Working Plan and Settlement.

2.16 Method of executing fellings

2.16.1 PBI

The object of felling in this block is to replace the existing crop by young and more uniform crop. The marking in these areas shall be carried out by DFO or ACF. The following general principles are given for the guidance of marking officer.

- i) There will be only one felling i.e. seeding felling in PBI. Final fellings will be done in PBIV.
- ii) Well grown, healthy, tall, clean boled trees with well developed crown, preferably of IIB to IIA class, uniformly spaced will be retained as seed bearers. The

number will be 35-45 trees in case of Deodar and Spruce, 25 to 35 trees of Kail and 70 to 80 in case of Fir and 20-25 trees of Chil per hectare. The spacing comes to 16-18 m, 18-21 m, 12-13 m and 21-24 m in case of deodar-spruce, kail, fir and chil respectively. The spacing of seed bearers should be less on hot dry aspect/steep slopes as compared to cold aspect, gentle moderate slopes. The spacing between seed bearers should be of about one crown width so as to allow sufficient light to reach the ground but the same time discourages unnecessary seed growth.

- iii) Spacing may be overlooked to some extent to favour better seed bearers and the more valuable species. The order to preference of retention of seed bearer will be Deodar, Kail, Spruce and for depending, of course, on the fitness of site to suit these species.
- iv) In case of mixed forests of Kail and Deodar, opening of the canopy should be light so that Deodar regeneration gets a start over that of Kail. In a predominantly Kail crop, retention of Deodar as seed bearer should be preferred.
- v) Compact groups of vigorously growing pole crop up to 40cm dbh and density not less than 0.6 and at least 0.2ha in extent shall be retained as part of the future crop.
- vi) All dead, dying, diseased, malformed and fallen trees will be marked for removal.
- vii) A strip of 50 m wide on either side along main roads and 25 m wide on either side of nallas and streams shall be left untouched.
- viii) On steep to precipitous (between 40-45) and broken ground, the markings should conform to selection principles. No marking be done on precipitous grounds.
- ix) Broad leaved trees not interfering with the conifer species or their regeneration should not be cut unnecessarily as they provide fuel/fodder to local people and also improve soil of this belt particularly in nallas/ depressions which acts as barriers against fire.

- x) Wolf trees, isolated young trees will be marked for felling.
- xi) The marking officer will prepare a detailed note/map of the area showing advance growth/selection marking/nallas. Roadsides and patches of concentrated fellings.

2.16.2 PBIV

Final fellings shall be carried out in this PB, where majority of the trees shall be of class V and IV i.e. up to 30 cm dbh. The felling of mother trees shall be done on the following principles:

- i) Over wood standing over young crop will be removed. Such over wood will be mainly of IIB and above classes.
- ii) If the young crop is very dense, D/C or C grade thinning among the coniferous plants, should also be carried out at the time of final fellings.
- iii) Isolated tree of II and III classes which will not merge with future crop and are likely to be potential wolf trees shall be removed.
- iv) Broad leaved species should not be felled but lopped if interfering in the growth of young plants.
- v) Mother trees will be lopped before felling so as to minimize the damage during fellings. Detailed marking note will be prepared by the marking officer.

2.16.3 PBII

There will be no removal from this PB except the salvage.

2.16.4 PBIII

As the crop is mostly understocked in most of the forests allotted to this PB, so no yield is being prescribed. Salvage removals will, however, be carried out.

2.17 Table of fellings

Yield will be controlled PB wise. Removals from PBII and III will count towards type B areas of PBI.

Tabular statement of the sequence of fellings in PBI and PBIV for the whole of the working circle is proposed in the table-72.

Table-72

PB I					PB IV		
Year	Range	Name of forests	Area (ha)	Kind of felling	Range	Name of forests	Area in (ha)
2012-13	Bhajji	D-28 Bani Jalag	13.40	Seeding felling	Mashobra	D-67 Paniali C-II	24.00
2013-14	Mashobra	D-73 Mashobra C-II (part)	30.00	-do-	Taradevi	D-24 Hathani ki Dhar	9.20
2014-15	-do-	-do-	25.00	-do-	Mashobra Mashobra	D-79 Godhi Ka Nal U-165 Sadhora	2.40 12.80
2015-16	-do-	-do-	25.60	-do-	Taradevi	D-198 Bhaili	7.60
2016-17	-do-	-do-	19.00	-do-	Koti	D-98 Phaniot C-IX	30.4
	(Bhajji)	R-2 Khatnol	6.80	-do-			
Total for first 5 years			119.80				86.40
2017-18	Koti	R-9 Rathmu C-II Part	27.20	Seeding felling	Koti	D-84 Patgair C-II (part)	15.00
2018-19	-do-	-do-	25.00	-do-		-do- (Part)	15.00
2019-20	-do- Mashobra	-do- D-73 Mashobra C-III Part	15.00 10.00	-do- -do-		-do- (Part)	25.00
2020-21	Mashobra	-do- (Part)	25.00	-do-	Bhajji	D-6 Nin (Part)	34.00
2021-22	-do-	-do- (Part)	28.00	-do-	Bhajji	-do- (Part)	34.00
Total for second 5 years							130.20
123.00							
2022-23	Mashobra	D-73 Mashobra C-III	33.80	Seeding felling	Mashobra	U-188 Khaljog (Part)	30.0
2023-24	Koti	U-223 Kufer (Part)	25.00	-do-	Mashobra	-do- (Part)	32.40
2024-25	-do-	-do- (Part)	25.00	-do-	Koti	D-102 Domehar (Part)	30.00
2025-26	-do-	-do- (Part)	25.00	-do-	Koti	-do-	30.00
2026-27	-do-	-do-	22.70	-do-	Koti	-do-	38.80
Total for third 5 years			131.50				161.20
Grand total			381.50				370.60

Note: 1 in PB1 areas, the fellings should follow regeneration of area.

- (a) Total area of PBI is 733.90 ha. This area has been diverted into two types A & B (see page 192). Seeding felling recommended in type B only area of which is 381.50 ha.
- (b) The area of 370.60 ha. In which PBIV final felling is prescribed is only for present working plan period; balance area will be prescribed for the next Working Plan.

Note: 2 If any forest from other PB except PBI, is burnt seriously or damaged and destroyed due to one or other reason, it should

forthwith be transferred to PBI for the purpose of restocking and instead an equivalent area of PBI in which regeneration fellings are still to be undertaken, should be transferred to PBII.

Note: 3 In type A area of PBI, DFO can allow corrective fellings after personal inspection. This will be petty fellings and all removals will count towards yield of type B areas. The list of such areas is given below table-73.

Table-73

Name of Range	Name of forest	Compartment no.	Area (ha)
Mashobra	D-65 Koti	-	74.00
	D-70 Naldehra	C-IV	38.00
	D-73 Mashobra	C-I	70.80
	D-81 Barmu	-	39.20
Koti	D-96 Oundla	C-II	80.20
	D-100 Manun	C-X	19.40
	D-100 Manun	C-XI	30.80
		Total	352.40

2.18 Subsidiary silvicultural operations in PBI

The following subsidiary operations will be carried out soon after the seeding fellings in this periodic block:

- i) Removal of dead, damaged and unfelled marked trees if any.
- ii) Cleaning and uncommercial thinnings in young crop.
- iii) Climber cutting wherever necessary.

2.18.1 Slash disposal

In order to provide a clean seed bed, felling refuse should be disposed off immediately as per instructions given in Punjab Forest leaf let No. 6.

2.18.2 Sowing and planting

Good seed year does not always coincide with the year of felling. In case the interval between felling year and good seed year is too much, then there is little hope for natural regeneration as by that time, the area becomes invaded by weeds and soil gets compact, so it is laid down that artificial sowing/planting will be done in unregenerated portions after

about 5-6 years of felling. The sowing and planting will be done in the following manner.

- i) For sowing, patches of 45x45x15 cm should be made, 2.5 m apart. The soil should be well pulverized and seed of deodar should be sown in the soil before the onset of winter rains. Deodar should be preferred; however, Kail should be sown as per suitability of the site.
- ii) For planting Deodar seedling of two and half years old with about 25-30 cm in height should be planted before the onset of monsoons in pits of 30x30x30 cm size. Nursery for this purpose should be laid out well in advance of the year when planting stock is required. The technique of planting will be as laid down in technical order no. 3 and 4 in the Punjab Forest Manual Vol. III.
- iii) In refractory areas, planting be preferred to sowing. The raw humus, if any, should be scrapped before sowing/ planting. The suggested list of areas requiring sowing/planting under this working circle is given as under in table-74.

Table-74

Statement showing forests requiring sowing/ planting			
Sr. No.	Name of Range	Name of areas/ forests	Area in ha
	Mashobra	D-73 Mashobra C-II	5
	Mashobra	D-72 Dhagog	10
	Mashobra	D-74 Kumali	10
	Mashobra	D-78 Sarog	25
	Mashobra	D-73 Mashobra	15
	Mashobra	D-70 Naldehara C-IV	5
	Mashobra	UPF-197 Rehana	5
	Mashobra	D-62 Kufri	10
	Koti	UPF-Kuni	25
	Koti	D-87 Kohan C-I	4
	Koti	U-239 Kot	4
	Koti	D-96 Ondla C-I	8
	Taradevi	D-215 Jhajia	5
	Taradevi	D197 Bhaili	5
	Taradevi	Total	136

2.18.3 Weeding and bush cutting

All the plantation areas should be weeded in the early stages. Normally two weedings one in June/July and another in Aug/Sept are considered sufficient for young plantations. It should be done judiciously and carefully so as not to disturb their roots. Removal of weaker plants from the patches where patch sowing is done should be done along with the weeding operations. The weeding should be done atleast for 4 years after closure or till such time as the seedlings are no longer in danger of being suppressed by shrubs. On warmer aspects and exposed sites, however, light shrub growth is essential to provide side shade to the young plants.

2.18.4 Cleanings

This operation should be carried out in the early stages both in congested natural regenerations and plantations and should be continued till the area is suitable for early thinning. Best and vigorously growing plants should be retained. All forked, crooked, sickly and damaged plants should be removed in cleanings, so as to provide growing space to better plants. Nothing more than what is absolutely necessary should be cut in cleanings. In deodar areas kail is coming up naturally in plenty, must be cut at the initial stage to avoid suppression of deodar. Cleaning should aim at the gradual spacing out of natural seedling (or sowings where the original stocking has been too dense) until the young trees are spaced approximately 1.2x1.2 m when 2 m high. All the cut material is invariably and immediately removed outside the area to avoid fire hazards.

2.18.5 Thinnings

The regeneration last cleaned at about 10-15 years of age, will be subjected to an early thinning when it attains dbh of 10 cm, giving a spacing of about 1.5 to 2 m between plants. Thereafter, thinning will be carried out only in PBIV at the time of final fellings, thinning will be carried out as per procedure laid down in Technical order No. 1 of Punjab Manual Vol. III.

2.18.6 Regeneration assessment

The regeneration survey of the felled PBI areas should be carried out every alternate year on 1:3750 scale maps to assess the progress of regeneration and to plan operations for the next year. Reason for failure should be sorted out and corrective measures taken forthwith.

2.18.7 Fencing

To get successful regeneration, all the PBI areas which have been felled for getting regeneration, should be closed with barbed wire fencing for protection against biotic interferences. Closure has to be effective and fences should be repaired regularly.

2.19 Miscellaneous regulations

2.19.1 Right holders requirements

The demand of right holders should be met as per their rights subject to silvicultural availability. No trees should be granted in closed area.

2.19.2 Closure

Effective closure is most essential for the success of plantation/regeneration area. It is thus imperative that the PBI areas are closed immediately after vacation by the exploiting agency. The area will have to be closed for cattle grazing till the regeneration is established. Normally this period is 30 years. Government notification for such closure should be issued well in time to avoid litigations.

2.19.3 Grazing and cutting

The PBI areas after felling and vacation of lot by the exploiting agency shall be closed for grazing till the regeneration is established. However, the controlled grazing will be allowed in other PBs as per rights of right holders. Similarly, there will be no restriction on grass cutting in those areas which are not under regeneration. Grass cutting in closed area shall be allowed as per discretion of Range Forest Officer and that too under supervision of Forest Guard to avoid damage to young seedlings.

2.2.19.4 Lopping

Lopping generally is heavy near habitation and also in those forests which are on the road side. It should be stopped immediately, as it makes trees susceptible to diseases and retards growth. However, lopping may be allowed to the right holders strictly on silvicultural principles and action as per rule should be taken if a person overlops the trees.

2.2.19.5 Fire protection

Forests will be protected from fires though the frequency of forest fires in deodar forest is negligible. Young deodar plantations and regeneration areas require special care and complete protection from fire. Special precautions are necessary in the areas adjoining chil forests. Forests floors are to be kept clean of needles especially during summer. Fire watchers should be posted during fire season alongwith the fire fighting equipments. Above all, public co-operation is essential to keep fire out of the area.

CHAPTER-III

CHIL WORKING CIRCLE

3.1 General constitution

All forests bearing a predominantly Chil crop and located on easy slopes have been allotted to this working circle. It also includes the areas where Chil plantations have been established. Moreover, some of the forests which were managed under Coppice/Oak Working Circle as per Khullar's plans, and now having Chil as predominant species, have also been allotted to this circle.

3.2 General character of vegetation

Chil is the principal species. It occurs in pure form or in mixture with Ban-Oak, Rhododendron, Lyonia and a few other broad leaved associates in depressions. Towards the upper transitional zone, Deodar and Kail also appear alongwith Chil. The crops can be distinguished in various age groups, a heterogeneous mixture of all age classes exist. However, detailed description of forest type is given in chapter II of part one of the plan.

3.3 Blocks and compartments

The nomenclature of blocks and compartments being followed at present shall continue and kept as such as in the previous working plan. Some of the plantations/regenerations having good established crop of chil have been brought for the first time under this working circle for their proper management.

3.4 Felling series

Only one felling series, that is, Shimla Felling Series corresponding to the Shimla Forest Division has been formed.

3.5 Special objects of management

In keeping with general objects of management, the special objects of management of the forest allotted to this working circle are:

- i) To convert the existing irregular crops into normal forests by obtaining normal growing stock, normal age class distribution and normal regeneration.
- ii) To improve the stocking of pure forests by artificial regenerations.
- iii) To obtain maximum sustained yield of resin and timber.
- iv) To protect the forests including plantation areas against the fire hazard.

3.6

Area statement

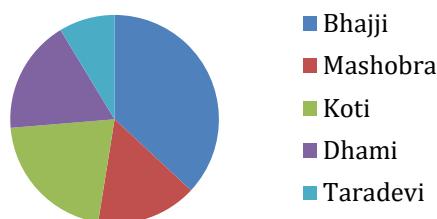
The total area allotted to this working circle is 3442.80 ha. The detailed distribution of the area by ranges and different categories of forest is given in the table-75.

Table-75

Rangewise distribution of RF, DPF and UPF in Chil Working Circle

Ranges	Area (ha)			
	RF	DPF	UPF	Total
Bhajji	-	545.90	725.00	1270.90
Mashobra	-	181.00	356.50	537.50
Koti	-	667.60	60.90	728.50
Dhami	-	265.20	341.90	607.10
Taradevi	83.10	215.70	-	298.80
Total	83.10	1875.40	1484.30	3442.80

Graphical Representation



3.7 Analysis and valuation of the crop

3.7.1 Stock maps

Stock maps for all the compartments and sub-compartments on 1:15,000 scale survey sheets have been prepared and placed in the concerned CH files.

3.7.2 Site quality

It was determined by ocular estimates while stock mapping and describing the compartments and is checked subsequently by measuring two dominant trees in the forest and then comparing them for the standard classes in the FRI yield tables. Site quality of each forest has been recorded in the respective CH files. The average quality of Chil is II/III.

3.7.3 Age classes

The crops are mostly irregular and uneven aged. The trees are mostly young to middle aged and few scattered mature trees are also found.

3.7.4 Density

This has been estimated ocularly and incorporated in the concerned CH files. The average crop density generally varies from 0.2 to 0.8 and the average density is 0.5.

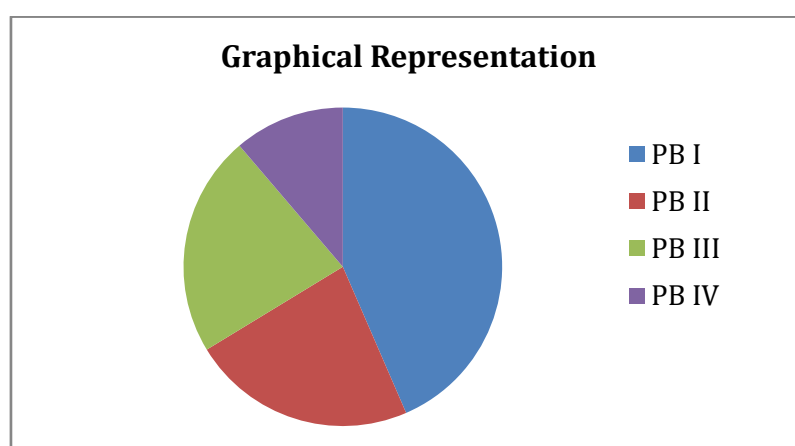
3.7.5 Enumerations

10% stratified random sampling has been carried out for the enumeration purpose and final figures have been arrived after extrapolating the figures for each forest. The enumeration in standard 10 cm diameter classes, down to 10 cm dbh, has been carried out in each PB areas selected as representative. The enumeration figures are recorded in the CH files. An abstract of the total and per hectare number and volume of trees of coniferous species in each diameter class and periodic block is given in the table-76.

Table-76
Total growing stock of various species
PB wise in Chil Working Circle (Vol in cum)

PB	Area	Para meter	Deodar	Kail	Chil	Total	Average Per ha
I	716.2	No.	1709	47603	166360	215672	301.1342894
		Vol	940	28665	87945	117551	164.131721
II	650.3	No.	1079	633	119327	121039	186.1282607
		Vol	447	701	55254	56401	86.73135736
III	562.7	No.	6826	8900	69716	85442	151.8428722
		Vol	2850	5610	39191	47651	84.68201985
IV	1513.6	No.	0	36	306322	306358	202.403592
		Vol	0	6	64199	64205	42.41854339

Note:-Figures of volume is taken in whole number.



3.8 Silvicultural system

The forests allotted to this working circle shall be managed under Indian Irregular Shelterwood System. Advance growth up to 30 cm dbh occurring in compact groups of 0.2 ha or more shall be retained to form part of future crop. No isolated single tree or pole shall be retained. The forests shall be generally regenerated naturally and supplemented with artificial regeneration.

3.8.1 Choice of species

Chil is the most suitable species for these areas and as such it will be preferred. However, deodar has been introduced in depressions in some chil forests which will be left as such and

tended. No efforts shall be made to decimate the Ban Oak which has come up in a mixture with chil in some of the forests. The suggested list of areas requiring planting under this working circle is given in Table-77.

Table -77

Statement showing forests requiring planting			
Sr.No.	Name of Range	Name of areas/forests	Area (ha)
1	Dhami	DPF-254 Hiri Ki Beshak	5
2	Dhami	UPF -534 Obru Marawag	5
3	Dhami	UPF-533 Sedan Marwag Jhakri	10
4	Dhami	DPF-255 Marwag	5
5	Mashobra	UPF- 156 Charain	10
6	Mashobra	D-68 Panihartu C-I	5
7	Mashobra	D-80 Badfer	5
8	Mashobra	D-77 Anu	5
9	Mashobra	U-152 Kalyanpur	5
10	Koti	D-95 Karoli C-I B	9
11	Koti	D-95 Karoli C-V	15
12	Koti	D-91 Touru	7
13	Taradevi	D-219 Jejar	10
14	Taradevi	D-205 Naugolcha	8
15	Taradevi	D-207 Tall Giri C-II	2.9
16	Taradevi	D-207 Tall Giri C-III	3.2
17	Taradevi	D-210 Girab	2.5
18	Bhajji	D-8 Karyali	10
19	Bhajji	D-11 Mandal	5
		Total	127.6

3.8.2 Exploitable size

To produce timber for standard sized sleepers and also obtain the maximum yield of resin, the exploitable diameter of 60 cm dbh has been fixed.

3.8.3 Rotation

At present, the chil forests are in the process of conversion from irregular to more or less regular crop. However, according to the stump analysis data collected at the time of revision of working plan by Sh. Pankaj Khullar, 60 cm dbh is attained by Chil at the age of 94 years. To be on the conservative side, the rotation is fixed at 100 years.

3.8.4 Regeneration period

It is estimated that in 20 to 25 years the Chil plants grow to a height of 5 m at which stage the forests can be allotted to PBIV and the regeneration can be considered reasonably established. Thus, the regeneration period of 25 years has been fixed to stock PBI or blank areas.

3.9 Division into periods and allotments to the Periodic Blocks

With a rotation of 100 years and regeneration of 25 years, the whole working circle has been divided into 4 periodic blocks, to achieve the set objectives.

3.9.1 PBI

All areas felled in previous plans but not regenerated fully, and areas having low density with dominance of mature to over mature trees in addition to areas where unestablished natural regeneration has come up at its own without closure and crown is relatively open, have been allotted to PBI. The total area under PBI is 716.20 ha. This is about 21% of the total area under this working circle. This PB is divided in to two parts i.e. Type A and Type B.

Type A consists of those areas which were in PBI as per previous plan and retained in PBI because of inadequate regeneration. Type B consists of those areas which are having mostly middle aged to mature trees and were allotted to either PBII of regular working circle or other working circle of the previous plans.

Total area under PBI is 716.20 ha. Out of which no felling will be done in Type A areas (313 ha). The balance 403.20 ha (Type B) will be gone over for felling during working plan period (15 years) i.e. about 27 ha will be required to be felled annually for regeneration.

3.9.2 PBII

The forests where the crop is approaching maturity and having comparatively better stocking than those of PBI, have been allotted to PBII. The total area under PBII is 650.30 ha which is about 19% of the total area of Chil working circle.

3.9.3 PBIII

The area of this PB is 562.70 ha which is 16% of the total area of chil working circle. Forests with pole stage to middle aged crops have been allotted to PBIII.

3.9.4 PBIV

All forests having regeneration or Chil plantation which are established in the form of pole crop have been allotted to this PB. The area is 1513.60 ha which is 44% of the total area under this working circle.

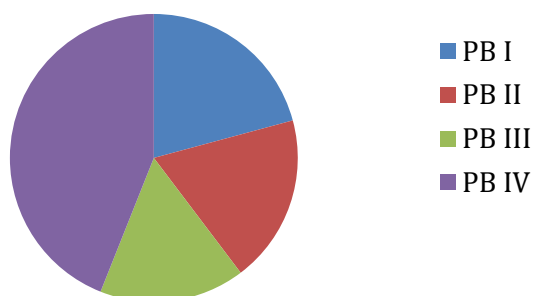
3.10 Area wise allotment to PBs

The area allotted to various periodic blocks in different Ranges of Shimla Forest Division, is given in the table-78

Table-78
Area allotted to various PBs

Ranges	Area (ha)				
	PBI	PBII	PBIII	PBIV	Total
Bhajji	345.50	163.80	166.40	595.20	1270.90
Mashobra	199.40	87.70	65.40	185.00	537.50
Koti	163.00	288.00	164.30	113.20	728.50
Dhami	-	27.20	18.10	561.80	607.10
Taradevi	8.30	83.60	148.50	58.40	298.80
	716.20	650.30	562.70	1513.60	3442.80

Graphical Representation



3.11 Felling cycle

It will continue to be 15 years.

3.12 Yield calculation

The yield from this working circle will consist of yield from PBI and PBIV areas and to some extent from PBIII in the form of thinning wherever required.

Yield has been calculated by following methods.

Method (i) Von Mantel's Formula

$$Y = 2GS/R$$

Where,

Y = Annual Yield

GS = Total Growing Stock

R = Rotation

Method (ii) CAI% for QII Crop in Different age class

The annual yield of Chil calculated on the basis of above two methods, is given below:-

Chil (By method i) = 4932.00 cum

(By method ii) = 7125.00 cum

However, the CAI% of different dia classes of Chil of Shimla Forest Division is given in table-79.

Table-79
Number and volume of Chil trees in Chil Working Circle
(Total area 3442.8 ha)

Species	Para-meter	V	IV	III	IIA	IIB	IA	IB	IC	ID	IE	Total
	No	290261	230847	84574	36267	13010	5261	1154	290	62	0	661724
Chil	Vol	21189	71101	60132	46277	26215	15366	4611	1333	367	0	246591
	CAI	966	2666	1618	1046	522	240	53	12	2	0	7125

Note: - Figure of volume taken includes upto decimals, therefore a variation of 2 cum as compared to table-76.

3.12.1 Yield from PBI

All PB-I areas have been enumerated down to 10 cm dbh. And have been divided into two types.

3.12.2 **Type A**

Those areas which were in PBI as per previous working plans have been retained in PBI because of inadequate regeneration or where regeneration has not been established, and where the seeding fellings were carried out in the past. Concentrated fellings are not recommended in such areas. The DFO can however, after personal inspection allow petty fellings on lines of corrective fellings in these forests. However, the removals if any, would count against yield of Type B areas. In such type of areas where regeneration is inadequate, may be supplemented with artificial regeneration operations. The total area of this type of PBI is 313.00 ha in Shimla Forest Division. As no felling is prescribed in such types of areas, so yield is not calculated.

3.12.3 **Type B**

Those forests which are having mostly middle aged to mature trees and were allotted either to PBII of regular working circle or other working circle as per previous working plans, now retained in PBI Type B where seeding fellings have been recommended. The total area is 403.20 ha in Shimla Forest Division. The annual yield is calculated as follows:-

3.12.4 From the perusal of extent of Type A and B areas, it is revealed that both types of areas are more or less equal in areas, which means that approximately half of the total PBI areas needs regeneration felling. Therefore, these areas will be felled in 15 years.

In such areas all trees are to be felled except:

- i) Seed bearers
- ii) On strategic locations like along nallas/broken ground etc.
- iii) Selection marking in steep precipitous slopes.
- iv) Advance growth

3.12.5 The main volume to be retained will be of seed bearers. On an average basis 22 trees of Chil per ha to be retained as seed bearers. The average dia class is to taken as IIB. The percentage of various species under this working circle is given in the following table-80.

Table-80

Total growing stock of conifers is 117551 cum and percentage of main species is calculated below

Species	Growing stock in PB-I (in cum)	Percentage
Chil	87945	74.81
Deodar	940	0.799
Kail	28665	24.38

3.12.6 Since, the forests are dominated by pure crop of chil and other conifer species are confined to nallas and depressions as such they are not recommended for felling. Thus, on an average basis 22 seed bearer of chil per ha will be retained.

3.12.7 Applying this proportion to the entire crop, in type B the volume to be retained as seed bearers comes as under:

Table-81

Species	Vol./ha to be retained in case of pure crop (cum)	Vol./ha to be retained in this case on proportionate basis		Volume to be retained over an area of 403.20 ha (cum)
		Proportionate factor	Volume per ha (cum)	
Chil	44.33	75%	33	13306

3.12.8 Volume shall also have to be retained on other accounts. This is assumed that 10% of the total volume shall have to be retained on account of these factors. Thus the volume available for felling is calculated in the following table-82.

Table-82

Species	Total Standing volume (cum) for type –B, 403.80 ha	75 % of standing volume (cum)	Volume of seed bearers (cum)	Volume available for felling (cum)
Chil	49511	37133	13306	23827

3.12.9 This volume is available for felling in 15 years. So the annual yield is prescribed as under in table-83.

Table-83

Species	Volume available for felling for 15 years (cum)	Volume available annually (cum)	Prescribed annual yield (cum)
Chil	23827	1588	1200

3.12.10 Yield from PBIV

There will be removal of overwood and thinnings in young crop in PBIV, while removing over wood, the trees shall have to be retained on strategic locations like along nallas, broken grounds etc. it is estimated that about 60% of the over wood i.e. trees of IIA and above require removal to free young poles from overhead shade. Moreover, thinning C or C/D grade will also be carried out in young crop. It is estimated that 10% volume of III and below classes will be available for felling. Thus, the yield is calculated as under:

Table-84
Total growing stock (PBIV)

Particulars	Chil
Total volume IIA and above	7972
Total volume III and below	56227
Volume available for felling is given as under in table-85	
Table-85	
60% of total volume of IIA and above classes	4783
10% of total volume of III and below classes	5622
Total Yield	10405

3.12.11 It is expected that the regeneration in the entire PBIV area will get established in next 30 years and above volume will be felled in next 30 years. Therefore, annual yield from PBIV will be as under in table-86.

Table-86

Species	Volume available for fellings for 15 Years (cum)	Volume available annually (cum)	Prescribed annual yield (cum)
Chil	10405	347	300

Increment is ignored as safeguard against over fellings to compensate for natural decaying/dying etc.

3.12.12 Yield from PBII and PBIII

No yield is prescribed from PBII & III. However, salvage removals will be carried out and will be counted towards the total yield of the Working Circle of PBI.

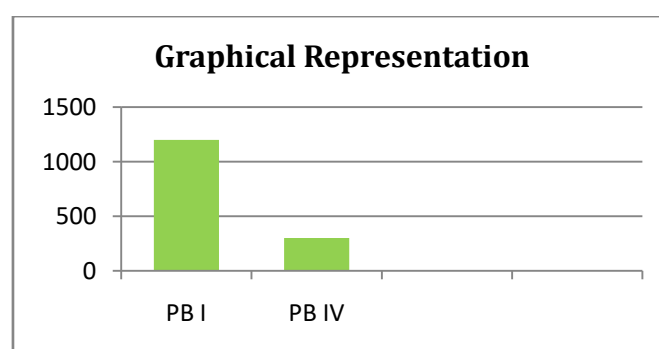
3.12.13 Prescribed yield

In view of the above prescriptions, the yield of Chil so fixed, is depicted in the table-87.

Table-87

**Prescribed annual yield of chil from
Chil Working Circle (in cum)**

Actual yield		Prescribed yield		
PBI Type B	PBIV	PBI Type B	PBIV	Total
1588	347	1200	300	1500



Note:-

- i) Yield is read with the marking principles/rules given in the working plan.
- ii) The silviculture will take precedence over the mathematical calculation of yield.

- iii) The commercial fellings will be undertaken in accordance with the GOI guidelines to be issued in future as per the Supreme Court orders with respect to fellings in forests.

3.13 Control of yield

All removals including salvage from all PBs will be counted towards the yield of working circle. Since the unit of working will be compartments and sub-compartments, some deviations are bound to occur. At the end of 5th year, the total yield should not be more than 10% of the prescribed yield and shall be carried forward in control forms for the adjustment in the next 5 years. No efforts should be made to obtain the prescribed yield, if it is not available silviculturally. Any deviations in yield should be adjusted in future fellings. As such when any forest is seriously damaged for burnt, it should be transferred to PBI for restocking by deferring the regeneration fellings in equivalent area of PBI. Such deferred areas should be relegated to PBII.

3.14 Method of executing fellings

3.14.1 PBI- Only one viz, seeding fellings will be carried out in PBI. Final fellings will be carried out in PBIV. Seeding felling will be carried out in unfelled and in those forests which require openings for regeneration. Restocking will be done in the forests felled in the past. High degree of prudence is required to carry out markings for seeding felling which should be done by DFO or ACF. The general guidelines to marking officer are given as under:

- i) About 20 to 25 trees of II A to I B class; healthy, untwisted, vigorously growing, well formed, clean boled, uniformly spaced will be retained as seed bearers. The average spacing comes to about 21-24 m. The guiding principle is this that on spacing of about one crown width be created around the seed bearers so as to permit sufficient light to reach the ground but at the same time prevent unnecessary weed growth. The spacing should be more on cooler aspect than on hot aspects to favour regenerations.

- ii) Compact groups of young crop upto 30 cm dbh and not less than 0.1 ha in extent with a density of 0.7 and above shall be retained as part of future crop and shall be thinned alongwith the seeding felling wherever necessary. However, overwood would be completely removed from patches of the established advance growth.
- iii) All the young saplings and poles below Vth classes which can merge with future crop will be retained.
- iv) Isolated Vth and above trees will be marked for felling.
- v) All dead, dying, diseased and fallen trees will be marked for removal.
- vi) Trees likely to damage the regeneration/advance growth should be lopped meticulously before felling.
- vii) All deodar, kail, spruce and oaks along the transitional belts will be retained. However, damaged, fallen and dry trees of such species shall be removed.
- viii) Marking should be conservative on stream banks, very steep and precipitous slopes and in refractory areas.
- ix) Above steep slopes, markings should be on selective principles and no marking being done on precipitous slopes.
- x) Along roads and highways a strip of 25 to 50 metres wide, on either side, not to be marked.

3.14.2 PBIV- Due to non execution of final fellings in various plans, the young crop of this PB is suffering from suppression. The markings in this PB, will entail the removal of over wood (IIA and above) suppressing the young crop. These fellings shall be carried out alongwith thinning of young crop.

Following guidelines are given for marking

- i) The trees standing as overwood generally (class II and above) over the established young crop are to be marked for felling.
- ii) In pole to middle aged crop, C or D/C grade thinning are to be carried out.
- iii) Dead, diseased, damaged and fallen trees will be marked for removal.

- iv) Seed bearers likely to damage the young crop should invariably be lopped before felling.
- v) No broad leaved trees are to be marked. However, if such species are found suppressing the young crop, the same may be lopped or removed.
- vi) After the main fellings are over, the damaged poles will be removed.
- vii) No trees in a strip 25 to 50 meter wide on either side of roads and National Highway will be removed. However, removals from either side of streams, nallas, on steep and precipitous slopes, will be conservative.

3.14.3 PBII and PBIII

Only salvage removal will be done.

3.15 Sequence of felling

The felling programme laid down for PBI and PBIV is tabulated in the table-88 which is based on the consideration of equitable distribution of work load and status of crop as far as possible, to facilitate proper administrative and management control.

Table-88
Felling programme in Chil Working Circle

PB I				PB IV		
Year	Range	Name of forests	Area (ha)	Range	Name of forests	Area (ha)
2012-13	Bhajji	D-1 Ratia	39.00 SF	Bhajji	D-12 Sal C-I (a)	78.50
2013-14	Mashobra	D-69 Sawankiar	29.60 SF	Dhami	U-551 Gaonchiri	2.40
2014-15	Koti	D-90 KamhaliC-I	29.20 SF	Taradevi	R-22 Charound	7.60
2015-16	Mashobra	U-156 Charain	25.00 SF	-		-
2016-17	Mashobra	D-68 Panihartu	15.00 SF	Dhami	D-254 Hiri Ki Beshak IV	11.80
Total for first 5 years			137.80			100.30
2017-18	Mashobra	D-68 Panihartu (part)	25.00 SF	Mashobra Dhami	U-162 Parni D-246 Parech Lachog D-252 Salaun C-VIII	11.80 10.00 18.00
2018-19	Mashobra	D-75 Janlog	36.80 SF	Koti	D-93 Chanahi C-I	15.00
2019-20	Bhajji	U-147 Sharri	21.30 SF	Dhami	D-254 HiriKiBeshak C-I	23.15

2020-21	Mashobra	U-159 Majher (part)	25.40 SF	Taradevi	D-210 Girab C-I	8.40
2021-22	-do-	- do-	30.00 SF	Koti	D-95 Karoli C-I b	20.00
Total for Second 5 years				138.50		
2022-23	Bhajji	U-143 Kiar	40.00 SF	Koti	D-95 Karoli C-III	9.60
2023-24	Bhajji	U-143 Kiar	40.50 SF	Dhami	D-254 Hiri Ki Beshak C-III	12.50
2024-25	Mashobra	D-80 Badphar C-I	12.60 SF	Koti	D-96 Quandla C-I	38.40
2025-26	Bhajji	U-146 Chakyana	17.90 SF	Dhami	D-254 Hiri Ki Beshak C-II	14.80
2026-27	Taradevi	R-25 Sandaug	8.30 SF	Koti	D-98 Phaniot C-II	20.20
-do-	Bhajji	D-64 Thaila	7.60 SF			
Total for third 5 years				126.90		
G.Total				403.20		
				106.35		
				105.50		
				312.15		

Note: The remaining PB IV forests will be prescribed for felling in the next plan in 15 years. The list of which is given in table-89.

Note: - (a) Total area of PB-I is 716.00 ha. This area has been divided into two Types A & B (see page 217) seeding felling is recommended in Type B only area of which is 403.20 ha.

- (c) Area of 312.15 ha, in which final fellings are prescribed in PBIV is only for the present working plan period balance will be prescribed for next Working Plan.

Table-89
List of Type A areas

Name of Range	Name of forest	Comp. no.	Area (ha)
Bhajji	D-10 Malgi	-	170.20
Koti	D-90 Kamhali	C-II	42.80
	D-91 Taunru	-	91.00
	Total		313.00

3.16 Subsidiary silvicultural operations in PBI

These operations will be carried out in the same year or in the year following the main felling and will consist of cultural operations described as under:

- i) Felling of dead, dying, damaged and marked trees left unfelled at the time of seeding fellings.

- ii) Cleaning and non commercial thinnings in young crops.
- iii) Climber cutting wherever necessary.

3.16.1 Slash disposal

As soon as all the timber is transported out from forest, the felling refuse should be disposed off without delay, in order to provide clear seed bed. The detailed instructions are given in Punjab forest leaf let no. 6 which should be carefully followed.

3.16.2 Effective closure

The slash disposal will be followed by effective closure against grazing for a period of 25 years to induce natural regeneration and its establishments. This may be done by barbed wire fencing which should be repaired regularly. The area can be closed earlier subject to the condition that crop has been control burnt and reached above danger of fire/browsing.

3.16.3 Artificial regeneration

If natural regeneration does not keep pace and the area is lacking inadequate recruitments/seedlings even after three years of closures, artificial regeneration will be carried out. The gaps and problematic areas should also be filled up artificially. To achieve the objectives nursery grown Chil seedlings, not less than 25 cm in height and about 9 months old, will be planted at a spacing of 2.5x2.5m. Planting will be done preferably during monsoon in the pits of 30x30x30 cm size. The failures will be beaten up for 4-5 subsequent years to ensure the success of plantations. The area will be protected against grazing, fire, etc.

3.16.4 Weeding and bush cutting

Two weedings for young regeneration i.e. during June-July and next during Sept-Oct will be done every year for the two subsequent years. Bushes interfering with establishment of regeneration will also be cut at the time of weeding. In planted areas, all herbs, shrubs and bushes within a radius of 1 m of the plants will be removed to reduce root competition with the young plants.

3.16.5 Cleanings and prunings

Young regeneration area and plantations of Chil will be regularly cleaned and pruned time to time as per requirement.

By the time the plants are 3/2 to 2 m tall, they should be spaced about one meter apart. All the cut material should be safely disposed off and the regeneration area be kept clean to safeguard against fire hazard. Lower one third portions of plants should be pruned to avoid fire risk. The cut material is thrown outside the area.

3.16.6 Silvicultural operations in PBIV areas

Like PBI areas, the slash disposal has to be carried out in PBIV areas in the same manner after the final fellings are carried out and the young crop is thinned. The damaged and left over unfelled trees shall have to be removed. The dry, uprooted and fallen trees shall be removed under salvage markings. C or C/D grade thinning has to be carried out.

3.17 Miscellaneous regulations

3.17.1 Grazing and grass cutting

No grazing will be allowed in closed areas, till the regeneration is fully established. However, grass cutting may be permitted in these areas as per discretion of Range Forest Officer and that too under supervision of Forest Guard, so that Chil seedlings are not damaged or removed during grass cutting. In other PBs, the control grazing is permitted.

3.17.2 Fire protection

The Chil forests are susceptible to fire of accidental and incendiary types. Therefore, the fire protection is of utmost importance and needs special attention. The fire protection measures prescribed in the detailed fire safety plan approved by the CCF/HP vide no. Ft.45-1/58/5622 dated 9.1.1976 should be followed. The felled areas of PBI shall remain fire protected until the regeneration attained the average height of 5 meter. The following measures are suggested for effective fire.

3.17.3 Fire line

Sufficient number of fire lines should be provided in each forest as per their requirements. All the fire lines should be maintained by keeping them clear of bushes, needles and other inflammable material.

3.17.4 Control burning

Entire Chil areas shall be control burnt departmentally atleast once in three years except for the regeneration area where the plants are less than 1.5-2 m in height. Annual control burning in PBI areas with the regeneration of over 2.5 m height shall be carried out till the regeneration attains an average height of 5 m. The ground around the chil trees tapped for resin will be kept clear of grasses, resin shavings and other inflammable material upto a radius of 2.5 m at the time of setting of resin.

3.17.5 Most of the fires generally spread from Ghasnies which are burnt almost every year. Also during spring every year, the farmers set fire to the stubble in the fields which spreads to the adjoining forests. It is, therefore, imperative to protect the forests either by burning the ghasnies under proper supervision or isolating them from the forest zone by providing fire lines.

Detailed instructions for control burning are given in HP Forest Manual Volume-IV which be referred to. The triennial programme of control burning is presented as under in table. This can be modified as per inspection by DFO/CF.

Table-90

Triennial programme of control burning Shimla Forest Division

Year	Range	Name of forest	Area (ha)
2012-13	Bhajji	D-1 Ratia	39.00
2015-16		D-8 Karayali	163.80
2018-19		D-64 Thaila	7.60
2021-22		U-146 Chakyana	17.90
2024-2025		U-147 Sharri	21.30
		U-29 Reog	67.20
		U-33 Seri	13.10
		U-34 Ratia	229.00
		U-587 Shawati	17.80
		U-591 Nalawan	23.30
		U-579 Dhar	10.50
		U-49 Majhiwar	13.80
	Mashobra	D-68 Panihartu	40.00
		D-69 Sawankiar	29.60
		U-156 Charain	25.00
		U-162 Parani	11.80
		U-168 Gohan	14.40
	Koti	D-87 Kohan C-IV	64.60
		D-87 Kohan C-III	28.40

		D-90 Kamhali C-I	29.20
		D-95 Karoli C-V	99.60
		D-98 Phaniot C-II	20.20
	Taradevi	R-20 Ichhasair CII	15.60
		D-207 Talgiri	62.90
		D-219 Jajer	23.20
	Dhami	D-237 Ganeog	10.00
		D-239 Dalimu C-II	16.40
		D-241 Kuiru	8.40
		D-246 Parechlochog	10.00
		D-248 Bhanwar-ka- Dhank	24.80
		D-253 LahogKiGhal C-I	22.40
		D-252 Salaun C-VII	12.00
		U-532 Ghandal	13.60
		D-542 Bathmana	27.20
		Total	1233.60
Year	Range	Name of forest	Area (ha)
2013-14	Bhajji	D-2 Mahasha Ser C-II	16.20
2016-17		D-10 Mulgi	179.20
2019-20		D-14 Kialu Anu C-I	42.80
2022-23		D-259 Shahli	18.80
2025-2026		U-58 Deola	88.90
		U-61 Dayangal	53.10
	Mashobra	D-75 Janlog	36.80
		D-77 Anu	11.00
		U-181 Janlog	76.70
		U-160 KogiNaldehra	67.20
		U-163 Chaklu	20.70
		U-192 Mehli	55.60
		U-174 Badfer	29.70
	Koti	D-87 Kohan C-II	24.20
		D-90 Kamhali C-II	42.80
		D-93 Chanahi C-I	15.00
		D-95 Karoli C-I (b)	101.40
		U-244 Loha	60.90
	Taradevi	R-19 Dumi C-I	51.60
		R-22 Charoond	7.60
		D-205 NaogGolcha	22.80
		D-210 Girab C-I	8.40
		D-211 Sharog	8.80
	Dhami	D-250 Shamlaun	2.80
		D-252 Salaun C-VIII	18.00
		D-254 Hiri-Ka-Beshak C-I	12.00
		-do- C-II	12.80
		-do- C-III	10.00
		-do- C-IV	9.20
		-do- C-V	10.00
		U-535 Ghandal obru	26.00
		U-563 Thakur dwara	6.10
		U-494 Okharu	44.40
		Total	1191.50

2014-15	Bhajji	D-12 Sal C-I (a)	78.50
2017-18		U-37 Sunni	30.70
2020-21		U-143 Kiar	80.50
2023-24		U-144 Deothi	57.90
2026-2027	Mashobra	D-80 Badphan C-I	12.60
		D-80 Badphan C-II	51.00
		U-159 Majhar	55.40
	Koti	D-91 Taumru	91.00
		D-95 Karoli C-III (a)	38.80
		D-95 Karoli C-III (b)	39.60
		D-96 Oundla C-I	38.40
		D-97 Kanda	34.40
	Taradevi	R-25 Sandaug	8.30
		D-207 Talgiri C-III	19.20
		D-210 Girab C-II	20.80
		D-214 Jhajia- Ichhaser C-I	24.40
		D-215 Jhajia- Ichhaser C-II	25.20
	Dhami	D-255 Marog	12.40
		D-230 Shahal	74.00
		U-519 Shangech	8.00
		U-498 Bajar ghat	22.40
		U-497 Bhatri -ki - Berh	22.80
		U-526 Mamu -ki- Chiyali	6.40
		U-531 Jhundla Gharog	9.20
		U-533 Sedan Marawag Jhakri	66.00
		U-534 Obru Maryaog	20.80
		U-558 Tul	9.80
		U-501 Panjehl Bainsh	35.60
		U-509 Panihana	11.60
		U-537 Marhiana	4.80
		U-540 Shobi-ki-Chayali	4.80
		U-551 Gaonchiri	2.40
		Total	1017.7

3.17.6 Removal of pine needles

Local people should be allowed and encouraged to collect the pine needles for their domestic requirements and use as packing material for vegetables and fruits. This will reduce the fire hazards to great extent.

3.17.7 Fire watchers

Adequate fire watchers should be appointed during the fire season with set of equipments for keeping fire lines, paths and roads clear off the inflammable material and watching the forests from strategic points with fire fighting equipments provided to them.

3.17.8 The right holders are required to render all possible help in detecting and extinguishing the forest fires. In case of non co-operation, their rights should be suspended.

3.17.9 Proper education through extension and publicity media can go a long way in making people aware of damage due to fire, the intensity of which is usually clouded by their innocence.

3.18 **Exercise of rights and concessions**

There is tremendous pressure of right holders demand on the forests at privileged rates. As per tendency, the selected markings are being done near to the habitation, roads, paths, thus the forests are depleting fast at such places. Such tendency should be curbed and TD should be met subject to the silvicultural availability of the trees. Dry and fallen trees should primarily be utilized to meet the right holders demand.

3.19 **Regeneration assessment**

An assessment of regeneration has to be done regularly in all PBI areas by the DFOs every third year. It is essential as the progress of regeneration will decide future PBI fellings. If regeneration is inadequate further fellings will be curtailed in direct proportion to the areas under inadequate regeneration. A report to this effect shall be made to CCF, working plan and settlement to seek approval of the revised felling programme.

3.20 **Resin tapping**

Resin tapping will be carried out by Rill method as described in Appendix-IX. The latest instructions if any may also be kept in view.

CHAPTER-IV

BIOSPHERE CONSERVATION WORKING CIRCLE

4.1 General constitution

This working circle comprised of all the forests which are situated on steep and precipitous slopes, near major streams and nallas, on either side of National/State highways, railway line, areas susceptible to erosion, near habitation where the biotic interference is high and around places of tourist importance etc. All RFs, DPFs and UPFs which were allotted to this working circle in the working plan under revision have been retained as such in this working plan also. In addition, all RFs, DPFs and UPFs having Ban, Mohru and Kharshu oaks as predominant species, which were earlier allotted to the Oak working circle have now been put in Biosphere Conservation Working Circle in the present plan. The forests of Ban oak, especially which are nearer to the habitations are under heavy pressure for collection of fodder, fuel wood, wood for agricultural implements and charcoal by the local villagers, so they are heavily lopped which retard their growth as a result there is almost disappearance of Ban oak forests in some of the forests. Natural regeneration of Oak is lacking because of lack of protection. Sowing and planting of Oak is also not successful to the desired level. In some of the forests where coppice fellings have been done in the past, regeneration has not come up or is poor. Many of the forests which are away from the habitations are generally well stocked and need to be preserved. The total area of this working circle will be 15248.72 ha.

4.2 General character of the vegetation

The general character of vegetation has been described in chapter-IIA of part- I. The forests of this circle represent almost all forest types which are found in the tract. Apart from conifers, Ban oak forests which have been allotted to this working circle occur almost pure in many forests of Taradevi, Koti, Dhami and Mashobra Ranges of Shimla Forest Division. Some of the forests like Tarab, Baraili and Salaun are the

example having almost pure crop of Ban. Mohru oak also occurs as pure as in Phaneot forest of Koti Range. Ban oak has been considered restricted and its felling prohibited for the purpose of commercial use. Only dry, dead and uprooted/fallen trees are to be removed to meet the bonafide requirement of the local right holders for fuel, fodder and wood for agricultural implements as per rights recorded in the settlement report. The description of individual forests has been placed in the respective CH files.

4.3 Blocks and compartments

The existing blocks and compartments of forests allotted to this working circle have been retained as such, as given in the plan under revision.

4.4 Special objects of management

Keeping in view of general objects of management, the following special objects of management are laid down.

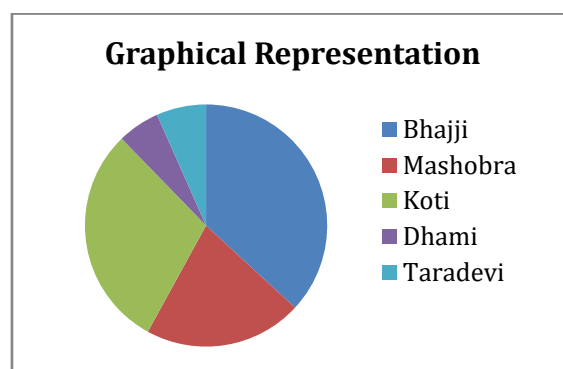
- i) Protection of hills from denudation and erosion.
- ii) Conservation of moisture and regulation of flow of water in nallas and streams.
- iii) To preserve the environment around tourist centres and along the highway to maintain and enhance their utility and beauty for tourist recreations and for wildlife.
- iv) To prevent indiscriminate lopping of trees.
- v) To introduce valuable species especially for the production of fuel and fodder by artificial planting in the blank areas.
- vi) Consistent with the above, to meet the demands of local right holders entirely on silvicultural principles regarding timber, fuel wood and grazing.
- vii) To manage the forests of this working circle as a source of water conservation.

4.5 Area statement

The total area of the circle is 15248.72 ha. Break up of area Range wise of different categories of forests is given in the table-91.

Table-91
Area distribution in the Biosphere Conservation Working Circle

Ranges	Area (ha)			
	RF	DPF	UPF	Total
Bhajji	45.80	3550.90	2024.07	5620.77
Mashobra	235.30	570.40	2415.40	3221.10
Koti	64.80	2141.80	2328.60	4535.20
Dhami	-	678.20	181.75	859.95
Taradevi	464.90	546.80	-	1011.70
Total	810.80	7488.10	6949.82	15248.72



4.6 Analysis and valuation of crop

4.6.1 Stock maps

All the forests have been stock mapped on 1:15000 scale survey sheets and have been incorporation/posted in the concerned CH files.

4.6.2 Site quality and age classes

On the basis of assessment of the forests, the site qualities of Chil, Deodar, Kail and Oak vary from III to even I. The age classes vary from young to mature but mostly middle aged. Both site qualities and age classes have been recorded in the

concerned CH files of the forests. However, there is no significance of site quality here as no felling is prescribed.

4.6.3 Density

This has been ocularly assessed and incorporated in the concerned CH files. The density is generally low in UPFs and comparatively high in DPFs and RFs.

4.6.4 Enumerations

To know the growing stock of this working circle, 5% enumeration has been carried out on the basis of stratified random sampling. The figures of enumeration so projected for each compartment of forests have been incorporated in the concerned CH files of the forests. Total and per ha number and volume of various species in Biosphere Conservation working circle is given in table-92.

Table-92
Total and per ha number and volume of various species in Biosphere Conservation Working Circle (Total Area-15248.72 ha)

Species	Class	V	IV	III	IIA	IIB	IA	IB	IC	ID	IE	Total	Per ha
Deodar	No	371134	307028	193246	89422	39549	13277	4641	1097	338	28	1019760	66
	Vol.	63835	141847	194792	159887	110738	53386	25221	6810	2661	273	759450	49
Chil	No	332906	344946	194343	81293	36624	1406	309	56	0	0	991884	65
	Vol.	24302	106243	138178	103730	73797	4108	1236	259	0	0	451853	29
Kail	No	171193	121180	116876	68100	27904	7932	1013	141	28	0	514367	33
	Vol.	26364	52713	115941	122036	78968	32332	5576	884	224	0	435037	28.
Spruce	No	171193	121180	116876	68100	27904	7932	1013	141	28	0	514367	33
	Vol.	18146	44231	107292	119584	80866	34379	6141	990	259		411887	27
Ban/Oak	No	1171516	445647	175075	39859	11561	3544	5035	28	0	0	1852265	121.
	Vol.	95479	122553	109772	45160	20845	9325	18222	117	0	0	421472	27.
B/L	No	616615	129168	36343	20590	6807	8523	4782	2363	0	0	825192	54.
	Vol.	70911	39784	24895	25553	13512	24845	19309	10997	0	0	229805	15
	Total Trees	2834557	1469148	832758	367364	150349	42615	16793	3826	394	28	5717834	375
	Total Volume	299037	507371	690870	575949	378726	158376	75705	20057	3143	273	2709505	178

4.6.5 Silvicultural system

As no exploitation of forests is involved, therefore no silvicultural system is prescribed. Thus, there will be no green felling except to meet the bonafide demand of right holders. The requirements will, however, be met with as far as possible from salvage removals.

4.6.6 Treatments prescribed

- i) The gaps in the forests will be filled up artificially. Sowing and planting will be resorted to. Species best suited to the areas will be preferred and no attempt will be made to replace the local species or to plant exotics.
- ii) The broad leaved species will be preferred in UPFs to meet the requirement of fuel and fodder. The forest shall be closed in phased manner to improve their stocking. However, the species required to be planted in the areas have been recorded in the respective CH files.
- iii) Green felling will not be allowed from these forests except salvage removal for meeting the bonafide demand of right holders.
- iv) These forests will be protected from soil and water conservation, aesthetic and tourist point of view besides maintaining the ecological balances.

4.7 Subsidiary silvicultural operations

4.7.1 Sowing and planting

Regeneration in most of the Oak forests of this working circle is poor because of uncontrolled grazing and heavy lopping. Further, there is marked reduction in mother trees. Thus, to increase the stock, the artificial method of regeneration shall be supplemented where the natural regeneration is inadequate. The technique for artificial regeneration of Ban oak is described below.

4.7.2 Seed collection and storage

Acorns shall be collected during December-January and will be dried in shade. Sealed tins should be preferred for storage of seed instead of gunny bags which may cause damage by rodents and

insects. The seeds should be kept at low temperature and high humidity. Seed stored for one year gives a fertility rate of 60%.

4.7.3 Direct sowing

Patches of 45x45x45 cm should be made at 3 m apart and soil should be dug to a depth of 15-20 cm and well pulverized cow dung and insecticide in proportionate, should be mixed with soil. The acorns should be sown about 2 cm deep, just before the onset of monsoon rains. For sowing one ha of area, about 10 kg seeds are sufficient. The seeds are germinated during the monsoon and takes about two to five weeks. The seed collected in the same year gives 60-70% germination success. Weeding and bush cutting shall be done once during the first year and once during the second year after the monsoon is over. The sown areas should be protected against grazing, fire and other biotic interferences.

4.7.4 Nursery technique

Raised nursery beds should be prepared. The soil should be fine and mixed with cow dung and insecticide as per requirement of the soil and site. Sowing should be done about 2 cm deep in soil during February-March in lines 25 cm apart with a spacing of about 5 cm between each seed. The nursery should be provided with light shade to avoid direct exposure to sun. Moreover, the beds should not be located under the trees to avoid damage to the young seedling through dripping of water. As per requirements, the beds must be irrigated after sowing till the onset of monsoon rains. Over irrigation should be avoided. Germination is completed within 4 to 5 weeks. Weedings as and when required should be done. To avoid root competition the seedlings should be spaced to 10 cm apart, when they are about 5 cm tall. Seedlings should be protected against defoliators and insecticides should be sprayed as and when required. When the plants are 2 to 3 years old and above 30 cms height can be planted in the field.

4.8 Regeneration assessment

It is also to be carried out by territorial staff for understocked areas after every 5 years. In case regeneration does not keep pace

satisfactorily corrective measures shall be taken to restock the area in prescribed time.

4.9 Tending operations

4.9.1 Cleaning

Cleaning in coppiced areas worked in the past shall be done judicially and vigorous shoots per stump shall be retained. The sowing and planting will also be cleaned of congestion and shrub growth.

4.9.2 Thinnings

Thinnings is also to be carried out in coppiced areas depending on the density of crop. The operations will be required in young crops, and shall be carried out as and when necessary. The number of shoots on each stump shall be reduced to two to three. The mention of required thinning has been made in the CH files and these removals by way of thinning can be best utilized for the fence posts.

4.10 Miscellaneous regulations

4.10.1 Grass cutting

Grass cutting in the area under regeneration should be restricted for at least first 2 to 3 years but may be permitted after that depending upon the success and that too at the discretion of Range Forest Officer.

4.10.2 Lopping

Lopping should not be allowed in the forests already heavily lopped. In case of Oak it has seeds on two year shoots. So, strict enforcement of exercise of rights is required in the forests allotted to this working circle. The lopping may be allowed in other areas strictly on silvicultural principles.

4.10.3 Monkey damage

All care should be taken to protect the young Oak plants from damages caused by monkeys.

4.10.4 Right holder requirement

The requirements of right holders in respect of fuel wood and timber for agricultural implements shall be met with from dead, uprooted and fallen trees.

4.10.5 Fire protection

All the forests allotted to this circle and plantations carried out will be strictly protected against fire specially the Chil and Oak forests which are prone to fire.

4.10.6 Soil conservation measures

Soil conservation measures alongwith afforestation, will be taken up as per availability of the funds, in the forests which are denuded and under active erosion.

4.10.7 Closures

All areas where plantation is to be done will be closed till plants reaches above the damage of browsing, fire etc. i.e. till they reach a height of 3 m or more. However, grass cutting may be permitted at the discretion of RFO subject to the condition that it may not cause soil erosion or may not hamper in the growth of the plantations. The list of forest/areas requiring sowing/planting under this working circle is given in table-93.

Table-93

Statement showing forests requiring sowing/planting

Name of Range	Name of areas/forests	Area (ha)
Dhami	DPF-253 Lahog Ki Ghar	5
	DPF-250 Salaun C-III	10
	DPF -250 Salaun C-IV	5
	DPF-250 Salaun C-V	5
	DPF-237 Genog C-I	15
	DPF-249 Prech	5
	DPF-247 Barelli C-IX	5
	DPF-244 Khil C-II	5

	DPF-233 Pandesh Bara	10
	DPF-232 Pandesh Chota	10
	UPF-521 MoolBerl	5
	DPF-231 Baledi	10
Mashobra	D-62 Kufri C-II&III	10
	D-83 Mundalu	20
	UPF-172 SurilaBurila	5
	D-67 Paniyali C-I	5
	UPF-167 Jayali	3
	UPF-152 Kalyenpur	5
	UPF-199 Pabbi	2
	R-6 TutiKandi	10
	UPF--204 Behar	2
	UPF-207 Taradevi	2
	UPF-202 Rajhana	5
	U-208 Malog	5
	R-7 Tarb C-I	5
	R-7 Tarb C-II	5
	R-7 Tarb C-III	5
	UPF-217 Mahuri	10
	R-7 Tarb C-I,II & III	5
Koti	U-262 Tikkari	14
	D-95 Karoli C-II	5
	U-268 Jhandi	30
	D-88 Bhalwag C-XII	10
	U-259 BhalaGaon	9
	U-225 Salon	15
	U-230 Bharech	6
	U-236 Jagloh	5
	U-237 Kherki	3
	U-242 Bharech	8
	D-84 Palgar C-III	9
	U-222 Patgair	20
	R-27 Godag C-I	5
Taradevi	D-208 Godag	2

	D-225 Tarb C-III	3
	D-225 Tarb C-V	4
	D-227 Raikot C-III	4
	D-223 Baderi C-III	6
	R-21 Balahu	1.5
	D-216 Dalata	2
	D-203 Neri	5
	D-204 Karond	5
Bhajji	U-16 Karyali	35
	U-18 Chaprani	40
	U-19 GraonJaisi	35
	U-20 Domehar	35
	U-21 Khaira	15
	U-22 Palag	10
	U-23 Chowki	20
	U-24 LunsuMugna	40
	U-25 Kadharghat	40
	U-26 Basantpur	20
	U-30 Dwarsu	10
	U-38 Nagar	30
	U-47 Jajehar	40
	U-48 Berti	10
	U-59 Dandi Bag	20
	U-577 JainiNali	10
	U-581 Chanawag-II	10
	U-581 Chanawag-I	10
	D-13 Aisha	5
	D-18 Sereha-I	5
	D-20 Lambidhar	5
	D-21 Fulagalani	15
	D-24 Domehar	5
	D-26 Biru	20
	Total	853.5

CHAPTER-V

PLANTATION WORKING CIRCLE

5.1 General constitution

This working circle includes mainly blank UPFs and degraded, barren or poorly stocked RFs and DPFs which require immediate attention and are not allotted to other working circles. This working circle will cover an area of 9636.80 ha. It also includes the plantations areas which are not yet established and could not qualify for allotment to other WCs.

5.2 General character of vegetation

These forests are either blank or poorly stocked by mixed deciduous species with some coniferous trees. There is heavy pressure of grazing, lopping, grass cutting and browsing in these areas. These forests have been described in detail in chapter-II of part I and detailed description of each forest is posted in the respective CH files.

5.3 Special objects of management

Keeping in view the present status and biotic pressure put on these forests, the following special objects of management have been laid down:

- i) To develop and augment the forest resources of the area by afforestation in blank and poorly stocked areas.
- ii) To improve the soil cover by closing eroded areas and thus improving the general environment of these degraded areas.
- iii) To regulate the flow of water in the stream and rivers by resorting to large scale plantation.
- iv) Raising suitable species which can fulfill the local demand of fuel, fodder, timber, etc.

5.4 Blocks and compartments

The existing blocks and compartments have been retained as such in all forests. No new compartment or sub-compartment has been created.

5.5 Area statement

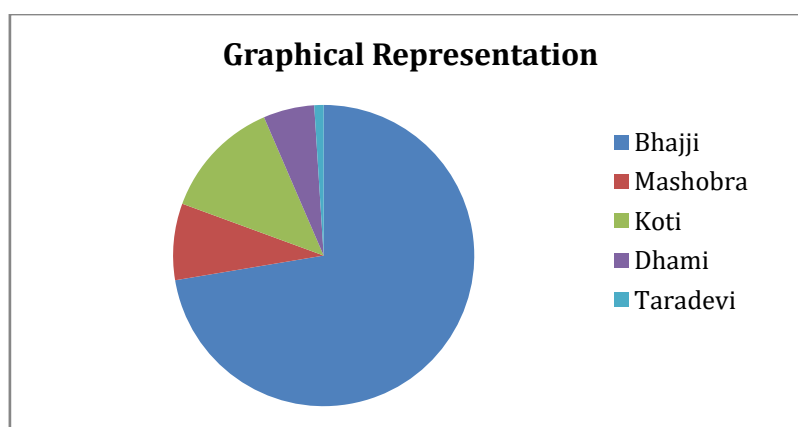
The areas which have not established and could not be diverted to other working circles are retained in the Plantation Working Circle as such.

The range wise area allotted to this working circle is given in the following table-94.

Table-94

Area distribution in Plantation Working Circle in ha

Division	Range	RF	DPF	UPF	Total
Shimla	Koti	-	-	1245.80	1245.80
	Bhajji	-	144.20	6830.20	6974.40
	Mashobra	-	-	791.82	791.82
	Dhami	-	69.20	459.00	528.20
	Taradevi	-	96.40	-	96.40
Total		-	309.80	9326.82	9636.62



5.6 Analysis and valuation of the crop

5.6.1 Stock maps

Detailed stock map of each forest has been prepared on the survey sheet in the scale of 1:15000 and placed in the respective CH files.

5.6.2 Density and quality

These areas are mostly blank or sparsely covered with trees and bushes. The quality in general is poor. Density is estimated ocularly which in general is below average and recorded in the respective CH files.

5.6.3 Enumerations

These forests are almost blank and 5% stratified random sampling has been carried out for the enumeration purpose to know the growing stock. Total and per ha number and volume of various species in Plantation working circle is given in table-95

Table-95
Total and per ha number and volume of various species in Plantation
Working Circle (Total Area-9636.62 ha)

Species	Class	V	IV	III	IIA	IIB	IA	IB	IC	ID	IE	Total	Per ha
Deodar	No	80963	60661	18523	5254	838	61	0	0	20	0	166321	17.25930326
	Vol.	13926	28025	18671	9395	2347	247	0	0	161	0	72772	7.551625154
Chil	No	666492	700451	137371	24330	6358	4457	654	307	0	0	1540420	159.8506386
	Vol.	48654	215739	97671	31045	12812	13019	2614	1409			422963	43.89126957
Ban /Oak	No	96276	11633	900	204	41	0	0	20	0	0	109075	11.31879323
	Vol.	7847	3199	564	232	74			85			12000	1.245288963
B/L	No	76628	12758	2597	1308	327	225	82	41	0	0	93966	9.750922901
	Vol.	8812	3929	1779	1624	649	656	330	190			17970	1.864717614
	Total Trees	920359	785503	159390	31097	7565	4743	736	368	20	0	1909782	198.179658
	Total Volume	79238	250893	118685	42295	15882	13921	2945	1685	161	0	525706	54.5529013

5.7 Silvicultural system, rotation and exploitable sizes

As the main object is to raise plantations, therefore, silvicultural system, rotation and exploitable sizes are not prescribed at this stage. The forests will be managed to improve the growing stock by protection and plantation.

5.7.1 Choice of species

The choice of species to be planted will vary according to the altitudinal zone and locality factors. Species best suited to the locality and which can fulfill the demand of fuel, fodder and timber will be preferred. Planting of exotic species will be avoided in general; the broad leaved species like Khair, Shisham, Bamboos,

Robinia, Darek, etc. will be preferred in lower zone. Chil will be preferred for rocky portions in between 800 to 1500 m. Deodar and Kail will be raised between 1500 to 2500 m. However, Fir/Spruce and Walnut etc. will be planted in between 2500 to 2800 m. The specific enteries regarding choice of species have been made in the general recommendations for different altitudinal zones are as under:

Altitudinal zone species recommended

Below 1000 m	<i>Acacia catechu</i> (Khair), <i>Dalbergia sissoo</i> (Shisham) <i>Sapindus mukorossi</i> (Ritha), <i>Morus alba</i> (Mulberry), Robinia, <i>Ailanthus spp.</i> , <i>Emblica officinalis</i> (Amla), <i>Cedrella toona</i> (Tun), <i>Bauhinia variegata</i> (Karyal), <i>Albizia spp.</i> (Siris), <i>Cassia fistula</i> (Amaltas), <i>Melia azedarach</i> (Drek), etc.
1000-1500 m	<i>Pinus roxburghii</i> (Chil), <i>Morus alba</i> (Mulberry), Robinia, <i>Grewia optiva</i> (Beul), <i>Bauhinia variegata</i> (Karyal), <i>Ailanthus spp.</i> , <i>Buxus sempervirens</i> (Boxwood), <i>Melia azedarach</i> (Drek), etc.
1500-2500 m	<i>Cedrus deodara</i> (Deodar), <i>Pinus wallichiana</i> (Kail), <i>Juglans regia</i> (Walnut), <i>Acer spp.</i> (Maple), <i>Fraxinus spp.</i> (Ash), Robinia, <i>Ailanthus spp.</i> , <i>Quercus incana</i> (Ban) <i>Aesculus indica</i> (Goon), etc.
Above 2500 m	Fir, <i>Picea smithiana</i> (Spruce), <i>Pinus wallichiana</i> (Kail), <i>Juglans regia</i> (Walnut), <i>Acer spp.</i> (Maple), <i>Fraxinus spp.</i> (Ash), <i>Prunus padus</i> (Jamu), <i>Aesculus indica</i> (Goon), etc.

5.8

Planting programme

Planting shall be carried out in monsoon or in winter season. The conifers will generally be planted in monsoon and broad leaved in winter. The species considered suitable for planting have been indicated for each area and also recorded in the respective compartment history files. However, the DFO will have discretion to change the species and year wise sequence depending on

circumstances, but the efforts should be to bring all these under well established plantation within the currency of this plan. A definite planting programme has been suggested; Range wise as given in the table-96.

Table-96

Statement showing forests requiring sowing/planting		
Name of Range	Name of Areas/Forests	Area (ha)
	UPF-519 Snagech	3
	UPF-513 Kushah	4
	UPF-528 Badera	5
Dhami	UPF 499 Ghatru	5
	UPF-516 Tikkari	5
	UPF-495 Bai Kaiar	5
	UPF-557 Shakrah	5
	UPF-553 Jakhari Sarmana	5
	UPF-588 Chalahal C-I	5
	DPF-239 Dalimu	10
	UPF-536 Salaun ka Ghat	10
	UPF-544 Dargot North	10
	UPF- 514 Bhukho	10
	UPF-517 Kuiru	10
	UPF-524 Gharogh	10
	UPF-538 Ozar	10
	UPF -541 Bohli	10
	UPF-498 Bajiar Ghat	10
	UPF -504 Tun	10
	UPF-583 Sohal	10
	UPF-596 Bajhol -II	10
	UPF-600 Sharog	10
	UPF-586 Dishti	10
	UPF-154 Paniartu	10
	UPF-155 Jagyalree	10
	UPF-196 Shalainj	10
	UPF-494 Okhroo Mandaya	15
	UPF-594 Kotla	15
	UPF-39 Hiwan	15
	UPF-580 Panyali	15
	UPF-157 Sawankiar	15
	UPF-194 Mehali	18
	DPF-228 Panihana	20
	UPF-501 Panjehl Bainsh	20
	UPF -502 Paniyali Nerti	20
	UPF-530 Dhar	20
	UPF-547 Dhalaya	20

	UPF-589 Mandri	20
	UPF-592 Bohli	20
	UPF-593 Shahli	20
	UPF-42 Nin	20
Taradevi	D-217 Kariar	20
	UPF-264 Dher Koriwari	24
	UPF-214 Badhog	25
	UPF-15 Draul	25
	UPF -194 Malai	25
Bhajji	UPF-3 Bag Sainj	30
	UPF-599 Pahal	30
	UPF-601 Nagar	30
	UPF-38 Nagar	30
Koti	UPF-262 Rohalti	32
	D-221 Tiba Jarani	34
	UPF-36 Madorghat	35
	UPF-48 Berti	35
	UPF-11 Bagri Banuna	40
	UPF-14 Bharara Drabla	45
	UPF-22 Palag	45
	UPF-5 Pandoa	50
	UPF-59 Dandi Bag	55
	UPF-226 Bharandi	55
	UPF-19 Graon Jaishi	58
	UPF-158 Oddu	62
	UPF-23 Chowki	65
	UPF-17 Himri	65
	UPF-256 Lakhoti	66
	UPF-4 Gharyana	70
	UPF-10 Malgi Kothi	70
	UPF-24 Lunsu Mungna	70
	UPF-20 Domehar	72
	UPF- 434 Nadukhar	75
Mashobra	UPF-214 Badhog	75
	UPF-189 Pru	78
	UPF-6 Dharogra	80
	UPF-21 Khaira Padain	82
	UPF-26 Basantpur	85
	UPF-25 Kadarghat	85
	UPF-267 Thund	85
	UPF-278 Sardagowan	85
	UPF-13 Ogli Suma	95
	UPF-47 Jajehar	95
	Total	2668

5.9 Control and deviation

The annual target of areas prescribed for planting must be achieved every year and deficit of any one year must be made up in the following year. The excess or deficit achievements will be shown in the control forms and checked at 5 years intervals. Only successful areas of plantations will be counted against the prescribed target. The detailed reasons for deviation should be given and sanction of deviation obtained from competent authority.

5.10 Regeneration assessment

Regeneration survey on 1:3,750 scale map shall be carried out every year till the plantation is established. Reasons of the failures, if any, should be recorded in the survey report and posted in respective CH files. All heavy failures will be personally investigated by DFO who will send report to CF for taking corrective steps.

5.11 Closures

Closures shall be got notified in advance of actual planting. Old plantations may be thrown open if these are beyond browsing damages. Effective closure is must in order to reduce the total closure period of each plantation. However, the areas prescribed for planting will remain closed till the plantations are established i.e. reaches to a height of more than 3 m.

5.12 Grazing and grass cuttings

Grazing will not be allowed till the plantation is at a level where no damage is caused by the animals. However, grass cutting in closed areas may be permitted when the plants have attained sufficient height and there is no chance of their being damaged by sickle. The permission of grass cuttings rests at the discretion of RFO. The grass should be equally distributed amongst all the right holders. It is better if panchayats are associated for the purpose.

5.13 Fire protection

5.13.1 The whole of the working circle shall be protected against fire by taking all possible preventive measures in advance. Maintaining cordial relations with the local people through participatory management, educating them properly and deployment of fire watchers are some such measures.

5.13.2 Fire lines of 5 metre width dividing the entire plantation areas into suitable blocks may be provided by clearing the bushes and other vegetations. Such fire lines are required to be made in areas which are prone to fire and particularly chil areas. These fire lines should be shown on treatment maps.

5.13.3 In the event of fire, timely action to extinguish the same will be taken through the help of right holders and JFMC's.

5.13.4 The offenders should be booked under the Indian Forest Act, 1927, H.P. Panchayati Raj Act, 1994 under provisions of Indian Penal Code, etc.

5.14 Plantation technique

The bushes which do not serve any purpose will be removed partially to get more space for raising important species. Well grown nursery raised plants be preferred. The normal height of plants should be 10" in case of conifers while 1 metre in case of broad leaved species. Selection of sites and choice of species are very important aspect of raising plantation which should be done by RFO. Detailed instructions regarding plantation techniques are given in technical order No. 3 and 4 of the Punjab Forest Manual Vol. III. These techniques are also well defined in the book "Environmental Development cum forest plantation planning and Management" by Shri. C.D. Katoch, IFS. Each species should be raised under favorable site conditions and in areas suiting to its silvicultural requirements.

5.14.1 Fencing

The area should be properly fenced so that it is protected against biotic interference. Though, there are various kinds of fencing but barbed wire fencing in three strands should be preferred. The vertical spacing of 1st strand from the ground level should be atleast 15 cm. Then spacing between 1st strand and 2nd strand should be 22.5 cm, while 3rd strand should be 30 cm above 2nd strand. The fence post should be fixed firmly in hole of 15 cm x 15 cm x 45 cm (depth). In the conventional method of barbed wire fencing the linear spacing between the fence posts is 3 metre. However, as per new technique advised by Sh. C. D. Katoch, IFS in his book "Environmental Development cum Forest Plantation

Planning and Management, the linear spacing between the fence posts should be 6 metre and in between one strand of G.I wire (3 mm) i.e. At a distance of 3 metre, is interwoven, thereby interlocking the barbed wire strands. This technique will require less number of fence posts and is recommended for trial. Though, this method of fencing was not followed so far in this division which must be adopted for trial and if the results are found satisfactory, should continue with it in order to overcome shortage of fence posts in this division. As per latest departmental policy fencing needs to be done around plantation sites only where it is necessary. Fencing along the steep slopes, cliffs, should be avoided where it serves no purpose. However, it is advisable to plant bio-engineering species suitable for the area along three strand barbed wire fencing especially in areas where grazing incidence is high; fencing work should be taken up during the rainy season along with live fence support even for area which is to be planted in the ensuing winter. Where economical, and especially along roads, treated bamboo posts should be used for fencing. Where adequate live fence material is planted, only-2 strands of barbed wire may be sufficient. Tall plants of broad leaved species (6-8 ft high) wherever available can also be planted along the fence.

5.14.2 Preparation of site and earth work

The bushes and grasses should be cut around the planting sites and then these should be burnt at least six months in advance of planting. After the sites are cleared, the pit digging operations shall be done at least one month in advance of planting. Planting of conifer species will be done at a space of 3x3 m along the contour in pits of 30x30x30 cm dimensions. For broad leaved planting the size may be 45 cm³. If patch sowing has to be done then square patches of 50x50 cm with 15 cm to 20 cm depth should be made at a distance of 3 m along the contour. These patches should also be made at least one month in advance of sowing.

5.14.3 Sowing/planting

Sowing/Planting is prescribed in monsoon i.e. July/August as well as in winter i.e. December/January. Though, the cost involved in sowing will be less but the survival through the planting will be

more, thus planting will be preferred. For this, suitable plants will be raised in nurseries. The seeds should be collected from healthy trees to get good survival. The work must be done under close supervision of the field staff and must be regularly inspected by RFO/ACF/ DFO.

5.15 Nursery techniques

Site for temporary nurseries should be selected within or nearer to the plantation areas and the source of water, to reduce the cost of carriage and mortality of the seedlings. The plants requirements should be worked and entire operation be planned in advance. The nursery should be raised well before the actual planting depending upon the time required to get seedlings of plantable size. Methods of nursery raising and time required to get plantable seedlings is described in detail in the book. “Forest Nursery Hand book” by Shri C. D. Katoch, IFS and in respect of some common species is given in table-97. However, the instructions regarding nursery techniques are also given in technical order No. 3 and 4 of the Punjab Forest Manual Vol. III.

Table-97

Method of nursery raising and the time required in respect of some common species

Species	Method of raising	Time required
Chil	Sowing in Polythene bags	8 to 9 months
Khair	Sowing in Polythene bags	5 month
Bamboo	Sowing in Polythene bags	2 to 3 years
Kachnar	Sowing in nursery beds	2 to 3 years (root shoot cutting)
Beul	Sowing in nursery beds	1 year
Semal	Sowing in nursery beds	1 to 2 year (root shoot cutting)
Deodar	Sowing in nursery beds	1 ½ year
Populars	Cutting in nursery beds	2 years (one year shoot and two Year root)
Walnut	Sowing in nursery beds	2 to 2 ½ year
Fir	Sowing in nursery beds	4 ½ year
Spruce	Sowing in nursery beds	3 to 3 ½ year

5.16 New concept of nursery

It is axiomatic that the degree of survival of plantations is directly linked to the quality of nursery stock raised in nurseries. More so,

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

Few important qualities of any good nurseries would include:

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

5.17 Tall planting

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

Table-98
Raising of Deodar in nurseries

Month	Nursery operations
Nov-Dec	1. Sow seeds in trays filled with only Vermicompost. Keep the trays in polyhouse. (1 kg Deodar seed contains 8000-10000 seeds approximately).
March (1st Year)	1. Prick in 6"x4" bags or in root trainers with potting mixture of 1:1:1 of sand: soil: vermicompost.
July (1st Year)	1. Transfer to 9"x5" bag alongwith ball of earth; add some more soil at bottom and sides.
July (2nd Year)	1. Transfer to 15"x7" bag alongwith ball of earth; add some more soil at bottom and sides.
July (3rd Year)	1. Plant 90% of the good quality plants. 2. Retain 10% best plants from among the quality plants for production of ' Tall Plants ' and shift them in bags of size 20"x12".
July (4th Year)	1. Shift these plants to cement bags or such other alternatives.
July (5th Year)	1. Plant out these plants in pits of size 60x60x60 cm.

Similarly month wise activity chart for raising Ban is given here:

Table-99
Raising of Oaks in nurseries

Month	Nursery operations
Nov	1. Sow seeds in fresh cow dung immediately after collection as Oak seeds are viable only for 7-14 days.
Jan (1st Year)	1. Prick the germinated seedlings in 9"x5" bags with potting mixture of 1:1:1 of sand: soil: vermicompost.
July (1st Year)	1. Transfer to 15"x7" bag alongwith ball of earth; add some more soil at bottom and sides.
July (2nd Year)	1. Transfer to 20"x12" bag alongwith ball of earth; add some more soil at bottom and sides.
July (3rd Year)	1. Plant 90% of the good quality plants. 2. Retain 10% best plants from among the quality plants for production of ' Tall Plants ' and shift them in cement bags.
July (4th Year)	1. Plant out these plants in pits of size 60x60x60 cm.

Tall plants of other deciduous species will also be raised in a similar way as that of Oak, sowing time and technique will be as per species requirement. For deciduous tall plants, root-shoot cuttings will be raised in production nurseries while sowing will be done in mother nurseries.

Nurseries larger than 0.25 ha but smaller than 0.5 ha, that have been closed can be used as **Mother Nursery** for production of root-shoot cuttings of deciduous broad leaved species. Thus, all

deciduous broad leaved species like Robinia, Chulli, Walnut, Horse Chest Nut, Daru, Drek, Ritha, etc. will not be grown from seed in production nurseries but their root-shoot cuttings will be made in Mother Nurseries. Month wise activity chart for such nurseries is given in table-100.

Table-100

Mother nurseries for production of deciduous broad leaved species

Month	Nursery operations
Nov-Dec	<ol style="list-style-type: none"> 1. Plough the field, add compost and broadcast seeds, level to cover the seeds 2. Flood irrigation to the field
March to June (Next Year)	<ol style="list-style-type: none"> 1. Flood irrigation 2-3 times depending on rainfall and temperature 2. Weeding twice-once before and once during monsoon (these plants will not be shown in nursery return)
Nov (Next Year)	<ol style="list-style-type: none"> 1. Uproot plants that are >2', transport to production nurseries 2. Make root-shoot cutting retaining 4" of root and 4" of shoot 3. Plant in polybags of size 15"x7" (Now they will be shown in the Nursery Return of May'13 under age group 1.5 years)
Nov-Dec (2nd Year)	<ol style="list-style-type: none"> 1. Plant 90% of the quality plants 2. Retain 10% best plants from among the quality plants for production of 'Tall Plants' 3. Make root shoot cutting of these 10% retained plants by cutting the shoot at 2' height (retaining only one shoot) and shift alongwith the soil to bags of size 20"x12"
Dec(3rd Year)	<ol style="list-style-type: none"> 1. Plant out these plants in pits of size 45x45x45 cm

5.18 Plantation practices

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

30% medicinal trees, 20% wild fruit trees suitable for the area and the remainder to be the main species of the forest type either conifer or broad leaved will be planted in areas allotted to plantation working circle. It should be seen that mixture should not complicate the silvicultural management. The mixture should therefore be simple with minimum number of species and one block with one species should be preferred. It has, therefore, to be ensured that for plantation programmes sufficient diversity of tree species is grown and available in the nurseries. It is also prescribed that wherever Deodar is being planted the plants should be atleast 2

and a half year old. Similarly broad leaved species should be atleast 1 year old. Deciduous broad leaved species are to be planted during winter while conifers are to be planted during the rainy season.

5.19 No site clearance is to be done

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

5.20 Beating up

Beating up of failures will be carried out for at least up to 5 years after the planting if the survival is less than 90%. Where the success is more than 90%, no beating up is to be done unless the failures are in compact block of 0.2 ha or more in extent. Therefore, suitable funds for maintenance of old plantations should be made in the annual budget estimates.

5.21 Pruning, Cleaning and Thinning

These operations will be carried out in old plantations. Pruning will be done up to 1/3rd height of the Chil plants when the crop has a mean height of 3 m, cleaning and thinning should be done where the crop is dense and the height of plant is 5 m or above one cleaning shall be enough.

2.5.22 Weeding

At least two weeding in the first year and one weeding during the rains in the following year is considered essential.

5.23 Treatment map

Treatment map on 1:3,750 scale shall be prepared for each plantation area showing the plantable, unpalatable locations, soil depth, slope and species to be planted. This map should be maintained in the CH files/plantation journals.

5.24 Plantation Journal

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

CHAPTER VI

THE FOREST PROTECTION (OVER LAPPING) WORKING CIRCLE

6.1 **General constitution**

This circle would be an overlapping working circle covering all the working circles and is constituted to evolve the strategy to ensure the protection of forests against the forest fires, illicit felling, smuggling of the timber, resin and NTFPs, encroachments over forest land, protection of the forests from the invasion of the alien species and illegal mining.

6.2 **General prescription**

In this Working Circle the problems like forest fires, illicit felling, smuggling of the timber, resin and NTFPs, encroachments over forest land, protection of the forests from the invasion of the alien species, and illegal mining in the Shimla Forest Division context in general will be discussed, analyzed, mitigation measures and a pragmatic strategy will be suggested.

6.3 **General character of the vegetation**

As the Forest Protection Working Circle is an overlapping Working Circle as such it represent almost all the forest types starting from scrub in lower elevations and extending upto higher elevations.

6.4 **Special objects of management**

The special objects of management are as under:-

- i) Fire vulnerability of each forest to be assessed especially Chil areas and preventive measures against fires planned and put in the APO.
- ii) The assessment of the illicit felling cases is to be done and a strategy to be adopted.
- iii) There are cases of smuggling of the timber in this division, its legal course of action and strategy for curbing down such incidences.
- iv) Dealing with the encroachments, legal course of action and strategy to mitigate the problem.
- v) Regular assessment of spread of invasive alien species in this WC to be monitored atleast once in two years and priority given to their removal in APOs.

6.5 **Area statement**

This working circle will be overlapping and therefore cover entire area under working plan.

6.6 **Methods of treatment**

The prescriptions in this chapter have been subdivided into following parts.

- i) Fire Management
- ii) Illicit felling and smuggling of the timber resin and NTFPs.
- iii) Invasive alien species management
- iv) Encroachments over forest land.
- v) Illegal mining on the forest land.

6.6.1 **Fire management**

There is a saying:

“Forest fire is a good servant but a bad master”.

Conserving forests mean conserving life. It is in our own best interest and it is vitally important to the health of the whole planet. Forests are the storehouse of biological diversity, home to two-thirds of all plants and animals. Moreover, they supply many of our most basic needs: shelter, food, clean water, oxygen and medicines. Forests share their natural wealth and diversity for our livelihoods and lifestyles, prevent severe water run-off and regulate climate. We must also remember the cultural, spiritual and recreational joys they give.

Uncontrolled forest fires are the major threats to the forest wealth i.e. flora and fauna, disturbing the biodiversity and the ecology and environment of a region. There are basically two seasons of the forest fires in this division. One, the prominent one is the summers between April to June and another is the winters between November-December. The winter season is not that prominent because most of the time there are winter rains and snowfall, therefore the impact is comparatively low. In summers the forest fires in hilly region has a very high impact as the terrain in the hills being sloppy, the fires spread very quickly and engulfs large tracts in no time as compared to the fires in the plains. This exposure of forest soil to the fire affects the soil structure and texture rendering it vulnerable to erosion and subsequently when the monsoon rains come; it washes away this loose soil. Himalayas being the most recent and youngest mountain ranges are greatly fragile where the

land mass is yet to find its final form and are consequently highly vulnerable to erosion. Thus this geological problem is further aggravated by the ill effects of fire.

Causes of forest fire

- a) **Manmade fires-** The three most important factors for fire are temperature, humidity and quantity of inflammable material. In summers all these three factors are highly favorable for forest fires thus bringing threshold point for fire ignition dangerously low. In the prevailing conditions of low humidity, high temperature and forest floor littered with highly inflammable pine needles, a fire is caused immediately when a source of fire like naked flame, cigarette or bidi, electric spark or any source of ignition comes in to contact with inflammable material.
- b) **Natural fires-** A few forest fires are because of the natural causes such as lightning which set trees on fire.

For the practical purpose the focus should be on the Man made fires.

Now let us discuss the causes of the man made fires:

A. Deliberate:

- i) People have a feeling (to some extent rightly so) that burning of an area stimulates a fresh flush of grass which is a primary need for fodder over vast stretches of the state.
- ii) Similarly in higher reaches people do this for “Guchhies” in the belief that the fire stimulates the growth of this much coveted and highly priced fungus.
- iii) In many areas of the state, a well established modus operandi for encroachment of forest lands has been evolved over the years. Burning of such prospective areas so as to render them devoid of vegetation is an early step in this subtle and gradual process of encroachment.
- iv) Since the marking of green trees has been stopped in the state and only dry trees can be marked, certain unscrupulous elements do not hesitate to put forests to fire in the hope of rendering the trees dry thereby providing them with work in the following years.
- v) In the misplaced belief that smoke raised from the fire will bring rains.

B. Unintentional mistakes of the people:

- i) Throwing cigaret, bidi, etc. by people passing through fire prone areas.

- ii) Throwing lighted cigarettes and bidis out of the passing vehicles which when falls on the inflammable material along the roadside, turns into forest fires.
- iii) Fire left unattended after working hours, by PWD labour engaged in road tarring which spreads to nearby forest with the strong wind.
- iv) School children putting fire for fun and then becoming uncontrolled.
- v) Burning of the 'ghasanis' in the peak summer season and then fire going out of control.
- vi) From vehicular traffic.
- vii) People lighting fire during picnic and fun and then leaving fire lighted which sometimes spreads as forest fire.
- viii) People passing through forest in the dark burn torchwood for lighting their path. Sometimes sparks from such torchwood turns into fire.
- ix) Instances are not uncommon when in summers some 'Baratis' having to pass through forests in the night have put the forests to fire to light up their path. The problem gets accentuated as most of the times such 'Baratis' are in.
- x) Inebriated conditions and can be expected to do things which defies normal human behaviour.

Whether it is the cause or the impact of the forest fire it is the people/community which is always in the centre.

"Since people are the main cause of forest fires, prevention and control must mainly involve communities living near forests," Investing in fire education and awareness will reduce the number of fires and the cost of fire management.

Therefore, firstly we have to deal with the community/people. We may need to:

A. Educate them regarding:

- i) About the right season for burning of 'ghasnis'.
- ii) The burning of the forest in the peak fire season means destroying the nests and the chicks of the birds, young born of the wild animals which are a sin.
- iii) The estimated loss occurring to the forest wealth due to fire.
- iv) The adverse impact of the fires on the water retention capacity of the area and its consequent ill effect on agriculture/horticulture.
- v) Gradual depletion of palatable grasses due to repeated fires and eventual invasion of inferior and unpalatable species.

- vi) The addition of the carbon to the atmosphere due to fire.
- vii) The nutrient deficiency in the soil.
- viii) Responsibility as citizen as well as consumer of forest resources.
- ix) Making forest fire as one of the chapter in the school level curriculum.

B. Train them:

- i) In fire fighting and provide the equipment to them.
- ii) Collection of the fire hazardous material and put that in proper use.
- iii) Linking this with the employment generation.
- iv) Making fire fighting as a community based activity.
- v) Involving the communities in the management of the forest.

"As long as people do not understand the dangers of using fire in the open without proper protection and often under extreme weather conditions, like hot summer temperatures of sometimes over 35 degrees, the fight against forest fires will continue to have only limited success" FAO Report. Women should be better trained in fire prevention because they play a key role in educating their children.

Two fold actions are required:

- i) Prevention
- ii) Remedial

Prevention: We know that every year there is a leaf fall in the deciduous and semi deciduous forests. That keeps on accumulating on the ground. If there are not proper rains the material does not degrade completely and becomes a ready material (fuel) for the forest fire in summer. On the other hand if we control burn the area there is early sprouting of the green grasses and less combustible material which reduces the impact of the fire in the peak season. The controlled burning depends on seasons, weather, humidity, the amount of moisture in dead vegetation, and the fullness of the forest floor vegetation and is monitored very carefully.

There need a strategy for addressing this problem. Some are:

- i) Control burning of the forests:
 - Season of control burning is the key thing. (In any case this work should be finished latest by first week of February.)
 - Identification of the areas to be control burnt.

- The technique of the control burning is to be taught to the forest guards and the workers. (The control burning has to be done from top to downwards.)
 - The plan for all the forests is to be drawn and then effectively implemented having all the forest area control burnt every third year. The four year cycle in practice is too long a period to reduce inflammable material in the changed scenario.
 - Presently, the control burning is practiced and budget allocated for Chil areas only listed in the working plan. There are large areas outside the Chil working circles, especially scrub areas, grasslands, which are equally prone to fire but are out of focus at present. Most of the fire incidents originate from such area and then travel to regular forests. But Forest Department's approach, embedded as it is, in the production forestry era, does not foresee any need to reduce fire hazard in such areas which are outside the purview of working plans. Fires in such areas may not be very detrimental to our "tree crops" but when flames in such areas (or even in private ghasnis) lit up the night sky, the local newspapers are full of criticism of the Forest Department next morning.
- ii) Maintenance of the fire lines:
 - iii) The fire lines are to be identified and maintained every third year by collection of the combustible material and control burning the same. The list of identified fire lines is given in para-2.13.7.3 of Chapter XIII.
 - iv) Cleaning and thinning in congested young crops especially in Chil crop. Due to ban on green felling and consequent giving up of cleaning and thinning operations, many regeneration areas have become so congested that once fire breaks out in such areas, it is almost impossible to do anything but to wait for entire crop to burn itself out.
 - v) Effective publicity in the peak season among the communities, school children and tourists.

Remedial:

The front line staff needs to be geared up for the fire season in advance in the following ways:

- i) Holding the workshops well before the fire season and accessing the strengths and weaknesses.

- ii) The officers should bear the responsibility to minimize the weaknesses.
 - iii) Effective planning at all the Division level as well as Range level.
 - iv) Timely Purchase of the firefighting equipment by assessing the need at Range level. The equipment should be handy and usable. Most of fire fighting tools purchased so far is hardly used in fire fighting as it is not designed for effective use in hilly terrain and is rather considered as a liability during fire fighting. Quality fire fighting tools are not readily available in local markets and good quality tools if sourced from major markets are quite expensive. Rather than giving meager budget to each DFO every year for purchase of fire equipment, which serves no purpose, quality and effective
 - v) tools should be sourced from reputed suppliers under a realistic and well thought out procurement plan in a centralized manner.
 - vi) More focus on the areas which are fire prone and where control burning has not been done.
 - vii) Lack of strategy, equipment, resources, manpower, and community response reduces the success of firefighting efforts. These results in demotivating even a highly enthusiastic forest official who in sheer helplessness and frustration gradually develops a sense of apathy towards forest fires. Such situation will be a great setback in our effort against forest fires and needs to be guarded against.
 - viii) Making a fully equipped team of at least 10 people which should be placed at Range level and should be engaged exclusively for the fire season and should not do any other work during fire season.
 - ix) The areas which are not covered departmentally responsibility be given to the Communities, NGOs, etc. by paying them incentive in the form of Cash. This incentive needs to be substantial rather than token.
 - x) Having effective liaison with other organizations like Police or Paramilitary Battalions, Fire Department, Panchyats, etc.
- “The remedial as well as preventive measures are complimentary to each other and one can not supplement the other”.

Now let us discuss the “Fire as a good tool”.

- i) In forest areas particularly the wildlife habitats the fire is used as a major tool in preventing the natural succession and maintaining the grasslands.

- ii) Fire is a powerful, natural phenomenon. Scientists have gathered more information on the effects of fire on forest ecosystems; they have learned that fire exclusion might not have been the best practice for land management.
- iii) Fire exclusion causes thick vegetation and large amounts of dead fallen materials. The heavy vegetation and dead material increase the fuel quantity on the forest floor and may cause fires to ignite more easily.
- iv) In certain cases controlled fire is essential to maintain the biological diversity.
- v) Many trees are dependent on the heat of fire in order to open up their seed cones for regeneration (conifers). Vegetation modification also affects the ecosystem's insects and diseases, wildlife populations, soil structure, and nutrient recycling.
- vi) Control burning creates an open forest floor. This eliminates any fuel that could contribute to a high intensity fire in the future.
- vii) When the fire burns the organic material in the forest, nutrient rich ash is left behind. When the first rain comes, the nutrients in the ash dissolve into the soil for the new plants to use. This process is called nutrient recycling.
- viii) Another outcome of controlled burning is that new growth begins immediately after the fires have been extinguished.
- ix) Fires also burn the unwanted fungi and insects which may destruct the forests otherwise.
- x) The controlled burning does not release as much smoke as uncontrolled fires do.
- xi) Leave snags that provide nesting spots for woodpeckers and many other bird species.

Seven action points

- Use of modern technologies like GIS and satellite images for creating data base and planning.
- Planning the control burning activity and maintenance of fire lines in well budgeted form.
- Plan Forest Fire fighting well in advance.
- Provide all equipments and facilities of mobility and communication to the fire fighting teams.
- Involve the communities in action as well as for educating.
- More stress on awareness during peak season.
- Evolve effective monitoring system.

Out of the total forest area of 31340.44 ha in Shimla Forest Division, 3442.80 ha (10.98 %) is under Chil Working Circle in the plan under revision. It is estimated that about one to three tons needles fall per hectare per season depending on the density of the forest. Thus taking an average of 1.5 tons per ha the volume of pine needles that fall each season is estimated to be 13350 tons. Dry pine needles are a fire hazard to the forest. Every year thousands of hectares of forest area gets fire burnt because of pine needle accumulation. The decomposition of pine needle is extremely slow. List of forests affected by fires in past is given in table-9 of part 1. Each beat will be taken as unit in addressing fire problem.

6.6.1.1 Strategy for fire management

The strategy for fire management will include the following:

- i) **Clearing of roads:** Accidental fires in Chil forests are caused by lit cigarettes negligently thrown by passersby. As all Chil forests have sufficient fallen needles during summers (April –June), it easily catches fire and results in forest fires most of which are restricted to ground. To address this, both sides of roads upto 10 m 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/vermicomposting/briquettes.
- ii) **Needle collection:** Another important and probably the most common reason for fires in Chil forests are the intentional fires lit by locals to get fresh flush of grass from the forests.
- iii) To combat such fires following strategies may be adopted singly or in combination:
 - a) **Participation of local people:** Since all such fires are caused by local people especially those having cattle, thus involving these stakeholders in fire management may help. Awareness programs combined with monetary incentives could be tried here. Fire management committees may be constituted at Panchayat level or existing/new JFMCs may be involved. The incentive for protecting 100 ha forest may be fixed as follows:

i) No fire: Rs 10,000

ii) 1 fire: Rs 5000

iii) 2 fires: Rs 2000

iv) More than 2 fires: No incentive

The area chosen for such schemes will thus save on deployment of fire watchers and the amount so saved will be used towards paying the incentive.

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

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

Presently in HP, 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 Shimla. However, as the exercise would involve identification of marketing channel, 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 and Environment has tried this enterprise in certain Panchayats. After making a study of the economics of the enterprise, the same may be adopted in Shimla. 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 mono-crop of timber species (which means no immediate use/access to resource) are neglected by people.

In forest compartments that are under active resin tapping, HPSFDC resin workers or resin agents should get such compartments cleared of fallen pine needles 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.

6.6.2 Illicit felling and smuggling of timber, resin and NTFPs:

With development of good network of roads, there has been an increase in incidences of illicit felling. Table-10 of Part-I gives the incidences of illicit felling since 1997.

The high price of timber in the market has attracted/created tendency to become rich overnight and hence the smuggling of timber takes place more than often. The illicit felling and smuggling are both related, many times organized. The incidences of smuggling have, however, reduced after the amendment in Indian Forest (HP 2nd Amendment) Act, 1991 vide which DFO has been designated as Authorized Officer to hear the cases pertaining to illegal transportation of Govt. property i.e. timber, resin, khairwood and katha and may order confiscation of both forest produce and the vehicle involved. The detail of cases admitted and decided in the court of Authorized Officer Shimla under 52A has been given in para-1.2.4.4.2 of Part-I under Table-11.

6.6.2.1 Strategy

- i) **Rapid Response Team:** Van Thana will be opened in the division and a team of young officials will be deployed to man it. They will work in Van Thana as Rapid Response Team (which means they will also be provided with good communication network- mobile allowance, vehicle, etc.) and will have exclusive responsibilities only of protection works including illicit felling, encroachment, forest fires, wildlife poaching, etc.
- ii) Stringent action against offender will act as a deterrent.
- iii) Whenever any vehicle is apprehended or timber is seized, they should be disposed of immediately (after seeking

permission from court) before there is any depreciation in their value. This will save space and time wasted in keeping them in custody.

- iv) Detail of guidelines for disposal of forest offences viz. compounding, challaning, lodging of FIR and powers given to Range Forest Officers for compounding is enclosed as Appendix-X (i-ii).

6.6.3 Invasive alien species: strategy for control and rehabilitation of affected areas

Introduction:

Biological invasions – one of the anthropogenically mediated ecological perturbations are threatening native biodiversity, preventing natural ecological succession and changing the community structure and composition, besides impacting ecosystem services. *Lantana camara* is perhaps one of the most important invasive alien plant species (exotic weed) in forest ecosystems of India as also in Shimla Division. Other alien invasive plant species with significant impact on the forests of Shimla Division include *Parthenium hysterophorus*, *Eupatorium 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 localities and show gregarious occurrence, at many places these share the niche and grow in an intimate mix with *Lantana*.

A reconnaissance was made during January 2011 to map the distribution of exotic weeds in various compartments in this Division, which is given in table-101. Whereas, it was possible to record the incidence of *Lantana* fairly accurately, the area infested with the other two main invasive alien species could not be recorded comprehensively due to these species being still in dormant condition.

Table-101
Table distribution of invasive alien species in Shimla

Altitude (m)	Places	Lantana	Approx . area in ha	Parthenium	Appro x. area in ha
700-950	Madeya, Dhalaya, Shahach, Mandorghat, Jamnu,	Very dense	365	Very dense on gentle slopes & plains	65
950-1200	Karori, Panjali, Nagar, Sohal, Chanwag,	Very dense on lower portion, but	787	Very dense and confined to nallas,	175
1200-1450	Binu, Panjeli, Bakhrel, Bagiar, Jakhari, Saden,	Sparse under open forest	283	Very dense on roadsides and	90
1450-1700	Jhandi, Tul, Jamnali, Bajhol, khariar, Jajer, Jauresh, Junga	Sparse at certain pockets	484	Very dense on roadsides, <i>ghasanies</i> and nallas and slopes of orchards	56
1700-1950	Dhar, Khariyar, Pujarli	-	62	Very dense on southern slopes	26
1950-2200	Naldehra, Sadhora, Mashobra, Taradevi, Koti	-	-	Sparse and almost absent on upper	15
Total			1981		427

Analysis of the table above reveals that in Shimla Division, approximately 2000 ha area is under invasion of Lantana, followed by 427 ha area under Parthenium. It also comes out that once the lands become degraded and infested with invasive species, these attract apathy of all the stakeholders, further strengthening the invasion process.

In the absence of any record of infestations of forests in the Division by exotic weeds prior to January, 2011, the data presented here will be taken as baseline for the proposed management purposes. It is also clear from the table above that the concentration of invasive species is more in altitudinal zone of 950-1200 m comprising Okhroo, Mandhorghat, Chanawag, Bajhol, Sandoa, Pandoa and Kalihatti beats.

6.6.3.1 Core principles of the strategy

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

- i) **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.

- ii) **Complete rehabilitation of infested areas:** It will involve shift from ‘one time removal of weeds’ to ‘complete rehabilitation’ of the treated areas by competing/shading out exotic weeds. All noxious exotic weeds on any given area will be tackled simultaneously.
- iii) **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.
- iv) **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.
- v) **No exotic species to be used to rehabilitate treated sites:** No potentially invasive exotic species – (viz. *Leucaena leucocephala*, *Prosopis juliflora*, *Jatropha curcus*, *Tecoma stans*, *Tectona grandis*, etc.) - will be used for plantation in the areas under rehabilitation, because of their deleterious effect on the native flora.
- vi) **Rehabilitation to start from low intensity infestation area and to progress towards area 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 allow tackling larger areas with the given financial resources and result in creating quick visible
- vii) Impact and to help in containing further spread of exotic weeds.
- viii) **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.

6.6.3.2 Management of Lantana: With the above mentioned core principles of the strategy, the approach/plan to implement the strategy will be as under:

With the major focus of the management strategy on ‘containing further spread’, a two pronged approach, as described below, will be followed in tackling Lantana menace on forest lands. Table-101 gives spread of Lantana and the intensity of infestation.

i) Approach-I (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.

ii) Approach-II (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.

6.6.3.3

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. **(See box below for details)**
- 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.
- iv) The following will be, based on local practices, standardized for effective implementation of Lantana management initiative:
 - Cutting tools/techniques.
 - Calendar of rehabilitation activities.
 - Cost models.
- v) 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.
- vi) 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.
- vii) An average of 150 ha of Lantana infested areas will be taken up for rehabilitation per year.



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 centre of the clump. Such manual handling of impenetrable thicket is possible because of the umbrella type of canopy which makes it difficult to reach the centre of clump easily. Such physical maneuvers minimize or prevent regeneration from rooted cut branches when they fall on the ground.
- (iii) Lift the clump/s and place the clump/s upside down. If the clump is not placed upside down, the prostrate rooted branches and the aerial old branches having aerial roots at nodes may develop into adult plants when they come in contact with the soil. Therefore, the upside-down orientation of cut clumps is critical in the prevention of regeneration of Lantana from cut clumps. It may be noted that Lantana does not produce root suckers.
- (iv) After drying the clumps, the clumps may be used as fuel or burnt at the same site or all the dried clumps may be collected at one place and then burnt. The best time for removal of Lantana is just before rainy season, i.e. when the plants are not in flowering and fruiting.



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

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

Approach-I (Areas where infestation overlaps with Lantana):

Such situation occurs under Chil, miscellaneous broad leaved and scrub forests. In such areas removal of these three exotic weeds will be taken up simultaneously with removal of Lantana and the treated areas rehabilitated with fast growing native species/grasses.

Approach-II (Areas where there is no 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.

6.6.4 Encroachments on forest land

In recent years encroachment of forest land has emerged as a big threat to forest land. This is more so in UPF. However in PFs also the incidence of encroachment is not uncommon. Thus the boundary pillars of forests must be maintained regularly, if any shifting is noticed, action must be initiated immediately under IFA, 1927. Up to 2011, 72 cases were pending for decision in Shimla Forest Division. These encroachments amount to 09-16-40 ha area of DPFs. Besides, 368 number of encroachment cases having an area of 85-32-86 ha had been vacated through special task force constituted for the purpose at division level. The latest position has been narrated in para-1.2.4.6 of Part –I.

6.6.4 .1 Preventive and remedial measures

- i) The forest officials must be well conversant with boundaries of the forests under their jurisdiction. The Range Forest Officers, Block Officers and Forest Guards must check the

boundary pillars frequently and in case of damage to boundary pillars, immediate legal action to punish the guilty and repair work should be undertaken on priority. DFO/ACF should also inspect the boundary pillars while inspecting forests, plantations and other forestry works.

- ii) The old stone masonry pillars should be replaced with cement mortar after proper demarcation. The new boundary pillars of only cement mortar should be constructed in future.
- iii) The field staff should be made accountable and sensitive towards the ever increasing menace of encroachments. The forest guard must initiate legal action as soon as the encroachment is noticed by him. He should chalk out the damage report and report the matter to Range Forest Officer through Block Officer. The Block Officer should immediately seek demarcation and challan the case in the appropriate court. Range Forest Officer must act quickly to file the case in the court; the laxity at any level must be dealt with under CCS (CCA) Rules.
- iv) All the encroachment cases on forest land are within the jurisdiction of DFO as collector of the division under HP Public Premises and Land (Eviction and Rent Recovery) Act, 1971. Range Forest Officers should challan all such cases before collector for speedy trial.
- v) The powers of carrying out demarcation are vested with the revenue officers under HP Land Revenue Act, 1954 and as such, many times, the demarcation of forests is delayed due to their pre-occupation. It is therefore, suggested that the Tehsildar, Kanungo who are on deputation with the Forest Department be delegated the powers of demarcation of forests to process encroachment cases expeditiously.

6.6.4.2 Strategy

- i) Repair all existing boundary pillars and construct more boundary pillars close to habitation. For this areas need to be identified that are prone to encroachments.
- ii) Immediate focus should be on the construction of new BPs in the New DPFs.

- iii) Railway girders can be used in encroachment prone areas and all BPs should be depicted in digitized maps of the area which will be maintained as a permanent record.
- iv) As a deterrent, FIRs should be registered as soon as an encroachment is detected. Court proceedings will then follow.
- v) Latitude, longitude and altitude readings of all Boundary Pillars (old and new) to be recorded in the BP register in place of traditional Backward and Forward Bearing and database in the Division office.
- vi) Detail of new guidelines as notified by Govt. of HP on encroachment and action to be taken thereon is enclosed as Appendix-XI.

6.6.5 Illegal mining on forest land

The Himalayas and its foothills are a treasure house of the minerals being exploited by human beings since times immemorial. With the advent of society, the methods of the extraction of the minerals became more and more mechanized which resulted in extraction of the minerals at a pace much faster than the pace at which the nature could meet itself with such a situation to recover from the onslaughts of human beings. It brought into sharp focus the conflict between development and conservation, which served to emphasize the need for reconciling the two into the larger interest of the society.

People have their right for the collection of building stones and slates for roofing which sometimes take the shape of the quarrying which causes damage to the hill side and forest growth especially in UPFs. With increase in population and better living standard, the demand for minerals such as stone, sand and limestone had greatly increased. The extraction of stones and sand is done unauthorizedly in a very surreptitious and clandestine manner at certain places by the sides of the link roads and along the nallas and streams which results in destruction of forests. Such activities need to be checked as its continuance would cause landslides and also turn the drainage channels into deep gullies to destroy surrounding vegetation. In addition to destruction of forests the mining activities result in soil erosion, air pollution and water pollution in

the streams as well as the ground water. Under the Mining Act, powers have been vested now with forest guards to take cognizance of illegal mining within their respective jurisdiction. Notification in this regard is enclosed as Appendix-V.

6.6.5.1 Preventive and remedial measures

- (a) The Range Forest Officer should get the mining plan of the areas where permission is granted by the Mining Department.
- (b) The Front line staff has to have close liaison with the staff of the Mining Department so that the permissions granted by Mining Department are in the knowledge of the Forest Department.
- (c) The applicability of the FCA, 1980 should be ensured.
- (d) To keep a watch on the stone crushers and the source of their raw material.
- (e) Close liaison has to be maintained with the PRIs and other NGOs to get the information as well as to take preventive steps.

6.6.5.2 Strategy

- (a) To ensure systematic and scientific mining, few amendments shall be required in Himachal Pradesh Minor Mineral (Concession) Revised Rules, 1971. For this a close liaison with the Mining Department is required.
- (b) The District Level River/Stream Bed Mining Action Plan should be procured and its proper implementation in the field should be ensured.
- (c) Some of the sensitive River beds/Streams or the section thereof for extraction of minor minerals be declared closed for the specific period which are sensitive from the wildlife point of view as well as soil conservation point of view.
- (d) Mining in River/Stream beds shall be allowed with the prior approval under FCA, 1980 with adhering to the conditions imposed there on.
- (e) Rehabilitation of the mined areas should be ensured in a time bound manner.
- (f) The species to be planted in the mined areas should be as per the soil condition and planning for the same be done in advance.
- (g) The areas where there is plenty of house constructions are on, especially around Shimla Township, specific sites for dumping the debris be identified and prepared for the dumping so that haphazard dumping is avoided/stopped.

CHAPTER-VII

SOIL & WATER CONSERVATION (OVERLAPPING) WORKING CIRCLE

7.1 General constitution

This working circle would be an overlapping working circle covering the entire tract under this working plan and is constituted to protect hill slopes from further denudation, erosion and to maintain the equitable flow of water in the rivers, streams, perennial nallas that originate from these hills. Himachal Pradesh, being one of the Himalayan states, is crucially important for the water regime of the entire country as most of the important rivers originate and get recharged in the Himalayas only. However, of late, a host of developmental activities have taken a heavy toll on the fragile Himalayan eco-system resulting in the drying up of many smaller rivulets, springs and by large scale soil erosion.

7.1.1 This working circle is constituted for emphasizing the need for conservation of soil and water in the tract. The whole tract is mountainous having altitude varies from 580 m to 2867 m above MSL. The slopes are steep, the soil fragile and soil movement common. Though the area receives plentiful precipitation in the form of rain and snow, yet most of it goes away as surface run off into vast multitude of khads, streams and nallas that drains the entire area into river system comprising Sutlej and Giri.

7.1.2 With advancement of science and technology a concept emerged to transfer river water over long distances through tunnels and open channel systems by constructing big multipurpose hydel projects. By these devices human society became complacent that they had controlled the fury of river systems in the shape of ravages by floods. Little was it realized that if the natural ecosystems in the catchment areas of the rivers was disturbed beyond a point then large scale soil erosion would silt up the huge water reservoirs meant for feeding canal systems and that such an eventuality would render useless all the capital expenditure that went in to putting up these gigantic structures and elaborate irrigation channels.

7.1.3 Soil and moisture conservation measures together with afforestation programme will check various forms of soil erosion and soil loss. Soil and water conservation measures keep the soil in good condition so as to accept rainfall, to provide good quality rooting environment and to avoid loss of top soil which ultimately will help in good land husbandry by improving ground water regime. This will also be useful for natural flora and fauna. Downstream floods and siltation of dams will also be reduced.

7.2 Reasons for degradation

More damage has been caused by human intervention thereto through natural processes. Unsustainable use of the hill slopes has led to an alarming situation where most of the area's forest have become devoid of natural regeneration, the density of the natural forests has been vastly reduced, and soil, the basic resource, has been left shallow and devoid of nutrients, most of the barren hillsides today are hardly capable of supporting tree vegetation, except in a few sheltered spots and depressions. Shallow and depleted soils do not support healthy vegetation. And lack of healthy vegetation leads to further depletion of soil. If not checked in time, this vicious cycle of destruction threatens to become irreversible. Once soil is washed away, or its fertility lost, all agricultural, and horticultural and animal husbandry activity, the mainstay of the people of this area, shall be under great threat. Some reasons for high surface runoff and consequent soil erosion broadly are:

- i) Fragile soil strata.
- ii) Steep slopes.
- iii) Heavy rainfall over a short period of time (monsoon).
- iv) Loss/reduction of forest cover.
- v) Uncontrolled grazing.
- vi) Unscientific system of agriculture.
- vii) Unscientific Mining and Road construction.

The unscientific construction of roads in the hilly tract and improper disposal of the debris is also one of the major causes for the constitution of this working circle. Secondly change in land use pattern and the approach of the inhabitants for converting more and

more land for agricultural practices has also led to the heavy silt load in the streams and khads. The continuous silt load needs to be tackled and required to be checked by making vegetative as well as engineering interventions.

7.3 Approach and strategy

7.3.1 Despite the havoc wreaked by human and animal activities on hill slopes, the fact remains that such activities cannot be wished away. Communities have lived in these hills for ages and over the generations, have developed system that enabled them to live in compatibility with nature. Increasing population of both, cattle and humans, and consequent increase in the demand for land for grazing, agriculture, horticulture and infrastructure development, have placed acute pressure on the eco-system. It is, however, also fact that activities essential for human survival shall continue in the hills, and land use shall have to be adjusted to cater to human demands. It is the management of the land use that has to receive attention. Therefore, constant efforts should be made to maintain and increase the protective vegetative cover in such areas and undertake suitable soil and water conservation works in a planned manner.

7.3.2 It is because of this need that soil and water conservation working circle has been constituted to restore the eco-system of the area under working plan.

7.3.3 Watershed approach will be adopted for the treatment of degraded areas along with integration of sectoral measures for comprehensive watershed development and maintenance.

7.3.4 Consolidation of treatment efforts through projectised approach with proper choice of treatment measures with emphasis on sustainability of treatment measures.

7.3.5 Construction of strategically located structures, along drainage, line treatment measures to check/reduce velocity of runoff and to impound water in the watershed.

7.3.6 The treatment of critical areas should be started from upper reaches of a particular watershed to the lower reaches and all the activities of

stabilization should be completed before taking the larger structures like WHS, Silt detention dams, etc.

7.4 General character of vegetation

The forests of this circle represent almost all forest types which are found in the tract. Most of the forests in lower elevations are poorly stocked, carry scattered tree growth or are devoid of adequate vegetation cover.

7.5 Special objects of management

- i) To protect the hill sides from further denudation and erosion by preserving and enhancing the forest cover and by undertaking soil conservation works in a planned manner wherever necessary.
- ii) To conserve moisture and regulation of flow of water in nallas and streams of the locality.
- iii) To prevent land degradation by adopting appropriate need based soil and watershed approach.
- iv) To prevent soil erosion and runoff from the area with a view to prevent premature siltation of multipurpose reservoirs and to reduce flood peaks and volumes of runoff.
- v) To improve land capability and moisture regime in the area under working plan.

7.6 Treatment of critical areas

- i) The areas which are under heavy erosion, ravines and landslides would be taken up on priority basis and should be treated first.
- ii) The culturable blanks and other poorly stocked areas will be restocked with suitable species. Preference may be given for live hedge fencing over wire fencing. The wire fencing should be adopted only at critical locations.
- iii) The area is treated with suitable package of treatment viz. construction of contour vegetative hedge, contour graded bunding, contour/staggered trenching, sowing and planting of plants, silvipasture development, afforestation, farm ponds, percolation tank, van sarovars, drainage line

treatment with earthen loose boulders, water harvesting structure, check bund, spillway, sediment detention structure.

- iv) The vegetative measures like afforestation, growing grasses and shrubs, planting, fuel, fodder and fruit bearing species may be based on local preference and suitability of site.
- v) The slopes of the area should be planted with local quick growing species. The unstable slopes and landslips be stabilized by planting bioengineering species like *Vitex negundo*, *Ipomea carnea*, *Arnudo donax*, *Agave spp.* On the slips brush wood wattling of *Vitex negundo* and lannea post be put up interwoven with bush wood.
- vi) The grazing along with rotational closure should be regulated in the eroded areas to improve the protective vegetative cover.
- vii) The bioengineering species like as mentioned above should be planted on 20 m of both sides of the stream.
- viii) The engineering structures like brush wood dams, check dams, water harvesting structures, etc. depending upon the site specific need to be constructed on the streams adopting the micro watershed approach.
- ix) In order to recharge the ground water, 'Van sarover' need to be constructed at various places particularly on the flat areas or at the moderate gentle slopes.
- x) Before we go for the soil and water conservation measures on the micro watershed basis, we need to establish the silt observatory posts at least on all the major khads of Sutlej, Gambhar, as well as Giri rivers. A continuous monitoring of the silt load and searching the major cause of the increase or decrease will help the HPFD in better planning and decision making.

7.7

Annual plan of operations

- i) Detailed schemes and estimates will have to be framed out subject to availability of funds. The Divisional Forest Officer would frame out schemes priority wise and execute them.

- ii) The catchment area treatment plans and any other centrally sponsored schemes prepared and launched for the area under working plan in future would form an integral part of this working plan of this division.
- i) The list of nallas and streams requiring treatment under this working circle, range wise is given in table-102.

Table-102

List of nallas requiring treatment

Name of Range	Name of Nalla	Length in (Km)
Bhajji	Bajeori Nalla	5
Bhajji	Gharyana Nalla	4
Bhajji	Juni Nalla -I	5
Bhajji	Juni Nalla-II	6
Bhajji	Kandola Nalla	2.5
Bhajji	Kheri Nalla	6
Bhajji	Ambri Nalla	5
Bhajji	Ambri Nalla-II	3
Bhajji	Basantpur Nalla	3
Bhajji	Gharat Nalla	5
Bhajji	Kandyala Nalla	3
Bhajji	Oddu Nalla	5
Bhajji	Sanya Kanjar Nalla	3
Bhajji	Nauti Khad	7
Bhajji	Guma Nalla	5
Bhajji	Cheer Nalla	8
Bhajji	Nauti Khad	4
Bhajji	Gadehri Nalla	4
Bhajji	Kadog Nalla	6
Bhajji	Lunsu Nalla	2.5
Bhajji	Bhagain Nehra Nalla	4
Bhajji	Bharana	3
Bhajji	Majwar Nalla	4
Bhajji	Drabla Nalla	1
Bhajji	Kochi Anu Nalla	3
Bhajji	Kochi-II Nalla	2
Bhajji	Nauti Anu Nalla	5
Bhajji	Dumaher Nalla	10
Bhajji	Dumaher Nalla -II	1.5
Bhajji	Karyala Nalla	7
Bhajji	Lunsu Nalla	5
Bhajji	Jashi Nalla	3
Bhajji	Nogli Nalla	7
Bhajji	Gadahu Nalla	2.5
Bhajji	Jaroba Nalla	4
Bhajji	Kanodi dhar	3
Bhajji	Malgi Khad	8

Bhajji	Sainj Bag Nalla-I	2
Bhajji	San Bag Nalla-II	1.5
Bhajji	Bag Nalla	2.5
Bhajji	Khandal Nalla	3
Bhajji	Pandoa Khad	5
Bhajji	Pipal Dhar Nalla	1
Bhajji	Sainj Nalla	3
Bhajji	Kayana Nalla	2
Bhajji	Khaltu Nalla	3
Koti	Pheneot Nalla	2.5
Koti	Thund Nalla	3.00
Koti	Panjali Nalla	1.5
Koti	Satlui Nalla	1.8
Koti	Salot Nalla	2.00
Koti	Kumahalli Nalla	3.2
Koti	Bharandi Nalla	1.6
Koti	GaratKa Nalla	3.4
Koti	Shalori Nalla	2.1
Koti	Bharech Nalla	1.9
Koti	Sagan Nalla	2.4
Koti	Pandali Nalla	3.1
Koti	Gajyadhani Nalla	2
Koti	Nagahai Ka Nalla	1.3
Koti	Seri	2.8
Dhami	Obroo Nalla	1.00
Dhami	Badoo Nalla	4.00
Dhami	Ghandal Nalla	3.00
Dhami	Sakoh Nalla	2.5
Dhami	Dhar Nalla	2.00
Dhami	Bhimkar Nalla	1
Dhami	Sadan Nalla	1
Dhami	Lachog	2.5
Dhami	Manghecg	2.00
Dhami	Dedhoeg Badoo Nalla	3.00
Dhami	Panjaili Nalla	1.5
Dhami	Ghat Ghatdu Nalla	1.5
Dhami	Narihana Nalla	1.00
Mashobra	Devali Nalla	2.1
Mashobra	Jagroti Nalla	3.5
Mashobra	Kyar Nalla	3.00
Mashobra	Ganohi Nalla	2.00
Mashobra	Rihanna Nalla	2.5
Mashobra	BadaGaon Nalla	2.00
Mashobra	Chalaunti Nalla	2.5
Mashobra	Ghishan Khad	3.00
Mashobra	Chaidi Nalla	3.00
Mashobra	Pagog Nalla	2.00
Mashobra	Lindidhar Nalla-II	2.00
Mashobra	Mungar Nalla	2.5
Mashobra	Dhanain Nalla	2.00
Mashobra	Kaitali Nalla	2.00
Mashobra	Dhingu Dhar Nalla	3.00
Mashobra	Thaila Nalla	2.00

Mashobra	D-72 Dhagog Nalla	3.5
Mashobra	Dhar Nalla	2.5
Mashobra	Paniyali Nalla	3.00
Mashobra	Kayalu Nalla	2.5
Mashobra	Kyarkoti Nalla	2.00
Mashobra	Karyal Nalla	2.00
Mashobra	D-62 Kufri C-III	3.5
Mashobra	D-65 Koti Nalla	3.00
Mashobra	Kunni Nalla Part-II	3.00
Mashobra	Kanda Nalla	2.00
Mashobra	Ghorna Nalla	2.00
Mashobra	Katala Nalla	2.00
Mashobra	Devthi Nalla	2.5
Mashobra	Ghabhan	3.00
Mashobra	Himala Nalla	2.5
Mashobra	Matain Nalla Part-II	3.00
Mashobra	NayaGaonNalla	2.00
Mashobra	D-66 Seepur Nalla C-II	3.00
Mashobra	Bohag Nalla	2.5
Mashobra	Katan Nalla	5.00
Mashobra	Mander Nalla	3.00
Mashobra	Tikkar Nalla	3.00
Mashobra	Kharbiru Nalla	2.5
Mashobra	D-70 Naldehara C-IV Nalla	3.00
Mashobra	Shainal Nalla	2.5
Mashobra	Saib Nalla	2.5
Mashobra	Auri Nalla	2.5
Mashobra	Tarab Nalla	2.00
Mashobra	Dareth Sheel Gaon Nalla	3.00
Mashobra	Khatnol Nalla	2.5
Mashobra	Padag Nalla	2.00
Mashobra	Kot Nalla	2.5
Mashobra	Anji Nalla	3.5
Mashobra	Rajhana Nalla	2.5
Taradevi	Gadaug Nalla	4.00
Taradevi	Chailly Nalla	2.00
Taradevi	Kair Nalla	3.00
Taradevi	Chamon Nalla	2.00
Taradevi	Nawag Golcha Nalla	1.00
Taradevi	Neri Nalla	2.00
Taradevi	Karond Nalla	2.00
Taradevi	Dhandhar Nalla	3.00
Taradevi	Bharoi Nalla	4.00
Taradevi	Janol Nalla	3.00
Taradevi	Haroh Nalla	3.00
Taradevi	Rouri Nalla	2.00
Taradevi	Hira Nagar Nalla	2.00
Taradevi	Kajail Nalla	1.00
Taradevi	Badehari Nalla	2.00

Taradevi	Bharyal Nalla	2.00
Taradevi	Majthai Nalla	1.5
Taradevi	Taradevi to Matholi Nalla	2.5
Taradevi	Mangaltoo Nalla	3.00
Taradevi	Sonal Nalla	2.00
Taradevi	Tarab to Dhari Nalla	2.5
Taradevi	Sonu bangle to Bagheri Nalla	2.00
Taradevi	Tarb to Ganperi Nalla	2.00
Taradevi	Sari Nalla	2.00
Taradevi	Kakret Nalla	1.5
Taradevi	Panoag Nalla	2.00
Total		438.2

7.8 Sediment monitoring stations

7.8.1 SMS/SOPs shall be established at exit point of certain critical watersheds undertaken for treatment under this working circle and hydrological and sediment monitoring data on daily rainfall, runoff and sedimentation during rainy season would be collected, and analyzed for assessing the effectiveness of the treatment measures.

7.8.2 Data must be collected for atleast two years prior to treatment. Thereafter, data are to be collected during the treatment and after treatment for each SMS and analyzed for monitoring and evaluation of the effectiveness of the treatment measures undertaken in the area.

CHAPTER- VIII

JOINT FOREST MANAGEMENT (OVER LAPPING) WORKING CIRCLE

8.1 General description

The foresters had long been working with the forest dwellers through the “taungya” system of cultivation under which agriculture crops were raised along with forest plantations for few years. The participatory forest management started in 1972 in India from West Bengal. Whereas, certain areas in the protected forests as also some areas vested in the Govt. under the HP Ceiling and Land Holding Act, 1972; Village Common Lands (Vesting and Utilization) Act 1974 and transferred or to be transferred to the Forest Department are barren or have degraded in the past. These areas need conservation, etc. so as to arrest their further environmental degradation and to augment fuel wood, fodder and small timber production for use by local people. A need for participatory forest management arises in Himachal. Moreover the PFM started in HP in 1985 through National Social Forestry (Umbrella) project. The project achieved its objectives by covering more than 1,00,000 ha area under plantations. During the implementation of this project more emphasis was given on achievement of physical and financial targets than social i.e. participatory and equity issues.

8.2 In the 1980s, the World Bank supported Social Forestry project (1984-92) and the Indo-German Integrated Dhauladhar project (1982-92) were implemented in HP. In these projects the drawbacks of Umbrella projects were well addressed. Therefore, in 1990s, the World Bank funded IWDP Kandi project started in the Shivalik hills in which participatory approach was emphasized and all three issues i.e. physical targets of Forest Department, social and equity were taken all together as per guidelines of the World Bank.

8.3 The framework for JFM in HP is provided by the Govt. of HP order of 12.5.1993, which followed the Govt. of India (JFM) circular of 1st June 1990 from the then Secretary (Environment and

Forests) enabling the spread of JFM to the Village Forest Development Committees (VFDC's) for Joint Forest Management in the Villages of Himachal Pradesh.

8.4 Strengthening of Joint Forest Management

- i) JFM should focus in and around pockets of poverty i.e. remote forested areas (better forest) and where livelihood dependence on forests is high. This would entail several genuine joint management activities (other than plantation) like collective protection against illicit felling, fires, poaching, etc. Issues of Rights, equity and benefit sharing are better addressed and conflicts resolved.
- ii) In participatory approaches the process is more important than achieving targets. Choosing and regularly training the right persons for the job is therefore critical.
- iii) Sharing of removals, including resin, intermediate and salvage fellings with VFDSs are necessary to establish long term stake of local communities in JFM.
- iv) Continual policy and rules adjustment and calibration to promote better market returns for wood and non wood based enterprises. Example, the recent decontrol of bamboo trade and transit and efficient markets for value added products.
- v) Local leadership has to play a critical role in JFM. The successful examples of JFM or CFM show that local leadership roles have been crucial in making the change. It could be an enlightened, accepted local person, an elected representative, a dedicated NGO/CBO or even a committed Range Forest Officer. This is also important for sustainability of groups.

8.5 Special objects of management

The basic objects of Joint or Participatory Forest Management are:

- i) To evolve consensus on the basic issues for the conservation of forest resources including soil and water.
- ii) To provide an effective treatment for wastelands, degraded forests and forest lands situated near villages through protection, afforestation, pasture development and soil conservation by active participation of local people.

- iii) To maintain the environmental stability through preservation of natural resources through involvement of local people in management.
- iv) To augment fuel wood, fodder and small timber production for use by local people.

8.6 The Govt. of HP has notified Himachal Pradesh Participatory Forest Management Regulations 2001 and the Sanjhi Van Yojna Scheme, 2001 which have strengthened JFM approach to a great extent. These regulations are reproduced in Appendix-XII.

8.7 Implementations of JFM in Shimla Forest Division

The JFM has been implemented in the division through projects like Overseas Development Administration or DFID, Sanjhi Van Yojna and FDA. The micro plans were prepared in accordance with project philosophy, principles and mode of working by VFDC/VFDS. The list of VFDCs constituted under FDA is given in table-103. Activities like soil conservation, Afforestation, village development activities, fire protection, grazing have been undertaken in the past but it is observed that in almost all cases, the participation of committees remained upto fund flow. Out of total 33 committees, 16 are totally inactive at present as of March, 2012. 17 JFMCs have been active and provided funds upto 31st March 2012 to carry out works as per micro plans prepared by them. There is a need to revive and activate rest of JFMCs which have become inactive for the past quite some time and involve those rural committees in forest management activities. Efforts may be made to identify the potential areas where more JFMCs can be constituted for adopting JFM approach for the protection and management of the forests.

Table-103

List of JFMCs existing in Shimla Forest Division as on 31st March, 2012

S.No.	Name of JFMC	Name of Beat	Name of Block	Name of Range
1	Bir-Ki-Jayan	Chanaog	Sunni	Bhajji
2	Bag	Sunni	Sunni	Bhajji
3	Golan	Madhorghat	Sunni	Bhajji
4	Karyali	Karyali	Himari	Bhajji
5	Himri	Himari	Himri	Bhajji

6	Kadhar	Kadharghat	Khatnol	Bhajji
7	Bagri	Himari	Himari	Bhajji
8	Dandibag	Khatnol	Khatnol	Bhajji
9	Shrog	Bajhol	Sunni	Bhajji
10	Chebri	Kadharghat	Khatnol	Bhajji
11	Kialu Bhamnol	Pandoa	Himari	Bhajji
12	Gadheri	Pandoa	Himari	Bhajji
13	Gharyana	Sunni	Sunni	Bhajji
14	Pahal	Pahal	Sunni	Bhajji
15	Nyahi	Shallaghat	Taradevi	Taradevi
16	Girb	Gadoug	Tutu	Taradevi
17	Bharyal	Tawi	Taradevi	Taradevi
18	Dhamoon	Jubberhatti	J. Hatti	Taradevi
19	Rangol	Kalihatti	J. Hatti	Taradevi
20	Kot	Petieud	Shoghi	Mashobra
21	Bhad	Petieud	Shoghi	Mashobra
22	Gumma	Paniyali	Mashobra	Mashobra
23	Dhartikanda	Dharti	Mashobra	Mashobra
24	Sanghech	Ganeog	Ghanhatti	Dhami
25	Panjaili	Okharoo	Halog	Dhami
26	Moolbari	Sanog	Ghanahatti	Dhami
27	Shaltu	Shalon	Halog	Dhami
28	Jhakri Sarmana	Badoo	Halog	Dhami
29	Rohalti	Pheneot	Koti	Koti
30	Trai	Karoli	Koti	Koti
31	Thund	Pheneot	Koti	Koti
32	Shilli	Karoli	Koti	Koti
33	Piran	Karoli	Koti	Koti

8.8 Future scope

8.8.1 There is tremendous scope for the JFM activities in the division. The forest areas where plantation and protection is the main focus are suitable/potential sites for afforestation, soil conservation, grassland improvement, NTFP development besides other forests.

8.8.2 Potential activities of JFM committees

The JFM/PFM committees can be the future agencies of forest development, conservation and expansion. The potential activities to be executed through JFMCs can be:

- i) Afforestation activity (both departmental and MNREGA)
- ii) Soil and water conservation through treatment of micro watersheds in a catchment.

- iii) Recharging of water bodies like boulders, ponds and underground water.
- iv) Minor construction work of road, paths and buildings.
- v) Awareness programme for forest protection, fire protection, propagation of medicinal herbs on a large scale.
- vi) Livelihood options like bee keeping, mushroom cultivation, vermicomposting, cutting and pruning, etc. through effective training.
- vii) Collection, value addition and marketing of NTFPs.

8.9 Selection of JFM working areas

The following broad guidelines have been devised for selection of potential (pilot) areas:

- i) Interest of local forest staff in involvement in joint forest planning and management;
- ii) Interest of local people in involvement in joint forest planning and management;
- iii) Existence of ongoing ‘successful’ collective land management systems;
- iv) Resource poor areas where there are constraints on the forest and farming system in term of access to grazing and forest products;
- v) Relatively homogenous local communities.

8.9.2 The information will be gathered from village-level PRA studies; workshops held with Range Forest Officers and Forest Guards, in conjunction with village visits and meetings to determine local people’s perception of problems and possible intervention. User’s definition of problems and approaches will provide the principal guide to action. Complex social environments will not be tackled in the initial stages. It is not expected that there will be 100% success rates in the establishment of Village Forest Development Committees. In some cases the field staff may have to withdraw from certain villages, because conflicts are too great. This should not be seen as a failure of the process, rather it is part of the process of adapting to and accepting village level realities, where there is sometimes irreconcilable difference between groups. In

order to reduce the risk of failure, planning exercises will focus on assessing the current and future needs of all the users of the forest resources (including women, poorer villagers and migratory graziers), and reaching consensus through negotiation in order to establish sustainable ways of managing resources for those who most need them.

8.10 Participatory Rural Appraisal (PRA)

8.10.1 PRA will be used as a way to facilitate communication between users and the Forest Department and to determine problems and priorities. At this initial discussion stage it is likely that only partial information will be obtained from the village, so it will be necessary to repeat the PRA exercise. Repeated PRAs would be used to continue the dialogue and build on the information base. PRA will be used to identify particular area needing more detailed socio-economic research.

8.10.2 Specifically PRAs will be used to:

- i) Finalise village selection
- ii) Build up baseline information
- iii) Identify forest users and their priorities
- iv) Provide the context for experimental learning for the staff and to create the basis for effective interaction between the department and forest users
- v) Identify local option for institution building
- vi) Draw up village level agreements

8.10.3 The key objectives of this PRA would be

- i) To identify local resource use system; access rules; differential control; legal and customary status of land; past and current tenurial status of land.
- ii) To document existing land use practices and management as a basis of their development.
- iii) To document current interaction between forest, farm and pasture; type of usage; division of labour.
- iv) To build a detailed picture of the socio economic context of villages; identify different categories of household (i.e. household profiles); to identify and assess effectiveness of

village institutions and leaders; to identify different levels of decision making in resource use and their relative importance, i.e. village council, men, women, rich, poor.

- v) To identify user's priorities and means of reaching consensus.
- vi) To identify different users' constraints to participation, for example women's labour time, poorer people's lack of access to decision making.
- vii) To identify and assess effectiveness of existing village level institutions, cooperative action between villages as a means to build more effective village or user group organizations.

8.11 The PRA process will be iterative to provide a growing dialogue between the department and forest users. Initially, information may be coloured by misunderstanding and mistrust on both sides. It is only as familiarity and participation in the benefits of joint management become apparent to forest users that a relationship of understanding and trust will be built between the staff of the department and villagers.

8.12 The PRA technique to be used in joint forest planning and management will include:

- i) Review of secondary data and existing information
- ii) Direct observation
- iii) Semi-structured interviews
- iv) Group interviews (casual, focused, village)
- v) Use of key informations, local experts
- vi) Use of local researchers
- vii) Ranking: wealth ranking, pairwise ranking, direct matrix ranking
- viii) Livelihood analysis
- ix) Seasonal diagramming (firewood, fodder, NTFPs, labour, etc.)
- x) Transects (systematically walking through an area with a group of local people)
- xi) Participatory mapping, modeling; people's mapping and modeling

- xii) Linkage chart (showing links between village organizations, between villages, and forest resources)
- xiii) Case studies and stories
- xiv) Ethno-histories
- xv) Brainstorming (especially joint sessions with villagers)

8.13 Role of front line staff

Forest Guards will coordinate all inputs to the village and will act as the interface between villager and the Department. They will be conduit for the flow of information both up and down the system. They will establish links with other village level organizations and government extension agents where appropriate. The departments most likely to be involved are Animal Husbandry, Agriculture and Rural Development.

8.13.1 Forest Guards will have the following responsibilities:

- i) To establish effective and representative Village Forest Development Committees;
- ii) To maintain contact with joint forest management groups (VFDCs);
- iii) To provide technical advice as required;
- iv) To arbitrate between groups if conflict arises and requested;
- v) To collect information through PRAs;
- vi) To provide feedback to the department;
- vii) To facilitate the full participation of women and poorer people;
- viii) To liaise between villagers and the department.

Although these activities are all additional to the current work of forest guard; the experience elsewhere indicates that as the JFPM process strengthens the more onerous protection workload of the guard will reduce.

8.14 Field level training

Field level training will be carried out through participatory workshops which encourage an experience based learning approach. At outset these workshops may be facilitated by some JFPM training specialist. Each person participating in the

workshop should share his experience and knowledge with other participants including the facilitators. A series of workshops should be organized at different levels, such as:

- i) Circle-level workshops
- ii) Division-level workshops
- iii) Range-level workshops
- iv) Beat-level workshops

8.15 Villagers re-orientation

Reorientation is not essential for the staff only, villagers will also need to be reoriented in their approach to the management of local natural resources, and in their perception of the role of the staff. The joint forest planning and management system forms a major part of this reorientation. Workshops should be organized for local leaders (local politicians, panchayat leaders, teachers, other key persons); and VFDCs. This will provide a forum where VFDCs can share experiences, learn from each other, and develop combined strategies and approaches to JFPM.

8.16 Micro plan

8.16.1 Before a VFDC can manage a forest, it will be required to prepare a micro plan. The micro plan will be prepared jointly by Executive Body of the VFDC and the Range staff, and will be discussed with the General House. It will be finally approved by the concerned DFO. The informations gathered during the PRA exercise will be helpful in preparation of the micro plan. Locally drawn maps of the area may be useful to ensure that everyone understands what areas are to be managed.

8.16.2 The micro plan should

- i) Detail which households and villages have access and right to the forest lands and forest products;
- ii) Include detail on protection and decision-making mechanisms;
- iii) Detail forest management prescription;
- iv) Detail soil conservation measures if considered necessary by the VFDC

- v) Detail grassland management measures if considered necessary by the VFDC
- vi) Demarcate the responsibilities of the department and the villagers (forest users);
- vii) Detail unambiguous rights to the usufruct and harvesting of common plantation, grassland and forest area;
- viii) Detail clear rules and mechanisms for the distribution of benefits: intermediate and the final harvest, among users.

8.17 Duties and responsibilities of JFM committees

To make the JFMCs active and functional, each member of JFMC should shoulder certain duties and responsibilities.

8.17.1 Duties of JFM committees

- i) To persuade the villagers to give available areas for plantation.
- ii) To assist the Forest Department in planning, protection, afforestation.
- iii) To help the FD in judicious use, of all existing rights and equitable sharing of usufructs, eco-development of the area as per approved management plan.

8. 17.2 Responsibilities of JFM committees

It will be the responsibility of committee to ensure:

- i) Just and fair distribution of the usufructs derived.
- ii) Ensure its management as per prescribed norms.
- iii) Settlement of all disputes between villagers.
- iv) To honor all commitments.

8.18 Power to JFMCs

The committee should make its own bye-law with the concurrence DFO. The concerned DFO should carry out necessary procedure for granting powers of a forest officer as mentioned in HPPFM Regulations, 2001.

- i) Power to register Damage Report.
- ii) Power to summon the accused to the general house of JFMC.

- iii) Make recommendations to Range Forest Officer regarding compounding of damage in respect of offences committed on JFMC areas.

8.19 MoU between Forest Department and JFMCs

8.19.1 In the participatory mode, the scheme is being implemented by setting up Forest Department Agency (FDA) at Forest Division level and JFMC at village level. As per the notified regulation titled HPPFM Regulations, 2001 notified vide no. Fts IIB/15-10/87 dated 23.8.2001, MoUs were signed between State Govt. represented by DFO of Forest Division in which FDA is being implemented and JFMC through its president during November 2009. Govt. of HP has approved this MoU after getting vetted from the Law Department the copy of which is annexed as Appendix-XIII. This MoU shall be valid for a period of five years from the date of signing as per terms and conditions detailed in the MoU for proper protection, maintenance, regeneration and management of plantation created under FDA and other forestry schemes within the jurisdiction of the JFMC.

8.19.2 In addition, a MoU has been signed between Forest Department and JFMCs for fire protection. No fire watcher is engaged in the area of JFMC. Further, a provision of honorarium/assistance has been made to be paid to JFMCs for doing excellent works in fire fighting. The copy of MoU as executed with the JFMCs is annexed as Appendix-XIV.

8.20 NTFPs

8.20.1 JFMCs can play an important role, in collection, marketing and propagation of NTFPs. Many villagers are dependent on collection of NTFPs to sustain their livelihood. So there is need to introduce such medicinal plants in the locality of JFM.

8.20.2 The JFM activities would concentrate on NTFPs management and no alteration should be permitted in the basic silvicultural prescription but to promote regeneration, development and sustainable harvesting of following NTFPs:

- i) Medicinal and Aromatic Plants

- ii) Grasses
- iii) Fiber and Flosses
- iv) Tans and Dyes
- v) Gums and Resins, etc.

8. 21 Development of technology for value added products

There is a lot of scope for development of technology for value added products. Various NTFPs are growing in the vicinity of JFMCs area. The value of original products collected directly from the forest is very less but if it is processed the value goes 2-4 time more than the original one. For example, Anardana, Amla Pickles, Murabba, Jam, Squash, etc.

8.22 Eco-tourism

There is need to develop specific sites for eco-tourism in JFM localities. Through various projects like stay home scheme, traditional food/Ethnic food serving etc. through eco-tourism the villagers not only get employment but self business will raise their income and it will become a source of livelihood.

8.23 Vermi composting

Almost each JFMCs member has domestic animals. So they are dependent on forest for grazing of animals, collection of fodder from forests. By collecting leaves and grasses for preparing vermicompost the villagers can enhance their income. Thus through training for preparation of vermicompost to the JFMCs members' large amount of vermi compost can be prepared and sold in market in view of its large demand. Thus, this activity is very important and beneficial for the villagers.

CHAPTER -IX

NON TIMBER FOREST PRODUCE (OVERLAPPING) WORKING CIRCLE

9.1 General constitution

9.1.1 With the thrust of forest management shifting from being ‘tree centered’ to ‘people centered’ forest are now being viewed as a source of not only commercial timber but of valuable Non Timber Forest Produce as well. The present National Forest Policy of 1988 lays special stress on meeting the requirement of rural and tribal populations. The rights and concessions from forests should primarily be for the bonafide use of the communities living within and around forest areas and their rights should be fully protected. Their domestic requirement of fuel wood, fodder, NTFPs, etc. would be the first charge on forest produce. However, it was also mentioned that the carrying capacity of the forests should be kept in consideration as well.

9.1.2 The area of this working Circle is equal to whole area of Shimla Division. This would be an overlapping working circle covering all the working circles and is constituted to ensure systematic development and exploitation of non timber forest produce species that occurs in the division. The main non timber forest produce found/extracted in the division are Resin, Medicinal plants, Daru-seed/Anardana and grasses. For resin extraction, Rill method will be followed to avoid damage to Chil trees. The main emphasis/focus would be on medicinal plants.

9.1.3 The forests covered under this working plan under revision have plenty of species giving minor forest produce. Resin, medicinal plants, tannins, and grasses, etc. are the important MFPs (NTFPs). The NTFP species occur throughout the tract, both in the forests and non forest area. A lot needs to be done in the field of conservation, development and management of NTFPs. This would be in accordance with the National Forests Policy of 1988, where in conservation and propagation of NTFPs and their contribution towards the local economy have been given due recognition and emphasis. In Shimla Forest Division, resin, medicinal plants, bamboos, tannins and grasses are the important NTFPs

contribution to the local economy. Information on medicinal plants is not readily available and there is a need to study and document the occurrence, yield estimates, exploitation and marketing of valuable medicinal plants in the division.

9.2 Special objects of management

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. The special objects of management would be:

- i) To conserve and augment existing non timber forest produce including medicinal plants resource in its natural habitat i.e. *in situ* conservation.
- ii) To encourage cultivation of commercially important species of medicinal plants on private lands *ex-situ* conservation.
- iii) To develop a system of marketing even the concept of MIS like agricultural crops can be followed through Forest Development Corporation for wild harvest so as to reflect both the conservation costs and the community benefits and especially for adoption of cultivation on wasteland/ additional land by farmers.
- iv) To encourage public-private-community partnership for building capacity for cultivation, value addition and processing of raw material before export from the state so that load on extraction is reduced.
- v) To promote the use of commercially viable medicinal plants by the state owned and private pharmaceutical units and subsidiaries engaged in value addition. At present medicinal herbs are being procured through Civil Supply Corporation by inviting tenders for govt. pharmacy units of Majra, Joginder Nagar, etc. even putting question mark on quality as well as proper species being used.
- vi) To maximize yield of medicinal plants through sustainable natural and artificial regeneration and scientific exploitation.

9.3 Blocks and compartments

The entire tract of the division will be covered by taking Beat as a unit.

9.4 Area statement

The working circle is overlapping, no area statement is required.

9.5 Analysis and valuation of the crop

The entire tract is rich in many useful shrubs, herbs which have been exploited from time to time. The area produces large quantities of Banaksha, Kakarsinghi, Anardana, etc. A list of commonly used or economically extracted medicinal herbs, plants occurring naturally are given in table-104.

Table -104
Medicinal plants of Shimla Forest Division

Sr No	Botanical name	Common name	Habit	Occurrence zone	Parts used
1	<i>Aconitum heterophyllum</i>	Mithi Patish	Herb	Sub alpine	Root
2	<i>Acorus calamus</i>	Barian	Herb	900 to 2000 m	Rhizome
3	<i>Angelica glauca</i>	Chora	Herb	Above 2200 m	Whole plant
4	<i>Artimisia nilagirica</i>	Siski	Herb	1500-2500 m	-do-
5	<i>Asparagus adsendens</i>	SufedMusli	Shrub	Upto 1800 m	Root
6	<i>Berberis spp.</i>	Rasaunt	Shrub	1800-3200 m	Root
7	<i>Cannabis sativa</i>	Bhang	Herb	Up to 1600 m	Leaves
8	<i>Cinnamomum tamala</i>	Tej patta	Shrub/Tree	Up to 2200 m	Leaves
9	<i>Dioscorea deltoidea</i>	Shingli mingli	Climber	Upto 2200 m	Tuber
10	<i>Ephedra spp.</i>	Bhutshur		Above 2200 m	Roots
11	<i>Heracleum candicans</i>	Patlain	Herb	2000-2500 m	Roots
12	<i>Mallotus philippinensis</i>	Kemal	Tree	Up to 1000 m	Roots
13	<i>Morchella esculenta</i>	Guchhi	Fungus	1500-2500 m	Fruiting body
14	<i>Myrica nagi</i>	Kaphal	Tree	1000-2100 m	Fruit
15	<i>Dactylorhiza hatagirea</i>	SalamPanja	Herb	Above 3000 m	Roots
16	<i>Picrorhiza kurroa</i>	Karoo	Herb	Above 3000 m	Roots
17	<i>Pistacia integerrima</i>	Kakarsinghi	Tree	Up to 1500 m	Fruit
18	<i>Podophyllum emodi</i>	Bankakri	Herb	Above 2200 m	Rhizome
19	<i>Polygonatum vaticilatum</i>	SalamMishri	Herb	2300-3000 m	Leaves
20	<i>Potentilla fulges</i>	Bajardanti	Herb	1500-3000 m	Roots
21	<i>Rhododendron arboreum</i>	Cheo	Tree	1200-2400 m	Leaves
22	<i>R.companulatum</i>	Saranger	Tree	Sub alpine	Flower
23	<i>Bergenia ligulata</i>	Pathar Tor	Shrub	1800 m & above	Whole plant
24	<i>Swertia chirata</i>	Chiryata	Herb	Sub alpine	Flower
25	<i>Taxus wallichiana</i>	Rakhal	Tree	2400-3000 m	Leaves
26	<i>Thymus serpyllum</i>	Banajwain	Herb	1200-1800 m	Seeds,leaves
27	<i>Tinospora cardifolia</i>	Gall	Herb	1500-2200 m	Leaves
28	<i>Viola serpens</i>	Banafsha	Herb	1000-3000 m	Flower
29	<i>Valeriana wallichii</i>	Mushbala	Herb	2100-3000 m	Root stock
30	<i>Valeriana hardwickii</i>	Nihani	Herb	1200-3600 m	-do-

9.6 Stock maps

As the medicinal plants are mostly herbs and shrubs found on annual or perennial basis, stock mapping is not possible due to scattered occurrence.

9.7 Methods of treatment

9.7.1 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 extinction of the species. A four year extraction cycle of the medicinal plants is proposed and extended to the plan period as is given in the table-105.

Table-105

Cycle of extraction of medicinal plants

Range	Blocks	Years when extraction will be allowed
Bhajji Dhami Koti	Sunni Halog Junga	2012-13, 2016-17, 2020-21
Bhajji Taradevi Koti	Khatnol Totu Koti	2013-14, 2017-18, 2021-22
Dhami Bhajji Taradevi	Ghanahati Himri Jubberhatti	2014-15, 2018-19, 2022-23

9.7.2 In case of Daru-seed/Anardana, annual extraction through village communities is proposed.

9.8 Artificial propagation and conservation

Keeping in view the economic importance and demand of medicinal herbs, it is desirable to encourage naturally occurring medicinal plants and other NTFPs in suitable localities. The demand of medicinal plants has picked up with setting up of pharmaceutical industries in the state. The existing germplasm of different herbs endemic to the division needs to be conserved. Following measures are suggested for the conservation, protection and propagation of medicinal plants.

- i) Enthobotanical survey for area of existence of various important usable NTFPs along with established usage of different Medicinal and Aromatic Plants.
- ii) Systematic rotational collection should be followed strictly on four year basis as above.
- iii) Heavy grazing and destruction of medicinal herbs should be checked as these species do not produce sufficient seeds/vegetative form of regeneration. Closure for biotic interference will be followed in specific area and range-wise.
- iv) The raising of nurseries/herbal garden, drug farms should be developed through various research institutes like HFRI, UHF Nauni, HPKVV and IHBT Palampur, Ayurveda Department who are engaged in development of package of practices of medicinal and aromatic plants. Three such gardens are proposed in lower, middle and higher altitude of the division, one in five year term basis after survey and site selection.
- v) Medicinal plant collectors should be educated and provided proper information or guidelines so that there is continuous regeneration of medicinal herbs and threatened plants are propagated *ex-situ* and planted in forests.
- vi) The community based organizations like the Mahila Mandals, Yuvak Mandals, VFDCs and other rural co-operatives should be involved in the development, protection, propagation and conservation of medicinal plants.
- vii) Exposure visit and on farm training be arranged for such community based institution along with liaison with Agriculture and Ayurveda Department of the state.

9.9 Propagation technique

Whereas method of propagation and harvesting of important plants be standardized after research inputs, the technique of propagation and harvesting of some important plants is described as detailed in table-106.

Table-106
Method of propagation of medicinal plants

Name	Method of propagation	Harvesting/collect ion	Uses
<i>Artemisia nilagirica</i>	The seeds are minute. The sowing is done in Feb./March. Seedlings are transplanted in June-July in pits at a spacing of 0.5 m × 0.5 m.	The crop is harvested in October when the plants bear flower.	The flowers are used in extraction of drug used as wormicide.
<i>Acorus calamus</i>	The species is propagated by sowing as well as planting rhizomes at 15 m deep at 30 cm × 30 cm spacing during Feb.-March. If direct sowing is decided, then the soil is worked up to a depth of 15 cm. Sowing is done in patches which may be spaced at 30 cm×30 cm.	Harvesting is done after one year during Nov.-Dec.	The dried rhizome is generally used in the form of infusion. It produces best results in case of dyspepsia and chronic diarrhoea.
<i>Aconitum heterophyllum</i>	The species is propagated by direct sowing in patches at 30 cm × 30 cm during Feb.-March.	Roots are dug out in the month of Oct.-Nov.	Roots are used as astringent, tonic and in diarrhoea, cough.
<i>Angelica glauca</i>	The species is easily propagated by sowing in patches at spacing of 3'×3'. Sowing is carried out in Feb.-March.	Collection/harvesting is done in Sep.-Oct.	Roots, fruits used for flavouring. Used in medicines for digestion, heart burn, flatulence.
<i>Dioscorea deltoidea</i>	It is propagated by planting rhizomes in 15 cm deep pit at the spacing of 60 cm × 45 cm during March. About 15-18 Qtls. of rhizomes are required for one hectare area.	Tubers are dug out in Nov.-Dec.	Tubers yield steroidal sapogenin which is a source for manufacture of oral contraceptive.
<i>Heracleum candicans</i>	The species is propagated by seeds and root cuttings. Seeds @ 10-15 Kg/ha are required. The root cuttings 2.5 cm to 4 cm long should be planted in 30 cm deep pits at a spacing of 75 cm × 50 cm in March-April.	After one year, the roots/tubers are dug in Oct.-Nov.	Roots are source of xanthotoxin, a furocoumarin which is used in treatment of leucoderma, fruits as aphrodisiac & nervetonic
<i>Podophyllum emodi</i>	The rhizomes are planted in 15 cm deep pits in the zone of natural occurrence. The seeds germinate in about 3 years but if sowing is done in bores at low altitudes, it can germinate in 6 months, then the seedlings can be taken to sub alpine region and transplanted.	The rhizomes are collected when fully developed.	
<i>Picrorhiza kurroa</i>	It is easily propagated by planting rhizomes in 15 cm deep pits at a spacing of 60 cm × 60 cm during Nov.-Dec.	Collection is done after 3-5 years when rhizomes are fully developed.	Roots are used as stomachic, tonic, improve appetite and stimulate gastric secretion.
<i>Swertia chirata</i>	It is propagated by sowing of seeds in patches at a spacing of 30cm×30cm during Feb.-March.	Harvesting is done in following November-December.	The dried plant yields drug used as tonic, stomachic, bronchial asthma & liver disorders.
<i>Valerina valeriana</i>	The species is propagated by direct sowing or planting rhizomes in 15 cm deep pits at espacement of 30 cm × 30 cm during Feb.-March. About 25-40 Qtls. of root stock is sufficient for one hectare.	Rhizomes are dug out after 3-5 years when fully developed.	Dried rhizomes are employed for hair and perfumes, as incense and in drugs for hysteria and nervous problems.
<i>Viola serpens</i>	The species is propagated by sowing or planting root suckers at a spacing of 15 cm × 15 cm during June-July.	Flowers are collected in Feb.-March in low lying area and in April-May in higher reaches.	Used for lung trouble, eye and ear diseases. Also used as blood purifier.

9.10 Other NTFPs plants/products

In terms of local extraction of NTFPs, the most removed species (by quantity) is Daru (Anardana seeds). As per estimate, total annual turnout of the species is approximately 400 to 500 qtls in Shimla Forest Division. Due to transfer of export permit power of about 51 species to Panchayats, the record of extraction of such species is not available readily but efforts be made to keep such record of extraction and export at least at Range and Block level in future.

9.10.1 Daru-seed/Anardana (*Punica granatum*)

The wild pomegranate got great economic importance in their respective region. It grows in the vast tract of the hill slopes. Its seeds are sun – dried to make Anardana. Every year, Anardana, worth thousands of rupees is collected from the hills and sold at various places throughout the country. Besides, Anardana, huge quantities of the fruit rind, worth thousands of rupees, is exported for use in various industries. The yield varies with the size of the tree. The average yield recorded was 32.4 kg per tree.

9.10.2 The major use of wild pomegranate is for the making of Anardana, which is used in making chutney and as a souring agent in various preparations. This tree can be successfully grown on a commercial scale in wastelands through seeds, with practically no cost of cultivation. The seeds require chilling treatment for better germination.

9.10.3 This tree can be successfully grown on a commercial scale in wastelands through seeds, with practically no cost of cultivation. The seeds require chilling treatment for better germination. Nursery technique already being practised in Bhajji Range need to be more scientific and research based for quality as well as high yielding varieties to be propagated. Poly bag raised seedlings already being raised in nurseries of Bhajji and Dhami Range will be more scientific and better germplasm.

9.10.4 Pomegranate butterfly (*Virachola isocrate* fabr.) is the most serious pest of this fruit and is responsible for heavy damage. The

caterpillars of this insect are responsible for rotting and premature dropping of fruits in the rainy season. Pest control, especially pomegranate butterfly protection can be achieved through spray of chemical after guidance from HFRI who have worked in this field for last few years.

9.10.5 Other steps for Daru protection

Suitable improved varieties be developed in the nursery of the department through guidance of UHF Nauni and transplanted in blank areas where patches of Daru tree exist.

9.10.6 It is the most highly priced NTFP collected in large quantity especially in Bhajji Range and Dhami Range. The villagers though have made their own institution and go for collection in the area of existing rights after August month mostly, yet there is a need to develop more participatory system of collection under the supervision of Forest Department for better protection. The species is grown easily through seeds. Directorate of Extension, UHF Nauni have developed packages of practices for important NTFPs, and therefore at least one front line staff of each Range will be trained for further imparting the skill to villagers and colleagues in the Range.

9.11 Fungi

The forest area of the Division is very rich in a variety of fungi, which consist of large number of edible or non-edible fungi. The non-edible fungi have many complex organic chemical compounds, which are of great medicinal value. The most important of all the fungi are *Morchella species*, which are commonly known as Guchhi. These are collected, dried and exported out and are discussed in detail below:-

The most common *Morchella* species

- i) *Morchella deliciosa.*
- ii) *Morchella esculenta.*
- iii) *Morchella conica.*

These grow naturally in the forest areas immediately after snow melting during the month of April and May. These are found mostly in the moderately dense forests, where these get the

required nutrients from the wood or other sources. This is important Minor Forest Produce which plays an important role in the village economy in the area.

9.12 Action on general NTFPs conservation

- i) A study to answer the questions raised must be commissioned soonest possible through research institutes.
- ii) A PAR (Participatory Action Research) study be undertaken to evolve, adopt and monitor non destructive ways of harvesting all species. As mostly extraction is done by labourer who is uneducated and may not identify species even.
- iii) NTFPs should be raised in large numbers in nurseries, as it is a very versatile species for use in Bio-engineering as well as for *ex-situ* conservation of germplasm.

9.13 Future line of action

Concerted efforts are required to be made to bring the collection, storage and marketing of the medicinal wealth of the division on proper and scientific lines so as to ensure the optimum exploitation of this resource on sustained basis and providing supplementary income to the local populace. Following are several such steps, which may be taken in this direction:-

- i) Immediate steps should be taken to identify the status of medicinal and aromatic plants found in the division.
- ii) For the important drug yielding plants, detailed scientific investigation is necessary for evolving better methods of cultivation, processing, etc. that are most profitable to those who undertake their cultivation as also the chemical screening of such plants.
- iii) Large scale cultivation of medicinal and aromatic plants should be encouraged so that their ruthless exploitation from the natural zone is checked.
- iv) The *in-situ* conservation of medicinal and aromatic plants by regulating their exploitation to a time-circle frame.
- v) Proper training for identification, collection, storage, handling and marketing should be arranged for local people. Formation of co-operatives will play an important role in eliminating the middlemen and maximizing the returns.

- vi) Public awareness programme should be launched amongst the local people regarding conservation of rare medicinal plants and to inculcate the concept of gene pool reserve amongst them.
- vii) Nurseries and demonstration plots should be created at suitable places and from there planting stock of medicinal plants should be given to farmer at nominal rates so as to induce them to undertake the cultivation of these herbs on their holdings, where production of food crops is not economical.
- viii) Compilation of traditional source of knowledge and information regarding identification and utilization of medicinal plants by local people is necessary to keep indigenous technical knowhow alive.

The NTFPs should be given the due trust and species yielding them should be included in the plantation programme. Nurseries should raise sufficient stock of medicinal and other plants of economic importance and make them available to the local population desirous of planting them. With many JFM schemes being under operation in the division, the stakeholders should be encouraged to include such species in JFM micro plans. The rural people of the area still used to take plant based traditional medicines for health care. Since they are still produced using old methods, their quality, efficacy and self life gets adversely affected. Hence, there is a need to introduce low cost, appropriate and simple technologies to encourage this dwindling practice and bring in additional income of rural households. Collection, processing, value addition and marketing aspects of NTFPs need to be studied and the Forest Department should provide all necessary help in this regard to training programmes on various aspects of NTFPs i.e. collection, refinement, value addition, storage and marketing should make growing and trading of NTFPs more remunerative.

9.14 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 addition to 32 species identified by NMPB (National Medicinal Plant Board, GoI) already to suit local conditions and as per consumption pattern in Shimla Forest Division, the low lying nurseries i.e. <1200 m need to grow species like Amla, Harad, 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 m species like *Myrica nagi* (kaphal), *Pistacia integerrima*, Walnut, Bird cherry, Hazelnut, etc. need to be grown in nurseries. Above that altitude the choice of species for Shimla Forest Division can be *Taxus wallichiana*.

A database for consumption of NTFPs may be procured from local traditional dealers.

9.15 Yield calculation

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 CH files which will help in the geographical indication of different species in future and help to plan for their conservation in future. CCF (NTFPs) may plan CAMP workshops for local endemic medicinal plants and NTFPs in future which will help taking better policy decision in future.

9.16 Subsidiary silvicultural operations

No silviculture system as well as subsidiary operations are proposed, however, *in situ* as well as *ex-situ* conservation in herbal garden is proposed for important NTFPs species.

9.17 Miscellaneous regulations

This includes extraction or collection and export of NTFPs. The collection of NTFPs is allowed strictly as per provisions of Settlement Report. The export is allowed under HP Forest Produce Transit (Land Route) Rules, 1978 against payment of specified export permit fee. Now the powers to issue permits rest with Panchayati Raj Institution in respect of certain species. Pardhan of Gram Panchayat from where these species have been collected issue the export permits under the rules *ibid*.

CHAPTER- X

WILDLIFE MANAGEMENT (OVERLAPPING) WORKING CIRCLE

10.1 General constitution

As is evident from the facts described in the foregoing chapters, Shimla Forest Division is having a huge altitudinal variation, right from 580 to 2867 m and snow receiving areas. Obviously, this division also has a vegetation diversity, which makes it very rich in wildlife as well. Therefore, this chapter of this Working Plan or say this Working Circle is constituted for emphasizing the necessity of conservation of wildlife, to address the man animal interface situation, inculcating the spirit of wild observation among the territorial staff and collection of information for better management of wildlife existing in this division. Therefore, this working circle overlaps all other working circles and will not only cover the forest area but will extend to the area outside the forest, especially for the purpose of addressing the problem of man animal interface.

10.2 Importance and value of wildlife

Shimla Forest Division is located in the southern side of Shimla District mainly comprising Shivaliks as well as alpine meadows of western Himalayas. The monsoon affected forests and alpine meadows of the Himalayan front ranges support a unique biota comprised of many distinct altitude sensitive ecosystems and are home to many plants and animals. The ecosystem supports the rich birds diversity especially pheasants as well as animals right from leopard at the apex and variety of herbivores and omnivores. Five out of the seven pheasants found in Himachal Pradesh are found in this division. Not only that, the purest variety of red jungle fowl is found in the lower tracts of this division. However this region as a whole has come under enormous pressure from human activities, both from the ongoing practice of traditional livelihoods, such as seasonal grazing, hunting and the collection of medicinal plants, as well as more recent developments such as the farming of temperate cash crops, tourism and hydroelectric power projects. Further, the importance and value of wildlife from cultural, aesthetic, scientific, economic and recreational point of view is immense. Our scriptures speak eloquently for the protection and preservation of birds and

animals. The biological importance of wildlife in maintaining the natural balance between different species hardly needs any emphasis. The role of various birds and animals in controlling crop pests and rodents and as scavengers, pollinators and seed dispersers are much appreciated. They hold much promise for bird watchers, nature photographers, sport enthusiasts and tourists.

10.3 Management practices and their impact on wildlife

The history of management of the forests of the tract has been discussed in detail in Chapter-VII. The forests of the tract have been worked primarily for the extraction of timber. Since Shimla Forest Division constitute the forests which were earlier the parts of princely states like Bhajji, Moolkoti, Dhami and Keonthal. As such apart from meeting the needs of the local people for the timber some of the areas were earmarked for hunting by the rulers of the princely states. These areas still hold the potential wildlife. In addition, the forests of Shimla Forest Division remained major source of the livelihood of the poor people by way of NTFPs/ MFPs collection. Collection of Guchi is another activity which encourages visit to every nook and corner of the forests by the collectors. This had some adverse impact on wildlife as well, because, of late, due to the increase in population the overexploitation of the NTFPs and a continuous biotic interference especially during the breeding season. On other hand, several tree species are often valuable for wildlife e.g. leaves, flowers, fruits, bark, and roots. Tree species with soft timber substrates are used by cavity excavating birds, natural tree cavities are used by a variety of animals. The ground flora in some of the forests is abundant and varied and the miscellaneous broad leaved species form the middle story, such mosaics are the micro habitats of many important wildlife species.

10.4 Threat assessment to wildlife

The local population is dependent on meeting their fuel wood and fodder requirements from the nearby forests. As a result, trees near the villages are heavily lopped. The forests near the habitations are also being cleared of lops and tops and other fallen wood which has an impact on the habitat of wildlife species which burrow holes in

such fallen wood. Domestic livestock grazing in the forests also adds to the problem. There are 23 numbers of gaddis with flock population as 6128 number of sheep and goats, graze in almost all parts of this division every year. There are incidences of organized killing of the wildlife especially leopards by the nomads “Bangalas” by putting snares. They also get indulged in killing of other endangered species like jackals, monitor lizard, porcupine, black bear, etc. for illegal trade. Stray cases of hunting of pheasants during winter periods are also reported in this division. Degradation of the habitats because of the continuous biotic pressure on the forests had resulted in the total disturbance of the food chain of the wildlife. As a result the species like leopard has made its niche near the habitations, leading to the cases of cattle/dog lifting and some times attack on human beings resulting in human animal interface. Similarly, the monkeys and langoors are finding a little food base in the forest areas and are resorting to the cash crop depredation.

10.5 Distribution of wildlife

The distribution of wildlife has been described in detail in Chapter IIB of Part-I of the plan.

10.6 Special objects of management

The primary goal of management of wildlife in Shimla Forest Division is to mitigate human wildlife interface and efforts for the conservation of the most endangered species. Conduct wildlife surveys and in order to achieve this goal, it is imperative to integrate the functions at two fronts, i.e.

- A.** Orientation and sensitization of the Territorial front line staff towards the wildlife monitoring and management.
 - i) By organizing short training capsules and workshops.
 - ii) By making the FLS sensitive towards the species identification, its status and significance.
 - iii) Encouraging the FLS towards indirect evidence collection, reporting and documentation of the same.
- B.** Making simple interventions to improve the micro wildlife habitats.

- i) Maintain and protect the natural vegetation communities (remove exotics and invasive alien species), populations of large ungulates (with emphasis on sambhar, ghoral) and pheasants.
 - ii) Protection of micro wildlife habitats from forest fire especially during breeding season.
 - iii) Planting some percentage of the preferred plant species.
 - iv) Identification and protection of the Sacred Groves.
 - v) Estimation of the species population which leads to human wildlife interface specifically and others in general to decide the management strategies.
- C.** Working with the local communities to reduce the human wildlife interface and incidences of poaching.
- i) Facilitate organizing of community based organizations, user groups of rural poor, preferably with strong linkages to the Panchayats. Establish the wildlife conservation efforts at Panchayat level through the consultative process.
 - ii) To come up to the expectations of the communities in terms of human wildlife interface by developing the expertise with in the FLS and making a quick response team.
 - iii) To facilitate the compensation cases of the poor people and making a proposal for pragmatic rates of compensation.
- D.** Reduction in the dependence of local communities on the important habitats to avoid human wildlife interface.
- i) By putting micro wildlife habitats on the minimum use for the right holders by providing the alternatives.
 - ii) Provide alternate grazing lands to the migratory graziers other than the micro wildlife habitat.
 - iii) Vaccination of the livestock both migratory as well as the domestic cattle.

10.7 Management strategy

In order to achieve the above objectives and goal, the strategic approach of wildlife management in Shimla Forest Division will aim both at the FLS and local communities.

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

10.7.1. **Orientation and sensitization of the territorial Front Line Staff towards the wildlife monitoring and management.**

- i) **Training:** It has been observed that the FLS is not oriented towards wildlife and sensitive enough to address the expected requirement in the present scenario. By organizing short training capsules and workshops for the FLS, an effort will be made to have basics of wildlife management. For the effective management of wildlife it is necessary that the staff is suitably trained. Two type of training is envisaged for the staff to increase their managerial capabilities viz. on job training and formal training courses. Following on job training should be arranged for the staff:-
- Several wildlife offence cases fail in the courts for the reasons of inadequate processing, faulty procedures and wrong interpretation of legal provisions. Co-operation of a lawyer can be enlisted periodically to update the knowledge of staff on fundamental of laws and legal procedures. A failed case emboldens others to break the laws. Therefore, staff should be well versed in investigation, adducing evidence and material, dealing with offenders, compoundable and non compoundable cases.
 - Staff should be imparted training in matters like postmortem of animals, collection of samples of vital organs for histopathological, viral and bacterial examination, their preservation and despatch, signs and symptoms of common wildlife diseases, external indicators of health. Such kind of training should be a continuous process rather than one time affair.
 - Training of staff is also necessary in recognizing wildlife evidences and their correct interpretation. Management decisions are often based on interpretation of field evidences hence this aspect becomes critical. Monitoring of pugmarks, collection of scats, collection of skulls and jaw bones are some such evidences in which staff needs to enhance their skills.
 - In addition to on job trainings, it is essential that staff is sent on formal training courses in wildlife management. Several

short terms specialised courses are now available at Wildlife Institute of India and in some other institutions. Forest Training Center, Sunder Nagar and Forest Training School, Chail are now offering short terms training courses in wildlife. Field staff should be deployed to attend such courses.

10.7.2 By making the FLS sensitive towards the species identification, its status and significance. This will help in making decision regarding management inputs, action plan for reducing human wildlife interface and also special efforts for the conservation of the endangered wildlife species.

10.7.3 **Research and monitoring** – Research and monitoring are among the weakest areas in wildlife management. The need is acknowledged but there is very little progress. The research need not necessarily be only biological as management and sociological areas are equally important. Research on a larger format involving species and community studies will need linkages with organizations possessing such research capabilities. However, small scale data collection and studies can be attempted at local level also. Encouraging the FLS towards indirect evidence collection, reporting and documentation of the same. Once the FLS is trained about the basics of the wildlife management, they can be encouraged towards the habit of evidence collection, observing the behaviour of wild animals, reporting and sharing with others and if needed documenting the same. This will help in generating enough information to take the management decisions and to formulate action plan.

10.7.4 **Making simple interventions to improve the micro wildlife habitats.**

- i) Maintain and protect the natural vegetation communities (remove exotics and invasive alien species), populations of large ungulates (with emphasis on sambhar, ghoral) and pheasants. This activity will be done in association with other forestry activities especially to remove exotics and invasive alien species. While carrying out this activity the wildlife species requirement has to be kept in mind so that

the species of grass and plants are planted to meet the requirement of the wildlife species.

- ii) Protection of micro wildlife habitats from forest fire especially during breeding season. In Shimla Forest Division there are some of the nicely maintained small chunks of forests in which a huge diversity exists. These areas can be managed as micro wildlife habitats to facilitate the population of some of the endangered species especially the pheasants. List of such micro habitats along with the flagship species of that forest is given in table-107. These areas are to be protected from forest fire especially during the breeding season.

Table-107

List of the forests which should be managed as micro habitats of the major wildlife species

Sr No	Name of the forest	Name of Range	Area (ha)	Flagship wildlife species found in the area
1	DPF-247 Barelli (Ghanati)	Dhami	86.40	Leopard, Barking deer, Khalij, Red jungle fowl.
2	DPF-252 Salaun	Dhami	157.60	Leopard, Barking deer, Khalij, Red jungle fowl.
3	R-7 Tarab	Mashobra	182.20	Leopard, Ghoral, Barking deer, Koklas.
4	DPF-83 Mundlu	Mashobra	119.00	Koklas, Cheer, Barking deer.
5	R-30 Mangaltu	Taradevi	110.40	Leopard, Ghoral, Barking deer, Koklas.
6	R-26 Talgiri	Taradevi	101.60	Leopard, Ghoral, Barking deer, Koklas.
7	DPF-18 Sareya	Bhajji	272.80	Black bear.
8	DPF-258 Bashailru	Bhajji	35.60	Black bear.
9	DPF-1 Ratiya	Bhajji	39.00	Ghoral, Cheer, Red jungle fowl.
10	DPF-88 Bhalaug	Koti	407.60	Barking deer, Leopard, Koklas.

- iii) Planting some percentage of the preferred plant species. As per the policy of the state government that out of the total plantations to be done in an area, at least 10% plants are to be of fruit bearing species, the species to be planted in a particular area is to be as per the requirement of the wildlife species specifically found in that area.
- iv) Identification and protection of the Sacred Groves. There are some of the sacred groves identified in this division by WWF Himachal Chapter. These groves are very important

from the wildlife point of view and are the home to many important endangered species, especially pheasants and the vultures.

- v) Estimation of the species population which leads to human wildlife interface specifically and others in general to decide the management strategies. The monkey census is a half yearly feature now. Need is the proper documentation of the population trends pre sterilization and post sterilization of the monkeys. This will help in studying the impact of sterilization and making decision regarding improvements in future. The methodology to be followed for conducting census twice a year is enclosed as Appendix-XV. Similarly, the leopard census is carried out after five years normally but for quite some time this has not been done in the state. This needs to be made a regular feature and in the present day technologies the camera trap methodologies is to be adopted in place of traditional 'Pug Mark Method'.
- vi) Dry, hollow trees, fallen trees, those partially submerged in stream water, large hollow logs rotting on the forest floor, tall and large crowned big old trees, with flaking splitting bark, tree species that bear fruits, flowers, seeds, leaf or the bark of roots of some trees are of special significance to wildlife. Some such trees in a randomly distributed pattern should be retained in the forests.
- vii) Micro habitat elements of geomorphic origin like caves, dens, overhangs in rocks have a special significance for wildlife. Different species mainly carnivores use cave and dens as shelter, breeding site and secure place for raising the young ones. Flat shelves along the top of cliffs are used by vultures and eagles for roosting and nesting. Roof of over hung's can have hives of honey bees, nests of swallows, swifts, martins. It is therefore necessary to conduct a proper survey to identify such key sites and to plan the forestry operations in such a way so as to cause least disturbance to wildlife.
- viii) **Riparian zones-** The riparian zones are among the most diverse, productive and vulnerable habitats and perform

several critical ecological functions. The habitat use pattern in this system by people is often unsustainable hence the riparian zones are constantly under threat. The felling rules prescribed in this working plan elsewhere provide for no felling along the banks of a stream but the objective there is more for maintaining stability of banks and preventing erosion. But such zones also have biological values and ecological functions. These sites are more often than not used by pastoralists to establish cattle camps. Timber extraction is generally done by laying temporary roads in this zone along the valley bottoms. Riparian zones are potential picnic sites. All important streams namely Sainj, Nauti, Malgi, Mangled, Badhog and Ashni Khads and both banks of rivers Sutlej and Giri should be treated as riparian zones. Road alignments along these zones should be avoided. A No Felling Zone to a width of three times the top height of trees on either side should be maintained.

- ix) **Biological Hotspots, Key sites and Sensitive sites-** These are small areas markedly rich in plant and animal diversity and often unique with respect to the plant and animal species association. These are small sites very vulnerable to change. Key areas have key functions to perform like roosting and nesting sites or breeding grounds of some particular species. Unless sufficient information is available about such areas, these are often ignored. These areas should be the integral strategy components in the other forests managed under different working circles as well.
- x) **Grassy Blanks- ‘Ghasnis’-** In forested areas, treeless openings or sites are called blanks or grassy blanks in forestry lexicon. These are called as ‘Ghasnis’ in the local terms. These areas are the potential habitats for many species especially like ghorals, porcupines and cheer pheasant. These are often prime target for plantation activity. But all care should be taken to understand the ecology of these areas before going for making any interventions. They all need to be managed for their associated characteristic structural, biological attributes, ecological functions and physical

integrity in consonance with the stated objectives of management.

10.8 Working with the local communities to reduce human wildlife interface and incidences of poaching.

- i) Facilitate organizing of community based organizations, user groups of rural poor, preferably with strong linkages to the Panchayats. Establish the wildlife conservation efforts at Panchayat level through the consultative process. There are many NGOs or other groups interested in becoming flag bearers of the wildlife conservation. We need to make use of their potential at least in identification of the species, their population trends and in anti-poaching campaign. Panchyats can act as moderators in reducing the human wildlife interface provided if there is a continuous consultative process and dialogue with the Panchyats.
- ii) To come up to the expectations of the communities in terms of human wildlife interface, by developing the expertise with in the FLS and making a quick response team. Whenever there is human wildlife interface, the territorial staff is totally dependant on the wildlife staff. There is need to develop expertise among the FLS and a quick response team is to be constituted for the purpose.
- iii) To facilitate the compensation cases of the poor people and making a proposal for pragmatic rates of compensation. Wildlife compensation has been made as part of Public Guarantee Act in HP. There are many cases of cattle lifting by the leopard but only a few are reported because the rates of compensation are too impractical. These need revision to make it realistic.

10.9 Reduction in the dependence of local communities on the important habitats to avoid human wildlife interface.

Good wildlife management is effective management of people's pressures on resources. If the pressures on forest based resources are not resolved to the satisfaction of ecological requirements and the local economic realities of peoples, there would be no habitats left to manage.

- i) By putting micro wildlife habitats on the minimum use for the right holders by providing the alternatives. The traditional rights of the local right holders are needed to be adjusted in the other forests at the time of next forest settlement.
- ii) Provide alternate grazing lands to the migratory grazers other than the micro wildlife habitat. Efforts are required to be made to provide alternate grazing lands to the migratory graziers so that these micro habitats are kept intact.
- iii) Vaccination of the livestock both migratory and domestic cattle. There is sizable population of domestic livestock as well as migratory graziers which in addition to other forest areas also graze in these micro habitats. If the grazing is unavoidable, the livestock going for grazing in these micro habitats should be vaccinated every year against the contact diseases.
- iv) To tackle the issue of livestock grazing, ways are to be found out as to how the existing cattle number could be reduced. One way could be by substituting them with smaller number of productive variety of cattle for economic and ecological gains. A beginning has already been made in this direction in the tract by introduction of jersey cows which are not sent for grazing to the forests but have to be stall fed. The futility of keeping large herds of unproductive cattle has to be impressed upon the people and alternatives popularized.
- v) The dependence on forests for fire wood requirement need also to be tackled by providing alternative fuels. Providing LPG connections can be one alternative.

10.10

Crop depredation

The villagers in Shimla Forest Division raise wheat, maize, potato, peas, ginger, cabbages, cauliflowers, garlic, etc. In addition to this, most of the farmers of Shimla Forest Division have now opted for off season vegetables and cash crops. This has changed the whole pattern of the agriculture practices in this division. The time of growing these crops mostly depends on the altitude of the area. The crop depredation is mainly done by monkeys, wild boars and black bears. Other wild animals such as ghoral, porcupine, bats and

parrots also do the damage to the crops. Main problem is because of monkeys and wild boars. Government of HP had allowed the killing of problematic monkeys and wild boars but some animal right activists has taken the issue to the HP High Court and the case is still pending.

There are legal provisions to annihilate the rodents such as rats and invertebrates like insects; the large mammals are protected under the various Schedules of the Wildlife Protection Act. In this scenario the poor farmer living on the edge of the forest faces problems like crop damage and legal action in the event of his killing a wild animal.

10.11 Livestock depredation

Due to increasing population pressures and consequent degradation of forest habitat, the wild animals such as Himalayan black bear or leopards have become “refugees” in their own habitats. It is a well known fact that the wild animals avoid areas with disturbances. This means that when their habitat gets further restricted as a result, they venture into the human habitations. The wild animals also intrude into agriculture fields as the crops raised are more palatable and they are located in easy locations. In addition to this, the poor and marginal farmers in the villages keep livestock such as sheep and goats which usually survive on grazing on the forest and pasture land. The wild animals find such domestic livestock as easy prey. The timing of the predations by the wild animals is very crucial to understand human animal conflict. The leopard killings are mostly in July to September, the Himalayan black bear made killings in almost same months. The wild carnivores remain active in the months of June to October when the livestock is in the forests/pastures of the forests.

10.12 Compensation

The occasional damage to livestock and human life caused by the wild animals has earned them the resentment of local people. To reduce this man animal conflict and to compensate the sufferers, the government has substantially enhanced the rates of compensation for damage caused to human life and livestock. These rates are appended as Appendix-XVI (i-iii). However, a close look at the Department’s rules reveals their inadequacy with

reference to the damage done by the wild animals in the field. The rules provide for postmortem report and verification by the high authority in the villages such as Pradhan/Up Pradhan of Gram Panchayat and a forest official, not less than the rank of a Range Forest Officer. For a poor person, it is difficult to approach these high authorities, as a result we find that very few cases of damage by the wild animals are reported for the claim of compensation. Moreover, the rules have been framed for the damage of domestic animals done by the large mammals, mostly the carnivores. This also reflects the inadequacy as most of the damage done relates to the crops and horticulture trees for which there is no provision of compensation. Human wildlife conflicts have assumed different dimensions in terms of human casualties, livestock killings and agricultural and horticultural crop raiding at the interface of wildlife habitats and human use dominated landscape. Such a situation affects the diverse sections of the village society differently. Those who live closer to the forest areas and away from the road head are mostly poor and bear most of the brunt of the human wildlife conflict. Man animal interface filter down to the base of the pyramid where the people are most directly affected by the depletion of physical resources, least able to fend off the ill-effects of man animal conflict and ill-equipped to take remedial action. Providing relief or compensation for damage to the crops and animals of the poor populations living close to the forests should become the priority for the Forest Officers.

10.13 Dealing with Leopards in Shimla Forest Division

In Himachal leopard is the dominant predator sitting on the top of the food chain pyramid. This magnificent animal is reported from all corners of this division. The terrain and the altitudinal variation of Shimla Forest Division make the leopard more versatile and mysterious. A strategy needs to be developed for dealing with leopards in Shimla Forest Division keeping in view the field conditions, prey base in forest area and extent of human leopard interface. In fact, leopard is one of the major animal which remains a permanent source of man animal conflict. To understand the extent of the problem is to have a population estimate of the

leopard. Till late nineties, leopard census once in five years was a regular feature but later on this practice is confined to only PAs.

Although, in Shimla Forest Division, there are no cases of leopard turning in to man eaters but many incidences occur in a year for leopard attacking the human beings, cattle lifting and getting trapped in the houses or the cowsheds. Whenever there is any such incidence, there is a huge public pressure for the elimination of the animal. The HPFD has not been able to make the people understand the ecology of the leopard. One of the typical habits of the leopard is its being strong territorial animal. As such when a male marks its territory, about 4 to 5 leopards also exist on the periphery of the marked territory, by making their separate territory in the other area. Whenever there is elimination of any leopard from its territory, the peripheral leopards also push their territory towards the vacant territory. It results in having many leopards in that area all of sudden and that make the operation more difficult. Therefore, before taking a decision of eliminating a leopard from any area, it is important that a quick study is conducted before taking any decision.

To overcome this sudden pressure, we need to have continuous interaction with the public, Panchyats and the local NGOs and need to create the awareness about the habits of the leopard. On the other hand although the DFOs (T) are the Wildlife Wardens but they hardly bears the responsibility to tackle the leopard problem. The normal practice is to pass the buck to the wildlife staff. In fact, DFOs (T) should remain equipped for any such situation. It has been observed in this division that leopard problem is more when 'Gaddies' are not in the area, i.e. the time between April to September. During this period, the leopard tends to move near to the habitations and dogs being its preferred food, it roams around the houses having reared a dog. This is very risky situation. At most of the times it has happened at many places that the leopard targeting the dog generally lifts the kid. Therefore, there is a need to educate the public. Most of the injuries caused by the leopards to the human beings are because of the retaliatory action of the human being on sighting a leopard. This leads to man animal conflict.

There is need that at least two leopard traps and one set of rescue equipments (like blow pipe and tranquilizing drugs) should be available with each Territorial Ranges. Rescue staff should be identified and a team of good efficient staff should be trained to meet any emergency situation. Two types of training to the rescue team are required. One is training about the use of tranquilizing equipment including a formal training of the basics of the habits and habitat of the leopard including movies of the case studies and handling the situation. Then there is a need of refreshers courses at least once in a year to update the skills and also to have the practical training including the case studies.

One of the simplest exercises which should be done at Range level is that to develop the leopard incidence data base. The simplest way of doing this is that on the range map, a 'DOT' can be put whenever there is confirmed sighting or there is incidence of cattle lifting, etc. This will generate a good data base and also the movement of the leopard can also be monitored. Once you observe that any leopard confining to a smaller area for the long time, it will mean that the animal is either old or injured, as such a public warning can be issued and a close watch is to be kept on such animal.

There is a rehabilitation and rescue policy of the Department which is available on the web page of the HPFD, http://hpforest.gov.in/Rescue_Release_Guidelines.pdf.

10.14 Monkey human interaction

The monkeys have become a problematic animal for last 10 to 15 years in Himachal. Whether it is the townships or the rural areas now monkey menace is quite common. Not many efforts were made to address this problem in the past as this problem was never considered a public problem. The get going approach has lead the problem to get aggravated and the situation at present is that whether it is farmers or the people living in the townships, everyone is facing the monkey menace helplessly. The efforts made for last 6-7 years at Forest Department level are too meager that it has no visible impact as such.

10.14.1 The monkey sterilization programme

Before we go for the mitigation of the monkey problem we need to understand the root causes of the monkey population increase and the abrupt behavior of the monkeys.

Causes of increase in monkey population:-

- i) **Change in land use pattern –**
 - a. Shift from traditional cropping pattern.
 - b. Off season cropping and high nutritional value cropping.
- ii) **Shift from wild to co-mensal –**
 - a. Due to increase in the human population even wild monkeys are now used to human habitations.
 - b. Monkeys are used to the human beings as well.
 - c. No struggle for food increases the life span
(Average lifespan in the wild is 4 years when they have to compete for food in the wild, whereas when easy food is available in the form of garbage/manual feeding in the townships, they can live up to 10-15 years.)
 - d. Non availability of food base in the wild (WL Habitats have degraded both qualitatively and quantitatively).
- iii) **No garbage management in townships-**
 - a. Easy food availability leads to multiplicity.
 - b. Increases the life span.
- iv) **Bifurcation of the groups due to the fragmentation of habitat or other reasons.**
 - a. The bifurcated group tend to regain the minimum same size (Group behaviour)
 - b. Abnormal behaviour when get separated from the group.
- v) **Manual feeding-**
 - a. Due to religious reasons.
 - b. Increased tourism and increased number of the temples.
 - c. Disposal of the waste food.
- vi) **No predators of the monkeys in the wild**

Monkeys are not the preferred food of leopard. Earlier large eagles/vultures used to pick up the infants of monkeys but now their population has gone down drastically.

10.15 **Some of the facts about monkeys are:**

- i) Mating is not confined to a specific season. Females are mature by three years of age, and males at four.
- ii) Females cycle similar to humans with menstrual cycles of around 28 days.
- iii) The monkey's average gestation period is six months (from 135-194 days) and most of the females in the group give birth to one baby in a year.
- iv) Males are the dominant sex, but they do not remain with troops permanently, so female monkeys lead these communities.
- v) Because troops include multiple mature males and females, their members are sexually promiscuous.
- vi) Females usually produce one young each year, which will be raised by its mother within the very social environment of the troop.
- vii) The typical lifespan of a rhesus monkey in captivity is approximately 15-20 years for males and 20-25 years for females.
- viii) The life span in the semi urban and urban areas can vary between 10-15 years whereas in the wild 3 to 7 years.
- ix) The monkeys also exhibit typical 'group living' behavior like maintaining minimum population of the group (group size)
- x) In HP the population estimate of the monkeys is more than 3 lakhs in which about 65 thousands are estimated in the townships and rest in the rural/forest areas.
- xi) In Shimla Forest Division itself a survey was conducted on the hot spots only and the estimation of monkey's population comes to be more than 5000 excluding Shimla township.

10.16 **Mitigation measures**

We have to address all the above causes if we want to have the effective results. Before doing so actually we need to study all the above causes in detail and then we can come to the conclusion of making recommendation of some measure to control the population of monkeys.

However some of the recommendations are as under:

- i) If less than 70% animals of a particular group are not sterilised within 6 months (period of gestation) the impact of the sterilisation will be minimal.
- ii) Right from capturing the monkeys, sterilisation to release back at the same area, the group identity has to be maintained and not to be mixed with the other group of the monkeys.
- iii) Though the females should be preferred for the sterilisation but for the practical purpose both the sexes are to be sterilised to have maximum impact.
- iv) The post operative behaviour of the monkeys needs to be studied especially after release.
- v) The success of the sterilisation programme depends upon the percentage of the catches in a group in the first go.
- vi) The monkeys confined to the townships need a different treatment than the rural/forested areas.
- vii) The monkeys of the rural areas can be pushed back to the forest areas by making them scare and by increasing the natural food base in the wild.
- viii) The groups in rural areas which are habituated and feeds on the agricultural crop only may need to be scientifically culled. (the sterilisation will not have considerable impact as it is very difficult to capture more than 70% of the group at a time in rural areas as the monkeys being semi co-mensal)
- ix) In the first go we should confine to the townships for the sterilisation and release back.
- x) Modern technologies like drop nets need to be used for capturing the monkeys and to increase the catches.
- xi) Training of the staff for monkey capturing.
- xii) Focus should be the GROUP rather than number from different groups.
- xiii) Stop manual feeding (Donations be put in containers).
- xiv) The food accumulated in the containers be medicated with the contraceptive medicines and then monkeys be fed at some common place.

- xv) Creating a mass awareness about garbage disposal, no manual feeding, how to avoid monkeys' attacks, post care, etc.
- xvi) Exploring the options for Export and Translocation to the NE states.

As pointed out earlier, the major animals responsible for human wildlife interface are leopards, monkeys, wild boars and the black bears. Some of the suggested measures for the reduction in the conflict between man and animals:

Proactive

- i) The villagers are already using deterrents such as making sounds at night, beating drums, lighting a fire, or putting up a scarecrow in their fields. The alternative access to crop fields can be of some use.
- ii) The Forest Officials need to take some proactive measures such as proper identification of the rogue animals, their tracking, and if needed "culling" or elimination.
- iii) Feasibility of setting up of cages/radio collaring of the problem animals may be explored. The Forest Officials and the local villagers need to put up a combined defense against such animals.
- iv) There is a need of regular census of ungulates and carnivores in the forests. The prey-predator relationship needs to be studied and worked out for the mountain animals along with the carrying capacity of their habitats.
- v) The issue of crop insurance has a lot of promise to resolve the man animal conflict in the Shimla Forest Division. Possibility of paying a portion of the insurance premium by the Forests Officials for poor villagers should be explored.

Reactive

However, once the damage is done, the provisions of compensation should be an easy and straightforward process so that the poor villagers are able to receive the compensation easily and without delay. It is also important that the Forest Department functionaries ensure that the poor people not only attend Panchayat or Gram

Sabha meetings in good number but also participate actively so that their voice is heard. Proper checks and balances can be evolved and the govt. can place the funds for compensation at the disposal of a Panchayat. The removal of problem animals may be considered in case such animals have been properly identified.

In fact, the main solutions lie in awareness about the large mammals, their ecology and behaviour; at the same time recognition of the fact that these are the poor villagers showing tolerance to the existence to the crop damaging bear or livestock lifting leopard. This enhances the limits of human existence with the large carnivores. The future of man animal conflict resolution lies as much in the involvement of the local communities in the wildlife habitat management, as in the measure that are taken to leave the wild habitats to the wild herbivores.

10.17

Pheasants census in Shimla Forest Division

The Shimla Forest Division has five out of the seven pheasants found in Himachal Pradesh which are kaleej (*Lophura leucomelanos*), cheer (*Catreus wallichii*), koklash (*Pucrasia macrolopha*), red jungle fowl (*Gallus gallus*) and pea fowl (*Pavo cristatus*). In addition to this the foot hills of Shimla division are very rich in galliform density. Both black and grey partridge are quite common in this division. Unfortunately the division lack a proper data about these magnificent birds. The management practices never address the habitat requirement of these species. Even it is said that the purest gene pool of red jungle fowl is found in the lower parts of this division adjoining Majhathal WL Sanctuary. Similarly cheer pheasant are quite common in their grassland habitat, though a serious and systematic effort to collect baseline information about them is lacking. Ghanatti area is famous for the viable population of khalij. Many research fellows have done their PhD on khalij from Ghanatti. There is need to document all such data and place it in the division for taking the management decisions. In addition to this there has to be a regular program for the census of these pheasants.

10.18

Method of census

The pheasants are typically territorial birds. They maintain their territory particularly during breeding season by giving calls.

Taking advantage of this habit, the pheasant census is generally done with the call count method. However many ways are employed to follow this method in the field. One of the prominent methods of call count is by displaying the recorded calls. The male responds back by listening the call. Secondly, by listening the calls of the pheasants at its own. Some experts give calls by mimicking the calls of the pheasant. It is advised that before going for the census of pheasants, a training workshop should be organized. If needed be the help of school children, volunteers and experts can be taken.

10.18.1 Calls identification

The most important factor is the identification of the call of a particular pheasant. This can be learnt by listening recorded calls, identification of calls by expert or by visiting the aviary and listening the calls of the pheasants and minding it. This method can be used for most of the pheasants which call during morning hours in their breeding season. The counts can be made from a strategic point in the habitat of the particular pheasant. The number obtained can be doubled for obtaining the estimate of breeding population (e.g., one male; one female). The following factors will influence observations

10.18.2 Season of the year

The counts of calling males assume that all the existing males in the area will call every morning. In the western Himalayas, the calling behaviour of these species of pheasants during various months of the year is as following:

<u>Cheer</u>	:	<u>January to May; September to December</u>
<u>Koklas</u>	:	<u>January to June; September to December</u>
Khali	:	January to May; September to December
RJF	:	February to June;
Pea fowl	:	Almost all around the year.

Most koklas observations are made during a short period of early morning. The males usually call at dawn for 15-20 minutes. Cheer pheasants call in chorus at dusk and dawn.

10.18.3 Location of census point

Surveys will be more successful if a strategic point is selected in the habitat of pheasant. This strategic point should be identified on the day before the survey/census. The census point should allow the observer to hear the birds over as wide an area as possible. A point on a ridge usually allows the observer to listen to the pheasant calls on both the sides. It is possible to hear all the calling birds within a radius of 400 m from the ridge, however, this can be reduced by the intervening ridges.

10.18.4 Position of observation

When there are multiple observers taking part in census operation of pheasants, they must be positioned at an interval of about 500 m to 600 m. All the observers must have visited their observation points on the previous evening of the census day. They should be in position well before dawn so that all the calling pheasants are counted.

10.18.5 Observation and data collection

The observer should have good knowledge of identification of the calls of pheasants which s/he is likely to encounter in the field. The observers should practice counting the involved numbers of calling birds. An approximate range of each call and the direction of the call must be anticipated. A compass can be used by the observer.

It is best to have similar formats for all the observers. These formats should have following details:

- i) Date of observation
- ii) Time of start and end of observations
- iii) Altitude of the observation point
- iv) Major vegetation types within the sample area
- v) Weather conditions on the day of observation including wind speed, precipitation, cloud cover, temperature, etc.

- vi) Marking of observation points on a large scale map of the area (marking of a conspicuous point such as a rock or a tree which can be located for subsequent census in the same area).

10.19

Dealing with vultures and other raptors for ecological balance

The main species of vultures found in this division are lammergeier, Egyptian vulture; white backed vulture, long billed vulture, Himalayan griffon and red headed vulture. The population of vultures has reached the critical level especially the white backed vultures. Most of them are nesting outside PAs and need the attention of the territorial staff. The vultures nest and breed either on the old chil trees finding some holes in it or making nest on the dead old branches. Another typical site of nesting of vultures is the rocky cliffs on the southern or south western aspect. These birds nest in colonies. As such the typical nesting sites of the vultures need to be identified and protected.

One of the major threats these magnificent birds are facing is the use of the drug 'Diclofenac' on the animals on which the vultures feed. The population of the white backed vulture has already reached at the most endangered level.

The main efforts which should be made in the field to protect Vultures are:

- i) Identification of the nesting sites of the vultures.
- ii) Retaining the snags while carrying markings in the field.
- iii) De skinning of the dead animals should be mandatorily be got done.
- iv) Ban on the use of 'Diclofenac'.
- v) Protecting the nests and nesting sites from forest fires especially in summers.

10.20

Proposal to declare forest of Gram Panchayat Himri (Bhajji Range; Shimla) as a Conservation Reserve

The areas were visited and there is potential of having good refuge for the wildlife in these forests. Good quality oak forests on the slopes of this area can constitute a good conservation reserve. There a famous 'Shalli Temple' on the highest point of this area

called Shalli peak (2867 m). All the inhabitants of the whole area and also the people up to Theog area come there for worship. Many trekkers and pilgrims visit the Shalli peak every year and the number is in thousands. The aforesaid area includes the forests of D-22 Himri – NDPF Himri, D-23 Chapravi, Galah, D- 19 Dabba and D-20 Lambidhar. Presently, these forests were being managed under Oak Working Circle and Biosphere Conservation Working Circle in the last WP of this division. The floral species include Deodar, Kail, Ban, Mohru, Kharsu, Rai/Tosh, Taxus, Rhododendron and mixed broad leaved species. The faunal diversity includes Black Bear, Leopard, Ghoral, Deer, Barking deer and variety of the pheasants.

On discussion with the people of the area, there is a division of the opinion whether this area should be declared as conservation reserve or not. Though it is a good idea to have any area conservation reserve, but at the same time keeping in view the recorded rights in the forest of the area and public visitation to the Shalli peak, there is a need to take a well thought decision keeping in view the future plans especially providing connectivity and other facilities to the Shalli Temple. Therefore, it will be in the fitness of things that the significant pockets of wildlife refuge are included in the Micro habitat list and are managed for the wildlife conservation.

10.21 Field Craft- How to observe and understand the Jungle

(Adopted from an account by Dr. AJT Johnsingh of WII)

When guards/officers/others venture into the forest they should be equipped with certain indispensable articles: a small sharp knife, a compass, a lighter or a match-box (covered in a water-proof polythene bag), leech-proof socks (if it is a leech country), a small rope, rain-coat (if it is in the rainy season or in an area of high rainfall), a good pair of field shoes and field dress (olive green or khaki), which will merge with the background.

Animals such as Himalayan black bear, brown bear and leopard can move much faster than humans. At the first close encounter they may snort, roar or scream. These sounds when heard in the

setting of the jungle can frighten us terribly and only experienced lucky persons who have survived these encounters will be able to tell us how weak and wobbly their knees became after the first nerve-wracking encounter. We should not think that we can easily outrun and escape these animals which, as said earlier, are much faster than we are. Also the terrain on which we will have to run- with slope, many holes, sharp wooden stumps, tangle of creepers, dense tall grass, logs, and rocks- is not an ideal place to outrun these beasts which run with four legs while we have only two teetering legs.

Therefore, go with caution in a forest where there are dangerous animals. Please follow the dictum "I should see these animals before they see me and should hear them before they hear me". Do not talk unnecessarily. Human voice can be heard, even from a long distance, by the jungle animals, in the "silence" of the forest. If there is a need to communicate, better whisper and signal. The objective of our visit to the forest is to see as many animals as possible and observe them. This can be accomplished only when we move as quietly as possible. We spend a fraction of our life looking for and observing animals in the forests. During this brief period, we should be as quiet as possible and observant of the events that happen around us. **Silence is an essential part of jungle-craft.**

In the jungle, smokers should become non-smokers. This is necessary for several reasons: by not smoking (i) the animals will not be alerted by the smell of the smoke, (ii) we avoid setting fire to the jungle, (iii) we show the utmost reverence to the jungle which we have resolutely determined to conserve. When we walk along a forest trail, particularly when the wind carries our smell down the trail, we should proceed with utmost caution. This is because animals like bear (particularly those which have had encounters with people earlier and therefore are not shy of people) can smell your approach and then either slink away or wait for your arrival. When the wind carries your smell down the path, walk slowly and silently, stop for a few seconds every 50-100 m, listen for sounds and then proceed. Most animals like bear make some

sound and indicate their presence. All these can be heard if you walk silently.

Forest Rules

- i) Never approach dangerous animals like black bear (particularly with the cubs) very close when they are in a flat terrain. With caution it is possible to approach them in a hilly or rocky terrain where the chances of escaping these animals are much greater.
- ii) If there is a fresh blood trail on the path one should proceed carefully. A wounded animal (e.g. a bear wounded by a poacher) may be ahead of us and should turn aggressive if approached very close. The same is applicable to other potentially dangerous animals like the leopard.
- iii) A leopard carrying its fresh kill may cause the fresh blood trail. Approaching a leopard on its fresh kill could be dangerous.
- iv) While on a blood trail if there are alarm calls of monkeys, and birds ahead of us it could be an indication of the predator going ahead. Go with caution.
- v) If you are returning to your camp alone on foot late in the evening and you see a dangerous animal (e.g. a bear with cubs), stop immediately. Stay at a safe distance. Hide behind a tree or rock, observe the animal and then by talking, by tapping on the tree with a stone or wood, or even by allowing the wind to carry your smell let the animal know that a human being is somewhere in the vicinity. The presence of the unseen human being makes most animals nervous and they make a slow but steady retreat away from your direction. Who will enter into a patch of tall dense grass where you hear the hissing of a cobra but don't see the snake? We will move away from the area. The great naturalist Dr. George B. Schaller has successfully used the above technique of remaining unseen and scaring away the Himalayan black bears in Dachigam National Park, Kashmir, India.
- vi) Do not stumble through the forest without carefully looking at the path.

- vii) Climbing a steep hill slope by clinging on to trees, climbers and rocks. Particularly in a tropical habitat, needs to be done with great caution. Before placing the palms, which like the feet are not protected, to hold on to something, watch carefully. There could be a scorpion, a nettle plant or a wasp nest nearby.
- viii) People often fail to differentiate between chasing and charging by a bear. Charging may stop with a forward aggressive rush for 20-50 m but chasing can go much beyond that even for a few hundred meters which could be very dangerous. When chased by an animal throw a conspicuous object (e.g. a white handkerchief) on a bush and run down a slope or run zig-zagging among the bushes. Put up as much distance as possible between you and animal. While chased, do not crouch inside a bush hopping to hide.
- ix) When chased by an animal, never try to climb a tree. A jungle-living tribal can do that but not a guard if he is recruited from a town or a Manager who is not used to tree-climbing. The fear would drain all the energy needed to climb.
- x) Sometimes you will be forced to walk through the forest at night. If you are in a group, stay together. As you walk along make some noise (talk, sing, or tap on a tree or rock at regular intervals). Don't surprise animals by walking into them. Tap the ground periodically, as you walk along, either with your foot or a stick. The vibrations will keep the snakes away and most animals will also move away when they are warned from a distance.

Practicals:

Each guard/officer should be persuaded to tell an interesting experience he has had in the jungle during his career.

Note: This chapter on Wildlife Management (Overlapping) Working Circle has been approved by the Chief Wildlife Warden Himachal Pradesh. Photocopy of the same annexed as Appendix – XVII.

CHAPTER – XI

ESTABLISHMENT AND LABOUR

11.1 Establishment

The position of the staff as stood on 31.3.2012 has been given in Table-32 of Chapter-VI of part I of this plan. The office work has increased to such an extent that the field staff especially the Range Forest Officers remain preoccupied with this work rather than devoting more of their time in the field work. The remedy lies in cutting short the procedure by using computers and also atleast range clerk in the Range offices should be provided. Main emphasis in the plan is on improvement of stocking of forests, like large scale plantation in blank areas and various silvicultural operations under different working circles. This will overall increase the work load at all levels. In future forest protection and maintenance of the regeneration areas are going to receive higher attention and more concentration. Keeping this in view, more field staff at all levels especially trained for forest protection will be required in future. Among ministerial staff atleast two senior assistants are required to run the office business smoothly.

11.2 Field Staff

Most of the Forest Guard and Deputy Rangers holding the charge of beats and blocks are lacking basic knowledge of forestry and allied subjects. Most of the Forest Guards who got promotion from class IV posts are no more than literate labourers. They are not in a position to manage and protect their beats and blocks for want of proper training and education. It is therefore, prescribed that only trained Forest Guards/Deputy Rangers be posted in beats and blocks. All the untrained field staff should be sent to training without further delay.

11.3 Labour

The position of labour supply is generally satisfactory except during the season of harvesting of fruits/vegetables and agricultural crops in some of the areas.

CHAPTER – XII

CONTROL AND RECORD

12.1 System of control

The system of control and maintenance of records as adopted in the state will be followed. Control is an integral part of the plan and record of all operations has to be maintained properly. It was observed that various records at divisional and range level were not maintained up to date. For facilitating the proper working and carrying out the prescriptions of the plan, the following records should be maintained regularly at divisional as well as range level.

12.2 Control forms

To exercise proper check and control on the prescription of the working plan, the DFO will prepare the annual control form showing the prescriptions and suggestions of working plan. These forms will be maintained every year as prescribed in Himachal Pradesh code for working plan procedure and will be submitted to CCF (WP Settlement) for scrutiny through CF. The following control forms will be maintained.

- (i) Control Form Nos. 2, 2A and 2B which control fellings.
- (ii) Control Form No. 4 and C which control works of improvement and reproduction.

These forms are described in detail in Punjab Forest Manual chapter No.11

12.3 Deviation statement

All the control forms shall be prepared for the financial year and submitted to the CF latest by 15th May every year together with (i) a deviation statement in triplicate, (ii) a certificate to the effect that all CH files are fully and accurately posted to date and the annual control forms for the year agree with the entries in the compartment histories, (iii) a note on the progress of operations prescribed in the working plan and (iv) explanatory notes.

12.4 Compartment history files

The maintenance of CH Files both at divisional and range levels are quite unsatisfactory. All the forms A to C are almost blank and in some cases haphazardly filled. Inspection notes are lacking in old CH files. Their upkeep and storage in the range and divisional office have been neglected. The CH Files have been prepared in duplicate for all the Reserved, Protected and Undemarcated Forests. Stock maps on 1:15000 scale have been prepared on survey sheet itself and posted in the respective CH files. The new descriptions, enumerations results, allotments, treatment, density, regeneration status, quality, underwood, undergrowth, etc. have been recorded in all the CH files. It is prescribed that all the CH files should be properly maintained and posted up-to-date in April every year. Important notes on silvicultural operations, markings, progress of regeneration and other cultural and subsidiary operations should be recorded in these files by the inspecting officers time to time. During field tour and also at the office inspection, the DFO will ensure that CH files are properly maintained and kept up-to-date. The DFO is required to submit a certificate together with the control forms that all the CH files have been brought up- to- date.

12.5 Nursery Journals

This will be maintained for all the nurseries on prescribed standard proforma and should have a complete record about the origin of seed, date of sowing, germination percentage, total number of plants, age wise, operations costs, etc. The inspecting official/officer should record their observations in these journals.

12.6 Plantation Journals

These shall be maintained for all plantation areas on prescribed standard proforma for which CH files have not been prepared. For areas having CH files, the detail should be incorporated in such CH files. It should contain the following information's:

- i) Map of the area on 1:15000 scale showing prominent features.
- ii) Location, legal status boundaries, configuration, altitude, aspect, slope, geology, etc.

- iii) Soil suitability maps on 1:3750 scale showing the unplanted blanks, scrubs, species to be raised and other treatment prescribed.
- iv) Regeneration survey map on 1:3750 scale showing regeneration/stocking position.
- v) A statement showing area planted and cost of planting item wise for each year.
- vi) A critical note by inspection officer/official on success or failure of plantations along with reasons for failure and corrective measures required for the success of plantations.

12.7 Divisional note book

The Divisional note book will be maintained on the prescribed form. No such record is maintained at present. This will contain a list of all the important activities which are given below:

- i) Auction results.
- ii) Lease rates for the various categories of forests and resin blazes.
- iii) Out turn of resin sections, tree lots, coppice coupes, etc.
- iv) Results of experiments carried out.
- v) Results of species/exotics tried and success achieved in different plantations.
- vi) Record of seed years of various species.
- vii) Survival and mortality rates in plantations.
- viii) Injuries to forest crops or any other information like forest fires, etc.
- ix) Total plantation targets.
- x) Budget allotment.
- xi) Construction of buildings/roads/paths.
- xii) Position of PBI.
- xiii) Any other important information regarding divisional working

This information will provide a bird's eyeview of the divisional working and may prove helpful at the time of the revision of the Working Plan.

12.8 Fire records

Records of fires will be maintained on the prescribed proforma both at the divisional and range level. Maps of the forests, showing the burnt areas will be filed in the concerned CH files and plantation journals alongwith the other relevant data such as the origin and nature of fire, extent of area burnt, damage assessment, how was it brought under control and the date and FIR No. lodged with police.

12.9 Register of books and maps

Register of books and maps will be maintained at the range and divisional level and should be kept up-to-date.

12.10 Register of forests

The register of RFs, DPFs, UPFs and even other forests like municipal forests, private forests, etc. shall be properly maintained in the divisional and range offices. All changes in area or boundaries should be recorded every year giving reference of government orders and notifications. A column should also be added regarding entry of the forest in the revenue record. If the forest is not entered in the revenue record, the effort should be made by DFO for its proper entry.

12.11 Register of roads and buildings

This will be maintained both in the range and divisional office and kept up-to-date. All roads and buildings constructed during the year shall be recorded in April every year alongwith cost of construction.

12.12 TD Register

It is to be maintained on prescribed proforma both at divisional and range level to regulate and check on TD grants. The entries of all the sanctioned TD should be made regularly in the relevant register.

12.13 Forest Guard Mannuals

All forests guards, incharge of beats should have a book containing following informations.

- i) A beat map on 1:15000 scale.

- ii) List of forests with area and their allotment.
- iii) Forest maps showing the compartments/sub compartments, boundary pillars, paths, etc. traced from the CH files.
- iv) Record of rights and concessions allowed to the local people.
- v) Duties and powers of forest guard.
- vi) List of roads, paths and buildings of the beat.
- vii) Zamindari rates of trees and forest produce.
- viii) Standing instructions of Range Forest Officer and Divisional Forest Officer.
- ix) List of Shamlat/ceiling lands and private forests with their Khasra Nos.
- x) Class wise volume and market rates of tree species of the region/division.
- xi) Sowing/planting and other silvicultural operations.
- xii) List of mother trees and standards.
- xiii) List of plantations and areas closed for regeneration.
- xiv) Total plantation target and allotment of the budget for the current year.
- xv) List of nurseries and availability of planting stock species wise.

12.14 Register of boundary pillars

This register will be compiled range wise and maintained at divisional level. The longitude and latitude of GPS readings of boundaries pillars around each forest shall be recorded in it.

12.15 Research Journals

The Research Journals indicating detail of statistical data collected, measurement of monumental trees, insect and fungus diseases, frequency of seed years, percentage of timber extracted from various forests specieswise vis-a-vis their standing volumes, other research work carried out and matters of great interest in the management of the forests shall be maintained.

12.16 Forest block book

Like beat manual, a Block book should also be prepared by every Block Officer incharge of the Block. It should contain all the information of Block. The map of the Block should contain the entire individual Beat in it. It should be checked by the RFO and DFO when they are on tours.

12.17 Record of capital expenditure

It should be maintained on the prescribed proforma both at Division and Range Office. Entries with regard to expenditure incurred and allotment of fund should be made every month to have effective control on the expenditure of budget.

CHAPTER-XIII

MISCELLANEOUS REGULATIONS

13.1

Petty Fellings

Petty fellings are generally of following nature:

- i) Trees required to meet the demand of right holders.
- ii) Dry trees occurring here and there.
- iii) Dry or green trees required for ordinary small departmental works like construction of bridges, manufacture of charcoal etc. or to be given to other government Department.
- iv) Green trees required for special tests at FRI or elsewhere or for the study of growth and statistical data by the working plan officer, research wing and other research organizations etc.
- v) Dry or green trees required to meet special free grants i.e. for the construction of houses destroyed by the natural calamities, repair and maintenance of religious and public utility places like temples, schools, sarai, etc.
- vi) Dry or green trees for the construction of huts, their repair, ropeway spans and other petty needs of contractor's persons and labourers employed on departmental works and residing in the forests.
- vii) Trees coming in the alignment of new roads, bridal paths, widening of existing roads, erection of transmission lines, water channels other works of public utility.

13.1.1

These fellings should be carried out as per the instructions issued by the Govt. from time to time. However, the approval of Govt. of India should also be obtained in cases where "Forest Conservation Act, 1980" is attracted such as item no. (VII) above etc. All such fellings shall be shown in CH files and control forms and shall count against the prescribed yield. DFO shall, however, exercise strict control over such fellings so that excessive fellings are not carried out under the garb of petty fellings.

13.1.2

Deviation

Any excess or deficit in fellings not prescribed in the working plan will constitute deviation. These may be of the following nature.

- i) Extensive fellings of wind fallen and dry trees killed by fires, fungi and insect attacks or other cases.
- ii) Fellings of unusual size and extent for special department works or removal along main electric lines or road alignment, etc.
- iii) Special fellings to meet a sudden new demand of a particular or local wood based industries or for defence purposes.
- iv) Stopping or curtailing clear fellings for plantations because of shortage of labour, funds or watering for the plantation works.

13.1.3 Application of sanction of deviation which can be foreseen must invariably be submitted sufficiently in advance through CF, so that sanction may be received before the deviation occurs. All fellings for whatsoever purpose made shall be properly accounted for in the control forms. Deviations for one year, for period of five year and for the entire period of the plan shall be not being more than 10% of the prescribed yield. A close watch shall be kept on the pace of regeneration and fellings shall be continued only if regeneration in areas felled is up to the mark.

13.2 Timber Distribution (TD)

With improvement in the living standard of the local people and development of area, the timber demand of right holders has increased manifold. This is particularly so because the right holders rates fixed long back are extremely low in comparison to the present market rate, which tempts the people, indulge in very liberal and wasteful use of timber and in some cases it is smuggled out also.

13.2.1 No proper record of TD grant is maintained at Divisional/Range/Block/Beat level. This results sometimes in misuse of TD. It is therefore, suggested that every beat guard should maintain a TD register of permanent nature which should be page numbered and certificate be signed by RFO. This register should find a place indicating number, class and species of trees and year of TD granted to him, name of the forest from where TD is granted and whether the applicant is right holder of that forest or not and the details when TD was granted earlier and of its utilization together

with utilization details of current TD. This should invariably be signed by the Forest Guard, Block officer and Range Forest Officer. DFO should check it at the time of range inspection or during tour in the field. This will certainly curb the misuse of TD, if any.

13.2.2

The state has recently notified HP Forest (Timber Distribution to Right Holders) Rules, 2010 for the rationalization and regulation of grant of timber. Under these rules the periodicity and quantity of wood to be granted at concessional rate for a family for building a house and for repairs has been fixed to reduce the pressures on the forests.

13.3

Roads, paths and bridges

The construction of a network of roads in the tract has made the forests accessible. A number of bridle and inspection paths (Appendix-XVII) covering the important forests and connecting the inspection huts and rest houses etc. have also been constructed in the past. However, most of these are not in good shape and need immediate repair. It is therefore prescribed that all existing forest roads, paths and bridges should be maintained properly and DFO should chalk out the biennial programme for repair and maintenance. Adequate funds should also be asked for. The new paths may be constructed to facilitate the inspection and protection of forests from fire and illicit fellings as per need which may arise in future.

In addition, all the PBI and other regeneration/plantation areas should be provided with 1 m wide inspection path along contour for proper inspection and execution of regeneration operations.

13.4

Buildings

Most of the buildings (except the new construction) are poorly maintained and some are in dilapidated condition. All such buildings need repair and maintenance regularly. DFO should chalk out the biennial programme for repair and maintenance of the buildings. The list of existing buildings has been given in Appendix-XVIII. Some of the forest buildings are without electricity even when the surrounding/adjoining towns or villages are electrified. All the buildings should be provided with required sanitary fittings. New buildings as required to be constructed at certain strategically important location may be constructed during

the plan period in the interest of better inspection, management and protection of forests.

13.5 Water supply

In most of the rest houses/inspection huts, water supply is irregular which needs to be strengthened. This should be ensured by fitting overhead tanks which may supply water 24 hours. While selecting the sites for new buildings of permanent nature, availability of sufficient clean water should be given top priority.

13.6 Telephone/wireless

As far as possible all the ranges and check posts should be provided with telecommunication system for better protection and management.

13.7 Fire protection

13.7.1 All the rest houses/inspection huts, divisional Range offices and other buildings should be provided with latest fire fighting equipments and staff should be given demonstrations and training for their use.

13.7.2 Fire also causes grave dangers to the forest wealth and it is essential to protect the forest from fire hazard, which is mainly confined to Chil and Oak forests, although occasional fires do occur in Kail forests but these are not of much consequence. The danger is maximum during summer and dry months when utmost care and precaution for prevention of fires are essential. To solve this problem, local Panchayat should be taken into confidence for co-operation of local people who can help in extinguishing the fire besides adopting necessary measures like debris burning, control burning and maintenance of fire lines. It will also be fruitful to make available sufficient funds for engaging fire watchers during fire season who can assist the staff in locating, preventing and fighting forest fires. They should control the forests and keep the roads, paths passing through the forests clear of needles, grass, bushes and dry leaves. A strict watch on local people should also be kept during fire season that deliberately lit fire in the forest for getting grass. Besides the fire lines around regeneration areas, as prescribed under the Chil working circle be maintained. Moreover, the following 10 metre wide fire lines should be maintained where

Chil forests adjoining large blocks of Deodar, Kail and Oak, and kept clear of inflammable material through annual burns.

13.7.3 Fire lines in Shimla Forest Division

a) Bhajji Range

- i) Between D-2 Mahasa Ser CI and CII
- ii) Between D-8 Kariali and U-18 Chaprani
- iii) Between D-20 Lambi dhar and D-19 Dabka/ U-18 Galah.
- iv) Between D-21 Phulgalani and D-22 Himri.

b) Mashobra Range

- i) All round R-6 Tuti Kandi
- ii) All round R-7 Tarab

c) Koti Range

- i) Between D-88 Bhalaug CIX and CX
- ii) Between D-88 Bhalaug CX and XI
- iii) Between D-87 Kohan CI and D-86 Jagheribagh.
- iv) Between D-87 Kohan CI R-9 RathmuCIII
- v) Between D-90 Kamhali CI and CII
- vi) Between D-90 Kamhali and U 257 Kamhali
- vii) Between D-93 Chanahi CI and CII
- viii) Between D-95 Karoli CII and CIII
- ix) Between D-95 Karoli CIIIa and CIIIb
- x) Between D-95 Karoli CIV and CV
- xi) Between D-95 Karoli CIII, CV and U-269 Satlahi
- xii) Between D-98 Phaniot CI and CII
- xiii) Between D-98 Phaniot CII and CIII

d) Dhami Range

- i) Between D-253 Lahog Ki Ghar CII and CIII
- ii) Between D-254 Hiri ki Besak CII and Salaun CVIII

e) Taradevi Range

- i) Between R-20 Ichhaser and D-215 Jhajia
- ii) Between D-218 Talgiri and R-26 Talgiri

13.7.4 DFO can add more number of forests in above list as per requirement. Though the detailed fire protection measures to be adopted have already been described in respective working circles

but if needed DFO adopt other methods as deemed fit keeping in view the condition.

- 13.7.5** Biological measures of the fire protection can also be adopted by creating mixtures of broad leaved species with Chil and Oak. The continuity of compartments should be broken by bringing evergreen vegetation especially in Chil zones. In new plantations, a green belt of mixed broad leaved species at suitable intervals is maintained.

13.8 Demarcation and survey

There are extensive areas under UPFs in this division covered by this plan. These have not only been subjected to indiscriminate lopping but also to unrestricted grant of 'nautors' and even encroachments. This results into rapid deterioration and degradation of the vegetation in these areas. In order to safeguard against further denudation and depletion of forest wealth it is imperative that all the UPFs be got demarcated, mapped and delimited on the ground by the revenue/forest settlement authorities and be declared as DPFs as early as possible. DFO should make efforts for the entry in the revenue record of all those DPFs/RFs which are not entered in the revenue records

- 13.8.1** There are some lands namely "Government Common Lands". These are confined in Taradevi Range of Shimla Forest Division. These have been planted with various species in the past. These areas have not been covered under previous Working Plans because the ownership of these lands has not yet been transferred to the state Govt. These areas can only be brought under scientific management if the ownership is transferred to the Govt. for which efforts should be made to bring them under the control of Forest Department and declare them as DPFs during the period of plan under revision. However, as per latest position most of such GCL have been transferred to the individuals and mutation done in the revenue record in accordance with the GoHP letter no. Rev. B. A. (3)-8/2001 dated 12/12/2001 copy of which is enclosed as Appendix-XIX. A list of such areas is given in Appendix-XX.

- 13.8.2** Efforts should be made by DFOs to get all encroachments ejected in the forest lands as they have been given powers of collectors.

13.9 Declaration of Reserved Forests

The Reserved Forests of the erstwhile princely states falling in this division have not been notified as such even after the constitution of Himachal Pradesh. This formality needs to be completed without further delay with the underlying object of ultimately converting them in to Reserved Forests. The appropriate steps are taken for this purpose forthwith as this requirement is already being delayed inordinately. Particulars of such forests are given in the table-108.

Table-108
Forests required to be notified as RFs

Erstwhile	Sr. No.	Old no. and Name of forest	To be notified as RFs and name given already	Area (ha)	Range
Keonthal	1	1/1 Mundlu	D-83 Mundlu	119.0	Mashobra
	2	1/2 Chanian	D-92 Chanian	47.4	Koti
Patiala (enclave)	1	1/1 Manun (CI to C XI)	D-100 Manun (CI to C XI)	435.2	Koti

13.10 Forest boundaries

The boundary pillars in most the RFs and DPFs are not properly maintained whereas in UPFs these either not fixed or poorly maintained. It is because the repair is not being done regularly. For this purpose quinquennial programme should be laid down for repair and maintenance of boundary pillars and sufficient funds should be made available for this purpose. It is also prescribed that the boundaries should be checked and corrected with the help of survey of India maps on 1:15000 scale in conjunction with revenue records, and a detail record of the position of boundary pillars of each forests be maintained and recorded in boundary pillars registers at division and range level. The boundaries should be surveyed and given GPS readings with respect to longitude and latitude and distance be measured between boundary pillars vis-à-vis each other, and recorded in the boundary pillar registers. The possibility of construction of cement concrete boundary pillars, especially along outer boundaries of forests and around the

cultivations, may be explored and these may be constructed as early as possible preferably within this plan period.

13.11 Periodic check of boundaries

Little attention has been made for checking of boundaries of the forests. Therefore, it has been suggested that boundaries should be checked at regular intervals for proper maintenance and repair. The checking should be done as per norms fixed below in table-110.

Table-110

Forest Guard	100%
Deputy Ranger	50%
Range Forest Officer	25%
ACF	10%
DFO	2%

A quinquennial programme of repair of existing boundary pillars and construction of new intermediate pillars should be prepared and given effect during the plan period. This must be followed, especially on the outer boundaries of the forests and on the boundaries with cultivation. However, DFO may modify the programme with the approval of CCF (WP and Settlement), keeping in view of availability of the funds or other circumstances. Detail of boundaries of forest should be entered in the Beat guard Manual of the respective beats and boundary register maintained at range and division level.

13.12 Compartment and sub compartment boundaries

The boundaries between the compartments of a forest and even between sub compartment are not marked properly. The compartment boards were found missing. So, it becomes difficult to locate the compartments and sub compartments in the field. Therefore, it is prescribed for proper intensive management that trees along outer boundaries of the forest should be marked with 15 cm wide black band at breast height, and trees along boundaries of compartment with white bands. Similarly, the boundaries of sub

compartments should be marked with broken white bands. It is also suggested that the small boards should also be placed at conspicuous points, especially where roads/paths cross the boundary, bearing the name, number, and area, allotment of forest/compartment/sub-compartment and name of range.

13.13

Maps

All the forests of the tract have been surveyed by Survey of India and survey sheets on 1:15000 scales are available for all the RFs, DPFs and UPFs of the tract. Stock maps of all the forests have been prepared on the survey sheets itself (1:15000 scale) and placed in the respective CH files. The survey sheets on 1:15000 scales are also available in the division and range offices. Consolidated management maps on 1:15000 scale showing compartment wise allotment to different working circle of all the RFs, DPFs and UPFs have also been prepared.

13.14

Forest settlement

Forest settlements of the tract are very old and the area falls under various erstwhile princely states which have different settlement reports or no proper settlement at all. Moreover, the record of rights varies from place to place. Because of manifold increase in human and cattle population and for developmental activities, the demand of timber and other forest products has increased. Moreover, the condition of almost all the forests has changed drastically. In the interest of better management and control, a uniform and revised record of rights as per the present situation is essential. Thus, the settlement should be revised at the earliest alongwith the demarcation of UPFs.

13.15

Nautors

Nautors have been granted in various forests freely and indiscriminately, especially in almost all UPFs. Even the well wooded and steep slopes have not been spared in some cases. Opinion of the Forest Department was not obtained before sanction of such nautors in most of the cases. Those nautors which have been regularized should be demarcated well and boundary pillars should also be raised around them. In future, DFO should ensure that no nautor is granted from any of the forests in contravention of the Forest Conservation Act, 1980.

13.16 Encroachments

Encroachments are common almost in all categories of forests. The UPFs specially are most affected with this menace. Boundary pillars have been displaced and encroached upon. Part of the forests has been converted into orchards and agricultural field. Even the reserved forests have not been spared. The encroachments detected during the stock mapping and inspection of the forests has been mentioned in the compartment description. It was difficult to know the exact area of the encroachment in absence of revenue demarcation and due knowledge among concerned field staff of the Forest Department. Therefore, DFO should ensure to check and detect the exact number and area of encroachment in each forest. Recently, the power of collectors has been given to DFOs. Therefore, DFO of Shimla Forest Division should take immediate action so that encroachments are ejected timely.

13.17 Research and sample plots

The old sample plots in some of the forests have now been abandoned. Therefore, DFO in consultation with UHF Nauni, Solan and HFRI, Shimla should lay out some sample research plots in some forests for growth and ecological studies. Local volume tables for important species should also be prepared.

It is of utmost importance that seed for artificial regeneration is collected from genetically superior trees. All such trees should be marked with white paints and protected. A list of such trees of various species should be maintained in a separate register in the range office. These trees should not be felled for grant of TD or other reasons. Such plots will be excluded from all working plan operations.

13.18 Preservation plots and monumental trees

Trees of extra ordinary dimensions and monumental trees of various species shall be selected, preserved and proper record thereof shall be maintained on standard form at range and divisional level. Few preservation plots of important species are suggested in table-111.

Table -111

Species	Forests
Deodar	D-66 Sipur
Chil	R-6 Tutikandi, D-2 Mahasha-Ser
Ban	D-88 Bhalaug

Temple grooves are also being preserved. Only dead, dry and uprooted trees may be removed from temple groves. Record of all temple groves shall be prepared and maintained both at Range and Divisional level.

13.19 Meteorological data

Data on precipitation, temperature, snowfall and wind is meager in this tract. The existing rain gauges are not maintained in proper condition and little or no data is recorded regularly. It is suggested that rain and snow gauges, maximum and minimum thermometer and hygrometer should be installed at all the range headquarters and forests rest houses/inspection huts where readings can be taken without interruptions throughout the year. The data should be compiled in the divisional office every month.

13.20 Medicinal herbs and plants

There are a large number of herbs, plants and trees in the tract yielding product of medicinal importance. The local people have right for extraction of these medicinal plants but their exploitation is not systematic and scientific. Therefore, a cyclic programme needs to be framed for division which should be approved by the Conservator of Forests, so that removals may take place in the proper manner and all areas get adequate time to re-operate and regenerate. This is especially important as far as removal of dioscorea tubers is concerned. Moreover, the techniques of artificial regeneration of these species should be developed and seedlings should be raised in the nurseries so that the affected areas may get sufficient regeneration otherwise these species will extinct in near future. Further, in cases where digging of soil is involved for extraction of roots, it will cause erosion, so immediate steps should be taken for conservation of soil as per requirement of the area.

13.21 Grazing

Heavy grazing, especially in UPFs adjoining habitation, is responsible for absence of regeneration, disappearance of ground

cover and consequent erosion of soil. The public should be educated on the advantage of stall feeding and their cooperation sought to regulate grazing on rotation basis. In closed areas, grass cutting should be allowed at the discretion of RFO and that too under supervision of staff, to the extent possible without prejudice to the safety of regeneration/plantation.

13.22 Lopping

It was also noticed that indiscriminate and unrestricted lopping of Kail, Oaks and even Deodar is causing wide spread damage to the forest growth particularly near habitations. It is therefore, prescribed that strict control should be exercised and it should be allowed on silvicultural principle and restricted to the limits permissible under the record of rights as per respective settlement reports.

13.23 Resin tapping

Resin is a valuable produce of Chil forests. The chil forests be tapped as per latest instructions. The old system of extraction of resin through cup and lip method has been completely replaced by Rill method. Though, the extraction work will be done by HPSFDC, but a strict control is essential to see that the tapping is being done as per prescribed technique otherwise the trees will be overtapped which will cause death of the trees.

13.24 Soil and water conservation

Conservation of soil and water is an important aspect and object of forest management in this hilly tract. The gradual disappearance of vegetative cover over extensive areas due to biotic interference and developmental activities, have led to accelerated erosion of soil. The successful rehabilitation of depleted and degraded forests and reforestation/afforestation of blank areas as prescribed in the Plantation Working Circle and in some areas on Biosphere Conservation Working Circle will go a long way in providing effective vegetative clothing to the hill slopes and thereby ensuring better conservation of soil and water. Besides plantations, the areas which require soil conservation measures like engineering works should be identified and steps should be taken to construct the engineering structure as per requirement of the site.

CHAPTER-XIV

FINANCIAL FORECAST AND COST OF THE PLAN

14.1 Past yield

The past yield from various working circles for Shimla Forest Division for the period 1996 to 2011 is given in Chapter-VII of part –I.

14.2 Future yield

The annual expected yield of different species in each working circle for Shimla Forest Division is given in the table-112.

Table-112
Annual yield prescribed (cum)

Working Circle	Species			Total
	Deodar	Kail	Chil	
Chil	-	-	1500	1500
Deodar/kail	3050	130	-	3180
Total	3050	130	1500	4680

14.3 Future revenue

The plan has been written keeping in view conserving and restocking the forests as per Govt. policy. However the annual yield is also prescribed in the forests wherever it is available, which is must to be extracted on silvicultural principles for improvement of the forests. If the prescriptions of this plan are strictly followed, it is expected there will be marked improvement in the density of the forests besides getting sustained yield to fulfill the right holder and other requirements of the timber.

14.3.1 Timber

It is difficult to make any definite financial forecast since the prices keep on fluctuating. However, there has been general trend of hike in the timber prices. Taking into consideration the market price of standing trees for the year 2011-12, the annual future revenue is thus estimated as under in table-113.

Table-113

Species	Estimated annual yield (m ³)	Average vol. of TD given each year in converted form (m ³)	Rate Rs/m ³ (For TD)	Revenue on a/c of TD (Rs)	Balance Volume (m ³)	Rate Rs/m ³	Revenue on a/c of balance volume (Rs)	Total annual future revenue (Rs)
Deodar	3050	1000	23899	23899000	2050	47624	97629200	121528200
Kail	130	25	14951	373775	105	38044	3994620	4368395
Chil	1500	50	6674	333700	1450	18630	27013500	27347200
Total								153243795

Thus the estimated future revenue during the plan period (15 years) will be as:

Rs. 153243795 x 15 = Rs. 2298656925/-

- 14.3.2 Resin:** The average number of blazes in Shimla Forest Division is 53000. The average yield per section is 32.78 qtl in Shimla Forest Division is given in table -114.

Table-114

Average No. of blazes	No. of average section	Average yield (qtl)	Total yield(qtl)
53000	53	32.78	1737

Anticipating a consistent annual yield of 1700 qtl and an average price of Rs 7000 per qtl, the revenue expected during the plan period comes to about Rs. 178500000 (7000x1700x15).

- 14.3.3 Revenue from other sources:-**

The revenue collected from other sources like grazing fee, compensation, rent of buildings, etc. from Shimla Forest Division is given below in table-115.

Table-115

Particulars	Amount in Rs
Grazing	46224
Compensation	919219
Rent of Buildings	214392
Registration fees	43170
Miscellaneous	5628679
Total	6851684

Rs. 6851684 x 15 = Rs.102775260/-

- 14.3.4** Total estimated future revenue during the plan period is given below in table-116

Table-116

Particulars	Amount in Rs
Timber	2298656925
Resin	178500000
From other sources	102775260
Total	2579932185

14.4**Future Expenditure**

The expenditure for the year 2011-12 in Shimla Forest Division is given below in table-117.

Table-117

Particulars	Shimla Forest Division
Salary	49738144
TA	400000
Medical	1575280
Liver/uniform	0
Law Charges	12000
Rent Rate/Taxes	0
Office Exp	1233500
Road & Building	345000
Wages	5564400
M & S	632787
Motor vehicle	241400
Maintenance	993800
Minor Work	0
Other Charges	479000
Total	61215311

14.4.1

The total expenditure of Shimla Forest Division is Rs. 61215311 and estimating future annual expenditure on the same value, the total plan (15 yrs.) expenditure will be Rs. 918229665.

14.5**Cost of plan**

The total expenditure incurred in preparation of working plan is given below in table-118.

Table-118

Particulars	Amount in Rs
Wages	828500
O.E.	90000
M & E	20000
M & S	114387
Motor Vehicle	132500
Other charges	0
Total	1185387

CHAPTER-XV

SUMMARY OF PRESCRIPTIONS

Name of Working Circle/Chapter	Heading	Prescriptions	Paragraph	Page No
(1)	(2)	(3)	(4)	(5)
Deodar-Kail Working Circle	Felling series	One felling series viz. Shimla felling series	2.4	166
	Silvicultural system	Indian Irregular Shelterwood	2.8	168
	Rotation and conversion period	120 Years	2.8.2	169
	Regeneration period	30 years	2.8.3	169
	Division into PBs	Four PBs of 30 Years.	2.9	169
	Yield calculation and annual yield of PBI	Deodar 3000 m ³ Kail 100 m ³ Chil -	2.10	171
	Yield Calculation and annual Yield of PBIV	Deodar 50 m ³ Kail 30 m ³ Chil -	2.11.1	175
	Prescribed yield of Working Circle	Deodar 3050 m ³ Kail 130 m ³ Chil -	2.14	176
	Control of Yield	Removal shall depend upon the progress of Regeneration.	2.15	177
	Method of executing felling in PBI	General principles for seeding felling laid down.	2.16.1	177
	Method of executing felling in PBIV	General principles for final felling and thinnings laid down.	2.16.2	179
	Treatment of PBII area	No removal except salvage removal.	2.16.3	179
	Treatment of PBIII area	No removal except salvage removal.	2.16.4	179
	Order of fellings in PBI & PBIV	Tabular statement for sequence of fellings in 15 years laid down.	2.17	179
	Subsidiary silvicultural operations in PBI	Slash disposal, seeding and planting, weeding, bush cutting, cleanings, thinnings, fencing and tending suggested.	2.18	181

	Miscellaneous regulations	Marking of trees to right holder subject to silvicultural availability, closure to be effective, grazing & lopping to be controlled and strict measures against fire protection.	2.19	184
Chil Working Circle	Felling series	One felling series viz. Shimla felling series.	3.4	186
	Silvicultural system	Indian Irregular Shelterwood.	3.8	189
	Rotation and Conversion period	100 Years	3.8.3	190
	Regeneration period	25 years	3.8.4	191
	Division into PBs	Four PBs of 25 Yrs each	3.9	191
	Calculation of yield and annual yield from PBI	Chil 1200 m ³	3.12.9	195
	Annual yield from PBIV	Chil 300 m ³	3.12.11	196
	Yield from PBII and PBIII	No yield is prescribed except salvage removals which will be counted towards total yield.	3.12.12	197
	Control of yield	All removals to be counted towards the yield of working circle, yield not to exceed prescribed yield. only trees available silviculturally should be felled.	3.13	198
	Method of executing felling in PBI	General principles for Seeding felling and thinnings laid down.	3.14.1	198
	Method of executing felling in PBIV	General principles for final felling and thinning Laid down.	3.14.2	199
	Sequence of felling	Felling programme of 15 years for PBs I & IV laid down.	3.15	200
	Subsidiary silvicultural operations in PBI	Slash disposal, effective closure, artificial regeneration, weeding and bush cuttings, cleanings and prunnings, grass cutting suggested.	3.16	201
	Provision in case of fire or regeneration failure	Seriously effected areas to be restocked artificially and treated as PBI further PBI fellings to be deferred.	3.16.3	202
	Miscellaneous regulations	Regulations regarding grass cutting, grazing, fire lines, control burning fire watchers, right holder are laid down.	3.17	203
	Exercise of right and conversion	Instructions regarding marking of TD laid down.	3.18	207
	Regeneration assessment	Prescribed.	3.19	207

	Resin tapping	Resin Tapping will be carried out by Rill Method.	3.20	207
Biosphere Conservation Working Circle	Objects of management	General objects of management laid down.	4.4	209
	Silvicultural system	No green fellings prescribed and hence no silvicultural system is prescribed only hygienic removals prescribed.	4.6.5	212
	Subsidiary silvicultural operations	Sowing/planting alongwith nursery technique is prescribed.	4.7	212
	Tending operations	Cleaning and thinnings are prescribed.	4.9	214
	Miscellaneous regulations	Regulations regarding, grass cutting, lopping, monkey damage, right holders requirements, etc. laid down.	4.10	214
	Soil conservation measures	Soil conservation alongwith afforestation suggested in denuded and eroded forests.	4.10.6	215
	Closures	Closures and afforestation suggested.	4.10.7	215
Plantation Working Circle	Objects of management	Objects of management laid down.	5.3	218
	Choice of species	Species for different altitudinal zones and locality suggested	5.7.1	220
	Planting programme	Definite planting programme Range wise suggested.	5.8	221
	Regeneration assessment	Regeneration assessment every year suggested till the plantation established.	5.10	224
	Closure	Area to be closed shall be got notified in advance.	5.11	224
	Plantation technique	General principles laid down.	5.14	225
	Nursery technique	General principles laid down.	5.15	227
	New concept of nursery	New concept of nursery laid down.	5.16	227
	Tall planting	Tall planting suggested to ensure success of plantation.	5.17	228
	Subsidiary silvicultural operations	Weeding, beating up, pruning, cleaning and thinning advised.	5.21	231
Protection (Over Lapping) Working Circle	Objects of management	General objects of management laid down.	6.4	233
	Method of treatment	Treatment prescribed	6.6	234
	Strategy for fire management	Strategy for fire management laid	6.6.1.1	241

		down for protection of forests against fire.		
	Strategy on smuggling of timber	Strategy to be followed prescribed.	6.6.2	243
	Invasive alien species	Strategy for control and rehabilitation of affected areas suggested.	6.6.3	244
	Management of lantana	Management strategy on containing spread of lantana suggested.	6.6.3.2	247
	Removal of lantana	Methology to be adopted for removal of lantana suggested.	6.6.3.3	249
	Management of other invasive alien species	Basic approach to rehabilitate areas suggested	6.6.3.4	251
	Encroachments	Preventive/remedial measures suggested.	6.6.4	251
Soil and Water Conservation (Over Lapping) Working Circle	Special objects of management	General objects of management laid down.	7.5	258
	Treatment of critical areas	Soil conservation measures alongwith afforestation suggested.	7.6	258
	Annual plan of operation	List of areas/nallas requiring treatment suggested.	7.7	259
Joint Forest Management (Over Lapping) Working Circle	Joint Forest management	Strenthning of JFM for management of forest and related activities.	8.4	265
	Objects of management	Objects of management laid down.	8.5	265
	Implementation of JFM	Implementation of JFM suggested in Shimla Forest Division.	8.7	266
	Potential activities under JFM	Certain potential activities laid down.	8.8.2	267
	Selection of JFM working areas	Certain guidelines devised for selection of potential sites.	8.9	268
	MoU between Department and JFMCs	MoU to be executed between the deparment and JFMCs.	8.19	274
	Technology for value added products	Development of technology suggested for value addition.	8.21	275
Non Timber Forest Produce (Over Lapping) Working Circle	Special objects of management	General objects of management are laid down.	9.2	277
	Method of treatment	Rotation for extraction of NTFPs is prescribed.	9.7	279

	Artificial propagation and conservation	Method for propagation and conservation of NTFPs is suggested.	9.8	279
	Importance of Daru-Seed (<i>Punica granatum</i>)	Measures for protection of daru tree against insects and other damages.	9.10.4	282
	General NTFPs conservation	Research study suggested to evolve better ways of harvesting.	9.12	284
	Future line of action	Measures to be taken suggested dealing with NTFPs scientifically.	9.13	284
	Miscellaneous regulations	Regulations regarding extraction and export of NTFPs laid down.	9.17	286
WildLife Management (Over Lapping) Working Circle	Special objects of management	General objects of management laid down.	10.6	289
	Management strategy	Strategic approach to be followed for wildlife management prescribed.	10.7	290
	Compensation	Provision of compensation for damage to crops and animals prescribed.	10.12	298
	Dealing with leopards	Methods to deal with leopards causing damage prescribed.	10.13	299
	Monkey- human interaction	Monkey menaee and its root causes described.	10.14	301
	Mitigation measures	Mitigation measures for monkey-human conflict prescribed.	10.16	303
	Method of census	Methods of pheasants census prescribed.	10.18	306
	Dealing with voltures	Methods for protection of voltures and other raprors prescribed.	10.19	309
Establishment and Labour	Staff as on 31.3.2012	Provision of additional staff, suggested.	11.1	314
	Field staff	Refresher course traning to field staff prescribed.	11.2	314
Control and Records	System of control	Control Forms, CH files, Nursery Journals. Plantation Journals, Divisional notebook, Register of Book and Maps, Fire Record Register of forests, Register of Roads and Buildings, TD Register Forest Guard Manual, Register of Boundary Pillars, Research Journals, Forest Block Book and Record of capital expenditure etc.	12.1 to 12.17	315-317

		should be maintained properly.		
Misc. Regulations	Petty fellings	Should be done as per instructions issued by Govt. and shall count against the prescribed yield.	13.1	321
	Timber Distribution	TD should be granted as per silvicultural availability and TD rates should be increased.	13.2	322
	Roads, Paths and Bridges	New roads and paths as per requirement suggested.	13.3	323
	Buildings	Construction or new building and maintenance of existing ones proposed as per requirement.	13.4	323
	Water supply	Water supply to all buildings should be ensured.	13.5	324
	Telephone/wireless	All ranges and check posts should have Telephone/Wireless.	13.6	324
	Fire protection	Laying out of new fire lines and maintenance of old proposed.	13.7	324
	Demarcation and survey	UPFs and Govt. common lands to be got demarcated and efforts should be made to eject all encroachments.	13.8	326
	Declaration of RFs	Notification of Reserved Forests, declaration of some DPFs as reserved forests proposed.	13.9	327
	Forest boundaries	Boundary pillars to be repaired/constructed and Boundary Pillars registers be maintained.	13.10	327
	Periodic check of boundaries	Programme for maintenance/ construction of boundary pillars laid down.	13.11	328
	Compartment and sub. boundaries	Tree along outer boundary of compartment to be marked with 15 cm black band at B.H. and along the boundary with white band. Boundaries of sub compartments should be marked with broken white bands.	13.12	328
	Forests settlement	Revised record of rights as per the present situation should be repared.	13.14	329
	Nautors	All regularized nautors should be got demarcated and boundary pillars should be raised around them.	13.15	329
	Encroachments	All encroachments should be	13.16	330

		detected and ejected as soon as possible.		
	Research and sample plots	Laying out of fresh sample plot/research, plots suggested.	13.17	330
	Preservation plots and monumental trees	Areas where preservation plots can be laid out suggested, listing and maintenance of Monumental trees suggested. Preservation of temple grooves suggested.	13.18	330
	Meteorological data	Installation/maintenance of rain gauges, snow gauges, max-mini thermo-meter and hygrometer suggested.	13.19	331
	Medicinal herbs and plants	Cyclic programme for the exploitation of medicinal herbs and plants suggested.	13.20	331
	Grazing	Controlled grass cutting in closed areas and stall feeding for cattle suggested	13.21	332
	Resin tapping	Resin tapping only by Rill method suggested.	13.23	332
	Soil and water conservation	Engineering structures in addition to afforestation suggested in denuded areas.	13.24	332
Financial Forecast and Cost of the Plan	Past yield	Past yield of Shimla felling series.	14.1	333
	Future yield	Future yield prescribed.	14.2	333
	Future revenue	Revenue from timber, resin and other sources described.	14.3	333
	Future expenditure	Expenditure to be incurred during plan period.	14.4	335
	Cost of the plan	Expenditure incurred in preparation of Working Plan	14.5	335

