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INTRODUCTION

The Marwah Forest division is located in the upper catchment of Chenab river in the North Eastern corner in the Jammu Province of the Jammu and Kashmir State. This division was created in 1982 by carving out Udil range from Doda division and Dachhan and Marwah ranges from Kishtwar Division and merging the ranges to form the Marwah Forest Division. This division is located in the higher altitude range.

The Government of Jammu and Kashmir had notified its intention to constitute the Kishtwar High Altitude National Park (KHANP) vide SRO-135 of 1990. Accordingly 29 sub-compartments of Dachhan range, located in the upper catchment of Kiyar, Nanth and Kibber nallahs were handed over to the Department of Wild life Protection, to constitute the said National Park.

The division is located in Kishtwar district. The extreme length of Marwah Forest Division on North ï South direction is 94.97 km and width on East ï West direction is 70.87 km. This Division spreads between the Latitudes $33^0$21ô53.740ò N and $34^0$01ô57.310ò N and Longitudes $75^0$23ô29.208ò E and $76^0$17ô4.282ò E. The Altitude ranges between +1080 m MSL at Bhandarkoot and +6600 m MSL in the Alpine areas near Kargil District Boundary.

From the geographical location, one can understand that the majority of the divisional area is located in the sub-alpine and alpine zone. In the GIS platform, the horizontal area enclosed within the watershed boundary is calculated to be 4606.23 sq.km. As per the form I, the total area of the demarcated forests was found to be 1865.50 sq.km (including the area handed over to KHANP). The state land, private land holdings and the vast stretch of glaciers occupy the remaining area.

The entire area of Udil range is drained into Chatroo nallah, which confluence with Marsudar river at Dadbet. The entire terrain of Marwah and Dachhan ranges is draining into Marsudar river, which ultimately confluence with Chandrabhaga river at Bhandarkot near Kishtwar and constitute mighty Chenab river, which is a major tributary to Indus river.

The Indus Water Treaty signed between the Government of India and Pakisthan, permits the Government of India to store one million acre foot of water in the Marsudar river. Both the Governments at the State and Union had identified the hydroelectric potential of the Chandrabhaga and Marsudar rivers and many mega hydroelectric projects are in different stages of implementation. In near

future these projects and other basic infrastructures will be built in this district, which will impact the forests and wild life of this region.

The study of the previous working plans and old records of this division reveals that the forests were worked under scientific management principles and systematic extraction of timber was the major activity of the department in the Chenab circle, including this division. The green conifer trees were felled and extracted in the coupes. The timber was transported either by head load, *pathru, tarspan* or launched in nallahs and rivers and caught in booms erected at various places such as Dadbed and Bhandarkote. The Government of India, through Forest Survey of India, conducted the Pre-Investment Survey in 1970ôs to explore the possibility of creation of forest based industries in this region. It shows the forest wealth of this tract.

From the careful perusal of old records of this division, one can understand that this region was the home for many temperate Himalayan NTFPôs. The division is the major home of important NTFPs such as Dhoop, Kuth, Kour, Banafsha, Dioscorea, Guchhies and many other medicinal herbs. Due to the ruthless destructive extraction of these species in the past, forced the State Government to ban the extraction of NTFPs (except Guchhies). Recently the ban was lifted and the State Government advocates for the non-destructive extraction of the legally allowed NTFPs.

Traditionally, the Forest Department enjoys the strong positive interaction with the local communities. The local people residing in the deep remote places feel the presence of the Government through the face of forest department. Apart from the regular forestry works, the department helps the local residents by construction of wooden crossings (*trangdies*) and wooden cantilever bridges. Over the years the forest department gained its expertise in the construction of the wooden cantilever bridges. Its manifestation is the construction of bridge at Sumbal, (a place in the Dachhan range) which is supposed to be the longest wooden cantilever bridge in the world. The total length of the bridge is about 225 feet including its anchoring base. Originally the bridge was constructed during late 1980ôs and due to its aging it was weakened in 2005. Again, it was constructed in 2011.

The local people enjoy liberal concession from the forest department. People are getting the dry trees (except deodar) sanctioned for construction of their houses and agricultural implements under Jammu Forest Notice. People collects the firewood from the forest. They obtain fodder, drinking water and NTFP from the forest. Till recently, the forest department was only department to

provide gainful employment to the people in the remote corners of the State. Their life and economy is closely linked with the welfare of the forest.

The Marwah forest division is considered as the ôParadiseô of nomadic graziers. Every year, about 3000 graziers visits the alpine pastures along with their 1.5 lakh live stocks. They originate from plains of the State and stay in the pasture for about 4-5 months every year. The department facilitates their transit and stay in this division. The few famous pastures deserve to be quoted such as Synthan and Pamber in Udil range, upper catchment pasture lands of Kiyar, Nanth and Kibber nallahs in Dachhan range, Warwan valley and Metwan area of Marwah range.

The terrain was the favourite destination for mountaineering experts of European countries. Till 1988, many tourists visited to conquer the Bhrama and Nun-Kun peaks. Sometimes, rafting experts tested their skill in the mighty Chenab, and graded it as óthe toughestô and never visited again!

The terrain, Marwah Forest Division was never fully explored by forest officers. It still waits to offer many surprises to the adventure lovers!.

(DR. K. ANANDH, IFS)
Working Plan Officer
Marwah Forest Division, Kishtwar

1. Trees of Marwah Forest Division

S. No.	Common Name	Botanical Name	Family
1	Akhrot	*Juglans regia*	Juglandaceae
2	Bankhor	*Aesculus indica*	Sapindaceae
3	Braari	*Ulmus wallichiana*	Ulmaceae
4	Bren	*Ulmus villosa*	Ulmaceae
5	Brimij	*Celtis australis*	Cannabaceae
6	Chaamp	*Alnus nitida*	Betulaceae
7	Deodar	*Cedrus deodara*	Pinaceae
8	Fir	*Abies pindrow*	Pinaceae
9	Haadi	*Prunus armeniaca*	Rosaceae
10	Hatab	*Parrotiopsis jacquemontiana*	Hamamelidaceae
11	Heru	*Quercus ilex*	Fagaceae
12	Kahu	*Olea cuspidate*	Oleaceae
13	Kail	*Pinus wallichiana*	Pinaceae
14	Kakarsinghi	*Pistacia integerrina*	Anacardiaceae
15	Kanjal	*Acer caesium*	Sapindaceae
16	Postul	*Taxus baccata*	Taxaceae
17	Shisham	*Dalbergia sissoo*	Fabaceae
18	Spruce	*Picea smithiana*	Pinaceae
19	Trikanni	*Acer pictum*	Sapindaceae
20	Tung	*Cotinus coggygria*	Anacardiaceae
21	White willow	*Salix alba*	Salicaceae
22	Zum	*Prunus cornuta*	Rosaceae

2. Common Medicinal Plants of Marwah Forest Division

S. No.	Common Name	Botanical Name	Family
1	Agg jari	*Saxifraga jacquemontiana*	Saxifragaceae
2	Ban tambaku	*Verbascum thapsus*	Scrophulariaceae
3	Banafsha	*Viola odorata*	Violaceae
4	Bankakdi	*Podophyllum hexandrum*	Berberidaceae
5	Belladonna	*Atropa belladonna*	Solanaceae
6	Bhang	*Cannabis sativa*	Cannabanaceae
7	Bhutyata	*Corydalis govaniana*	Papaveraceae
8	Brand	*Phytolacca acinosa*	Phytolaccaceae
9	Chalander	*Viburnum grandiflorum*	Adoxaceae
10	Chora	*Angelica glauca*	Apiaceae
11	Chukri	*Rheum austral*	Polygoniaceae
12	Chuku	*Oxalis corniculata*	Oxalidaceae
13	Dand jari	*Rhodiola himalensis*	Crassulaceae
14	Dhad Kopdi	*Bergenia Stracheyi*	Saxifragaceae

S. No.	Common Name	Botanical Name	Family
15	Feku	*Ficus palmate*	Moraceae
16	Gaddo	*Salvia moorcroftiana*	Lamiaceae
17	Guggal	*Jurinea dolomiaea*	Asteraceae
18	Gul-e-snobar	*Geranium wallichianum*	Geraniaceae
19	Hamesh bahar	*Calendula officinalis*	Asteraceae
20	Handh	*Taraxacum officinale*	Asteraceae
21	Hillu	*Impatiens glandulifera*	Balsamiaceae
22	Jarjam	*Sanecio chrysanthemoides*	Asteraceae
23	Kaimal	*Berberis lyceum*	Berberidaceae
24	Kajuban	*Arnebia benthami*	Boraginaceae
25	Kalishadi	*Daphne oleoides*	Thymelaeaceae
26	Kanhaji	*Sorbaria tomentosa*	Ranunculaceae
27	Kareel Kaimbul	*Berberis aristata*	Berberidaceae
29	Kesar	*Crocus sativus*	Iridaceae
30	Kim	*Morina longifolia*	Dipsacaaceae
31	Kinns	*Diascorea deltoidea*	Dioscoreaceae
32	Kour	*Picrorhiza Kurrooa*	Scrophulariaceae
33	Kuppad jari	*Sedum ewersii*	Crassulaceae
34	Kuth	*Saussurea lappa*	Asteraceae
35	Mooin	*Artemisa maritime*	Asteraccae
36	Mori	*Delphinium roylei*	Ranunculaeeae
37	Mulam	*Inula royeleana*	Asteraceae
38	Murma	*Valeriana dubia*	Valerianaceae
39	Nag Rus	*Acorus calamus*	Araceae
40	Neel Kanth	*Ajuga bracteosa*	Lamiaceae
41	Nichni	*Rhododendron campannalatum*	Ericaceae
42	Patrishi	*Aconitum heterophyllum*	Ranunculaceae
43	Postul	*Taxus baccata*	Taxaceae
44	Sapp Google	*Arisaema flavum*	Araceae
45	Shemar	*Desmodium elegans*	Leguminosae
46	Sheshak	*Rhabdosia rugosa*	Lamiaceae
47	Shutenger	*Rhododendren anthopogon*	Ericaceae
48	Suchal	*Malva neglecta*	Malvaceae
49	Tatnu	*Caltha palustris*	Rannnculaeeae

3. Common Herbs of Marwah Forest Division

S. No.	Common name	Botanical name	Family
1	Avens	*Geum elatum*	Rosaceae
2	Babyôs breath	*Gypsophila cerastioides*	Caryophyllaceae
3	Black Henbit, Henbane,	*Hyoscyamus niger*	Solanaceae
4	Bladder Campion	*Silene vulgaris*	Caryophyllaceae
5	Burdock	*Arctium lappa*	Asteraceae

S. No.	Common name	Botanical name	Family
6	Cinquefoil	*Potentilla argyrophylla*	Rosaceae
7	Cow Parsnip	*Heracleum candicans*	Apiaceae
8	Crameôs bill flower	*Geranium pratense*	Geraniaceae
9	Cudweed	*Gnaphalium hypoleucum*	Asteraceae
10	Dandelion	*Taraxacum officinale*	Asteraceae
11	Darnel grass	*Lolium temulentum*	Poaceae
12	Foreget-me-Not	*Myosotis sylvatica*	Boraginaceae
13	Golden Rod	*Solidago virgaurea*	Asteraceae
14	Grannyôs Bonnet	*Aquilegia fragrans*	Ranunculaceae
15	Groundsel	*Senecio chrysanthemoides*	Asteraceae
16	Helleborine	*Epipactis latifolia*	Orchidaceae
17	Helleborine Orchid	*Epipactis wallichii*	Orchidaceae
18	Houndôs Tongue	*Cynoglossum zeylanicum*	Boraginaceae
19	Kashmir Sage	*Salvia hians*	Lamiaceae
20	Larkspur	*Delphinium vestitum*	Ranunculaceae
21	May Apple	*Podophyllum hexandrum*	Berberidaceae
22	Milkvetch	*Astragalus*	Fabaceae
23	Millfoil	*Achillea millefolium*	Asteraceae
24	Mountain Sorrel	*Oxyria digyna*	Polygonaceae
25	Nepal Cinquefoil	*Potentilla nepalensis*	Rosaceae
26	Nepal Dock	*Rumex nepalensis*	Polygonaceae
27	Northern Bedstraw	*Galium boreale*	Rubiaceae
28	Pink Evening Primrose	*Oenthera rosea*	Onagraceae
29	Red Clover	*Trifolium pretense*	Fabaceae
30	Rock splitter	*Bergenia stracheyi*	Saxifragaceae
31	Silky Woundwort	*Stachys sericea*	Lamiaceae
32	St. Johnôs Wort	*Hypericum perforatum*	Hypericaceae
33	Sun Spurge,	*Euphorbia helioscopia*	Euphorbiaceae
34	Touch me not	*Impatiens thomsonii*	Balsaminaceae
35	Wallichôs Willow Herb	*Epilobium wallichianum*	Onagraceae
36	White spotted Lousewort	*Pedicularis punctata*	Orabanchaceae
37	Wild Indigo	*Indigofera heterantha*	Fabaceae
38	Wild Lettuce	*Lactuca longifolia*	Asteraceae
39	Wild Rose	*Rosa webbiana*	Rosaceae
40	Wild Strawberry	*Fragaria nubicola*	Rosaceae

1. Checklist of Mammals of Marwah Forest Division

S. No.	Common Name	Scientific Name
1	Beach of Stone Marten	*Martes foina*
2	Brown Bear	*Uusus arctos*
3	Common Langur	*Semnopithecus entellus*
4	Hangul or Kashmir Stag	*Cervus elaphus hanglu*
5	Himalayan Black Bear	*Ursus thibetanus*
6	Himalayan Marmot	*Marmot bobak*
7	Himalayan Mouse Hare	*Ochotona roylei*
8	Himalayan Yellow Throated Marten	*Martes flavigula*
9	Ibex	*Capra ibex*
10	Jackal	*Canis aureus*
11	Jungle Cat	*Felis chaus*
12	Leopard	*Panthera pardus*
13	Long Tailed Marmot	*Mamot caudate*
14	Musk Deer	*Moschus chrysogaster*
15	Red Fox	*Vulpes vulpes*
16	Snow Leopard	*Uncia uncial*

2. Check list of birds of Marwah Forest Division

S. No.	Common Name	Scientific name	Family
1	Alpine accentor	*Prunella collaris*	*Muscicapidae*
2	Alpine swift	*Tachymarptis melba*	*Apodidae*
3	Bearded vulture or Lammergeier	*Gypaetus barbatus*	*Accipitridae*
4	Black and yellow grosbeak	*Mycerobas icterioides*	*Muscicapidae*
5	Black redstart	*Phoenicurus ochruros*	*Muscicapidae*
6	Black tit	*Parus rufonuchalis*	*Muscicapidae*
7	Black-eared Kite	*Milvus migrans*	
8	Black-naped green wood-pecker	*Picus canus*	*Dicidae*
9	Blue rock pigeon	*Columba livia*	*Columbidae*
10	Blue Rock Pigeon	*Columba livia*	
11	Blue rock thrush	*Monticola solitarius*	*Muscicapidae*
12	Blue whistiling thrush	*Myophonus caeruleus*	*Muscicapidae*
13	Blue-headed redstart	*Phoenicurus caeruleocephala*	*Muscicapidae*
14	Blythôs leaf warbler	*Phylloscopus reguloides*	*Muscicapidae*
15	Booted eagle	*Hieraaetus pennatus*	*Accipitridae*
16	Brown bullfinch	*Pyrrhula nipalensis*	*Muscicapidae*
17	Brown dipper	*Cinclus pallasii*	*Muscicapidae*
18	Cheer pheasant	*Catreus wallichi*	*Falconidae*
19	Chukar patridge	*Akectirus chukar*	*Falconidae*
20	Cinamon tree sparrow	*Passer rutilans*	*Muscicapidae*

21	Collared grosbeak	*Mycerobas affins*	*Muscicapidae*
22	Common cuckoo	*Cuculus canorus*	*Cuculidae*
23	Common kingfisher	*Alcedo atthis*	*Alcedinidae*
24	Common myna	*Acridotheres tristis*	*Sturnidae*
25	Crested black tit	*Parus melanolophus*	*Muscicapidae*
26	Crested lark	*Galerida cristata*	*Alaudidae*
27	Durskey crag-martin	*Hirundo concolor*	*Hirundinidae*
28	Eagle owl	*Bubo bubo*	*Strigidae*
29	European roller	*Coracias garrulous*	*Coracidae*
30	Fire capped tit	*Cephalopyurs flammiceps*	*Muscicapidae*
31	Gold billed blue magpie	*Urocissa flavirostris*	*Corvidae*
32	Gold crest	*Regulus regulus*	*Muscicapidae*
33	Golden eagle	*Aquila chrysaetos*	*Accipitridae*
34	Golden oriole	*Oriolus oriolus*	*Oriolidae*
35	Green backed tit	*Parus monticolus*	*Muscicapidae*
36	Grey- headed flycatcher	*Culicicapa ceylonensis*	*Muscicapidae*
37	Grey headed thrush	*Turdus rubrocanus*	*Muscicapidae*
38	Grey tit	*Parus major*	*Muscicapidae*
39	Grey wagtail	*Motacilla cinerea*	*Muscicapidae*
40	Grey winged blackbird	*Turdus boulboul*	*Muscicapidae*
41	Griffon vulture	*Gyps fulvus*	*Accipitridae*
42	Himalayan Bearded Vulture	*Gypaetus barbatus hemachalanus*	
43	Himalayan Golden Eagle	*Aquila chrysaetos*	
44	Himalayan Griffon Vulture	*Gyps himalayensis*	
45	Himalayan monal	*Lophophorus impejanus*	*Falconidae*
46	Himalayan pied wood-pecker	*Dendrocopos himalayensis*	*Dicidae*
47	Himalayan Rufous Turtle Dove	*Streptopelia orientalis meena*	
48	Himalayan snowcock	*Tetraogallus Himalayensis*	*Falconidae*
49	Himalayan swiftlet	*Collocalias brevirostris*	*Apodidae*
50	Himalayan tree-creeper	*Certhia discolor*	*Muscicapidae*
51	Hodgsonôs mountain finch	*Leucosticte nemoricola*	*Muscicapidae*
52	Hoopoe	*Upupa epops*	*Upupidae*
53	House crow	*Corvus splendens*	*Corvidae*
54	House sparrow	*Passer domesticus*	*Muscicapidae*
55	House swift	*Affinis*	*Apodidae*
56	India white-backed vulture	*Gyps bengalensis*	*Accipitridae*
57	Indian cuckoo	*Cuculus micropterus*	*Cuculidae*
58	Indian ring dove	*Stretopelia decaocto*	*Columbidae*
59	Indian tree pie	*Dendrocitta vagabunda*	*Corvidae*
60	Jungle crow	*Corvus macrorhynchos*	*Corvidae*
61	Kashmir nuthatch	*Sitta cashmirensis*	*Muscicapidae*
62	Kashmir red breasted Flycatcher	*Ficedula subrubra*	*Muscicapidae*

63	Kastrel	*Falco tinnunculus*	
64	Kestrel	*Falco tinnunculus*	*Falconidae*
65	Kiklas	*Pucrasia macrolopha*	
66	Koel	*Eudynamys scolopaceas*	*Cuculidae*
67	Koklass pheasant	*Pucrasia macrolopha*	*Falconidae*
68	Lesser pied kingfisher	*Ceryle rudis*	*Alcedinidae*
69	Linnet	*Carduelis cannabina*	*Muscicapidae*
70	Little forktail	*Enicurus scouleri*	*Muscicapidae*
71	Little owl	*Athene noctua*	*Strigidae*
72	Little pied flycatcher	*Ficedula westermanni*	*Muscicapidae*
73	Long-eared owl	*Asio otus*	*Strigidae*
74	Monal Pheasant	*Lophophorus impeajanus*	
75	Olivaceous leaf-warbler	*Phylloscopus griselous*	*Muscicapidae*
76	Orange bullfinch	*Pyrrhula aurantiaca*	*Muscicapidae*
77	Orange flanked bush-robin	*Tarsiger cyanurus*	*Muscicapidae*
78	Pallas leaf-warbler	*Phylloscopus proregulus*	*Muscicapidae*
79	Paradise flycatcher	*Terpsiphone paradise*	*Muscicapidae*
80	Pariah kite	*Milvus migrans govinds*	*Accipitridae*
81	Peregrine	*Falco peregrines*	
82	Pied or white wagtail	*Motacilla alba*	*Muscicapidae*
83	Pink-browed rosefinch	*Carpodacus rodochrous*	*Muscicapidae*
84	Plain leaf-warbler	*Phylloscopus neglectus*	*Muscicapidae*
85	Plain or yellow browned leaf-warbler	*Phylloscopus inornatus*	*Muscicapidae*
86	Plumbeous water-redstart	*Rhyacornis fuliginosus*	*Muscicapidae*
87	Red jungle fowl	*Gallus gallus*	*Falconidae*
88	Red turtle dove	*Stretopelia tranquebarica*	*Columbidae*
89	Red-breasted rosefinch	*Carpodacus puniceus*	*Muscicapidae*
90	Red-headed bullfinch	*Pyrrhula erythrocephala*	*Muscicapidae*
91	Red-mantled rosefinch	*Carpodacus rhodochlamys*	*Muscicapidae*
92	Rofous backed shrike	*Lanius schach*	*Lanidae*
93	Rose ringed parakeet	*Psittacula krameri*	*Psittacidae*
94	Rufos-streaked accentor	*Prunella himalayana*	*Muscicapidae*
95	Rufous trustle dove	*Stretopelia orientalis*	*Columbidae*
96	Rufous-tailed flycatcher	*Muscicapa ruficauda*	*Muscicapidae*
97	Scaly-bellied green wood-pecker	*Picus squamatus*	*Dicidae*
98	Shikra	*Accipiter badius*	
99	Slaty blue flycatcher	*Muscicapa leucomelana*	*Muscicapidae*
100	Slatyuheaded parakeet	*Psittacula himalayana*	*Psittacidae*
101	Snow patridge	*Larwa lerwa*	*Falconidae*
102	Snow pigeon	*Columba leuconota*	*Columbidae*
103	Sparrow hawk	*Accipiter nisus nisosimilis*	*Accipitridae*
104	Spot winged grosbeak	*Mycerobas melanozanthos*	*Muscicapidae*
105	Spotted dove	*Stigmatopelia chinensis*	*Columbidae*

106	Spotted forktail	*Enicurus maculates*	*Muscicapidae*
107	Starling	*Sturnus vulgaris*	*Sturnidae*
108	Swallow	*Hirundo rustica*	*Hirundinidae*
109	Swift	*Apus apus*	*Apodidae*
110	Tickells leaf-warbler	*Phylloscopus affinis*	*Muscicapidae*
111	Tree sparrow	*Passer montanus*	*Muscicapidae*
112	Tytlerôs leaf-warblers	*Phylloscopus tytleri*	*Muscicapidae*
113	Variegated laughing thrush	*Garrulax variegates*	*Muscicapidae*
114	Western tragopan	*Tragopan melanocephalus*	*Falconidae*
115	White breasted kingfisher	*Halcyon omyrnensis*	*Alcedinidae*
116	White cheeked bulbul	*Pycnonotus leucogenys Leucogenys*	*Pycnonotidae*
117	White cheeked nuthatch	*Sitta leucopsis*	*Muscicapidae*
118	White throated tit	*Aegithalos leucogenys*	*Muscicapidae*
119	White-breasted dipper	*Cinclus cinclus*	*Muscicapidae*
120	White-browned rosefinch	*Carpodacus thura*	*Muscicapidae*
121	White-capped water-redstart	*Chairmarrornis leucocephalus*	*Muscicapidae*
122	White-winged redstart	*Phoenicurus erythrogaster*	*Muscicapidae*
123	Wren	*Troglodytes troglodytes*	*Muscicapidae*
124	Wryneck	*Jynx torquilla*	*Dicidae*
125	Yellow wagtail	*Motacilla flava*	*Muscicapidae*
126	Yellow-headed wagtail	*Motacilla citreola*	*Muscicapidae*

PART-I

Summary of Facts on which Proposals are based

CHAPTER I. Tract Dealt with

1.1. Name and situation

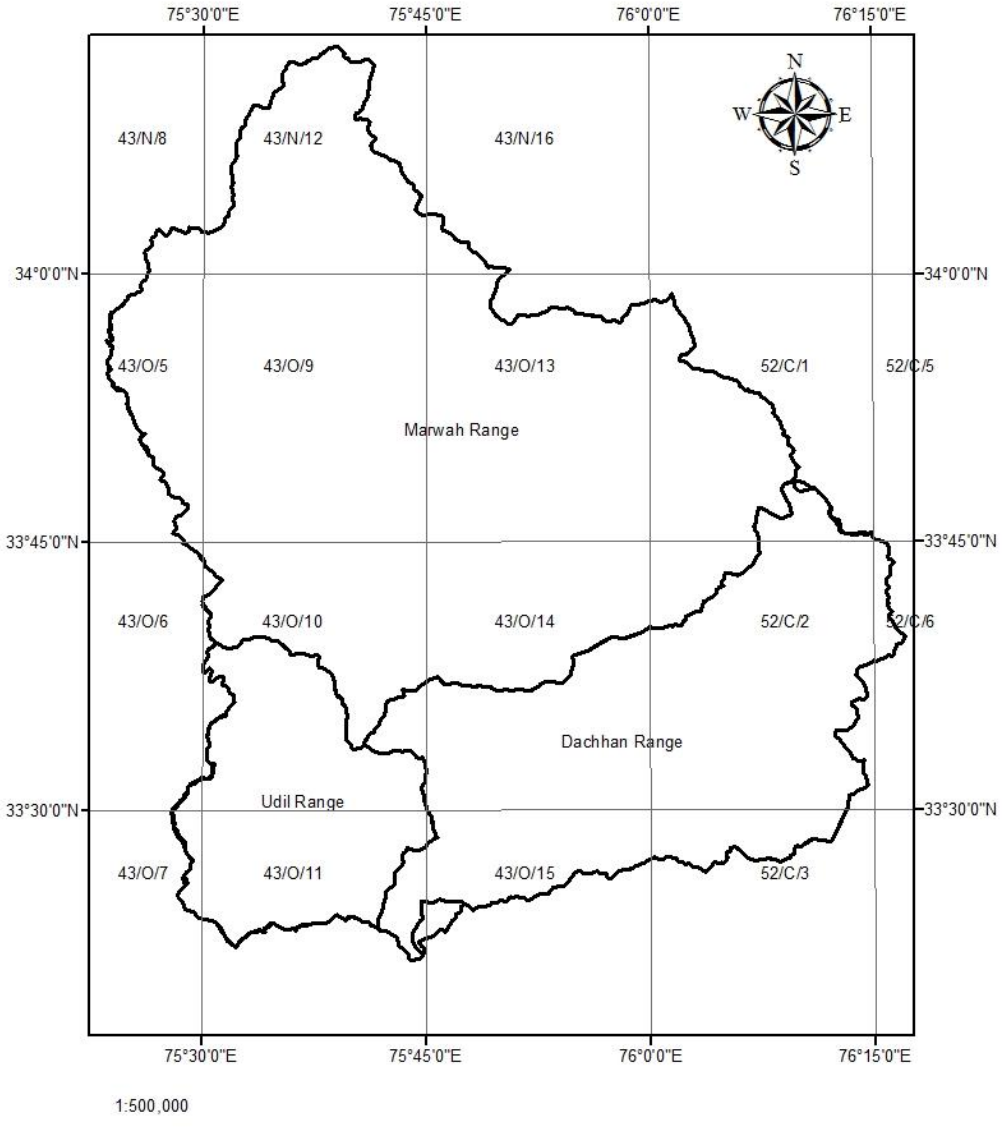
1.1.1 This Working plan deals with the Forests of Marwah Forest Division of the Chenab Forest Circle falling in Jammu province of Jammu and Kashmir State. Marwah Forest Division falls in the civil jurisdiction of Kishtwar district. It consists of three territorial Ranges namely Dachhan, Marwah and Udil. During the reorganization of Forest Divisions in 1982 A.D, the Dachhan and Marwah Forest Ranges were carved out from the erstwhile Kishtwar Forest Division and Udil Forest Range was carved out from erstwhile Doda Forest Division. These Ranges were merged to constitute Marwah Forest Division. The following flow chart depicts the history of Marwah Forest Division in relation to the administrative jurisdiction of various Divisions over the three Ranges.

1893	Udhampur Forest Division		
1906	Kishtwar Forest Division		Reasi Forest Division
1924	Kishtwar Forest Division (Kishtwar, Nagseni, Padder, Dachhan, Udil and Marwah ranges)	Ramban Forest Division (Kuntwara, Siraj and Marmat from Kishtwar Forest Division) (Banihal and Ramban from Reasi Forest Division)	
1926	(Udil range transferred to Ramban Forest Division) → Udil		
1954	Kishtwar Forest Division (Kishtwar, Nagseni, Padder, Dachhan, and Marwah ranges)		Doda Forest Division (Desa, New Siraj, Marmat, Udil, Simbol ranges)
1982	Kishtwar Forest Division (Kishtwar, Nagseni and Padder ranges)	Marwah Forest Division (Udil, Marwah and Dachhan ranges)	Doda Forest Division (Siraj, Takrai and Kuntwara ranges)

1.1.2 The extreme length of Marwah Forest Division on North – South direction is 94.97 km and width on East – West direction is 70.87 km. This Division spreads between the Latitudes $33^0$21’53.740” N and $34^0$01’57.310” N and Longitudes $75^0$23’29.208” E and $76^0$17’4.282” E. The area falls in the following 1:50,000 scale maps of Survey of India, namely 43/N/8, 43/N/12, 43/N/16, 43/O/5, 43/O/6, 43/O/7, 43/O/9, 43/O/10, 43/O/11, 43/O/13, 43/O/14,

43/O/15, 52/C/1, 52/C/2, 52/C/3, 52/C/5 and 52/C/6. Figure 1 provides the range wise index of the GT sheets.

Figure 1. Index to GT sheets pertain to Marwah Forest Division and its territorial ranges



1.1.3. The Northern and North Eastern side of the Marwah Forest Division is bounded by Kargil District, Eastern side in Dachhan range by Kishtwar High Altitude National Park, on the South Eastern side by Kishtwar Forest Division, on the South Western side by Thakrai Range of Doda Forest Division on the Western side by Anantnag Division and on North Western side by Lidder Forest Division.

1.1.4 In 1990 the Govt. of Jammu and Kashmir notified its intention to constitute Kishtwar High Altitude National Park vide SRO- 135. 29 sub compartments of Dachhan Range were proposed to be brought under the National Park. Accordingly the compartments such as 24b, 24c, 24d, 24e, 24f, 24g, 24h, 24i, 24j, 24k, 24l, 25, 28, 29a, 29b, 29c, 29d, 29e, 29f, 29g, 29h, 30a, 30b, 30c, 30d, 30e, 30f, 30g and 30h were handed over to Department of Wildlife Protection. Recently on the direction of the Hon'ble Supreme Court of India, it was decided by the Govt. of Jammu & Kashmir to change the boundary of the National park to include the un-compartmentalized areas on the east of Marwah range till upto the boundary of Kargil district under the administrative control of the National park and remove certain populated areas and areas of hydrological importance from the purview of the National park so that both development and conservation can be taken care of simultaneously.

1.1.5 The Kishtwar- Chatroo- Sinthan- Anantnag highway (NH-1B) bisects the Udil range. It enters the Division at Bhandarkoot and runs for about 85 Km and leaves the Division at Sinthan top. In the Dachhan Range, the road exist upto Dangdoroo. The place, Inshan in Warwan valley of Marwah Range is connected to the Kashmir valley by road through Margan top.

1.2. Configuration of ground

1.2.1 The entire tract of Marwah Forest Division is extremely mountainous bearing very steep slopes pierced by deep valleys. Due to glacial and riverine erosion since time immemorial, the entire surface area of the tract is deeply serrated in all possible direction with varying degrees of slope. It results in land mass of various aspects. The availability of water, steepness of slope and soil depth are the locality factors which decide the composition of the crop and the canopy density in that area. On the whole, the entire country presents a variety of aspects. The area is practically devoid of any flat land in the forest area. Most parts of Udil and Dachhan Ranges are very steep in nature compared to Marwah Range. The Non-Forest lands viz., revenue lands, private land holdings and agricultural lands located in this tract are also similarly facing the same type locality factors. Suitable hill sides are cultivated by terracing the field into flat lands.

1.2.2 The Altitude of Marwah Forest Division ranges between +1080 m MSL at Bhandarkoot and +6600 m MSL in the Alpine areas near Kargil District Boundary. The Nun and Kun (about 6,500 m), the most worshiped trio, the three Brahma in Dachhan range (6,416 m, 6,108 m and 6,013 m) are the major peaks of this division. The major passes of this division are as follows. The Synthan pass (3,786 m) and Singhpur pass (3,569 m) are connecting Udil Range with Kashmir Valley. The Penjan pass (4,141 m) connects Udil Range with Marwah valley

over Phambar spur. The Margan pass and Konnag gali connect Warwan valley with Kashmir valley.

1.3. Geology, Rock and Soil

1.3.1 The Warwan-Phambar tract of Marwah Forest Division represents a complete a geological succession from pre-Cambrian to Triassic age. The Paleozoic succession is best exposed along Saribal Range and in Marsudar River in Warwan valley in the form of Margan syncline and a complimentary Warwan anticline. The central Himalayan crystalines are consisting of Hornblende granite genesis, granetiferous genesis, Bionite genesis, Granite genesis with schists, marble bands and granites / pegmatites and central genesis and schists. These types of rocks are best observed in the tract.

1.3.2 Clay-alluvial soil is the most predominant in the river banks and at lower elevation. The size of the soil particle increases from lower elevation to higher elevation under normal circumstances. It is due to prevalent of cold weather and less prevalence of 'soil forming factors' at higher elevation. In general at medium elevation (+1500 m MSL to +3000 m MSL) the soil is highly productive which is manifested in the form of good stand of forest crops. At higher elevation the soil depth is the major factor that determines the availability of fodder in the area. In the highly degraded and eroded areas the thin top soil is removed and the underlying boulders are exposed which is not supporting any fodder growth. Also it is difficult to trek on these tracts. The right bank areas of Marsudar river in the northern Dachhan Range (from Compartment No. 2 to 10) is supposed to have the richest soil which is manifested in the form of tallest Kail trees.

1.4. Climate and rainfall

1.4.1 The major part of the division experiences temperate climate. The regular monsoon does not reach this division. The rain fall is due to westerly disturbances and local factors. The rain fall recorded (in mm) at Doda by Indian Meterological Department is as follows.

Table 1.1. Statement of Rainfall data recorded at Doda.

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2004	272.8	117.8	4.7	116.5	92.6	124.7	93.4	73.5	14.6	119.7	43.4	40.8
2005	206.9	576.4	231.1	70.5	64.1	39.3	266.3	60.6	72.9	6.2	11.4	0.0
2006	326.7	117.6	187.9	63.9	53.7	70.0	240.6	214.4	283.0	67.0	12.2	37.9
2007	4.9	151.9	353.2	14.0	62.3	66.9	88.7	100.4	28.8	0.9	0.0	83.9
2008	25.1	227.0	7.7	122.7	65.6	102.2	102.6	72.8	48.0	44.8	6.6	131.7
2009	160.0	151.9	82.7	141.0	59.6	50.6	112.2	51.7	59.1	7.1	81.2	19.1
2010	48.0	240.8	41.6	79.2	177.6	109.2	167.2	189.0	110.0	36.2	29.8	73.8
2011	65.0	230.4	140.8	128.0	72.6	53.6	80.2	130.2	83.0	45.0	8.4	38.2

1.4.2 The Kandi area i.e. tract between Bhandarkoot & Chattroo and Bhandarkoot & Soundar experiences sub-tropical climate and the remaining tract i.e. upper part of Udil and Dachhan

Ranges and entire Marwah Range experience Temperate climate. In the Kandi belt snow fall is lesser and in the tract receives rainfall during early winter and early summer. In the remaining areas of the Division snowfall starts in late November and remains upto early April every year. This tract is characterized by long severe winters and short mild summer. Monsoon does not reach this Division. Rains due to local factors and Western disturbances are prevalent. Dry weather is observed during the months of July, October and early November. Very few forest fire incidences occurred during the same period.

1.5. Water supply

1.5.1 The Marwah Forest Division is located within the watershed boundary of upper part of Marsudar River and Chatroo Nallah. The prominent left bank tributaries of Marsudar River in Marwah Range are Kaintal, Gumbar, Kuzuz, Mungil, Giar, Hajka, Tramkhah, Apan and Rin Nai Nallahs. The prominent Right bank tributires of Marsudar in Marwah Range are Nal Nar, Nogi Nar, Dik Nar, Baskhani, Choidraman nai, Dunai, Gagarnai and Passernai Nallahs. The prominent tributaries of Marsudar River in Dachhan Range are Kiyar, Nanth and Kibber Nallahs. The entire area of Marwah and Dachhan Ranges is draining into Marsudar River. The prominent Nallahs of Udil Range such as Sigdi nalla, Singhpore nalla and Synthan nalla are draining into Chatroo nalla. The Chatroo nalla confluences with Marsudar River at Dadpeth. The Marsudar and Chandarbhaga Rivers confluence at Bhandarkoot hereafter named as Chenab and flows towards Southern side. Many permanent aquifers are disbursed throughout the tract. People are using these aquifers for drinking and cooking purposes. The hot springs are located at Tatapani in Marwah and at Kiyar in Dachhan range.

1.6. Distribution and area

1.6.1 In this tract the forests exist as a continuous strip in the altitudinal zone between 1800 m and 3000 m. The presence of large number of chaks inside the demarcated forests is a prominent feature of this division. The lower fringes of forests are honeycombed with human settlement.

1.6.2 During the last revision of the Working Plans of this tract, in 1978, the forest areas were given adequate attention for area calculation. However, the glacier areas and blanks exist above the tree lines were neither measured and nor accounted in the last revision. Also the area of the compartments such as 24g, 24h, 29d, 29e, 30c and 30d of Dachhan Range and 38, 75, 76, 77 and 78 of Marwah Range were not measured. Hence to clear the ambiguity, an exercise was carried out to ascertain the exact boundary of the forest division. All the maps pertain to this Division area were procured from the Survey of India, Dehradun. The watershed boundary of the Marsudar river was traced in the map and it forms the boundary of the Marwah Division. The horizontal area inside the watershed boundary of the Division was estimated under GIS and presented below.

Table 1.2. Statement of Gross area of watershed.

Range	Gross horizontal area of the watershed (Sq.km.)
Dachhan	1287.20
Marwah	2763.12
Udil	555.91
Total	**4606.23**

Out of 4606.23 sq km area, 2730.048 sq km is compartmentalized and the remaining 1876.182 sq km constitutes un-compartmentalized glacier areas, private land holdings and revenue land.

Table 1.3. Statement of comparison of area of the Division under previous and present revision.

S. No.	Range	Area as per the Previous Working Plan (Ha.)			Area Estimation by GIS (Ha.)			Difference in area (Ha.)
		Comm	Uncomm	Total	Comm	Uncomm	Total	
1	Dachhan	8519.00	30841.00	39360.00	13532.36	109503.87	123036.21	83676.21
2	Marwah	12549.00	78349.00	90898.00	11925.50	93681.32	105606.82	14708.82
3	Udil	18551.52	24786.37	43337.89	10853.62	33508.23	44361.85	1023.96
	Total	**39619.52**	**133976.37**	**173595.89**	**36311.48**	**236693.42**	**273004.88**	**99408.99**
New Areas								
	24g/D			0.00			17709.70	
	24h/D			0.00			28530.90	
	29d/D			0.00			10520.70	
	29e/D			0.00			12222.70	
	30c/D			0.00			10686.20	
	30d/D			0.00			3854.83	
	Total			0.00			**83525.03**	**83525.03**
	38/M			0.00			3658.86	
	75/M			0.00			266.88	
	76/M			0.00			4600.84	
	77/M			0.00			1773.34	
	78/M			0.00			5337.06	
	Total			0.00			**15636.98**	**15636.98**
	Total New							**99162.01**
	Old							
	Dachhan							151.18
	Marwah							-928.16
	Udil							1023.96
	Total old							**246.98**
	Old + New							**99408.99**

1.6.3` As the final notification of the Kishtwar High Altitude National Park is yet to be issued, the above figure is inclusive of the National Park area. Apart from the demarcated forest land, it includes the undemarcated glaziers, alpine grass lands, state land and private land holdings.

It is pertinent to mention here that all the figures related to area in this working plan, refers to the horizontal area measured in GIS, unless it is specified.

1.6.4 The compartment boundaries were digitized by referring to previous working plan maps. However, it is advisable to use the demarcation records for solving boundary issues. After estimation of the area of all the compartments the area of the Division is presented below. As per the management map, the area of the division is as follows.

Table 1.4. Statement of horizontal area.

Range	Gross horizontal area (Sq.km.) (excluding KHANP)	Gross horizontal area (Sq.km.) (including KHANP)
Dachhan	239.05	1230.36
Marwah	1056.07	1056.07
Udil	443.62	443.62
Total	**1738.74**	**2730.05**

1.6.5 The Rangewise distribution of area under different species is provided in the table 2.1. The perusal of the area statement shows that commercial forest area and uncommercial area (broad leaved, non wooded and blank area) constitute 16.82 and 83.18 percent respectively of the total compartmentalized area. The demarcated forest constitutes 40.50 percent of the gross watershed area of the division.

1.6.6 The area of the individual compartments and sub compartments and their commercial forest area were estimated by using the GIS software. The commercial forest areas of the compartments were digitized using LISS III satellite imagery and Google Earth. After ground truthing, the stock maps were prepared.

1.6.7 In comparison to the previous working plan, the total area of the compartments varies in this plan due to the change in the methodology. During the revision of the previous plan, the area was measured manually by using the dot grids.

Dot Grid Method:-

In a transparent sheet, 2mm x 2mm squares were marked with a dot inside. Each square of 2mm x 2mm is equal to 1 hectare in 1:50,000 GT Sheet Map. The dot grids were overlaid on the compartment map of 1:50,000 and number of squares occupied inside the boundary was manually counted and hence area of the compartment was calculated and shown in the last revision. Also, in the last revision, the glacier area above the forested area were not accounted for. Area of the 11 compartments was not accounted for. To solve the ambiguity, an attempt was made during the current revision.

Table 1.5. Statement of comparison of area under different methodologies of estimation.

Item	Previous Plan (Ha) (DOT GRID METHOD)	Current Plan (Ha) (GIS TOOLS)	Difference
Dachhan Range			
6 Indefinite compartments	NA	83525.03	
81 Comp & Sub Comp	39360.00	39511.18	+151.18
87 Entries	**39360.00**	**123036.21**	
Marwah Range			
5 Indefinite compartments	NA	15636.98	
85 Comp & Sub Comp	90898.00	89969.84	-928.16
90 Entries	**90898.00**	**105606.82**	
Udil Range (165 Entries)	**43337.89**	**44361.85**	+1023.96
Total 11 Entries	NA	99162.01	
Total 331 Entries	173595.89	173842.87	+246.98
G. Total 342 Entries	**173595.89**	**273004.88**	**+99408.99**
Outside area		**187618.12**	
Area Under Watershed		**460623.00**	

1.7. State of Boundaries

1.7.1 The forest area of this division was first demarcated in 1910's A.D. As per the Form-1, 12,135 (7302 in Mainline and 4833 in Chaks) boundary pillars were located in the field as well as indicated in the demarcation map. At the time of demarcation, they had erected heap of stones and identified as boundary pillars. As on today, these pillars do not exist in the field.

Table 1.6. Statement of the Rangewise demarcated forest area as per Form-1.

Range	Demarcated area (in Ha.)	No. of Boundary Pillars	Area of Chaks (in Ha.)	No. of Boundary pillars in Chaks
Dachhan*	83892.276	1700	315.053	1322
Marwah	58872.896	2121	405.972	1504
Udil	43784.560	3481	426.810	2007
Total	**186549.732**	**7302**	**1147.835**	**4833**

(* Includes the areas handed over to Kishtwar High Altitude National Park)

1.7.2 A demarcation exercise was carried out in the Chingam Forest under CAMPA during 2011-12 and 210 boundary pillars were erected as per the demarcation map. A comprehensive exercise should be taken up to demarcate the forest land to save it from the encroachment.

1.8. Legal position

1.8.1 All these forests are the property of the Government of J&K State and their administration vests with the Forest department. Thus the State Forest Department is responsible for the protection, management and betterment of the flora and fauna found in these forests. the control of fluctuating grazing vests with the Forest Department. Closure of any forest area up to half of any forest subject to maximum of one quarter of the total area of a forest range, at a time, with adequate and suitable provision for right of way, can be effected by the Forest Department.

1.8.2 Berun-line forests (un-demarcated forests) presently under control of State Revenue Department have been ordered to be taken over and managed by the Forest Department but not much has so far been done in this direction, with the result these forests continue to be ill managed. Berun line forests include large forest area in this tract, with scant and depleted vegetative cover. These forests are likely to loose whatever is left with them, in case they are not transferred to the Forest department and managed on the scientific lines.

1.8.3 All demarcated forests come under the purview of the J & K Forest Act of Samvat 1987 Act No. II of 1987 (1930 AD) as amended upto December 1997 AD. Under the Amended Act, the respective territorial Divisional Forest Officers, as Authorised Officer, have been conferred the power to issue orders of confiscation in respect of timber, vehicles, implements etc. involved in the commission of a forest offence. To ensure that the records of the Division are not confounded with the records and functions of the Authorised officer, provision for a separate Court room, record room, and necessary ministerial staff needs to be made on priority.

1.8.4 In discharging its obligation and responsibilities, the forest department is guided by the following acts, rules and notification that came into being from time to time.

- The Cattle Trespass Act, 1977 (1920 AD) Act No. VIII of 1977
- The J&K State Kuth Act, 1978 (1921 AD) Act No. I of 1978
- The J&K Forest Act of Samvat 1987 (1930 AD) as amended upto December 1997
- The J&K (Sale of timber) Act, 1987 (1931 AD) Act No. III of 1987.
- The Jammu Forest notice and Kashmir Forest notice
- The J&K Kahcharai Act, 2011 (1954 AD) Act No. XVIII of 2011
- The J&K Public Premises (Eviction of Unauthorised Occupants) Act,1959. Act No. XIII of 1959
- The J&K Preservation of Specified Trees Act, 1969. Act No. V of 1969.
- The J&K Land Improvement Schemes Act, 1972 Act No. XXIV of 1972
- The J&K Wildlife (Protection) Act, 1978 Act No. VIII of 1978
- The J&K State Forest Corporation Act, 1978 Act No. XII of 1978
- The J&K Nationalization of Forest Working Ordinance, 1986. Ordinance No. V of 1986
- The J&K Extraction of Resin Act, 1986. Governor's Act No. VIII of 1986
- Govt. order no. 24-FST of 1990 dated 15.1.1990-Restriction on commercial fellings

- The J&K Rehabilitation of Degraded Forests village plantation Rules 1992 (Rules for Benefit Sharing) SRO 61 of 1992 dated 29.03.1992.
- The J&K Forest (Conservation) Act 1997.
- The Sawmills (Registration and Control) Rules 2012.

1.9. Rights and Concessions

1.9.1 The ownership of the forests vests in the State government and are administered through the Forest Department. Most of the Berun line forest yet to be transferred to the Department. The right of way shall however be permitted to the people.

1.9.2 No legal rights are recognized in the State. People residing within five km from the boundary of the demarcated forests enjoy liberal concession in respect of timber for bonafide use for construction, agricultural implements and firewood. The timber may be granted as free of cost in case of fire and other natural calamities. These rules and its exercise are embodied in the Jammu Forest Notice.

1.9.3 Other concessions enjoyed by the local inhabitants are briefly described as follows.

- Collection of dead, fallen material for their bona fide domestic use as firewood and small timber.
- Collection of felling debris/ refuse from the vacated coupes.
- Lopping of tree for fodder and other domestic purpose only is allowed in case of Forest trees other than conifers and special class broad- leaved trees such as Walnut, Ash, Tun, Acer, Prunus padus etc.
- All non-timber forest produce not forbidden by any special order and excepting those covered under the Kuth Act can be collected free of charge for domestic purpose.
- Grass cutting and grazing allowed in all the forests except those which are closed for the purpose of conservancy.

Table 1.7. Statement showing the volume of timber issued to the concessionists.

Year	Volume (cum)	Year	Volume (cum)	Year	Volume (cum)
1981-82	160.07	1992-93	2188.30	2003-04	780.52
1982-83	1220.26	1993-94	1682.87	2004-05	406.63
1983-84	1226.17	1994-95	1479.55	2005-06	366.39
1984-85	1602.85	1995-96	57.51	2006-07	725.05
1985-86	756.23	1996-97	678.47	2007-08	1699.75
1986-87	231.04	1997-98	709.62	2008-09	1264.63
1987-88	516.70	1998-99	1649.62	2009-10	2544.52
1988-89	1160.20	1999-00	621.92	2010-11	1786.85
1989-90	687.53	2000-01	853.24	2011-12	2743.53
1990-91	885.78	2001-02	876.07	**Total**	**32822.68**
1991-92	894.22	2002-03	366.59		

1.9.4 The quantum of timber being granted to the concessionists has been increasing during the preceding decades. It may be due to the corresponding increase in their standard of living.

1.9.5 In addition to the above figures, the timber is also removed by local inhabitants from the forest illicitly, which remains mostly undetected/ unaccounted for. The damage cases, when registered, are generally compounded/ settled departmentally after the recovery of cost and compensation, much lower than the prevailing rates in the open market.

1.10 Grazing

1.10.1 The control of grazing in forest land vests with the Forest Department. People enjoy liberal concession in respect of grazing in these forests. The people can graze their livestock at will and there is no restriction either on place or on number. The division is bestowed with vast pastures and behaks. Uncontrolled and unlimited grazing is resorted to and has rendered them deplete. People have traditionally partitioned out amongst themselves such grazing areas. In recent times due to shrinking of natural resources and expansion in number of livestock, people resorted to violence means to get more pasture area under their control. There are clashes between the nomadic groups and between nomadic and local people of the area.

1.10.2 Grazing shall be allowed only in the designated places. The migratory route shall also be designated and violators shall be fined heavily. Existing grazing fees are very less and government shall increase it. The local as well as nomadic graziers under reports the number of cattles, they possess. It should be monitored properly and violators shall be fined.

CHAPTER II

Flora and Fauna
A. Forest Flora

2.1 Occurrence and distribution of species

2.1.1 The elevation of Marwah Forest Division varies from 1080 m to 6600 m above mean sea level. Accordingly a corresponding diversity is exhibited in the forest of the division which include sub- tropical, temperate, sub-alpine and alpine elements. The valley area from Bhandarkote to Sounder and Bhandarkote to Chatroo are low lying and sub-tropical forests are encountered in this region. With the raise in elevation, corresponding changes in the vegetation from sub-tropical to sub-temperate and ultimately to alpine type.

2.1.2 In the sub-tropical forests of this divisions, Oak (*Quercus ilex*), which occurs between 1100 m to 1800 m, is the predominant species. The broad leaved forests are mostly confined to areas adjoining to Marsudar River and its tributaries in Udil and Dachhan Ranges. Deodar is not found in Warwan valley of Marwah Range.

2.1.3 Around two thirds of the wooded area of this division falls under the category of temperate forests. In Marwah Forest Division, Deodar (*Cedrus deodara*) occupies maximum area (38.99%) compared to other conifer species. It occurs between 1500 m and 2500 m. A part from some pure patches, Deodar is mostly found mixed with Kail, Fir or Spruce. Kail (*Pinus wallichiana*) has the widest distribution, in respect of altitudinal variation. It occupies 29.91% of commercial area. Starting from upper limits of Oak around 1500 m, Kail occupies areas upto 2800 m adjoining Fir forests. It is encountered in all the three Ranges in its natural zone, either in pure form or mixed with other conifers species. It was observed that the needles of the Kail trees in the higher altitudinal zone is comparatively shorter in length than their counter parts in the lower altitudes. It needs further study.

2.1.4 Fir (*Abies pindrow*) forests occupy 31.10% of the wooded areas of the division. Fir forests are restricted to elevations above 2500 m and up to timber line in Udil Range but encountered in lower elevations in Marwah Range. It is restricted in distribution in Dachhan Range. Fir is associated with deodar and Kail towards its lower limit and occasionally with Spruce (*Picea smithiana*) on steep slopes. In moist shady localities on northern aspects, Fir and Spruce descend considerably into deodar- Kail forests. Occasional trees of Yew (*Taxus baccata*) are also encountered in these forests in Dachhan Range, but their proportion is insignificant. The compartment 16b in Dachhan Range (10.74 hectares) is having a good stock of Yew. It is absent in Udil and Marwah Ranges.

2.1.5 Broad leaved species find representation in sub-tropical as well as temperate areas of the Divisions. Generally they are found mixed with conifer species but occasionally pure patches of broad leaved species are also encountered. In sub- tropical areas, species like Populus and Alnus favour moist shady depressions along nallas. On exposed sites, Oak is more frequent. Different types of Populus are encountered in the low lying areas and riverine island in Marwah range. The natural willow and Seabuck throne bushes are frequently observed in the riverine islands in Warwan valley. *Parrotia jacquemontiana* occurs in pure patches in Dachhan range. In compartments 10 and 18 of Marwah range, all the major conifers such as Deodar, Kail, Fir and Spruce along with Bhojpatra can

be observed in the same patch of land which is very unique feature of this area. In temperate regions of the Division, Bhojpatra (*Betula utilis*) is prominent among broad leaved species.

2.1.6 The high altitude pastures, devoid of tree cover occupy the alpine and sub-alpine belt above tree line. These are covered with Junipers, miscellaneous grasses and legumes. Due to heavy grazing the palatable grasses are being replaced by unpalatable varieties. Table 2.1 provides the range wise distribution of the area and under different species as compiled from stock maps of the division.

TABLE 2.1. RANGE WISE DISTRIBUTION OF AREA UNDER DIFFERENT SPECIES

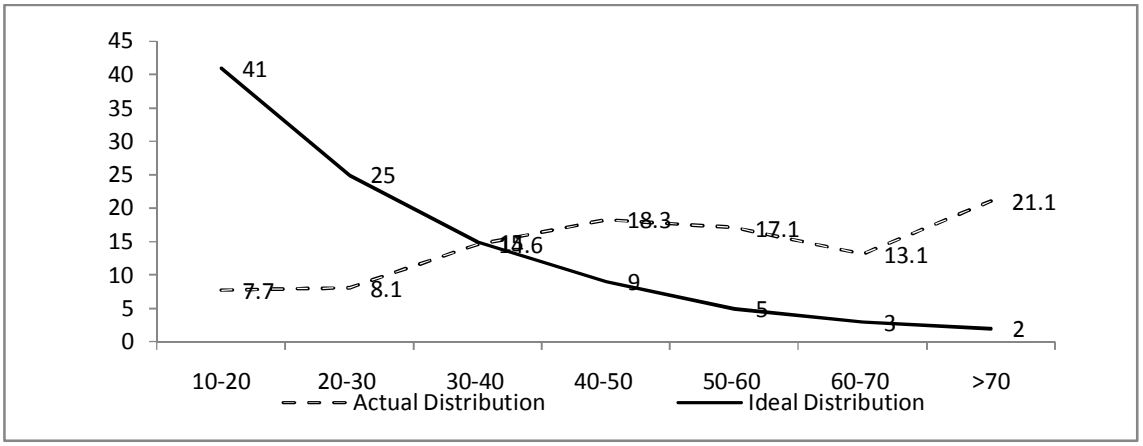
Range	COMMERCIAL FOREST AREA (Ha)				Broad leaved blank and Pastures	Total
	Deodar	Kail	Fir	Sub. Total		
Dachhan	4528.70	1825.47	116.66	6470.83	17434.90	23905.73
Marwah	1755.81	5048.41	5121.28	11925.50	93681.32	105606.82
Udil	5120.41	1875.68	3857.53	10853.62	33508.23	44361.85
Total	**11404.92**	**8749.56**	**9095.47**	**29249.95**	**144624.45**	**173874.40**
% of Total	38.99	29.91	31.10			

Composition and Condition of the crop.

2.1.7 The total number of trees of principal conifers and broad leaved species in different classes are summarised under Table 2.2. and Table 2.3. It gives the distribution of the volume of conifers over different diameter classes. On the whole there is a preponderance of middle-aged and mature growing stocks. The diameter distribution reflects an acute deficiency of stems below 30 cm d.b.h in all conifers. The diameter distribution forms a bell shaped curve rather than following an 'inverse J' curve as can be seen in figure 2.

Fig 2. PERCENTAGE DISTRIBUTION OF STEMS IN MARWAH FOREST DIVISION

IDEAL VERSUS ACTUAL



Diameter Class (Cm)

Diameter Class (Cm)	10-20	20-30	30-40	40-50	50-60	60-70	>70
Ideal Distribution %	41.0	25.0	15.0	9.0	5.0	3.0	2.0
Actual Distribution %	7.7	8.1	14.6	18.3	17.1	13.1	21.1

TABLE 2.4. SPECIESWISE DISTRIBUTION OF TREES AND VOLUME (CuM) IN PERCENTAGE

Species	Number of stems (%)	Volume (CuM) (%)
Deodar	42.76	38.19
Kail	26.55	22.37
Fir	27.36	39.44
Broad leaf	3.33	

2.1.8 The health of Deodar- Kail forests of this division, which constitute around 68.90% of the wooded area, is considerably better. The aberrations in diameter class distribution are not very pronounced with all the classes finding representation. Nevertheless, the representation of lower diameter classes falls short of the desired distribution. In terms of density, most of the crop is compact with canopy density averaging around 0.6. However, around heavily populated areas, the crop is open and scattered. Because of lower biotic pressure from grazing animals and lesser incidence of fire in inaccessible forests, the status of regeneration in these forests is better. One comes across patches of adequate and established regeneration frequently in these forests. However, because of non-removal of over-wood and lack of thinning, the regeneration is stagnating at many places. In its natural zone, Kail crop has come up very well in land slip areas on freshly exposed soil. In certain areas, the blanks in the forests have been rapidly invaded by weeds including a few varieties of ferns. In such cases heavy carpet of weeds results in mortality of seedlings.

2.1.9 The fir forests of Dachhan Range were already transferred to KHANP. The Fir forests of Warwan valley are of excellent quality. In most cases, in Marwah Range, the regeneration is found to be satisfactory. The canopy density of Fir crop is adequate but the diameter distribution is highly skewed in favour of mature and over mature trees. In some patches the trees are dying and decaying in considerable numbers. For stimulating regeneration in large scale gaps have to be created in the canopy.

TABLE 2.2 DETAILED STATEMENT OF TREE COURT OF MARWAH FOREST DIVISION

Total tree count over the entire commercial area of Marwah Forest Division

Species	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100<	Grand Total
Deodar	161850	191100	350999	404624	403649	278850	191100	117975	58500	79950	2238597
Kail	113100	128700	195975	267150	241800	203775	131625	62400	29250	16575	1390350
Fir	115050	91650	194025	252525	221325	178425	142350	101400	76050	59475	1432275
B.L	15600	35100	26325	39000	26325	13650	7800	4875	3900	1950	174525
Total	**405600**	**446550**	**767324**	**963299**	**893099**	**674700**	**472875**	**286650**	**167700**	**157950**	**5235747**

Percentage distribution of stems in different diameter classes.

Species	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100<	Grand Total
Deodar	3.09	3.65	6.70	7.73	7.71	5.33	3.65	2.25	1.12	1.53	42.76
Kail	2.16	2.46	3.74	5.10	4.62	3.89	2.51	1.19	0.56	0.32	26.55
Fir	2.20	1.75	3.71	4.82	4.23	3.41	2.72	1.94	1.45	1.14	27.37
B.L	0.30	0.67	0.50	0.74	0.50	0.26	0.15	0.09	0.07	0.04	3.32
Total	**7.75**	**8.53**	**14.65**	**18.39**	**17.06**	**12.89**	**9.03**	**5.47**	**3.20**	**3.03**	**100.00**

TABLE 2.3 DETAILED STATEMENT OF VOLUME OF CONIFERS IN MARWAH FOREST DIVISION

Total volume (cum) of conifers over the entire commercial area of Marwah Forest Division

Species	**10-20**	**20-30**	**30-40**	**40-50**	**50-60**	**60-70**	**70-80**	**80-90**	**90-100**	**100<**	**Grand Total**
Deodar	20619.69	24351.03	268357.55	538509.87	845823.55	876471.50	838757.77	668134.90	400880.94	604468.82	5086375.62
Kail	14408.94	16399.67	149833.39	363111.99	547760.18	680890.20	581443.01	333957.01	179733.81	111705.53	2979243.73
Fir	14657.37	11678.56	164825.01	393288.50	658057.65	874069.53	975476.95	841297.79	714959.56	606291.00	5254601.92
Total	**49686.00**	**52429.26**	**583015.95**	**1294910.36**	**2051641.38**	**2431431.23**	**2395677.73**	**1843389.70**	**1295574.31**	**1322465.35**	**13320221.27**

Percentage distribution of Voulme of Conifers in different diameter classes.

Species	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100	100<	Grand Total
Deodar	0.15	0.18	2.01	4.04	6.35	6.58	6.30	5.02	3.01	4.54	38.18
Kail	0.11	0.12	1.12	2.73	4.11	5.11	4.37	2.51	1.35	0.84	22.37
Fir	0.11	0.09	1.24	2.95	4.94	6.56	7.32	6.32	5.37	4.55	39.45
Total	**0.37**	**0.39**	**4.37**	**9.72**	**15.40**	**18.25**	**17.99**	**13.85**	**9.73**	**9.93**	**100.00**

2.1.10 In some patches of Udil range the regeneration of Fir forests is affected due to accumulation of organic matter. Things are also made difficult by the fact that a good seed year in Fir comes after an interval of about 10 years. Lower seed production coupled with high mortality of seedlings provides a recipe for disaster so for as regeneration of Fir forests is concerned. In many places it has been noticed that regeneration of Kail is gradually intruding into gaps created in Fir forests. Also, excellent regeneration of Fir and spruce can be seen under the canopy of Deodar-Kail forests that occur immediately between Fir zone. It appears that fir/ Spruce cones that roll down, or seeds that fall in deodar- Kail forests, find conditions suitable for regeneration in some pocket of these forests and therefore thrive in such localities.

2.1.11 Pure broad leaved forests are restricted to a very small area in this Division. Generally, broad leaved species are found mixed with conifers. The broad leaved species around habitation, especially Oaks, suffer heavily on account of lopping for fuel and fodder. Fairly large sized mature trees of broad leaved species are found only deep inside the forests. Excessive lopping results in attenuated crowns and lower seed production. As a result, the regeneration of broad leaved species like Oak is highly inadequate. Seedlings of angiosperms are also more susceptible to grazing and browsing. However, good regeneration of several species like Alnus nepalensis and Populus ciliate can be seen on freshly exposed sites along at many places.

2.2. General description of the types of forests

2.2.1. The Forests of Marwah Forest Division have been categorized and described in the light of Revised Forest Types of India (1968) by Champion and Seth as applicable to the Forests of the tract. They are summarized below:

	MONTANE SUBTROPICAL FORESTS	
	Group 10- Subtropical Dry Evergreen Forests	
1.	Sub-Tropical dry evergreen Olea cuspidata scrub forest	10/C1a
	MONTANE TEMPERATE FORESTS	
	Group 12- Himalayan Moist Temperate Forests	
2.	Ban oak forest (Quercus incana)	12/C1a
3.	Moru oak forest (Quercus dilatata)	12/C1b
4.	Moist deodar forest (Cedrus deodara)	12/C1c
5.	Western mixed coniferous forest	12/C1d
6.	Moist temperate deciduous forest	12/C1e
7.	Low level blue pine forest (Pinus wallichiana)	12/C1f
8.	Kharsu oak forest (Quercus semecarpifolia)	12/C2a
9.	West Himalayan upper oak / fir forest	12/C2b
10.	Himalayan temperate pastures	12/D S3
11.	Alder forest	12/1S1
12.	Low level blue pine forest	12/2S1
	Group 13- Himalayan Dry Temperate Forests	
13.	Dry broadleaved and coniferous forest (Quercus ilex / Pinus	13/C1

	gerardiana)	
14.	Dry deodar forest	13/C2b
15.	West Himalayan high-level dry blue pine forest (Pinus wallichiana)	13/C4
	SUB ALPINE FORESTS	
	Group 14- Sub Alpine Forests	
16.	Birch / fir forest	14/C1b
	ALPINE SCRUB	
	Group 15- Moist Alpine Scrub	
17.	Birch / Rhododendron scrub forest	15/C1
18.	Dwarf Rhododendron scrub	15/C2/E1
19.	Alpine pastures	15/C3

These types of forests are described below:

MONTANE SUB TROPICAL FORESTS

2.2.2 In subtropical forests, the temperature regime is determined more by altitude than by latitude and is characteristically developed in the hilly areas. The subtropical zone is considered as transitional from the tropical to a temperate zone and is sometimes hardly distinguishable either in form or composition from one or the other. There are two major representatives of Montane subtropical forests are prevailing in India namely 8A- Southern sub tropical broad leaved hill forest and 8B- Northern sub tropical wet hill forests.

Group 10 - Subtropical Dry Evergreen Forests

2.2.3 The subtropical dry evergreen forests are characterized by scrub of small leaved evergreen trees and shrubs including thorny species. The shrubby growth generally predominates but there is a monsoon development of herbs including grass. The climate prevailing in these localities is characterized by a long hot and very dry season and a cold winter with occasional frost. The annual precipitation is ranging between 500 mm to 1000 mm occurring mostly in July to August but with a fair proportion of winter rains.

10/C1a. Sub Tropical Dry Evergreen *Olea Cuspidata* Scrub Forest

2.2.4 *Olea cuspidata* (Kahu) is the chief species of this forest. This sub-type occurs along the lower limits of the Division in the narrow valleys and extends in the higher reaches until it is replaced by *Quercus ilex*. It occurs in pure patches and is under heavy human pressure. The common associates are the *Punica granatum, Pistachia integerrima,* Chir, *Dalbergia sisoo, Myrsino africana, Daphne olooides* and *Plectranthus spp.* This sub types forms only negligible percentage of forest land and is mostly spread over revenue lands. It is common only on drier Southern slopes along river Chenab, Marsudar and Chatroo nalla. This type is also subject to serious erosion.

MONTANE TEMPERTATE FORESTS

2.2.5 The northern montane temperate forests seem to be best classified by the rain fall during the season of vegetative activity which may be taken as roughly the months with mean temperature over 13^{o}C. Three stages are distinguishable two of them mainly coniferous, though broadleaved trees (either evergreen oaks or mixed deciduous species) or often

associated with the conifers, only the wettest type being predominantly broadleaved evergreen.

Group 12 - Himalayan Moist Temperate Forests

2.2.6 This type of forest was quoted as temperate broadleaved and coniferous forests in the previous working plans of this state. The characteristic feature of the Himalayan moist temperate forest is the extensive development of coniferous forest. These coniferous forest are very similar to those of other parts of the north temperate zone in Europe and America. Practically pure crops are almost frequent than the next ones, the species found been dependant mainly on altitude aspect. The evergreen oaks become important and conspicuous. The oak forest are usually composed of single species and are usually of low height with widely branching crowns and poor boles.

12/C1a. Ban Oak Forest *(Quercus incana)*

2.2.7 The Ban oak forests occupy a narrow fringe in the altitudinal range along the Deodar and Kail Forests. It is met with in the lower altitudinal zones of Udil and Dachhan Ranges between 1800 to 2300 Mt. elevation above MSL. Associate species are *Pieris evalifolia, Rhododendron arboreum, Acer pantaminicum, Quercus ilex, Dapane, Porberis* and *Indigofera. Rosa moschata* and *Hedra helix* are the common climbers. Ban oak is heavily lopped for fodder and firewood.

12/C1b. Moru Oak Forests *(Quercus dilatata)*

2.2.8 In this type of forests *Quercus dilatata* (Moru) is the chief species. In this zone *Quercus ilex* (Heru) is also included as where the Moru ends, Hiru starts and vice versa. This distribution of Hiru is mainly on monsoon rains and occurs along the main valleys. Moru oak being more mesophytic sticks to Northern slopes on more stable and older soils than does *Quercus ilex*. Its common associates are *Cedrus deodara, Pinus wallichiana, Quercus incana, Ubus Wallichiaas, Fraxinus excelsior, Cedrela serrata* and *Alnus nitida.* The *Quercus dilatata* often occurs as under storey but seldom as consociation. *Quercus dilatata* is highly lopped.

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

2.2.9 *Cedrus deodara* is the characteristic species of this type and it often occurs as pure but at times mixed with blue pine, little Fir and spruce. This type does not form climax as it is directly or indirectly influenced by human activities. It occurs in the altitudinal zone of 1700 m to 2300 m generally but descends to lower levels on cooler Northern aspects and is replaced here by Kail. It is chiefly found in Udil & Dachhan Ranges. It consists of all valuable Forests which have been brought under conversion to uniform. It occurs on all geological formations on well drained soils and avoids ill drained and damp soils. It clothes all types of slopes. Natural regeneration of Deodar and Kail is plentiful and is only lacking over ill drained sites, extremely steep slopes and areas carrying dense undergrowth. Grazing is usually heavy throughout. Fires though not very common, damage considerably the young crop.

2.2.10 The common associates are *Pinus Wallichiana, Abies pindrow, Picea smithiana, Quercus ilex, Quercus dilitata, Quercus incana, Rhus succdanea, Eodrela serrate, Prunus padus, Fraxinus floribanda, Acsculun indica, Rhododendron arboreun, Celtis australius, Populus ciliata* and *Alnus nitida.* Under dense canopy of Deodar, the under storey of Broadleaved species is often missing and under growth very sparse. But is open crop, dense under storey of broadleaved species like *Rhus, Cedrela, Aesculus, Eorylus colurna, Prunus*, etc is found. On clear felled patches or fire burnt sites *Populas* appears on cooler sites and Kail on hotter aspects.

2.2.11 The chief under growth is of *Parrotia jacquemontiana* particularly on North-Western and Western aspects and when it is dense, it inhibits the regeneration of Deodar. It is commonly met in Udil Range and in some parts of Marwah. Other important species are *Viburaum, Indigofena, Desmodium, Lonicera augustifolia, Sarococcoca saligna, Deutzia stamina, Berbaris lyceum, Wikstroemia canescens, Buddleiapinaculata, Prinsepia utilis, Spiraea sorbifolia, Samilax, Clematis, Hedra helix* and *Rosa moschata.* Important fungus are *Trametes pini* and Parasite *Arcouthobium rinnutissimum* which attack Kail abundantly.

2.2.12 Deodar commonly occurs pure as consociation but also occurs in association with Kail, Fir, Spruce, *Quercus spp*. Kail in moist Deodar zone is of serial types and is in its progression towards Deodar. Young Deodar is often found as an under storey with Kail. Deodar is in sub-climax in this zone.

12/C1d. Western Mixed Coniferous Forests

2.2.13 This type refers to the Fir Forests with some spruce and Deodar and Kail formation falling within this type having varying intermixture of evergreen and deciduous broad leaved trees and also glades of broad leaved forests. This type includes all workable Fir Forests of the Tract. This type is marked with open grassy stretches which serve as grazing grounds. This type is found between 2400 to 3000 m. *Quercus semicarpifola* and *Quercus dilatata* form upper and lower limits respectively. These forests are dense canopied but lack generally in younger classes. Mature and over mature trees preponderate whereas middle-aged are less in proportion. The best quality Fir forests are seen in Marwah and Dachhan. Heavy openings in Fir canopy invite heavy seed growth and wind damage.

2.2.14 This type is traversed by high snow slides along nallas during winter which do a considerable damage to the crop along their fringes. Along such beds walnut and other species have come up eg. compartment 5, 6, 8, 10/Marwah where the trees have attained a typical snow bend. Stems are almost prostrate and (curved) for most part of their length. Strong winds, often blizzard, hit this during winter, which do considerable wind damage to the crop. Permanent blanks are frequently located which impart patchy look to these forests. Fire sites are invaded by Fir and *Populus*.

2.2.15 Heavy grazing is resorted to in this type as most of the temperate posture grounds are situated in this zone. The regeneration of Fir is absent near such sites and the crop abundantly carries mature and over mature trees and few middle aged trees. The proportion of younger age classes increases with the increase of distance from the grazing grounds. Another important inimical factor, in obtaining natural Fir regeneration is huge accumulation

of raw humus. The seed is effectively prevented to strike the soil by thick layers of humus. Over wetter or damp depressions the regenerations of Fir has been found to be absent. The trees are mature to over-mature and diseased over such sites. Regeneration of Fir comes easily on well drained soils and is deficit on gently and very steep grounds, completely lacking on badly drained very moist and damp sites. Density of under growth particularly Viburnum, thickness of raw humus, intensity of grazing, presence of felling refuse determine, besides the above factors, the presence or absence of Fir regeneration and where these are found in lesser extent, the regeneration has come up beautifully.

2.2.16 Above all the judicious opening of the canopy is most desired to allow less of under-growth and areas where openings had been heavy are carrying dense *Niburnum, Polygonum, Spiraea, Skimmia* and under growth and have limited the chances of regeneration.

2.2.17 Kail contributes a great part in colonizing bare hotter gaps whereas Deodar comes to occupy the very steep and broken grounds. It also occurs as mixture in the lower limits of this type whereas Kail ascends to higher altitudes.

2.2.18 The common associates are *Taxus baccata, Quercus semecarpifolia, Acer pictum, Prunus padus, Populus ciliata, Juglans regia, Fraxinus floribunda, Corylus colurna, Aesculus spp.* and *Salix spp.* This type is known for carrying important medicinal flora.

12/C1e. Moist Temperate Deciduous Forests

2.2.19 This type is found between 1800 to 2700 m met with in 12/C 1c, 12/C 1d types mostly in shady depressions and along nalla and stream banks, comprising of deciduous broad leaved trees like *Aesculus indica, Juglans regia, Acer spp, Prunus padus, Corylus colurna, Celtis australis, Populus ciliata, Salix spp, Ulmus Wallichiana.* This type is in edaphic climax and occurs only on moist shady depressions and damp gentler breaks or along the banks of running nallas. The regeneration of these species is often difficult.

12/C1f. Low Level Blue Pine Forest *(Pinus wallichiana)*

2.2.20 All blue pine (*Pinus Wallichiana*) forests met within the Ban, Moru, Oak and mixed coniferous zones constitute this type. These forests are pure Kail forest but at sometimes with slight mixture of Deodar, spruce and Fir and due to the colonization of blanks which might have occurred by any causes, natural or biotic and as such are secondary in nature and regarded as secondary serial type.

12/C2a. Kharshu oak Forest *(Quercus semecarpifolia)*

2.2.21 This type consists of *Quercus semecarpifolia* forests, often pure, capping western mixed coniferous forests type on southern slopes and merge with Alpine zone above. It also forms an under storey with Fir and replaces Fir where biotic influence are excluded. Characteristics species are *Quercus semecarpifolia, Betula utilis, Acer caesium, Rhododendron, R. barbatum, Abies pindrow, Picea smithiana.* It is developed between 2500 to 3300 meter altitudes and is regarded to be in stable climatic climax.

12/C2b. West Himalayan upper Oak / Fir Forests

2.2.22 The characteristic species of this type is *Quercus semecarpifolia* and *Abies pindrow* and grow from 2600 to 3400 meters almost to tree limit where it either disappears into pure oak forest or birch forest and even directly into sub-alpine zone. The forests are generally two storeyed, upper storey of Fir and the Kharshu, as an under storey, together forming a fair ground cover. This type is not regarded as commercial forests and have almost all either have been assigned to the Unregulated Working Circle or separated from pure Fir forests i.e. Western mixed coniferous forest. Spruce forms large proportions in this type. Other characteristic trees in this type are *Rhododendron barbatum, Taxus baccata, Betula utilis* and *Acer caesium.* This type is transitional stage between pure Fir and pure Kharshu oak types and regarded as degenerated type of Fir forests. Grazing is heavy and fires are often common.

12/DS3. Himalayan Temperate Pastures

2.2.23 This type includes blanks known commonly as Behaks or Dhars conspicuously devoid of all tree growth. The ground is completely covered with grasses and herbaceous flora. The blanks seem to have been cleared where water facility existed and the intense continued biotic and human interference have made them perpetual pastures. These pastures are heavily grazed, even much beyond the carrying capacity of such pastures. This type seems to be in biotic climax.

12/1S1. Alder Forests

2.2.24 This type occurs along nallas and depressions in all types described above. It occurs as pure and extends from sub-tropical to temperate zone and is found widely over the tract. Its associates are *Alnus nitida, Populus ciliate, Ulmus villosa, Celtis spp., Fraxinus floribunda, Aesclus indica, Spiraea* and *Sarcococca*.

12/2S1. Low Level Blue Pine Forests

2.2.25 All colonizing Kail forests between 1500 to 2400 m altitude occurring side by side with moist Deodar type have resulted as a result of forest conservancy nearly 80 years ago. The crop is predominantly young with few mature, branchy Kail trees with small middle aged groups at places. It is commonly developed over hotter Southern or South Eastern and South Western slopes. These forests have been brought under conversion to uniform alongwith Deodar forests since 1985 AD and most of the over wood stands already removed and forests converted. Some Deodar on cooler aspects, Fir and Spruce also occurs over moist shady depressions. Other associates are more or less those which are found in the most Deodar type. The under growth is often scanty and consists of *Indigofera, Desmodium, Viburnum, Wikstroemia* and *Berberis*. Common associates are *Cedrus deodara, Abies pindrow, Picea smithiana, Quercus incana, Quercus ilex, Celtis australis, Alnus nitida, Fraxinus* (ash) *Aesculus indica.*

Group 13 - Himalayan Dry Temperate Forests

13/C1. Dry broad leaved coniferous forest (*Quercus ilex* / *Pinus gerardiana)*

2.2.26 The characteristic species are *Pinus gerardiana* (chilgoza), *Quercus ilex and Celtis australis.* This type occupies mostly drier, very steep and difficult lower slopes in the inner valley.

2.2.27 *Quercus ilex* (Heru Oak) is the main species and it occurs pure and gregariously. In Dachhan it extends up to Sounder village. Heru Oak is the chief source of firewood in the tract and is largely used for agricultural implements. Regeneration of *Quercus ilex* is good but heavily lopped for fodder and firewood and is found in bush state in Kishtwar area. Mature trees become hollow and unsound. It coppices well.

2.2.28 The other characteristic species is the *Pinus gerardiana* (Chilgoza pine). In Dachhan ie 16a, 16b, 17, 21b, 21c, 27b occupying very rugged and extremely steep slopes, sometimes precipitous. The rainfall is poor. It usually occupies the lower slopes of the valley or the compartments. The fruit of the chilgoza tree is edible and is exported out of the zone.

2.2.29 Deodar and Kail in this zone are of poor quality and much branched. This is true when the crop occupies the sheet rock formation. On deeper, well drained soils, which are very rare in occurrence, the quality becomes good.

13/C2b. Dry Deodar Forest

2.2.30 The characteristic trees are *Cedrus deodara, Pinus wallichiana, Quercus ilex, Pinus gerardiana and Dalbargia sissoo.* This belt occupies lower slopes along river Chenab right upto Dadpeth and Tagood. Deodar comes only on favorable sites with Kail at easier grounds. *Quercus ilex* stocks to much steeper slopes and particularly the lower parts. The crop is often patchy. The crop is stunted and poor in quality.

2.2.31 *Daphne oleoides* and *Plactranthus rugosus* and the typical shrubs with other usual herbaceous growth. Higher up this type is replaced by moist temperate zone and lower down by *Olea cuspidata, Dalbargia sisoo* and pure *Quercus ilex* forest.

2.2.32 This type is insignificant in extent and considered to be in as the effects of dryness of soil are more pronounced which have been resulted due to the very steep and precipitous configuration of the ground and less rain fall as it lies on sheltered lower slopes of Kandi belt.

13/C4. West Himalayan High-Level Dry Blue Pine Forests *(Pinus wallichiana)*

2.2.33 The characteristics species is blue pine. This type is composed of Kail which is young and colonizing with little Deodar and Fir on cooler depressions. Deodar regeneration is coming under Kail canopy suitable places. Kail is often attacked by armi in this type as well. This type is developed on hotter southern and South Western higher slopes in the area. This type is extensively developed in Udil, Marwah & Dachhan.

2.2.34 It appears to be undergoing secondary succession re existing the higher hotter bare slopes. Extensive grassy blanks exist in this type and besides heavy grazing on higher parts, in lower

blanks grass cutting is resorted to. The ground is covered with dense root matting hardly permitting the Kail seeds to strike the soil. Chance seedlings get cut with grass.

SUB ALPINE FORESTS

Group 14- Sub Alpine Forests

14/C1b. Birch Fir Forest

2.2.35 The characteristic species are *Betula utilis* (Birch), *Abies pindrow* and *Rhododendron spp.* which forms open forests. This type is finally replaced by Birch, Rhododendron and Alpine pasture types. This type is quite extensive and occurs throughout the tract. This type is under great biotic pressure as heavy grazing is resorted to in the summer. This type is Bio-climatic climax.

ALPINE SCRUB

Group 15- Moist Alpine Scrub

15/C1. Birch / Rhododendron Scrub Forests

2.2.36 This type is exclusively developed Udil Range below Phambardar forming upper catchment areas of Satkolam. The characteristic trees are *Betula utilis* as forming upper storey and *R. campanulatum* as under storey with herbaceous flora. This type is heavily grazed.

15/C2/E1. Dwarf Rhododendron Scrub Forests

2.2.37 This type is well developed in Udil Range above 3500 mtrs and consists of low bushes of *Rhododendron lepidotum* and *R. anthopogon* and at time *R. campanulatum*. This is found in small contiguous breaks on very steep bouldry grounds. Chiefly on Northern aspects at Phambar Dhar and Sinthan Top and is fringed with Alpine pastures. *Rhododendron lepidotum* supplements the firewood requirement of the graziers in summer though other dead wood of Fir and birch are also commonly used. Heavy grazing goes on in this type as it contains numerous luxurious vast grassy stretches.

15/C3. Alpine Pastures

2.2.38 The characteristic vegetation is only herbaceous. *Anemones* and *Potentillas* and occasional *funipe* species of family *Ranunculaceae Compositae* and *Primulaceae* are also found in abundance. This type is extensively developed in all the three ranges. This type is heavily grazed.

2.3. Status of Natural Regeneration

2.3.1 In the undisturbed natural forests the regeneration of major conifers is found to be quite satisfactory. In areas where the timber extraction had taken up in large scale in the past, the regeneration of conifers is found satisfactory. The important factor to be considered is the invasion of Kail in Deodar areas. The gregarious in nature and faster growth rate of kail facilitate it to inward the traditional Deodar forests. In the closures established for afforestation of the area, the natural regeneration is well establishing. However, the difficulty of regeneration is observed in many cases where the conditions required are not

meeting. In case of Fir, areas having huge deposition of needles at higher elevation, the regeneration are found not satisfactory. The un-decomposed needles do not allow the germination of fir seeds due to acidic nature of the substratum. In the dense forests, due to lack of adequate sunlight in the forest floor, the young regeneration is absent. Wherever, the canopy is opened adequately, the regeneration found to be satisfactory. Another major reason of lack of regeneration in the open areas close to the habitation is the grass cutting by the locals. The people of this locality are cutting the grasses from the forest floor during the month of September to November and dumping the grasses for making hay. This practice lead to the destruction of all the young recruits and hence open areas close to habitation are not practically regenerating naturally.

2.3.2 The Marwah Forest Division is the home for all the temperate medicinal plants. Mostly the medicinal plants were extracted in destructive means. Due to the ban of collection of NTFP in the State during the recent past, these species got the relief. Nowadays the population of NTFPs found be satisfactory. Hence the Government of J&K contemplate of lifting of ban of collection of NTFPs with proper regulation both in term of area and volume.

2.4. Injuries to which crop is liable

2.4.1.Snow damage

The majority area of Marwah Forest Division is located in the temperate zone. All the places receive snowfall every year during the month of December and January. The upper reaches receives sufficiently larger quantum of snow fall. The accumulation of snow on the tree top and high wind speed facilitate the breaking of leading stem of the conifer trees or uprooting of conifer trees. Also snow avalanche is damaging the standing trees.

2.4.2. Landslide

Landslide is a common feature in Marwah Forest division due to the steep sloppiness of the terrain. Landslides are very frequent phenomenon during rainy season and early summer the month of March. Also the developmental projects such as road construction and the other activities trigger the land slides. In all the sanctions issued under J&K Forest Conservation Act cases, the user agencies are directed to create structures to prevent landslides. In many instances, it is not being followed by the user agencies which should be monitored strictly in feature to prevent landslides.

2.4.3. Pest in Kail trees

A bark beetle pest *Ips schmutzenhoferi* (Locally called *Armi*) is observed in the kail trees damaging the crop in the warmer aspects. The infested tree dries and ultimately dies. The severity of infestation is greater in open warm areas. The spreading of the pest is observed to be facilitated due to global warming. It requires further studies to manage the pest in the kail forests.

2.4.4. Illicit damage

Illicit damages are comparatively lesser in this forest division. People are getting conifer trees (except Deodar) for construction and renovation of their houses under Jammu Forest Notice.

Also in the rural areas, due to poor economic condition of the people, they were using timber for building of houses right from the plinth upto the roof level. Nowadays due to the implementation of various employment generation programmes of both the Union and State Governments, the condition of the people improved largely which is reflected in the form of construction of houses using bricks and concrete. It led to the decreased pressure on forest for timber purpose. Due to lack of road connectivity and distance from the cities, there is no smuggling of timber for economic benefits.

2.4.5. Fire wood extraction

As the entire area of Marwah Forest Division is located in the snow bound area, people are largely depending upon the firewood for warming of their living places in their houses and cooking purposes. Due to lack of road connectivity people are left with the only option of firewood for energy needs. Large quantum of firewood is extracted from the forest. In rural areas people are still living in joint family system. A household may have ten to twenty souls. This household requires a minimum of three quintal of firewood for warming and cooking purpose in a day during winter season. This large quantity of firewood is extracted from the fallen materials in the forest and dumped in their backyards. The issue of firewood extraction is detrimental to the health of forest, and hence should be addressed properly.

2.4.6. Torch wood extraction

The entire Marwah Range and majority part of Dachhan and Udil Ranges are not connected by electrical grid. People are depending on the torch wood for lighting purposes. The torch wood extraction has both direct and indirect consequence on the forest. Use of torch wood for lighting, led to many major fire accidents in the recent past. The notable examples are the fire accidents happened at Margi, Choidraman and Shoknai in Warwan Valley. Similar cases were reported in other divisions as well. In these fire accidents people lost their households and ultimately the forest department was directed to extract huge volume of timber and distributed it to the local people.

2.4.7. Grazing

The Marwah Forest Division is the paradise for graziers. This division is bestowed with vest tract of pasture lands. The nomadic and local graziers are reaping the maximum benefit of grazing activity. Traditionally people are keeping live stocks for supplementing their income. Local people as well as the nomadic graziers are taking their live stocks to the alpine pastures during summer and return back during autumn.

2.4.7.1. Nomadic graziers

The nomadic graziers spend their summer months in alpine pasture and during winter they visit their native plains. The nomadic graziers hailing from Kathua, Samba, Jammu, Udhampur and Reasi Districts visit the alpine pastures located in Udil, Dachhan Ranges and Renai Nallah area in Marwah Range. They either cross Chandrabagha river at Bandakote or they cross the Jawahar Tunnel and Margon top and reaches their destination. Traditionally the alpine pastures are “shared” among these peoples and the visit the same pasture land every year.

Hence rotational grazing cannot be followed for management of alpine pastures land. They sometime "sell" or "mortgage" the pasture land they "own" and the "right" over the land passed onto the next generation. They pay the nominal grazing fee to the block forest officers, visiting them. They normally under-report the number of animals they are keeping. The prevailing superstition is that if the nomadic grazier reveals the exact number of animal he possesses to an unknown person, he will lose the animals. Sometimes the nomadic graziers also take the live stocks of the locals from the neighbouring villages to the alpine pasture and return the animals when he recedes back to the plains and collect the charges on kind.

2.4.7.2. Local graziers

The local people also rear the animals. In addition to the subsistence agriculture, local people also rear the animals for milk, meat and wool. During summer months these animals are fed with green grasses and forages. As the entire area will be cover under snow during winter the locals use to cut the grasses during autumn season for feeding the animals during winter. The activity of grass cutting removes all the current recruits of forest species from the floor. It is the major factor against natural regeneration of conifer forests. There is a constant quarrel between the local and nomadic graziers and among them in sharing of the pasture land available.

2.4.8. Forest fire

In the temperate areas, forest fire occurs mainly during October and November and rarely in the month of April. The dryness is major factor facilitating fire and not the temperature. The forest fire damages the young pole crops heavily. After the fire incidence, the first colonizer of the forest floor is *Perrotia*. After taking reasonable efforts the fire burnt area, can be regenerated properly. During fire season attention should be focused on areas of young regenerating crops and pole crops. Fire should be extinguished before it takes the form of crown fire. The beneficial effects of fire should be used in the management of alpine pastures.

2.4.9. Loping

Though conifers are prohibited to be lopped but still a great incidence of lopping is noticeable. Moreover, broad-leaved trees, even the special class are lopped for fodder. Not contenting with this the lopping is carried out even upto the tip of the crown and tree virtually gets killed. The illicit damage is to be curbed down and species permitted for lopping shall only be lopped as per standing lopping rules.

2.4.10. Girdling

Girdling is very common along demarcation line, particularly around "chaks" and encroached areas. This is primarily done to encroach upon the adjoining forest area slowly and gradually.

2.4.11. Encroachment

Lust of all the men is a pitiable enemy. Fully knowing the repercussions of such a havoc, deliberate inflicts damage and encroachments where the trees are girdled and felled and even burnt. Illicit damage is common in the forests near the Palmar, where as in the interior, it is negligible. Notwithstanding, all efforts will be made in combating such forces right at the source.

CHAPTER II B. FOREST FAUNA

Checklist of Mammals of Marwah Forest Division

S. No.	Common Name	Scientific Name
1	Beach of Stone Marten	*Martes foina*
2	Brown Bear	*Uusus arctos*
3	Common Langur	*Semnopithecus entellus*
4	Hangul or Kashmir Stag	*Cervus elaphus hanglu*
5	Himalayan Black Bear	*Ursus thibetanus*
6	Himalayan Marmot	*Marmot bobak*
7	Himalayan Mouse Hare	*Ochotona roylei*
8	Himalayan Yellow Throated Marten	*Martes flavigula*
9	Ibex	*Capra ibex*
10	Jackal	*Canis aureus*
11	Jungle Cat	*Felis chaus*
12	Leopard	*Panthera pardus*
13	Long Tailed Marmot	*Mamot caudate*
14	Musk Deer	*Moschus chrysogaster*
15	Red Fox	*Vulpes vulpes*
16	Snow Leopard	*Uncia uncial*

2.5.1 Birds

Check List Of Birds Of Marwah Forest Division

S. No.	Common Name	Scientific name	Family
1	Alpine accentor	*Prunella collaris*	Muscicapidae
2	Alpine swift	*Tachymarptis melba*	Apodidae
3	Bearded vulture or Lammergeier	*Gypaetus barbatus*	Accipitridae
4	Black and yellow grosbeak	*Mycerobas icterioides*	Muscicapidae
5	Black redstart	*Phoenicurus ochruros*	Muscicapidae
6	Black tit	*Parus rufonuchalis*	Muscicapidae
7	Black-eared Kite	*Milvus migrans*	
8	Black-naped green wood-pecker	*Picus canus*	Dicidae
9	Blue rock pigeon	*Columba livia*	Columbidae
10	Blue Rock Pigeon	*Columba livia*	
11	Blue rock thrush	*Monticola solitarius*	Muscicapidae
12	Blue whistiling thrush	*Myophonus caeruleus*	Muscicapidae
13	Blue-headed redstart	*Phoenicurus caeruleocephala*	Muscicapidae
14	Blythôs leaf warbler	*Phylloscopus reguloides*	Muscicapidae
15	Booted eagle	*Hieraaetus pennatus*	Accipitridae
16	Brown bullfinch	*Pyrrhula nipalensis*	Muscicapidae
17	Brown dipper	*Cinclus pallasii*	Muscicapidae
18	Cheer pheasant	*Catreus wallichi*	Falconidae
19	Chukar patridge	*Akectirus chukar*	Falconidae

20	Cinamon tree sparrow	*Passer rutilans*	Muscicapidae
21	Collared grosbeak	*Mycerobas affins*	Muscicapidae
22	Common cuckoo	*Cuculus canorus*	Cuculidae
23	Common kingfisher	*Alcedo atthis*	Alcedinidae
24	Common myna	*Acridotheres tristis*	Sturnidae
25	Crested black tit	*Parus melanolophus*	Muscicapidae
26	Crested lark	*Galerida cristata*	Alaudidae
27	Durskey crag-martin	*Hirundo concolor*	Hirundinidae
28	Eagle owl	*Bubo bubo*	Strigidae
29	European roller	*Coracias garrulous*	Coracidae
30	Fire capped tit	*Cephalopyurs flammiceps*	Muscicapidae
31	Gold billed blue magpie	*Urocissa flavirostris*	Corvidae
32	Gold crest	*Regulus regulus*	Muscicapidae
33	Golden eagle	*Aquila chrysaetos*	Accipitridae
34	Golden oriole	*Oriolus oriolus*	Oriolidae
35	Green backed tit	*Parus monticolus*	Muscicapidae
36	Grey- headed flycatcher	*Culicicapa ceylonensis*	Muscicapidae
37	Grey headed thrush	*Turdus rubrocanus*	Muscicapidae
38	Grey tit	*Parus major*	Muscicapidae
39	Grey wagtail	*Motacilla cinerea*	Muscicapidae
40	Grey winged blackbird	*Turdus boulboul*	Muscicapidae
41	Griffon vulture	*Gyps fulvus*	Accipitridae
42	Himalayan Bearded Vulture	*Gypaetus barbatus hemachalanus*	
43	Himalayan Golden Eagle	*Aquila chrysaetos*	
44	Himalayan Griffon Vulture	*Gyps himalayensis*	
45	Himalayan monal	*Lophophorus impejanus*	Falconidae
46	Himalayan pied wood-pecker	*Dendrocopos himalayensis*	Dicidae
47	Himalayan Rufous Turtle Dove	*Streptopelia orientalis meena*	
48	Himalayan snowcock	*Tetraogallus Himalayensis*	Falconidae
49	Himalayan swiftlet	*Collocalias brevirostris*	Apodidae
50	Himalayan tree-creeper	*Certhia discolor*	Muscicapidae
51	Hodgsonôs mountain finch	*Leucosticte nemoricola*	Muscicapidae
52	Hoopoe	*Upupa epops*	Upupidae
53	House crow	*Corvus splendens*	Corvidae
54	House sparrow	*Passer domesticus*	Muscicapidae
55	House swift	*Affinis*	Apodidae
56	India white-backed vulture	*Gyps bengalensis*	Accipitridae
57	Indian cuckoo	*Cuculus micropterus*	Cuculidae
58	Indian ring dove	*Stretopelia decaocto*	Columbidae
59	Indian tree pie	*Dendrocitta vagabunda*	Corvidae
60	Jungle crow	*Corvus macrorhynchos*	Corvidae
61	Kashmir nuthatch	*Sitta cashmirensis*	Muscicapidae
62	Kashmir red breasted Flycatcher	*Ficedula subrubra*	Muscicapidae
63	Kastrel	*Falco tinnunculus*	
64	Kestrel	*Falco tinnunculus*	Falconidae
65	Kiklas	*Pucrasia macrolopha*	
66	Koel	*Eudynamys scolopaceas*	Cuculidae
67	Koklass pheasant	*Pucrasia macrolopha*	Falconidae
68	Lesser pied kingfisher	*Ceryle rudis*	Alcedinidae
69	Linnet	*Carduelis cannabina*	Muscicapidae
70	Little forktail	*Enicurus scouleri*	Muscicapidae
71	Little owl	*Athene noctua*	Strigidae

72	Little pied flycatcher	*Ficedula westermanni*	Muscicapidae
73	Long-eared owl	*Asio otus*	Strigidae
74	Monal Pheasant	*Lophophorus impeajanus*	
75	Olivaceous leaf-warbler	*Phylloscopus griselous*	Muscicapidae
76	Orange bullfinch	*Pyrrhula aurantiaca*	Muscicapidae
77	Orange flanked bush-robin	*Tarsiger cyanurus*	Muscicapidae
78	Pallas leaf-warbler	*Phylloscopus proregulus*	Muscicapidae
79	Paradise flycatcher	*Terpsiphone paradise*	Muscicapidae
80	Pariah kite	*Milvus migrans govinds*	Accipitridae
81	Peregrine	*Falco peregrines*	
82	Pied or white wagtail	*Motacilla alba*	Muscicapidae
83	Pink-browed rosefinch	*Carpodacus rodochrous*	Muscicapidae
84	Plain leaf-warbler	*Phylloscopus neglectus*	Muscicapidae
85	Plain or yellow browned leaf-warbler	*Phylloscopus inornatus*	Muscicapidae
86	Plumbeous water-redstart	*Rhyacornis fuliginosus*	Muscicapidae
87	Red jungle fowl	*Gallus gallus*	Falconidae
88	Red turtle dove	*Stretopelia tranquebarica*	Columbidae
89	Red-breasted rosefinch	*Carpodacus puniceus*	Muscicapidae
90	Red-headed bullfinch	*Pyrrhula erythrocephala*	Muscicapidae
91	Red-mantled rosefinch	*Carpodacus rhodochlamys*	Muscicapidae
92	Rofous backed shrike	*Lanius schach*	Lanidae
93	Rose ringed parakeet	*Psittacula krameri*	Psittacidae
94	Rufos-streaked accentor	*Prunella himalayana*	Muscicapidae
95	Rufous trustle dove	*Stretopelia orientalis*	Columbidae
96	Rufous-tailed flycatcher	*Muscicapa ruficauda*	Muscicapidae
97	Scaly-bellied green wood-pecker	*Picus squamatus*	Dicidae
98	Shikra	*Accipiter badius*	
99	Slaty blue flycatcher	*Muscicapa leucomelana*	Muscicapidae
100	Slatyuheaded parakeet	*Psittacula himalayana*	Psittacidae
101	Snow patridge	*Larwa lerwa*	Falconidae
102	Snow pigeon	*Columba leuconota*	Columbidae
103	Sparrow hawk	*Accipiter nisus nisosimilis*	Accipitridae
104	Spot winged grosbeak	*Mycerobas melanozanthos*	Muscicapidae
105	Spotted dove	*Stigmatopelia chinensis*	Columbidae
106	Spotted forktail	*Enicurus maculates*	Muscicapidae
107	Starling	*Sturnus vulgaris*	Sturnidae
108	Swallow	*Hirundo rustica*	Hirundinidae
109	Swift	*Apus apus*	Apodidae
110	Tickells leaf-warbler	*Phylloscopus affinis*	Muscicapidae
111	Tree sparrow	*Passer montanus*	Muscicapidae
112	Tytlerôs leaf-warblers	*Phylloscopus tytleri*	Muscicapidae
113	Variegated laughing thrush	*Garrulax variegates*	Muscicapidae
114	Western tragopan	*Tragopan melanocephalus*	Falconidae
115	White breasted kingfisher	*Halcyon omyrnensis*	Alcedinidae
116	White cheeked bulbul	*Pycnonotus leucogenys Leucogenys*	Pycnonotidae
117	White cheeked nuthatch	*Sitta leucopsis*	Muscicapidae
118	White throated tit	*Aegithalos leucogenys*	Muscicapidae
119	White-breasted dipper	*Cinclus cinclus*	Muscicapidae
120	White-browned rosefinch	*Carpodacus thura*	Muscicapidae
121	White-capped water-redstart	*Chairmarrornis leucocephalus*	Muscicapidae

122	White-winged redstart	*Phoenicurus erythrogaster*	Muscicapidae
123	Wren	*Troglodytes troglodytes*	Muscicapidae
124	Wryneck	*Jynx torquilla*	Dicidae
125	Yellow wagtail	*Motacilla flava*	Muscicapidae
126	Yellow-headed wagtail	*Motacilla citreola*	Muscicapidae

CHAPTER III

Utilization of the Produce

3.1. Agricultural customs and wants of the population

3.1.1 In Marwah area the arable land is limited in availability. Due to the ecological and social factors the land holdings are very small in nature. People had terraced the sloppy land for cultivation. Many of the area is under rainfed. The Irrigation and Flood Control Department is in the process of constructing new canals as well as maintains the old irrigation channels for feeding the agricultural fields. During summer season people are cultivating food crops such as rice, rajmash, buckwheat and maize. During winter in some places potato and wheat are raised. Walnut and Apple are cultivated in orchards. People are keeping livestock such as buffalo, cow, horse, sheep and goats. During summer the people are taking their livestock to the nearby pastures. During winter the livestock are stall fed. The people are busy during September and October months collecting grass forages for their livestock to be fed during winter. In lower elevation apiculture is followed in limited way. In Chatroo and adjoining area, sericulture is practised in minimal scale.

3.2. Markets and marketable products

3.2.1 As the agriculture is subsistence in nature, food grains are not available for marketing. People are depending on Public Distribution System for wheat and rice. Walnut and rajma are available in small scale for marketing. Sericulture is being practiced in some places in Chattroo. Wool, meat and milk are also available in limited scale for marketing.

3.3. Demand and supply of forest produce and pressure on forests

3.3.1.Timber

Demand for timber

3.3.1.1 About 80,000 people are living in the jurisdiction of the division. An average size of household is 6 and hence number of families worked out to be 13,333. In the remote places of this division timber is the major component of building construction. It was observed that for construction of a house about 30 cum of wood is required. Also the constructed houses require complete renovation after 25 years. The decadal growth rate of population is about 25% in this area, on an average 333 new houses need to be built. But due to socio- economic reasons, people opt live in joint family system hence approximately 40-50 new houses are built and about 500 houses are renovated every year in this division.

Timber requirement for construction of new houses = 50 x 30 = 1500 cum

Timber requirement for renovation of houses = 500 x 10 = 5000 cum

Total = 6500 cum

3.3.1.2 Most of the timber requirement is met through concession. Sometimes illicit damage does occur to meet the timber requirement.

3.3.1.3 For the concessionists who are living in the vicinity of the forests, dry fallen Kail and Fir trees are sanctioned by the DFO for construction purposes under Jammu Forest Notice. For fire victims the trees are sanctioned at free of cost. Also extracted timber in the form of scants is sold to the concessionists through Timber Sale Depots in subsidized rates in this Division.

3.3.1.4 Also forest lessees, later the State Forest Corporation (SFC) worked out the forests. They extracted the timber in log as well as sawn form. Earlier lessees had installed band saws in the forests for extraction. The extracted timber was transported by *Patroo*, rope ways and head load upto the road head or launching sites. River *Mahaning* was the common practice in this Division. The booms were erected at Dadpeth and Bhandarkote from where the extracted timber was transported by road to faraway places.

3.3.1.5 The Forest Department was supplying timber to other Government Departments for construction purposes, but it was stopped nowadays. Recently Government directed the forest department to supply the timber for the construction of primary schools under Sarv Siksha Abhiyan (SSA).

3.3.2. NTFP

3.3.2.1 The non-timber forest produces (NTFP's) such as *Dhoop, Kuth, Kour, Mushkbala, Diascoria, Bankakri, Baladona, Guchhies* are available in this Division. Except guchhies, the extraction and transportation of other NTFP's are banned by the Government. The extraction of NTFP's were auctioned by the Government for a period of one year and huge quantities of NTFP's were extracted before the ban. The extraction of guchhies from the Division is continued.

3.3.3 Fire wood

3.3.3.1 Majority of the area situated in temperate zone and local residents require fire wood for their domestic needs and warming their house during winter. Approximately about 10kg of firewood is required per soul per day during winter. About 2kg of firewood is required during summer season. Hence the total requirement of firewood is 1728000 quintals. Most of the firewood is collected from the forest area.

3.4. Methods of harvesting and their costs

3.4.1 Timber is harvested by manual means. The trees are marked either in the coupes or which are coming under the land diversion cases under J&K Forest Conservation Act, 1997. The Forest Department as well as State Forest Corporation are the two major agencies entrusted in the timber operation. In case of Guchhie's the contractor who is willing to pay highest royalty is allowed to extract it from the forest area for a period of one year.

3.5. Lines of export

3.5.1 The Udil Range is comparatively placed in better position than the other two Ranges in terms of connectivity. Majority of the area are connected by Kacha / Pacca roads and

Cellphone network. Kishtwar – Chatroo – Synthan – Anantnag road (NH1B) is bisecting the range. In Dachhan range, the road upto Dangdoroo was under construction. The remaining stretches of this road namely Dangdoroo to Lopara and Lopara to Nowpachi are at various stages of processing. In Marwah range, the block Head quarter Nowpachi and range head quarter Yourdoo are yet to be connected by road with Kashmir Valley by the stretches of roads namely Margon top to Inshan, Mulwarwan to Nowpachi (constructed upto Purana Kadal) and Purana Kadal to Nowpachi. Through these networks of roads the timber and the NTFP's are exported to other places.

3.6. Past and current Prices

3.6.1 The revised sale rate of timber in A, B and C concession zones, municipal council/ committee and municipal corporation areas was fixed in 2006 as under

Zone	Deodar (Rs./cft)	Kail (Rs./cft)	Fir/Spruce (Rs./cft)
A			
Log	161	102	59
Sawn	202	121	81
B			
Log	246	160	120
Sawn	281	193	136
C			
Log	Prevailing rate of J&K State Forest Corporation		
Sawn	Prevailing rate of J&K State Forest Corporation		

3.6.2 The revised sale rate of timber in A, B and C concession zones, municipal council/ committee and municipal corporation areas was fixed in 2010 as under

Zone	Deodar (Rs./cft)	Kail (Rs./cft)	Fir/Spruce (Rs./cft)
A			
Log	185	130	74
Sawn	215	160	104
B			
Log	345	245	138
Sawn	375	275	168
C and Muncipal Council & Committee areas			
Log	513	360	205
Sawn	543	390	235

3.6.3 The rates quoted above are exclusive of taxes. 13.5% of VAT and developmental charges @ Re.1.00 per cft is also levied over and above the cost.

CHAPTER IV

Activities of State Forest Corporation

4.1. Jammu & Kashmir State Forest Corporation

4.1.1 The J&K SFC was created by the act of legislation, namely The Jammu and Kashmir State Forest Act, 1978 and rules were framed in 1981. The forests were worked out by lessees in the olden days and later the forest working was nationalised by The Jammu and Kashmir Nationalisation of Forest Working Act, 1987.

4.1.2 The Forest Department hands over the coupes to SFC and levies the royalty. Before the ban of green felling of trees, the SFC was handling huge volume of timber every year. Due to the imposition of ban on green felling by the State Government and the various directives issued by the Hon'ble Supreme Court of India regarding felling, resulted in least quantum of timber extraction by SFC. Later, the Hon'ble Supreme Court of India endorsed the Qualitative and Quantitative norms (popularly called as Q&Q Norms), proposed by the State. As per the Q&Q norms, 80 lakh cft of standing volume of conifer trees (dry, fallen; basically hygienic markings) can be cleared in the State for extraction every year, but except few years, the limit of 80 lakh cft was never touched hence it resulted in financial crunch for the corporation.

4.1.3 The State Forest Corporation suggests the available volumes from different compartments. If the compartment fits to be worked out as per the conditions imposed by Q&Q norms, then only it is enumerated for dry / fallen trees. The CF (Working Plan Circle) issues the technical clearance. Based on the technical clearance, the trees in the compartment are marked. The marking list is sent to CF (Working Plan Circle) for issue of technical sanction. The CCF (Territorial) issues the Administrative Approval, based on the TS. Then the marking in the compartment is handed over to the SFC for extraction.

Table 4.1.Table showing the volume (in cft) handed over to SFC from Marwah Forest Division during 1979-80 to 2012-13

Year of Handing over	Deodar	Kail	Fir	Grand Total
1979-80	4,32,978	11,88,887	5,06,436	**21,28,301**
1980-81	6,84,707	3,26,660	1,81,283	**11,92,650**
1981-82	16,91,604	11,04,048	4,68,992	**32,64,644**
1982-83	2,74,548	1,14,016	21,545	**4,10,109**
1983-84	3,63,105	1,30,887	7,52,265	**12,46,257**
1984-85	8,49,585	4,79,681	4,48,810	**17,78,076**
1985-86	3,85,110	4,98,128	15,53,994	**24,37,232**
1986-87	2,31,178	1,22,470	83,386	**4,37,034**
1987-88	75,589	15,345	1,60,512	**2,51,446**
1988-89	10,31,373	5,75,696	13,00,580	**29,07,649**
1989-90	7,62,798	5,11,961	11,30,705	**24,05,464**
1994-95	4,24,873	6,18,902	12,30,238	**22,74,013**
1997-98	3,36,356	6,10,046	10,01,808	**19,48,210**

Year of Handing over	Deodar	Kail	Fir	Grand Total
1999-00	7,719	9,302	34,538	**51,559**
2000-01	1,31,849	1,29,037	84,762	**3,45,648**
2001-02	56,498	45,203	45,697	**1,47,398**
2002-03	90,505	1,14,146	87,532	**2,92,183**
2003-04	41,992	61,190	1,80,623	**2,83,805**
2004-05	42,850	59,423	6,978	**1,09,251**
2005-06	87,212	71,232	11,339	**1,69,783**
2008-09	1,97,588	49,791	0	**2,47,379**
2009-10	31,367	25,142	21,504	**78,013**
2010-11	75,114	26,209	13,556	**1,14,879**
2011-12	1,64,041	1,26,742	53,886	**3,44,669**
2012-13	0	0	0	**0**
Grand Total	**84,70,539**	**70,14,144**	**93,80,969**	**2,48,65,652**

4.1.4 The SFC prepares the estimate for the timber operation, based on the expected out turn and calculates the cost for extraction and transportation of timber upto its central depots. Then the SFC allocates the work to the contractors for execution of timber operation based on competitive bids. When the timber is dumped in the road head, the transportation of timber is permitted by either CF or the CCF (Territorial), after due verification of the stocks.

4.1.5 The entire operation of timber extraction and transportation shall be very closely monitored by the territorial field staff. From the starting of felling operation upto the disposal of debries and handing over the compartment back to the forest department, it should be monitored properly. The felling of marked trees shall start only after the proper handing over of the marking to the SFC. The felling shall always be on the Hill side; in rarest cases it is along the contour and never be on the down side. The falling tree shall never injure the other standing trees. Likewise there are many conditions. The territorial department shall be reported about the progress of the operation every month.

4.1.6 The felled tree is delimbed and logs of standard sizes are cut. The logs are debarked and rolled down to road head for further transportation in Kashmir valley, but extracted into scants for sale in Jammu province. The 10'X10"X5" wooden sleepers are called as BG sleepers as it was meant for Broad Gauge Railway Sleepers. Apart from BG, the terms used by local people meant for under-sized sleepers are *Pasale, Chakkoor* and *Dimdima*. The extracted scants are brought to road head either by head load, *Pathru* or aerial ropeway (*tar* span). The pathru is used when the extracted stuff is more than 30000 sleepers and intended to be transported from the higher elevation point to the lower destination through steeper path. When the sleepers have to cross longer distance and many deep valleys, the aerial ropeways are used. When the sleepers move under the force of gravity, no extra mechanical power is required. If it has to move against the gravity, the diesel engines are used to power the lifting of scants. If smooth moving water channel is available, the from the origin upto the destination, the scants are launched in water body and caught at the

boom erected at the destination. From the road-head the scants are loaded in trucks and transported. Form -25 (Transport permit) is issued by territorial division for monitoring the land transportation of forest produces.

4.1.7 Mostly, the timber is sold in open auction by SFC.

The rates in vogue in SFC for timber operations during 2013-14 is as follows.

#	Activity	Category (norm rate in Rupees)			
	SAWN FORM	**D**	**C**	**B**	**A**
(a)	**Extraction (on FMM)**				
1	Felling (per cft)	2.63	2.21	1.99	1.57
2	Hand Sawing ï under/odd size (per cft)	34.83	31.83	29.47	26.81
b.	Hand Sawing ï standard size (per cft)	39.81	36.37	33.68	30.64
(b)	**Off–road Transportation (on DMM)**				
3	Pathroo (per cft/Km of 33 chain)	5.82	5.66	5.52	5.37
4	Pacci nail (per Cft/Km of 33 chain)	2.18	1.96	1.96	1.88
5	Tarspan (per span/cft)	4.91	4.67	4.57	4.67
6	S.N Mahan (per cft per km of 33 chain)	1.53	1.44	1.44	1.33
7	Main Nallah Mahan (cft/Km)	1.33	1.33	1.33	1.33
8	Head carriage (forests) (per cft/chain)	0.43	0.43	0.43	0.43
9	Crane (per cft/Km)	7.36	6.99	6.99	6.99
10	H/C after nikkasi (per cft/chain)	0.45	0.45	0.45	0.45
(c)	**Minor Related Activity (on DMM)**				
11	Launching (S.N Mahaning) / Cft				0.32
12	Nikassi (per cft)				0.64
13	Stacking (per cft)				0.61
	LOG FORM				
(d)	**A. EXTRACTION (A1 +A3)**				5.90
	A1 CONVERSION				3.93
14	A1.1 Debranching &Debarking /cft				0.80
15	A1.2 Sawing &log marking/cft				3.13
16	A3 Felling (per cft)				1.97
17	Loading logs (per cft)				3.55
18	Un- loading Logs (per cft)				0.04

(e) Log Rolling

#	Log rolling upto Kutcha Loading Point (Per cft chain)	Norms Rate in Rupees
1	Category A (0-20 degrees)	0.73
2	Category B (20-30 degrees)	0.53
3	Category C (30-40 degrees)	0.38
4	Category D (> 40 degrees)	0.18

(f) Kutcha Road Transportation (Log Form) (Figures in Rupees)

Volume Slab Cft	Distance slab			
	0-50 km	**6-10 km**	**11-20 km**	**Above 21 km**
Upto 5000	2.69	2.06	1.61	1.26
5001-10000	2.64	1.91	1.35	0.93
10001-20000	2.51	1.86	1.32	0.91
20001-40000	2.39	1.76	1.25	0.86
40001-80000	2.26	1.63	1.14	0.76
Above 80001	2.13	1.53	1.07	0.71

(g) Pucca Road Transportation (Log Form) (Fig. in Rs.)

#	Distance slab in Km	Rate (in Rs/cft/Km)	Rate with 15% Contractor's profit (Rs/cft/km)
1	0-20	0.27	0.31
2	20-40	0.24	0.27
3	40-70	0.22	0.25
4	Above 70	0.19	0.22

(h) Pucca Road Transportation (Sawn Form) National Highways (Fig. in Rs.)

#	Distance slab in Km	Rate (in Rs/ cft/Km)	Rate with 15% Contractor's profit (Rs/cft/km)
1	0-50	0.14	0.16
2	51-100	0.13	0.15
3	101-150	0.12	0.13
4	Above 151	0.11	0.12

(i) Road Transportation (Sawn form)

Other than National Highways = Rs. 0.17/ cft/ km

(j) Loading charges (sawn timber) = Rs. 1.14/ cft

(k) Extraction in log form on old NPC procedure

Activity	Rate
Extraction including felling, conversion rolling etc. (all operations) upto KLP	At the average rate of Rs. 191 per labour per day as per NPC procedure

4.2. Results of Socio Economic Survey

4.2.1 The Chatroo and Marwah are the tehsils under the jurisdiction of the division. About 80,000 people with similar number of live stocks are living under the territorial jurisdiction of the division. In the rural areas very few people are getting the occupation in the State Government. The remaining people practise the rainfed agriculture and supplemented by rearing of animals for their subsistence and mostly live Below Poverty Line.

4.2.2 The people are largely benefitted by the welfare schemes of the Government such as MGNREGA, etc. Many people got seasonal employment in GREF under road construction activity. The food grains are supplied by fair price shops in the interior parts of the terrain, so that people are getting something to eat. The irony is that the cost of transportation of food grains is more than double its actual cost, as the only mode available for transportation is depends on *ponnies*.

4.2.3 As the tract is the remotest part of the State, most of the places are not covered under conventional electric grid. Part of the Udil range upto Chingam Village and upto Suid village in Dachhan Range, villages are covered under electricity grid. The remaining portion of these

ranges and entire Marwah Range is still uncovered by electrical grid. People are being distributed with solar operated light but it is not sufficient. People are still using the torch wood and kerosene lamps for lighting purpose.

4.2.4 As the most part of terrain is unconnected by road network, the modern fuels still not reached households of these villages and hamlets. People are still using the firewood for cooking and warming of their houses during winter.

CHAPTER V

Staff and labour Supply

5.1. Staff

5.1.1.Sanctioned strength of staff of Marwah Forest Division

Acute shortage of staff is noticed in this division. The following table shows the sanctioned and working strength of staff of Marwah Forest Division during 2012-13.

Table 5.1. Statement showing the Sanctioned and Working Strength of Marwah Forest Division.

S.No	Designation	Sanctioned Strength	Working Strength
1	DCF	1	1
2	ACF	1	0
3	Range Officer Grade-I	3	1
4	Range Officer Grade-II	2	0
5	Foresters	26	6
6	Deputy Foresters	10	3
7	Forest Guards	81	43
8	Senior Assistant	1	0
9	Junior Assistant	7	2
10	Driver	0	1
11	Cleaner	1	0
12	Chowkidhar FRH	11	9
13	Orderly	4	10
14	Mali	4	4
15	Watchers	1	9
16	Helpers		28
	Total	**153**	**117**

5.1.2. Daily rated workers of Marwah Forest Division

5.1.2.1 There were 52 daily rated workers working in this division prior to 31.01.1994 and they are allowed to continue. Out of which five workers had passed away, one got regularized and remaining 46 daily rated workers are working during 2012-13.

5.1.2.2 Keeping in view the extensive nature of these forests and their inaccessibility, the above staff strength is inadequate. Reorganisation of administrative blocks and beats, to suit to the present protection needs, has to be introduced. The Divisional Forest Officer had submitted such a proposal in consultation with the Conservator of Forest, to the Chief conservator of Forests for formal sanction of such posts.

5.2. Labour

5.2.1. Labour problem is acute in the Division. The local population though poor and healthy, shirks labour jobs, especially the Rajputs and Thakurs. This is one of the main reason of labour shortage in the locality. The local labour, whosoever is available, is not expert in various timber exploitation methods. Skilled labourers are imported from other places. Moreover various other projects by the GREF, MGNREGA are going on simultaneously in the locality and the choice of labour for Forest works is the last. The problem is becoming acute year after year. Mechanised logging methods, therefore shall be the only alternative in future to minimize the shortage of labour.

CHAPTER VI

Past system of management

6.1. General history of the forests of Marwah Forest Division

6.1.1. The early history of Kishtwar Forests is similar to the history of other neighbouring forests but it is considered to be the typical of the Department itself. In the beginning the control of Forests was with the Revenue Department and the Wazir-a-Wazarat who was the District Officer who administered with the help of few Tehsildars who managed the affairs of each Tehsil. Outdoor work of the field was controlled by a 'Girdawar' or 'Kembedar' in each illaqa who was having under him a few Rakhas and a Chaprasi for collection of revenue or forest dues from the villagers or the individuals. They did not care about the protection nor exerted any control over the quantity of produce consumed or wasted. The Rasums used to be paltry and the people were at liberty to fell as many trees as they liked from any place and of any size. People felled trees according to their choice near the habitations.

6.2. Past system of management and their results

6.2.1. Felling for export of timber was started in S. 1922 (1855 AD) originally through Punjab Traders and subsequently by the State Contractors. The written permits or pattas for felling certain number of trees were issued on payment of a fixed sum per tree in advance. The trees could be felled anywhere. Supervision was altogether non existent and no rules for forest conservancy were observed. The Permit holders hacked the forests ruthlessly and indiscriminately over accessible grounds along stream banks and around cultivations. The forests situated away from such sites escaped the brunt of such fellings.

6.2.2. Regular Forest Department was started in S. 1948 to S. 1964. and was organized under the control of Mr. Mac Donell, IFS as the first Conservator of Forests (Kashmir). The Udhampur Division comprised of the Udhampur and Reasi wazarats forests. In S 1950, immediate steps to stop wasteful method of working were adopted. The Forest Regulation No. I of S. 1951 was passed by the State Council with a view to introduce Forest Conservancy on systematic lines. The forest demarcation and survey of boundaries were undertaken for the first time. Construction of Forest roads and buildings to facilitate inspection was started. Organization of Ranges and beats was done with the provision of staff to cope up with the increased work. Felling were regulated within safe limits, mostly on dead, dying and diseased trees and the energy of the Department was diverted to extract the felled trees, logs and sleepers left in the forest by the former workers.

6.2.3. In S. 1961 sale of standing trees was introduced in place of Departmental working. In S 1963 Udhampur division was split up into Kishtwar and Reasi Division for carrying out more concentrated and effective management. The Kishtwar Division included whole of present day Kishtwar district, Doda district and parts of Ramban and Udhampur districts. The rest constituted Reasi Forest Division.

6.2.4. First Plan of Kishtwar Forest Division (S.1965 to S.1992, 1908 AD to 1935 AD)

6.2.4.1. First regular working Plan for Kishtwar Division was drawn up in S. 1965 and the forests were worked under the first plan from S. 1965 to S 1992. The forests were divided into two working Circles namely I and II, the former comprising compact and workable forests of the Division and latter included inaccessible and unworkable forests. Salient features of the working Circle was that the forests were worked under old selection system with a felling cycle of fourteen years. The yield was prescribed by number of Ist class Deodar trees. Other species, including Kail, were ignored and their removal permitted under Silvicultural necessity only. In addition to the above, the entire Working Circle was gone over in 7 years for removal of dead wood.

6.2.4.2. Kishtwar Division was split up further on Ist Poh. S 1981 (1924 A.D). The Kuntwara, Siraj and Marmat Ranges were transferred to the newly created Ramban Division. Ramban and Banihal Range of Reasi Division were also included in the Ramban Division. At the end of S 1983 (1926 A.D) Udil Range was also transferred to the Ramban Division leaving the present Kishtwar Division comprising five Ranges i.e. Kishtwar, Nagseni, Paddar, Dachhan and Marwah.

6.2.5. Harman Singh Pathania Plan (S.1985 to S.1997, 1928 to 1940 AD)

6.2.5.1. Revision of the first Plan was taken in S 1984 by Sh. Harnam Singh Pathania and the second Plan remained force till S 1997 (1940 A.D) including three years extension. The outstanding features of the plan were the formation of Deodar Kail working Circle, and the Unregulated Working Circle. These two newly formed working Circles were synonyms to the I and the II working Circles of the First Plan with a slight change in nomenclature.

6.2.6. Razdan Plan (S 1998-2017, 1942-1961 AD)

6.2.6.1. The above Plan was revised by Mr R N Razdan which remained in operation from S 1998 to S 2017 for period of twenty years inclusive of three years extension. In this plan as well, regular working of Deodar and Kail forests were prescribed only on accessible and well stocked areas. Fir was treated as uncommercial. If Fir trees were occurring in mixture with Deodar and Kail then they were permitted to be removed simultaneously on silvicultural grounds with the permission of the Chief Conservator of Forests. The Fir Forests were neither compartmentalized nor was treatment prescribed, except protection. A great deal of construction works such as repairs of existing roads, buildings and bridges and some new buildings and bridges came up during the plan period.

6.2.7. Chenab Valley Fir Plan (S 1998 to S 2007, 1941 to 1950 A.D)

6.2.7.1. Fir started receiving demand in the market during Razdan's plan and consequently a separate working Plan for Chenab Valley was prepared by Sheikh Ghulam Rasul in S 1997 for a period of ten years from S 1998 to S 2007. It included areas of compartment 18 and 19 of Marwah range, Bajpath, Warwan, Gumri, Sonder nar Fir forests, compartment 1 and 2 of Dachhan Range. But only Gumri, Sondar nar Fir forests, compartment 18, 19 Quaderna and

compartment 1 of Dachhan range were assigned for working. No Fir areas were laid out as separate compartment and were named after their local names. Fir Selection Working Circle was carved for working of these forests with an exploitable diameter of 30" with a rotation of 180 years. Felling cycle of 30 years was kept and forests were worked under one felling series i.e. loggable felling series in the whole Division. This plan could be implemented partially.

6.2.8. Reshi Plan (1961-62 to 1987-88 A.D)

6.2.8.1. Razdan's plan was revised by G Q Reshi which came into force in 1961-62 and was prepared for a period of 27 years ie from 1961-62 to 1987-88. With the conclusion of the plan it was thought of to have covered second felling cycle of 30 years including three years of extension granted to Razdan's Plan. An interim check after 13 years was prescribed but the plan was ordered to be revised after it had a currency of about seventeen years.

6.2.8.2 The salient features of Reshi's plan were that:-

1 All the commercial Fir forests of the tract were brought under regular scientific management for the first time in the history as fir had gained sufficient demand in the market by this time.

2 All the uncompartmentalized areas were comparmentised and allotted to various working Circles under the new plan. This resulted in more or less into reorganization of the forests in Marwah Range and as a consequence new serial numbers were assigned to the compartments. Intensive sub-compartmentation in Dachhan Range was resorted to. Fir forests were separated from Deodar and Kail Forests wherever possible.

3 Three working Circles were carved out namely Deodar Kail Selection, Fir Selection and Unregulated cum Improvement Working Circles. Both the Deodar Kail and Fir Selection working Circles were managed under the Indian Selection System.

6.2.8.3 Deodar Kail Selection Working Circle

This comprised of all the accessible Deodar Kail Forests with good amount of Fir. The natural regeneration of Deodar and Kail found to be profuse. The exploitable size was continued to be 30" dbh or 75 cm dbh for all the three species i.e. Deodar, Kail and Fir. A rotation period of 150 years for Deodar and Kail and 180 years for Fir was prescribed. 30 years felling cycle was followed. 54.3% of the commercial areas was enumerated down to 12" diameter in 6" diameter classes. The yield was regulated by Brandis method and checked by Von Mantles formula. The yield by Brandis method prescribed and followed in this plan for erstwhile Kishtwar Forest Division was as follows.

Deodar - 4,89,000 cft.

Kail - 2,69,000 cft

Fir - 4,15,000 cft

Total - 11,73,000 cft

The average yield per acre was 20 cft, 17 cft. and 45 cft. for Deodar, Kail and Fir respectively and was considered quite safe. The yield was to be realized from all the fit green and dry trees of 12" and above in diameter, marked for whatever purpose.

6.2.8.4. Fir Selection Working Circle

1 All the forests which predominate in Fir occurring whether pure or mixed with Deodar and Kail were allotted to this Working Circle. Due to steepness of the terrain, Selection System was prescribed. Exploitable diameter for all the three species viz., Deodar, Kail and Fir was kept as 30" with a technical rotation of 180 years for Fir which was followed in the case of Deodar and Kail as well. A felling cycle of 30 years was continued and the entire working Circle was assigned to one felling series.

2 Partial enumerations down to 12" dbh were carried out and nearly 33% of the area was enumerated. The yield was calculated and prescribed by Brandis method and checked by Von Mantles formula. The yield adopted during the plan period was:-

Deodar	-	75,000 cft.
Kail	-	90,000 cft
Fir	-	8,46,000 cft
Total	-	10,11,000 cft

The yield was to be realized from all the fit green and dry trees marked for any purpose in the entire Working Circle. The yield was taken to be quite safe. No definite prescription for closing the Fir areas was prescribed excepting some suggestion for closing area on experimental basis. Kuth areas were however directed to be closed in Dachhan and Marwah Ranges.

6.2.8.5 Unregulated Cum Improvement Working Circle

1 Forests situated in the remote and inaccessible areas where the working was not economical, were assigned to this Working Circle. This also includes huge areas that were poorly stocked and situated at high altitudes. Alpine pastures, rocky and precipitous areas, where conservation of vegetative cover was of paramount importance for water and soil conservation, water shed protection etc were also compartmented and included.

2 No regular felling operations were prescribed under this Working Circle. General protection and improvement was to be afforded to the crop during the plan period. Petty demands of the people were however permitted to be met from these forests out of trees 30" dbh. and over. Pasture lands were suggested in general to be managed on scientific lines but no guide lines were prescribed.

6.2.8.6 Miscellaneous Regulation

1 Exhaustive prescriptions regarding constructions of new roads, Bridges, Buildings and repairs of the existing infrastructure in the Division were prescribed along with other usual controls.

6.2.9 Achievement of Reshi Plan

6.2.9.1 The Plan was most elucidative than Razdan's Plan. Fir became commercially important and required regular management. This led to the transfer of Fir areas from the Unregulated Working Circle and also from the Deodar-Kail Working Circle of the last Plan to the newly created Fir Selection Working Circle. Intensive compartmentalization was thus carried out, but at places it was undesirable as the neighbouring sub-compartment was assigned to the same Working Circle. The directives regarding introduction of artificial regeneration were not stressed upon and this important prescription remained ignored. No closure for Fir areas requiring regeneration was imposed and such areas remained without and appreciable amount of regeneration. Subsidiary silvicultural operations were not attended to and majority of the worked out areas contain undecomposed felling debris which has added to the already woeful condition of the Fir Forests.

6.2.9.2 As regards the realization of the yield it was prescribed on much conservative grounds. Method of distribution of the surplus stock, as desired under Brandis yield regulation method in Selection forests was not suggested. With the result that most of the forests were worked out heavily. Thus future yield was encroached upon. Kail was prescribed to be favoured, with the result that markings in Kail were light and even the diseased Kail trees lift unmarked. This was largely due to the fact that the yield estimation in case of Kail was much on the lower side.

6.2.9.3 However, the records revealed that in both the Working Circles about 70 lakhs cft went in arrears. One of the obvious reasons is the limited scope of running lessees in the drainage and prescribed coupe has been often dropped. Secondly, the system of short period lessees, to conclude the working of the forests by the private enterprises before the initiation of the Nationalization of state forests, put a ceiling on the annual yield and induced a significant departure from the Working Plan prescriptions, even though the coupes were capable of yielding more. The plan yield thus also went in arrears.

6.2.10 Narsinghia's Plan for Dachhan and Marwah Ranges (1978-79 to 1987-88 AD)

6.2.10.1 The author revised the previous Working Plan pertains to Kishtwar Forest Division. The Dachhan and Marwah forest ranges of this division was covered under this plan. This plan proposed Mixed Conifers Selection Working Circle, Fir Selection Working Circle, Protection cum Improvement Working Circle and Unregulated and Wildlife Protection Working Circles.

6.2.10.2 Mixed Conifers Selection Working Circle

1 The compartments such as 1a, 2a, 4, 5, 6, 7, 8b, 8c, 9, 10a, 13, 15, 16a, 17, 18a, 19b, 20, 21a, 21b, 22, 23a, 24a, 26, 27a, 28, 29a, 30a, 30h, 36, 37, 38a and 39a of Dachhan Range and the compartments such as 2a, 2b, 4, 17, 18, 60, 62, 69, 72, 73, 79, 84 and 87b of Marwah Range were assigned to this working circle.

2 The annual yield prescribed for the Mixed Conifers Selection Working Circle was as follows.

Deodar	-	1.999 cu.m/Ha (70.5940 cft/Ha)
Kail	-	2.343 cu.m/Ha (82.7423 cft/Ha)
Fir	-	0.575 cu.m/Ha (20.3060 cft/Ha)
Average Yield	-	4.917 cu.m/Ha (173.6423 cft/Ha)

6.2.10.3 Fir Selection Working Circle

1 The compartments such as 1b, 1c, 3, 10c, 11, 12, 14, 24k, 24l, 25, 29f, 29g, 29h, 30e, 30f, 30g, 31a, 31b, 32, 33, 34a, 35a and 35b of Dachhan Range and the compartments such as 1, 3, 5, 7, 8, 10, 12, 13, 19, 22, 23a, 24, 26, 27, 30b, 31, 32, 35, 42, 43, 47, 56, 57, 58, 59, 64, 67, 80, 81, 82, 85, 86 and 87a of Marwah Range were assigned to the working circle..

2 In case of Fir Selection Working Circle the annual yield was prescribed as follows

Deodar	-	0.810 cu.m/Ha (28.6050 cft/Ha)
Kail	-	0.988 cu.m/Ha (34.8909 cft/Ha)
Fir	-	3.096 cu.m/Ha (109.3343 cft/Ha)
Average Yield	-	4.894 cu.m/Ha (172.8302 cft/Ha)

6.2.10.4 Protection cum Improvement Working Circle

1 The compartments such as 16b and 39b of Dachhan Range and 51 and 52 of Marwah range were assigned to this working circle. No commercial yield was prescribed.

6.2.10.5 Unregulated and Wildlife Protection Working Circles.

1 The compartments such as 2b, 8a, 8d, 10b, 18b, 19a, 19c, 21c, 23b, 24b, 24c, 24d, 24e, 24f, 24g, 24h, 24i, 24j, 27b, 27c, 29b, 29c, 29d, 29e, 30b, 30c, 30d, 30i, 34b and 38b of Dachhan Range and the compartments such as 6, 9, 11, 14, 15, 16, 20, 21, 25, 28, 29, 30a, 33, 34, 36, 37, 38, 39, 40, 41, 44, 45, 46, 48, 49, 50, 53, 54, 55, 61, 63, 65, 66, 68, 70, 71, 74, 75, 76, 77, 78 and 83 of Marwah Range were assigned to this working circle. No commercial yield was prescribed.

6.2.11 Narsinghia's Plan for Udil Range (1978-79 to 1987-88 AD)

1 The author revised the previous working plan of Doda Forest Division. The compartments 30/U to 135/U of Udil forest range was covered under this plan. He prescribed Deodar and Kail Uniform Working Circle, Mixed Conifers Selection Working Circle, Fir Selection Working Circle, Improvement Working Circle, Reboisement Working Circle and Unregulated Working Circle.

6.2.11.1 Deodar Kail Uniform Working Circle

1 The compartments such as 30, 33a, 33b, 34b, 35a, 35c, 49a, 50, 51a, 52a, 58, 59b, 60a, 60c, 61, 62, 63, 64, 66a, 66b, 67a, 67c, 70a, 70c, 72a, 78b, 79b, 80a, 80b, 81a, 81b, 82, 83a, 83c, 84a, 90c, 91b, 94b, 95a, 97b, 97c, 98a, 98c, 99b, 99c, 100, 102b, 103a, 104, 105a, 106b, 106c, 107b, 108b, 108c, 110a, 127a and 129a of Udil Range were assigned to Deodar Kail Uniform working circle. The annual yield prescribed for Deodar Kail Uniform Working Circle was as follows.

Deodar	-	1.295 cu.m/Ha (45.7325 cft/Ha)
Kail	-	1.513 cu.m/Ha (53.4311 cft/Ha)
Fir	-	5.598 cu.m/Ha (197.6916 cft/Ha)
Average Yield	-	8.406 cu.m/Ha (296.8552 cft/Ha)

6.2.11.2 Fir Selection Working Circle

1 The compartments such as 35b, 36b, 37, 38, 41, 46, 49b, 51b, 52b, 53, 54, 67b, 68b, 70b, 70d, 71, 74, 75, 76, 77c, 78a, 79a, 83b, 84b, 90b, 91a, 93c, 94a, 97a and 131 of Udil Range were assigned to Fir selection working circle. The annual yield prescribed for this Working Circle was as follows.

Deodar	-	0.183 cu.m/Ha (6.4626 cft/Ha)
Kail	-	0.388 cu.m/Ha (13.7021 cft/Ha)
Fir	-	3.120 cu.m/Ha (110.1819 cft/Ha)
Average Yield	-	3.691 cu.m/Ha (130.3466 cft/Ha)

6.2.11.3 Mixed Conifers Selection Working Circle

1 The compartments such as 31, 32, 34a, 34c, 36a, 40, 42, 47, 48, 52c, 59a, 65, 68a, 69, 72b, 73, 87, 88, 89, 90a, 93b, 103b, 106d, 108a, 109a, 110b, 111, 124, 126, 127b, 128, 129b and 130 of Udil Range were assigned to mixed conifers selection working circle. The annual yield prescribed was as follows.

Deodar	-	1.102 cu.m/Ha (38.9168 cft/Ha)
Kail	-	0.729 cu.m/Ha (25.7444 cft/Ha)
Fir	-	0.742 cu.m/Ha (26.2035 cft/Ha)
Average Yield	-	2.573 cu.m/Ha (90.8647 cft/Ha)

6.2.11.4 Improvement Working Circle

1. The compartments such as 51c, 98b, 99a, 102a, 105b, 106a and 107a of Udil Range were assigned to improvement working circle. No commercial yield was prescribed.

6.2.11.5 Reboisement Working Circle

1. The compartments such as 75a, 77b, 92, 93d, 95b, 101 and 125 of Udil Range were assigned to reboisement working circle. No commercial yield was prescribed.

6.2.11.6 Unregulated Working Circle

1. The compartments such as 39, 43, 44, 45, 55, 56, 57, 60b, 77a, 85, 86, 93a, 96, 109b, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 132, 133, 134 and 135 of Udil Range were assigned to unregulated working circle. No commercial yield was prescribed.

6.2.12 Achievements of Narsinghia's Plans in Marwah Forest Division

1. These prescriptions were followed during marking of the trees for commercial exploitation. The commercial extraction of timber from the forest was continued till 1990. All the accessible forests were worked on scientific basis, which is manifested in the form of good stand of crop on today. The Hon'ble Supreme Court of India also directed all the State Governments to fell the trees only on the basis of Working Plan prescriptions and also directed to ensure regeneration in the areas of commercial exploitation. As the Working Plans were not revised at appropriate time, commercial exploitation of green trees from the Forests was not taken up.

Table 6.1. Abstract of Estimated Growing Stock in the commercial working circles by Narsinghia's plan

Working Circle	Growing Stock (in cum)			Total GS (in cum)	Commercial area (In ha.)	Average GS (in cum/ ha.)
	Deodar	Fir	Kail			
Dachhan Range						
Fir Selection working Circle	62,948	10,23,511	26,844	11,13,303	3,724	298.95
Mixed Coniferous Seclection Working Circle	4,60,375	65,695	1,69,448	6,95,518	4,586	151.66
Total	**5,23,323**	**10,89,206**	**1,96,292**	**18,08,821**	**8,310**	**217.67**
Marwah Range						
Fir Selection working Circle	30,157	32,23,671	97,127	33,50,955	9,826	341.03
Mixed Coniferous Seclection Working Circle	2,11,442	55,756	1,13,296	3,80,494	2,723	139.73
Total	**2,41,599**	**32,79,427**	**2,10,423**	**37,31,449**	**12,549**	**297.35**
Udil Range						
Deodar Kail Uniform Working Circle	5,74,775	9,203	5,15,338	10,99,316	5,598	196.37
Fir Selection working Circle	3,596	17,43,523	3,568	17,50,687	4,147	422.09
Mixed Coniferous Seclection Working Circle	2,74,503	1,57,470	1,45,265	5,77,238	4,057	142.27
Total	**8,52,874**	**19,10,196**	**6,64,171**	**34,27,241**	**13,802**	**248.29**
G. Total	**16,17,796**	**62,78,829**	**10,70,886**	**89,67,511**	**34,661**	**258.71**

6.2.13 Yield recommended and marking taken up in Marwah Forest Division

6.2.13.1 Working Circle Wise Analysis

The Working plans recommended the total removal of 7,71,874 cum during the plan period between 1978-1979 to 1987-1988 but the total removal between 1978-1979 to 2011-12 was to the tune of 7,27,270 cum (includes the removal by concensists also) and 44,604 cum went on arrear.

2 Deodar Kail Uniform Working Circle

The working plan recommended a removal of 25,644 cum of wood from the conversion area during the plan period. But the total removal was 26,575 cum till 2011-12. The working plan recommended the thinning yield of 58,903 cum from the converted areas, against which 1,14,114 cum was extracted till 2011-12. In the unallotted block an yield of 31,390 cum was recommended to be marked against which 1,04,742 cum was marked till 2011-12.

3 Fir selection working Circle

The working plan recommended a removal of 4,73,928 cum of wood from the fir selection working circle against which 1,67,115 cum was marked till 2011-12.

4 Mixed conifer selection working circle

1,82,008 cum of wood was prescribed to be marked during the plan period, against which 2,58,137 cum was marked till 2011-12.

5 Uncommercial working circle

56,585 cum of wood was marked from the uncommercial working circle primarily to meet the local demand.

6.2.13.2 Range wise analysis

The working plan recommended to remove 1,48,492 cum of wood from the Dachhan range in the commercial working circles against which only 69,236 cum (46.63%) of wood was marked till 2011-12. Against a recommended yield of 3,38,427 cum of wood to be removed, only 66,678 cum (19.70%) of wood was removed from Marwah range till 2011-12. Against a recommendation of 2,84,954 cum, 5,34,769 cum (excess of 87.67%) of wood was marked and removed from the commercial forest of Udil range. It showed that the extraction was taken up more than the prescribed limits in the accessible Udil range and the inaccessible Marwah and Dachhan ranges where left untouched.

6.2.13.3 Purpose wise analysis

S. No.	Purpose	Volume of timber marked (Cum)	Percentage
1	Concession	32,822	4.43
2	Departmental Extraction	4,172	0.56
3	Marking Handed Over to SFC	7,04,019	95.01
	Total	**7,41,014**	

6.2.14 Between 1979-80 to 1990-91 timber to the tune of 5,31,703 cum was marked for extraction. It constitutes 71.75% of total marking between 1979 to 2011. Between 1991-92 and 2000-2001, 1,42,978 cum of timber (19.30%) was marked for exploitation. Between 2001-02 and 2011-12 about 66,332cum (8.95%) of timber was marked for removal. The remarkable variation in timber extraction during the 35 years is due to reasons such as imposition of ban on green felling by the State Government in 1990, directives of the Hon'ble Supreme Court of India since 1996, prevalence of disturbed conditions in the State between 1989 to 2006 and lack of skilled man power for timber extraction.

CHAPTER VII

STATISTICS OF GROWTH AND YIELD

7.1 Preparation of local volume table of conifer species

7.1.1 The Marwah Forest Division is located in the upper catchment of Chenab valley. This region is the home of Himalayan conifer species. The review of published literatures indicated that this region is traditionally having well stocked conifer forests and it was exploited in a scientific way to meet the demand of the country. The Government of India had conducted Pre-investment Survey of Forest Resources of Chenab valley and presented the interim inventory results in 1971. The purpose of the study was to find to the economic availability of raw materials for the development of forest based industries in the region. During the study they had used the combination of aerial photography and 0.1 ha sample plots to obtain more precise estimation of growing stock. As part of the exercise, they have designed the volume equation for all the major conifer species.

7.1.2 Mr. B.L. Tickoo, ACF had carried out studies in the Chenab valley in late 1970s to prepare the volume equations. He analysed the data using computer and presented his findings.

7.1.3 During the last working plan revision, an exercise was carried out in Kishtwar division to derive the local volume equations of major conifers. During the exercise, 809 trees of conifers were measured in the coupes covering the entire area of erstwhile Kishtwar Division. The author of the Kishtwar working Plan Sh. Narsinghia has presented his findings in the working plan. During the same period the working plan of Doda Forest Division was also under revision and volume equation where derived using the similar exercise in the division also. The Kullu volume table (the local volume table of Himachal Pardesh State forest department for the Kullu region) is presently used in this State. The derived volume equations are presented below.

7.1.3.1 Pre-investment survey of forest resources interim inventory results.

Volume equation for Deodar $V = 0.343140-3.646670*D + 14.295253*D^2$

Volume equation for Kail $V = 1.009923- 7.586554*D + 18.608842*D^2$

Volume equation for Fir $V= 0.023802-0.984622*D + 10.182621*D^2$

Where V= Volume of the standing tree in cubic meter and

D= over bark diameter of the tree at breast height in meters

7.1.4 The volume equation derived during the working plan revision exercise in 1978 in Kishtwar Forest Division is as follows.

Volume equation for Deodar $V = 0.03325-0.0197*D + 0.0013*D^2$

Volume equation for Kail $V = 1.00075- 0.0678*D + 0.00182*D^2$

Volume equation for Fir $V= 0.5462-0.0023*D + 0.00116*D^2$

Where V= Volume of the standing tree in cubic meter and

D= over bark diameter of the tree at breast height in centimetres

Comparison of local volume tables derived from different sources.

7.1.5 DEODAR **(Vol. in Cum)**

Dia - Class	Kishtwar Local volume Table	Preinvestment survey for Chenab Valley	Doda Local volume table	Kulu Volume Table	Tickoo's volume table for Chenab valley
10-20	0.15	0.17	0.15	0.13	0.22
20-30	0.36	0.47	0.45	0.13	0.66
30-40	0.94	1.00	0.95	0.76	1.36
40-50	1.87	1.77	1.65	1.33	2.31
50-60	2.88	2.77	2.55	2.10	3.5
60-70	4.24	4.01	3.70	3.14	4.87
70-80	5.87	5.49	5.05	4.39	6.43
80-90	7.75	7.20	6.65	5.66	8.04
90-100	9.89	9.15	8.45	6.85	9.79
100& above	12.30	11.34	10.55	7.56	11.57

7.1.6 KAIL **(Vol. in Cum)**

Dia - Class	Kishtwar Local volume Table	Preinvestment survey for Chenab Valley	Doda Local volume table	Kulu Volume Table	Tickoo's volume table for Chenab valley
10-20	0.39	0.12	0.20	0.13	0.22
20-30	0.50	0.36	0.58	0.13	0.67
30-40	0.86	0.88	1.00	0.76	1.41
40-50	1.64	1.64	1.70	1.36	2.30
50-60	2.78	2.65	2.60	2.27	3.20
60-70	4.28	3.91	3.65	3.34	4.21
70-80	6.15	5.43	4.90	4.42	5.32
80-90	8.39	7.20	6.35	5.35	7.55
90-100	10.98	9.22	7.95	6.14	8.84
100& above	13.95	11.49	9.80	6.74	10.28

7.1.7 FIR **(Vol. in Cum)**

Dia - Class	Kishtwar Local volume Table	Preinvestment survey for Chenab Valley	Doda Local volume table	Kulu Volume Table	Tickoo's volume table for Chenab valley
10-20	--	0.11	0.10	0.13	0.12
20-30	--	0.41	0.25	0.13	0.39
30-40	0.87	0.97	0.80	0.85	0.87

Dia - Class	Kishtwar Local volume Table	Preinvestment survey for Chenab Valley	Doda Local volume table	Kulu Volume Table	Tickoo's volume table for Chenab valley
40-50	1.70	1.80	1.50	1.56	1.59
50-60	2.95	2.90	2.40	2.97	2.56
60-70	4.34	4.26	3.55	4.90	3.78
70-80	5.96	5.90	4.95	6.85	5.24
80-90	7.82	7.80	6.65	8.30	6.94
90-100	9.92	9.99	8.65	9.40	8.83
100& above	12.22	12.42	11.00	10.19	10.93

7.1.8 From the above tables it is evident that the local volume table for Kishtwar region is found to be very close to the local volume table prepared by the pre-investment survey for Chenab region. The other two tables such as local volume table for Doda region and Tickoo's volume table for Chenab region are very close to each other and the Kulu volume table recorded leaser volume than the other tables in many instances. As a policy the Kulu volume table is used by the Forest department in this State.

7.2. Working circle wise assessment of growing stock

7.2.1 The method of working circle wise assessment of growing stock is presented as follows.

For estimation of growing stock, stratified random sampling technique was adopted coupled with remote sensing and GIS tools. The entire divisional area is stratified and the random points were generated in the GIS software. The random points served as the centre of the 0.1 ha. sample plots.

7.2.2 Stratification of the demarcated forest area

The stratification (segregation of the heterogeneous population into more or less homogeneous sub-groups) of the demarcated area into different strata by grouping compartments was carried out on following lines.

I. First stage stratification of total demarcated forests area into.	1. Wooded commercial area 2.Uncommercial wooded area, blanks, pastures and glaziers
II. Second stage stratification of wooded area into.	Production Stratum Conservation Stratum.
III. Third stage stratification of production stratum into.	Deodar Kail Irregular sub-stratum Mixed conifer sub-stratum Fir sub-stratum
IV. Fourth stage stratification of deodar ï Kail Irregular sub- stratum into periodic blocks.	Conversion block Converted block Unallotted block

7.2.3. The number of sample points required to be surveyed and measured in each of the above strata to achieve the desired accuracy of 20 percent at 95 percent confidence level was computed on the basis of a preliminary survey.

Name of Stratum/ Sub Stratum	No. of sample points surveyed.
Deodar Kail sub- stratum	
Conversion block	6
Converted block	37
Unallotted block	28
Sub-Total	**71**
Mixed Conifers sub-stratum	**51**
Fir sub-stratum	**68**
Conservation sub-stratum	**109**
Grand Total	**299**

7.3.1 Allocation of compartments to various working circle

The compartment allocation during the previous working plan was consulted. The compartment wise marking carried out during the period of 1978 to 2012 was studied carefully. The working plan officers visited more than 50% of the compartments and observations regarding availability of growing stocks, distribution of various dia classes in the compartment and the regeneration established in the areas where felling operations carried out, were made. As per the observation and the inferences the compartments were allocated into various working circles.

7.3.2 Laying out of compartments in the field

The compartments were laid down in the field by making coal tar rings of 10 cm width in the centre of 30 cm dry wide ring on the trunk of suitable trees. Compartment number and the boundary features have been carved and painted with coal tar at breast height on suitable tree trunks at the base middle and top of the compartment and in important locations. More detail descriptions regarding compartment lay out is given in 8.5.

7.3.3 Creation of GIS platform for working plan exercise

Using open source softwares, scanned maps, satellite imageries such as LISS III (supplied by ISRO, Hydrabad) LANDSAT 7 (supplied by USGS) and Google Earth, the GIS plate form for Marwah forest Division was created. Using DEM produced from Cartostat I and the rectified working plan maps the compartment boundaries of Marwah and Dachhan ranges were digitised.

Intensive sub compartmentalization of Udil range was carried out during last working plan revision but the map was not clearly depicting the boundaries. Hence an extensive study of boundaries of all the sub compartments was carried out. Mr. Abdul Kabir Giri, (Retired R.O Udil Range) and Mr. Mohammad Munwar Bhat, (R.O Marwah) had described the boundaries of all sub compartments of Udil range. Based on their descriptions, the boundaries were drawn on the map of 1:15000 scale and verified in the field. Then the maps were rectified

and used along with digital elevation model of the Cartostat I imagery, for digitization the boundaries of compartments/ sub compartments of Udil range. The horizontal area of the compartment was calculated in the GIS softwares.

7.3.4 Stratification of forest area

Using open source satellite imageries the commercial forest areas of the compartments were identified, digitised and map was prepared. The map of commercial forest area of the various working circles was sent to the field for verification. After verification, the map was used for sampling exercise. A pilot survey was conducted in the working circles to ascertain the numbers of sample plots to be laid down in the commercial forest area for estimation of growing stock. Based on the pilot survey the number of sample plots was decided using statistical analysis. The GIS software was used to locate the centre of the sample plots in the commercial forest area of the working circle, randomly. The location of the plot centres were transferred to GPS (Global Positioning System). Using the GPS the field survey parties located the centre of the plot in the field and laid down 0.1 ha sample plots and collected the required data.

7.3.5 Laying out of 0.1 Ha sample plot in the field

The random points were reached in the field by use of GPS. The random point will be the centre of the plot. In plain areas, from the centre of plot 22.36 m was measured in four directions, i.e. North, south, east and west using compass, and pegs were fixed on ground. The inter distances between the pegs were measured and adjusted to 31.62m so that it encloses an area of 0.1 Ha. If the terrain is slopy, angle of slope was measured using hypsometer. Based on the degree of slope, slope correction factor was used and the length of the plot was adjusted so that 0.1 ha of horizontal area was delineated for sampling. Once the plot of 0.1 Ha horizontal area was delineated on the field, all the trees/ poles having diameter, more than 10 cm is enumerated and tabulated, dia class wise and species wise, in the form, for estimation of growing stock. All the entities of less than 10 cm was considered as seedling and counted as regenerations. Using wedge prism (Factor 1), the no. of tally trees and half tally trees were counted. The height of the tree and its corresponding dia class was also measured and noted in the form. Signs of wild life and other important parameters were also recorded in the form.

The sample plot enumeration data were compiled working circle wise and the parameters such as dia class wise, species wise distribution of stems and corresponding volume in the working circle and basal area of the crop were calculated.

7.4 Survival Co-efficient

The growth and statistics of the previous working plans of the Chenab circle were consulted. The Yield tables of common Indian timber species (Himalayan region) Volume –I complied in the Directorate of Forest education and published by Forest research Institute & colleges Dehra Dun in 1967 was also consulted. The growth statistics of conifer species of Kullu region, published by Troop was also studied carefully. The data on the relationship between age and dia class of major conifers, presented by Troop was found to be more appropriate for this region and compared with the field observations. It was found that both are similar and it was used in the present study.

7.5 All the data were analysed in Microsoft Excel computer package.