REPORT ON INVERTORY OF TREES OUTSIDE FOREST RURAL (TOF-R) IN HIMACHAL PRADESH

Forest Survey of India
Ministry of Environment, Forest & Climate Change
Government of India
Dehradun, Uttarakhand

FOREWORD

Trees outside Forest (TOF) are recognized as an important component of biotic resources in a State. A major proportion of timber, fuel wood and small wood used by people comes from TOF that exist in the form of small woodlots and block plantations, trees along linear features such as roads, canals and bunds as well as scattered trees standing on farmlands, homesteads, community lands and urban area.

Recognizing the importance of TOF, FSI initiated the assessment of TOF in the early 1990s. Initially, this assessment was confined to the districts or State level. Since 2003, FSI has been generating national level estimates of TOF every two years. FSI has also carried out assessment of TOF for some states like Punjab, Uttar Pradesh, Tamil Nadu, Uttarakhand and Jammu & Kashmir on a project mode at the request of the respective State Forest Departments.

Himachal Pradesh Forest Department (HPFD) requested FSI in May, 2019 to carry out inventory of TOF in rural and urban areas of the State. FSI accepted the task of estimation of volume and potential production in TOF areas of 12 districts of Himachal Pradesh State on a project mode through its Northern Zone Regional Office at Shimla in collaboration with HPFD. The project was started in August 2020. However, due to the restrictions the COVID pandemic, the project could not move forward as per the schedule. The field work of the project was taken up in April, 2022 and the project was completed in 2023. A methodology using high resolution remote sensing data was applied for assessing TOF areas. Plots were approached using GPS and data on the ground was collected and recorded in field forms. The field work under this study is carried out by the Himachal Pradesh Forest Department. The present report is the output of an exhaustive and rigorous exercise.

The report is divided into six chapters describing the methodology used for assessment of TOF, field work, data processing, analysis and results. There are annexures containing data on distribution of species and diameter class, total number of stems & stems/ha and their volume & vol. /ha for rural areas of the (AOI)- Area of Interest in all the 12 districts. In addition to stems and volume, potential production in TOF areas has also been estimated species wise for entire State. The results indicate that the total stems for Himachal Pradesh is estimated as 140.05 million with a wood volume of 32.97 million cubic meter. The total potential production is estimated to be 0.282 million cum.

I take this opportunity to place on record my appreciation for the sincere efforts made by officers and staff of Forest Inventory Unit of FSI Headquarters, Dehradun and field staff of Northern Zone, FSI, Shimla in preparing the report. The cooperation received from the officers and staff of HPFD is warmly acknowledged.

It is hoped that the information given in the report would help the State Forest Department to chalk out appropriate policy for establishment of wood based industries in the state and also help the planners to understand the production and supply position of timber and small wood in the state and develop policies and strategies accordingly.

21.11.23

(Anoop Singh)
Director General, FSI

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EXECUTIVE SUMMARY

Trees outside Forest in Rural areas (TOFR) exists in the form of small woodlots and block plantations, trees along linear features such as roads, canals, bunds etc. and scattered trees on farmlands, homesteads and community lands. They serve a number of economic and ecological functions and, therefore, TOFR requires to be managed in a planned and systematic manner.

In Himachal Pradesh, the notified forest area is 68.16 percent of total geographic area of the state, however, a significant proportion of tree wealth of the state lies outside the notified forest area. Rural area of Himachal Pradesh has been planted with trees like *Pinus roxburghii/longifolia, Grewia oppositifolia, Cedrela toona (Toona ciliata), Pyrus species*, and *Acacia catechu* in large amount. The Forest Department of Himachal Pradesh requested Forest Survey of India to estimate number of stems and volume of wood in Trees Outside Forest in Rural areas (TOFR) of 12 districts of Himachal Pradesh State. Accordingly, FSI took up this task on a project mode in collaboration with Himachal Pradesh Forest Department. The field works were carried out by the staff of Himachal Pradesh Forest Department under the supervision of Forest Survey of India. The data entry and data processing work was carried out by Forest Survey of India. On the basis of inventoried districts, stems and their volume according to species and diameter have been estimated for all the districts of Himachal Pradesh state.

The methodology used by FSI for this project is same as used for national forest inventory of TOFR. The optimum plot size and number of samples required for each stratum (Block, Linear and Scattered) has been determined on the basis of past National Forest Inventory data conducted earlier by FSI. The optimum plot size for Block and Linear strata are 0.1 ha and 10mx125m strip respectively. In case of Scattered stratum, the optimum size of sample plot for non-hilly areas has been ascertained as 3.0 ha and 0.5 ha for hilly areas. The sample sizes for Block, Linear and Scattered stratum have been determined as 35, 50 and 50 respectively. However, the number of sample points may increase depending upon the variability in each district and desired sampling intensity. Shortfall of desired sample points in one stratum is compensated from other stratum.

MAJOR FINDING OF THE INVENTORY IS HIGHLITED BELOW:

- The total estimated stems in TOF rural areas of Himachal Pradesh are 140 million. The number of stems per hectare in the state is estimated as 92.69 stem.
- The total estimated volume of wood in TOF is 32.97 million cum. The volume per hectare in the state is estimated as 21.82 cum.
- Mandi district has the maximum number of stems of 32.27 million having 7.16 million cum volume and minimum in Lahul & Spiti district which is 1.09 million and 0.20 million cum respectively. The number of stems per hectare in rural areas is highest in Mandi (170.83) and lowest in Lahul & Spiti (5.83).
- The dominant species in TOF rural areas of Himachal Pradesh in terms of number are *Pinus roxburghii/longifolia* (11.68 million), *Grewia oppositifolia* (11.13 million), *Cedrela toona* (7.46 million), *Pyrus species* (6.75 million), *Acacia catechu* (6.36 million), *Celtis australis/tetrandra* (6.11 million), *Mangifera indica* (5.86 million), *Quercus leucotrichophora* (5.81 million) and *Eucalyptus species* (5.04 million).

- The main 10 species contributing volume in Tree Outside Forest (Rural) of Himachal Pradesh are *Pinus roxburghii/longifolia* (4.10 m.cum), *Cedrela toona* (2.45 m.cum), *Grewia oppositifolia* (2.07 m.cum), *Celtis australis* (1.77 m.cum), *Quercus leucotrichophora* (1.51m.cum), *Mangifera indica* (1.48 m.cum), *Eucalyptus species*(1.01 m.cum), *Pinus excelsa/wallichiana* (0.98 m. cum), *Syzygium cumini* (0.89 m.cm) and *Alnus nitida* (0.86 m.cum).
- The total annual potential production from TOF (Rural)has been estimated to be 1.49 million cum.

The standard error percentage for estimated stems and volumes has been found to be 2.20 and 2.32 respectively which is well in the acceptable limit as per the sampling design.

CONTENTS

Chapter – 1
Introduction

1. Introduction

The State of Himachal Pradesh has a geographical area of 55,673 sq km, which constitutes 1.69% of the geographical area of the country. The State lies between 30º22'N to 33º12'N latitude and 75º45' E to 79º04' E longitude and is bordered by Jammu & Kashmir in the North, Punjab in the West, Haryana in the South and Uttarakhand in the Southwest. The State has international border with China in the East. Predominantly a mountainous State in the western Himalayas, the State has three distinct regions viz the Shiwaliks with altitude upto 1,500 m, middle Himalayan region between 1,500 m to 3,000 m and the Himadris higher than 3,000 m. About one third of the area in the State is permanently under snow, glaciers and cold desert. The tree growth is minimal in this region due to harsh conditions. The average annual rainfall is about 1,800 mm. The temperature varies from sub-zero to 35°C. The Satluj, Beas, Ravi, Chenab and Yamuna are the important rivers of the State. The State has 12 districts all of which are hill districts and three tribal districts. As per the 2011 census, Himachal Pradesh has a population of 6.86 million accounting for 0.57% of India's population. The rural and urban population constitutes 89.97% and 10.03% respectively. Tribal population is 5.71% of the State's population. The population density of the State is 123 per sq km which is much lower than the national average. The 19th livestock census 2012 has reported a total livestock population of 4.84 million.

Table 1.1 Land Use Pattern

Land Use Types	Area (in 000' ha)	Percentage
Geographical Area	5,567	
Reporting area for land utilization	4,577	100.00
Forests	1,124	24.56
Not available for land cultivation	1,136	24.82
Permanent pastures and other grazing lands	1,501	32.79
Land under misc. tree crops and groves	68	1.49
Culturable wasteland	120	2.62
Fallow land other than current fallows	20	0.44
Current fallows	65	1.42
Net area sown	543	11.86

Source: Land Use Statistics, Ministry of Agriculture, GOI, (2017-18)

1.1.Overview of Forestry Scenario

As per the Champion & Seth Classification of Forest Types (1968), the forests in Himachal Pradesh belong to 8 Type Groups which are further divided into 39 Forest Types. The forests in the State can be broadly classified into coniferous forests and broad-leaved forests. Distribution of species follows altitudinal zonation. The vegetation varies from dry scrub forests at lower altitudes to alpine pastures at higher altitudes. In between these two extremes, distinct vegetational zones of Mixed Deciduous Forests, Bamboo, Chir Pine, Oak, Deodar, Kail, Fir and Spruce are found. More than 95 species are endemic to Himachal Pradesh and characteristic of Western Himalayan flora, while about 5% (150 species) are exotic, introduced over the last 150 years. The State Government aims at bringing 50 % of the geographical area under forest cover. Being a forest fire

sensitive State, a detailed standard operating procedure called 'HP Forest Fire Manual – Prevention and Control' has been published by the State in 2018.

1.2.Recorded Forest Area

Recorded Forest Area (RFA) in the State is 37,948 sq km of which 1883 sq km is Reserved Forests, 28,887 sq kmisProtected Forests, and 7178 Sq km Unclassed Forests. In Himachal Pradesh, during the period 1st January 2015 to 05th February 2019, a total of 959.63 hectares of forest land was diverted for non-forestry purposes under the Forest Conservation Act, 1980 (MoEF&CC, 2019).

Table 1.2 District wise Recorded Forest Area (in sq km)

Sl. No.	Name of District	Geographical Area	Recorded Forest Area	% of Forest Area to GA in the District	% of Forest Area of the State
1.	Bilaspur	1167	343	29.39	0.62
2.	Chamba	6522	5523	84.68	9.92
3.	Hamirpur	1118	165	14.76	0.30
4.	Kangra	5739	3131	54.56	5.62
5.	Kinnaur	6401	5595	87.41	10.05
6.	Kullu	5503	4590	83.41	8.24
7.	Lahaul & Spiti	13841	10953	79.13	19.67
8.	Mandi	3950	2014	50.99	3.62
9.	Shimla	5131	3591	69.99	6.45
10.	Sirmaur	2825	1205	42.65	2.16
11.	Solan	1936	626	32.33	1.12
12.	Una	1540	212	13.77	0.38
Total		**55673**	**37948**	**68.16**	**68.16**

Table 1.3 District wise Rural, Urban Area & Population

Sl. No.	Name of District	Geographical Area (sq km)	Rural Area (sq km)	Urban Area (sq km)	Population as per 2011 Census
1.	Bilaspur	1,167	1,149.47	17.53	381,956
2.	Chamba	6,522	6,501.26	20.74	519,080
3.	Hamirpur	1,118	1,106.39	11.61	454,768
4.	Kangra	5,739	5,691.34	47.66	1,510,075
5.	Kinnaur	6,401	6,401.00	-	84,121
6.	Kullu	5,503	5,485.87	17.13	437,903
7.	Lahaul & Spiti	13,841	13,841.00	-	31,564
8.	Mandi	3,950	3,922.26	27.74	999,777
9.	Shimla	5,131	5,075.57	55.43	814,010
10.	Sirmaur	2,825	2,805.88	19.12	529,855
11.	Solan	1,936	1,902.63	33.37	580,320
12.	Una	1,540	1,519.51	20.49	521,173
Total		**55,673**	**55,402.18**	**270.82**	**6,864,602**

1.3.Protected Areas

Five National Parks, 28 Wildlife Sanctuaries and three Conservation Reserves constitute the Protected Area network of the State covering 15.1% of its geographical area.

1.4.Forest Cover

As per ISFR 2021, the Forest Cover in the State is 15,442.95 sq km which is 27.73% of the State's geographical area. In terms of forest canopy density classes, the State has 3,162.99 sq km under Very Dense Forest(VDF), 7,100.13 sq km under Moderately Dense Forest (MDF) and 5,179.83 sq km under Open Forest (OF).

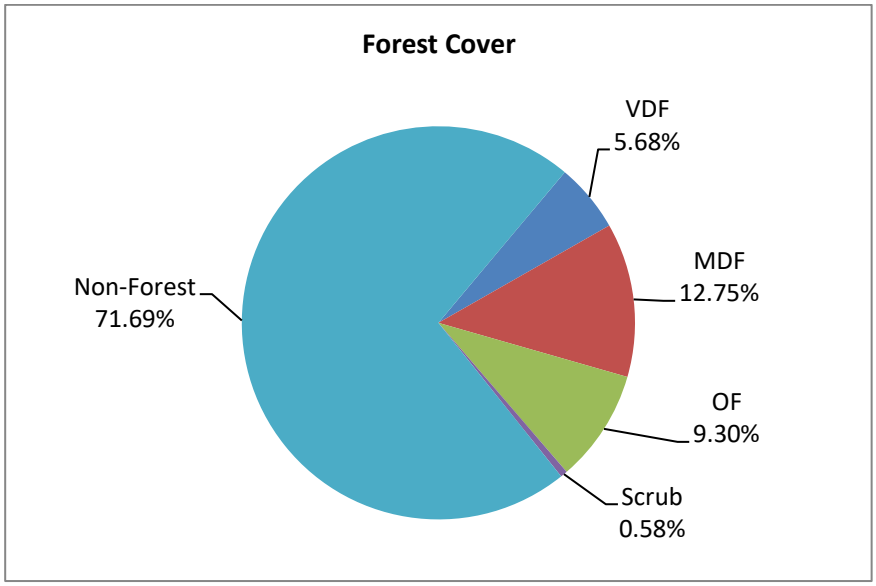

Figure 1.1 Forest Cover of Himachal Pradesh

1.5.Forest Types

Forest Type Maps of 2020 have been refined in the recently completed exercise by FSI. Percentage area under different forest types of Himachal Pradesh as per the Champion & Seth classification (1968), according to the Atlas Forest Types of India 2020 are presented in the following table.

Table 1.4 Percentage area under different forest types of Himachal Pradesh

Sl. No.	Forest Type	% of Forest Cover
1.	3C/C2b(i) Bhabar-Dun Sal Forest	1.02
2.	5B/C1a Dry Siwalik Sal Forest	0.46
3.	5B/C2 Northern Dry Mixed Deciduous Forest	12.29
4.	5/DS1 Dry Deciduous Scrub	0.73
5.	5/DS3 (Euphorbia Scrub)	0.03
6.	5/E9 Dry Bamboo Brake	0.39
7.	5/1S2 Khair-Sissu Forest	0.01
8.	9/C1a Lower Or Siwalik Chir Pine Forest	7.01
9.	9/C1b Upper Or Himalayan Chir Pine Forest	6.47
10.	9/DS1 Himalayan Subtropical Scrub	0.40
11.	12/C1a Ban Oak Forest (Q.Incana)	3.97
12.	12/C1b MoruOak Forest (Q.Dilatata)	0.06
13.	12/C1c Moist Deodar Forest (Cedrus)	10.34
14.	12/C1d Western Mixed Coniferous Forest (Spruce, Blue Pine, Silver Fir)	14.05
15.	12/C1e Moist Temperate Deciduous Forest	0.54
16.	12/C1f Low Level Blue Pine Forest (P. wallichiana)	2.28
17.	12/C1/DS1 Oak Scrub	1.15
18.	12/C1/DS2 Himalayan Temperate Secondary Scrub	0.63
19.	12/C2a KharsuOak Forest (Q.Semecarpifolia)	0.75
20.	12/C2b West Himalayan Upper Oak/Fir Forest	0.69
21.	12/DS1 Montane Bamboo Brakes	0.06
22.	12/E1 Cypress Forest	0.04
23.	12/1S1 Alder Forest	0.02
24.	13/C1 Dry Broadleaved And Coniferous Forest (Q.Ilex- P. Gerardiana)	0.04
25.	13/C2a NeozaPine Forest (P.Gerardiana)	0.63
26.	13/C2b Dry Deodar Forest (Cedrus)	1.12
27.	13/C3 (West Himalayan Dry Temperate Deciduous Forest)	0.00
28.	13/C4 West Himalayan High Level Dry Blue Pine Forest (P. Wallichiana)	0.34
29.	13/C5 West Himalayan Dry Juniper Forest (J. Macropoda)	0.30
30.	13/1S2 Popular / Salix Forest	0.32
31.	14/C1a West Himalayan Sub-Alpine High Level Fir Forest	0.58
32.	14/C1b West Himalayan Birch/Fir Forest	2.65
33.	15/C1 Birch/Rhododendron Scrub Forest	0.22
34.	15/C2 Deciduous Alpine Scrub	0.05
35.	15/E1 Dwarf Rhododendron Scrub	0.01
36.	16/C1 Dry Alpine Scrub	0.72
37.	16/E1 Dwarf Juniper Scrub	0.92
	Grass land Forest Types (outside forest cover)	
38.	12/DS3 Himalayan Temperate Pastures	4.91
39.	15/C3 Alpine Pasture	18.18
40.	Plantation/ TOF	5.92
Total		**100.00**

1.6.Soil

The State of Himachal Pradesh is situated in the north-western part of Himalaya. Most of the geographical area of Himachal Pradesh comes under forest, pasture, and grazing land. The soils found in the Himalayas are diverse in character depending upon altitude, vegetation cover, slope, structure and stage. The major soil groups in the Himalayas are brown hill soil, sub-mountain soil, mountain meadow soil and red loamy soils, apart from other less major types. Most of the soil in this region are acidic in nature. Acidic soils are found in high altitude areas of the western Himalayas, at mid and high altitude regions of central Himalayas are across all altitudinal ranges in the eastern Himalayas. Himalayan foothill/ terai soils is extensively found in the foothills of Himachal Pradesh. Desert (arid) soils are found in Lahaul –spiti and kinnaur and Bharmour areas of the State.

1.7.Climate

There is great variation in the climatic conditions of Himachal due to extreme variation in elevation. The climate varies from hot and sub-humid tropical in the southern tracts to cold, alpine and glacial in the northern and eastern mountain ranges with higher elevation. The State has areas like Dharamsala that receive very heavy rainfall, as well as those like Lahaul and Spiti that are cold and almost rainless. Broadly Himachal experience three seasons; hot weather season, cold weather season and rainy season. Summer lasts from mid-April till the end of June and most parts become very hot (except in alpine zone which experience mild summer) with the average temperature ranging from 28 °C (82 °F) to 32 °C (90 °F). Winter lasts from late November till mid-March. Snowfall is common in alpine tracts (generally above 2,200 meters i.e. in the Higher and Trans-Himalayan region).

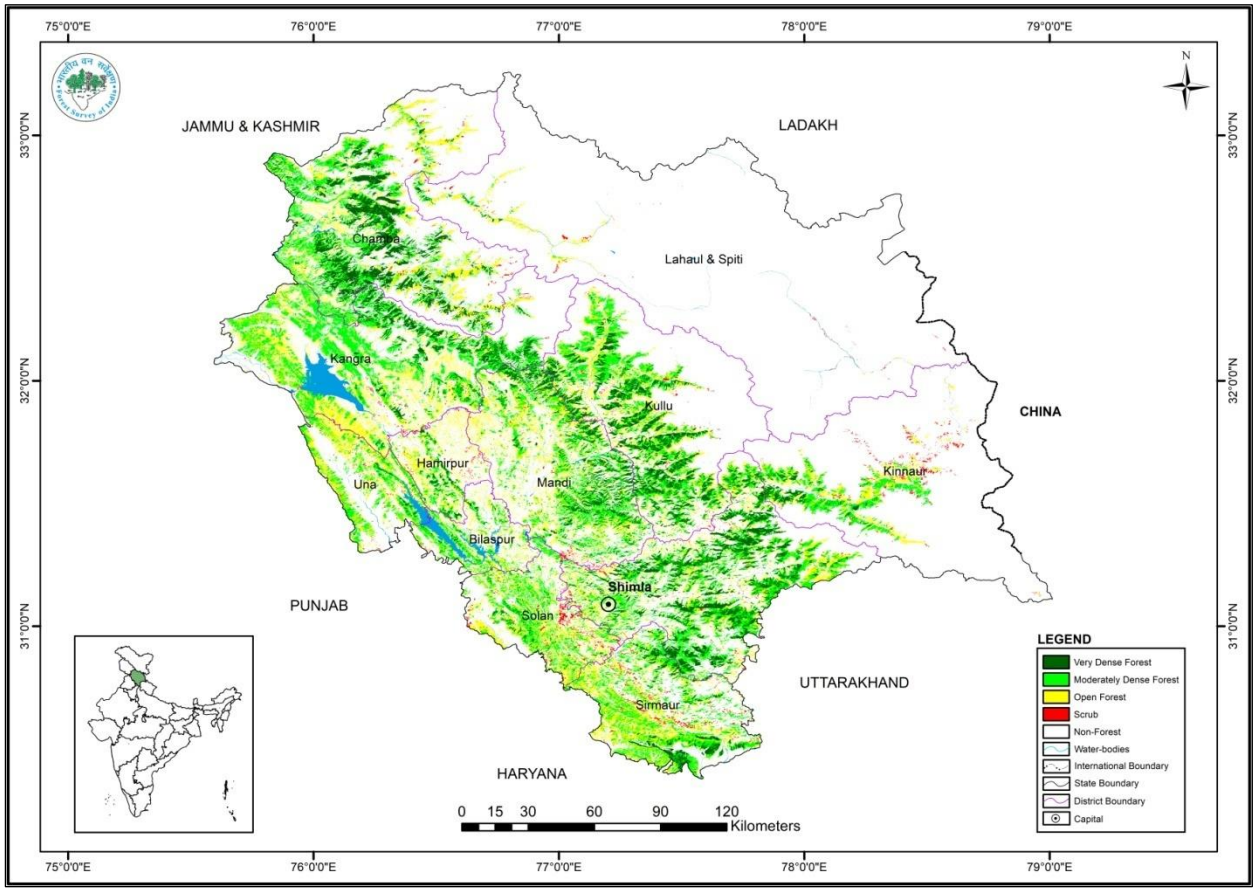

Figure 1.2 Forest Cover Map of Himachal Pradesh

1.8.Tree Ouside Forest

Trees Outside Forests (TOF) are the substantial sources of forest produce in the country as well as in the states as a major proportion of timber, fuel wood and small wood is coming from outside the forest areas. The TOF is playing an important role in reducing pressure on our forest by meeting a large proportion of demand of wood of the society. Due to this growing importance, several states have already assessed their TOF resources. Tress may be available on agriculture land, along road, railways, canals, ponds, orchards, parks, gardens and homestead plays many roles like forests. They make a critical contribution to sustainable agriculture, food security, furniture and rural household economies. They supply many products and services similar to forests. They protect crops and the soil against water and wind erosion, thus combating drought and desertification and protecting water resources.

FSI has started assessment of TOF in the early 1990; however, a regular assessment on a two-year cycle basis at national level was started in 2002. The assessment is being carried out both in rural and urban areas.

Chapter - 2
Methodology

2.1 Introduction

Over the years extensive plantations have been carried out by the social Forestry department of Himachal Pradesh and most of timber, fuel wood, plywood etc requirement of the people was being met from TOF. However, the only estimate of growing stock outside the forest areas available with the State Govt. was through ISFRs. The Himachal Pradesh Forest Department, felt that precise assessment of tree resources outside the forest area is essentially required at district level and, therefore, requested Forest Survey of India, Dehradun to assess the total availability of timber in Non-Forest Land (NFL) i.e. TOF, annual availability of timber in TOF total as well as annual availability of tree species from TOF exempted for the purpose of felling and transit in the State and total as well as annual availability of Khair wood on TOF.Accordingly, FSI took up the task of estimation of stems and their volume on TOF rural areas of Himachal Pradesh on a project mode. The main objectives of the project are given as under:

a. To estimate number of trees in TOF (Rural Areas) in different diameter classes for important species at district and State level.
b. To estimate growing stock (volume) in TOF (Rural Areas) in different diameter classes for important species at district and State level.
c. To assess annual potential production of timber species at the district and State level.

2.2 Responsibilities of FSI

a. Downloading of satellite data (Sentinel).
b. Digital image processing, stratification and generation of sample points for TOF Inventory.
c. Preparation of field manual for field work.
d. Training of field staff of Himachal Pradesh Forest Department on field Inventory.
e. Providing formats of field forms for inventory.
f. Sample checking of field inventory.
g. Data entry, checking, processing and analysis of inventoried district
h. Estimation of number of stems and volumes for important species
i. Annual availability of timber from TOF for Himachal Pradesh
j. Preparation of report for district and State wise

2.3 Responsibilitiesof Himachal Pradesh Forest Department

a. To provide Forest area boundary and extent, if available
b. To provide Urban area boundary and extent, if available
c. To provide Volume equations/volume table, if State specific equations are available in the HPFD.
d. Deployment of field staff and formation of crews for the field inventory. At least 5 to 7 crews, each crew comprising 2 staff of Dy. Ranger/ Forester/ Forest Guard level and one daily wage staff for each district.
e. Deployment of vehicles for field work
f. To carry out field inventory and collection of data
g. Supply the filled up field forms to FSI for data entry and processing.
h. Logistics arrangement for trainers preferably at forest training Institute.
i. Supply district wise Geographic area and Recorded forest area
j. Supply of district wise Urban area.

k. List of important timber species, of from TOF
l. Rotation period of the about timber species, if available
m. Classification of species by their type of timber value (Timber/Non timber/Fuelwood etc.).

2.4 Methodology for Assessment of TOF Rural

A remote sensing based stratified random sampling approach had been used for assessment of TOF (Rural). The sampling frame for inventory of TOF (Rural) had been created using high resolution satellite data, to stratify TOF resources of the selected districts into three strata, namely block, linear and scattered. Thereafter, simple random sampling had been followed to select optimum number of sample points from each stratum. The methodology which is used for stratification of tree resources in the selected district into block, linear and scattered is described briefly as follows: -

The Sentinel multispectral, satellite data, a European satellite data having 10 m resolution which is freely downloadablehad been used for assessment of TOF resources of Himachal Pradesh. Thereafter, the images were geometrically rectified with the help of Survey of India toposheets on 1: 50,000 scale or OSM series toposheets whichever was available. Since the area of interest was TOF, the recorded forest area of the district was masked out. Wherever recorded forest area boundaries were not available the green wash area, is taken as proxy to the recorded forest area and the same was masked out. The imagesare then classified into vegetation, snow cover, alpine pasture, water bodies and river beds etc.

This classification enables the interpreter to distinguish between tree cover and other classes. The classified image is visually analysed for editing and refinement. Since the area of tree patches less than 0.1 ha is not qualified to be included into block, thus such pixels are clumped and cluster of pixels having less than 0.1ha were eliminated. After editing of the classified image, the final classified map is generated having three classes in TOF areas, namely, Block, Linear and Scattered which are treated as strata for TOF inventory. From the classified TOF map, area under each stratum is calculated. In addition, area which does not support tree vegetation, like rivers and water bodies, riverbeds etc. which are termed as un-culturable Non Forest Area, were calculated.

The optimum plot size and number of sample required for each stratum had been determined on the basis of basis of pilot studies conducted by FSI earlier. The optimum plot size for Block and Linear strata are 0.1 ha and 10m x 125 m strip respectively. In case of scattered stratum, the optimum size of sample plot is 0.5 ha for Himachal Pradesh. The minimum sample sizes for Block, Linear and Scattered strata are 35, 50 and 95 respectively. Shortfall of desired sample points in one stratum will be compensated from other stratum.

Desired number of sample points was randomly generated for each stratum separately and were sent to Himachal Forest Department for field inventory. At each sample point, plot of appropriate size is laid out by the field crew and the data on pre-decided variables like species name,dbh, crown diameter and category of plantation, etc., is collected on designed formats. Data processing was carried out using data processing module developed by FSI. The schematic chart of methodology of TOF using remote sensing is given below:

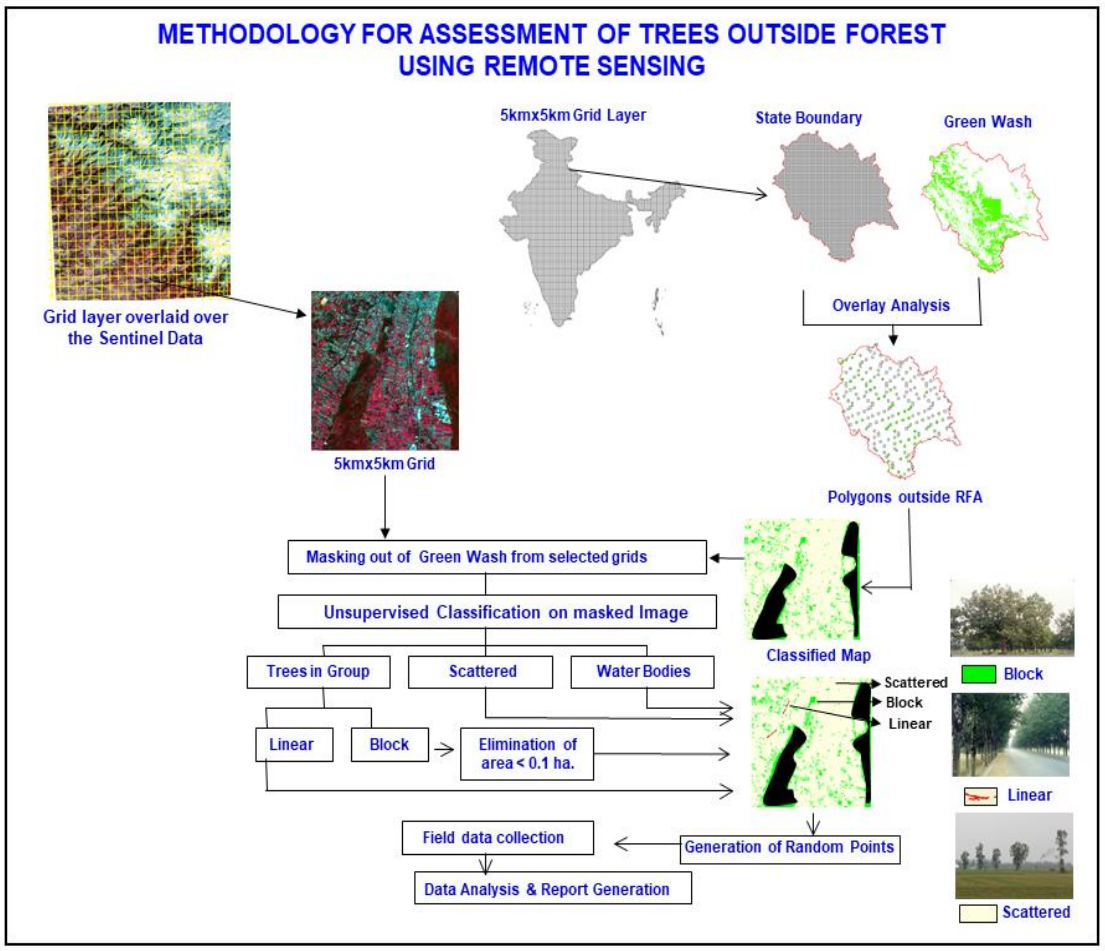

Figure 2.1 Schematic Chart of Methodology of TOF Rural

Table 2.1 Districts and stratum wise number of sample plots.

Sl. No.	Name of District	Block	Linear	Scattered	Total
1.	Bilaspur	121	6	100	**227**
2.	Chamba	102	-	108	**210**
3.	Hamirpur	149	-	31	**180**
4.	Kangra	79		190	**269**
5.	Kinnaur	34	-	85	**119**
6.	Kullu	88	-	224	**312**
7.	Lahaul & Spiti	5*	-	41	**46**
8.	Mandi	168	-	81	**249**
9.	Shimla	121	-	114	**235**
10.	Sirmaur	122	-	96	**218**
11.	Solan	117	-	60	**177**
12.	Una	77	13	90	**180**
	Total	**1183**	**19**	**1220**	**2422**

Note: *Due to inadequate sample size and insufficient data, estimation for this stratum is not generated.

Chapter - 3
Data Collection

3.1 Introduction

The data collection constitutes one of the very important parts of any field project. Therefore, as a first step all the variables, which were necessary for meeting the objectives of the study, were identified. The formats were designed to include all such variables. Accordingly, prior to commencement of field work, field Manual along with different formats for field data collection was prepared. Training programmes were conducted by FSI at Nahan, Shimla, Dharamshala, Mandi, Hamirpur and Chamba toexplain in detail to the field staff of Himachal PradeshForest Department for carrying out field inventory.

3.2 Organization of Field Work for TOF Rural

The field work was organized as per the instruction for Field Inventory given in the field manual. Field parties/crews comprising of three to four crew members headed by a crew leader were constituted to carry out the field work for data collection.

The crew leaders were provided with the list of the sample points (with information on latitude & longitude and other required information) to be inventoried. These sample point were the centre of the sample point from where the detail data was collected. The crew leader alongwith the field party approached the sample points with the help of GPS and laid out a sample plot of an appropriate size as per the instructions given in the field manual. Adequate training on GPS& field data collectionwas also imparted to the field staff of Himachal Pradesh Forest Department.

3.3 Layout of Plot in Block Stratum (Square Plot of 0.1 ha)

After reaching the plot center (GPS point), the NE, SE, SW & NW corners of the plot at 45º, 135º, 225º & 315º respectively were fixed by measuring 22.36 m. horizontal distance (i.e. half of the diagonal) by steel tape in all four directions. These four corners were marked by thin poles or bamboos of 5 cm dia. and 1.5 meter in height. A red colour cloth was tied at the top end of these corner posts for getting clear visibility from different spots in the plot. Thedimensions of the plot were checked to ensure i.e. all sides of the square plot should measure 31.62 meter horizontal distance.

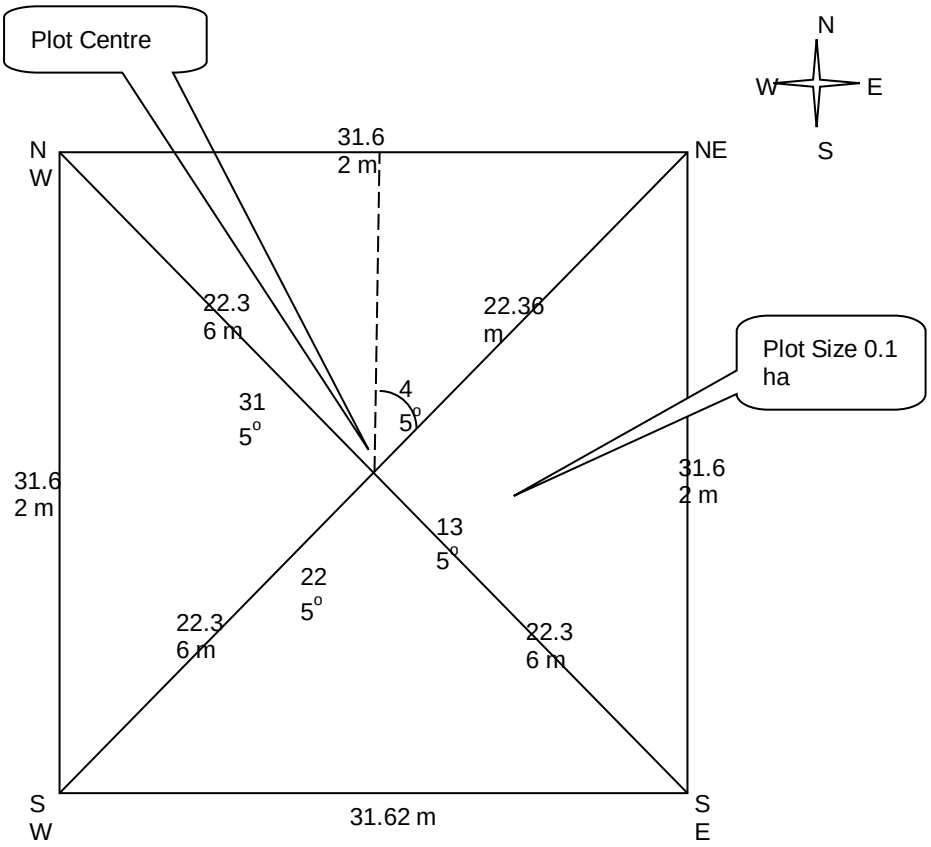

Figure 3.1 Layout of Square plot of 0.1 ha in Block Stratum

3.4 Layout of Plot in Linear Stratum (Rectangular Plot of 0.125 ha)

After reaching the center of the plot at given lat. & long as per sample list with the help of GPS, the plot centre was adjusted keeping 62.5m on both sides. Accordingly, plot along the linear strip width of 10m was laid outwith the help of chain/ measuring tape from the starting canopy of the strip of trees. If any of the side is less than 62.5 m then plot center was adjusted in such a manner that each side of the adjusted plot should 62.5 m respectively, as shown in the figure below. The actual lat. & long. of the mid-point of the length (adjusted plot center) of laid out sample plot was recorded in the Form TOFR-2 at appropriat place.

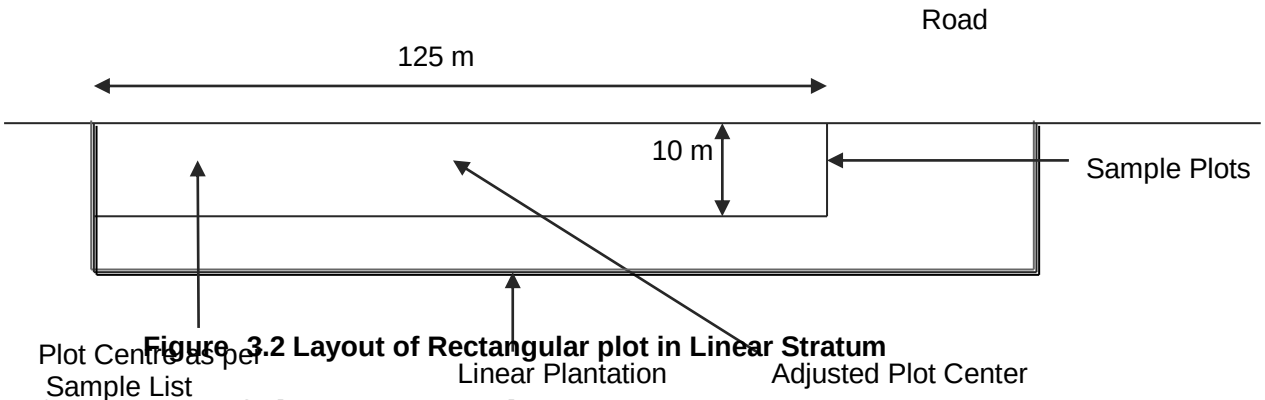

Figure 3.2 Layout of Rectangular plot in Linear Stratum

3.5 Layout of Plot in Scattered Stratum

The size of scattered plots and their number is different in plain and hilly areas. Since, the State of Himachal Pradesh falls in both hilly and plain regions, therefore, the methodology for laying out the scattered plot in both the regionsis explained as below:

3.5.1 Layout of Plot in Scattered Stratum (Hilly Areas)

After reaching the plot centre with the help of GPS,a square plot of 0.5 ha is laid out. After fixing the plot centre, the NW at 315^0, NE at 45^0, SE at 135^0 & SW at 225^0 corners of the plot by measuring 50.0 m. horizontal distance i.e. half of the diagonal by measuring tape in all four directionswas fixed. These four corners were marked by thin poles or bamboos of 5 cm dia and 1.5 m in height. A red colour cloth was tied at the top end of these corner plots for getting clear visibility from different spots in the plot. In case, the 0.5 ha square plot includes part of block or/and linear stratum then plot center should be adjusted suitably to exclude the undesired stratum.Thedimensions of the plot were checked to ensure i.e. all sides of the square plot should measure 70.71 meter horizontal distance.

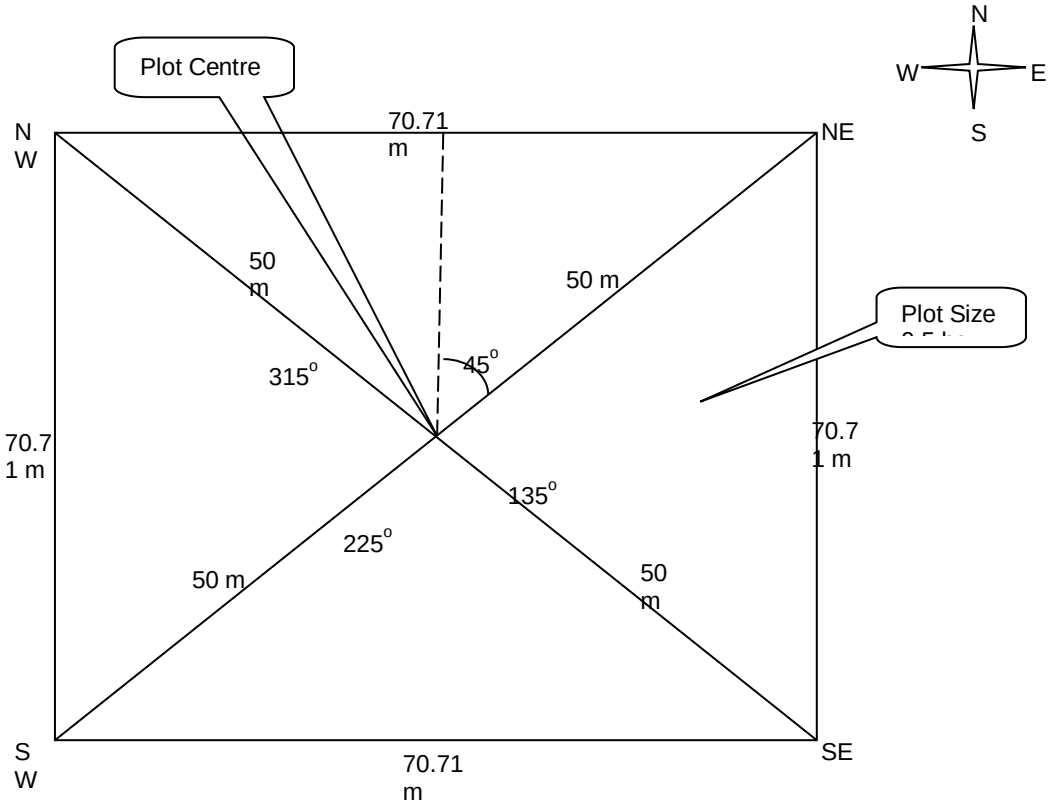

Figure 3.3 Layout of Square plot of 0.5 ha in Scattered Stratum in Hilly Areas

3.5.2 Layout of Plot in Scattered Stratum (Non Hilly Area))

After reaching the plot centre with the help of GPS,a square plot of 3.0 ha is laid out. After fixing the plot centre, the NW at 315^0, NE at 45^0, SE at 135^0 & SW at 225^0 corners of the plot by measuring 122.47 m. horizontal distance i.e. half of the diagonal by measuring tape in all four directions was fixed. These four corners were marked by thin poles or bamboos of 5 cm dia and 1.5 m in height. A red colour cloth was tied at the top end of these corner plots for getting clear visibility from different spots in the plot. In case, the 3.0 ha square plot includes part of block or/and linear stratum then plot center should be adjusted suitably to exclude the undesired

stratum.Thedimensions of the plot was checked to ensure i.e. all sides of the square plot should measure 173.20 meters horizontal distance.

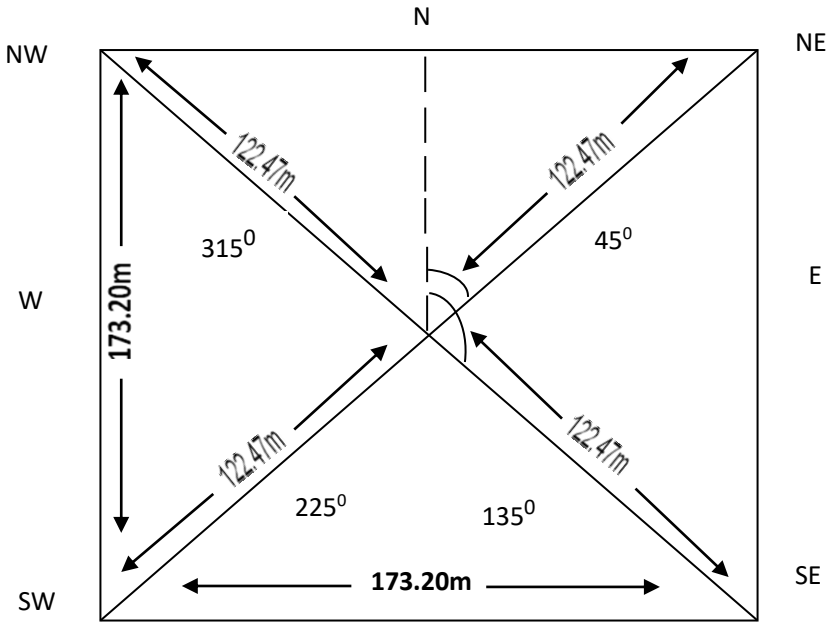

Figure 3.4 Layout of Square plot of 3.0 ha in Scattered Stratum in Non Hilly Areas

3.6 Data Collection Formats for TOF Rural

The data was collected and recorded in the following field forms. It is mandatory for the Crew Leaders to ensure that adequate number of blank forms is carried in the field.

1. TOFR –1 Plot Approach Form
2. TOFR – 2 Plot Enumeration Form

3.6.1 TOF(R)-1: Plot Approach Form (Rural)

The information regarding the mode of travel up to the reference point and prominent features observed during the journey was recorded in this form. This form also indicates the time of starting from camp and arrival at the reference point.

3.6.2 TOF(R)-2: Plot Enumeration Form (Rural)

In this form the data of all trees of 5 cm and above diameter at breast height over bark in a sample point was recorded species wise & diameter class wise. The dead trees having utility less than 70% and all trees of less than 5 cm diameter were ignored.

Chapter - 4
Data Processing

4.1 Data Verification, Entry and Processing

After collection of field data in the desired field forms, it was entered into the computer for further processing. As per project proposal, the data collected in the field forms by the field parties of Himachal Pradesh Forest Department wereto be entered by the Himachal Pradesh Forest Department. The duly checked and cleaned entered data were to be sent to the FSI, Dehradun for processing, however due to some reasons data entry work was not done by Himachal Pradesh forest department and requested FSI for data entry. Accordingly, the data entry work was carried out by FSI NZ, Shimla.

The entered data was again checked before processing. The processing of the data was carried out by FSI using data processing module developed by FSI. Species and diameter class wise volume is calculated for each tree with the help of the volume equations developed by FSI as Himachal Pradesh Forest Department could not provide Volume equations as per the agreement.

The data processing was carried out independently for all the inventoried districts of Himachal Pradesh. Estimates of stems per ha and volume per ha were generated according to species and diameter class for block, Linear and scattered under each district. Estimated stems and their volumes are generated according to species and diameter class by aggregating stem per hectare and volume per hectare over the entire Rural CNF Area of each stratum for each districtby combining the estimated stems and volumes under block,scatteredstratum. By aggregating the estimates of stems and volume of all the three strata, the estimates of stems and volumes according to species and diameter class has been prepared for Rural.

4.2 Area Computation

The non-forest areas (geographical area minus recorded forest area) within a stratum over which the aggregation has to be done may contain unculturable lands that cannot support tree vegetation. Such lands include snow cover, alpine pasture, water bodies,wetlands, rivers and river beds etc. All these areas are subtracted from the non-forest area. The resultant area gives the “Culturable Non-Forest Area (CNFA) for each district. This is the net area over which the sample data of tree per hectare and volume per hectare was aggregated to obtain the estimates of total steams and total volume.

In Rural TOF, area per plot for block. Linear and scattered is fixed and also the total plots enumerated in each stratum are known. From this the total area of sample plots was calculated. The total area classified under block and linear stratumwas worked out by using image processing. However, for the scattered stratum, the total area was obtained on residual method by subtracting area of block and linear stratum form rural CNFA of the district. By using these area figures and rural CNFA area, total steams and volume were estimated for block, linear and scattered stratum for each district.

4.3 Estimation Procedure

Rural: In rural area each district is stratified into block, linear and scattered stratum. Since the size of plots in each stratum was same, sample plots in each stratum were drawn as per the plan of simple random sampling (SRS) and accordingly formula was used for estimation. The estimation of mean and variance under SRS is given as follows:

Let n = number of sample plots in stratum
N = total number of plots in the stratum
y_i= volume/number of trees for ith sample plot

$\bar{y} = \frac{\sum y_i}{n}$ = Average volume/number of tree in the sample

$\bar{Y} = \frac{\sum y_i}{N}$ = Average volume/number of trees in the population

$$V(\bar{y}_R) = \left(\frac{N-n}{Nn}\right)S^2$$

Where, $S^2 = \frac{1}{n-1}\sum(y_i - \bar{y})^2$

= sampling variance of stems/ha or vol/ha

The estimated stems or volume and stems/ha or volume/ha both for rural areas were calculated as follows:

Let y_{ij} = Volume or number of stems for i^{th} sample plot in j^{th} stratum
x_{ij} = Area of i^{th} sample plot for j^{th} stratum

Then, volume or stem per hectare for j^{th} stratum is given by

$$T_j = \frac{\sum_{i=1}^{n} y_{ij}}{\sum_{i=1}^{n} x_{ij}}$$

Estimated volume/stems for j^{th} stratum
$S_j = T_j \times A_j$

Where A_j = CNFA of j^{th} stratum

Total estimated volume/stems for i^{th} district

$$T_i = \sum_{j=1}^{3} S_j$$

Volume/stems for i^{th} district is given by

$R_i = \frac{T_i}{A_i}$ Where A_i = CNFA of i^{th} district

Total estimated volume/stems for the State of Himachal Pradesh is given by

$$T = \sum_{i=1}^{12} T_i$$

And volume/stem per hectare for the State is given by

$$R = \frac{T}{A} \qquad \text{where } A = \sum_{i=1}^{12} A_i \text{ = CNFA of Himachal Pradesh}$$

The Standard Error (SE) for i^{th} district was calculated as follows

$$V(T_i) = \sum_{i=1}^{12} A_{ij}^2 \times V(R_j)$$

$$V(R_i) = \frac{V(T_i)}{A_i^2} \text{ where } A_i = \sum_{j=1}^{3} A_{ij}$$

$$SE(R_i) = \sqrt{V(R_i)}$$

$$SE(\%) = \frac{SE}{R_i} \times 100$$

The Standard Error for all the districts combined was calculated as follows

$$V(T) = \sum_{i=1}^{12} A_i^{\,2} \times V(R_i) \qquad \text{where, } R = \frac{T}{A}$$

$$V(R) = \frac{V(T)}{A^2}$$

$$SE(R) = \sqrt{V(R)}$$

$$SE\% = \frac{SE}{R} \times 100$$

4.4 Standard Error

The precision of estimates generated through sampling method is very necessary for any estimation procedure to be complete. It helps in understanding the error contained in the generated estimates. The standard error serves this purpose which was calculated by using the formulae as given in estimation procedure. As the steam/ha and volume/ha are directly related to estimated steams and volume respectively, the standard error calculated for steam/ha and volume/ha hold equally good for estimated stems and volume also. This is why the standard error was calculated for steam/ha and volume/ha. The district wise standard error for steam/ha and volume/ha are given as follows

Table 4.1 District wise estimates of Standard Error (SE) for steam/ha and volume/ha

Sl. No.	Name of District	SE percent (Trees/ha)	SE percent (Volume/ha)
1.	Bilaspur	4.45	6.55
2.	Chamba	7.35	8.59
3.	Hamirpur	8.73	9.05
4.	Kangra	6.82	7.39
5.	Kinnaur	16.75	11.87
6.	Kullu	7.44	10.86
7.	Lahaul & Spiti	43.69	42.94
8.	Mandi	5.08	5.48
9.	Shimla	6.65	6.95
10.	Sirmaur	4.89	4.76
11.	Solan	5.48	4.64
12.	Una	8.05	6.9
Total		**2.20**	**2.32**

Chapter –5
Results

As per the objectives of the project, total number of stems and their volume for different species under different diameter classes in rural area of all the 12 districts of Himachal Pradesh are to be estimated. As per the table given below it is observed that the maximum stems per hectare were found in Mandi followed by Bilaspur, Una and Hamirpur. The lowest stem per hectare was observed in Lahul Spiti preceded by Kinnaur. Similarly, the Table reveals that the maximum estimated Volume per hectare were found in Mandi followed by solan, Una and Hamirpur The lowest volume per hectare was found in Lahul Spiti preceded by Kinnaur and Kangra.

Table 6.1 District wise estimated stems, Stems/ha and volume, Volume/ha of Himachal Pradesh

Sl. No.	Name of District	Estimated no. of Stems	Estimated Volume (in cum)	Estimated Stems/ha	Estimated Volume/ha
1.	Bilaspur	9,276,680	1,705,819	129.03	23.73
2.	Chamba	5,161,775	1,383,631	92.29	24.74
3.	Hamirpur	10,972,145	2,481,649	119.64	27.06
4.	Kangra	15,999,630	3,878,502	69.75	16.91
5.	Kinnaur	1,122,582	393,036	17.82	6.24
6.	Kullu	6,304,798	1,536,434	98.30	23.96
7.	Lahaul & Spiti*	1,090,326	196,136	5.83	1.05
8.	Mandi	32,273,077	7,157,200	170.83	37.89
9.	Shimla	14,087,161	3,389,366	95.76	23.04
10.	Sirmaur	14,361,296	3,742,909	90.74	23.65
11.	Solan	14,295,298	3,621,000	112.84	28.58
12.	Una	15,105,104	3,480,829	120.23	27.70
	Total	**140,049,872**	**32,966,511**	**92.69**	**21.82**

*In the absence of the adequate sample size for block stratum, only for scattered stratum has been estimated.

Chapter – 6
Estimation of Potential Production

Potential production of forest depends on several factors such as its structure, growth, density, productive capacity of site etc. the estimate of potential production been generated for rural area of the State separately using growing stock estimates generated under the study. The Himachal Pradesh Forest Department supplied the complete list of tree species including palm like plants which are found in the survey. The Himachal Pradesh Forest Department was asked to indicate tree species being use as 'timber' and 'non timber and rotation period of specified timber species. The information was supplied by Himachal Pradesh Forest Department has been given in annexure III. The estimates of growing stock were arranged according to species. The potential production has been calculate using Von Montel's formula as given below:

$$\text{Potential Production (or Yield)} = \frac{2GS}{R}$$

Where GS = Growing Stock
R = Rotation period

For estimation of potential production, the rotation period of the species provided/ approved by the HPFD have been used. Using the information of timber value, growing stock and rotation period in the above mentioned formulae species wise potential production were calculated. Species wise potential production for TOF rural of Himachal Pradesh State have been given in annexure II.

Table 5.1 District wise estimated Potential Production of Himachal Pradesh

Sl. No.	Name of District	Potential Production(cum)
1.	Bilaspur	71220.55
2.	Chamba	46665.33
3.	Hamirpur	93287.92
4.	Kangra	181395.56
5.	Kinnaur	7523.76
6.	Kullu	43560.57
7.	Lahaul & Spiti*	27631.75
8.	Mandi	399199.57
9.	Shimla	80615.61
10.	Sirmaur	106568.18
11.	Solan	141821.43
12.	Una	293420.77
Total		**1492911.00**

*In the absence of the adequate sample size for block stratum, only for scattered stratum has been estimated.

Annexure - I
Estimated number of Steams and Volume District wise

District 1: Bilaspur

Table 1.1: Distribution of estimatedtrees and trees/ha (Species and dia class wise) for Rural Area

Sl. No.	Species	Diameter Class (cm)			Total	Trees/ha
		10-30	30-50	50+		
1.	*Acacia catechu*	1,128,099	9,124	9,359	1,146,582	15.95
2.	*Albizzia chinensis*	28,359	16,681	0	45,040	0.63
3.	*Albizzia julibrissin*	78,401	10,009	0	88,410	1.23
4.	*Azadirachta indica*	55,677	6,259	3,591	65,527	0.91
5.	*Bauhinia retusa*	81,738	13,345	0	95,083	1.32
6.	*Bauhinia species*	219,626	15,020	0	234,646	3.26
7.	*Bombax ceiba*	105,238	25,899	3,643	134,780	1.87
8.	*Butea monosperma*	136,077	28,257	3,751	168,085	2.34
9.	*Cedrela toona*	872,656	113,970	14,969	1,001,595	13.93
10.	*Cedrus deodara*	25,022	10,009	1,668	36,699	0.51
11.	*Celtis australis*	48,376	6,672	0	55,048	0.77
12.	*Dalbergia sissoo*	549,753	44,632	7,564	601,949	8.37
13.	*Emblica officinalis*	14,567	0	1,822	16,389	0.23
14.	*Ficus carica*	36,674	6,375	0	43,049	0.60
15.	*Ficus semicordata*	17,299	9,105	0	26,404	0.37
16.	*Ficus species*	6,385	0	0	6,385	0.09
17.	*Grewia oppositifolia*	1,132,580	44,658	5,311	1,182,549	16.45
18.	*Lannea coromandelica*	44,387	9,068	2,332	55,787	0.78
19.	*Leucaena leucocephala*	384,549	5,769	1,166	391,484	5.45
20.	*Mallotus philippinensis*	236,704	11,073	0	247,777	3.45
21.	*Mangifera indica*	680,995	51,490	13,746	746,231	10.38
22.	*Morus species*	609,862	43,467	911	654,240	9.10
23.	*Olea glandulifera*	100,089	5,004	0	105,093	1.46
24.	*Pinus roxburghii*	88,410	38,367	8,340	135,117	1.88
25.	*Pistacia integerrima*	57,684	13,220	1,019	71,923	1.00
26.	*Psidium guyava*	9,104	1,822	0	10,926	0.15
27.	*Syzygium cumini*	316,436	31,834	2,987	351,257	4.89
28.	*Rest of species*	1,444,827	99,668	14,130	1,558,625	21.68
Total		**8,509,574**	**670,797**	**96,309**	**9,276,680**	**129.03**

Table 1.2: Distribution of estimated volume (cum) and volume/ha (Species and dia class wise) for Rural Area

Sl. No.	Species	Diameter Class (cm)			Total	Vol./ha
		10-30	30-50	50+		
1.	*Acacia catechu*	90,898	5,109	32,600	128,607	1.79
2.	*Albizzia chinensis*	3,481	12,698	0	16,179	0.23
3.	*Albizzia julibrissin*	11,895	6,968	0	18,863	0.26
4.	*Azadirachta indica*	8,128	3,399	8,096	19,623	0.27
5.	*Bauhinia retusa*	15,078	13,397	0	28,475	0.40
6.	*Bauhinia species*	27,758	10,535	0	38,293	0.53
7.	*Bombax ceiba*	13,299	17,682	10,047	41,028	0.57
8.	*Butea monosperma*	20,019	17,717	11,675	49,411	0.69
9.	*Cedrela toona*	148,911	84,587	40,685	274,183	3.81
10.	*Cedrus deodara*	6,877	8,229	3,539	18,645	0.26
11.	*Celtis australis*	5,881	7,142	0	13,023	0.18
12.	*Dalbergia sissoo*	109,419	31,762	24,517	165,698	2.30
13.	*Emblica officinalis*	1,258	0	4,211	5,469	0.08
14.	*Ficus carica*	1,968	4,819	0	6,787	0.09
15.	*Ficus semicordata*	1,038	3,620	0	4,658	0.06
16.	*Ficus species*	542	0	0	542	0.01
17.	*Grewia oppositifolia*	119,396	36,156	15,930	171,482	2.39
18.	*Lannea coromandelica*	2,823	7,209	8,822	18,854	0.26
19.	*Leucaena leucocephala*	36,319	4,194	3,303	43,816	0.61
20.	*Mallotus philippinensis*	25,758	6,884	0	32,642	0.45
21.	*Mangifera indica*	48,213	27,138	37,839	113,190	1.57
22.	*Morus species*	59,939	23,976	1,025	84,940	1.18
23.	*Olea glandulifera*	9,124	2,652	0	11,776	0.16
24.	*Pinus roxburghii*	14,822	32,107	22,508	69,437	0.97
25.	*Pistacia integerrima*	12,569	10,998	5,733	29,300	0.41
26.	*Psidium guyava*	507	3,564	0	4,071	0.06
27.	*Syzygium cumini*	41,359	24,519	5,418	71,296	0.99
28.	Rest of species	128,429	56,981	40,121	225,531	3.14
Total		**965,708**	**464,042**	**276,069**	**1,705,819**	**23.73**

District 2: Chamba

Table 2.1:Distribution of estimated trees and trees/ha (Species and dia class wise) for Rural Area

Sl. No.	Species	Diameter Class (cm)			Total	Trees/ha
		10-30	30-50	50+		
1.	*Albizia species*	46,794	34,984	14,652	96,430	1.72
2.	*Albizzia chinensis*	3,281	3,938	3,281	10,500	0.19
3.	*Alnus nitida*	20,324	27,320	26,014	73,658	1.32
4.	*Bauhinia retusa*	45,934	10,499	656	57,089	1.02
5.	*Bombax ceiba*	39,354	24,051	5,683	69,088	1.24
6.	*Cedrela toona*	31,263	19,456	2,624	53,343	0.95
7.	*Celtis australis*	317,034	39,360	17,265	373,659	6.68
8.	*Dalbergia sissoo*	50,262	10,926	0	61,188	1.09
9.	*Ficus species*	282,070	42,197	18,139	342,406	6.12
10.	*Grewia elastica*	349,362	25,147	0	374,509	6.70
11.	*Grewia oppositifolia*	536,739	95,973	6,995	639,707	11.44
12.	*Grewia species*	230,018	53,784	10,493	294,295	5.26
13.	*Juglans regia*	24,280	6,562	0	30,842	0.55
14.	*Mangifera indica*	155,837	6,122	6,994	168,953	3.02
15.	*Morus species*	47,229	11,806	5,027	64,062	1.15
16.	*Olea cuspidata*	65,620	12,468	0	78,088	1.40
17.	*Pinus excelsa*	24,936	7,875	1,312	34,123	0.61
18.	*Pinus roxburghii*	152,190	55,753	5,027	212,970	3.81
19.	*Pistacia integerrima*	4,370	2,185	4,371	10,926	0.20
20.	*Pyrus pashia*	384,159	44,598	4,154	432,911	7.74
21.	*Quercus leucotrichophora*	192,159	17,273	2,625	212,057	3.79
22.	*Salix alba*	52,905	10,715	0	63,620	1.14
23.	Rest of species	1,230,279	143,192	33,880	1,407,351	25.16
Total		**4,286,399**	**706,184**	**169,192**	**5,161,775**	**92.29**

Table 2.2:Distribution of estimated volume (cum) and volume/ha (Species and dia class wise) for Rural Area

Sl. No.	Species	Diameter Class (cm)			Total	Vol./ha
		10-30	30-50	50+		
1.	*Albizia species*	7,717	24,844	30,620	63,181	1.13
2.	*Albizzia chinensis*	828	3,211	5,055	9,094	0.16
3.	*Alnus nitida*	6,897	31,078	97,355	135,330	2.42
4.	*Bauhinia retusa*	6,496	6,703	1,184	14,383	0.26
5.	*Bombax ceiba*	5,899	14,925	12,640	33,464	0.60
6.	*Cedrela toona*	7,210	14,825	5,933	27,968	0.50
7.	*Celtis australis*	44,032	33,004	51,197	128,233	2.29
8.	*Dalbergia sissoo*	11,749	9,500	0	21,249	0.38
9.	*Ficus species*	21,967	18,197	42,690	82,854	1.48
10.	*Grewia elastica*	23,837	10,818	0	34,655	0.62
11.	*Grewia oppositifolia*	82,483	75,508	20,270	178,261	3.19
12.	*Grewia species*	18,362	22,148	16,984	57,494	1.03
13.	*Juglans regia*	3,075	7,079	0	10,154	0.18
14.	*Mangifera indica*	7,170	2,612	16,752	26,534	0.47
15.	*Morus species*	4,637	6,929	23,496	35,062	0.63
16.	*Olea cuspidata*	3,748	7,391	0	11,139	0.20
17.	*Pinus excelsa*	4,972	7,478	4,429	16,879	0.30
18.	*Pinus roxburghii*	21,803	38,363	13,154	73,320	1.31
19.	*Pistacia integerrima*	1,104	2,563	8,467	12,134	0.22
20.	*Pyrus pashia*	30,249	16,784	4,838	51,871	0.93
21.	*Quercus leucotrichophora*	23,140	15,014	8,089	46,243	0.83
22.	*Salix alba*	11,053	9,538	0	20,591	0.37
23.	Rest of species	119,097	85,223	89,218	293,538	5.25
Total		**467,525**	**463,735**	**452,371**	**1,383,631**	**24.74**

District: Hamirpur

Table 3.1:Distribution of estimated trees and trees/ha (Species and dia class wise) for Rural Area

Sl. No.	Species	Diameter Class (cm)			Total	Trees/ha
		10-30	30-50	50+		
1.	*Acacia catechu*	482,433	8,350	0	490,783	5.35
2.	*Albizia species*	26,905	8,350	2,783	38,038	0.41
3.	*Albizzia chinensis*	146,310	45,550	12,219	204,079	2.23
4.	*Albizzia lebbek*	163,146	21,882	5,182	190,210	2.07
5.	*Albizzia odoratissima*	55,302	12,762	0	68,064	0.74
6.	*Bauhinia retusa*	271,825	32,018	0	303,843	3.31
7.	*Bauhinia species*	106,692	10,205	0	116,897	1.27
8.	*Bombax ceiba*	89,332	38,286	0	127,618	1.39
9.	*Cedrela toona*	619,114	128,840	32,561	780,515	8.51
10.	*Celtis australis*	35,255	11,134	0	46,389	0.51
11.	*Dalbergia sissoo*	722,858	82,522	0	805,380	8.78
12.	*Eucalyptus species*	177,201	26,905	928	205,034	2.24
13.	*Ficus species*	454,793	14,617	4,640	474,050	5.17
14.	*Grevillea robusta*	4,254	38,285	0	42,539	0.46
15.	*Grewia oppositifolia*	1,432,425	147,802	21,270	1,601,497	17.46
16.	*Lannea coromandelica*	42,539	8,508	0	51,047	0.56
17.	*Leucaena leucocephala*	212,696	8,508	0	221,204	2.41
18.	*Mallotus philippinensis*	556,647	16,857	0	573,504	6.25
19.	*Mangifera indica*	319,277	90,013	30,932	440,222	4.80
20.	*Morus species*	785,127	58,311	2,784	846,222	9.23
21.	*Phoenix sylvestris*	110,602	4,254	0	114,856	1.25
22.	*Pinus roxburghii*	477,361	293,191	65,260	835,812	9.11
23.	*Prunus cornata*	102,980	9,277	0	112,257	1.22
24.	*Syzygium cumini*	375,302	53,673	1,856	430,831	4.70
25.	*Terminalia crenulata*	27,832	4,640	0	32,472	0.35
26.	*Zizyphus mauritiana*	55,302	12,762	0	68,064	0.74
27.	Rest of species	1,532,018	195,346	23,354	1,750,718	19.09
Total		**9,385,528**	**1,382,848**	**203,769**	**10,972,145**	**119.64**

Table 3.2:Distribution of estimated volume (cum) and volume/ha (Species and dia class wise) for Rural Area

Sl. No.	Species	Diameter Class (cm)			Total	Vol./ha
		10-30	30-50	50+		
1.	*Acacia catechu*	38,753	7,871	0	46,624	0.51
2.	*Albizia species*	3,798	4,221	7,940	15,959	0.17
3.	*Albizzia chinensis*	22,388	35,745	19,420	77,553	0.85
4.	*Albizzia lebbek*	23,257	13,045	6,588	42,890	0.47
5.	*Albizzia odoratissima*	4,526	10,945	0	15,471	0.17
6.	*Bauhinia retusa*	35,323	22,431	0	57,754	0.63
7.	*Bauhinia species*	11,749	6,597	0	18,346	0.20
8.	*Bombax ceiba*	11,229	24,232	0	35,461	0.39
9.	*Cedrela toona*	96,356	101,543	80,818	278,717	3.04
10.	*Celtis australis*	5,236	10,707	0	15,943	0.17
11.	*Dalbergia sissoo*	128,446	74,983	0	203,429	2.22
12.	*Eucalyptus species*	22,608	18,776	1,402	42,786	0.47
13.	*Ficus species*	28,484	7,647	24,469	60,600	0.66
14.	*Grevillea robusta*	556	17,314	0	17,870	0.19
15.	*Grewia oppositifolia*	171,058	112,169	61,396	344,623	3.76
16.	*Lannea coromandelica*	2,220	9,386	0	11,606	0.13
17.	*Leucaena leucocephala*	14,845	6,807	0	21,652	0.24
18.	*Mallotus philippinensis*	52,046	10,164	0	62,210	0.68
19.	*Mangifera indica*	20,465	43,796	74,851	139,112	1.52
20.	*Morus species*	76,977	29,648	5,077	111,702	1.22
21.	*Phoenix sylvestris*	17,467	1,265	0	18,732	0.20
22.	*Pinus roxburghii*	76,529	215,040	136,514	428,083	4.67
23.	*Prunus cornata*	7,220	9,153	0	16,373	0.18
24.	*Syzygium cumini*	55,633	37,864	5,065	98,562	1.07
25.	*Terminalia crenulata*	3,588	4,600	0	8,188	0.09
26.	*Zizyphus mauritiana*	5,745	6,660	0	12,405	0.14
27.	Rest of species	132,831	93,411	52,756	278,998	3.04
Total		**1,069,333**	**936,020**	**476,296**	**2,481,649**	**27.06**

District 4: Kangra

Table 4.1:Distribution of estimated trees and trees/ha (Species and dia class wise) for Rural Area

Sl. No.	Species	Diameter Class (cm)			Total	Trees/ha
		10-30	30-50	50+		
1.	*Acacia catechu*	1,461,435	91,424	25,446	1,578,305	6.88
2.	*Albizia species*	64,216	33,424	17,940	115,580	0.50
3.	*Albizzia chinensis*	52,213	27,051	33,850	113,114	0.49
4.	*Albizzia lebbek*	189,683	30,072	0	219,755	0.96
5.	*Albizzia odoratissima*	113,347	16,193	2,313	131,853	0.57
6.	*Bauhinia retusa*	459,743	54,291	4,344	518,378	2.26
7.	*Bombax ceiba*	120,593	61,055	20,126	201,774	0.88
8.	*Cedrela toona*	573,050	161,214	40,059	774,323	3.38
9.	*Celtis australis*	394,795	73,926	13,030	481,751	2.10
10.	*Dalbergia sissoo*	338,676	72,903	12,764	424,343	1.85
11.	*Eucalyptus species*	74,023	11,567	16,193	101,783	0.44
12.	*Ficus bengalensis*	988	5,085	7,009	13,082	0.06
13.	*Ficus religiosa*	9,427	1,235	23,003	33,665	0.15
14.	*Ficus species*	241,415	23,764	31,604	296,783	1.29
15.	*Grewia oppositifolia*	931,185	47,668	5,120	983,973	4.29
16.	*Lannea coromandelica*	222,068	13,879	0	235,947	1.03
17.	*Leucaena leucocephala*	178,116	0	0	178,116	0.78
18.	*Litchi senensis*	134,167	39,325	0	173,492	0.76
19.	*Mallotus philippinensis*	1,244,409	58,528	0	1,302,937	5.68
20.	*Mangifera indica*	646,467	193,944	102,282	942,693	4.11
21.	*Morus alba*	174,782	24,434	5,579	204,795	0.89
22.	*Morus species*	196,278	42,756	1,976	241,010	1.05
23.	*Pinus roxburghii*	13,879	90,216	16,192	120,287	0.52
24.	*Populus ciliata*	163,364	28,972	2,172	194,508	0.85
25.	*Prunus cornata*	222,068	30,072	0	252,140	1.10
26.	*Syzygium cumini*	578,297	89,093	8,175	675,565	2.95
27.	*Terminalia arjuna*	19,544	19,545	23,887	62,976	0.27
28.	*Terminalia belerica*	67,866	14,070	5,085	87,021	0.38
29.	Rest of species	4,671,010	580,818	87,853	5,339,681	23.28
Total		**13,557,104**	**1,936,524**	**506,002**	**15,999,630**	**69.75**

Table 4.2:Distribution of estimated volume (cum) and volume/ha (Species and dia classwise) for Rural Area

Sl. No.	Species	Diameter Class (cm)			Total	Vol./ha
		10-30	30-50	50+		
1.	*Acacia catechu*	129,956	65,023	42,883	237,862	1.04
2.	*Albizia species*	8,673	22,326	41,020	72,019	0.31
3.	*Albizzia chinensis*	8,009	19,528	76,808	104,345	0.45
4.	*Albizzia lebbek*	27,240	17,532	0	44,772	0.20
5.	*Albizzia odoratissima*	14,686	10,505	3,669	28,860	0.13
6.	*Bauhinia retusa*	65,026	34,058	8,486	107,570	0.47
7.	*Bombax ceiba*	15,202	40,194	39,167	94,563	0.41
8.	*Cedrela toona*	108,450	126,083	78,121	312,654	1.36
9.	*Celtis australis*	53,921	53,189	42,520	149,630	0.65
10.	*Dalbergia sissoo*	66,090	48,743	27,121	141,954	0.62
11.	*Eucalyptus species*	11,733	9,953	29,735	51,421	0.22
12.	*Ficus bengalensis*	84	2,757	41,725	44,566	0.19
13.	*Ficus religiosa*	1,291	631	60,340	62,262	0.27
14.	*Ficus species*	18,780	8,226	112,197	139,203	0.61
15.	*Grewia oppositifolia*	107,695	39,492	19,151	166,338	0.73
16.	*Lannea coromandelica*	20,108	8,130	0	28,238	0.12
17.	*Leucaena leucocephala*	18,386	0	0	18,386	0.08
18.	*Litchi senensis*	15,825	10,777	0	26,602	0.12
19.	*Mallotus philippinensis*	122,538	35,729	0	158,267	0.69
20.	*Mangifera indica*	55,155	80,341	225,907	361,403	1.58
21.	*Morus alba*	21,357	14,624	13,187	49,168	0.21
22.	*Morus species*	25,870	26,631	4,618	57,119	0.25
23.	*Pinus roxburghii*	3,428	69,881	36,940	110,249	0.48
24.	*Populus ciliata*	13,397	26,350	4,751	44,498	0.19
25.	*Prunus cornata*	16,898	10,511	0	27,409	0.12
26.	*Syzygium cumini*	77,568	59,444	17,312	154,324	0.67
27.	*Terminalia arjuna*	4,864	20,631	103,945	129,440	0.56
28.	*Terminalia belerica*	8,239	13,690	20,154	42,083	0.18
29.	Rest of species	464,158	289,983	159,156	913,297	3.98
Total		**1,504,627**	**1,164,962**	**1,208,913**	**3,878,502**	**16.91**

District 5: Kinnaur

Table 5.1:Distribution of estimated trees and trees/ha (Species and dia class wise) for Rural Area

Sl. No.	Species	Diameter Class (cm)			Total	Trees/ha
		10-30	30-50	50+		
1.	*Acer species*	3,225	0	0	3,225	0.05
2.	*Aesculus indica*	1,075	1,075	0	2,150	0.03
3.	*Ailanthus excelsa*	13,794	0	0	13,794	0.22
4.	*Alnus nitida*	49,282	7,971	7,971	65,224	1.04
5.	*Anogeissus latifolia*	29,029	12,901	1,075	43,005	0.68
6.	*Cedrus deodara*	67,235	52,752	39,849	159,836	2.54
7.	*Juglans regia*	13,976	4,300	0	18,276	0.29
8.	*Pinus excelsa*	112,452	67,873	18,530	198,855	3.16
9.	*Pinus gerardiana*	37,050	12,495	1,724	51,269	0.81
10.	*Pinus roxburghii*	18,935	5,811	0	24,746	0.39
11.	*Populus ciliata*	12,262	1,937	0	14,199	0.23
12.	*Prunus persica*	12,901	0	0	12,901	0.20
13.	*Prunus species*	123,466	15,274	0	138,740	2.20
14.	*Pyrus pashia*	6,450	0	0	6,450	0.10
15.	*Pyrus species*	151,418	0	0	151,418	2.40
16.	*Quercus dilatata floribunda*	24,555	11,409	2,586	38,550	0.61
17.	*Quercus leucotrichophora*	3,448	9,482	0	12,930	0.21
18.	*Quercus species*	11,826	2,150	0	13,976	0.22
19.	*Rhododendron species*	3,448	7,758	3,448	14,654	0.23
20.	*Robinia pseudocacia*	22,393	5,172	0	27,565	0.44
21.	*Salix alba*	11,825	0	0	11,825	0.19
22.	*Syzygium cumini*	9,676	0	0	9,676	0.15
23.	Rest of species	74,674	11,845	2,799	89,318	1.42
Total		**814,395**	**230,205**	**77,982**	**1,122,582**	**17.82**

Table 5.2:Distribution of estimated volume (cum) and volume/ha (Species and dia class wise) for Rural Area

Sl. No.	Species	Diameter Class (cm)			Total	Vol./ha
		10-30	30-50	50+		
1.	*Acer species*	407	0	0	407	0.01
2.	*Aesculus indica*	148	571	0	719	0.01
3.	*Ailanthus excelsa*	774	0	0	774	0.01
4.	*Alnus nitida*	4,869	6,334	21,242	32,445	0.51
5.	*Anogeissus latifolia*	2,822	4,150	771	7,743	0.12
6.	*Cedrus deodara*	10,266	36,298	100,811	147,375	2.34
7.	*Juglans regia*	952	2,507	0	3,459	0.05
8.	*Pinus excelsa*	20,445	52,442	42,817	115,704	1.84
9.	*Pinus gerardiana*	4,416	6,876	2,426	13,718	0.22
10.	*Pinus roxburghii*	1,178	5,568	0	6,746	0.11
11.	*Populus ciliata*	1,267	1,031	0	2,298	0.04
12.	*Prunus persica*	671	0	0	671	0.01
13.	*Prunus species*	7,258	4,513	0	11,771	0.19
14.	*Pyrus pashia*	350	0	0	350	0.01
15.	*Pyrus species*	4,096	0	0	4,096	0.07
16.	*Quercus dilatata floribunda*	3,108	6,082	3,943	13,133	0.21
17.	*Quercus leucotrichophora*	626	7,885	0	8,511	0.14
18.	*Quercus species*	586	986	0	1,572	0.02
19.	*Rhododendron species*	503	2,609	3,194	6,306	0.10
20.	*Robinia pseudocacia*	1,695	1,304	0	2,999	0.05
21.	*Salix alba*	1,633	0	0	1,633	0.03
22.	*Syzygium cumini*	604	0	0	604	0.01
23.	Rest of species	3,428	3,501	3,073	10,002	0.16
Total		**72,102**	**142,657**	**178,277**	**393,036**	**6.24**

District 6: Kullu

Table 6.1:Distribution of estimated trees and trees/ha (Species and dia class wise) for Rural Area

Sl. No.	Species	Diameter Class (cm)			Total	Trees/ha
		10-30	30-50	50+		
1.	*Ailanthus tryphas*	77,599	0	0	77,599	1.21
2.	*Alnus nitida*	106,162	178,786	93,117	378,065	5.89
3.	*Cedrela toona*	12,425	1,864	2,485	16,774	0.26
4.	*Cedrus deodara*	96,221	49,662	21,728	167,611	2.61
5.	*Celtis australis*	45,349	4,348	0	49,697	0.77
6.	*Dalbergia sissoo*	23,607	621	0	24,228	0.38
7.	*Eucalyptus species*	51,561	8,075	0	59,636	0.93
8.	*Ficus carica*	21,727	6,208	0	27,935	0.44
9.	*Ficus species*	123,002	11,803	0	134,805	2.10
10.	*Grewia oppositifolia*	265,248	20,501	4,346	290,095	4.52
11.	*Juglans regia*	33,533	21,111	9,313	63,957	1.00
12.	*Lannea coromandelica*	37,895	1,863	0	39,758	0.62
13.	*Melia azadirachta*	63,364	5,591	0	68,955	1.08
14.	*Morus alba*	46,559	0	3,104	49,663	0.77
15.	*Morus species*	39,137	4,969	0	44,106	0.69
16.	*Pinus excelsa*	113,004	34,145	0	147,149	2.29
17.	*Pinus roxburghii*	186,935	135,961	9,312	332,208	5.18
18.	*Pistacia integerrima*	203,133	47,207	7,455	257,795	4.02
19.	*Populus ciliata*	6,208	9,312	0	15,520	0.24
20.	*Prunus domestica*	40,351	0	3,104	43,455	0.68
21.	*Prunus species*	221,703	33,539	16,767	272,009	4.24
22.	*Pyrus communis*	177,606	16,771	0	194,377	3.03
23.	*Pyrus pashia*	86,350	7,454	0	93,804	1.46
24.	*Pyrus species*	2,187,690	72,023	0	2,259,713	35.23
25.	*Quercus dilatata floribunda*	6,208	9,312	0	15,520	0.24
26.	*Quercus incana*	204,859	71,391	49,662	325,912	5.08
27.	*Quercus leucotrichophora*	107,429	69,535	22,973	199,937	3.12
28.	*Salix alba*	21,728	0	0	21,728	0.34
29.	Rest of species	547,724	73,266	11,797	632,787	9.87
Total		**5,154,317**	**895,318**	**255,163**	**6,304,798**	**98.30**

Table 6.2:Distribution of estimated volume (cum) and volume/ha (Species and dia class wise) for Rural Area

Sl. No.	Species	Diameter Class (cm)			Total	Vol./ha
		10-30	30-50	50+		
1.	*Ailanthus tryphas*	8,981	0	0	8,981	0.14
2.	*Alnus nitida*	20,282	138,513	210,217	369,012	5.75
3.	*Cedrela toona*	2,334	1,296	5,625	9,255	0.14
4.	*Cedrus deodara*	4,456	29,327	45,874	79,657	1.24
5.	*Celtis australis*	5,656	5,100	0	10,756	0.17
6.	*Dalbergia sissoo*	5,231	382	0	5,613	0.09
7.	*Eucalyptus species*	11,839	9,574	0	21,413	0.33
8.	*Ficus carica*	1,398	2,087	0	3,485	0.05
9.	*Ficus species*	12,229	8,411	0	20,640	0.32
10.	*Grewia oppositifolia*	36,820	18,128	9,915	64,863	1.01
11.	*Juglans regia*	4,249	15,988	38,424	58,661	0.91
12.	*Lannea coromandelica*	2,576	4,745	0	7,321	0.11
13.	*Melia azadirachta*	9,620	3,396	0	13,016	0.20
14.	*Morus alba*	2,149	0	5,557	7,706	0.12
15.	*Morus species*	9,242	4,437	0	13,679	0.21
16.	*Pinus excelsa*	17,647	30,833	0	48,480	0.76
17.	*Pinus roxburghii*	32,087	58,190	12,122	102,399	1.60
18.	*Pistacia integerrima*	44,184	38,678	25,634	108,496	1.69
19.	*Populus ciliata*	159	5,671	0	5,830	0.09
20.	*Prunus domestica*	3,277	0	9,792	13,069	0.20
21.	*Prunus species*	16,437	13,313	18,078	47,828	0.75
22.	*Pyrus communis*	11,524	5,841	0	17,365	0.27
23.	*Pyrus pashia*	7,703	3,131	0	10,834	0.17
24.	*Pyrus species*	103,945	20,221	0	124,166	1.94
25.	*Quercus dilatata floribunda*	233	6,169	0	6,402	0.10
26.	*Quercus incana*	69,966	43,982	45,401	159,349	2.48
27.	*Quercus leucotrichophora*	14,468	46,263	40,903	101,634	1.58
28.	*Salix alba*	4,290	0	0	4,290	0.07
29.	Rest of species	40,470	28,447	23,317	92,234	1.44
Total		**503,452**	**542,123**	**490,859**	**1,536,434**	**23.96**

District 7: Lahaul & Spiti

Table 7.1:Distribution of estimated trees and trees/ha (Species and dia class wise) for Rural Area

Sl. No.	Species	Diameter Class (cm)			Total	Trees/ha
		10-30	30-50	50+		
1.	*Juglans regia*	2,253	6,758	9,011	18,022	0.10
2.	*Juniperus macropoda*	18,022	38,297	0	56,319	0.30
3.	*Prunus cornata*	15,769	0	0	15,769	0.08
4.	*Prunus domestica*	11,264	0	0	11,264	0.06
5.	*Prunus species*	13,516	0	0	13,516	0.07
6.	*Pyrus species*	466,317	4,506	4,505	475,328	2.54
7.	*Robinia pseudocacia*	36,044	0	0	36,044	0.19
8.	*Salix alba*	247,802	150,934	45,054	443,790	2.37
9.	Rest of species	20,274	0	0	20,274	0.11
Total		**831,261**	**200,495**	**58,570**	**1,090,326**	**5.83**

Table 7.2:Distribution of estimated volume (cum) and volume/ha (Species and dia class wise) for Rural Area

Sl. No.	Species	Diameter Class (cm)			Total	Vol./ha
		10-30	30-50	50+		
1.	*Juglans regia*	57	3,479	13,190	16,726	0.09
2.	*Juniperus macropoda*	1,753	5,061	0	6,814	0.04
3.	*Prunus cornata*	402	0	0	402	0.00
4.	*Prunus domestica*	316	0	0	316	0.00
5.	*Prunus species*	541	0	0	541	0.00
6.	*Pyrus species*	11,852	993	7,621	20,466	0.11
7.	*Robinia pseudocacia*	932	0	0	932	0.00
8.	*Salix alba*	22,106	58,587	68,109	148,802	0.80
9.	Rest of species	1,137	0	0	1,137	0.01
Total		**39,096**	**68,120**	**88,920**	**196,136**	**1.05**

District 8: Mandi

Table 8.1:Distribution of estimated trees and trees/ha (Species and dia class wise) for Rural Area

Sl. No.	Species	Diameter Class (cm)			Total	Trees/ha
		10-30	30-50	50+		
1.	*Albizia species*	224,798	149,865	56,200	430,863	2.28
2.	*Albizzia chinensis*	391,430	118,742	35,353	545,525	2.89
3.	*Albizzia lebbek*	56,199	70,249	9,366	135,814	0.72
4.	*Bauhinia retusa*	505,942	72,967	8,309	587,218	3.11
5.	*Bauhinia species*	146,839	10,877	0	157,716	0.83
6.	*Cedrela toona*	1,911,072	314,534	17,676	2,243,282	11.87
7.	*Celtis australis*	2,779,437	403,817	69,342	3,252,596	17.22
8.	*Eucalyptus species*	14,503	3,626	9,064	27,193	0.14
9.	*Ficus bengalensis*	9,366	0	4,683	14,049	0.07
10.	*Ficus religiosa*	5,439	0	5,439	10,878	0.06
11.	*Ficus species*	645,381	68,889	14,049	728,319	3.86
12.	*Grewia oppositifolia*	2,545,719	206,818	14,806	2,767,343	14.65
13.	*Machilus species*	758,691	132,642	6,496	897,829	4.75
14.	*Mallotus philippinensis*	828,943	28,099	0	857,042	4.54
15.	*Mangifera indica*	492,196	56,652	33,538	582,386	3.08
16.	*Morus species*	578,458	92,304	0	670,762	3.55
17.	*Pinus roxburghii*	2,146,598	573,325	62,696	2,782,619	14.73
18.	*Pistacia integerrima*	240,660	75,386	11,180	327,226	1.73
19.	*Populus ciliata*	593,103	91,247	101,974	786,324	4.16
20.	*Prunus cornata*	1,579,770	126,298	4,683	1,710,751	9.06
21.	*Quercus dilatata floribunda*	43,509	34,444	14,503	92,456	0.49
22.	*Quercus glauca*	396,261	62,544	22,359	481,164	2.55
23.	*Quercus leucotrichophora*	1,433,683	197,905	53,479	1,685,067	8.92
24.	*Syzygium cumini*	1,059,931	111,039	14,050	1,185,020	6.27
25.	Rest of species	8,350,096	865,796	97,743	9,313,635	49.30
Total		**27,738,024**	**3,868,065**	**666,988**	**32,273,077**	**170.83**

Table 8.2:Distribution of estimated volume (cum) and volume/ha (Species and dia class wise) for Rural Area

Sl. No.	Species	Diameter Class (cm)			Total	Vol./ha
		10-30	30-50	50+		
1.	*Albizia species*	31,573	105,992	107,633	245,198	1.30
2.	*Albizzia chinensis*	53,412	79,981	83,663	217,056	1.15
3.	*Albizzia lebbek*	6,219	63,018	17,994	87,231	0.46
4.	*Bauhinia retusa*	70,944	41,656	12,084	124,684	0.66
5.	*Bauhinia species*	16,744	5,138	0	21,882	0.12
6.	*Cedrela toona*	335,801	200,834	37,968	574,603	3.04
7.	*Celtis australis*	349,410	358,395	197,295	905,100	4.79
8.	*Eucalyptus species*	1,280	3,722	23,600	28,602	0.15
9.	*Ficus bengalensis*	1,014	0	96,929	97,943	0.52
10.	*Ficus religiosa*	475	0	27,330	27,805	0.15
11.	*Ficus species*	47,243	26,122	29,277	102,642	0.54
12.	*Grewia oppositifolia*	307,813	151,414	31,486	490,713	2.60
13.	*Machilus species*	103,915	112,044	23,642	239,601	1.27
14.	*Mallotus philippinensis*	79,989	19,879	0	99,868	0.53
15.	*Mangifera indica*	31,842	26,762	56,046	114,650	0.61
16.	*Morus species*	59,753	56,369	0	116,122	0.61
17.	*Pinus roxburghii*	253,250	369,894	117,000	740,144	3.92
18.	*Pistacia integerrima*	44,224	58,375	20,667	123,266	0.65
19.	*Populus ciliata*	74,058	81,118	268,774	423,950	2.24
20.	*Prunus cornata*	111,986	46,166	5,942	164,094	0.87
21.	*Quercus dilatata floribunda*	9,255	25,964	33,886	69,105	0.37
22.	*Quercus glauca*	48,588	48,196	86,327	183,111	0.97
23.	*Quercus leucotrichophora*	206,802	130,349	122,909	460,060	2.44
24.	*Syzygium cumini*	139,963	91,183	32,620	263,766	1.40
25.	Rest of species	663,371	442,813	129,820	1,236,004	6.54
Total		**3,048,924**	**2,545,384**	**1,562,892**	**7,157,200**	**37.89**

District 9: Shimla

Table 9.1:Distribution of estimated trees and trees/ha (Species and dia class wise) for Rural Area

Sl. No.	Species	Diameter Class (cm)			Total	Trees/ha
		10-30	30-50	50+		
1.	*Alnus nitida*	69,353	104,029	75,131	248,513	1.69
2.	*Cedrela toona*	173,484	61,052	0	234,536	1.59
3.	*Cedrus deodara*	409,577	151,268	61,687	622,532	4.23
4.	*Celtis australis*	655,287	77,756	25,249	758,292	5.15
5.	*Eucalyptus species*	34,676	14,448	5,780	54,904	0.37
6.	*Ficus racemosa*	75,133	8,669	0	83,802	0.57
7.	*Ficus species*	224,493	51,318	1,947	277,758	1.89
8.	*Grewia oppositifolia*	558,677	38,878	0	597,555	4.06
9.	*Juglans regia*	27,257	23,364	31,152	81,773	0.56
10.	*Melia azadirachta*	114,871	7,788	0	122,659	0.83
11.	*Morus species*	5,841	9,735	0	15,576	0.11
12.	*Myrica sapida*	26,008	14,448	2,890	43,346	0.29
13.	*Pinus excelsa*	1,254,350	500,529	20,350	1,775,229	12.07
14.	*Pinus roxburghii*	1,183,623	384,450	3,894	1,571,967	10.69
15.	*Pistacia integerrima*	232,714	64,127	9,673	306,514	2.08
16.	*Prunus cornata*	137,497	9,673	0	147,170	1.00
17.	*Prunus species*	525,681	56,462	25,309	607,452	4.13
18.	*Punica granatum*	31,151	5,841	0	36,992	0.25
19.	*Pyrus communis*	295,589	29,205	0	324,794	2.21
20.	*Pyrus pashia*	109,031	13,629	5,841	128,501	0.87
21.	*Pyrus species*	2,897,594	365,680	104,459	3,367,733	22.89
22.	*Quercus dilatata floribunda*	170,491	8,669	17,337	196,497	1.34
23.	*Quercus leucotrichophora*	870,923	77,078	10,616	958,617	6.52
24.	*Quercus species*	31,787	40,455	14,448	86,690	0.59
25.	*Robinia pseudocacia*	153,154	8,669	0	161,823	1.10
26.	Rest of species	1,109,295	144,343	22,298	1,275,936	8.67
Total		**11,377,537**	**2,271,563**	**438,061**	**14,087,161**	**95.76**

Table 9.2:Distribution of estimated volume (cum) and volume/ha (Species and dia class wise) for Rural Area

Sl. No.	Species	Diameter Class (cm)			Total	Vol./ha
		10-30	30-50	50+		
1.	*Alnus nitida*	19,592	93,756	196,048	309,396	2.10
2.	*Cedrela toona*	28,497	54,665	0	83,162	0.57
3.	*Cedrus deodara*	62,889	100,475	109,984	273,348	1.86
4.	*Celtis australis*	77,272	53,093	64,147	194,512	1.32
5.	*Eucalyptus species*	3,746	8,154	11,047	22,947	0.16
6.	*Ficus racemosa*	4,542	2,414	0	6,956	0.05
7.	*Ficus species*	17,317	16,022	5,875	39,214	0.27
8.	*Grewia oppositifolia*	51,072	42,794	0	93,866	0.64
9.	*Juglans regia*	1,816	16,771	110,995	129,582	0.88
10.	*Melia azadirachta*	11,961	3,243	0	15,204	0.10
11.	*Morus species*	884	19,637	0	20,521	0.14
12.	*Myrica sapida*	1,214	5,523	3,722	10,459	0.07
13.	*Pinus excelsa*	300,008	359,104	43,343	702,455	4.77
14.	*Pinus roxburghii*	142,251	210,490	7,027	359,768	2.45
15.	*Pistacia integerrima*	40,565	47,224	14,917	102,706	0.70
16.	*Prunus cornata*	8,244	3,559	0	11,803	0.08
17.	*Prunus species*	30,656	19,523	42,470	92,649	0.63
18.	*Punica granatum*	980	2,943	0	3,923	0.03
19.	*Pyrus communis*	19,355	9,189	0	28,544	0.19
20.	*Pyrus pashia*	6,588	4,683	4,958	16,229	0.11
21.	*Pyrus species*	184,557	113,865	119,053	417,475	2.84
22.	*Quercus dilatata floribunda*	14,081	6,971	38,115	59,167	0.40
23.	*Quercus leucotrichophora*	93,292	41,130	31,032	165,454	1.12
24.	*Quercus species*	2,708	24,134	19,609	46,451	0.32
25.	*Robinia pseudocacia*	8,114	2,349	0	10,463	0.07
26.	Rest of species	77,574	53,992	41,546	173,112	1.18
Total		**1,209,775**	**1,315,703**	**863,888**	**3,389,366**	**23.04**

District 10: Sirmaur

Table 10.1:Distribution of estimated trees and trees/ha (Species and dia class wise) for Rural Area

Sl. No.	Species	Diameter Class (cm)			Total	Trees/ha
		10-30	30-50	50+		
1.	*Acacia catechu*	144,352	12,030	0	156,382	0.99
2.	*Albizzia lebbek*	110,670	64,959	26,464	202,093	1.28
3.	*Albizzia procera*	60,936	30,691	0	91,627	0.58
4.	*Alnus nitida*	62,553	7,218	0	69,771	0.44
5.	*Bauhinia retusa*	235,607	36,730	0	272,337	1.72
6.	*Bauhinia species*	103,565	16,841	7,217	127,623	0.81
7.	*Bombax ceiba*	92,305	16,164	3,965	112,434	0.71
8.	*Cedrela toona*	306,647	116,096	25,748	448,491	2.83
9.	*Cedrus deodara*	107,299	9,624	0	116,923	0.74
10.	*Celtis australis*	453,612	107,130	30,311	591,053	3.73
11.	*Dalbergia sissoo*	13,888	2,227	446	16,561	0.10
12.	*Ficus species*	179,762	36,561	0	216,323	1.37
13.	*Grewia oppositifolia*	900,265	66,100	23,092	989,457	6.25
14.	*Mallotus philippinensis*	228,557	7,217	0	235,774	1.49
15.	*Mangifera indica*	1,113,831	79,704	9,221	1,202,756	7.60
16.	*Morus species*	37,746	9,809	3,270	50,825	0.32
17.	*Olea cuspidata*	122,690	15,077	2,406	140,173	0.89
18.	*Pinus excelsa*	112,750	40,417	0	153,167	0.97
19.	*Pinus roxburghii*	2,733,027	1,143,731	55,334	3,932,092	24.84
20.	*Pistacia integerrima*	98,640	40,900	0	139,540	0.88
21.	*Prunus cornata*	117,887	48,117	0	166,004	1.05
22.	*Pyrus pashia*	332,473	17,482	2,406	352,361	2.23
23.	*Quercus incana*	18,281	0	0	18,281	0.12
24.	*Quercus leucotrichophora*	2,174,087	390,389	38,493	2,602,969	16.45
25.	*Rhododendron arboreum*	250,209	4,811	0	255,020	1.61
26.	*Terminalia chebula*	36,561	6,317	0	42,878	0.27
27.	Rest of species	1,457,537	163,482	37,362	1,658,381	10.48
Total		**11,605,737**	**2,489,824**	**265,735**	**14,361,296**	**90.74**

Table 10.2:Distribution of estimated volume (cum) and volume/ha (Species and dia class wise) for Rural Area

Sl. No.	Species	Diameter Class (cm)			Total	Vol./ha
		10-30	30-50	50+		
1.	*Acacia catechu*	13,948	7,471	0	21,419	0.14
2.	*Albizzia lebbek*	17,296	45,840	43,734	106,870	0.68
3.	*Albizzia procera*	14,782	28,083	0	42,865	0.27
4.	*Alnus nitida*	14,634	5,243	0	19,877	0.13
5.	*Bauhinia retusa*	32,065	29,319	0	61,384	0.39
6.	*Bauhinia species*	10,640	9,231	17,915	37,786	0.24
7.	*Bombax ceiba*	10,026	9,768	24,305	44,099	0.28
8.	*Cedrela toona*	56,210	89,137	58,003	203,350	1.28
9.	*Cedrus deodara*	21,971	4,854	0	26,825	0.17
10.	*Celtis australis*	63,856	76,380	96,124	236,360	1.49
11.	*Dalbergia sissoo*	2,802	2,000	1,013	5,815	0.04
12.	*Ficus species*	16,398	16,978	0	33,376	0.21
13.	*Grewia oppositifolia*	128,262	57,220	61,176	246,658	1.56
14.	*Mallotus philippinensis*	25,097	4,734	0	29,831	0.19
15.	*Mangifera indica*	85,633	26,991	17,578	130,202	0.82
16.	*Morus species*	6,378	7,484	5,112	18,974	0.12
17.	*Olea cuspidata*	10,094	8,099	20,037	38,230	0.24
18.	*Pinus excelsa*	25,467	29,711	0	55,178	0.35
19.	*Pinus roxburghii*	480,522	652,613	111,829	1,244,964	7.87
20.	*Pistacia integerrima*	19,415	36,357	0	55,772	0.35
21.	*Prunus cornata*	10,375	22,872	0	33,247	0.21
22.	*Pyrus pashia*	23,303	5,246	2,504	31,053	0.20
23.	*Quercus incana*	9,917	0	0	9,917	0.06
24.	*Quercus leucotrichophora*	317,201	282,275	90,590	690,066	4.36
25.	*Rhododendron arboreum*	18,169	1,888	0	20,057	0.13
26.	*Terminalia chebula*	4,248	2,231	0	6,479	0.04
27.	Rest of species	136,333	84,302	71,620	292,255	1.85
Total		**1,575,042**	**1,546,327**	**621,540**	**3,742,909**	**23.65**

District 11: Solan

Table 11.1:Distribution of estimated trees and trees/ha (Species and dia class wise) for Rural Area

Sl. No.	Species	Diameter Class (cm)			Total	Trees/ha
		10-30	30-50	50+		
1.	*Acacia arabica*	77,303	9,276	6,184	92,763	0.73
2.	*Acacia catechu*	1,989,724	179,084	16,406	2,185,214	17.25
3.	*Albizzia lebbek*	71,118	37,106	0	108,224	0.85
4.	*Azadirachta indica*	126,136	29,782	0	155,918	1.23
5.	*Bauhinia retusa*	264,716	13,055	0	277,771	2.19
6.	*Bombax ceiba*	107,962	41,710	4,037	153,709	1.21
7.	*Cedrela toona*	827,843	242,228	26,524	1,096,595	8.66
8.	*Celtis australis*	363,406	30,321	9,706	403,433	3.18
9.	*Dalbergia sissoo*	334,198	64,756	0	398,954	3.15
10.	*Eucalyptus species*	268,240	53,665	4,982	326,887	2.58
11.	*Ficus carica*	41,571	9,448	0	51,019	0.40
12.	*Ficus religiosa*	16,148	3,092	7,816	27,056	0.21
13.	*Ficus semicordata*	49,129	9,449	0	58,578	0.46
14.	*Ficus species*	31,985	7,421	1,752	41,158	0.32
15.	*Grewia oppositifolia*	1,269,054	41,262	7,129	1,317,445	10.40
16.	*Lannea coromandelica*	75,764	18,464	1,752	95,980	0.76
17.	*Leucaena leucocephala*	343,219	14,533	3,092	360,844	2.85
18.	*Mallotus philippinensis*	204,078	9,276	0	213,354	1.68
19.	*Mangifera indica*	485,535	71,701	32,691	589,927	4.66
20.	*Melia azadirachta*	44,073	8,759	0	52,832	0.42
21.	*Morus species*	165,043	25,288	5,789	196,120	1.55
22.	*Pinus roxburghii*	983,286	547,301	129,867	1,660,454	13.11
23.	*Pistacia integerrima*	319,962	94,308	4,037	418,307	3.30
24.	*Quercus leucotrichophora*	105,131	27,828	0	132,959	1.05
25.	*Quercus species*	216,447	49,474	0	265,921	2.10
26.	*Syzygium cumini*	373,107	46,310	4,844	424,261	3.35
27.	Rest of species	2,873,572	288,059	27,984	3,189,615	25.18
Total		**12,027,750**	**1,972,956**	**294,592**	**14,295,298**	**112.84**

Table 11.2:Distribution of estimated volume (cum) and volume/ha (Species and dia class wise) for Rural Area

Sl. No.	Species	Diameter Class (cm)			Total	Vol./ha
		10-30	30-50	50+		
1.	*Acacia arabica*	8,835	6,708	8,330	23,873	0.19
2.	*Acacia catechu*	183,219	118,003	32,135	333,357	2.63
3.	*Albizzia lebbek*	10,989	22,419	0	33,408	0.26
4.	*Azadirachta indica*	20,112	20,503	0	40,615	0.32
5.	*Bauhinia retusa*	28,467	9,414	0	37,881	0.30
6.	*Bombax ceiba*	13,330	30,121	12,500	55,951	0.44
7.	*Cedrela toona*	160,451	187,239	55,177	402,867	3.18
8.	*Celtis australis*	54,495	24,549	23,466	102,510	0.81
9.	*Dalbergia sissoo*	64,287	51,698	0	115,985	0.92
10.	*Eucalyptus species*	41,432	36,102	10,161	87,695	0.69
11.	*Ficus carica*	4,462	4,255	0	8,717	0.07
12.	*Ficus religiosa*	2,070	909	152,756	155,735	1.23
13.	*Ficus semicordata*	4,976	3,263	0	8,239	0.07
14.	*Ficus species*	3,883	3,682	2,979	10,544	0.08
15.	*Grewia oppositifolia*	140,030	30,563	17,218	187,811	1.48
16.	*Lannea coromandelica*	12,156	13,967	3,393	29,516	0.23
17.	*Leucaena leucocephala*	29,969	9,256	5,879	45,104	0.36
18.	*Mallotus philippinensis*	17,025	6,648	0	23,673	0.19
19.	*Mangifera indica*	34,514	35,591	63,257	133,362	1.05
20.	*Melia azadirachta*	5,881	4,613	0	10,494	0.08
21.	*Morus species*	16,811	15,681	10,517	43,009	0.34
22.	*Pinus roxburghii*	159,993	345,718	443,069	948,780	7.49
23.	*Pistacia integerrima*	63,425	79,146	8,603	151,174	1.19
24.	*Quercus leucotrichophora*	20,013	18,731	0	38,744	0.31
25.	*Quercus species*	26,221	26,024	0	52,245	0.41
26.	*Syzygium cumini*	53,775	35,015	9,404	98,194	0.78
27.	Rest of species	239,842	157,843	43,832	441,517	3.49
Total		**1,420,663**	**1,297,661**	**902,676**	**3,621,000**	**28.58**

District 12: Una

Table 12.1:Distribution of estimated trees and trees/ha (Species and dia class wise) for Rural Area

Sl. No.	Species	Diameter Class (cm)			Total	Trees/ha
		10-30	30-50	50+		
1.	*Acacia arabica*	35,921	17,961	4,490	58,372	0.46
2.	*Acacia catechu*	240,958	8,782	0	249,740	1.99
3.	*Bauhinia retusa*	143,686	17,961	0	161,647	1.29
4.	*Bombax ceiba*	49,637	47,680	7,444	104,761	0.83
5.	*Cedrela toona*	587,091	210,666	10,349	808,106	6.43
6.	*Dalbergia sissoo*	272,054	55,788	3,724	331,566	2.64
7.	*Eucalyptus species*	3,696,801	294,652	65,946	4,057,399	32.29
8.	*Ficus racemosa*	170,291	10,179	9,801	190,271	1.51
9.	*Ficus religiosa*	16,090	21,096	34,667	71,853	0.57
10.	*Ficus species*	54,310	4,661	9,236	68,207	0.54
11.	*Grewia oppositifolia*	688,840	59,477	3,512	751,829	5.98
12.	*Holoptelea integrifolia*	242,191	40,400	12,534	295,125	2.35
13.	*Lannea coromandelica*	330,649	47,579	2,056	380,284	3.03
14.	*Leucaena leucocephala*	554,661	20,838	0	575,499	4.58
15.	*Mallotus philippinensis*	852,889	25,208	6,246	884,343	7.04
16.	*Mangifera indica*	718,107	330,180	135,742	1,184,029	9.42
17.	*Mitragyna parviflora*	29,857	19,320	0	49,177	0.39
18.	*Morus alba*	1,080,004	93,538	0	1,173,542	9.34
19.	*Morus species*	613,195	112,622	10,142	735,959	5.86
20.	*Pistacia integerrima*	55,896	16,061	2,056	74,013	0.59
21.	*Populus ciliata*	220,019	0	0	220,019	1.75
22.	*Syzygium cumini*	347,794	108,957	32,716	489,467	3.90
23.	*Zizyphus mauritiana*	134,716	41,979	6,468	183,163	1.46
24.	Rest of species	1,749,675	197,253	59,805	2,006,733	15.97
Total		**12,885,332**	**1,802,838**	**416,934**	**15,105,104**	**120.23**

Table 12.2:Distribution of estimated volume (cum) and volume/ha (Species and dia class wise) for Rural Area

Sl. No.	Species	Diameter Class (cm)			Total	Vol./ha
		10-30	30-50	50+		
1.	*Acacia arabica*	8,154	12,841	10,283	31,278	0.25
2.	*Acacia catechu*	17,059	4,082	0	21,141	0.17
3.	*Bauhinia retusa*	19,304	11,066	0	30,370	0.24
4.	*Bombax ceiba*	4,913	31,557	16,789	53,259	0.42
5.	*Cedrela toona*	109,012	153,549	19,888	282,449	2.25
6.	*Dalbergia sissoo*	49,839	37,901	6,614	94,354	0.75
7.	*Eucalyptus species*	303,446	217,267	131,350	652,063	5.19
8.	*Ficus racemosa*	11,705	5,627	32,038	49,370	0.39
9.	*Ficus religiosa*	1,071	10,736	123,373	135,180	1.08
10.	*Ficus species*	2,692	1,712	28,811	33,215	0.26
11.	*Grewia oppositifolia*	81,010	38,372	8,889	128,271	1.02
12.	*Holoptelea integrifolia*	17,818	16,988	14,279	49,085	0.39
13.	*Lannea coromandelica*	38,865	34,750	3,488	77,103	0.61
14.	*Leucaena leucocephala*	58,854	12,721	0	71,575	0.57
15.	*Mallotus philippinensis*	96,029	13,134	6,632	115,795	0.92
16.	*Mangifera indica*	56,777	143,594	264,371	464,742	3.70
17.	*Mitragyna parviflora*	3,057	6,785	0	9,842	0.08
18.	*Morus alba*	96,434	50,289	0	146,723	1.17
19.	*Morus species*	71,526	63,746	16,675	151,947	1.21
20.	*Pistacia integerrima*	11,671	12,667	3,956	28,294	0.23
21.	*Populus ciliata*	22,159	0	0	22,159	0.18
22.	*Syzygium cumini*	42,683	81,757	61,934	186,374	1.48
23.	*Zizyphus mauritiana*	11,805	15,870	8,829	36,504	0.29
24.	Rest of species	156,816	97,271	355,649	609,736	4.85
Total		**1,292,699**	**1,074,282**	**1,113,848**	**3,480,829**	**27.70**

Annexure – II
Estimated Potential production for TOF Rural

Table13: Estimated Potential Production(cum) in TOF Rural in Himachal Pradesh

District: Bilaspur

Sl. No.	Species	Potential Production(cum)
1.	*Cedrela toona*	15667.50
2.	*Mangifera indica*	9055.22
3.	*Acacia catechu*	6430.30
4.	*Dalbergia sissoo*	5523.30
5.	*Syzygium cumini*	3564.77
6.	*Populus ciliata*	3490.78
7.	*Morus species*	3397.59
8.	*Bombax ceiba*	3315.82
9.	*Butea monosperma*	2502.11
10.	*Eucalyptus species*	2192.91
11.	*Salix alba*	2051.62
12.	*Melia azadirachta*	1341.23
13.	*Mallotus philippinensis*	1313.09
14.	*Pinus roxburghii*	1192.05
15.	*Pistacia integerrima*	1178.80
16.	*Azadirachta indica*	1032.83
17.	*Rest of the Species*	7970.63
Total		**71220.55**

Table 14: Estimated Potential Production(cum) in TOF Rural in Himachal Pradesh

District: Chamba

Sl. No.	Species	Potential Production(cum)
1.	*Celtis australis*	8548.89
2.	*Alnus nitida*	5413.18
3.	*Pyrus pashia*	5187.10
4.	*Salix alba*	3743.68
5.	*Melia azadirachta*	2771.90
6.	*Bombax ceiba/malabaricum*	2677.09
7.	*Eucalyptus species*	2580.10
8.	*Mangifera indica*	2122.72
9.	*Populus ciliata*	2032.26
10.	*Cedrela toona*	1598.20
11.	*Morus species*	1402.51
12.	*Rest of the Species*	8587.70
Total		**46665.33**

Table 15: Estimated Potential Production(cum) in TOF Rural in Himachal Pradesh

District: Hamirpur

Sl. No.	*Species*	Potential Production(cum)
1.	*Cedrela toona*	15926.70
2.	*Eucalyptus species*	13253.58
3.	*Mangifera indica*	11128.92
4.	*Pinus roxburghii*	7134.71
5.	*Dalbergia sissoo*	6780.98
6.	*Syzygium cumini*	4928.14
7.	*Morus species*	4468.09
8.	*Populus ciliata*	3982.13
9.	*Bombax ceiba*	3448.34
10.	*Albizzia chinensis*	3102.13
11.	*Acacia catechu*	2810.86
12.	*Mallotus philippinensis*	2488.39
13.	*Albizzia lebbek*	2144.50
14.	*Prunus cornata*	1665.61
15.	*Celtis australis*	1612.90
16.	*Zizyphus mauritiana*	1473.66
17.	*Melia azadirachta*	1239.08
18.	*Pyrus pashia*	1034.07
19.	*Rest of the Species*	4665.13
Total		**93287.92**

Table 16: Estimated Potential Production(cum) in TOF Rural in Himachal Pradesh

District: Kangra

Sl. No.	Species	Potential Production(cum)
1.	*Mangifera indica*	28912.27
2.	*Eucalyptus species*	19406.43
3.	*Cedrela toona*	17865.94
4.	*Populus ciliata*	15010.76
5.	*Acacia catechu*	11893.07
6.	*Celtis australis*	9975.34
7.	*Syzygium cumini/jambolanum*	7716.25
8.	*Bombax ceiba/malabaricum*	7565.03
9.	*Mallotus philippinensis*	6330.69
10.	*Salix alba*	5613.01
11.	*Prunus cornata*	5000.76
12.	*Dalbergia sissoo*	4731.82
13.	*Albizzia chinensis*	4173.81
14.	*Pyrus pashia*	3178.44
15.	*Albizzia lebbek*	3076.21
16.	*Melia azadirachta*	3057.05
17.	*Morus species*	2838.01
18.	*Morus alba*	2466.16
19.	*Zizyphus mauritiana*	2464.38
20.	*Terminalia belerica*	2097.40
21.	*Pinus roxburghii*	1974.85
22.	*Holoptelea integrifolia*	1570.22
23.	*Pistacia integerrima*	1041.24
24.	*Rest of the Species*	13436.42
Total		**181395.56**

Table 17: Estimated Potential Production(cum) in TOF Rural in Himachal Pradesh

District: Kinnor

Sl. No.	Species	Potential Production(cum)
1.	*Cedrus deodara*	2183.35
2.	*Pinus excelsa*	1714.12
3.	*Alnus nitida*	1297.82
4.	*Populus ciliata*	766.02
5.	*Salix alba*	333.11
6.	*Rhododendron species*	252.25
7.	*Pinus gerardiana*	228.65
8.	*Quercus leucotrichophora*	170.21
9.	*Rest of the Species*	578.23
Total		**7523.76**

Table 18: Estimated Potential Production(cum) in TOF Rural in Himachal Pradesh

District: Kullu

Sl. No.	***Species***	Potential Production(cum)
1.	*Alnus nitida*	14760.50
2.	*Eucalyptus species*	5353.34
3.	*Pistacia integerrima*	4339.79
4.	*Populus ciliata*	2954.09
5.	*Morus species*	660.91
6.	*Melia azadirachta*	2386.04
7.	*Quercus leucotrichophora*	2032.67
8.	*Pinus roxburghii*	1706.65
9.	*Juglans regia*	1676.04
10.	*Salix alba*	1535.69
11.	*Pyrus pashia*	1259.73
12.	*Cedrus deodara*	1201.32
13.	*Rest of the Species*	3693.79
Total		**43560.56**

Table 19: Estimated Potential Production(cum) in TOF Rural in Himachal Pradesh

District: Lahul & Spiti

Sl. No.	Species	Potential Production(cum)
1.	*Salix alba*	27054.87
2.	*Juglans regia*	477.90
3.	*Prunus cornata*	40.24
4.	*Robinia pseudocacia*	35.86
5.	*Rest of the Species*	22.88
Total		**27631.75**

Table 20: Estimated Potential Production(cum) in TOF Rural in Himachal Pradesh

District: Mandi

Sl. No.	Species	Potential Production(cum)
1.	*Populus ciliata*	141316.72
2.	*Celtis australis*	60340.02
3.	*Cedrela toona*	32834.41
4.	*Eucalyptus species*	19658.77
5.	*Prunus cornata*	16409.48
6.	*Syzygium cumini*	13188.32
7.	*Pinus roxburghii*	12335.72
8.	*Melia azadirachta*	9373.13
9.	*Machilus species*	9215.43
10.	*Quercus leucotrichophora*	9201.21
11.	*Mangifera indica*	9171.99
12.	*Albizzia chinensis*	8682.26
13.	*Pyrus pashia*	6313.88
14.	*Bombax ceiba*	5414.21
15.	*Pistacia integerrima*	4930.64
16.	*Mallotus philippinensis*	4653.44
17.	*Morus species*	4644.91
18.	*Albizzia lebbek*	4588.06
19.	*Morus alba*	2829.69
20.	*Litsaea species*	2748.71
21.	*Salix alba*	2206.46
22.	*Ehretia acuminata*	2054.69
23.	*Dalbergia sissoo*	1744.90
24.	*Juglans regia*	1166.64
25.	*Emblica officinalis*	1084.70
26.	*Rest of the Species*	13091.17
Total		**399199.56**

Table 21: Estimated Potential Production(cum) in TOF Rural in Himachal Pradesh

District: Shimla

Sl. No.	Species	Potential Production(cum)
1.	*Celtis australis*	12967.48
2.	*Alnus nitida*	12375.83
3.	*Pinus excelsa*	10406.74
4.	*Pinus roxburghii*	5996.12
5.	*Eucalyptus species*	5736.94
6.	*Cedrela toona*	4752.12
7.	*Pistacia integerrima*	4108.21
8.	*Cedrus deodara*	4049.60
9.	*Juglans regia*	3828.77
10.	*Quercus leucotrichophora*	3309.08
11.	*Melia azadirachta*	3127.86
12.	*Pyrus pashia*	2081.87
13.	*Populus ciliata*	1670.88
14.	*Prunus cornata*	1180.37
15.	*Morus species*	1103.10
16.	*Quercus species*	1033.11
17.	*Rest of the Species*	2887.52
Total		**80615.6**

Table 22: Estimated Potential Production(cum) in TOF Rural in Himachal Pradesh

District: Sirmaur

Sl. No.	Species	Potential Production(cum)
1.	*Pinus roxburghii*	20749.41
2.	*Celtis australis*	15757.34
3.	*Quercus leucotrichophora*	13801.33
4.	*Cedrela toona*	11619.99
5.	*Mangifera indica*	10416.16
6.	*Albizzia lebbek*	5605.52
7.	*Prunus cornata*	3717.97
8.	*Bombax ceiba*	3527.93
9.	*Pyrus pashia*	3105.38
10.	*Bauhinia retusa*	2360.89
11.	*Pistacia integerrima*	2280.24
12.	*Mallotus philippinensis*	1337.54
13.	*Acacia catechu*	1110.07
14.	*Morus species*	1024.51
15.	*Rest of the Species*	10153.89
Total		**106568.17**

Table 23: Estimated Potential Production(cum) in TOF Rural in Himachal Pradesh

District: Solan

Sl. No.	Species	Potential Production(cum)
1.	*Cedrela toona*	23020.95
2.	*Eucalyptus species*	21923.56
3.	*Acacia catechu*	16667.85
4.	*Pinus roxburghii*	15947.23
5.	*Mangifera indica*	10668.97
6.	*Celtis australis*	6834.01
7.	*Pistacia integerrima*	6046.95
8.	*Syzygium cumini/jambolanum*	4909.72
9.	*Bombax ceiba*	4476.01
10.	*Acacia arabica*	4053.12
11.	*Dalbergia sissoo*	3866.16
12.	*Salix alba*	2978.44
13.	*Pyrus pashia*	2364.38
14.	*Azadirachta indica*	2201.29
15.	*Melia azadirachta*	2048.20
16.	*Albizzia lebbek*	1782.62
17.	*Morus species*	1720.33
18.	*Zizyphus mauritiana*	1241.93
19.	*Quercus species*	1160.99
20.	*Prunus cornata*	1114.07
21.	*Mallotus philippinensis*	1094.06
22.	*Rest of the Species*	5700.61
Total		**141821.45**

Table 24: Estimated Potential Production(cum) in TOF Rural in Himachal Pradesh

District: Una

Sl. No.	Species	Potential Production(cum)
1.	*Eucalyptus species*	163016.07
2.	*Mangifera indica*	37179.38
3.	*Cedrela toona*	16139.91
4.	*Populus ciliata*	9466.56
5.	*Syzygium cumini*	9318.64
6.	*Morus species*	6077.92
7.	*Morus alba*	5876.37
8.	*Acacia arabica*	5773.27
9.	*Mallotus philippinensis*	4633.16
10.	*Bombax ceiba*	4263.72
11.	*Zizyphus mauritiana*	3993.21
12.	*Holoptelea integrifolia*	3275.95
13.	*Dalbergia sissoo*	3145.13
14.	*Acacia catechu*	2011.34
15.	*Pistacia integerrima*	2010.85
16.	*Albizzia lebbek*	1293.99
17.	*Melia azadirachta*	1130.97
18.	*Rest of the Species*	14814.33
Total		**293420.77**

Annexure – III
List of important species in TOF area as per by HPFD

List of important Tree species (Trees Outside Forests) with Local and Botanical Names

Sr. No.	Botanical Name of Species	Local Name of Species
1.	*Albizia species*	Kala Siris/ Ohi/ Siris
2.	*Bauhinia species*	Kachnar/ Karial
3.	*Eucolyptus species*	Safeda
4.	*Morus alba*	Kimu/ Chimu/ Shahtoot/ Tut/ Mulbery
5.	*Populus deltoides/ ciliata*	Poplar
6.	*Salix species*	Indian Willow/Biuns
7.	*Dendrocalamus strictus/ Dendrocalamus hamiltonii/ Bambusa*	Bamboo culms/ Lathi/ bans/ Maggar/ Dharainch/ Bans
8.	*Broussounetia papyrifera*	Japanese Shahtoot/ Paper mulberry
9.	*Alnus nitida*	Paik/ Koi/ Kosh/ Kunis/ Kunish/ Nyun
10.	*Celtis australis/ Celtis tetrendra*	Khirk/ Khadki
11.	*Melia azedarch*	Darak/ Bakin
12.	*Ficus species*	Fagoora/ phagoora/ Tiamble/ timla/ tirmal/ ankiri/ cluster/ fig/ goolar
13.	*Toona ciliata*	Toon
14.	*Syzygium cumini*	Jamun
15.	*Tectona grandis*	Teak/ Sagun/ Sagwan
16.	*Terminalia arjuna*	Arjun
17.	*Bombax ceiba*	Semal/ Shalmaltas
18.	*Grewia species*	Bihul/ Beul/ Bhimal/ Bhi-unal/ Dhaman
19.	*Prunus cerasoides*	Paza/ Padam
20.	*Mallotus philippensis*	Kamala/ Raini/ Rohan/ Rohini/ Sinduri
21.	*Mangifera Indica*	Aam
22.	*Sapindus mukorossi*	Rishtak/ Ritha/ Dode
23.	*Ficus religiosa*	Peepal
24.	*Ficus benghalensis*	Bargad
25.	*Pinus roxburghii*	Chil Pine
26.	*Pinus wallichiana*	Blue Pine
27.	*Cedrus deodara*	Deodar
28.	*Abies pindrow*	Fir
29.	*Picea smithiana*	Spruce
30.	*Pinus gerardiana*	Chilgoza Pine
31.	*Quercus sp.*	Oak
32.	*Terminalia bellirica*	Bahera
33.	*Shorea robusta*	Sal
34.	*Acacia catechu*	Khair
35.	*Juglans regia*	Walnut
36.	*Rhododendron sp.*	Brass
37.	*Butea monosperma*	Dhak
38.	*Azadirachta indica*	Neem
39.	*Fraxinus griffithii*	Ash
40.	*Olea cuspidata*	Olive
41.	*Betula utilis*	Bhojpatra/ Birch
42.	*Dalbergia sissoo*	Shisham
43.	*Punica granatum*	Daru
44.	*Myrica esculenta*	Kafal

Rotation age:

Sr. No.	Botanical Name of Species	Local Name of Species	Rotation age (Yrs)
1.	*Toona ciliata*	Toon	
2.	*Tectona grandis*	Teak/ Sagun/ Sagwan	50-90
3.	*Quercus leucotrichophora*	Ban, Oak	100
4.	*Pinus roxburghii*	Chil Pine	120
5.	*Pinus wallichiana*	Blue Pine	120-150
6.	*Cedrus deodara*	Deodar	120-150
7.	*Abies pindrow*	Fir	90
8.	*Picea smithiana*	Spruce	120
9.	*Shorea robusta*	Sal	70
10.	*Juglans regia*	Walnut	60-80
11.	*Dalbergia sissoo*	Shisham	60

List of Species and rotation period used for obtaining Potential Production Estimation

List of timber species with their rotation period are identified on the basis of list provided/approved by Himachal Pradesh Forest Depratment and research paper "Ethnobotanical Studies on Timber Resources of Himachal Pradesh, India" (https://opensiuc.lib.siu.edu/cgi/viewcontent.cgi?article=1626&context=ebl)

S. No.	botanical_name	Local Name	Rotation Period
1.	*Acacia arabica/ Acacia nilotica/indica*	Babul, Kikar, Bawar, Bawal	12
2.	*Acacia catechu*	Khair, Velsundra,Hiwar	40
3.	*Aesculus indica/Pavia indica*	Himalayan horse chestunut, Panger	50
4.	*Albizzia chinensis(Old) Albizzia stipulata*	Bombeza,A.Avara	50
5.	*Albizzia julibrissin*	Sirse	50
6.	*Albizzia lebbek*	Kala Siris, Bhander, Sarsaoda, Koko, Kalbage	40
7.	*Alnus nitida*	Kunis	50
8.	*Alstonia scholaris*	Chatidu, Chatiwan, Satwin, Chatim, Pala, Chatuin, Chhatyal	7
9.	*Azadirachta indica/ Melia indica*	Neem, Nibbaro, Nimdo, Vepa maram	38
10.	*Bauhinia purpurea*	Kachna, Chameli, Pasau	52
11.	*Bauhinia retusa/Variegata*	Sahra, Kachnar, Kachan	52
12.	*Betula utilis*	Bhojpatra, Birch	100
13.	*Bombax ceiba/malabaricum/ Salmalia malabarica/ Insigne*	Semal, Sawar, Semer, Simul, Shimola, Elavo, Buruga	25
14.	*Butea monosperma(Old) Butea frondosa*	Palas, Kakhar, Khakhara, Palasin, Samatha, Dhak, Sumortha	40
15.	*Cedrela toona/Toona ciliata/ Toon Microcarpa febrifuga*	Tun, Darli, Darloi, Dal, Mathagiri, Vedi, Vembu, Malavepa, Noga, Chonagil, Jatipoma, Poma	120
16.	*Cedrus deodara*	Depdar, Dayar, Devadaru,Deodar	135
17.	*Celtis australis/tetrandra*	Kharik	30
18.	*Dalbergia sissoo*	Sissoo, Shisham, Tahli	60
19.	*Ehretia acuminata**	Gaul	52
20.	*Ehretia laevis**	Chamror, Khoba, Datrang	52
21.	*Emblica officinalis/ Phyllanthus emblica*	Amla, Aonla, Amlaki, Nellimaram, Nelli, Amloki	40
22.	*Erythrina suberosa*	Pangra, Gararo, Mander, Dhaul, Dhak	25
23.	*Eucalyptus citriodora*	Nilgiri	7
24.	*Eucalyptus globules*	Blue gum	8.5
25.	*Eucalyptus grandis*	Nilgiri	6
26.	*Eucalyptus hybrid*	Nilgiri	11
27.	*Eucalyptus species*	Nilgiri,Thadya,Thallawara	8
28.	*Ficus bengalensis*	Figs, Wad,Bargad, Alamaram	52

29.	*Flacourtia indica(Old) Flacourtia ramontchi**	Kangu, Kakai	52
30.	*Holoptelea integrifolia*	Kaneji, Pungo, Aval, Chiebil, Nambinara, Wavala,Ayam, Tabani	30
31.	*Juglans regia*	Akhrot, Akhor	70
32.	*Litsaea species**	Lakri, Narkh, Bailara, Shurur, Lampatia, Maida	52
33.	*Machilus species**	Kaula, Sunkaula	52
34.	*Mallotus philippinensis*	Rehini, Sindhuri, Ruina, Rolli, Kamela	50
35.	*Mangifera indica*	Amb, Ambo, Mavu, Moru, Mamidi,Magani	25
36.	*Melia azadirachta*	Bijainn, Baknia, Motilimdo, Betain, Bakamlimdo	12
37.	*Morus alba*	Tori,Tuntri,Tont	50
38.	*Morus species*	Tut, Kimu, Shahtoot	50
39.	*Picea smithiana/morinda*	Spruce	120
40.	*Pinus excelsa/wallichiana*	Kail	135
41.	*Pinus gerardiana*	Chilgoza	120
42.	*Pinus roxburghii/longifolia*	Chir	120
43.	*Pistacia integerrima*	Kakkar, Kakroi, Kakra	50
44.	*Populus ciliata*	Poplar, Safeda, Paharipipal,Vanu	6
45.	*Populus species*	Bonpipal, Godhpipal	6
46.	*Prunus cornata(Old) Prunus padus*	Payyan, Jamun, Padam, Paji	20
47.	*Pyrus pashia*	Kainth, Mehal	20
48.	*Quercus leucotrichophora*		100
49.	*Quercus semecarpifolia*	Kharsu oak	90
50.	*Quercus species*	Oak, Philiant, Rainj, Riani	90
51.	*Rhododendron arboreum*	Burans, Biirans	50
52.	*Rhododendron species*	Ghemula, Talias, Simris, Taqueaha	50
53.	*Robinia pseudocacia**		52
54.	*Salix alba*	Bhains,Willow	11
55.	*Salix species*	Bed, Bhainshara, Bashroi, Manju, Gadhbhains	11
56.	*Sapium insigne*	Khinna, Khirna, Khimi, Hure	10
57.	*Shorea robusta*	Sal	70
58.	*Syzygium cumini/jambolanum(Old) Eugenia jambolana*	Jamoon, Piaman, Rajamun, Jamak, Jambudo	40
59.	*Tectona grandis*	Sagwan, Teak	70
60.	*Terminalia belerica*	Behera, Behdo, Gowa, Phomra, Kamia, Tharala	50
61.	*Terminalia crenulata/tomentosa*	Saja, Sajad, Saj, Ain, Alu, Asan	50
62.	*Ulmus wallichiana**	Chamar, Mawa, Himri	52
63.	*Zanthoxylum alatum**	Tiur	52
64.	*Zizyphus mauritiana(Old) Zizyphus jujuba*	Ber,Kul	20

* In the absence of rotation period, average of the other species roatation period has been used

Annexure – IV
Volume Equation used for Himachal Pradesh

Volume equations used to compute volume of wood in predominant tree speciesare given in the following table.

S. No.	Species Name	Volume Equation
1	*Acacia arabica*	V=(0.16609-2.78851*D+17.22127*(D^2)-11.60248*(D^3))
2	*Acacia catechu*	V=(0.02384-0.72161*D+7.46888*(D^2))
3	*Acacia lenticularis*	V=(0.16609-2.78851*D+17.22127*(D^2)-11.60248*(D^3))
4	*Acacia suma*	V=(0.16609-2.78851*D+17.22127*(D^2)-11.60248*(D^3))
5	*Acer species*	V=(-0.10851+(3.0425*D))^2
6	*Aesculus indica*	V=(0.220191+3.923711*D-1.117475*(D^0.5))^2
7	*Ailanthus excelsa*	√V=-0.41331+2.66051*D+0.94576√D
8	*Ailanthus tryphas*	√V=-0.41331+2.66051*D+0.94576√D
9	*Albizia species*	√V=-0.07109+2.99732*D-0.26953√D
10	*Albizzia chinensis*	√V=-0.07109+2.99732*D-0.26953√D
11	*Albizzia julibrissin*	√V=-0.07109+2.99732*D-0.26953√D
12	*Albizzia lebbek*	V=-0.0367+5.87369*D^2
13	*Albizzia mollis*	√V=-0.07109+2.99732*D-0.26953√D
14	*Albizzia odoratissima*	√V=-0.07109+2.99732*D-0.26953√D
15	*Albizzia procera*	√V=-0.07109+2.99732*D-0.26953√D
16	*Alnus nitida*	V=0.41455-1.37120*√D+11.33119*D^2
17	*Anogeissus latifolia*	V=-0.011053+0.087418*D+2.545701*D^2+4.766918*D^3
18	*Azadirachta indica*	V=-0.0351+5.32981*D^2
19	*Bauhinia retusa*	V=(-0.04262+6.09491*(D^2))
20	*Bauhinia species*	V=(-0.04262+6.09491*(D^2))
21	*Betula utilis*	V=(0.12652-0.018037*100*D+0.000956*100*100*(D^2))
22	*Bombax ceiba*	V=(0.136196-2.07674*D+10.1566*(D^2))
23	*Butea monosperma*	V=(0.0417-0.47789*D+3.50714*(D^2)+9.76048*(D^3))
24	*Cassia fistula*	V=(0.05159-0.53331*D+3.46016*(D^2)+10.18473*(D^3))
25	*Cedrela toona*	V=(-0.05514+2.67753*D)*(-0.05514+2.67753*D)
26	*Cedrus deodara*	V=(10.03982*(D^2)-1.28303*D+0.07367)
27	*Celtis australis*	V=(0.03629+3.95389*D-0.84421*(D^0.5))^2
28	*Cordia species*	V= (0.007602-0.033037*D+1.868567*(D^2)+4.483454*(D^3))
29	*Dalbergia sissoo*	V=0.00331+0.000636*D^2*10000
30	*Emblica officinalis*	V=(-0.022635+4.889163*(D^2))
31	*Eucalyptus globules*	V=0.02894-0.89284*D+8.72416*D^2
32	*Eucalyptus grandis*	V=0.02894-0.89284*D+8.72416*D^2
33	*Eucalyptus hybrid*	V=0.02894-0.89284*D+8.72416*D^2
34	*Eucalyptus species*	V=0.02894-0.89284*D+8.72416*D^2
35	*Ficus carica*	V= (0.007602-0.033037*D+1.868567*(D^2)+4.483454*(D^3))
36	*Flacourtia indica*	V=(0.00085-0.35165*D+4.77386*(D^2)-0.90585*(D^3))
37	*Grewia oppositifolia*	V=(0.0418481-1.140567*D+9.817616*(D^2))
38	*Grewia tiliaefolia*	V=0.05858-1.20414*D+9.80167*D^2
39	*Juglans regia*	√V=-0.207229+3.254007*D
40	*Lannea coromandelica*	V=(0.14004-2.35990*D+11.90726*(D^2))
41	*Leucaena leucocephala*	V=(-0.143393+3.040067*D)^2)
42	*Machilus species*	V=0.07116-1.33867*D+9.8397*D^2+2.29781*D^3
43	*Mallotus philippinensis*	V=(0.14749-2.87503*D+19.61977*(D^2)-19.11630*(D^3))

S. No.	Species Name	Volume Equation
44	*Melia azadirachta*	V=-0.0351+5.32981*D^2
45	*Morus alba*	V=-0.0351+5.32981*D^2
46	*Morus species*	V=-0.0351+5.32981*D^2
47	*Phoenix sylvestris*	V=(0.0239-0.6266*D+5.4067*(D^2))
48	*Pinus excelsa*	V=(10.44*(D^2)-0.851*D+0.020)
49	*Pinus gerardiana*	V=(0.05131+3.9859*D-1.0245*(D^0.5))^2
50	*Pinus roxburghii*	V=(0.05131+3.9859*D-1.0245*(D^0.5))^2
51	*Pistacia integerrima*	V=(0.220191+3.923711*D-1.117475*SQRT(D))^2
52	*Populus ciliata*	V=(-0.143393+3.040067*D)^2)
53	*Populus species*	V=(-0.143393+3.040067*D)^2)
54	*Quercus dilatata*	V=(0.0988-1.5547*D+10.1631*(D^2))
55	*Quercus glauca*	V=(0.0988-1.5547*D+10.1631*(D^2))
56	*Quercus griffithii*	V=(0.0988-1.5547*D+10.1631*(D^2))
57	*Quercus incana*	V=√0.240157+3.820069*D-1.394520*√D
58	*Quercus leucotrichophora*	V=(0.0988-1.5547*D+10.1631*(D^2))
59	*Quercus species*	V=.04430-.84266*D+6.362390*D^2+2.27556*D^3
60	*Rhododendron arboreum*	V=(0.306492+4.31536*D-1.749908*(D^0.5))^2
61	*Salix alba*	V=(0.220191+3.923711*D-1.117475*(D^0.5))^2
62	*Syzygium cumini*	V=0.09809-1.94468*D+13.36728*D^2-6.33263*D^3
63	*Tectona grandis*	√v=-0.405890+1.98158*D+0.987373*√D
64	*Terminalia arjuna*	√V=-0.14325+3.07937*D
65	*Terminalia belerica*	√V=-0.14325+3.07937*D
66	*Terminalia crenulata*	V=0.08658-2.04096*D+13.28405*D^2-3.58047*D^3
67	Unidentified/Miscellanous species	V=(0.007602-0.033037*D+1.868567*(D^2)+4.483454*(D^3))

Annexure – V
Field Forms of TOF Rural

TOFR –1

PLOT APPROACH FORM

Job No.	Survey code	Form code	FSI Zone	Phy. Zone	State code
1(3)	**2(1)**	**3(1)**	**4(1)**	**5(2)**	**6(2)**
	2	1	1	01	02

District code	Stratum code	Plot No.	Map sheet No.	Latitude dd mm ss	Longitude dd mm ss	Plot Hilly or Non Hilly
7(2)	**8(1)**	**9(3)**	**10(6)**	**11(8)**	**12(8)**	**13(1)**

14. Name of Camp

15. Time (hrs.) at which left the camp

16. Distance covered by vehicle (km)

17. Time taken in journey by vehicle Hours Minutes

18. Time at which started on foot hrs.

19. Distance covered on foot upto plot center Km. Mtr.

20. Time of arrival at the Plot hrs.

21. Plot destination Mark (Name of village)

22. Time of departure from the Plot hrs.

23. Time at which returned to the camp hrs.

24. Navigation done by Name GPS/Compass (tick one)

25. Plot laid out by

26. Enumeration done by

27. Remarks

Name of Crew Leader

Signature with Date

Note: - 1st number in the row below the field headings represents the column number and the number inside the bracket represents the column width.

TOFR -2

PLOT ENUMERATION FORM

Job No.	Survey Code	Form code	FSI Zone	Phy. Zone	State code	District code	Stratum code	Plot No	Plot Status
1(3)	2(1)	3(1)	4(1)	5(2)	6(2)	7(2)	8(1)	9(3)	10(1)
	2	2	1	01	02				

Plot Ownership	Latitude dd mm ss	Longitude dd mm ss	Category of plot	Shifted Latitude dd mm ss	Shifted Longitude dd mm ss	Plot Type
11(1)	12(8)	13(8)	14(1)	21(8)	22(8)	24(1)

S.No.	Species name	Species Code 15(4)	dbh (cm) 16(3)	No. of culms 17(3)	Crown Width 18(3)	Category of trees/ bamboo 19(1)	Bamboo Quality 20(1)	Status of Tree 23(1)
	Total							

Page No…….Total No. of Pages **Name of Crew Leader** **Sign of Crew Leader with Date**

Note: - 1st number in the row below the field headings represents the column number and the number inside the bracket represents the column width.

Annexure – VI

Glossary of Important Terms& Abbreviations Used

Culturable Non Forest Area (CNFA)	It is the net geographical area, lying outside recorded forest, which can support tree vegetation (thus, excluding areas under wetlands, rivers, river beds, perennial snow covered mountains, etc.)
Forest Cover	All lands more than one hectare in area, with a tree canopy density of more than 10 percent irrespective of ownership and legal status. Such lands may or may not be statutorily notified as forest area.
Growing Stock	It is the sum (by number or volume) of all the trees growing /living in the forest or TOF.
Inventory	The measuring and describing the quantity and quality of crop and many other characteristics of the land area upon which crop is growing
Recorded Forest Area (RFA)	The geographic area recorded as forests in Governments records.
Tree Cover	It comprises tree patches outside the recorded forest area exclusive of forest cover and less than the minimum mappable area (1 ha).Such small patches comprising of block,linear and scattered trees are not delineated as forest cover during interpretation of satellite data . The areas of scattered trees are computed by notional numbers.
Tree Outside Forests (TOF)	All trees growing outside recorded forest area.
TOF (Rural)	All trees available in rural area outside the Recorded Forest Area.
TOF (Urban)	All trees available in urban area outside the Recorded Forest Area.
Volume equations	Volume equations are regression equations between volume, diameter and height of a particular tree species. If the equation is between volume and diameter only, it is called local volume equation and if height is also taken into consideration, the volume equation is called as general volume equation.

Abbreviations Used

CNFA	-	Culturable Non Forest Area
FSI	-	Forest Survey of India
GPS	-	Global Positioning System
HPFD	-	Himachal Pradesh Forest Department
IRS	-	Indian Remote Sensing
LISS	-	Linear Imaging Self Scanner
NRSC	-	National Remote Sensing Centre
PAN	-	Panchromatic
PCCF	-	Principal Chief Conservator of Forests
RFA	-	Recorded Forest Area
SOI	-	Survey of India
TOF	-	Tree Outside Forest
TOFI	-	Tree Outside Forest Inventory
TOFR	-	Tree Outside Forest Rural

CONTRIBUTION

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