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INVENTORY SURVEY

(Non - Forest Area)

OF

JIND DISTRICT

(HARYANA STATE)

भारतीय वन सर्वेक्षण विभाग
Forest Survey of India
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Bihar, India

INVENTORY RESULTS

FOREST SURVEY OF INDIA

NORTHERN ZONE

SHIMLA-1

1995

PREFACE

Forest survey of India, for the first time, took up inventory surveys in the rural areas with the primary objective of assessing the distribution of trees and their Growing Stock in the rural areas and to have an overview of the various social forestry schemes implemented by the State Forest Departments. The inventory survey was carried out according to stratified random sampling methodology. One of the important points in this survey was to categorise various types of trees in a village. The categories were farm forestry, roadside plantations, village woodlot, block plantations, canals, railway lines, ponds and rest. This report pertaining to the district Jind, Haryana is the second in this series by the Northern Zone, Shimla. It presents the results of inventory of trees outside the traditional forest areas.

The geographical area of the Jind District is 3306 Sq. Km. The survey was carried out during 1992-93 in the rural areas of the district covering an area of 3271.93 Sq. Km.

Out of the total species inventoried, twenty species on the basis of their predominance and commercial importance have been presented separately. Other species have been kept together as miscellaneous.

The total number of trees in the district have been assessed to be 34.90 lakh i.e. 10.67 trees/ha. and the corresponding volume has been assessed to be 6.98 lakh cubic meters i.e. 2,133 cum/ha. *Acacia nilotica* (Babul) and *Eucalyptus* spp. (Safeda) were found to be the main species with 14.91 lakh trees (42.73%) and 6.97 lakh trees (19.98%) respectively.

It is hoped that this report will be used, not only by the state Forest department of Haryana but also by others.

The inventory survey was carried out by the staff of Northern Zone of Forest Survey of India and the data was also processed by them. The work of the field staff and officers who were associated in carrying out the inventory survey, data processing and writing of this report, is appreciated.

Sd/-
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ACKNOWLEDGEMENTS

The State of Haryana is situated in the North--West part of India. It has extreme climate which is very cold in winter and very hot during summer. Besides this in many villages proper drinking water facility is also not easily available. The staff of the Northern Zone were engaged in carrying out the inventory survey of non-forest, areas of Haryana with the co-operation of State Forest Department's officers and staff. The Panchayat Pardhans and members and also the villagers have been very kind to extend their co-operation in making our field work smooth and easy. The Deputy Commissioner and other staff of the Revenue Department of the district were very helpful and co-operative. I acknowledge with thanks for the co-operation and help extended by all concerned as mentioned above.

I am specifically grateful to Shri P. S. Malik, IFS, the Principal Chief Conservator of Forests of Haryana for directing the officers and staff of his department to extend full co-operation to our field staff. I am also thankful to Shri D R. Ramesh Singh IFS, Conservator of Forests (HQ) and Divisional Forest Officer Jind for providing us the required data and informations. Shri G. K. Ahuja, IFS, Divisional Forest officer, Social Forestry, Panipat, Range Officers (territorial) and other field staff have also been very co-operative in extending all possible facilities

I acknowledge with thanks, on behalf of Forest Survey of India (Northern Zone), to all the concerned as mentioned above but for their kind co-operation and help extended to this organisation it would not have been so easy to bring out this report successfully.

Sd/-
(Manjit Singh, IFS)
Joint Director

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SUMMARY

1. To assess the availability of forest resources for production of timber, fuelwood and raw material for paper pulp, packing cases, essential oils and matchwood etc. in areas outside the traditional Reserved Forests and those forest areas which could not be covered while undertaking the regular Inventory Survey of Haryana State. The Inventory Survey has been carried out in the Jind district of Haryana during 1992-93.

2. As per 1981 Census Jind district had a total of 354 villages, having a total area of 3271.41 Sq. Km., out of which 16 villages were randomly selected and surveyed.

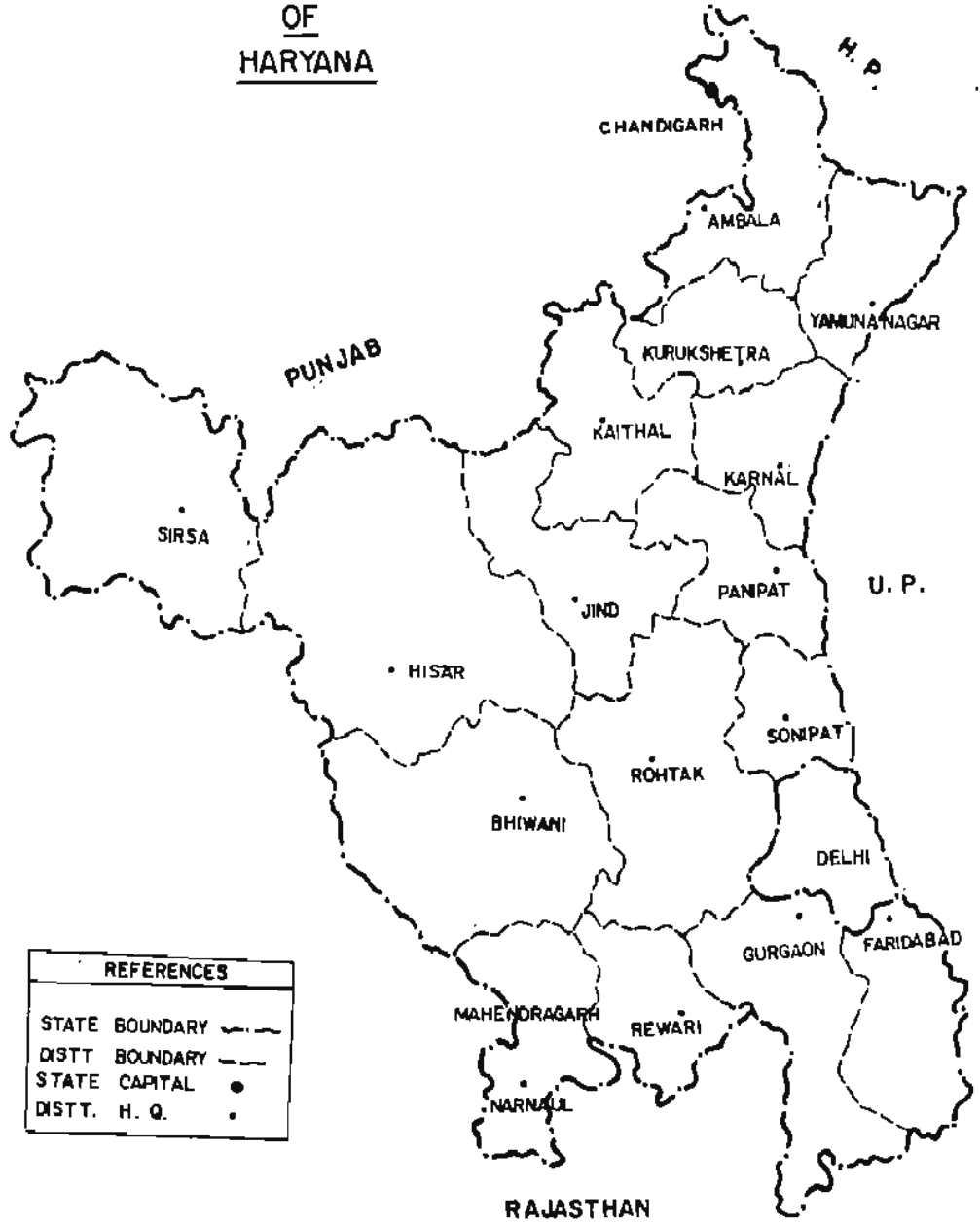
3. In the entire rural area of Jind district 34.90 lakh trees (10.67 trees/hectare) have been estimated. The analysis shows that maximum number of the estimated trees are in 10-20 cms. dia-class i.e. 21.91 lakh trees (62.80%) and minimum in 40 cms. and above dia-class i.e. 1.72 lakh trees (4.93%).

4. The specieswise distribution of total number of estimated trees shows that *Acacia nilotica* (Babul) has the largest representation i.e. 14.91 lakh trees (42.73%) followed by *Eucalyptus* spp. 6.97 lakh trees (19.98%), *Dalbergia sissoo* (Shisham) 3.82 lakh trees (10.95%), *Morus* spp. 1.38 lakh trees (3.97%), *Azadirachta indica* 1.31 lakh trees (3.77%), *Zyzyphus* spp. 0.82 lakh trees (2.36%), *Populus* spp. 0.79 lakh trees (2.25%), *Salvadora* spp. 0.77 lakh trees (2.20%), *Melia azedarach* 0.72 lakh trees (2.06%) *Mangifera indica* 0.66 lakh trees (1.89%), *Prosopis juliflora* 0.54 lakh trees (1.56%), *Syzygium cumini* 0.43 lakh trees (1.23%) and *Ficus* spp. 0.40 lakh trees (1.14%).

5. The distribution of total number of trees categorywise and dia-classwise shows that the representation of trees is maximum in the Category-I - FARM FORESTRY i.e. 17.42 lakh trees (49.92%) and minimum in the Category-V - PONDS i.e. 0.35 lakh trees (1.01%)

6. In the entire rural area of Jind district total estimated volume of all species and dia-classes combined comes to be 6.976 lakh cubic meters and volume/hectare is 2.133 Cum.

MAP SHOWING DISTTS.
OF
HARYANA



REFERENCES	
STATE BOUNDARY	— — — — —
DISTT BOUNDARY	- - - - -
STATE CAPITAL	•
DISTT. H. Q.	•

CHAPTER 1

1.1 Introduction

To assess the availability of forest resources for production of timber, fuelwood and raw material for paper pulp, packing cases, essential oils, matchwood etc. in area outside the traditional Reserved Forest areas and those forest areas which could not be covered while undertaking the regular Inventory Survey of Haryana State.

1.2 Description of the District.

Jind district is a part of Eastern Haryana plain. The district was formed at the time of reorganisation of composite state of Punjab and creation of Haryana in November, 1966, which earlier had been a part of the Sangrur district. The Sangrur district itself was carved out of the territories of erstwhile Patiala, Nabha and Jind states collectively known as Phulkian states. According to local traditions recorded in the Imperial Gazetteer, the town of Jind owes its foundation to the Pandavas who are supposed to have built a temple here to Jaini Devi, the 'goddess of victory' around which sprang the town of Jainiपुरi since corrupted into Jind.

1.3 Location

The district lies between $29^{\circ} 03'$ and $29^{\circ} 50'$ North latitudes and between $75^{\circ} 57'$ and $76^{\circ} 47'$ East longitudes. On its east and north-east lies the districts of Karnal and Kurukshetra. On the north-west it borders with Patiala and Sangrur districts of Punjab. In the north-west, west and south-west it has a common boundary with Hisar district and on its south and south-east lie the Rohtak and Sonapat districts. The district comprises of three tehsils of Narwana, Jind and Saffidon. The area of the district is 3,306 Sq. Km. with a population of 9,38,074 as per 1981 Census.

1.4 Physical Features

Soil and topography

The district on the whole is divided into the following two sub-micro-regions on the basis of soils and topography:

(a) Narwana Plain

The region spreads over Narwana tehsil (except a few villages in central and southern parts of the tehsil) and part of Jind tehsil of the district. From relief point of view, the maximum height of the region is 233 metres above m.s.l near village Kheri Lamba (121) in Narwana tehsil and minimum height of 223 metres near village Sandil (10) in Jind tehsil. It is entirely a plain land having a general slope from North-East to South-West. The region is predominantly agricultural as is exhibited by rural character of the settlements. Over the region cultivated land is very extensive. Small patches of scrubs and bushy types of vegetation are found here and there.

The geological formation of the region is 'Alluvium'. The soil of the region is loam (Bhangar and Nardak). Soils as classified by National Bureau of Soil Survey and Land Use Planning (ICAR), Nagpur, this region has Aquepts-Ochrepts types of soils.

Ochrepts – Shallow black, brown and alluvium soils of northern region

Aquepts – Brown soils (Hydromorphic)

The soil is compact and stiff because of the addition of silt over the years by flowing water. It is less granular and has a lower water holding capacity. Canal system is the only important source of water supply for irrigation and domestic purpose also.

The region is well covered by a network of all types of roads radiating in all directions from Narwana town which is an important town in the region. The main railways passing through the region are Narwana to Jind, to Jakhal mandi and to Kaithal via Kalayat (Broad gauge).

(b) Jind Plain

The region spreads over Jind tehsil leaving a few villages in the North, whole of Saffidon tehsil and some villages of the central and southern Narwana tehsil. From the physiographic point of view, it is a plain area having a maximum height of 233 metres above m.s.l near village Baroda (88) and a minimum height of 232 metres above m.s.l near village Ramnagar (12). Both the heights are found in Narwana tehsil and Saffidon tehsil respectively.

The geological formation, the soil of the region and its classification are the same as that of Narwana Plain.

On the whole the region is under extensive cultivation due to the availability of fertile soil and irrigation facilities. A network of major and minor distributaries of canals cover every patch of land.

The region is well connected by all kinds of roads with towns namely Saffidon, Jind, Julana and Uchana. Two Broad gauge railway lines passing through the region are Panipat to Jind and Rohtak to Jakhal mandi.

1.5 Climate

The Jind district lies in the Eastern Haryana plain which has a Gangetic type, subtropical continental monsoon climate.

1.6 Rain

Monsoon bring rains from July to September. From October to June the weather is generally dry except a few showers from western cyclones. The average annual rainfall in the Jind district is less than that of Karnal and Kurukshetra districts but more than that of Hisar and Rohtak districts. The average annual rainfall varies between less than 500 mm in South-West part to more than 600 mm in the North-East part of the district due to variation in distance from the Himalayas and the Thar desert. The climate in the district is attributed to short wet months and long spell of dry months or weeks. Humidity is very high during the short period of rainy season and very low during dry summer months of May and June.

1.7 Temperature

Due to its distance from the sea, the diurnal and seasonal range of temperature is wide. The maximum daily temperature during summer reaches more than 45 C during the last week of May or early June. Hot dry winds blow during the day due to its proximity to the semi-arid and arid areas of Haryana and Rajasthan. During winter the minimum temperature during night falls below 5 C in December and January.

1.8 Frost, Fog, Hail and Dust Storms

Ground frost also occurs when there is snow fall in H.P. and U.P. hills. Fog occurs during the months of January and February. Occasional spells of hail storms also occur during the period from February to April. During May June dust storms also lash the district.

1.9 Socio-Economic Conditions

The economy of the district is primarily agricultural. At the time of 1981 Census, about 74% of the total main workers were cultivators and agricultural labourers. Most of the industries are agro-based. They manufacture mostly cotton textiles and food products. There are some cotton ginning and pressing units and items like steel wire ropes, cattlefeed and leather products are also manufactured. The range of items produced include surgical cotton, stainless steel, medicinal injections, steel fabricated items, candles, zinc sulphate, PVC wire, agricultural implements, hosiery goods and soap etc.

The district has adequate canal irrigation facilities. Out of the total area of the district 90.52% is cultivable area out of which 72.95% is irrigated. The area under cultivation of food grains, cotton and sugarcane is more than other crops. Mainly wheat, bajra, gram and rice are grown. Only 4 Sq. Km. area of the district is under R.F.. As per 1977 Livestock Census, the number of livestock in the district was 6,23,000 which included cattle, buffaloes, sheep, goats and pigs.

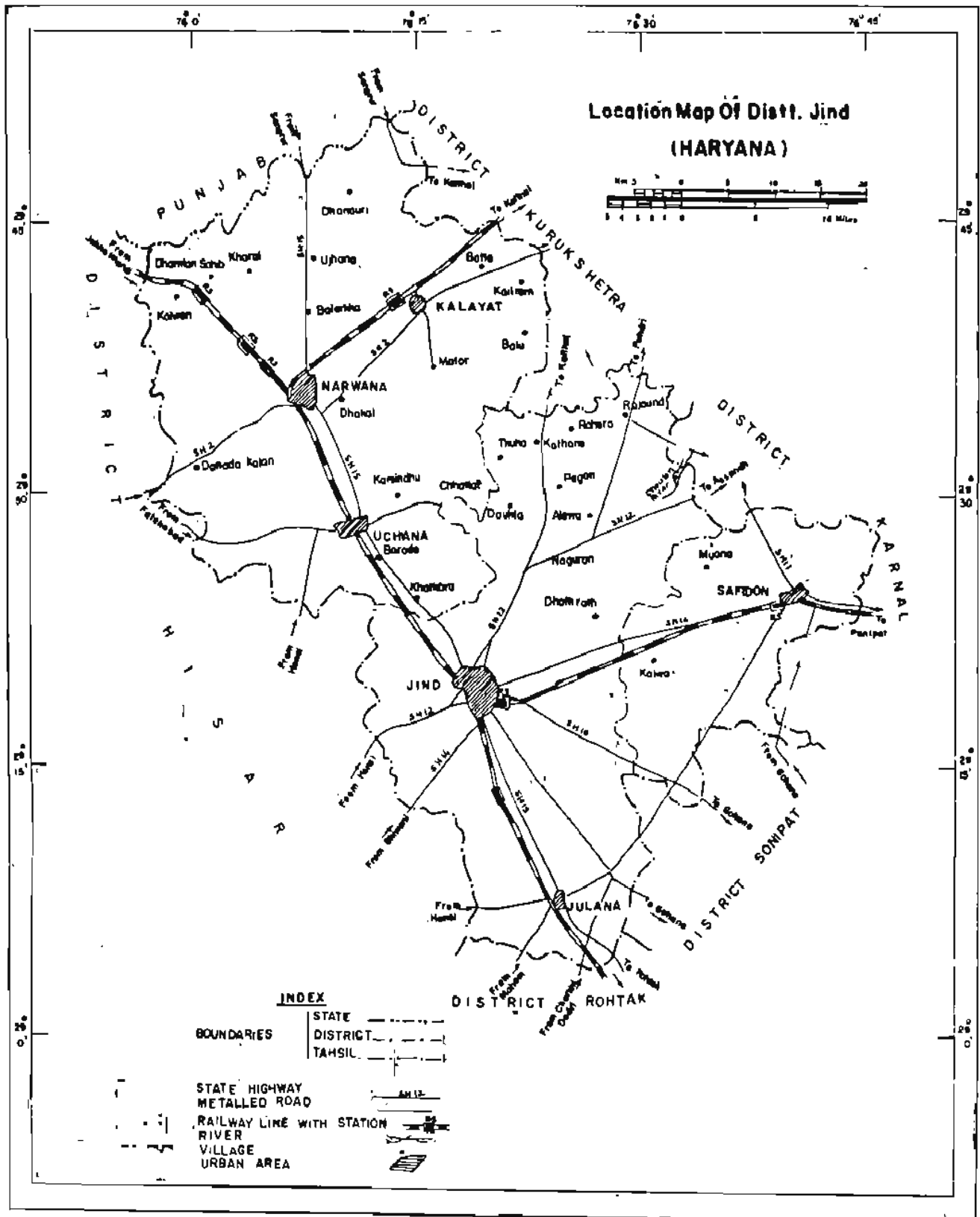
The people of Haryana are hardworking and enterprising. The per capita income in Haryana is second to Punjab among the states of the country. Per capita consumption of milk is about 500 gms. as compared to the National average of 137 gms. Wheat and bajra are staple food of the people in Narwana and Jind tehsils whereas wheat and rice are staple food in Saffidon tehsil.

The district has mainly a rural population. About 86% of the population live in villages. As per 1981 Census, 26.18% of total population of the district were literate. Literacy percent among the men is 38.08% whereas that of the women is only 12.24%. Literacy percentage among the Urban population is 49.62% whereas it is only 22.42% among the rural population. The Scheduled Castes constitute 19.25% of the total population. Out of the total population workers including marginal workers constitute about 38.20% whereas non-workers constitute 64.80%.

1.10 Uses

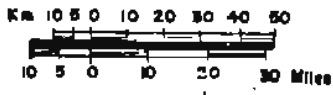
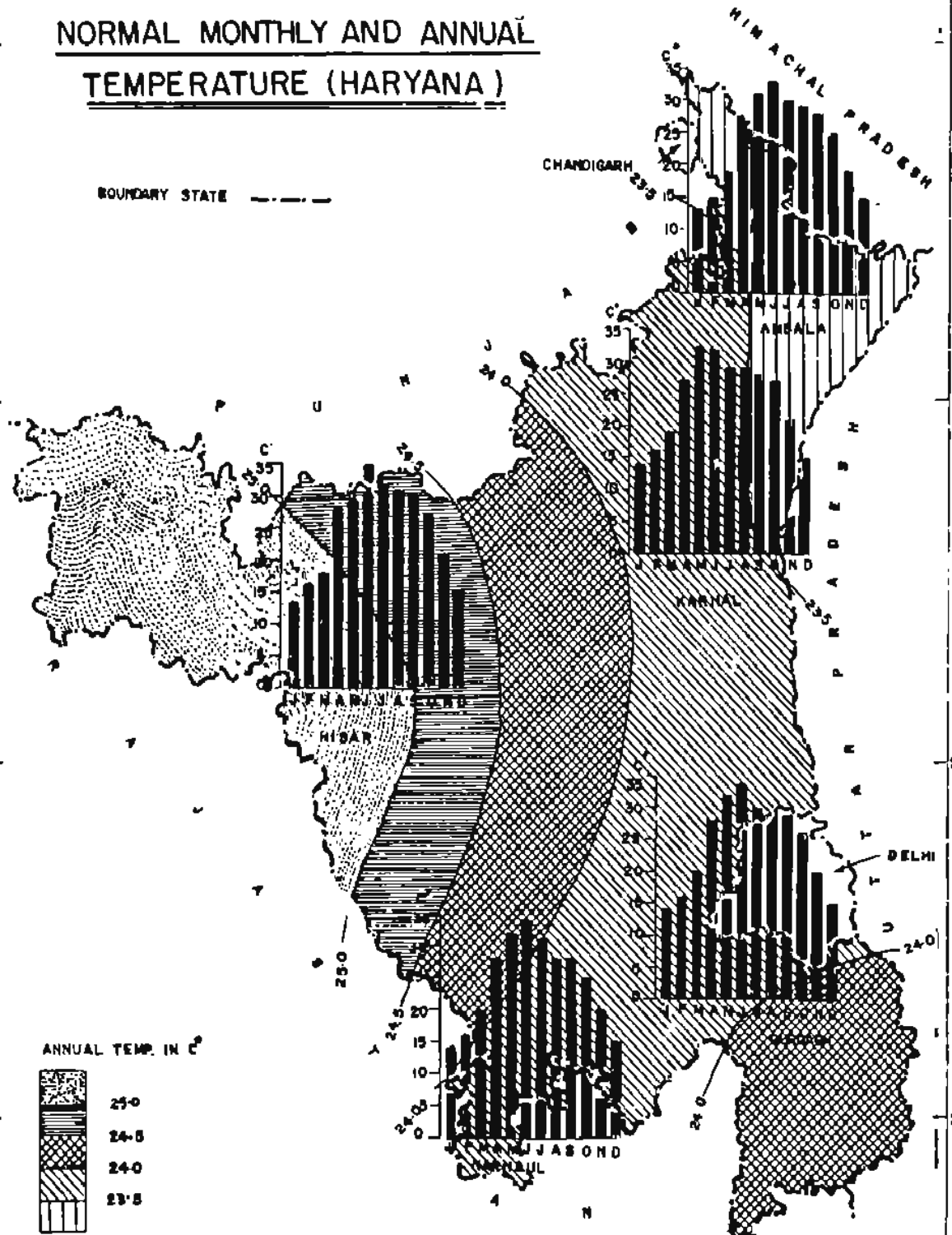
The trees provide mainly timber, fuel, fodder, fruits and shade. Timber is obtained mainly from *Dalbergia sissoo*, *Eucalyptus* spp., *Melia azedarach*, *Syzygium cumini*, *Morus alba*, *Mangifera indica*, *Azadirachta indica*, *Albizia* spp. etc. Small timber is obtained mainly from *Acacia nilotica*, *Acacia* spp., *Prosopis cineraria*, *Tamarix articulata* etc. All the above mentioned trees provide fuelwood also. Trees like *Prosopis juliflora*, *Acacia nilotica*, *Acacia tortilis*, *Albizia* spp., *Morus alba*, *Prosopis cineraria* also provide fodder in the form of leaves or pods. *Morus alba* provides wood for manufacturing hockey sticks and other sports goods. Poplars provide matchwood and Eucalyptus paper pulpwood. Fruits are obtained from *Zizyphus* spp. and *Syzygium cumini*. Katha is extracted from *Acacia catechu*. Neem oil is obtained from *Azadirachta indica*.

It has been seen that with the ban on felling of green trees in Himachal Pradesh, packing cases for apple and other fruits/vegetables are supplied from Haryana which are constructed from Eucalyptus wood. *Eucalyptus* is also used for making cheap furniture and also as a fuel.

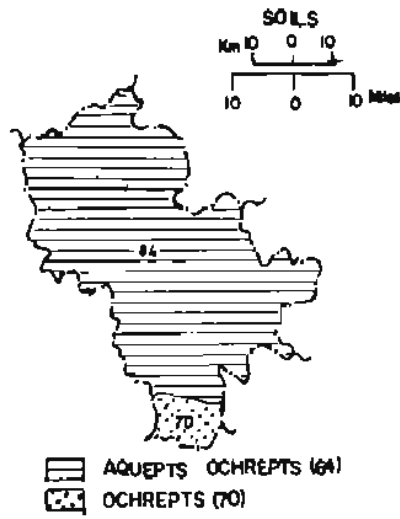


NORMAL MONTHLY AND ANNUAL TEMPERATURE (HARYANA)

BOUNDARY STATE - - - - -



TYPES OF SOILS & GEOLOGY
DISTT. JIND (HARYANA)



CHAPTER 2

2.1 Design and Methodology of Non-Forest Inventory Survey

District Census Books of Census Survey 1981 were used as basis of Inventory of Non-Forest Area. A list of villages in the district was prepared and each village was given a serial number.

2.2 Definition of Non-Forest Area

For the purpose of this survey

- (1) All those areas were taken which were outside the traditional Reserved Forest Areas.
- (2) All those areas which satisfied the following conditions were also excluded:
 - (a) All places within the Municipality, Corporation, Cantonment Board or a notified area Committee etc.
 - (b) All other places which satisfied the following criteria:-
 - (i) A minimum population of 5,000;
 - (ii) At least 75% of the male working population engaged in non-agricultural pursuits and
 - (iii) A density of population of at least 400 per Sq. Km. (1,000 per Sq. mile).

In addition to all municipal areas/Cantonment Board, four villages namely (1) Babiya in Ambala district, (2) Smalakha in Karnal district, (3) Gurgaon (rural) and (4) Jharsa in Gurgaon district satisfying the above criteria had been treated as Census towns (non-municipal) in 1981 Census. Panchkula Urban Estate in Ambala district had also been treated as a town. The Faridabad Complex Administration consisting of Faridabad, Faridabad Township and Ballabgarh towns of 1971 and some surrounding villages in Faridabad district had been treated as towns.

2.3 Sampling Design and Method of Selection of Sample villages.

The inventory survey was undertaken in the rural area (Non-forest area only) of the state. The design followed in the field inventory was random sampling with the villages as sampling units. A list of villages of Jind district was prepared according to 1981 Census and each village was given a serial number.

Firstly, the number of sample villages to be surveyed in the state was decided by taking a pilot survey such that the results of the survey at State level would be at the precision level of $\pm 10\%$ at 95% probability level.

For carrying out pilot survey, 2 to 3 villages were taken from each district of Haryana State. Total 31 villages were selected for pilot survey in Haryana State. A list of the villages selected for pilot survey is given in Appendix-I.

The villages selected for pilot survey were taken up one by one for carrying out complete enumeration of all the trees of 10 cms. and above diameter at B.H.T (OB). Each of these selected villages, with its area and boundaries as per the revenue records, was treated as a sampling unit.

After completing the pilot survey the data was processed for obtaining number of trees/Ha. in each village for calculation of sample size by using the formula

$$n = \frac{\left(\frac{2 \times c.v.}{10}\right)^2}{1 + \frac{1}{N}\left(\frac{2 \times c.v.}{10}\right)^2}$$

Where $c.v. = \frac{s}{x} \times 100$ and

N = total no. of villages in the State.

For large N , it will be equal to

$$n = \left(\frac{2 \times c.v.}{10}\right)^2$$

The method used was ratio method of estimation. The sample size obtained from pilot survey was 219 villages.

These 219 villages were distributed over all the districts proportional to the rural area of the district. A list of number of villages selected for each district is given in the Appendix-II.

These randomly selected villages in each district were taken up one by one for carrying out complete enumeration of all the trees of 10 cms. and above diameter. Each of these randomly selected villages, with its area and boundaries as per the revenue records, was treated as a sampling unit.

2.4 Field Methodology

The field data is collected by a Crew, consisting of one Junior Technical Assistant (Crew Leader), a Deputy Ranger, two Fieldmen, a Khalasi and unskilled labourers engaged locally wherever necessary for showing the boundary of the village as well as helping in the survey work.

Each Crew Leader is provided with a list of villages to be tackled alongwith a set of 1:50,000 scale maps with location of villages duly marked. The Crew Leader is required to find the nearest convenient route so that they can reach the village with minimum traverse by jeep or on foot. After reaching the village the next job is to determine the boundary of the village. For this purpose, the maps of the Revenue department are referred and in addition the help of village level authorities are obtained. The unit of sampling is the whole of sample village. To begin the data collection it is necessary to select the starting/reference point preferably centre of the village. This reference point/centre is not necessarily to be the centre of the area. The details of the location of the reference point/centre and its description are recorded in the village description form. This is very important to enable the checking crew to reach this point and commence checking.

After fixing the starting/reference point, the enumeration work is started from the reference point by dividing the entire village into suitable sized angular quadrants with the help of compass in such a way that enumeration within each angular quadrant could be completed in one working day. The size of each angular quadrant is decided by the Crew Leader accordingly. Enumeration of trees/bamboo is commenced from the line marking due North from the centre/reference point and is proceeded in clockwise direction (i.e. North to East).

This procedure is important to avoid duplication/ommission of trees when the enumeration work is continued on the next day. Further, all the enumerated trees are suitably marked with chalk to achieve this objective. The

informations regarding number of angular quadrants, the size of each angular quadrant and number of trees enumerated in each quadrant are recorded in the prescribed Field forms given below:

- (1) Village-Description Form
- (2) Village Tree Enumeration Form
- (3) District Tree Form

Samples of the above field forms may be seen in the Appendix-VI. The field forms are briefly described below:

(1) Village Description Form

The information regarding the conspicuous features of the point selected as the Centre for starting the enumeration, number of angular, Six of each angular quadrant and number of trees enumerated in each quadrant are recorded in this form.

(2) Village Tree Enumeration Form

In this form the data of all trees of 10 cms. and above diameter at breast height over bark (DBH(OB) in a sampled village are recorded. The dead trees having utility less than 70% and all trees of less than 10 cms. diameter are ignored.

(3) District Tree Form

This form has to be filled in for each sampled village selected in the district.

While carrying out the survey, i.e. enumeration and measurement of trees the category of each tree - indicating the type of plantation it belongs to is also recorded in the columns of Village Tree Enumeration Form. the definitions used for this classification are as under:

Farm Forestry:	Trees along the farm bunds and in small patches upto 0.1 ha. in area.
Road side Plantation:	For trees planted along the road side.
Village Woodlot:	Naturally growing trees on community/private land.
Block Plantation:	Patches covering an area of more than 0.1 ha. and not falling in any of the above.
Ponds:	For trees planted in and around water ponds.
Railway Lines:	For trees planted along the railway lines.
Canals	Trees planted along the canals.
Rest:	Trees not falling in any of the above categories.

CHAPTER 3

Data Processing

3.1 Processing of the Data

After completion of field work, the field forms of the villages surveyed were consolidated and checked for any inconsistencies and Coding mistakes, if any. Forms for each village were then processed manually and information was filled in the tables. The species found in sample villages of Jind district during survey are given in Appendix-III. Since many of the species in the region were having a very small number of trees, they were clubbed together under Miscellaneous species. Twenty main species were selected for calculating the number of stems on the basis of their numerical occurrence, commercial importance and regional importance. Two tree species which were not important for estimation of volume were not taken up for calculation of volume. After manual processing of the data the tabulated data was then transferred to the data files in the Personal Computer (PC) using suitable softwares. The data files were then processed for making various tables in desired formats required to be incorporated in the Report.

3.2 Area Computation

Rural area of the district was calculated by adding up the areas of the villages given in the Census Book of 1981 of that district.

Collection of felled tree data has been discontinued by zones, for developing volume equations. The volume factors have been obtained from the Logging Divisions and Territorial Forest Divisions of the State Forest Department of Haryana.

The volume factors used for different tree species have been given in the volume table at the end of this chapter.

Estimation Procedure.

The estimation procedure is given below

Let

x_i = area of the i th village

y_i = volume/no. of trees for the i th village

n = no. of sample villages in the district/state

N = total no. of villages in the district/state

$$\bar{x} = \sum_{i=1}^n x_i / n = \text{average area per village in the sample}$$

$$\bar{X} = \sum_{i=1}^N x_i / N = \text{average area per village in the population (District/State).}$$

$$\bar{y} = \sum_{i=1}^n y_i / n = \text{average volume/no. of trees in the sample}$$

$$\bar{Y} = \sum_{i=1}^N Y_i / N = \text{average volume/no. of trees in the population (District/State)}$$

$A = \sum_{i=1}^N x_i$ = total area of all villages in the population (District/State)

Then the mean volume/no. of trees per unit area for the population (District/State) is given by

$$\hat{R} = \frac{Y}{x}$$

The estimate of R is the sample ratio

$$\hat{R} = \frac{\sum_{i=1}^n y_i}{\sum_{i=1}^n x_i} = \frac{Y}{x}$$

The estimate of total volume/no. of trees in the population (District/State) is given by

$$\hat{T} = \frac{A \times Y}{x} = A \times \hat{R}$$

Estimated variance of \hat{R} is given by

$$\hat{V}(\hat{R}) = \frac{N-n}{N n x^2} \times \frac{1}{(n-1)} \left[\sum_{i=1}^n y_i^2 - 2\hat{R} \sum_{i=1}^n y_i x_i + \hat{R}^2 \sum_{i=1}^n x_i^2 \right]$$

When N is large, then

$$\hat{V}(\hat{R}) = \frac{1}{n(n-1) x^2} \left[\sum_{i=1}^n y_i^2 - 2\hat{R} \sum_{i=1}^n y_i x_i + \hat{R}^2 \sum_{i=1}^n x_i^2 \right]$$

Estimated variance of \hat{T} is given by

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

$$S.E. \text{ of } \hat{R} = \sqrt{\hat{V}(\hat{R})} \text{ and } S.E.\% = \frac{S.E.}{\hat{R}} \times 100$$

$$S.E. \text{ of } \hat{T} = \sqrt{\hat{V}(\hat{T})} \text{ and } S.E.\% = \frac{S.E.}{\hat{T}} \times 100$$

Volume Table - specieswise and dia-classwise

S.N.	Name of Species	10-20	20-30	30-40	40 +
1.	<i>Acacia catechu</i>	0.10	0.21	0.51	1.13
2.	<i>Acacia nilotica</i>	0.06	0.14	0.57	1.13
3.	<i>Acacia</i> spp.	0.06	0.14	0.57	1.13
4.	<i>Acacia tortilis</i>	0.06	0.14	0.57	1.13
5.	<i>Albizia</i> spp.	0.06	0.14	0.57	1.13
6.	<i>Azadirachta indica</i>	0.06	0.14	0.57	1.13
7.	<i>Dalbergia sissoo</i>	0.06	0.14	0.57	1.13
8.	<i>Eucalyptus</i> spp.	0.10	0.41	0.95	1.71
9.	<i>Ficus</i> spp.	0.06	0.14	0.57	1.13
10.	<i>Mangifera indica</i>	0.06	0.14	0.57	1.13
11.	<i>Melia azedarach</i>	0.06	0.14	0.57	1.13
12.	<i>Morus</i> spp.	0.06	0.14	0.57	1.13
13.	<i>Populus</i> spp.	0.07	0.35	0.73	1.26
14.	<i>Prosopis cineraria</i>	0.06	0.14	0.57	1.13
15.	<i>Prosopis juliflora</i>	0.06	0.14	0.57	1.13
16.	<i>Psidium guyava</i>	0.06	0.14	0.57	1.13
17.	<i>Salvadora</i> spp.	0.06	0.14	0.57	1.13
18.	<i>Syzygium cumini</i>	0.06	0.14	0.57	1.13
19.	<i>Tamarix articulata</i>	0.06	0.14	0.57	1.13
20.	<i>Zizyphus</i> spp.	0.06	0.14	0.57	1.13
21.	Misc. spp.	0.06	1.14	0.57	1.13

CHAPTER 4

Stand and Stock Tables

As per 1981 Census Jind district has a total of 354 villages having an area of 3271.41 Sq. Km. Out of these, 16 villages were randomly selected and surveyed (see Appendix - IV). The data collected (for trees having 10 cms. and above diameter) from these 16 villages have been statistically analysed for variability in respect of tree stock and tree volume parameters and "number of stems/hectare" and "volume/hectare". The analysis shows that the estimated number of trees/hectare is 10.67 and the corresponding volume is 2.133 Cum./hectare for entire Jind district.

The distribution of total number of stems and stems/hectare as well as total volume and volume/ha. have been estimated and included as table nos. 1 to 6.

In the entire rural area of Jind district 34.90 lakh trees have been estimated and the distribution thereof is discussed below:

1. The distribution of total number of estimated trees, dia- classwise and specieswise (all categories combined), is given in table No. 1. The analysis shows that the maximum number of the estimated trees occur in 10-20 cms. dia-class i.e. 21.91 lakh trees (62.80%) followed by 8.29 lakh trees (23.75%) in 20-30 cms. dia-class, 2.97 lakh trees (8.52%) in 30-40 cms. dia-class and 1.72 lakh trees (4.93%) in 40 cms. and above dia-class.

The specieswise distribution of total number of trees in the district has been estimated by ratio estimation method. It shows that in the rural area of Jind district *Acacia nilotica* (Babul) has the largest representation i.e. 14.91 lakh trees (42.73%) followed by *Eucalyptus* spp. 6.97 lakh trees (19.98%), *Dalbergia sissoo* 3.82 lakh trees (10.95%), *Morus* spp. 1.38 lakh trees (3.97%), *Azadirachta indica* 1.31 lakh trees (3.77%), *Zyzyphus* spp. 0.82 lakh trees (2.36%), *Populus* spp. 0.79 lakh trees (2.25%), *Salvadora* spp. 0.77 lakh trees (2.20%) *Melia azedarach* 0.72 lakh trees (2.06%), *Mangifera indica* 0.66 lakh trees (1.89%), *Prosopis juliflora* 0.54 lakh trees (1.56%), *Syzygium cumini* 0.43 lakh trees (1.23%) and *Ficus* spp. 0.40 lakh trees (1.14%). The representation of the rest of the species is less than 1% each.

2. The distribution of total number of trees (estimated), categorywise and dia-classwise (all species combined), is given in table No.2. It shows that the representation of trees in Category-1 - Farm Forestry is the highest i.e. 17.42 lakh trees (49.92%) followed by Category-IV - Block Plantations 8.60 lakh trees (24.65%), Category-II - Roadside Plantations 3.97 lakh trees (11.40%), Category-III - Village Woodlot 2.05 lakh trees (5.86%) and Category-VII - Canals 1.99 lakh trees (5.71%).

The distribution of stems per hectare is the largest in dia-class 10-20 cms. i.e. 6.70 followed by 2.53 in 20-30 cms. dia-class, 0.91 in 30-40 cms. dia-class and 0.53 in 40 cms. and above dia-class.

3. The distribution of total number of trees estimated, specieswise and categorywise (all dia-classes combined), has also been presented in table no.3.

The specieswise percentage and categorywise percentage of the estimated trees has already been mentioned in para 1 and 2 above.

The analysis shows that the specieswise total number of estimated trees (in order of decreasing number) in the various prescribed categories are as under:

Category I – Farm Forestry

As per the estimate, this category has a total number of 17.42 lakh trees (49.92%) which is the highest total of all the categories. It is mainly comprised of *Acacia nilotica* 6.70 lakh, *Dalbergia sissoo* 2.88 lakh, *Eucalyptus* spp. 2.72

lakh, *Morus* spp. 1.28 lakh, *Azadirachta indica* 1.01 lakh, *Meliã azedarach* 0.69 lakh, *Mangifera indica* 0.45 lakh, *Syzygium cumini* 0.38 lakh, *Zyzyphus* spp. 0.33 lakh, *Ficus* spp. 0.24 lakh, *Populus* spp. 0.20 lakh, *Psidium guyava* 0.16 lakh and *Acacia* spp. 0.11 lakh. The representation of the rest of the species are very negligible.

Category II – Roadside Plantation

As per estimation there are 3.98 lakh trees in all in this category i.e. 11.40% of the total number of estimated trees. It is mainly represented by *Acacia nilotica* 1.82 lakh, *Eucalyptus* spp. 1.72 lakh and *Dalbergia sissoo* 0.26 lakh. The representation of the remaining species is very poor and hence not presented here.

Category III – Village Woodlots

In this category the total number of trees, as per the estimation, is 2.05 lakh (5.86%). The predominant species in this category are *Salvadora* spp. 0.73 lakh, *Acacia nilotica* 0.42 lakh, *Prosopis cineraria* 0.34 lakh and *Zyzyphus* spp. 0.10 lakh. The remaining species have a poor representation.

Category IV – Block Plantations

There are 8.60 lakh trees (24.65%) in all in this category. The main species forming bulk of the crop (in decreasing order) are *Acacia nilotica* 4.28 lakh, *Eucalyptus* spp. 1.80 lakh, *Populus* spp. 0.58 lakh, *Dalbergia sissoo* 0.49 lakh, *Zyzyphus* spp. 0.39 lakh, *Mangifera indica* 0.20 lakh, *Psidium guyava* 0.18 lakh, *Azadirachta indica* 0.15 lakh and *Prosopis cineraria* 0.10 lakh. The representation of the remaining species being very poor are not mentioned here.

Category V – Ponds

As per the estimate, there are in all 0.35 lakh trees (1.01%) in this category. This category is mainly comprised of 0.20 lakh trees of *Acacia nilotica*. In this category too other species have a very poor representation.

Category VI – Railway Lines

It is estimated that this category has a total of 0.51 lakh trees (1.45%) and is mainly represented by *Eucalyptus* spp. having 0.27 lakh trees and *Acacia nilotica* having 0.20 lakh trees. The representation of the rest of the species again are very poor.

Category VII – Canals

It is estimated that this category in total has 1.99 lakh trees (5.71%). The main species in order of predominance are *Acacia nilotica* 1.29 lakh, *Eucalyptus* spp. 0.45 lakh and *Dalbergia sissoo* 0.10 lakh. The representation of the rest of the species are rather very poor.

Analysis of Volume (Stock)

As per the estimate the entire rural area of Jind district has a total volume (all species and dia-classes combined) of 6.98 lakh cubic meters corresponding to estimated total of 34.90 lakh trees. The distribution of this stock is discussed below:

1. An assessment of dia-classwise and specieswise distribution of volume (all categories combined) is presented in table no.4. The table shows that the total estimated volume of trees of all species belonging to the dia-class 40 cms. and above is 1.96 lakh cubic meters (28.07%) and as such it is the highest volume of all the dia-classes. It is followed by dia-class 30-40 cms. having a total volume of 1.77 lakh cubic meters (25.44%), 20-30 cms. dia-class having 1.72 lakh cubic meters (24.72%) and 10-20 cms. dia-class having 1.52 lakh cubic meters (21.77%).

It also shows that the total volume per hectare contributed by trees of all species of all dia-classes combined is 2,133 cum. The volume per hectare for different dia-classes (in decreasing order) are as below:

40 cms. and above dia-class (0.599 cum.), 30-40 cms. dia- class (0.543 cum.), 20-30 cms. dia-class (0.527 cum.) and 10-20 cms. dia-class (0.464 cum.).

It may also be seen from the said table that the bulk of the volume, for combined dia-classes, is mainly contributed by the following species (in decreasing order):

Acacia nilotica 23.97 lakh cubic meters (34.36%), *Eucalyptus* spp. 14.50 lakh cubic meters (20.78%), *Dalbergia sissoo* 11.46 lakh cubic meters (16.42%), *Salvadora* spp. 0.33 lakh cubic meters (4.68%), *Azadirachta indica* 0.27 lakh cubic meters (3.84%), *Morus* spp. 0.26 lakh cubic meters (3.74%), *Populus* spp. 0.199 lakh cubic meters (2.86%), *Ficus* spp. 0.198 lakh cubic meters (2.86%), *Ficus* spp. 0.198 lakh cubic meters (2.83%), *Mangifera indica* 0.18 lakh cubic meters (2.61%) and *Prosopis cineraria* 0.10 lakh cubic meters (1.47%). The volume contributed by the rest of the species is very less.

2. The distribution of total estimated volume, specieswise and categorywise (all dia-classes combined), is given in table no.5. It shows that the categorywise total volume, when all species are combined, are as below (in decreasing order):

Category-I 3.53 lakh cubic meters (50.61%), category-IV 1.04 lakh cubic meters (14.91%), category-II 0.91 lakh cubic meters (13.10%), category-VII 0.64 lakh cubic meters (9.19%), category-III 0.64 lakh cubic meters (9.06%), category-V 0.11 lakh cubic meters (1.63%) and category-VI 0.10 lakh cubic meters (1.50%).

It can also be seen that the distribution of specieswise total volume, when all categories are combined, are as under (in decreasing order):

Acacia nilotica 2.40 lakh cubic meters (34.36%), *Eucalyptus* spp. 1.45 lakh cubic meters (20.78%), *Dalbergia sissoo* 1.15 lakh cubic meters (16.42%), *Salvadora* spp. 0.33 lakh cubic meters (4.68%), *Azadirachta indica* 0.27 lakh cubic meters (3.84%), *Morus* spp. 0.26 lakh cubic meters (3.74%), *Populus* spp. 0.199 lakh cubic meters (2.86%), *Ficus* spp. 0.198 cubic meters (2.83%), *Mangifera indica* 0.18 lakh cubic meters (2.61%), *Prosopis cineraria* 0.10 lakh cubic meters (1.47%).

3. The distribution of total volume (estimated), categorywise and dia-classwise (all species combined), is given in table no.6. It shows that the total volume of all the categories in the dia- class 40 cms. and above is 1.96 lakh cubic meters (28.07%) and as such is the highest among all the dia-classes. It is followed by 30-40 cms. dia-class having a total volume of 1.77 lakh cubic meters (25.44%), 20-30 cms. dia-class having 1.72 lakh cubic meters (24.72%) and 10-20 cms. dia-class having 1.52 lakh cubic meters (21.77%).

It also shows that category-I (All dia-classes combined) has the highest volume of 3.53 lakh cubic meters (50.61%), followed by category-IV having 1.04 lakh cubic meters (14.91%), category-II having 0.91 lakh cubic meters (13.10%), category-VII having 0.64 lakh cubic meters (9.19%), category-III having 0.63 lakh cubic meters (9.06%), category-V having 0.11 lakh cubic meters (1.63%) and category-VI having 0.10 lakh cubic meters (1.50%).

Table No. 1
Total number of stems specieswise and dia-classwise

(All categories combined)

Rural area of JIND DISTRICT: 3271.41 Sq. Km.

S.No.	Name of Species	10-20	20-30	30-40	40+	Total	% age
1.	<i>Acacia catechu</i>	0	0	0	0	0	0.00
2.	<i>Acacia nilotica</i>	974923	330755	133622	51965	1491265	42.73
3.	<i>Acacia spp.</i>	8425	4300	1335	628	14688	0.42
4.	<i>Acacia tortilis</i>	0	0	0	0	0	0.00
5.	<i>Albizia spp.</i>	6716	2318	904	648	10586	0.30
6.	<i>Azadirachta indica</i>	81481	27552	13060	9347	131440	3.77
7.	<i>Dalbergia sissoo</i>	171702	97152	66476	46700	382030	10.95
8.	<i>Eucalyptus spp.</i>	500983	173489	20070	2729	697271	19.98
9.	<i>Ficus spp.</i>	13512	7777	5322	13120	39731	1.14
10.	<i>Mangifera indica</i>	32894	16633	8247	8170	65944	1.89
11.	<i>Melia azedarach</i>	55793	13413	2298	530	72034	2.06
12.	<i>Morus spp.</i>	79223	37706	14672	6815	138416	3.97
13.	<i>Populus spp.</i>	30734	45523	2122	236	78615	2.25
14.	<i>Prosopis cineraria</i>	34014	11921	5341	3102	54378	1.56
15.	<i>Prosopis juliflora</i>	11646	3045	745	79	15515	0.44
16.	<i>Psidium guyava</i>	33818	354	0	0	34172	0.98
17.	<i>Salvadora spp.</i>	23684	22487	11646	18951	76768	2.20
18.	<i>Syzygium cumini</i>	26865	8484	4694	2887	42930	1.23
19.	<i>Tamarix articulata</i>	0	0	0	0	0	0.00
20.	<i>Zizyphus spp.</i>	60135	17439	3693	1158	82425	2.36
21.	Misc. spp.	44874	8584	3142	4811	61411	1.76
Total		2191422	828932	297389	171876	3489619	100
%age		62.80	23.75	8.52	4.93	100	

Table No. 2
Total number of stems categorywise and dia-classwise
(All species combined).

Rural area of JIND DISTRICT : 3271.41 Sq. Km.

S.No.	Category	10-20	20-30	30-40	40 +	Total	% age
1.	I	1023391	466872	169541	82167	1741971	49.92
2.	II	235586	98999	41771	21366	397722	11.40
3.	III	92811	54888	25590	31284	204573	5.86
4.	IV	704084	131305	17911	6894	860194	24.65
5.	V	18383	7012	3339	6481	35215	1.01
6.	VI	33721	12962	2768	1119	50570	1.45
7.	VII	83446	56894	36469	22565	199374	5.71
	Total	2191422	828932	297389	171876	3489619	100
	%age	62.80	23.75	8.52	4.93	100	
	Stems/ha.	6.70	2.53	0.91	0.53	10.67	

Table No. 3
Total number of stems specieswise and categorywise
(All dia-classes combined)

Rural area of JIND DISTRICT: 3271.41 Sq.Km.

S.No. Name of Species	C a t e g o r i e s							Total	% age
	I	II	III	IV	V	VI	VII		
1. <i>Acacia catechu</i>	0	0	0	0	0	0	0	0	0.00
2. <i>Acacia nilotica</i>	669247	182188	42479	428320	19776	20071	129184	1491265	42.73
3. <i>Acacia</i> spp.	10643	1296	510	237	255	923	824	14688	0.42
4. <i>Acacia tortilis</i>	0	0	0	0	0	0	0	0	0.00
5. <i>Albizia</i> spp.	5793	452	1120	2632	59	20	510	10586	0.30
6. <i>Azadirachta indica</i>	101473	2749	5498	14689	4320	923	1788	131440	3.77
7. <i>Dalbergia sissoo</i>	288217	26179	7619	48664	256	746	10349	382030	10.95
8. <i>Eucalyptus</i> spp.	272487	172466	0	179615	1041	26905	44757	697271	19.98
9. <i>Ficus</i> spp.	23881	236	7659	2062	5519	59	315	39731	1.14
10. <i>Mangifera indica</i>	44756	0	353	20070	0	0	765	65944	1.89
11. <i>Melia azedarach</i>	68618	137	1708	1394	59	0	118	72034	2.06
12. <i>Morus</i> spp.	127633	491	4851	4164	275	39	963	138416	3.97
13. <i>Populus</i> spp.	19501	0	0	58485	0	0	629	78615	2.25
14. <i>Prosopis cineraria</i>	59	4496	33581	10487	589	727	4439	54378	1.56
15. <i>Prosopis juliflora</i>	6383	5145	0	1100	20	0	2867	15515	0.44
16. <i>Psidium guyava</i>	16281	0	0	17734	0	0	157	34172	0.98
17. <i>Salvadora</i> spp.	0	118	73489	1747	1336	0	78	76768	2.20
18. <i>Syzygium cumini</i>	38217	20	431	3908	20	0	334	42930	1.23
19. <i>Tamarix articulata</i>	0	0	0	0	0	0	0	0	0.00
20. <i>Zizyphus</i> spp.	32855	178	10035	38825	138	20	374	82425	2.36
21. Misc. spp.	15927	1571	15240	26061	1552	137	923	61411	1.76
Total	1741971	397722	204573	860194	35215	50570	199374	3489619	100
% age	49.92	11.40	5.86	24.65	1.01	1.45	5.71	100	

Table No. 4
Total volume and vol./ha. specieswise and dia-classwise
(All categories combined)

Rural area of JIND DISTRICT : 3271.41 Sq.Km.

S.No.	Name of Species	10-20	20-30	30-40	40 +	Total	%Age	Vol./ha.
1.	<i>Acacia catechu</i>	0	0	0	0	0	0.00	0.000
2.	<i>Acacia nilotica</i>	58495	46305	76166	58719	239685	34.36	0.733
3.	<i>Acacia spp.</i>	505	603	760	710	2578	0.37	0.008
4.	<i>Acacia tortilis</i>	0	0	0	0	0	0.00	0.000
5.	<i>Albizia spp.</i>	403	325	515	732	1975	0.28	0.006
6.	<i>Azadirachta indica</i>	4890	3858	7444	10562	26754	3.84	0.082
7.	<i>Dalbergia sissoo</i>	10303	13600	37892	52771	114566	16.42	0.350
8.	<i>Eucalyptus spp.</i>	50099	71130	19067	4668	144964	20.78	0.443
9.	<i>Ficus spp.</i>	810	1090	3033	14825	19758	2.83	0.060
10.	<i>Mangifera indica</i>	1974	2328	4700	9232	18234	2.61	0.056
11.	<i>Melia azedarach</i>	3347	1878	1311	599	7135	1.02	0.022
12.	<i>Morus spp.</i>	4754	5279	8362	7701	26096	3.74	0.080
13.	<i>Populus spp.</i>	2151	15934	1548	297	19930	2.86	0.061
14.	<i>Prosopis cineraria</i>	2042	1667	3043	3505	10257	1.47	0.031
15.	<i>Prosopis juliflora</i>	699	427	425	90	1641	0.24	0.005
16.	<i>Psidium guyava</i>	2029	50	0	0	2079	0.30	0.006
17.	<i>Salvadora spp.</i>	1420	3148	6637	21414	32619	4.68	0.100
18.	<i>Syzygium cumini</i>	1611	1187	2676	3262	8736	1.25	0.027
19.	<i>Tamarix articulata</i>	0	0	0	0	0	0.00	0.000
20.	<i>Zizyphus spp.</i>	3608	2442	2105	1309	9464	1.36	0.029
21.	Misc. spp.	2693	1200	1791	5437	11121	1.59	0.034
Total		151833	172451	177475	195833	697592	100	2.133
% age		21.77	24.72	25.44	28.07	100		
Vol./ha.		0.464	0.527	0.543	0.599	2.133		

Table No. 5
Distribution of total volume (Cum.) - specieswise and categorywise
(All dia-classes combined)

Rural area of JIND DISTRICT: 3271.41 Sq. Km.

C a t e g o r i e s									
S.No. Name of Species	I	II	III	IV	V	VI	VII	Total	%age
1. <i>Acacia catechu</i>	0	0	0	0	0	0	0	0	0.00
2. <i>Acacia nilotica</i>	105266	47681	7956	31045	2411	2387	42939	239685	34.36
3. <i>Acacia</i> spp.	1602	376	90	56	65	98	291	2578	0.37
4. <i>Acacia tortilis</i>	0	0	0	0	0	0	0	0	0.00
5. <i>Albizia</i> spp.	928	119	309	252	13	1	353	1975	0.28
6. <i>Azadirachta indica</i>	19920	450	1878	1444	2312	521	229	26754	3.84
7. <i>Dalbergia sissoo</i>	86714	11571	2971	5156	116	382	7656	114566	16.42
8. <i>Eucalyptus</i>	65322	29588	0	33444	128	6963	9519	144964	20.78
9. <i>Ficus</i> spp.	10752	67	4141	407	4226	23	142	19758	2.83
10. <i>Mangifera indica</i>	12398	0	71	5394	0	0	371	18234	2.61
11. <i>Melia azedarach</i>	6792	8	195	96	4	0	40	7135	1.02
12. <i>Morus</i> spp.	24011	153	1167	554	17	2	192	26096	3.74
13. <i>Populus</i> spp.	3290	0	0	16271	0	0	369	19930	2.86
14. <i>Prosopis cineraria</i>	55	576	7582	808	341	70	825	10257	1.47
15. <i>Prosopis juliflora</i>	529	479	0	88	1	0	544	1641	0.24
16. <i>Psidium guajava</i>	996	0	0	1074	0	0	9	2079	0.30
17. <i>Salvadora</i> spp.	0	92	30266	1253	942	0	66	32619	4.68
18. <i>Syzygium cumini</i>	7761	1	87	676	1	0	210	8736	1.25
19. <i>Tamarix articulata</i>	0	0	0	0	0	0	0	0	0.00
20. <i>Zizyphus</i> spp.	4164	27	1403	3760	50	1	59	9464	1.36
21. Misc.spp.	2579	200	5073	2225	744	8	292	11121	1.59
Total	353079	91388	63189	104003	11371	10456	64106	697592	100
%age	50.61	13.10	9.06	14.91	1.63	1.50	9.19	100	

Table No. 6
Distribution of total volume (Cum.) - Categorywise and dia-classwise
(All species combined)

Rural area of JIND DISTRICT : 3271.41 Sq. Km.

S.No.	Category	10-20	20-30	30-40	40+	Total	%age
1.	I	68390	90617	100778	93294	353079	50.61
2.	II	19589	23075	24524	24200	91388	13.10
3.	III	5569	7685	14585	35350	63189	9.06
4.	IV	48137	35088	12406	8372	104003	14.91
5.	V	1142	1002	1903	7324	11371	1.63
6.	VI	2665	4429	1892	1470	10456	1.50
7.	VII	6341	10555	21387	25823	64106	9.19
	Total	151833	172451	177475	195833	697592	100
	% age	21.77	24.72	25.44	28.07	100	

Appendix - I
List of the villages selected for Pilot Survey in Haryana State.

S.No.	Name of the village	Area (Ha)
1.	Golapur	123.00
2.	Dhaurala	511.11
3.	Mohammedpur	1731.00
4.	Bhatoo	583.00
5.	Dobhi	2896.00
6.	Khandakheri	2324.00
7.	Baidwala	1416.38
8.	Kuranganwali	1479.00
9.	Siwara	1126.00
10.	B. Busna	248.00
11.	Lalheri	267.09
12.	B. Tauru	184.94
13.	Haliaki	480.00
14.	Nathusari	1741.00
15.	Bondkalen	2353.00
16.	Gorakhpur	4370.00
17.	Baghana	1479.51
18.	K.Lakasingh	140.00
19.	Shohdapur	316.05
20.	Nandgaon	825.14
21.	Gurauthi	1720.00
22.	Kharkhara	979.00
23.	Mammon Majra	199.51
24.	Sulhera	572.00
25.	Bhandari	677.00
26.	Saundhad	2753.00
27.	Dachaur	2728.00
28.	Dighal	2211.00
29.	Kahnaur	2762.00
30.	Shampura	1017.00
31.	Phadani	208.00
	Total	40420.73

Appendix - II
Districtwise number of the villages selected
for Inventory Survey in Haryana State.

S.No.	Name of the District	Total No. of villages in the District	No. of villages selected for survey
1.	Ambala	1306	39
2.	Bhiwani	428	23
3.	Faridabad	505	11
4.	Gurgaon	721	14
5.	Hissar	510	33
6.	Jind	354	16
7.	Kurukshetra	743	20
8.	Karnal	634	18
9.	Mohindergarh	743	16
10.	Rohtak	458	19
11.	Sirsa	323	21
12.	Sonapat	348	11
	Total	7073	241

Appendix - III

List of species found in Sample villages in Jind District.

S.No.	Botanical name	Common name
1.	2.	3.
1.	<i>Acacia lenticularis</i>	Safed babul, Amiar, Kanti
2.	<i>Acacia nilotica</i>	Babul, Kikar, Bawar, Bawal
3.	<i>Acacia spp.</i>	
4.	<i>Aegle marmelos</i>	Bel, Belpara, Bil, Billi
5.	<i>Ailanthus excelsa</i>	Maharukh, Arru, Ardusa, Butazod, Dhella, Mahalimla
6.	<i>Albizia lebbek</i>	Kala siris, Kalbage, Koko, Siris, Bhandar, Sarsaoda
7.	<i>Albizia procera</i>	Safed siris/siras, Karha, Karhar, Karhai
8.	<i>Albizia spp.</i>	Hiharu, Morai, Mog, Sundi, Kunis
9.	<i>Alstonia scholaris</i>	Chatidu, Chatiwan, Chatim, Pala, Chatuin, Chaitan, Pale
10.	<i>Anthocephalus chinensis</i>	Kadamb, Kadam, Kodavara, Attutek, Vellaikadamby
11.	<i>Azadirachta indica</i>	Neem, Nimbo, Nibbaro, Vepa
12.	<i>Bauhinia spp.</i>	Kachnar, Papri, Jhingora
13.	<i>Bombax ceiba</i>	Semal, Savar, Semer, Shimola
14.	<i>Butea monosperma</i>	Palas, Dhak, Palasin, Kakhar
15.	<i>Cassia fistula</i>	Amaltas, Bahra, Bhawa, Sonari
16.	<i>Cassia siamea</i>	Minjiri, Nellatangedu
17.	<i>Citrus spp.</i>	Nimbu, Lemon
18.	<i>Cordia spp.</i>	Lassora, Bairula, Borala
19.	<i>Crataeva unilocularis</i>	Barna, Barun, Gundi
20.	<i>Dalbergia sissoo</i>	Sisoo, Shisham, Tahli
21.	<i>Delonix regia</i>	Gulmohar, Golmohan, Krishnachura
22.	<i>Emblica officinalis</i>	Amla, Aonla, Amlaki, Nellimara
23.	<i>Erythrina suberosa</i>	Dhaul, Gararu, Mander, Pangra
24.	<i>Eucalyptus spp.</i>	Nilgiri, Safeda
25.	<i>Ficus bengalensis</i>	Bargat, Bad, Fig
26.	<i>Ficus religiosa</i>	Pipal, Pipli, Papada, Pripari
27.	<i>Ficus spp.</i>	Anjar, Akhar, Budita
28.	<i>Flacourtia indica</i>	Kakai, Kangu

29.	<i>Grewia</i> spp.	Diamiul, Gharbhimti, Pharasai
30.	<i>Grevillea robusta</i>	Silver oak
31.	<i>Holoptelia integrifolia</i>	Abal, chielbil, Kaneji
32.	<i>Jonesia 'asoca</i>	Ashoka
33.	<i>Kigelia pinnata</i>	
34.	<i>Mangifera indica</i>	Am, Amb, Ambo, Mavu, Moru
35.	<i>Melia azedarach</i>	Bijain, Baknia, Betain, Bakain
36.	<i>Mitragyna parvifolia</i>	Phaldu, Mundi, Kaiz, Battaganum
37.	<i>Moringa</i> spp.	Sajna, Sohjna, Sanjna, Saijna
38.	<i>Morus</i> spp.	Tut, Kimu, Shabtoot
39.	<i>Nyctanthus arbortristis</i>	Harshingar, Kari
40.	<i>Olea dioica</i>	Akksale, Madle
41.	<i>Phoenix sylvestris</i>	Khajur, Betha
42.	<i>Populus</i> spp.	Banpipal, Godhpipal, Pahari Pipal
43.	<i>Prosopis cineraria</i>	Jand, Jant
44.	<i>Prosopis juliflora</i>	Juliflora
45.	<i>Prunus</i> spp.	Aru, Aria, Gont, Khurmani
46.	<i>Psidium guyava</i>	Amrud
47.	<i>Salvadora</i> spp.	Jal, Jhal
48.	<i>Syzygium cumini</i>	Jamun, Jamoon, Jamak
49.	<i>Tamarindus indica</i>	Imli, Amli, Ambli, Chinch
50.	<i>Tamrix articulata</i>	France, Farash
51.	<i>Tectona grandis</i>	Sagwan, Sagun, Teak, Theku
52.	<i>Terminalia arjuna</i>	Arjun, Kahuwa, Sadadoe
53.	<i>Thuja</i> spp.	
54.	<i>Vitex negundu</i>	Sinuer
55.	<i>Zizyphus mauritiana</i>	Ber, Beri
56.	<i>Zizyphus</i> spp.	

Appendix - IV

List of the villages surveyed in Jind District

S.No.	Name of the village	Name of Tehsil	Area (ha)	Map Sheet No.
1.	Sulehra	Narwana	572.00	44 O/14
2.	Baghana	Jind	1479.51	53 C/6
3.	Maṭor	Narwana	2685.00	53 C/6
4.	Jhanj Khurd	Jind	445.15	53 C/7
5.	Thal	Jind	671.00	53 C/10
6.	Zafargarh	Jind	1111.00	53 C/8
7.	Malakpur	Safidon	1040.00	53 C/11
8.	Pindara	Jind	471.00	53 C/7
9.	Dhillowas	Jind	515.56	53 C/7
10.	Karsola	Jind	1392.00	53 C/8
11.	Sindvi Khera	Jind	604.19	53 C/7
12.	Alewa	Jind	3158.00	53 C/7
13.	Dhabitek Singh	Narwana	733.00	53 C/2
14.	Anta	Safidon	633.00	53 C/11
15.	Bagenwala	Jind	129.09	53 C/3
16.	Durana	Jind	1018.17	53 C/6

16657.67

Appendix - V

Definitions of Categories

Code No.	Category	Definition
1.	Farm forestry	Trees along the farm bunds and in small patches upto 0.1 ha. in area.
2.	Roadside plantation.	Trees planted along the roadside.
3.	Village woodlot	Naturally growing trees on private/community land.
4.	Block Plantation.	Block plantation having an area of more than 0.1 ha. and not falling in any of the above categories.
5.	Ponds.	Trees planted in and around water ponds.
6.	Railway lines	Trees planted along the railway lines.
7.	Canals	Trees planted along the canals.
8.	Rest	Trees not falling in any of the above categories.

Appendix - VI
FIELD FORMS

DISTRICT TREE FORM

(ABSTRACT OF ENUMERATION IN SAMPLE VILLAGES)

JOB NO	CARD DESIGN NO.	STATE	DISTRICT	NO OF VILLAGES IN THE DISTRICT	No. OF SAMPLE VILLAGES IN THE DISTRICT	TOTAL AREA OF THE VILLAGES IN THE DISTRICT. (Km ²)	SAMPLE VILLAGE	GEOGRAPHICAL AREA OF THE SAMPLE VILLAGE (Hact)	CATEGORY OF THE SAMPLE VILLAGE
1-3	4-6	7-8	9-10	11-15	16-17	18-22	23-27	28-31	32

Number of Trees in The Sample Village According to Category of the Plantation/ Trees

FARM FORESTRY	ROAD SIDE PLANTATION	VILLAGE WOODLOT	BLOCK PLANTATION	PONDS	RAILWAY LINES	CANALS	REST	TOTAL
33-36	37-40	41-44	45-48	49-52	53-56	57-60	61-64	65-70

DATE..... 199

Page No.

Sign of Crew Leader

Total No. of Pages

Name of Crew Leader

VILLAGE DESCRIPTION FORM

1. State and code
2. Division and code
3. District and code.
4. Mapsheet and code
5. Name of Village
6. Area of the Village
7. Crew Leader (Name)
8. Date of commencement of survey
9. Date of completion of survey
10. Conspicuous feature selected as the centre for starting the survey.
11. Description of this centre and approach to this point.
12. Number of angular quadrants into which the area of village has been divided (give size of quadrants in degrees).
13. Compassing done by
14. Tree enumeration done by
15. Height measurements taken by

16. B.T. and other measurements taken by

17. Quadrant-wise summary of enumeration

QUADRANT NO.	DATE OF SURVEY	TOTAL NO. OF TREES
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Dated:

Signature of
Crew Leader

Diagram etc. of village

