GOVERNMENT OF INDIA
MINISTRY
OF
ENVIRONMENT AND FORESTS

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REPORT
ON
INVENTORY OF NON FOREST AREAS
OF
BETUL DISTRICT
(MADHYA PRADESH)

FOREST SURVEY OF INDIA, CENTRAL ZONE
NAGPUR
2000 -2001

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PREFACE

Forest Survey of India, for the first time took up Inventory of non forest areas in 1991 to estimate the growing stock of Trees existing in non forest land as these growing stock plays very important role in meeting the demand of local population for timber and fuel wood. During the year of 1992 the Central Zone unit of Forest Survey of India, Nagpur conducted a pilot survey in Madhya Pradesh (Geographical area 443446 sq.km.) in entire non-forest area (288032 sq.km.) by taking 19 representative villages from all 12 agro-climatic zones where in the no. of trees were counted in order to work out the sample size for the regular survey to be undertaken in the non-forest area of the State.

Accordingly, 199 sample villages were worked out to be taken for sampling in non-forest area of the State. Further, the no. of sample villages were calculated for each district based on its geographical areas. Thus 4 sample villages were selected randomly for Betul district representing all sub-divisions from where the data were collected on various forms.

The result of survey indicates that Betul district having 10043 sq.km geographical area and 5529 sq.km of non-forest area has 4153003 trees of various species and diameter classes which may yield 3742316 cu.m. of volume which is substantial quantity to meet the requirement of timber and fuel wood for local people.

The data analysis was done at Machine Data Management Unit of Forest Survey of India, Dehradun under the guidance of Shri S.K. Chakrabarti, Dy.Director. The draft report was prepared by Shri M.D.Singh, STA under the guidance of Shri F.S.Jafry, Joint Director and Shri T.S.K.Reddy, Deputy Director, Forest Survey of India, Central Zone, Nagpur. The report was typed by Smt. Gresamma Varghese, Steno. The efforts made in bringing out the report by concerned officials is appreciated.

I trust that the report gives ample details about the trees vegetation existing in non-forest area of Betul district which will be quite useful to the users agencies and the planners.

Dr.J.K.Rawat
Director.

F.S.I.
Dehradun.

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Acknowledgments

On behalf of Forest Survey of India, Central Zone, Nagpur, the undersigned expresses deepest gratitude and sincere thanks to the office bearers of the Village Panchayats and special thanks to the villagers for extending all possible help, co-operation and hospitality to the field staff of this organization, making their stay very comfortable without which the survey work could not be done.

The organization is also thankful to the Collector, Betul and other revenue officials for providing information required for the non-forest inventory work and the valuable co-operation extended to the staff during the field work. The organization expresses its sincere thanks to the Conservator of Forests, Betul Circle, the Deputy Conservator of Forests, Betular Forest Division and their field staff who extended their valuable co-operation to the field parties of this office without which it would not have been possible for us to complete the survey work in the stipulated time.

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CHAPTER I

1.0 INTRODUCTION:

The Forest Survey of India has been basically engaged in conducting surveys in forest areas of the country to assess the land uses and growing stock of forest vegetation existing in such land use classes. It also monitors the state of forests, based on satellite data on 2 years cycle, apart from various other special studies like Wood consumption, vegetation mapping, thematic mapping etc. which are undertaken simaltaneously. Apart from the forest land, the non-forest areas of the country has also substantial quantity of trees and bamboo in farms and open lands in villages, around ponds and tanks, along roads, canals, and railway lines etc. which contribute significantly towards meeting demands of local people for timber and fuel wood for their building construction furniture, agricultural implements and domestic fuel wood etc. Hence it was decided in 1991 by the organisation to undertake inventory of non-forest areas to assess the growing stock of trees and bamboo occurring in different strata of non-forest land such as man made forest under different afforestation programme like social forestry, farm forestry, agro forestry, avenues and canal bank plantation and natural trees growing on open land of villages in the district, for planning a rational strategy for augmenting the local demands of timber and fuel-wood.

The inventory of non-forest area in Betul district was carried out during October, 1992 to February 1993 along with inventory of forest area.

1.1 DESCRIPTION OF THE DISTRICT:

Betul district of Madhya Pradesh falls in Satpura hill ranges extending over 10043 sq.km. of geographical area. The forest alone comprise 4514 sq.km. which is 45% of the total area. The non-forest area covers 5529 sq.km. There are four Tahsils, Bhaisdehi, Betul, Shahpur and Multai in the district and ten Development Blocks. There are in all 1318 villages where non-forest land exists. The district is basically rural base with 81.38% population residing in villages.

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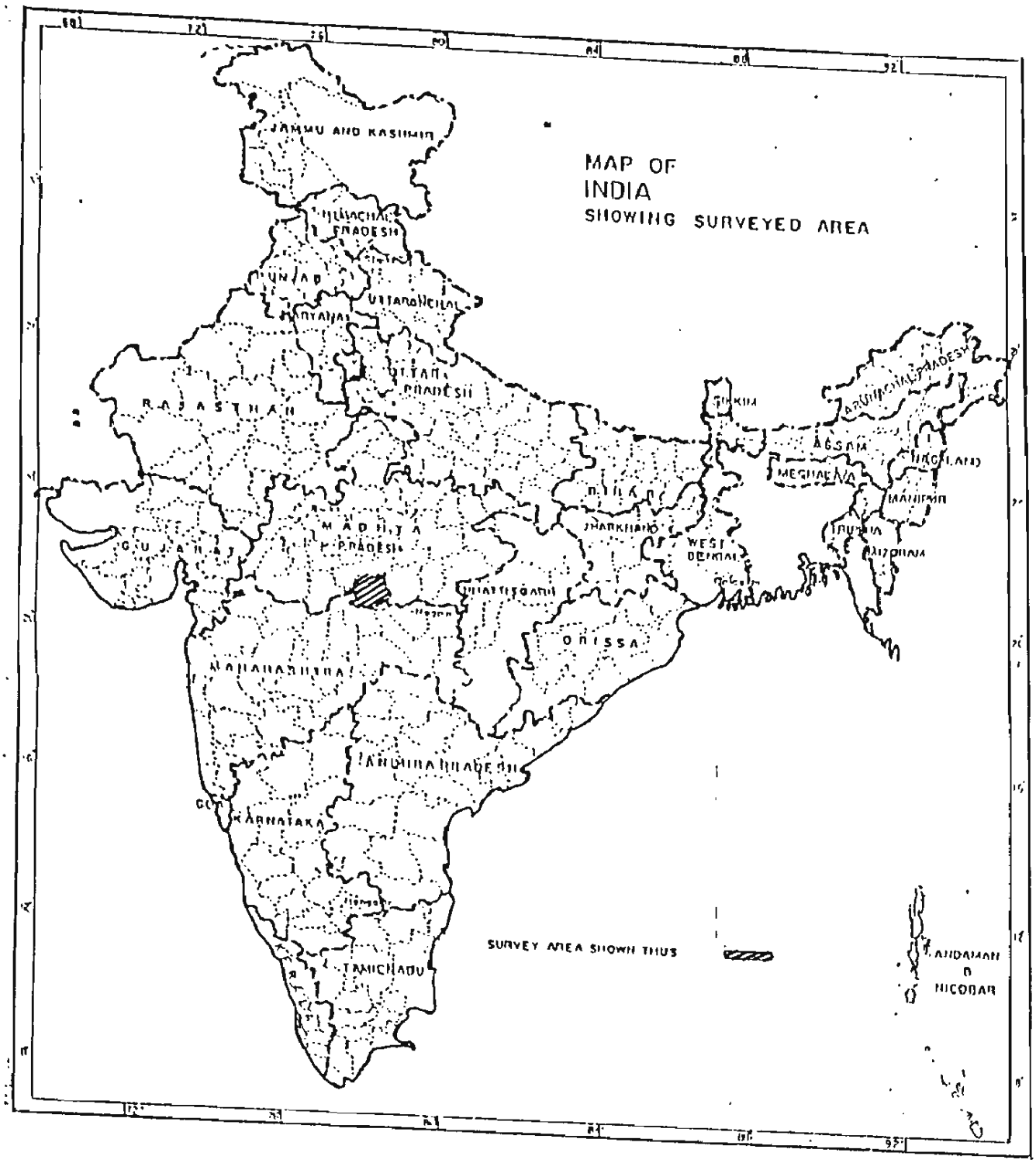
MAP OF
INDIA
SHOWING SURVEYED AREA
JAMMU AND KASHMIR
RAJASTHAN
GUJARAT
MADHYA PRADESH
ORISSA
KARNATAKA
TAMILNADU
SIKKIM
ASSAM
MEGHALAYA
TRIPURA
MIZORAM
SURVEY AREA SHOWN THUS
ANDAMAN & NICOBAR

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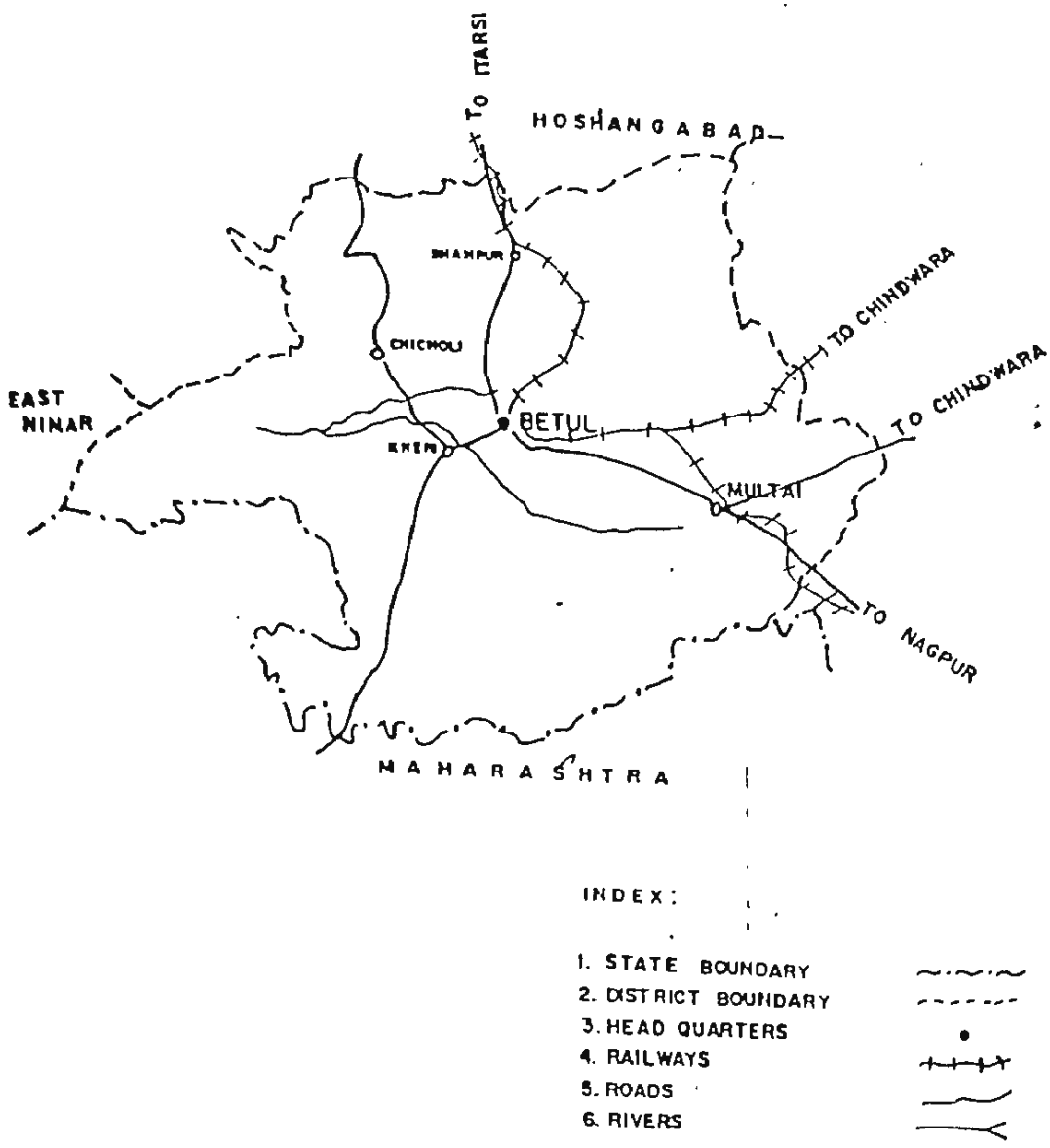
MAP OF BETUL DISTRICT



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1.2 LOCATION:

The district lies in Narmada catchment between 21°-22' and 22° 10' North latitude and between 77° 10' and 78° 30' east longitudes situated in south west of Madhya Pradesh. The district is surrounded by Hoshangabad district to the north, Chhindwara district to the east and Khandwa (East Nimar) district to the west, while southern boundary stretches up to the border of Amravati and Nagpur districts of Maharashtra State. The district is situated at an altitude of 653 meter above mean sea level.

1.3 ADMINISTRATIVE UNITS:

The district administration located at Betul administers and implements government policies and programmes through four Tahsils with Headquarter at Bhaidehi, Betul, Shahpur and Multai. There are following 10 Development Blocks functioning under above four Tahsils for carrying out various development schemes and programmes.

Tahsil	Block	No. of villages	Total
Bhaisdehi	Bhaisdehi Athner Bhimpur	128 96 150	374
Betul	Betul Ghodedonger Chicholi	185 127 78	390
Shahpur	Shahpur	156	156
Multai	Multai Amla Prabhat patnem	135 148 115	395
Total ..4	10		1318

1.4 AREA AND POPULATION:

The geographical area of the district is 10043 km^2 out of a total of 443446 km^2 of Madhya Pradesh. The forests occupy 4514 km^2 (45%) and 5529 km^2 (55%) of non-forest land including urban land. As per 1991 Census, the population of the district is 1181501 with a population density of 118 per km^2. The district has a very strong rural base with a majority of population i.e.

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81.38% residing in villages while 18.62% are urban based. Out of the total population about 10.78% belong to Scheduled caste whereas 37.50% constitute scheduled tribes. Literacy in the district is only 36.34% of the population.

1.5 TOPOGRAPHY:

The tract is undulating to hilly confined to Satpura hill ranges which traverses through the district. Flat topped hills present an unique feature of the tract. The altitude varies between 353.3 meter to 1108 meters above mean sea level. Tapti river flows through south western part of the district forming an important watershed while the Northern terrain is drained by innumerable tributories culminating into Narmada river.

1.6 CLIMATE AND RAINFALL:

The climate of the district is very pleasant between November to March while hot summer prevails between April to June and Monsoon is spread over July - October. Mean annual rainfall of the district is 1172 mm received mostly through south-west monsoon. Mean maximum temperature recorded is 32°C. Mean minimum temperature being 18°C whereas relative humidity obtained is around 57.6%. Rainy season experiences heavy dew while frost is common during winter in valleys of main rivers and tributories as well as in depressions yet no appreciable damage to the vegetation was noticed.

1.7 SOCIO-ECONOMIC CONDITIONS:

Agriculture and Forests play a major role in village economy. The conventional agriculture is in vogue on small holdings. As per 1991 census about 23.83% of the population depend upon agriculture while 10.14% of the population are engaged as agricultural labourer and a small number of 1.39% are on various types of family trade. About 6.62% are other working class, 4.67% are marginal workers whereas a sizeable mass of 53.34% are non working class. A majority of people depend upon Nistar from forest land for energy needs, small timber for construction purposes, agricultural implements, fencing, bullock carts, bamboos for fencing and

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basket making. Besides this privileges, the villagers also collect minor forest produce like Mahuwa flowers, Achar seeds and leaves, Harra, Aonla, Bahcda, Karanj, Tendu leaves, gums and barks of various trees and also grasses etc. A sizeable population also earn their bread from various forestry operations such as felling of trees, logging, villeting of firewood, stacking, transportation of forest produce, extraction of bamboos, construction of forest roads, plantation works, fire protection, Wild life management and other seasonal forestry works.

1.8 LIVESTOCK POPULATION:

Although the livestock population in the district is fairly large, the rearing of cattle is not aimed at milk production as the animal are of inferior breed, mainly multiplied for ploughing and carting purpose. Almost the entire cattle population thrives on forests. The detail of live stock population as per 1992 Census is as follows:

1	Cows including bullock	557687
2	Buffaloes	108056
3	Sheep	7084
4	Goats	133848
5	Horses	2634
6	Donkeys	951
7	Camal	1
8	Pigs	6171
9	Hens	158882
10	Ducks	590
	Total	975904

1.9 LANDUSE PATTERN:

Out of 10043 sq.km. geographical areas the forests in the district occupy 4514 sq.km. reckoning to about 45%. The balance 5529 sq.km. are non-forest land out of which 716.23

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sq.km. land is not available for agriculture, being put to other uses and fallows. 265.34 sq.km. is uncultivable and grass land while rest of the land is used for cultivation.

1.10 AGRO-ECOLOGICAL ZONE:

A major portion of the Betul district is in the Agro-ecological region no. 10, while a small portion bordering East Nimar at Dhanjipur and at Dhar adjoining Paratwada of Maharashtra fall in the region no. 6 as per Map prepared by National Bureau of Soil survey and Land use planning of ICAR Nagpur. However as per State classification of agro-climatic zone, the district is classified under plateau of Satpuda. Important Kharif crops raised are Rice, Jawar, Soyabean, Maize, Bazra, Millets under rainfed condition while Pigeon pea, gram, Mung, Arhar, Wheat, Uded are raised in winter. Amongst oil crops, Til, Ground nut, Cotton, Mustard, Alsi and Soyabean are important. Besides these main crops, variety of vegetables are grown during winter. The soils are generally alluvial red murram and clayey. The clayey soils pose difficulty in cultivation following prolonged dry spell and soil loss in monsoon due to heavy run off of the surface soil.

1.11 USES OF VILLAGE FOREST:

The trees occurring in village forest provide mainly timber, fuel, fodder, fruits, shed and minor produces. Timber is obtained mainly from Teak and other species. The other species are such as Siras, Sissoo, and Shivan are used for timber work where as rest species like Babul, Khair, Maharukh, Tendu, Eucalyptus, Jamun and Arjun are used as fuel wood. Mango and Mahua are not generally exploited being fruit/flower producing trees.

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CHAPTER II

2.1 DESIGN AND METHODOLOGY

In order to decide the Sample size i.e. no. of sample villages to be taken for non forest inventory, a pilot survey was conducted in the State taking 19 villages giving representation to each agro-climatic zone. There are 45 districts in Madhya Pradesh comprising twelve agro-climatic zones. The forest and non-forest area of the State are 155414 and 288032 km^2 respectively. The total inhabited villages in the state are 76468 (1991 census). On the basis of pilot survey 199 sample villages were determined and distributed among the various districts of Madhya Pradesh according to their geographical area. For Betul District four sample villages were to be surveyed.

2.2 SELECTION OF SAMPLE VILLAGES:

As indicated above only four sample villages were required for non forest inventory in Betul district. The list of villages were obtained from district Panchayat office, Betul. The villages were numbered and four sample villages were selected randomly, using random number table, which are mentioned below:

Tahsil	No. of villages	Sample village selected	Geo.area in sq.km. of sample village	Location	
				Grid	Mapsheet
Bhaisdehi	374	Goinda	3.67	502	55 G/14
Betul	390	Khedsavligarh	7.24	201	55 G/13
Shahpur	156	Bhankakhadri	6.18		55 K/16
Multai	395	Taranwada	4.5	403	55 K/1
Total	1315		21.59		

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2.3 DEFINITION OF NON FOREST AREA:

For the purpose of this survey:

(1) All those areas were taken which were outside the traditional Reserved Forests, Protected Forests or Un-classed forest boundaries.

(2) All those areas which satisfy the following conditions were excluded:

a. All places within the Municipality, Corporation, Cantonment Board or a notified area Committee etc.

b. All other places which satisfy the following criteria:

i. A minimum population of 5000

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.

2.4 FIELD METHODOLOGY:

The selected sample villages were allotted to four crews each consisting of one JTA, one Dy.Ranger, two Field Man one Khalasi and two local unskilled labourer to assist the crews. The sample villages were marked on topo-sheets also to facilitate approach and location of villages by shortest convenient route. On reaching sample village the next job of the crew was to determine the boundary of village. For this purpose they take help of revenue maps provided by the Revenue Department and the local people.

The sampling unit was the village. To begin with the data collection it was necessary to select the starting/reference point preferably some important permanent feature like well/ temple/ School etc. It need not necessarily be a geometrical center of the village. The reference point was described in the Village Description Form. This is important to facilitate cross checking of work by the check crew or Supervising Officer.

After fixing the reference point, the enumeration work was started from reference point by dividing the entire village into suitable sized wedge with the help of compass in such a way that enumeration with each wedge could be completed easily without missing any tree/bamboo clump. The enumeration of all trees having diam 10 cm and above with all bamboo clumps were carried out and recorded in the enumeration forms beginning from North direction and proceeding clockwise. This procedure is important to avoid duplication/Omission of trees/ bamboo clumps. All enumerated trees/bamboo clumps were marked with chalk stick to check any omission/duplication of work.

The data were collected on following field forms.

(1) Village Description Form:

- The information regarding the location of village, description of reference point, various measurements taken by field staff, date of survey and abstract of enumeration by wedge is collected on this form. Sample is annexed with the report.

(2) District Tree Form:

This form is filled in for each sample village. The information like State, district, total no. of villages in the district, no. of sample villages in the district, area of sample village, category of village is collected together with the abstract of enumeration by various categories. The sample is annexed on the report.

(3) Village Tree Enumeration Form:

All the trees having dbh 10 cm and above occurring in non-forest area of the sample villages were enumerated in this form.

(4) Village Bamboo Enumeration Form:

The enumeration of bamboo clump occurring in non forest area of sample village was done in this form by recording its diameter at base of the clump. The sample is annexed in the report.

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(5) Village Sample Bamboo Enumeration and clump Analysis Form:

The enumerated clumps bearing S.No. 1,9,17,25..... (1st clump and every 8th clump there after) of each species occurring in sample village will be analyzed in detail and recorded in this report.

(6) Village Bamboo Weight Form:

The length and weight of two Green representative bamboo for each species is recorded in this form. The sample is annexed in the report.

While carrying out the survey, the trees were enumerated by its category. The category of each tree was indicated in the form against the enumerated trees. For this purpose the following categories of trees were identified:

(1) Farm Forestry: Trees along the farm bunds and in small patches up to 0.1 ha in area.
(2) Road side Plantation: Trees planted along road side.
(3) Village wood lot: Naturally growing trees on community/private land.
(4) Block Plantation: Plantation patches covering an area of more than 0.1 ha and not falling in any of above categories.
(5) Ponds : Trees planted in and around ponds
(6) Railway Lines : Trees planted along railway lines
(7) Canals: Trees planted along canals.
(8) Rest : Trees not falling in any of the above categories.

2.5 DATA COLLECTION FROM SAMPLE VILLAGES:

The selected sample villages were allotted to field parties who had collected data from these villages on various field forms designed for the purpose as explained in above paragraphs. The field forms were checked in zonal office and sent to Data Processing Unit of Headquarter, Dehradun (FSI) where the data was processed and various stand and stock tables were prepared. The abstract of data collected from 4 sample villages of Betul district is mentioned below:

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S.No.	Name of sample villages selected	Area in sq.km	Total trees enumerated	Total Bamboo clump enumerated
1	Goinda	3.67	1531	5
2	Khedisarlingarh	7.24	2447	43
3	Bankakhedri	6.18	6893	38
4	Taranwada	4.5	5146	73
		21.59	16217	159

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CHAPTER III

DATA PROCESSING

3.1 PROCESSING OF DATA:

After completion of field work, the field forms of the sample villages were consolidated and checked for inconsistencies and coding mistakes (if any). The data from each village was entered in personal computer and the distribution of trees in each diameter class for each category of tree was obtained species wise. For this purpose, the software package D base IV was used. Data was analysed by using ratio method of estimation to arrive at final estimate.

Since many of the species in the district occurred in small numbers, they were clubbed together under Miscellaneous species. For Betul district of Madhya Pradesh, 14 main species were selected for calculating the number of stems, on the basis of their numerical occurrence, commercial importance and regional importance.

3.2 AREA COMPUTATION:

Non-forest area of the district was calculated by subtracting forest area from the total geographical area of the district which comes to 5529 km^2.

3.3 VOLUME ESTIMATION:

To estimate the volume of trees in NFA, the local volume table was prepared by using the local volume equations developed during the forest inventory of the district.

3.4 ESTIMATION PROCEDURE:

The estimation procedure is given below :

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Let x_i = area of the ith village

y_i = Volume/no. of trees for the ith village

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

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

$= \sum_{1}^{n} \frac{x_i}{n}$ = average area per village in the sample

$\overline{X} = \sum_{1}^{N} \frac{X_i}{N}$ = average area per village in the population (district/State)

$\overline{y} = \sum_{1}^{n} \frac{y_i}{n}$ = average volume/no. of trees in sample

$\overline{Y} = \sum_{1}^{N} \frac{Y_i}{N}$ = average volume/ no. of trees in population district/State

$A = \sum_{1}^{N} X_i$ = Total area of all villages in the population district/State

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A = $\sum_{1}^{N} X_i$ = Total area of all villages in the population district/State

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

$$\hat{R} = \frac{\overline{Y}}{\overline{X}}$$

The estimate of R is sample ratio

$$\hat{R} = \frac{\sum_{1}^{n} y_i}{\sum_{1}^{n} x_i} = \frac{\overline{y}}{\overline{x}}$$

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

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

Estimated variance of R is given by

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

When N is large then

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$$V(\hat{R}) = \frac{1}{n(n-1)\bar{x}^2}\left[\sum_1^n y_i^2 - 2\hat{R}\sum_1^n y_i x_i + \hat{R}^2\sum_1^n x_i^2\right]$$

Estimated variance of T is given by $\hat{V}(\hat{T}) = A^2 \times \hat{V}(\hat{R})$

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

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

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CHAPTER IV

STAND AND STOCK ESTIMATION

4.1 GROWING STAND ESTIMATION:

On the basis of data collected from 4 sample villages having 21.59 sq.km. (2159 ha) of geographical area the estimation of total growing stand (stems) has been made for the entire non-forest area (5529 sq.km) of the district. The total stems and stem/ha for all categories combined together has been produced in 4.1T1 and that for all categories, it is shown in table No. 4.1T2 annexed with the report. The growing stand has been estimated for 14 important species which have contributed significantly towards stand and stock and the rest having small contribution have been merged together and classified Miscellaneous species. The abstract of growing stand based on estimation is produced below:

S.No.	Category	Total no. of trees	Percentage
1	Farm Forestry	1629754	39.25
2	Road side plantation	107301	2.58
3	Village Wood lot	2140657	51.55
4	Block Plantation	151346	3.64
5	Ponds	1792	0.04
6	Rest	122153	2.94
	Total	4153003	100

In all 41.53 lakh trees of different species and diam class are existing in all over Betul district in its non-forest area out of which about 51.55% exist in village wood lot. Farm forestry trees contribute significantly is about 39.25% in total stand of district in non-forest area.

4.2 GROWING STOCK ESTIMATION:

The growing stock of trees in non-forest area has been estimated by using local volume table which was prepared by applying local volume equations generated during Forest inventory of Betul and neighbouring districts of Madhya Pradesh. Because there was no local volume table available with the forest department or with Forest Survey of India. Table No. 4.2T1 gives

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volume and vol/ha of trees of all categories combined together and table No. 4.2T2 gives total volume by species and categories which are annexed with the report. The abstract of growing stock estimated in Betul district is produced below.

S.No.	Category	Total no. of trees	Total volume in cu.m.	Voume per ha	Percentage
1	Farm Forestry	1,629,754	1,552,504.00	2.81	41.49
2	Road side plantation	107,301	216,730.60	0.39	5.79
3	Village Wood lot	2,140,657	1,602,307.00	2.89	42.82
4	Block Plantation	151,346	245,097.80	0.44	6.55
5	Ponds	1,792	3,002.63	0.01	0.08
6	Rest	122,153	122,674.00	0.22	3.25
	Total	4,153,003	3,742,316.03	6.77	100.00

4.3 CONCLUSION:

The result of survey of non-forest area of Betul district indicates that there is substantial amount of tree growth in non-forest area which support the needs of local people in meeting their demand of timber and fuel wood. Their dependence on government forest is minimised to a great extent specially under situation where forest wealth is depleting day-by-day due to rise in population and increase of demand of forest produce. The growing stock of non-forest area plays a very important role in fulfilling the demand of timber and fuel wood of local villages to a great extent.

Apart from meeting the need or their own requirement of timber and fuel wood the villagers get some income also by selling trees, timber and fuel wood to other consumers by brining their produce to the nearest township and to other villages who are not in position to plant sufficient trees in their farms for their use. So the village forest helps the villagers in improving their socio-economic condition to some extent. There is urgent need to encourage the villagers to grow more and more trees in the village to reduce their dependency in government forests.

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Table No.4.1T1

DISTRIBUTION OF ESTIMATED TREES IN NON FOREST AREA OF BETUL DISTRICT OF MADHYA PRADESH

AREA OF DISTRICT: 552900 ha AREA OF VILLAGES SURVEYED: 2159ha
ALL CATEGORY COMBINED (SPECIES WISE & DIA CLASS WISE)

SL. NO.	NAME OF SPECIES	DIAMETER CLASSES							TOTAL	% 0F TREES	STEM / HA.
		10-20	20-30	30-40	40-50	50-60	60-70	70 +			
1	Acacia arabica	47376	29450	24072	16133	1280	512	1280	120103	2.89	0.217
2	Acacia catechu	8195	2561	768	512	0	0	256	12292	0.3	0.022
3	Ailanthus escelsa	2816	2560	768	0	768	256	512	7680	0.18	0.014
4	Albizzia lebbeck	1793	2561	1024	512	0	0	0	5890	0.14	0.011
5	Bombex ceiba	8450	3329	1536	768	1280	512	1280	17155	0.41	0.031
6	Dalbergia sissoo	1024	1280	0	0	0	0	0	2304	0.06	0.004
7	Diospyros melanoxylon	13317	4097	2048	1792	256	512	256	22278	0.54	0.04
8	Eucalyptus spp.	7171	3329	4097	1280	768	0	256	16901	0.41	0.031
9	Gmelina arboria	33548	24329	19462	11780	3329	512	2049	95009	2.29	0.172
10	Madhuca latifolia	22536	17159	23560	21767	17414	16133	34573	153142	3.69	0.277
11	Mangifera indica	148789	111400	88351	68632	29194	40462	125740	612568	14.75	1.108
12	Syzygium cumini	68376	52754	33803	15622	4866	1280	2048	178749	4.3	0.323
13	Tectona grandis	428696	301418	166715	41231	3585	1024	1536	944205	22.74	1.708
14	Terminalia arjuna	13060	15877	13061	9219	6659	3329	7939	69144	1.66	0.125
15	Rest of spp.	865330	442269	265054	148021	56339	41487	77083	1895583	45.64	3.428
TOTAL		1670477	1014373	644319	337269	125738	106019	254808	**4153003**	**100**	**7.511**
% OF TREES		40.22	24.43	15.51	8.12	3.03	2.55	6.14	**100**		
STEM/HA		3.021	1.835	1.165	0.61	0.227	0.192	0.461	**7.511**		

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Table 4.1 T2

DISTRIBUTION OF ESTIMATED TREES IN NON FOREST AREA OF BETUL DISTRICT OF MADHYA PRADESH

AREA OF DISTRICT: 552900 ha AREA OF VILLAGES SURVEYED: 2159ha

ALL DIA CLASS COMBINED (CATEGORY WISE & SPECIES WISE)

SL. NO.	NAME OF SPECIES	CATEGORY CLASSES							% 0F TREES	STEM / HA.
		I	II	III	IV	V	VIII	TOTAL		
1	Acacia arabica	22535	1024	96032	0	0	512	120103	2.89	0.217
2	Acacia catechu	3073	0	9219	0	0	0	12292	0.3	0.022
3	Ailanthus escelsa	2304	256	3584	1024	0	512	7680	0.18	0.014
4	Albizzia lebbeck	3585	0	2305	0	0	0	5890	0.14	0.011
5	Bombex ceiba	3328	768	13059	0	0	0	17155	0.41	0.031
6	Dalbergia sissoo	768	0	1024	256	0	256	2304	0.06	0.004
7	Diospyros melanoxylon	5121	256	16645	256	0	0	22278	0.54	0.04
8	Eucalyptus spp.	9988	1280	2560	256	0	2817	16901	0.41	0.031
9	Gmelina arboria	68120	3329	23304	256	0	0	95009	2.29	0.172
10	Madhuca latifolia	99108	1536	42768	8706	256	768	153142	3.69	0.277
11	Mangifera indica	454047	56341	46353	50962	0	4865	612568	14.75	1.108
12	Syzygium cumini	87582	8194	58133	1536	0	23304	178749	4.3	0.323
13	Tectona grandis	196677	3329	692982	48656	0	2561	944205	22.74	1.708
14	Terminalia arjuna	2304	0	54548	512	0	11780	69144	1.66	0.125
15	Rest of spp.	671214	30988	1078141	38926	1536	74778	1895583	45.64	3.428
TOTAL		1629754	107301	2140657	151346	1792	122153	**4153003**	**100**	**7.511**
% OF TREES		39.24	2.58	51.54	3.64	0.04	2.94	**100**		
STEM/HA		2.948	0.194	3.872	0	0.003	0.221	**7.511**		

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Table 4.2 T1

ESTIMATED VOLUME OF TREES IN THE NON FOREST AREA SURVEY OF BETUL DISTRICT OF MADHYA PRADESH

AREA OF DISTRICT: 552900 ha AREA OF VILLAGES SURVEYED: 2159ha
ALL CATEGORY COMBINED (SPECIES WISE & DIA CLASS WISE)

SL. NO.	NAME OF SPECIES	DIAMETER CLASSES							TOTAL	% 0F VOL.	VOL/ HA.
		10-20	20-30	30-40	40-50	50-60	60-70	70 +			
1	Acacia arabica	5116.62	11927.25	21737.02	25619.2	3129.6	1771.52	5912.32	75213.53	2.00	0,136
2	Acacia catechu	770.33	796.47	516.87	604.16	0	0	914.94	3602.77	0.1	0.007
3	Ailanthus escelsa	270.33	1054.72	790.27	0	2429.95	1198.85	3329.54	9073.66	0.24	0.016
4	Albizzia lebbeck	184.68	1388.06	1005.57	727.55	0	0	0	3305.86	0.09	0.006
5	Bombex ceiba	811.2	1371.55	1580.54	1494.53	4049.92	2397.7	8323.84	20029.28	0.54	0.036
6	Dalbergia sissoo	129.02	660.49	0	0	0	0	0	789.51	0.02	0.001
7	Diospyros melanoxylon	1677.95	1835.46	2080.77	3277.57	739.58	2147.33	1470.72	13229.38	0.35	0.024
8	Eucalyptus spp.	817.49	1281.67	3355.44	1397.76	1078.27	0	519.17	8449.8	0.23	0.015
9	Gmelina arboria	3556.09	13332.29	19267.38	19637.26	7020.86	1592.84	9464.33	73871.05	1.97	0.134
10	Madhuca latifolia	2298.67	9162.91	22782.52	34565.99	44458	55674.98	175008.52	343951.54	9.19	0.622
11	Mangifera indica	15176.48	59487.59	85435.42	108987.61	74532.3	139634.4	636495.88	1119749.63	29.92	2.025
12	Syzygium cumini	7452.99	28434.41	32755.1	25292.02	12126.1	4774.4	12726.28	123561.27	3.3	0.223
13	Tectona grandis	59588.74	138953.7	160879.98	67907.45	8991.18	3631.11	7312.89	447265.05	11.95	0.809
14	Terminalia arjuna	1423.53	8557.7	12656.1	14925.56	16594.2	12417.17	49332.95	115907.24	3.1	0.21
15	Rest of spp.	93455.64	179119	239343.77	235057.36	137749	143545	356046.39	1384316	36.99	2.504
TOTAL		192729.8	457363.2	604186.75	539494.02	312899	368785.3	1266857.77	**3742315.57**	**100**	**6.769**
% OF VOL.		5.15	12.22	16.14	14.42	8.36	9.86	33.85	**100**		
VOL/HA		0.349	0.827	1.093	0.976	0.566	0.667	2.291	**6.769**		

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Table 4.2 T2

ESTIMATED VOLUME OF TREES IN THE NON FOREST AREA SURVEY OF BETUL DISTRICT OF MADHYA PRADESH

AREA OF DISTRICT: 552900 ha AREA OF VILLAGES SURVEYED: 2159ha
ALL DIA CLASS COMBINED (CATEGORY WISE & SPECIES WISE)

SL. NO.	NAME OF SPECIES	CATEGORY CLASSES							% 0F VOL.	VOL/ HA.
		I	II	III	IV	V	VIII	TOTAL		
1	Acacia arabica	8867.43	390.15	65521.77	0	0	434.18	75213.53	2.01	0.136
2	Acacia catechu	1439.07	0	2163.7	0	0	0	3602.77	0.1	0.007
3	Ailanthus escelsa	1249.28	105.47	7089.93	260.09	0	368.89	9073.66	0.24	0.016
4	Albizzia lebbeck	2618.66	0	687.2	0	0	0	3305.86	0.09	0.006
5	Bombex ceiba	2922.49	312.57	16794.22	0	0	0	20029.28	0.54	0.036
6	Dalbergia sissoo	196.61	0	328.7	132.1	0	132.1	789.51	0.02	0.001
7	Diospyros melanoxylon	7194.76	32.26	5262.78	739.58	0	0	13229.38	0.35	0.024
8	Eucalyptus spp.	4790.18	1007.61	1663.23	209.66	0	779.12	8449.8	0.23	0.015
9	Gmelina arboria	57501.19	918.64	15424.08	27.14	0	0	73871.05	1.97	0.134
10	Madhuca latifolia	193537.9	4217.86	111406.27	33861.77	247.55	680.19	343951.54	9.19	0.622
11	Mangifera indica	703744.8	165345	93688.41	147200.34	0	9771.1	1119749.63	29.92	2.025
12	Syzygium cumini	62330.21	3263.7	45128.95	717.82	0	12120.59	123561.27	3.3	0.223
13	Tectona grandis	93976.42	4572.27	318796.1	29105.53	0	814.73	447265.05	11.95	0.809
14	Terminalia arjuna	1078.01	0	87884.5	165.88	0	26778.85	115907.24	3.1	0.21
15	Rest of spp.	411057.1	36565.03	830467.12	32677.88	2755.08	70793.83	1384316	36.98	2.504
TOTAL		1552504	216730.6	1602307	245097.79	3002.63	122673.6	**3742315.57**	**100**	**6.769**
% OF VOL.		41.48	5.79	42.82	6.55	0.08	3.28	**100**		
VOL/HA		2.808	0.392	2.898	0.443	0.005	0.222	**6.769**		

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Table No. 3.3 T

LOCAL VOLUME TABLE OF BETUL DISTRICT OF MADHYA PRADESH

SL. NO.	NAME OF SPECIES	0.387298	0.5	0.591608	0.67082	0.74162	0.806226	0.866025
		DIAMETER CLASSES						
		10-20	20-30	30-40	40-50	50-60	60-70	70 +
		0.15	0.25	0.35	0.45	0.55	0.65	0.75
1	Acacia arabica	0.108	0.405	0.903	1.588	2.445	3.46	4.619
2	Acacia catechu	0.094	0.311	0.673	1.180	1.833	2.631	3.574
3	Ailanthus escelsa	0.096	0.412	1.029	1.946	3.164	4.683	6.503
4	Albizzia lebbeck	0.103	0.542	0.982	1.421	2.380	3.530	5.060
5	Bombex ceiba	0.096	0.412	1.029	1.946	3.164	4.683	6.503
6	Dalbergia sissoo	0.126	0.516	0.910	1.570	2.450	3.340	4.621
7	Diospyros melanoxylon	0.126	0.448	1.016	1.829	2.889	4.194	5.745
8	Eucalyptus spp.	0.114	0.385	0.819	1.092	1.404	1.720	2.028
9	Gmelina arboria	0.106	0.548	0.990	1.667	2.109	3.111	4.619
10	Madhuca latifolia	0.102	0.534	0.967	1.588	2.553	3.451	5.062
11	Mangifera indica	0.102	0.534	0.967	1.588	2.553	3.451	5.062
12	Syzygium cumini	0.109	0.539	0.969	1.619	2.492	3.730	6.214
13	Tectona grandis	0.139	0.461	0.965	1.647	2.508	3.546	4.761
14	Terminalia arjuna	0.109	0.539	0.969	1.619	2.492	3.730	6.214
15	Rest of spp.	0.108	0.405	0.903	1.588	2.445	3.46	4.619

Contents

VILLAGE DESCRIPTION FORM

1 State

2 District

3 Mapsheet No

4 Sample village

5 Area of the sample village (in ha.)

6 Crew Leader (name)

7 Date of commencement of survey

8 Date of completion of survey

9 Conspicuous feature selected as the centre for starting the

10 Description of the centre and approach to this

11 Number of angular quadrabts forned in the sample village

12 Compassing done by

13 Tree enumeration done by

14 Height measurements taken by

15 Quadrantwise summary of enumerations

Quadrant No.	Date of survey	No. of trees enumerated
1		
2		
3		
4		
Total		

Date

Signature of crew leader

Rough diagram of sample village

Contents

FORM NO.1

Date collection on village forest (outside green wash area)

Mapsheet No.
Name of vi Tahsil District

Range Forest Division Circle

1 Reference point for
Village
(mention distancde from nearest Railway station/bus statian etc.

2 Area planted by social forestryh/individuals, Department etc.
- a. Village wood lot
- b. Rehabitation of Degraded forest
- c. Rural fuel wood
- d. Any other schemes
- e.Any other Vanmahotsava etc.

3 Category of the village

4 Land use

Area unde ha.

1. Habitation l.e School, collages, Hospital, Play ground Samshan etc.
2. Cultivaiton
   - A. Irrigated
   - B. Non-irrigated
3. Follow lands including pasture lands, waste lands,water body ravines etc.
4. Strips.
   - A.Road (mention National, state, other
   - B Railway
   - C.Canal
   - D. Others

Total Area

Signatrure .....
Name.....
Designation
Date:

Contents

DISTRICT TREE FORM

Job No.	Card desigh number	State	District	No of Village in the district	No. of Sample village in the district	Geographical area of the district(Ha)	Sample Vilage	Geo. Area of the sample village (ha)	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 he plantation/tract.

Farm forestry	Road side platation	Village wood lots	Block platation	Ponds	Railway line platationCanals	Canals	Rest	Total
33-36	37-40	41-44	45-48	49-52	53-56	57-60	61-64	65-70

Page No.....
Total No. of Pages.....

Signature of the crew leader.....
Name of the crew leader.....

Contents

Village sample Bamboo Enumeration and clump Analysis Form.

Job No	Card Design	District	Sample Village	Area of Sample Village(Ha)
1-'3	4-'5	6-'7	8-'12	13-'16

Average culm height (in Culm)		Bamboo Quality
Upto 1 cm top	upto 2 cms top	
72-74	75-77	78

Species	Species code	Clump serial	Clump diameter(in cms)	Clump size class	Green Sound clums							Green damaged clums							Dry Sound clums			Dry Damaged culms			Decayed culms	Total No. of Culms
					Current year	one to two seasons old			over two seasons old			Current year	one to two seasons old			over two seasons old										
						2<5 cms	5<8 cms	8+ cms	2<5 cms	5<8 cms	8+ cms		2<5 cms	5<8 cms	8+ cms	2<5 cms	5<8 cms	8+ cms	2<5 cms	5<8 cms	8+ cms	2<5 cms	5<8 cms	8+ cms		
																								–	–	

Date.....

Signature of the crew leader.....
Name of the crew leader.....

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TREE ENUMERATION FORM (VILLAGE FOREST SURVEY)

Job No	Card Design	State	District	Sample Village	Geo. Area of the Sample Village
1-'3	4-'6	7-'8	9-'10	11-'15	16-'19

Name of the Village:

Map Sheet No.:

Total No. of Trees
42-47

S.No	Species		DBH-OB(cms)	Tree Height(m)	Age (years)	Category	S.No	Species		DBH-OB(cms)	Tree Height(m)	Age (years)	Category
	Name	Code						Name	Code				

Page No.....
Total No of Pages.....

Signature of the crew leader.....
Name of the crew leader.....

Date.....

*Mention area in the case of Farm Forestry, Block Plantation & Village Woodlots (patches only)

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